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(54) **SHOE BODY-FORMING PIECE AND MANUFACTURING METHOD THEREOF**

(57) A shoe body-forming piece (100') includes an upper portion (110) including an instep portion (112) and a pair of heel portions (114) separately disposed on one side of the instep portion (112) to make the upper portion (110) have a substantially U-shaped configuration outlined by a perimeter edge (110a) and an inner edge (110b); and a shoe-sleeve portion (220) having a connection side (220a) at least partially connected to the inner edge (110b), wherein the upper portion (110) and the shoe-sleeve portion (220) are knitted from at least one yarn to form a unitary knit construction with a plurality of courses and wales, so that the shoe body-forming piece (100') does not have any sewing portion as the knitting process is completed; when the shoe body-forming piece (100') is processed to form a shoe body, the upper portion (110) corresponds to a fore portion, a lateral portion, and a heel portion of a foot, and the shoe-sleeve portion (220) corresponds to an ankle portion of the foot.

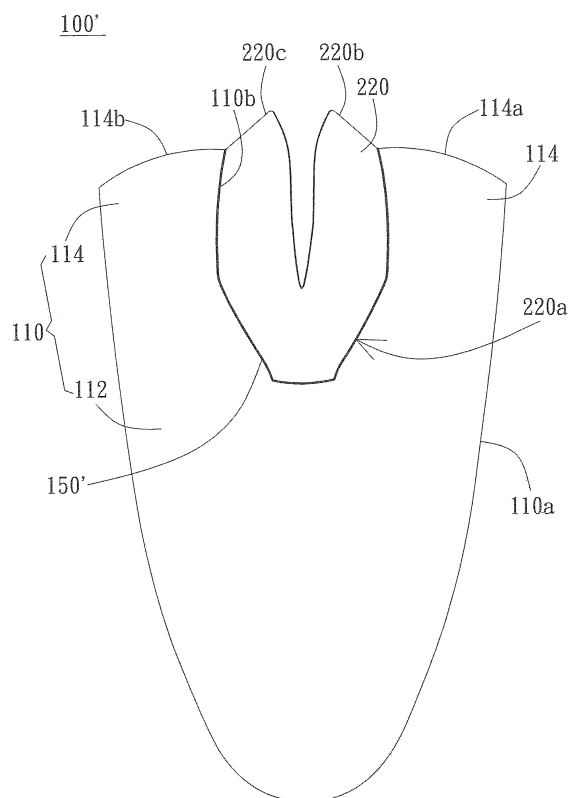


FIG. 4A

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The invention generally relates to a shoe body-forming piece and a manufacturing method thereof. Particularly, the invention relates to a shoe body-forming piece with a shoe-sleeve portion and a manufacturing method thereof.

2. Description of the Prior Art

[0002] Conventional shoes are often of poor ventilation due to the material used and may sometimes cause an uncomfortable feeling. A user's feet are often enclosed in the shoes for a substantial amount of time, so disease may be easily caused on the feet if the shoes are of poor ventilation. Further, in the conventional manufacturing method of shoes, a large amount of material is wasted during the cutting, jointing, and trimming processes. This causes an environmental issue and also increases the manufacture cost of shoes.

[0003] In addition, conventional shoes usually cover the portion of foot below the ankle. In the outdoor activities such as mountain-climbing, running, and ball-playing that require large amount of foot movements, the protection to the ankle is obviously insufficient, and it is likely to cause foot injury.

SUMMARY OF THE INVENTION

[0004] In view of the prior arts, it is an object of the present invention to provide a shoe body-forming piece and a manufacturing method thereof, wherein the shoe body-forming piece has a unitary knit construction of an upper portion and a shoe-sleeve portion, not only providing air permeability and hygroscopicity, but also providing enhanced protection to the ankle portion, making the shoe body-forming piece is applicable to a variety of shoes.

[0005] It is another object of the invention to provide a method for forming a shoe body-forming piece. The method includes providing at least one yarn to knit a shoe-sleeve portion according to a predetermined number of stitches and retaining a plurality of to-be-weaved loops after the shoe-sleeve portion is formed; providing at least two yarns to knit a pair of symmetric heel portions respectively outside two sides of the shoe-sleeve portion; when the knitting of the pair of heel portions arrives the plurality of to-be-weaved loops, the plurality of to-be-weaved loops is simultaneously knitted to connect the pair of heel portions and the shoe-sleeve portion; and continuously knitting one of the at least two yarns of the pair of heel portions to form an instep portion, so the instep portion and the pair of heel portions are combined to form an upper portion; when the knitting of

the instep portion arrives the plurality of to-be-weaved loops, the plurality of to-be-weaved loops is simultaneously knitted to connect the instep portion and the shoe-sleeve portion.

[0006] In an embodiment, the number of the plurality of to-be-weaved loops is less than the predetermined number of stitches, so the shoe-sleeve portion is merely partially connected to the upper portion. In another embodiment, the number of the plurality of to-be-weaved loops is equal to the predetermined number of stitches, so one side of the shoe-sleeve portion is substantially completely connected to the upper portion along an inner edge defined by the instep portion and the pair of heel portions.

[0007] In an embodiment, the shoe-sleeve portion is knitted by a tubular double knitting manner, so the shoe-sleeve portion has a first knit surface and a second knit surface, and the tubular double knitting manner includes: alternatively casting on the at least one yarn according to the predetermined number of stitches to form a first starting side of the first knit surface; alternatively backwards casting on the at least one yarn according to the predetermined number of stitches to form a second starting side of the second knit surface; knitting the at least one yarn to connect the first starting side to form the first knit surface, backwards knitting the at least one yarn to connect the second starting side to form the second knit surface, and repeatedly knitting the first knit surface and the second surface; and after the shoe-sleeve portion is formed, retaining a portion of a plurality of stitches of one of the first knit surface and the second knit surface as the plurality of to-be-weaved loops.

[0008] In an embodiment, the step of forming the first starting side and the second starting side includes: casting on the at least one yarn to form the first starting side in a manner of every two alternative stitches spaced by two empty needles; before forming the second starting side, changing the first starting side from the manner of every two alternative stitches spaced by two empty needles to a manner of every two non-alternative stitches spaced by one empty needle; backwards casting on the at least one yarn to form the second starting side in the manner of every two alternative stitches spaced by two empty needles; changing the second starting side from the manner of every two alternative stitches spaced by two empty needles to the manner of every two non-alternative stitches spaced by one empty needle; and changing the first starting side from the manner of every two non-alternative stitches spaced by one empty needle back to the manner of every two alternative stitches spaced by two empty needles.

[0009] In an embodiment, the step of repeatedly knitting the first knit surface and the second knit surface includes: before backwards knitting the second knit surface, changing the first knit surface from the manner of every two alternative stitches spaced by two empty needles to the manner of every two non-alternative stitches spaced by one empty needle; changing the second start-

ing side from the manner of every two non-alternative stitches spaced by one empty needle back to the manner of every two alternative stitches spaced by two empty needles, and backwards knitting the second knit surface; before repeatedly knitting the first knit surface, changing the first knit surface from the manner of every two non-alternative stitches spaced by one empty needle back to the manner of every two alternative stitches spaced by two empty needles to form the first knit surface; and before repeatedly knitting the second knit surface, changing the second knit surface from the manner of every two non-alternative stitches spaced by one empty needle back to the manner of every two alternative stitches spaced by two empty needles to form the second knit surface.

[0010] In an embodiment, the method further includes extending an inlaid strand through two opposite ends of the shoe-sleeve portion when the at least one yarn is knitted to form the shoe-sleeve portion.

[0011] In an embodiment, the method further includes pulling the inlaid strand tightly, so the two opposite ends of the shoe-sleeve portion is secured together by the inlaid strand, and the shoe-sleeve portion has a sleeve structure.

[0012] In another embodiment, the invention provides a shoe body-forming piece formed by the method described above, wherein the shoe body-forming piece is characterized in that: the pair of heel portions are separately disposed on one side of the instep portion to make the upper portion have a substantially U-shaped configuration outlined by a perimeter edge and an inner edge; and the shoe-sleeve portion has a connection side at least partially connected to the inner edge, and a connection line is formed between the shoe-sleeve portion and the upper portion.

[0013] In an embodiment, the connection line extends along only a portion of the inner edge. In another embodiment, the connection line extends substantially completely along the inner edge.

[0014] In an embodiment, the shoe-sleeve portion has a seamless integral sleeve structure, and the shoe-sleeve portion is partially connected to the inner edge, so a connection line formed between the shoe-sleeve portion and the upper portion extends along only a portion of the inner edge.

[0015] In an embodiment, the invention provides a shoe body-forming piece including an upper portion having an instep portion and a pair of heel portions separately disposed on one side of the instep portion to make the upper portion have a substantially U-shaped configuration outlined by a perimeter edge and an inner edge; and a shoe-sleeve portion having a connection side at least partially connected to the inner edge, wherein the upper portion and the shoe-sleeve portion are knitted from at least one yarn to form a unitary knit construction with a plurality of courses and wales, so that the shoe body-forming piece does not have any sewing portion as the knitting process is completed; when the shoe body-form-

ing piece is processed to form a shoe body, the upper portion corresponds to a fore portion, a lateral portion, and a heel portion of a foot, and the shoe-sleeve portion corresponds to an ankle portion of the foot.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

FIG. 1A is a schematic view of an embodiment of the shoe body-forming piece of the invention.

FIG. 1B is a schematic view of an embodiment of the shoe body formed from the shoe body-forming piece of FIG. 1A.

FIG. 1C is a schematic view of an embodiment of the method for forming a shoe body-forming piece. FIGs. 2A and 2B are respectively an exploded view and an assembly view of an embodiment of the shoe formed from the shoe body of FIG. 1B.

FIGs. 3A and 3B are schematic views of another embodiment of the shoe body-forming piece of the invention.

FIG. 4A is a schematic view of a further embodiment of the shoe body-forming piece of the invention.

FIG. 4B is a schematic view of an embodiment of initially forming the shoe-sleeve portion of the invention.

FIG. 4C is a schematic view of forming the shoe-sleeve portion of FIG. 4A.

FIG. 4D is a schematic view of an embodiment of the shoe body formed from the shoe body-forming piece of FIG. 4A.

FIG. 4E is a schematic view of another embodiment of the method for forming the shoe body-forming piece of FIG. 4A.

FIG. 5A is a schematic view of a further embodiment of the method for forming the shoe body-forming piece.

FIG. 5B is a schematic view of a knitting process of the shoe body-forming piece of FIG. 5A.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0017] The invention provides a shoe body-forming piece and a manufacturing method thereof. Particularly, the invention provides a knitted shoe body-forming piece with a shoe-sleeve portion to be applied to various shoes and to provide flexibility, comfortability, and permeability as well as protection to the ankle. For a throughout understanding of the invention, details of steps and structures of the invention will be described. Any manufacturing process and specific steps for manufacturing the structure of shoe that are well known in the art will not be described in order not to impose undue limitations to the invention.

[0018] As shown in FIG. 1A, in an embodiment, the shoe body-forming piece 100 of the invention includes

an upper portion 110 and a shoe-sleeve portion 120. The upper portion 110 and the shoe-sleeve portion 120 are knitted from at least one yarn to form a unitary knit construction with a plurality of courses and wales, so the shoe body-forming piece 100 does not have any sewing portion as the knitting process is completed. The course is a horizontal row of needle loops, and the wale is a vertical column of intermeshed needle loops. That is, a meandering path along which the yarn is knitted is defined as the course, and the extending direction of the wale crosses the extending direction of the course. Accordingly, the upper portion 110 and the shoe-sleeve portion 120 can be knitted in a predetermined sequence from the yarn(s) to include multiple courses and wales which constitute the unitary knitted shoe body-forming piece 100 including the upper portion 110 and the shoe-sleeve portion 120 without any sewing portion. It is noted that the number, color, or material of yarns for knitting the shoe body-forming piece 100 can be determined according to the stretchable requirements for different sections, the color or pattern design of the shoe body, etc. The shoe body-forming piece 100, specifically the upper portion 110, may have a single-layered or multiple-layered structure and have different pattern designs for applications of various shoes.

[0019] The upper portion 110 includes an instep portion 112 and a pair of heel portions 114 separately disposed on one side of the instep portion 112 to make the upper portion 110 have a substantially U-shaped configuration outlined by a perimeter edge 110a and an inner edge 110b. Specifically, the upper portion 110 has a flat U-shaped profile as the pair of heel portions 114 connected to the instep portion 112. The perimeter edge 110a is defined by the outer edge of the instep portion 112 and the outer edges of the pair of heel portions 114. The inner edge 110b is defined by the adjacent inner edges of the pair of heel portions 114 and the upper edge of the instep portion 112. That is, the adjacent sides of the pair of heel portions 114 and the upper side of the instep portion 112 define an opening 130 of the U-shaped profile, i.e. the inner edge 110b defines the opening 130 of the U-shaped profile. In this embodiment, the shoe-sleeve portion 120 has a substantial rectangular shape, and the shoe-sleeve portion 120 has a connection side 120a (e.g. the bottom side) at least partially connected to the inner edge 110b. In this embodiment, the connection side 120a side is partially connected to the inner edge 110b. Specifically, the middle part of the connection side 120a is connected to the inner edge 110b at the bottom of the opening 130.

[0020] The method of forming the shoe body-forming piece 100 includes knitting at least one yarn to form an upper portion 110 and a shoe-sleeve portion 120 consisting of a plurality of courses and wales. Preferably, the at least one yarn is knitted firstly to form the shoe-sleeve portion 120 and the knitting continues at the connection side 120a to form the upper portion 110, so the connection side 120a is merely partially connected to the inner

edge 110b of the upper portion 110. Specifically, the at least one yarn is knitted back and forth along the X direction to form the shoe-sleeve portion 120 in a substantial rectangular shape. Preferably, the course direction of the shoe-sleeve portion 120 is substantially parallel to the X direction, and the wale direction of shoe-sleeve portion 120 is substantially parallel to the Y direction, so the lowest course in the Y direction is the connection side 120a of the shoe-sleeve portion 120, and the wale direction of the shoe-sleeve portion 120 is perpendicular to the connection side 120a. At least one yarn is knitted from the opposite sides of the shoe-sleeve portion 120 to form the pair of heel portions 114 and the instep portion 112, and the connection side 120a of the shoe-sleeve portion 120 is connected only to the middle part of the upper portion 110. Once the knitting process is completed, the upper portion 110 and the shoe-sleeve portion 120 are connected without any sewing portion, so the manufacturing process can be simplified by eliminating the cutting, sewing processes and the material cost and the labor cost are also reduced.

[0021] As shown in FIG. 1C, in an embodiment, the method of forming the shoe body-forming piece 100 may include a step (a), providing at least one yarn to knit a shoe-sleeve portion 120 according to a predetermined number of stitches and retaining a plurality of to-be-weaved loops (such as indicated by a~c) after the shoe-sleeve portion 20 is formed; a step (b), providing at least two yarns to knit a pair of symmetric heel portions (such as a left heel portion 114' and a right heel portion 114") respectively outside two sides of the shoe-sleeve portion 120; when the knitting of the pair of heel portions 114', 114" arrives the plurality of to-be-weaved loops a~c, the plurality of to-be-weaved loops a~c is simultaneously knitted to connect the pair of heel portions 114', 114" and the shoe-sleeve portion 120; and a step (c), continuously knitting one of the at least two yarns of the pair of heel portions 114', 114" to form an instep portion 112, so the instep portion 112 and the pair of heel portions 114', 114" are combined to form an upper portion 110; when the knitting of the instep portion 112 arrives the plurality of to-be-weaved loops a~c, the plurality of to-be-weaved loops a~c is simultaneously knitted to connect the instep portion 112 and the shoe-sleeve portion 120.

[0022] Specifically, in an embodiment, the knitting process of the shoe body-forming piece 100 is preferably performed by a flat knitting machine with double needle beds. For example, in the step (a), the shoe-sleeve portion 120 is preferably knitted by a double knitting manner, so the shoe-sleeve portion 120 is a flat rectangular knit fabric with two technique surfaces on opposite sides, and when the shoe-sleeve portion 120 is formed, a plurality of loops (such as to-be-weaved loops a~c) of the connection side 120a is retained. For example, only the to-be-weaved loops a~c in the middle part of the connection side 120a are retained on the needle bed and will be weaved to connect the upper portion 110. That is, after the shoe-sleeve portion 120 is formed, the number of the

plurality of to-be-weaved loops that is retained on the needle bed is less than the predetermined number of stitches, so the shoe-sleeve portion 120 is only partially connected to the upper portion 110.

[0023] In the step (b), outside one side of the shoe-sleeve portion 120 (such as the left side 120b on the drawing), at least one yarn is provided and knitted from left to right, preferably in a double knitting manner, to form the left heel portion 114' with a predetermined number of stitches. Next, outside the other side of the shoe-sleeve portion 120 (such as the right side 120c on the drawing), at least another one yarn is provided and knitted from left to right, preferably also in the double knitting manner, to form the right heel portion 114" with the same predetermined number of stitches. Then, from right to left, the right heel portion 114" and the left heel portion 114' are sequentially backwards knitted. The knitting of the left heel portion 114' and the right heel portion 114" is repeated back and forth till reaching the plurality of to-be-weaved loops a~c. When the knitting of the left heel portion 114' and the right heel portion 114" arrives the plurality of to-be-weaved loops a~c, the to-be-weaved loops a~c are respectively simultaneously knitted to connect the pair of heel portions 114', 114" and the shoe-sleeve portion 120. For example, when the stitch a' of the left heel portion 114' corresponds to the to-be-weaved loop a of the shoe-sleeve portion 120, the to-be-weaved loop a can be simultaneously knitted with the stitch a' by moving the needle bed. Then, on the symmetric right heel portion 114", the corresponding stitch b' of the right heel portion 114" is simultaneously knitted with the to-be-weaved loop b of the shoe-sleeve portion 120. The connection of the pair of heel portions 114', 114" and the shoe-sleeve portion 120 is continued by knitting back and forth until the to-be-weaved loops a~c are connected to the stitches a'~c' of the pair of heel portions 114', 114", respectively.

[0024] In the step (c), one of the at least two yarns of the pair of heel portions 114', 114" is continuously knitted to form the instep portion 112, so the instep portion 112 and the pair of heel portions 114', 114" are combined to form the upper portion 110. When the knitting of the instep portion 112 arrives the plurality of to-be-weaved loops a~c, the plurality of to-be-weaved loops a~c is simultaneously knitted to connect the instep portion 112 and the shoe-sleeve portion 120. For example, when the right heel portion 114" is backwards knitted and the stitch c' of the right heel portion 114" corresponds to and is knitted with the to-be-weaved loop c of the shoe-sleeve portion 120, the yarn of the right heel portion 114" is continuously knitted to connect the left heel portion 114' to form the instep portion 112, and the knitting is repeated back and forth to form the instep portion 112. The shoe body-forming piece 100 made by the above method is shown in FIG. 1A and characterized in that the pair of heel portions 114 are separately disposed on one side of the instep portion 112 to make the upper portion 110 have a substantially U-shaped configuration outlined by the perim-

eter edge 110a and the inner edge 110b, and the shoe-sleeve portion 120 has the connection side 120a partially connected to the inner edge 110b, and a connection line 150 formed between the shoe-sleeve portion 120 and the upper portion 110 extends along a portion of the inner edge 110b.

[0025] As shown in FIG. 1B, when the shoe body-forming piece 100 is processed to form a shoe body 10, the upper portion corresponds to a fore portion, a lateral portion, and a heel portion of a foot, and the shoe-sleeve portion 120 corresponds to an ankle portion of the foot. In an embodiment, the method of manufacturing the shoe body 10 includes: forming the shoe body-forming piece 100 as described above; sewing the pair of heel portions 114 together, so the inner edge 110b defines a shoe opening 130' of the shoe body 10, and the upper portion 110 defines an inner space 12 for receiving the foot; and sewing two opposite ends 120b, 120c along the connection side 120a of the shoe-sleeve portion 120 together to define a shoe-sleeve opening 122. Specifically, the shoe body-forming piece 100 can be formed by the method described above, and the end portions 114a, 114b (shown in FIG. 1A) of the pair of heel portions 114 are sewed together, so the inner edge 110b which defines the opening 130 of the U-shaped profile becomes a closed ring to define the shoe opening 130'. Therefore, after the sewing process, the upper portion 110 becomes a three-dimensional structure defining the inner space 12 for receiving the foot, and the inner space 12 has an opening 14 on the bottom side. That is, the perimeter edge 110a defines the opening 14.

[0026] Moreover, the two opposite ends 120b, 120c (shown in FIG. 1A) of the shoe-sleeve portion 120 are sewed together along the Y direction, so the starting side that is opposite to the connection side 120a of the shoe-sleeve portion 120 becomes a closed ring to define the sleeve opening 122. In other words, the bottom side (i.e. connection side 120a) of the shoe-sleeve portion 120 is partially connected to the edge of the shoe opening 130', so the shoe-sleeve portion 120 and the upper portion 110 are partially separated to allow a larger range of relative movement. As such, the foot is much easier received in the inner space 12 by inserting through the sleeve opening 122 into the shoe opening 130'. During movement, the shoe-sleeve portion 120 is capable of protecting the ankle while the partial connection between the shoe-sleeve portion 120 and the upper portion 110 provides sufficient flexibility of movement.

[0027] In addition, when the upper portion 110 and/or the shoe-sleeve portion 120 are formed, at least one thermal plastic yarn can be knitted simultaneously. When the shoe body-forming piece 100 is processed to form the shoe body 10, since the thermal plastic yarn is thermal-curable, by thermal molding, the thermal plastic yarn can be melted to be uniformly distributed over the shoe body 10 (e.g. the instep portion 112 and the heel portions 114) and then harden to support the shape of the shoe body 10 and to enhance the structural strength of the shoe

body 10, preventing the shoe body 10 from being unshapeable. The material of the thermal plastic yarn includes any suitable thermal curable material including, but not limited to, nylon, polyester, acrylic, etc. It is noted that the shoe body 10 can be shaped by other methods, not limited to the use of thermal plastic yarn during the knitting process.

[0028] As shown in FIGs. 2A and 2B, the shoe body 10 made from the shoe body-forming piece 100 can be combined with the sole structure 20 by adhering, sewing to form the shoe 1.

[0029] In another embodiment, as shown in FIG. 3A, when the at least one yarn is knitted to form the shoe-sleeve portion 120, an inlaid strand 140 can be simultaneously extended through two opposite ends 120b, 120c of the shoe-sleeve portion 120. Therefore, as shown in FIG. 3B, when the inlaid strand 140 is pulled tightly, the two opposite ends 120b, 120c of the shoe-sleeve portion 120 is secured together by the inlaid strand 140, and the shoe-sleeve portion 120 has a sleeve structure without further sewing process. Specifically, when the shoe-sleeve portion 120 is knitted back and forth along the X direction, the inlaid strand 140 is simultaneously extended from the one end 120b to the other end 120c of the shoe-sleeve portion 120, so the two opposite ends 120b, 120c can be connected by the inlaid strand 140. When the knitting process of the shoe body-forming piece 100 is completed, by pulling the inlaid strand 140 along the Y direction, the opposite ends 120b, 120c of the shoe-sleeve portion can be connected together, so the starting side that is opposite to the connection side 120a of the shoe-sleeve portion 120 becomes a closed ring and defines the sleeve opening 122.

[0030] In the above embodiment, the shoe-sleeve portion 120 is shown to be partially connected to the upper portion 110, but the shoe-sleeve portion 120 and the upper portion 110 can be connected by a different way. In another embodiment, as shown in FIG. 4A, the connection side 220a of the shoe-sleeve portion 220 of the shoe body-forming piece 100' is connected to the upper portion 110 along the inner edge 110b. In other words, the connection side 220a of the shoe-sleeve portion 220 is connected to the inner edge 110b from one side (e.g. right side) to the other side (e.g. left side). In an embodiment, the at least one yarn is preferably knitted firstly to form the shoe-sleeve portion 220 and the knitting continues from the connection side 220a to form the upper portion 110, so the connection side 220a is substantially completely connected to the inner edge 110b of the upper portion 110, and no separated portion exists between the connection side 220a of the shoe-sleeve portion 220 and the upper portion 110. As shown in FIG. 4B, the at least one yarn is knitted back and forth along the X direction to form the shoe-sleeve portion 220 in a substantial rectangular shape similar to the shoe-sleeve portion 120 shown in FIG. 1A. The shoe-sleeve portion 220 has a connection side 220a corresponding to the inner edge 110b of the upper portion 110. Specifically, as shown in

FIGs. 4B and 4C, When the shoe-sleeve portion 220 is knitted to the last few rows (such as row 200~202), the loop A of the row 203 is simultaneously knitted with the loop B of the row 202 by the connection yarn 240 to form the first connection stitch 241 shown in FIG. 4C. Then, the loop C of the row 204 is simultaneously knitted with the loop D of the row 202 by the connection yarn 240 to form a second connection stitch. Similarly, the loop E of the row 205 is simultaneously knitted with the loop F of the row 202 by the connection yarn 240 to form a third connection stitch, and the loop G of the row 206 is simultaneously knitted with the loop H of the row 202 by the connection yarn 240 to form a fourth connection stitch. In such a manner, the shoe-sleeve portion 220 can be connected to the inner edge 110b of the upper portion 110 as shown in FIG. 4D. In this embodiment, the wales of the shoe-sleeve portion 220 are preferably arranged along the connection side 220a (or the inner edge 110b). Then, at least one yarn is knitted along the X direction to connect one end of the connection side 220a, and at least another one yarn is knitted along the X direction to connect the other end of the connection side 220a to form the pair of heel portions and the instep portion 112, which are connected to the connection side 220a of the shoe-sleeve portion 220. As such, the connection side 220a of the shoe-sleeve portion 220 is substantially completely connected to the inner edge 110b of the upper portion 110 without any sewing portion after the knitting process is completed, so the manufacturing process can be simplified by eliminating the cutting, sewing processes, and the material cost and the labor cost are also reduced.

[0031] In an embodiment, the shoe body-forming piece 100' can be formed by a method similar to the method shown in FIG. 1C. For example, as shown in FIG. 4E, the method of forming the shoe body-forming piece 100' may include the step (a) to the step (c), but the difference is that in the step (a), the number of the plurality of to-be-weaved loops (such as indicated by a~g) retained on the needle bed after the shoe-sleeve portion 220 is formed is substantially equal to the predetermined number of stitches, and the to-be-weaved loops a~g will be weaved to connect the upper portion 110.

[0032] In the step (b), outside one side of the shoe-sleeve portion 220 (such as the left side 220b on the drawing), at least one yarn is provided and knitted from left to right, preferably in a double knitting manner, to form the left heel portion 114' with a predetermined number of stitches, and the leftmost to-be-weaved loop a on the left side 220b of the shoe-sleeve portion 220 is simultaneously knitted. Next, outside the other side of the shoe-sleeve portion 220 (such as the right side 220c on the drawing), at least another one yarn is provided and simultaneously knitted with the rightmost to-be-weaved loop b on the right side 220b of the shoe-sleeve portion 220, and then knitted from left to right, preferably also in the double knitting manner, to form the right heel portion 114" with the same predetermined number of stitches. Then, from right to left, the right heel portion 114" is back-

wards knitted until reaching the to-be-weaved loop c on the right side 220c of the shoe-sleeve portion 220, and the to-be-weaved loop c is simultaneously knitted. When backwards knitting the left heel portion 114', the to-be-weaved loop d on the left side 220b of the shoe-sleeve portion 220 is simultaneously knitted, and then the left heel portion 114' is knitted from right to left to form. The knitting process is continued and repeated in a similar way to form the left heel portion 114' and the right heel portion 114", and the rest of the to-be-weaved loops e~i are sequentially knitted until the to-be-weaved loops a~i are respectively connected to the corresponding stitches a'~i' of the pair of heel portions 114', 114".

[0033] When the to-be-weaved loops a~i are respectively connected to the corresponding stitches a'~i' of the pair of heel portions 114', 114", the step (c) similar to FIG. 1C is performed, i.e. one of the at least two yarns of the pair of heel portions 114', 114" is continuously knitted to form the instep portion 112, so the instep portion 112 and the pair of heel portions 114', 114" are combined to form the upper portion 110. For example, when the stitch i' of the left heel portion 114' is simultaneously knitted with the corresponding to-be-weaved loop i of the shoe-sleeve portion 220, the yarn of the left heel portion 1.14' can be continuously knitted to connect the right heel portion 114" to form the instep portion 112, and the knitting is repeated back and forth to form the instep portion 112. The shoe body-forming piece 100' made by the above method is shown in FIG. 4A and characterized in that the pair of heel portions 114 are separately disposed on one side of the instep portion 112 to make the upper portion 110 have a substantially U-shaped configuration outlined by the perimeter edge 110a and the inner edge 110b, and the shoe-sleeve portion 220 has the connection side 220a substantially completely connected to the inner edge 110b, and a connection line 150' formed between the shoe-sleeve portion 220 and the upper portion 110 extends along the inner edge 110b.

[0034] As shown in FIG. 4D, when the shoe body-forming piece 100' is processed to form a shoe body 10', the upper portion 110 corresponds to a fore portion, a lateral portion, and a heel portion of a foot, and the shoe-sleeve portion 220 corresponds to an ankle portion of the foot. In an embodiment, the method of manufacturing the shoe body 10' includes: forming the shoe body-forming piece 100' as described above; sewing the pair of heel portions 114 together, so the inner edge 110b defines a shoe opening, and the upper portion 110 defines an inner space 12 for receiving the foot; and sewing two opposite ends 220b, 220c of the connection side 220a of the shoe-sleeve portion 220 together to define a shoe-sleeve opening 122. Specifically, the shoe body-forming piece 100' can be formed by the method of FIG. 4E, and the end portions 114a, 114b (shown in FIG. 4A) of the pair of heel portions 114 are sewed together, so the inner edge 110b of the U-shaped profile becomes a closed ring to define the shoe opening. Therefore, after the sewing process, the shoe body-forming piece 110 becomes a

three-dimensional structure defining the inner space 12 for receiving the foot, and the inner space 12 has an opening 14 on the bottom side. That is, the perimeter edge 110a defines the opening 14.

[0035] Moreover, the two opposite ends 220b, 220c (shown in FIG. 4A) of the shoe-sleeve portion 220, which are connected to the end portions 114a, 114b of the pair of heel portions 114, are sewed together, so the starting side that is opposite to the connection side 220a of the shoe-sleeve portion 220 becomes a closed ring defining the sleeve opening 122. In other words, the bottom side (i.e. connection side 220a) of the shoe-sleeve portion 220 is completely connected to the inner edge of the upper portion 110, so the shoe-sleeve portion 220 and the upper portion 110 are tightly connected. As such, when the foot is received in the inner space 12 by inserting through the sleeve opening 122, the protection to the ankle can be enhanced. Furthermore, the shoe body 10' can be combined with a sole structure to form a shoe in a way similar to FIGs. 2A and 2B.

[0036] In the above embodiments, the shoe-sleeve portion 120 or 220 is flat and has a substantial rectangular shape with two opposite technique surfaces formed by the double knitting manner, but not limited thereto. In another embodiment, as shown in FIG. 5A, a shoe-sleeve portion 320 can be formed by a tubular double knitting manner to have a seamless integral sleeve structure when the shoe-sleeve portion 320 is knitted. The shoe-sleeve portion 320 has a first knit surface 321 and a second knit surface 322. For example, the tubular double knitting manner includes: a step (a1), alternatively casting on the at least one yarn according to the predetermined number of stitches to form a first starting side 321a of the first knit surface 321; a step (a2), alternatively backwards casting on the at least one yarn according to the predetermined number of stitches to form a second starting side 322a of the second knit surface 322; a step (a3), knitting the at least one yarn to connect the first starting side 321a to form the first knit surface 321, backwards knitting the at least one yarn to connect the second starting side 322a to form the second knit surface 322, and repeatedly knitting the first knit surface 321 and the second surface 322; and a step (a4), after the shoe-sleeve portion 320 is formed, retaining a portion of a plurality of stitches of one of the first knit surface 321 and the second knit surface 322 as the plurality of to-be-weaved loops (such as indicated by a~e).

[0037] As shown in FIG. 5B, by using a double-bed flat knitting machine with changeable rail paths and cams, which drive the actions of needles, the knitting of the shoe-sleeve portion 320 and the upper portion 110 can be performed. In the step S10, forming the first starting side 321a and the second starting side 322a includes: casting on the at least one yarn to form the first starting side 321a in a manner of every two alternative stitches spaced by two empty needles; before forming the second starting side 322a, changing the first starting side 321a from the manner of every two alternative stitches spaced

by two empty needles to a manner of every two non-alternative stitches spaced by one empty needle. For example, during the first knitting period P1 in the step S10, from left to right, by using the cam at the first position 401, the at least one yarn is cast on the front needle bed and the back needle bed to form the first starting side 321a in the manner of every two alternative stitches spaced by two empty needles. That is, the first starting side 321a is arranged in an alternative manner, which refers to one stitch on the front needle bed, one stitch on the back needle bed, and two empty needles, then another one stitch on the front needle bed, one stitch on the back needle bed, and two empty needles, and so on. Next, by using the cam at the second position 402, the stitches on the back needle bed are moved to corresponding needles of the front needle bed, so the alternative manner (i.e. every two alternative stitches spaced by two empty needles) of the first starting side 321a is changed to the non-alternative manner (i.e. two non-alternative stitches spaced by one empty needle). That is, the non-alternative manner refers to two stitches on the front needle bed and one empty needle, then another two stitches on the front needle bed and one empty needle, and so on.

[0038] The step S10 further includes: backwards casting on the at least one yarn to form the second starting side 322a in the manner of every two alternative stitches spaced by two empty needles; changing the second starting side 322a from the manner of every two alternative stitches spaced by two empty needles to the manner of every two non-alternative stitches spaced by one empty needle; and changing the first starting side 321a from the manner of every two non-alternative stitches spaced by one empty needle back to the manner of every two alternative stitches spaced by two empty needles. For example, during the second knitting period P2 of the step S10, by using the cam at the first position 401, backwards knitting from right to left, the at least one yarn is cast on the front needle bed and the back needle bed to form the second starting side 322a in the manner of every two alternative stitches spaced by two empty needles. That is, the at least one yarn is backwards cast on the empty needles of the front and back needle beds, which are not occupied by the stitches of the first starting side 321a in the previous step, to form the second starting side 322a from right to left in the alternative manner, i.e. one stitch on the front needle bed, one stitch on the back needle bed, and two empty needles, then another one stitch on the front needle bed, one stitch on the back needle bed, and two empty needles, and so on. Then, by using the cam at the second position 402, the stitches on the front needle bed are moved to corresponding needles of the back needle bed, so the alternative manner (i.e. every two alternative stitches spaced by two empty needles) of the second starting side 322a is changed to the non-alternative manner (i.e. two non-alternative stitches spaced by one empty needle). That is, the non-alternative manner refers to two stitches on the back needle bed

and one empty needle, then another two stitches on the back needle bed and one empty needle, and so on. Next, by using the cam at the third position 403, the non-alternative manner (i.e. every two stitches spaced by one empty needle) of the first starting side 321a is changed back to the alternative manner (i.e. every two alternative stitches spaced by two empty needles). In other words, the stitches of the first starting side 321a, which are moved to the front needle bed in the previous step, are moved back to the back needle bed where they are originally cast on. Therefore, the steps (a1) and (a2) of forming the first starting side 321a and the second starting side 322a are completed. It is noted that during the backwards knitting, due to the reverse change of knitting path, the arrangement order of the cams is also reversed. That is, during the backwards knitting, the cam at the first position 401 used in the second knitting period P2 of the step S10 is the cam at the third position 403 which is not used in the first knitting period P1 of the step S10. The cam at the third position 403 used in the second knitting period P2 of the step S10 is the cam at the first position 401 used in the first knitting period P1 of the step S10. The cam at the second position 402 is remained in the same order of position.

[0039] In the step S11, the repeatedly knitting of the first knit surface 321 and the second knit surface 322 includes: before backwards knitting the second knit surface 322, changing the first knit surface 321 from the manner of every two alternative stitches spaced by two empty needles to the manner of every two non-alternative stitches spaced by one empty needle; changing the second starting side 322a from the manner of every two non-alternative stitches spaced by one empty needle back to the manner of every two alternative stitches spaced by two empty needles, and backwards knitting the second knit surface 322; before repeatedly knitting the first knit surface 321, changing the first knit surface 321 from the manner of every two non-alternative stitches spaced by one empty needle back to the manner of every two alternative stitches spaced by two empty needles to form the first knit surface 321; and before repeatedly knitting the second knit surface 322, changing the second knit surface 322 from the manner of every two non-alternative stitches spaced by one empty needle back to the manner of every two alternative stitches spaced by two empty needles to form the second knit surface 322.

[0040] For example, during the first knitting period P1 of the step S11, from left to right, by using the cam at the first position 401 (i.e. the cam at the third position 403 used in the second knitting period P2 of step S10), the at least one yarn is knitted in the manner of every two alternative stitches spaced by two empty needles to connect the first starting side 321a to form the first knit surface 321. Then, by using the cam at the second position 402 (i.e. the cam at the second position 402 used in the second knitting period P2 of step S10), the first knit surface 321 is changed from the manner of every two alternative stitches spaced by two empty needles to the manner of

every two non-alternative stitches spaced by one empty needle, i.e. the stitches of the first knit surface 321 on the back needle bed are moved the front needle bed. Next, by using the cam at the third position 403 (i.e. the cam at the first position 401 used in the second knitting period P2 of step S10), the second starting side 322a is changed from the manner of every two non-alternative stitches spaced by one empty needle to the manner of every two alternative stitches spaced by two empty needles, i.e. the stitches of the second starting side 322a, which are moved to the back needle bed in the previous step, are moved back to the front needle bed where they are originally cast on. During the second knitting period P2 of the step S11, backwards knitting from right to left, by using the cam at the first position 401 (i.e. the cam at the third position 403 used in the first knitting period P1 of step S11), the at least one yarn is knitted in the manner of every two alternative stitches spaced by two empty needles to connect the second starting side 322a to form the second knit surface 322. Then, by using the cam at the second position 402 (i.e. the cam at the second position 402 used in the first knitting period P1 of step S11), the second knit surface 322 is changed from the manner of every two alternative stitches spaced by two empty needles to the manner of every two non-alternative stitches spaced by one empty needle, i.e. the stitches of the second knit surface 322 on the front needle bed are moved the back needle bed. Next, by using the cam at the third position 403 (i.e. the cam at the first position 401 used in the first knitting period P1 of step S11), the first knit surface 321 is changed from the manner of every two non-alternative stitches spaced by one empty needle to the manner of every two alternative stitches spaced by two empty needles, i.e. the stitches of the first knit surface 321, which are moved to the front needle bed in the previous step, are moved back to the back needle bed. During the third knitting period P3 of the step S11, from left to right, by using the cam at the first position 401 (i.e. the cam at the third position 403 used in the second knitting period P2 of step S11), the at least one yarn is knitted in the manner of every two alternative stitches spaced by two empty needles to form the first knit surface 321. Then, by using the cam at the second position 402 (i.e. the cam at the second position 402 used in the second knitting period P2 of step S11), the first knit surface 321 is changed from the manner of every two alternative stitches spaced by two empty needles to the manner of every two non-alternative stitches spaced by one empty needle, i.e. the stitches of the first knit surface 321 on the back needle bed are moved the front needle bed. Next, by using the cam at the third position 403 (i.e. the cam at the first position 401 used in the second knitting period P2 of step S11), the second knit surface 322 is changed from the manner of every two non-alternative stitches spaced by one empty needle to the manner of every two alternative stitches spaced by two empty needles, i.e. the stitches of the second knit surface 322, which are moved to the back needle bed in the previous step,

are moved back to the front needle bed. The knitting processes performed in the second knitting period P2 and the third knitting period P3 of the step S11 are repeated to form the first knit surface 321 and the second knit surface 322, so the shoe-sleeve portion 320 having a three-dimensional seamless sleeve structure can be formed. It is noted that after the shoe-sleeve portion 320 is formed, at least a portion of the stitches of one of the first knit surface 321 and the second knit surface 322 is retained as the plurality of to-be-weaved loops a~e. For example, a plurality of stitches of the first knit surface 321 is retained as the to-be-weaved loops a~e. Therefore, the step (a4) is performed.

[0041] After the shoe-sleeve portion 320 of FIG. 5A is formed, the step (b) similar to FIG. 1C is performed, i.e. at least two yarns are provided on the left side of the shoe-sleeve portion 320 to form the left heel portion 114' and on the right side of the shoe-sleeve portion 320 to form the right heel portion 114", respectively. When the knitting of the pair of heel portions 114', 114" arrives the plurality of to-be-weaved loops a~e, the plurality of to-be-weaved loops a~e is simultaneously knitted with the corresponding stitches a'~e' of the left heel portion 114' and the right heel portion 114" to connect the pair of heel portions 114', 114" and the shoe-sleeve portion 320. When the to-be-weaved loops a~e are respectively connected to the corresponding stitches a'~e' of the pair of heel portions 114', 114", the step (c) similar to FIG. 1C is performed, i.e. one of the at least two yarns of the pair of heel portions 114', 114" is continuously knitted to form the instep portion 112, so the instep portion 112 and the pair of heel portions 114', 114" are combined to form the upper portion 110. For example, when the stitch e' of the left heel portion 114' is simultaneously knitted with the corresponding to-be-weaved loop e of the shoe-sleeve portion 320, the yarn of the left heel portion 114' can be continuously knitted to connect the right heel portion 114" to form the instep portion 112, and the knitting is repeated back and forth to form the instep portion 112. The shoe body-forming piece made by the above method is characterized in that the pair of heel portions 114', 114" are separately disposed on one side of the instep portion 112 to make the upper portion have a substantially U-shaped configuration outlined by the perimeter edge 110a and the inner edge 110b, and the shoe-sleeve portion 320 is a seamless integral three-dimensional sleeve structure and has a connection side 320a partially connected to the inner edge 110b. A connection line can be formed between the shoe-sleeve portion 320 and the upper portion 110 and extends at least partially along the inner edge 110b of the upper portion 110.

[0042] Although the preferred embodiments of the present invention have been described herein, the above description is merely illustrative. The preferred embodiments disclosed will not limit the scope of the present invention. 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 method for forming a shoe body-forming piece, comprising:

providing at least one yarn to knit a shoe-sleeve portion according to a predetermined number of stitches and retaining a plurality of to-be-weaved loops after the shoe-sleeve portion is formed; providing at least two yarns to knit a pair of symmetric heel portions respectively outside two sides of the shoe-sleeve portion; when the knitting of the pair of heel portions arrives the plurality of to-be-weaved loops, the plurality of to-be-weaved loops is simultaneously knitted to connect the pair of heel portions and the shoe-sleeve portion; and

continuously knitting one of the at least two yarns of the pair of heel portions to form an instep portion, so the instep portion and the pair of heel portions are combined to form an upper portion; when the knitting of the instep portion arrives the plurality of to-be-weaved loops, the plurality of to-be-weaved loops is simultaneously knitted to connect the instep portion and the shoe-sleeve portion.

2. The method of claim 1, wherein the number of the plurality of to-be-weaved loops is less than the predetermined number of stitches, so the shoe-sleeve portion is merely partially connected to the upper portion.

3. The method of claim 1, wherein the number of the plurality of to-be-weaved loops is equal to the predetermined number of stitches, so one side of the shoe-sleeve portion is substantially completely connected to the upper portion along an inner edge defined by the instep portion and the pair of heel portions.

4. The method of claim 1, wherein the shoe-sleeve portion is knitted by a tubular double knitting manner, so the shoe-sleeve portion has a first knit surface and a second knit surface, and the tubular double knitting manner includes:

alternatively casting on the at least one yarn according to the predetermined number of stitches to form a first starting side of the first knit surface; alternatively backwards casting on the at least one yarn according to the predetermined number of stitches to form a second starting side of the second knit surface;

knitting the at least one yarn to connect the first starting side to form the first knit surface, backwards knitting the at least one yarn to connect the second starting side to form the second knit surface, and repeatedly knitting the first knit surface and the second surface; and after the shoe-sleeve portion is formed, retaining a portion of a plurality of stitches of one of the first knit surface and the second knit surface as the plurality of to-be-weaved loops.

5. The method of claim 4, wherein the steps of forming the first starting side and the second starting side comprise:

casting on the at least one yarn to form the first starting side in a manner of every two alternative stitches spaced by two empty needles; before forming the second starting side, changing the first starting side from the manner of every two alternative stitches spaced by two empty needles to a manner of every two non-alternative stitches spaced by one empty needle; backwards casting on the at least one yarn to form the second starting side in the manner of every two alternative stitches spaced by two empty needles; changing the second starting side from the manner of every two alternative stitches spaced by two empty needles to the manner of every two non-alternative stitches spaced by one empty needle; and changing the first starting side from the manner of every two non-alternative stitches spaced by one empty needle back to the manner of every two alternative stitches spaced by two empty needles.

6. The method of claim 5, wherein the repeatedly knitting of the first knit surface and the second knit surface includes:

before backwards knitting the second knit surface, changing the first knit surface from the manner of every two alternative stitches spaced by two empty needles to the manner of every two non-alternative stitches spaced by one empty needle; changing the second starting side from the manner of every two non-alternative stitches spaced by one empty needle back to the manner of every two alternative stitches spaced by two empty needles, and backwards knitting the second knit surface; before repeatedly knitting the first knit surface, changing the first knit surface from the manner of every two non-alternative stitches spaced by one empty needle back to the manner of every

- two alternative stitches spaced by two empty needles to form the first knit surface; and before repeatedly knitting the second knit surface, changing the second knit surface from the manner of every two non-alternative stitches spaced by one empty needle back to the manner of every two alternative stitches spaced by two empty needles to form the second knit surface. 5
7. The method of claim 1, further comprising extending an inlaid strand through two opposite ends of the shoe-sleeve portion when the at least one yarn is knitted to form the shoe-sleeve portion. 10
8. The method of claim 7, further comprising pulling the inlaid strand tightly, so the two opposite ends of the shoe-sleeve portion is secured together by the inlaid strand, and the shoe-sleeve portion has a sleeve structure. 15
9. A shoe body-forming piece formed by the method of claim 1, **characterized in that:** 20
- the pair of heel portions are separately disposed on one side of the instep portion to make the upper portion have a substantially U-shaped configuration outlined by a perimeter edge and an inner edge; and 25
- the shoe-sleeve portion has a connection side at least partially connected to the inner edge, and a connection line is formed between the shoe-sleeve portion and the upper portion. 30
10. The shoe forming piece of claim 9, wherein the connection line extends along only a portion of the inner edge. 35
11. The shoe forming piece of claim 9, wherein the connection line extends substantially completely along the inner edge. 40
12. The shoe forming piece of claim 9, wherein an inlaid strand extends through two opposite ends of the shoe-sleeve portion perpendicular to the connection side; when the inlaid strand is pulled tightly, the two opposite ends of the shoe-sleeve portion is secured together by the inlaid strand, so the shoe-sleeve portion has a sleeve structure. 45
13. A shoe body-forming piece formed by the method of claim 4, **characterized in that:** 50
- the pair of heel portions are separately disposed on one side of the instep portion to make the upper portion have a substantially U-shaped configuration outlined by a perimeter edge and an inner edge; and 55
- the shoe-sleeve portion has a seamless integral

sleeve structure, and the shoe-sleeve portion is partially connected to the inner edge.

14. A shoe body-forming piece comprising an upper portion, the upper portion comprising an instep portion and a pair of heel portions separately disposed on one side of the instep portion to make the upper portion have a substantially U-shaped configuration outlined by a perimeter edge and an inner edge, **characterized in that:**

the shoe body-forming piece further comprises a shoe-sleeve portion, and the shoe-sleeve portion has a connection side at least partially connected to the inner edge;

the upper portion and the shoe-sleeve portion are knitted from at least one yarn to form a unitary knit construction with a plurality of courses and wales, so that the shoe body-forming piece does not have any sewing portion as the knitting process is completed; and

when the shoe body-forming piece is processed to form a shoe body, the upper portion corresponds to a fore portion, a lateral portion, and a heel portion of a foot, and the shoe-sleeve portion corresponds to an ankle portion of the foot.

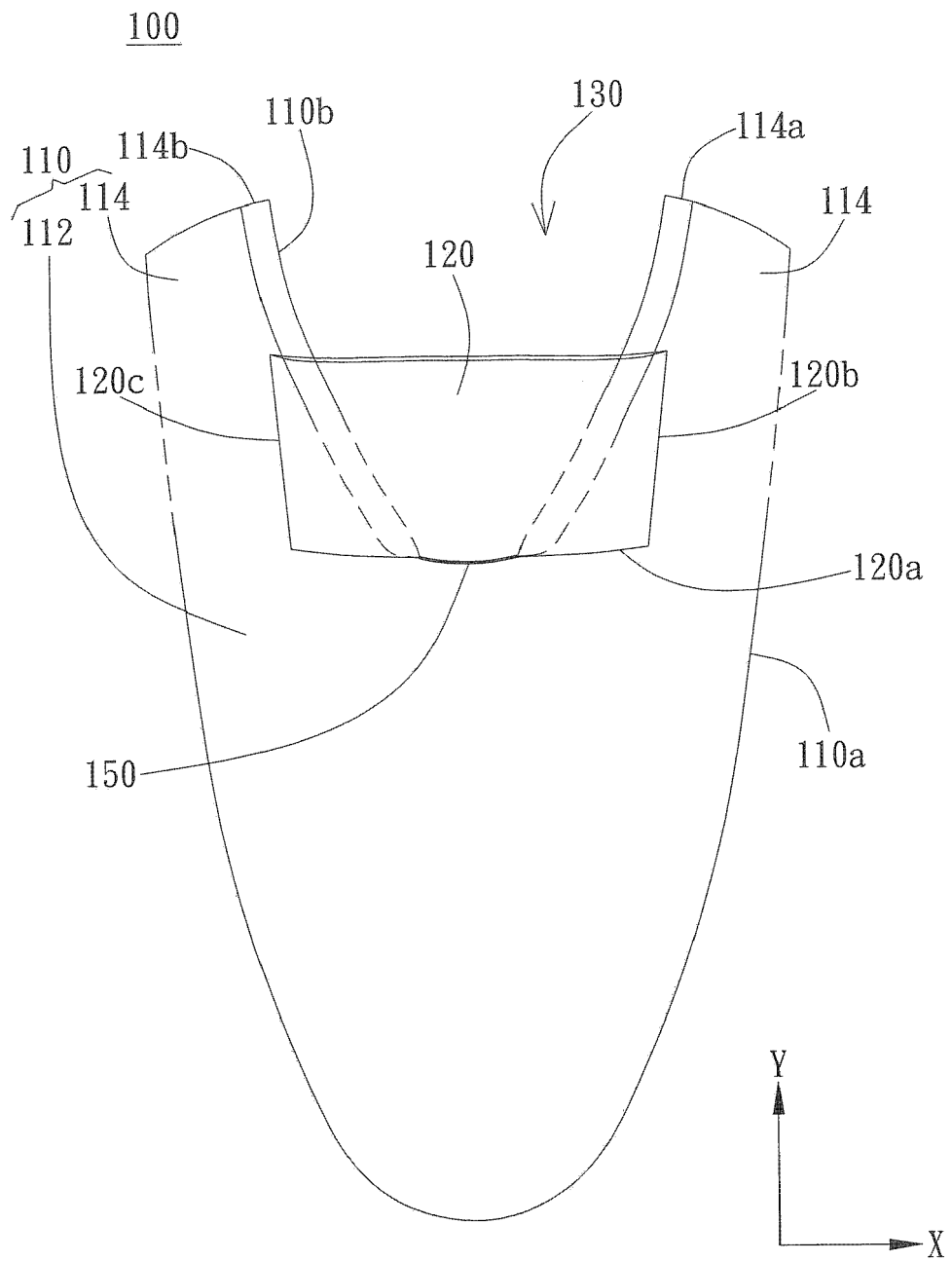


FIG. 1A

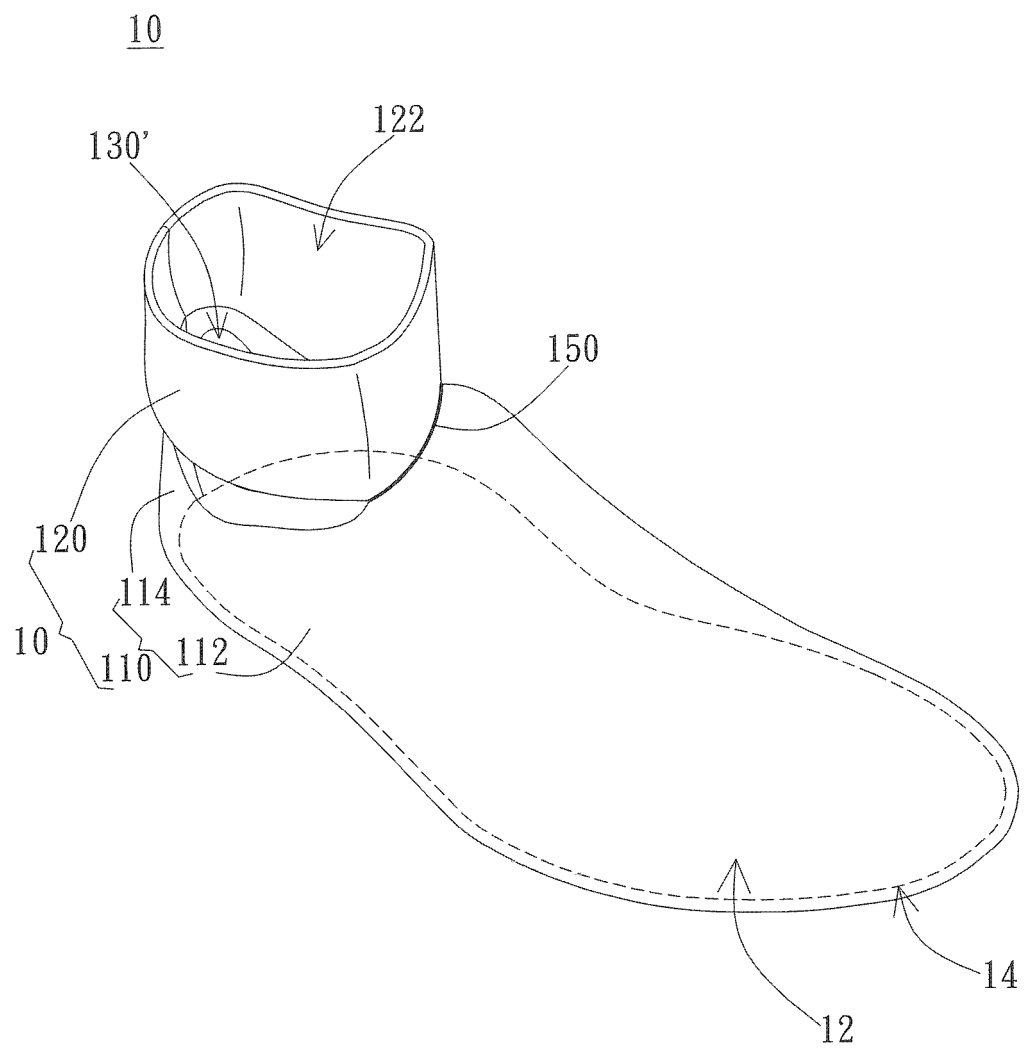


FIG. 1B

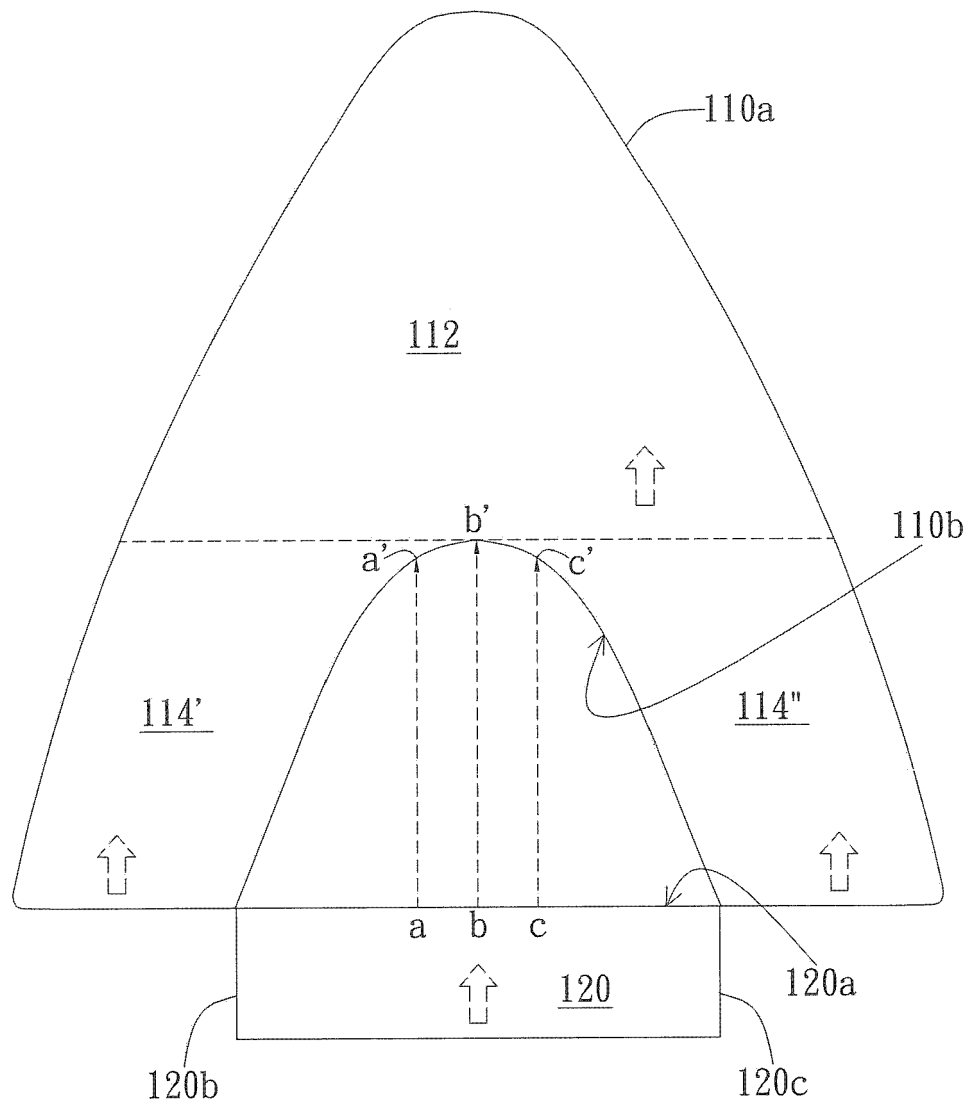


FIG. 1C

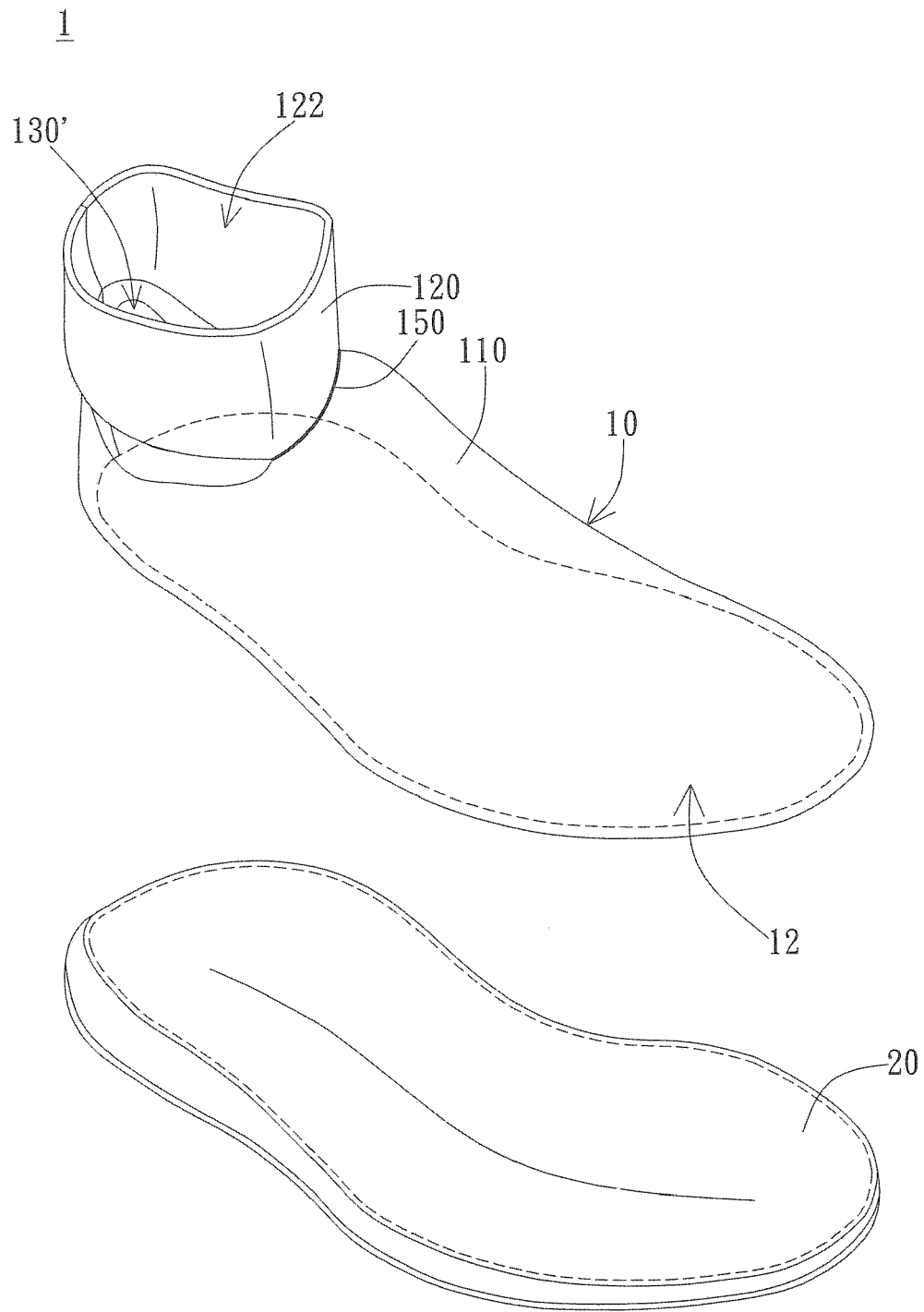


FIG. 2A

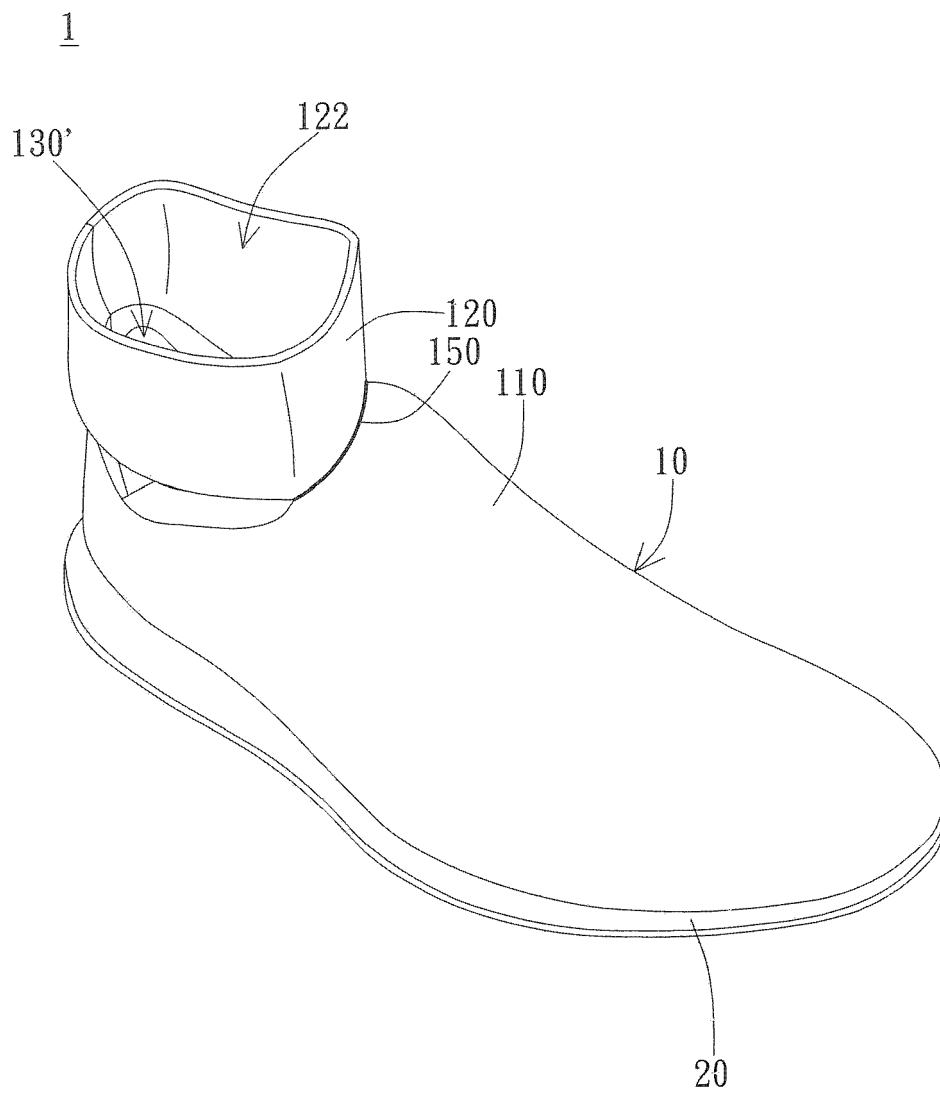


FIG. 2B

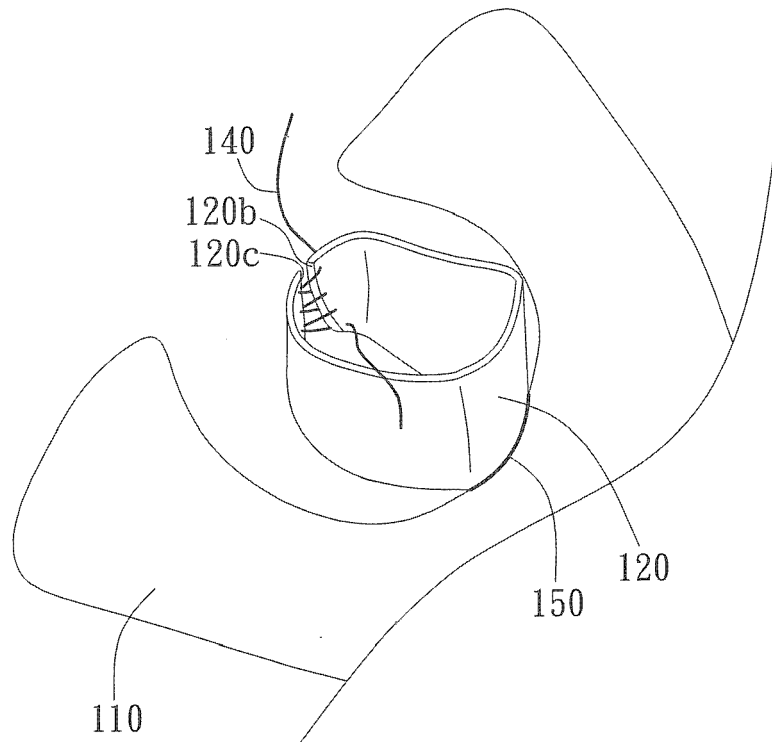


FIG. 3A

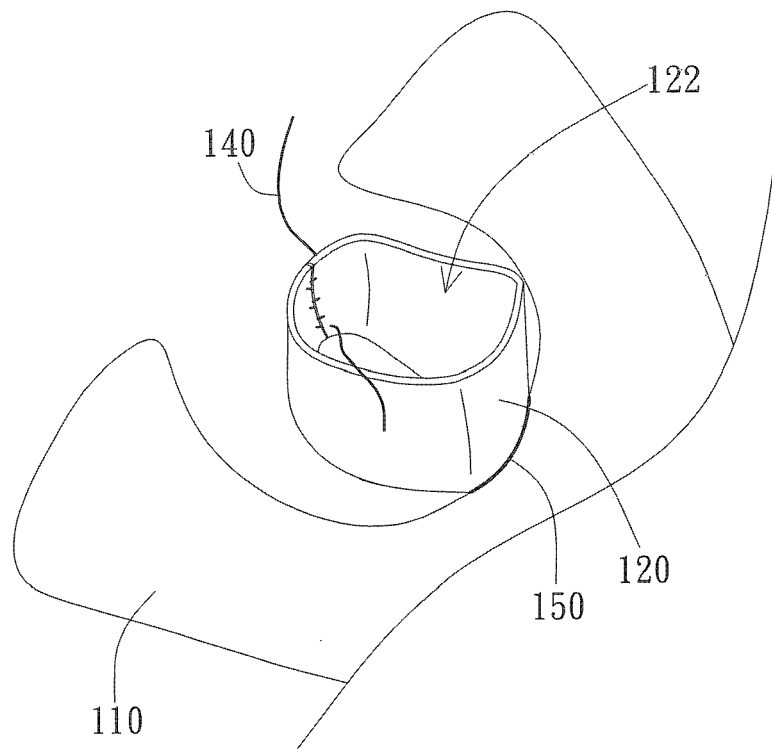


FIG. 3B

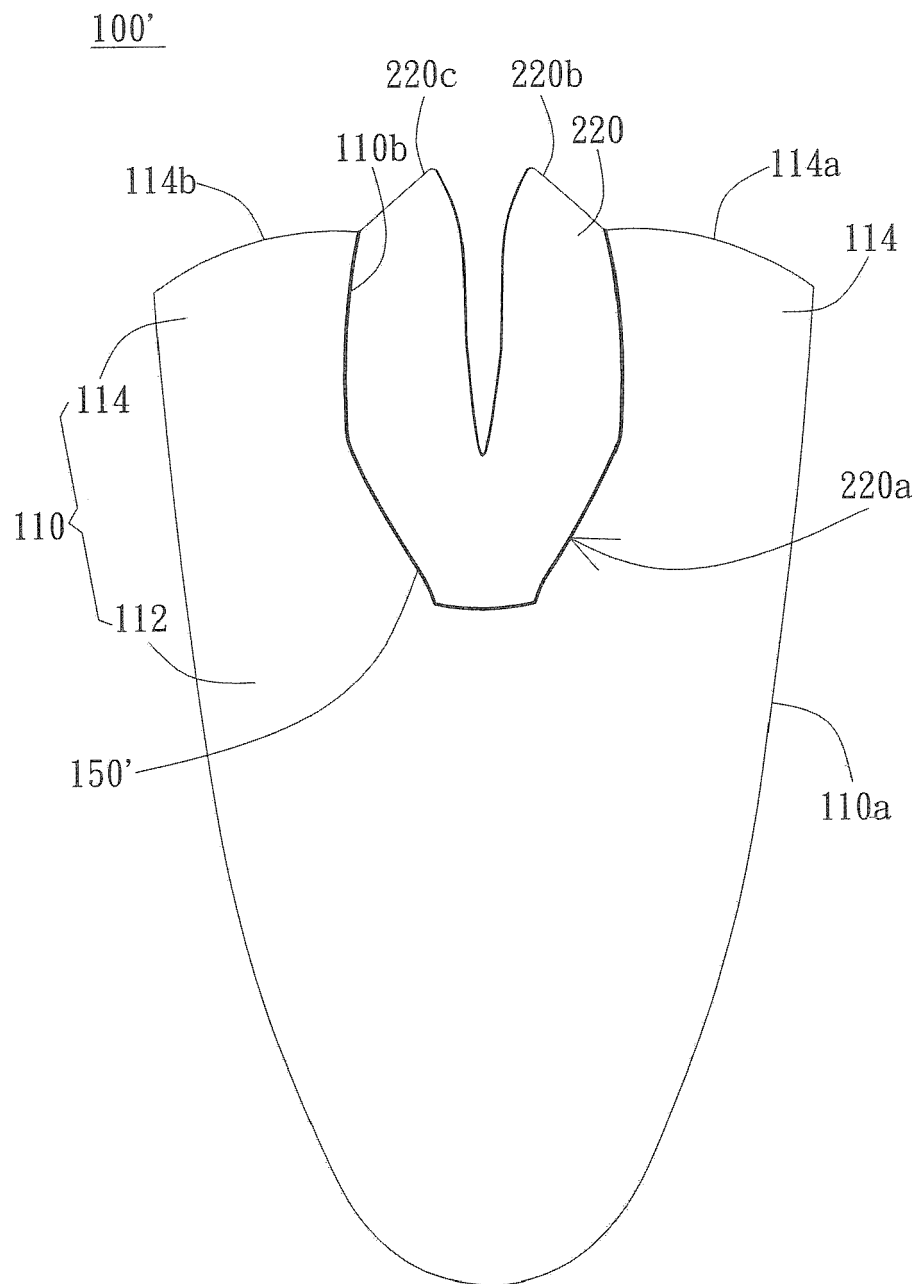


FIG. 4A

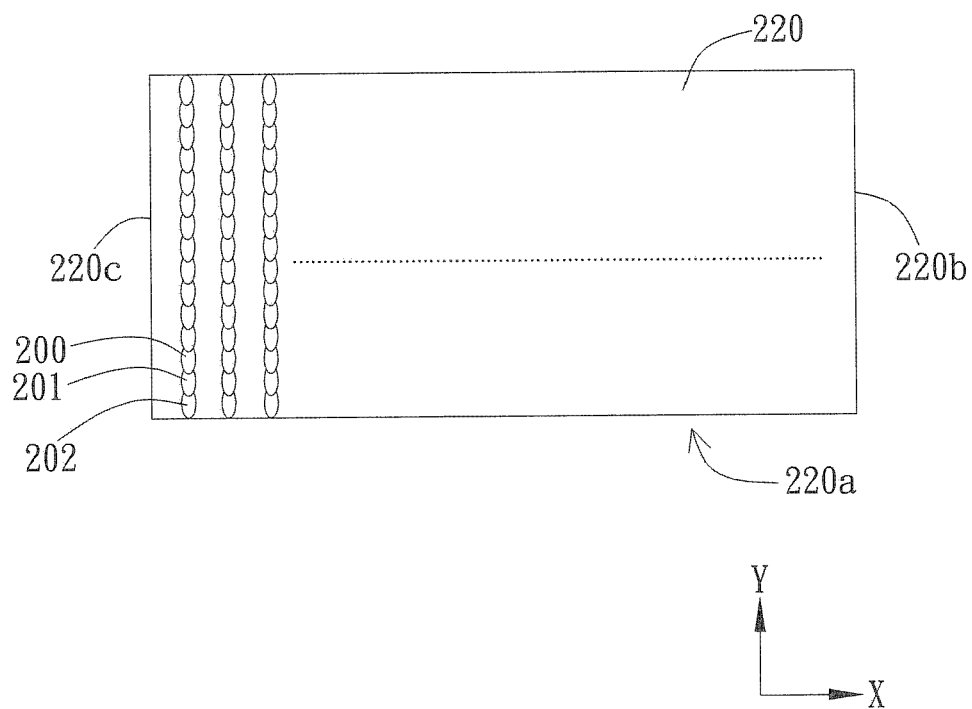


FIG. 4B

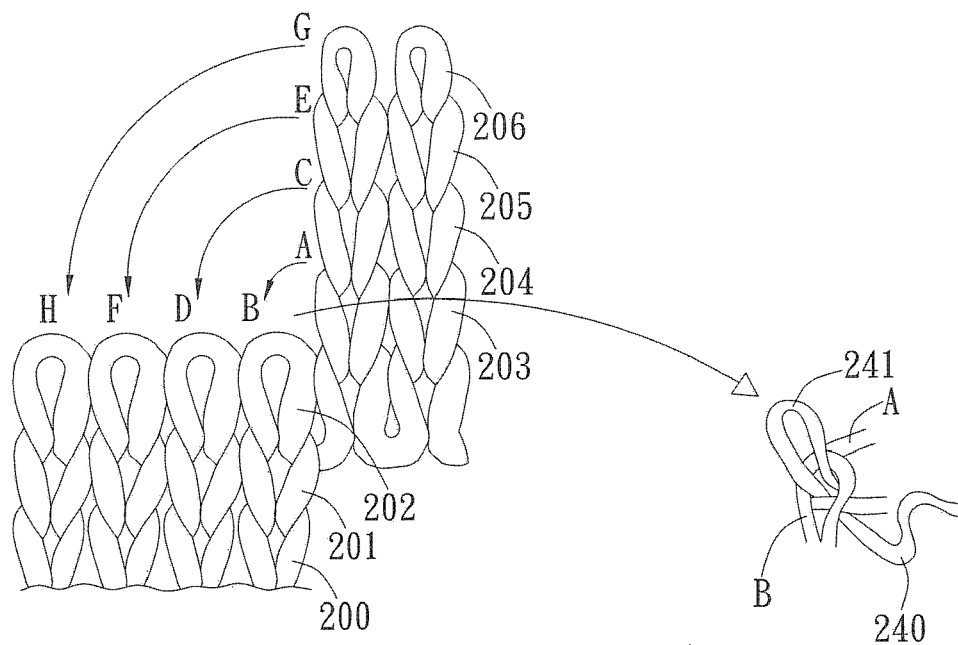


FIG. 4C

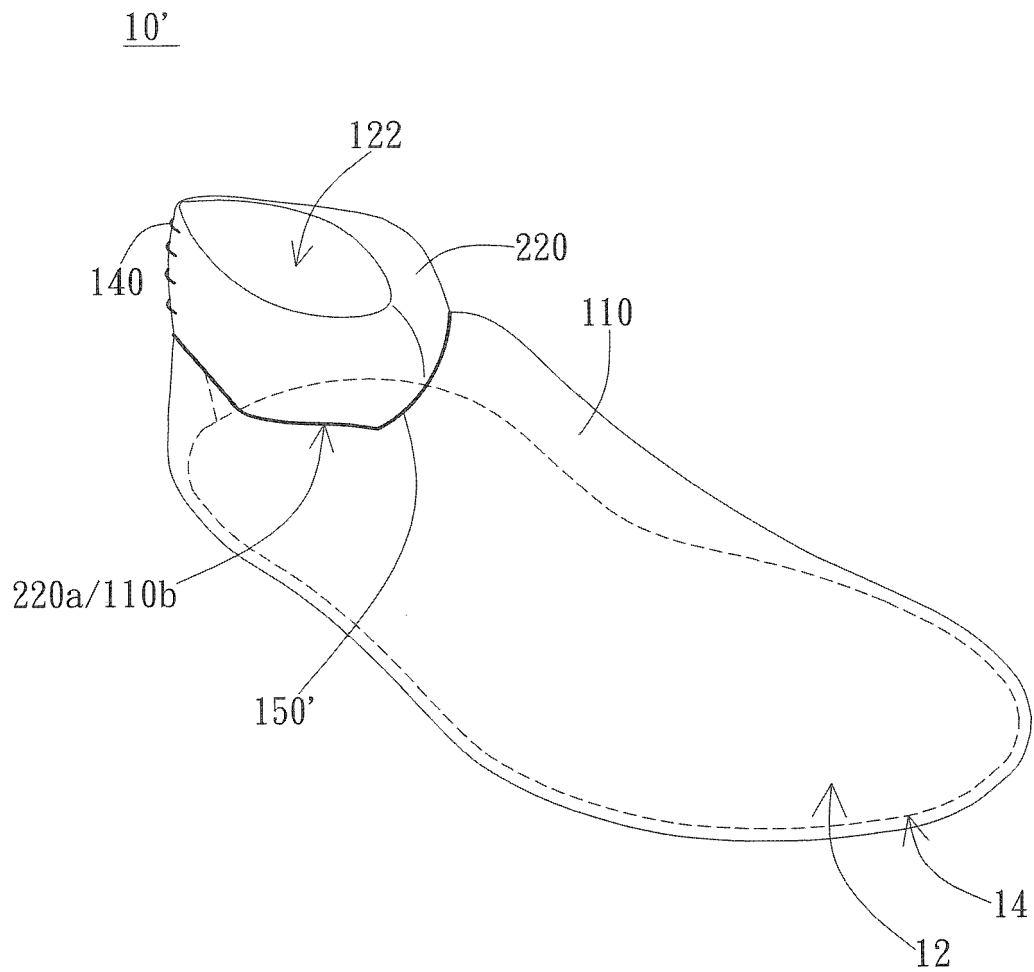


FIG. 4D

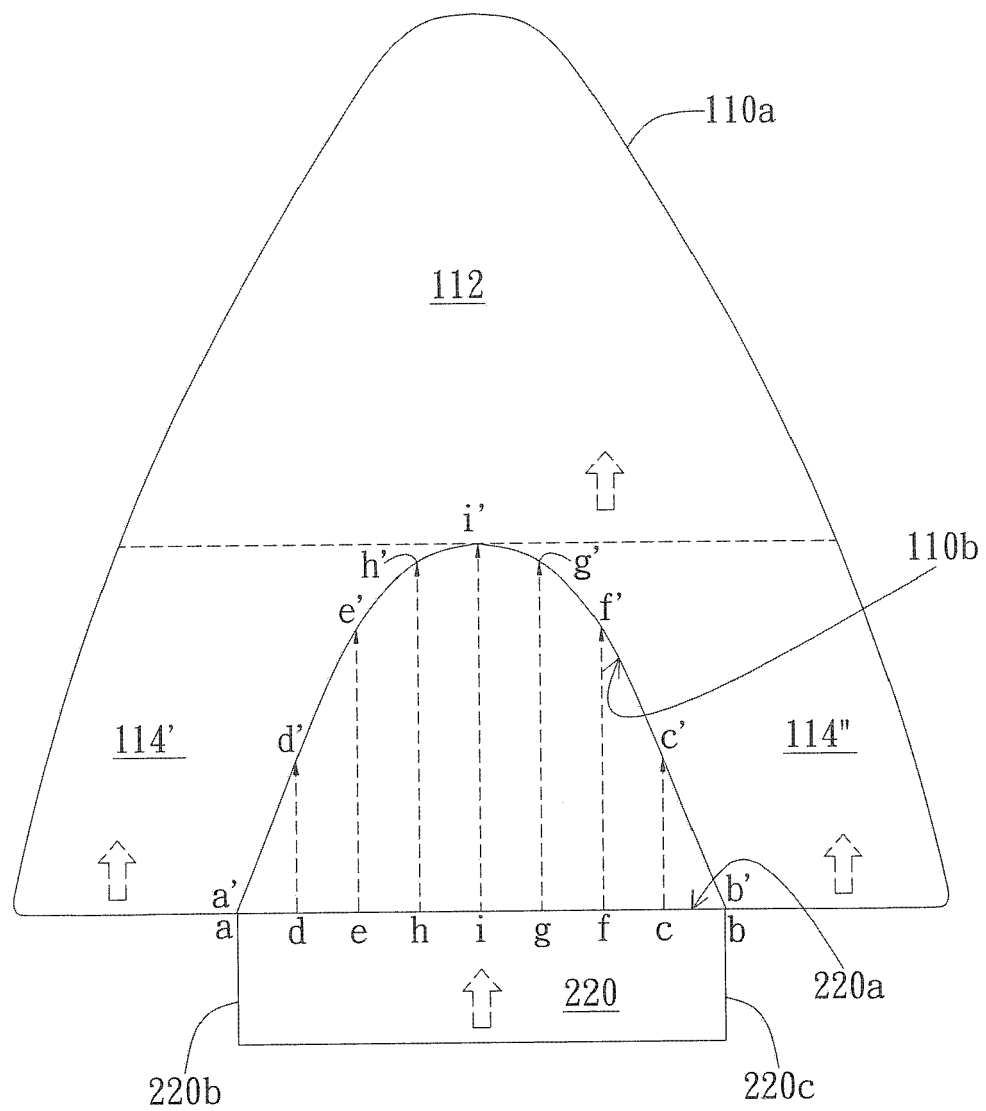


FIG. 4E

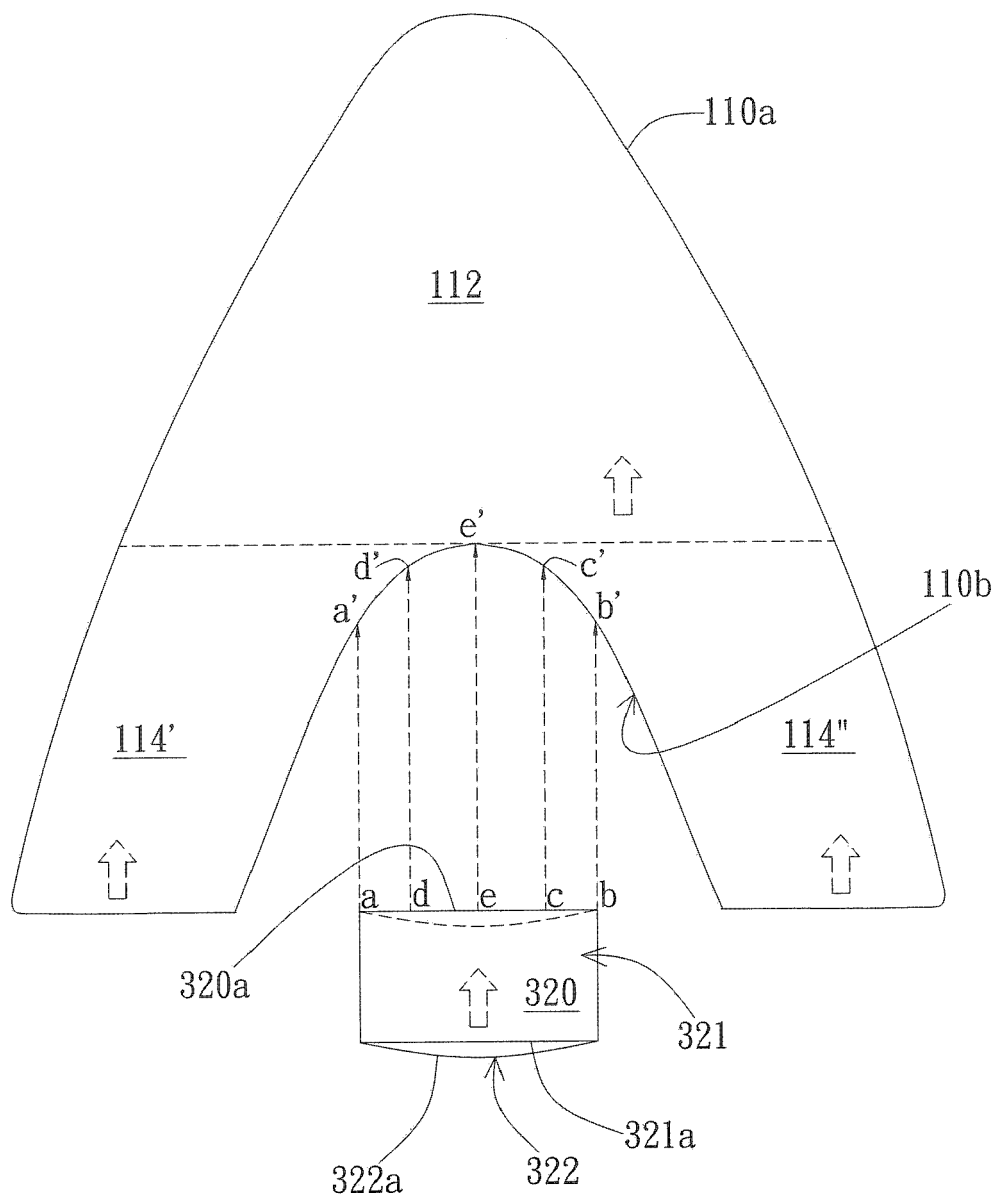


FIG. 5A

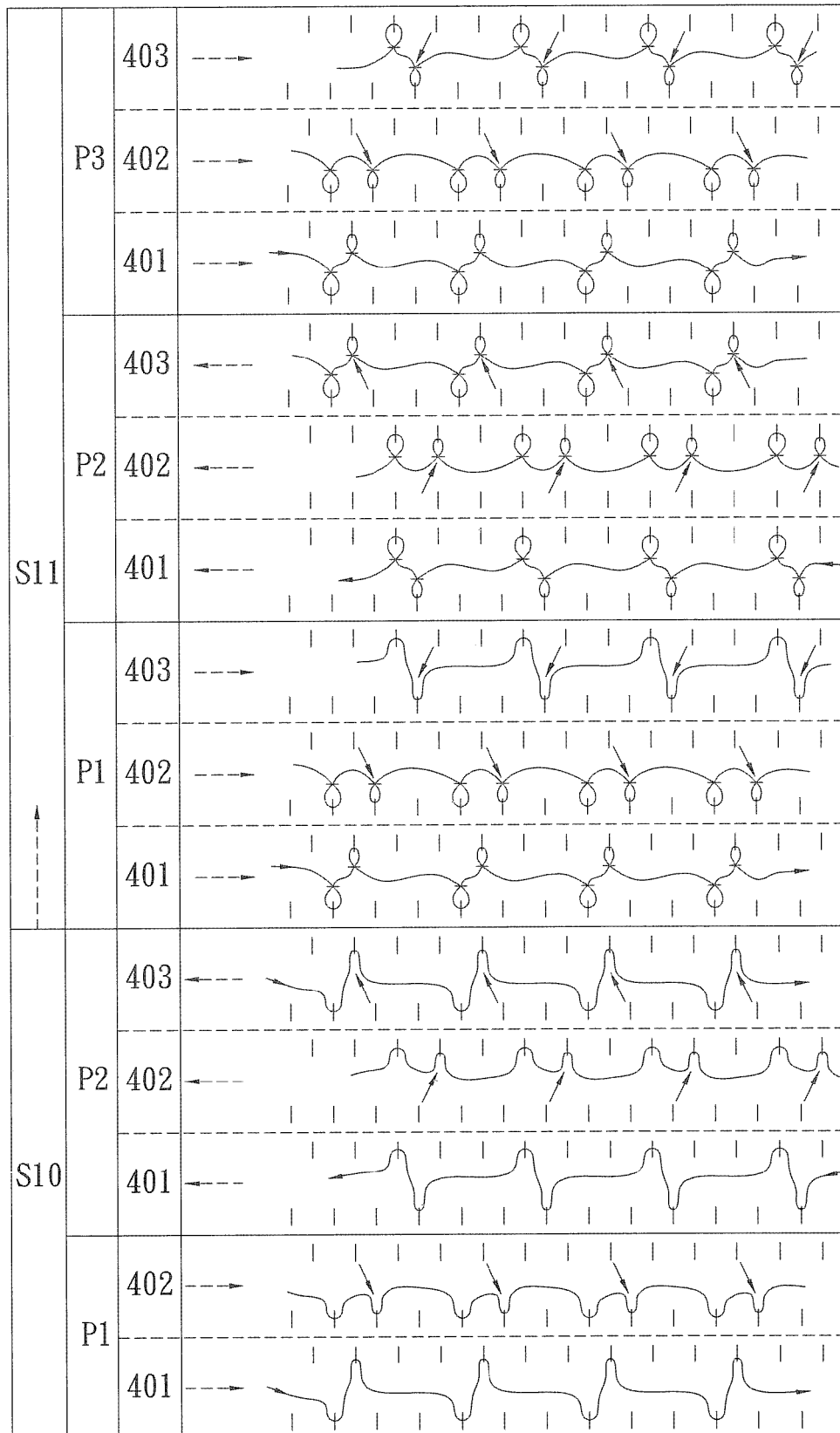


FIG. 5B



EUROPEAN SEARCH REPORT

Application Number
EP 17 16 8603

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X	US 2014/150296 A1 (DUA BHUPESH [US] ET AL) 5 June 2014 (2014-06-05)	1-3,7,9,10,13,14	INV. D04B1/10
Y	* paragraphs [0051] - [0055], [0068],	11	
A	[0137] - [0157]; figures 1-6, 7E, 25, 28, 31-36G *	4-6	ADD. A43B1/04
Y	EP 2 960 362 A1 (SHIMA SEIKI MFG [JP]) 30 December 2015 (2015-12-30) * paragraphs [0051] - [0052]; figures 1, 2 *	11	
A,P	WO 2016/123316 A2 (NIKE INNOVATE CV [US]) 4 August 2016 (2016-08-04) * paragraphs [0085] - [0090]; figures 14-17 *	8,12	
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			D04B A43B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 September 2017	Examiner Sterle, Dieter
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 16 8603

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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