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(54) **DOUBLE FACED WEFT KNITTED FABRIC SUITABLE FOR A VAMP**

(57) A double faced weft knitted fabric 900 for a vamp is provided in the present invention. The double faced weft knitted fabric for a vamp includes a puffy layer 100 and a knit layer 300. The puffy layer 100 is composed of a first wire 110 which is wider than 900 Denier. The knit layer 300 includes a first knit layer 310 and a second knit layer 320 disposed on the opposite sides of the puffy layer 100. A flat area 400 and a convex area 600 are respectively defined on the knit layer 300, wherein the flat area 400 surrounds the convex area 600.

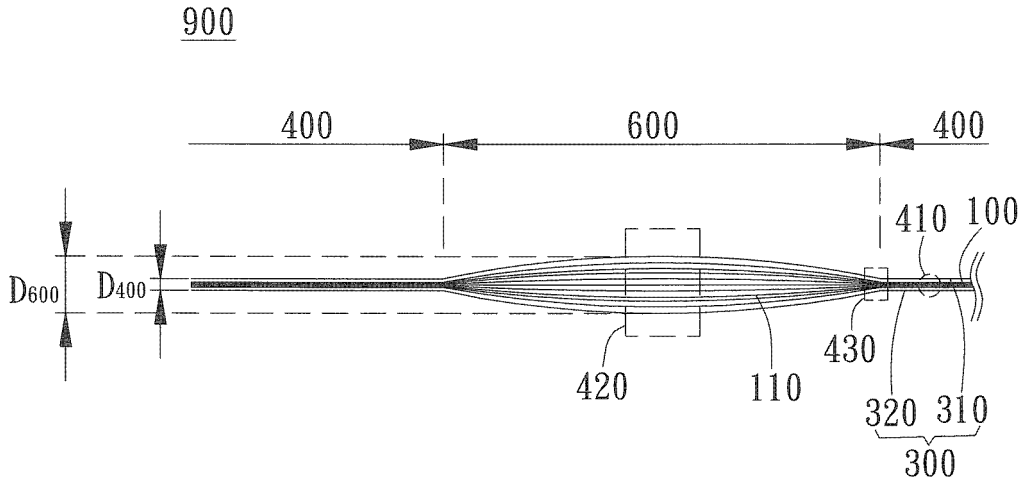


FIG. 1A

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] This invention generally relates to a stereoscopic weft knitted fabric for vamp. More particularly, this invention relates to a knitted fabric for vamp having stereoscopic patterns.

2. Description of the Prior Art

[0002] In general, a shoe includes a vamp, a tongue, and a sole. Besides covering the foot to prevent the foot from an injury caused by the friction between the foot and an object, the vamp also serves the purposes of helping the user to distinguish one's own shoes and enhancing the aesthetics of the shoe.

[0003] As to the function of covering the foot to prevent the foot from an injury caused by the friction between the foot and an object, the conventional approach is to increase the thickness of the vamp, which increases the weight of the shoes and is unfavorable to the lightening of the shoes. Another approach is to use a foamed material as the vamp. However, the foamed material is unfavorable for eliminating moisture and heat due to its poor air permeability. The problem with eliminating moisture and heat would be solved by using a knitted fabric having both stereoscopic patterns and better air permeability as the vamp.

[0004] As to the function of helping the user to distinguish one's own shoes and enhancing the aesthetics of the shoe, the use of stereoscopic knitted fabric as vamp can significantly increase the design flexibility of the outward appearance of the shoe, and further enhance the distinguishability and aesthetics of the shoes.

SUMMARY OF THE INVENTION

[0005] It is an object of the present invention to provide a stereoscopic weft knitted fabric for vamp.

[0006] The stereoscopic weft knitted fabric for vamp includes a puffy layer and a knit layer. The puffy layer is composed of a first wire which is wider than 900 Denier. The knit layer includes a first knit layer and a second knit layer disposed respectively on the opposite sides of the puffy layer. A flat area and a stereoscopic area are respectively defined on the knit layer, wherein the flat area surrounds the stereoscopic area.

[0007] In one embodiment of the present invention, the puffy layer is composed of the first wire disposed as multiple stacks.

[0008] In one embodiment of the present invention, the puffy layer is composed of the first wire disposed as single layer.

[0009] In one embodiment of the present invention, wherein the stereoscopic weft knitted fabric for vamp is weaved by a knitting machine having the number of needle in the range between 12 and 14.

[0010] In one embodiment of the present invention, the first knit layer and the second knit layer pass respectively through the puffy layer and interweave in the flat area to limit the gap between the first knit layer and the second knit layer in the flat area.

[0011] In one embodiment of the present invention, at least one of the first knit layer and the second knit layer includes thermoplastic material, wherein the first knit layer and the second knit layer approach each other in the flat area and are pressed against the puffy layer to be thermo-molded.

[0012] In one embodiment of the present invention, the first wire includes insulated conducting wires.

[0013] In one embodiment of the present invention, the first wire includes optical fibers.

[0014] In one embodiment of the present invention, the first knit layer of the knit layer protrudes outward in the stereoscopic area, wherein the second knit layer stays flat.

[0015] In one embodiment of the present invention, the stereoscopic weft knitted fabric for vamp includes a first knit layer, a puffy layer, and a second knit layer. The puffy layer is disposed on one side of the first knit layer, wherein the puffy layer is composed of a first wire having linear density larger than 900 Denier. The second knit layer is disposed on the other side of the puffy layer with respect to the first knit layer. The first knit layer and the second knit layer surround and grip together the puffy layer to make respectively the gripped portion and the ungripped portion of the puffy layer flat and puffy.

[0016] In one embodiment of the present invention, the stereoscopic weft knitted fabric for vamp is weaved by a knitting machine having the number of needle in the range between 12 and 14.

[0017] In one embodiment of the present invention, the first knit layer and the second knit layer pass respectively through the puffy layer and interweave in the gripped portion of the puffy layer to limit the gap between the first knit layer and the second knit layer in the gripped portion of the puffy layer.

[0018] In one embodiment of the present invention, at least one of the first knit layer and the second knit layer includes thermoplastic material, wherein the first knit layer and the second knit layer approach each other in the gripped portion of the puffy layer and are pressed against the puffy layer to be thermo-molded.

[0019] In one embodiment of the present invention, the first knit layer of the knit layer protrudes outward in the ungripped portion of the puffy layer, wherein the second knit layer stays flat.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

FIG. 1A is a schematic view of an embodiment of

the stereoscopic weft knitted fabric for vamp of the present invention;

FIG. 1B is a schematic view of another embodiment of the stereoscopic weft knitted fabric for vamp of the present invention;

FIGs. 2A to 2C are schematic views of different regions in the embodiment shown in FIG. 1A;

FIG. 2D is a schematic view showing the knitting of an embodiment of the stereoscopic weft knitted fabric for vamp of the present invention;

FIG. 3A is a schematic view of partial filling of an embodiment of the stereoscopic weft knitted fabric for vamp of the present invention;

FIGs. 3B to 3D are schematic views showing the steps of partial filling of an embodiment of the stereoscopic weft knitted fabric for vamp of the present invention;

FIG. 3E is a schematic view showing the weaving at the entering position of the first wire in the embodiment shown in FIG. 3A;

FIGs. 4A to 4F are schematic views showing the interweaving of the first knit layer and the second knit layer of an embodiment of the stereoscopic weft knitted fabric for vamp of the present invention;

FIG. 5 is a schematic view showing an embodiment which protrudes outward on one side of the stereoscopic weft knitted fabric in the stereoscopic area.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0021] As shown in the embodiment in FIG. 1A, the stereoscopic weft knitted fabric 900 includes a puffy layer 100 and a knit layer 300. The puffy layer 100 is composed of a plurality of first wire 110 which is wider, in linear density, than 900 Denier (a unit of measure for the linear mass density of fibers, which is the mass in grams per 9000 meters of the fiber). The first wire can be any functional fibers and yarns or heterogeneous materials of plant fibers, animal fibers, artificial fibers, metallic fibers, or objects having the appearance or shapes of yarns such as insulated conducting wires and optical fibers. The knit layer 300 includes a first knit layer 310 and a second knit layer 320 disposed respectively on the opposite sides of the puffy layer 100. A flat area 400 and a stereoscopic area 600 are respectively defined on the knit layer 300, wherein the flat area 400 surrounds the stereoscopic area 600. In this embodiment, the gap D_{400} between the first knit layer 310 and the second knit layer 320 in the flat area 400 is smaller than the gap D_{600} between the first knit layer 310 and the second knit layer 320 in the stereoscopic area 600.

[0022] Taking a different point of view, as the embodiment shown in FIG. 1A, the stereoscopic weft knitted fabric 900 includes a first knit 310, a puffy layer 100, and a second knit layer 320. The puffy layer 100 is disposed on one side of the first knit 310, wherein the puffy layer 100 is composed of a plurality of first wire 110 which is wider than 900 Denier. The second knit layer 320 is disposed on the other side of the puffy layer 100 with respect to the first knit layer 310. The first knit layer 310 and the second knit layer 320 surround and grip together the puffy layer 100 to make respectively the gripped portion and the ungripped portion of the puffy layer 100 flat and puffy, wherein the gripped flat portion and the ungripped puffy portion correspond respectively to the flat area and the stereoscopic area.

[0023] Since the puffy layer 100 is composed of a plurality of first wires 110 having linear density larger than 900 Denier, the puffy layer 100 has a high degree of puffiness in the stereoscopic area 600. More particularly, the first wires 110 of the puffy layer 100 can be seen as the frame in the stereoscopic area 600. Since the linear density of the first wires 110 is larger than 900 Denier, i. e. having wider diameter, the first wires 110 occupy more space such that they give a high degree of puffiness to the puffy layer 100.

[0024] As shown in the embodiment in FIG. 1A, the puffy layer 100 is composed of the first wires 110 disposed as multiple stacks. In other words, the first wires 110 can be interlaced on different planes. In a different embodiment shown in FIG. 1B, however, the puffy layer 100 is composed of the first wires 110 disposed as a single layer. More particularly, the first wire 110 is inherently puffy, hence it is able to show its puffy characteristic well when it is not gripped and limited by the first knit layer 310 and the second knit layer 320 in the stereoscopic area 600.

[0025] As shown in the embodiment in FIG. 1B, the gap D_{400} between the first knit layer 310 and the second knit layer 320 in the flat area 400 is substantially larger than the denier of the first wire 110. Specifically, since the first wire 110 is puffy and occupies space, the gap D_{400} between the first knit layer 310 and the second knit layer 320 in the flat area 400 must not be smaller than the denier of the first wire 110 at its most compressed state. In one embodiment, the stereoscopic weft knitted fabric for vamp is weaved by a knitting machine having the number of needle in the range between 12 and 14, which are respective the upper limit and the lower limit for knitting the wires having linear density larger of 900 denier.

[0026] As shown in the embodiment in FIG. 1A, the first knit layer 310 and the second knit layer 320 pass respectively through the puffy layer 100 and interweave in the flat area 400 to limit the gap between the first knit layer 310 and the second knit layer 320 in the flat area 400. More particularly, FIGs. 2A, 2B, and 2C are respectively schematic views of regions 410, 420, and 430 in the embodiment shown in FIG. 1A. Taking a different point of view, as shown in the embodiment in FIG. 2D, the first wire 110 of the puffy layer 100 is the floating yarns disposed between the first knit layer 310 and the second knit layer 320 when weaving the two. The stereoscopic area 600 (see FIG. 1 A) is the area that the first knit layer 310 and the second knit layer 320 interweave

without passing through the puffy layer 100.

[0027] Moreover, localized puffy effect can be produced in the stereoscopic weft knitted fabric 900 of the present invention. As shown in the embodiment in FIG. 3A, the first wire 110 darts in and out the first knit layer 310 without interweaving with the first knit layer 310 and the second knit layer 320 in the stereoscopic area 600 (see FIG. 1 A). Accordingly, the first wire 110 substantially fill the space between the first knit layer 310 and the second knit layer 320 in the stereoscopic area 600, such that it makes the stereoscopic area 600 puffy. Before the first wire 110 darts in the first knit layer 310 to form one side of it, the weaving process undergoes "ring-shifting", wherein the rings on the lower knitting needle are shifted to the upper knitting needle. After then, as shown in FIG. 3C, the first wire 110 enters the space between the lower knitting needle and the upper knitting needle. Afterwards, the weaving of the first knit layer 310 and the second knit layer 320 continues. FIG. 3E is a schematic view showing the weaving in region 440 of the embodiment shown in FIG. 3A.

[0028] The first knit layer 310 and the second knit layer 320 can be interwoven via various methods. As shown in the embodiment in FIG. 4A, a first yarn 301 forms a plurality of first loops 331 by the sequential winding movement of knitting needle 500, wherein the plurality of first loops 331 are interlocked to form the first knit layer 310. The first yarn 301 passes through the puffy layer 100 in the flat area 400 after forming the last one of the first loop 331. Afterwards, it forms a plurality of second loops 332 by the sequential winding movement of knitting needle 500, wherein the plurality of second loops 332 are interlocked to form the second knit layer 320. This interweaving method is preferably used in the junctional zone between the stereoscopic area 600 and the flat area 400 to produce localized puffy effect in the stereoscopic weft knitted fabric 900. The interweaving methods used in the embodiments shown in FIGs. 4B to 4D are the same. Moreover, different interweaving methods can be used in accordance with the design, manufacturing, or application requirements.

[0029] As shown in another interweaving method used in the embodiment in FIG. 4E, the first yarn 301 forms m number of first loops 331 by sequential winding movement and passes through the puffy layer 100 in the flat area 400 (see FIG. 1A). After forms a third loop 333, it passes through the puffy layer 100 in the flat area 400 and forms n number of first loops 331 by sequential winding movement. The second yarn 302 forms a plurality of second loops 332 by sequential winding movement. The m and n number of first loops 331 are interlocked to form the first knit layer 310, wherein the third loop 333 and the second loops are interlocked to form the second knit layer 320. This interweaving method is preferably used in the flat area 400 between stereoscopic areas 600. The interweaving method used in the embodiment shown in FIGs. 4E is the same. The difference between the embodiments shown in FIGs. 4E and 4F is that there is no empty exit between the m and n first loops 331 in the embodiment shown in FIG. 4F.

[0030] In different embodiments, the forming of the gap between the first knit layer and the second knit layer is not limited to interweaving. For example, at least one of the first knit layer and the second knit layer may include thermoplastic material, wherein the first knit layer and the second knit layer approach each other in the flat area and are pressed against the puffy layer to be thermomolded. More particularly, the first knit layer and the second knit layer that are pressed against the puffy layer are capable of being melted to pass through the puffy layer and stick with each other after cooling, such that the puffy layer is secured therebetween.

[0031] In the embodiment shown in FIG. 1A, the first knit layer 310 and the second knit layer 320 respectively protrude outward in the stereoscopic area 600. In other words, the stereoscopic weft knitted fabric 900 protrudes outward on both sides in the stereoscopic area 600. In different embodiments, however, the stereoscopic weft knitted fabric 900 protrudes outward only on one side in the stereoscopic area 600 in accordance with the design, manufacturing, or application requirements. As shown in the embodiment in FIG. 5, the first knit layer 310 of the knit layer 300 protrudes outward in the stereoscopic area 600, wherein the second knit layer 320 stays flat.

[0032] Although the preferred embodiments of the present invention have been described herein, the above description is merely illustrative. Further modification of the invention herein disclosed will occur to those skilled in the respective arts and all such modifications are deemed to be within the scope of the invention as defined by the appended claims.

Claims

1. A stereoscopic weft knitted fabric for vamp, comprising:

   a puffy layer composed of a first wire which is wider than 900 Denier; and
   a knit layer including a first knit layer and a second knit layer disposed respectively on the opposite sides of the puffy layer, wherein a flat area and a stereoscopic area are respectively defined on the knit layer, wherein the flat area surrounds the stereoscopic area.

2. The stereoscopic weft knitted fabric for vamp of claim 1, wherein the puffy layer is composed of the first wire disposed as multiple stacks.

3. The stereoscopic weft knitted fabric for vamp of claim 1, wherein the puffy layer is composed of the first wire disposed as single layer.

4. The stereoscopic weft knitted fabric for vamp of claim

1, wherein the stereoscopic weft knitted fabric for vamp is weaved by a knitting machine having the number of needle in the range between 12 and 14.

5. The stereoscopic weft knitted fabric for vamp of claim 1, wherein the first knit layer and the second knit layer pass respectively through the puffy layer and interweave in the flat area to limit the gap between the first knit layer and the second knit layer in the flat area.

6. The stereoscopic weft knitted fabric for vamp of claim 1, wherein at least one of the first knit layer and the second knit layer includes thermoplastic material, wherein the first knit layer and the second knit layer approach each other in the flat area and are pressed against the puffy layer to be thermo-molded.

7. The stereoscopic weft knitted fabric for vamp of claim 1, wherein the first wire includes insulated conducting wires.

8. The stereoscopic weft knitted fabric for vamp of claim 1, wherein the first wire includes optical fibers.

9. The stereoscopic weft knitted fabric for vamp of claim 1, wherein the first knit layer of the knit layer protrudes outward in the stereoscopic area, wherein the second knit layer stays flat.

10. A stereoscopic weft knitted fabric for vamp, comprising:

a first knit layer;
a puffy layer disposed on one side of the first knit layer, wherein the puffy layer is composed of a first wire having linear density larger than 900 Denier; and
a second knit layer disposed on the other side of the puffy layer with respect to the first knit layer;
wherein the first knit layer and the second knit layer surrounds and grip together the puffy layer to make respectively the gripped portion and the ungripped portion of the puffy layer flat and puffy.

11. The stereoscopic weft knitted fabric for vamp of claim 10, wherein the puffy layer is composed of the first wire disposed as multiple stacks.

12. The stereoscopic weft knitted fabric for vamp of claim 10, wherein the puffy layer is composed of the first wire disposed as single layer.

13. The stereoscopic weft knitted fabric for vamp of claim 10, wherein the stereoscopic weft knitted fabric for vamp is weaved by a knitting machine having the number of needle in the range between 12 and 14.

14. The stereoscopic weft knitted fabric for vamp of claim 10, wherein the first knit layer and the second knit layer pass respectively through the puffy layer and interweave in the gripped portion of the puffy layer to limit the gap between the first knit layer and the second knit layer in the gripped portion of the puffy layer.

15. The stereoscopic weft knitted fabric for vamp of claim 10, wherein at least one of the first knit layer and the second knit layer includes thermoplastic material, wherein the first knit layer and the second knit layer approach each other in the gripped portion of the puffy layer and are pressed against the puffy layer to be thermo-molded.

16. The stereoscopic weft knitted fabric for vamp of claim 10, wherein the first wire includes insulated conducting wires.

17. The stereoscopic weft knitted fabric for vamp of claim 10, wherein the first wire includes optical fibers.

18. The stereoscopic weft knitted fabric for vamp of claim 10, wherein the first knit layer of the knit layer protrudes outward in the ungripped portion of the puffy layer, wherein the second knit layer stays flat.

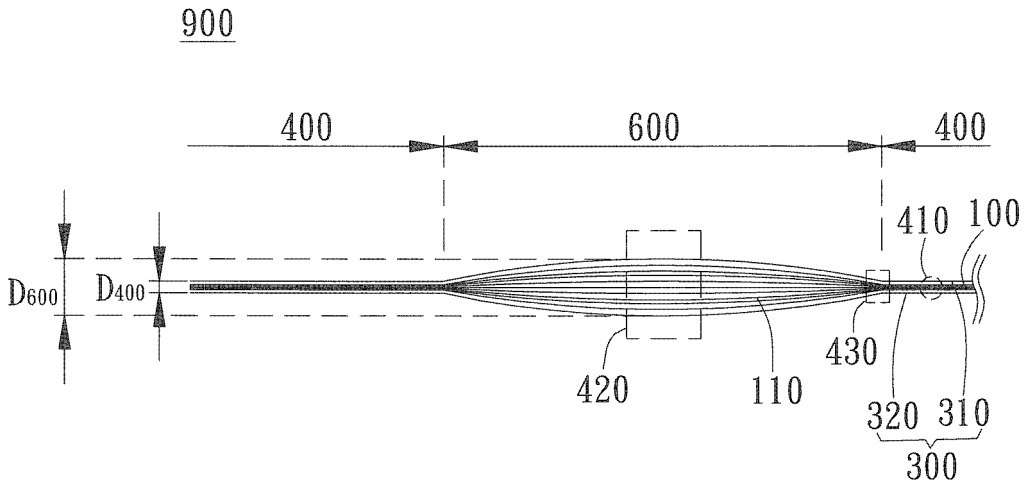

900
400
600
400
410
100
D600
D400
430
420
110
320
310
300

FIG. 1A

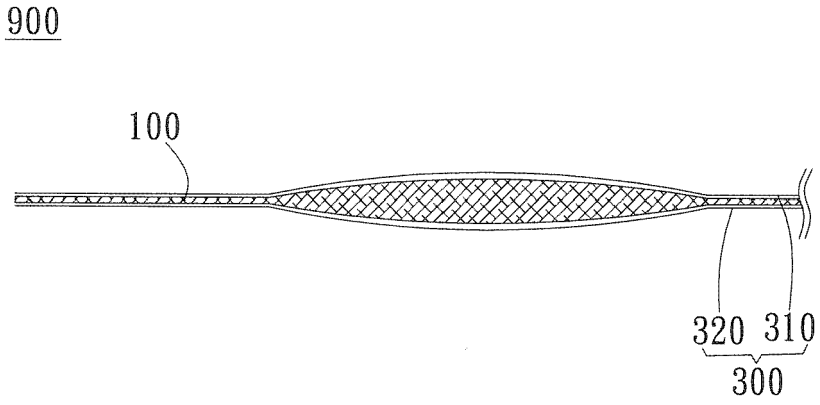

900
100
320
310
300

FIG. 1B

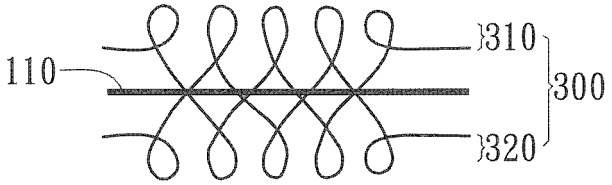


FIG. 2A

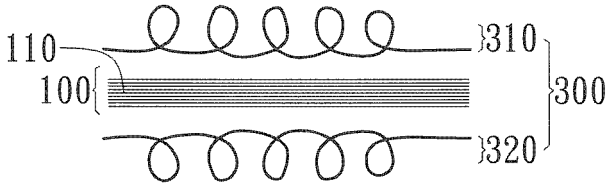


FIG. 2B

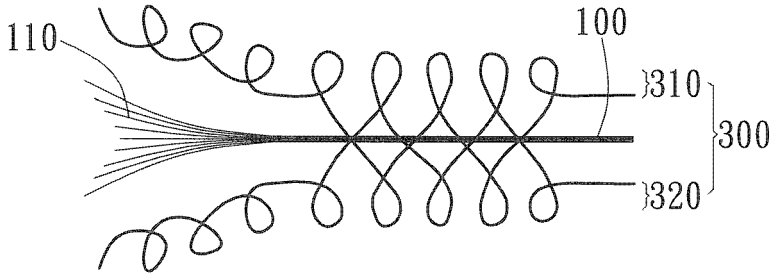


FIG. 2C

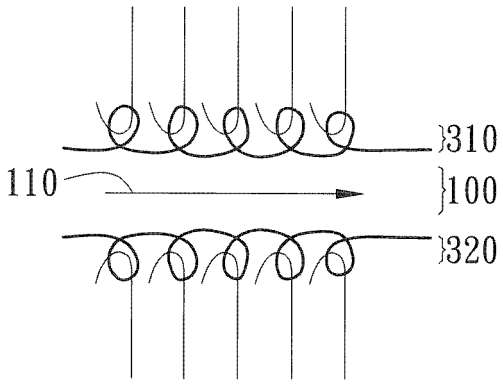


FIG. 2D

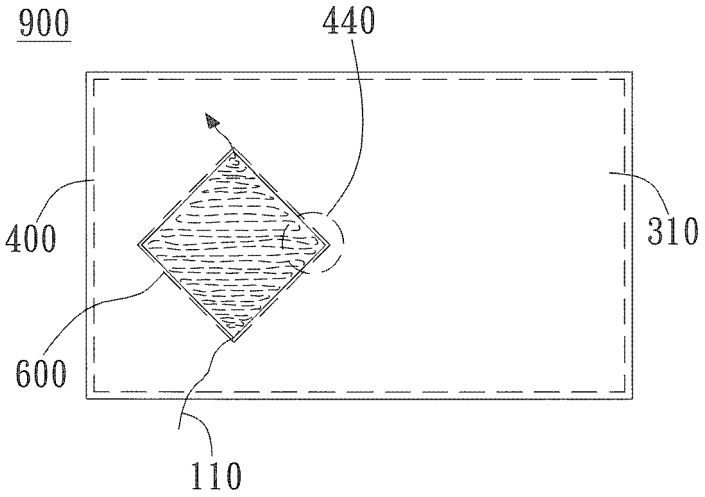


FIG. 3A

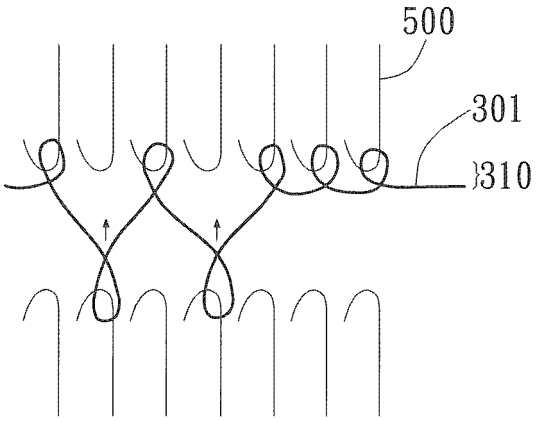


FIG. 3B

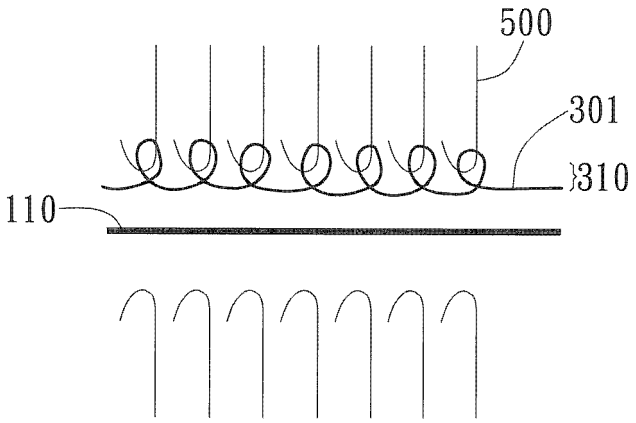


FIG. 3C

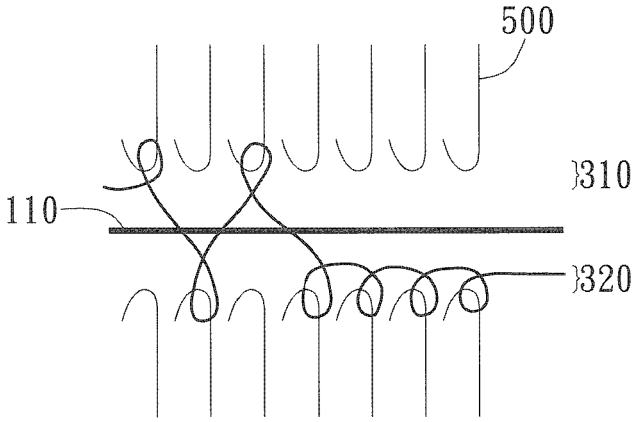


FIG. 3D

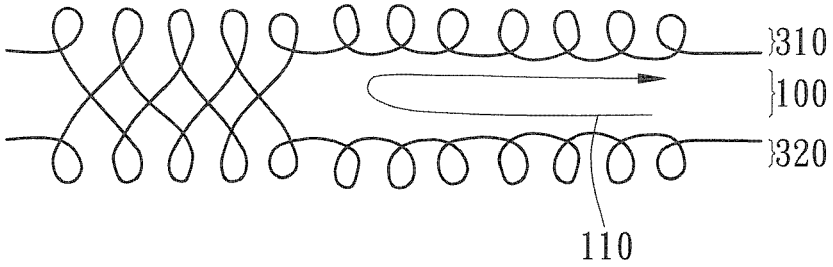


FIG. 3E

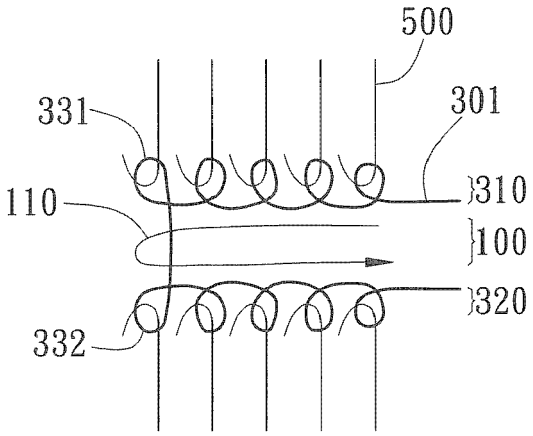


FIG. 4A

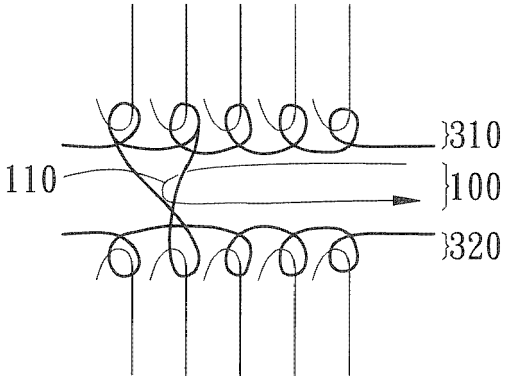


FIG. 4B

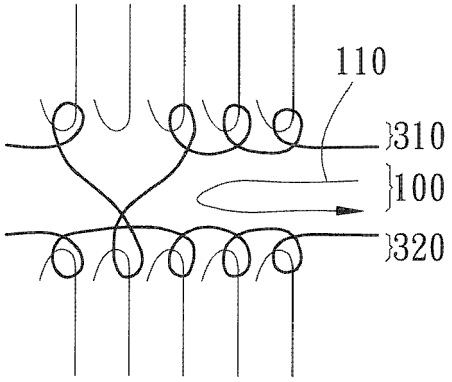


FIG. 4C

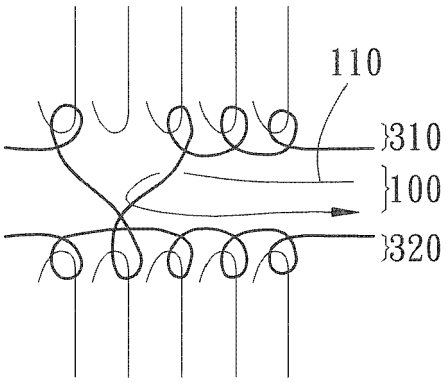


FIG. 4D

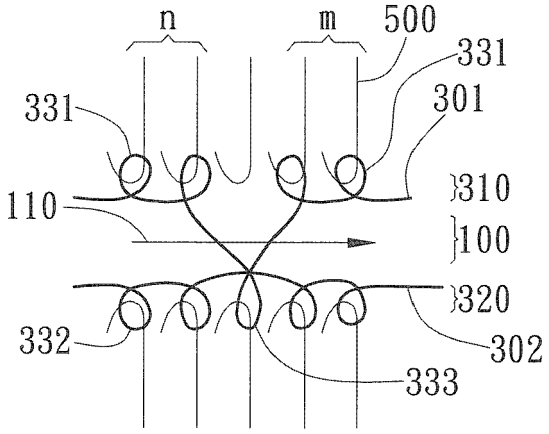


FIG. 4E

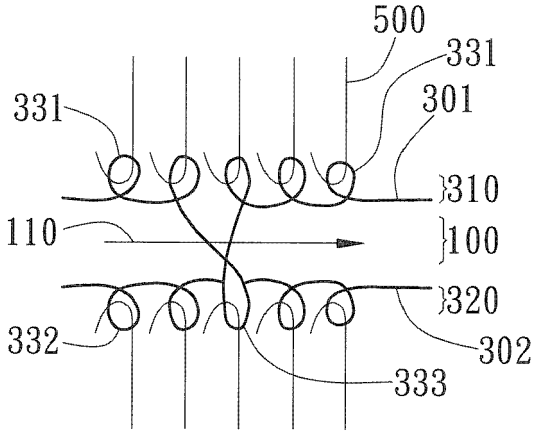


FIG. 4F

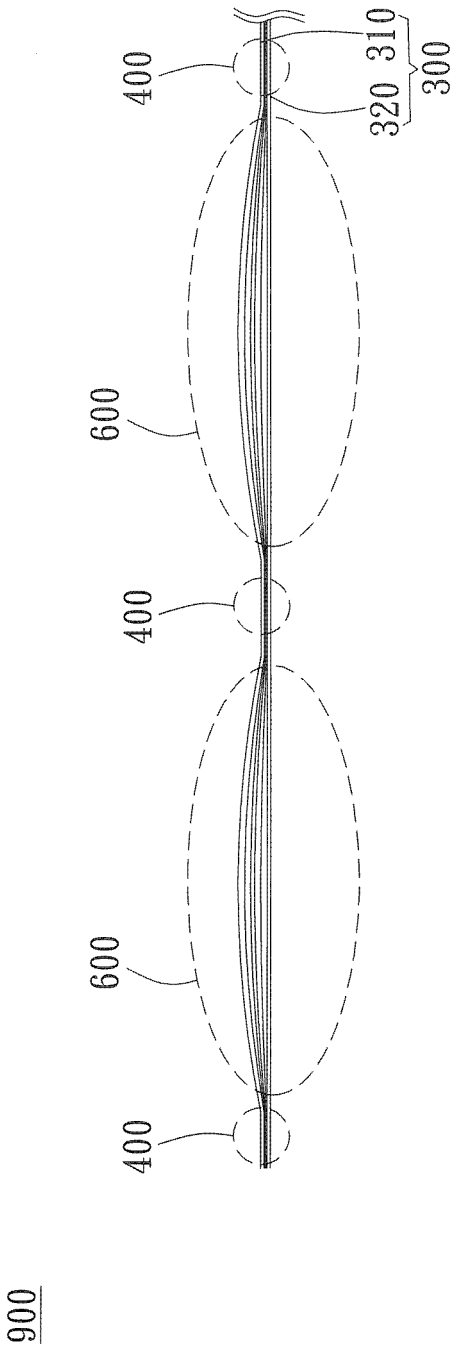


FIG. 5

Europäisches Patentamt
European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 17 15 2387

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 530 195 A1 (MATTES & AMMANN GMBH & CO KG [DE]) 5 December 2012 (2012-12-05) * paragraphs [0024] - [0029], [0036] - [0039]; claim 6; figures 1-4 *	1,3-5, 10,12-14	INV. D04B1/12
X Y A	GB 1 148 086 A (MONSANTO TEXTILES LTD [GB]) 10 April 1969 (1969-04-10) * page 1, line 47 - page 2, line 107; claims 1, 2, 7-9, 10, 11, 18-20; figure 1 *	1-6, 10-15 7,8,16, 17 9,18	
Y A	US 2015/216256 A1 (PODHAJNY DANIEL A [US]) 6 August 2015 (2015-08-06) * paragraphs [0053], [0054], [0063], [0078], [0079], [0085], [0086], [0097]; claims 1, 4, 8-10; figures 6-15B *	7,8,16, 17 1,9,10, 18	

TECHNICAL FIELDS SEARCHED (IPC)

D04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 July 2017	Sterle, Dieter

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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