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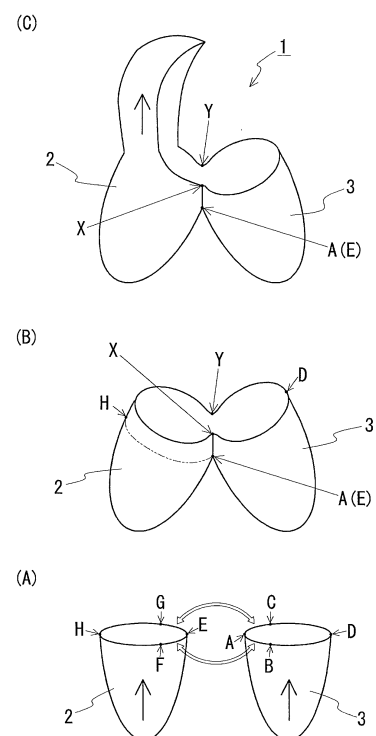
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(54) **FOOTWEAR KNITTING METHOD, FOOTWEAR MANUFACTURING METHOD, AND FOOTWEAR**

(57) Provided is a footwear knitting method for knitting footwear that partially has a two-layer structure. The footwear knitting method is a method for knitting footwear (1) provided with a base knitted fabric portion (2) that has a foot insertion opening (5), and is shape of an item of footwear, using a flat knitting machine. The footwear knitting method includes: starting knitting of the base knitted fabric portion (2) from a toe side or a heel side of the base knitted fabric portion (2) to complete the base knitted fabric portion (2) with a left side part and a right side part of the base knitted fabric portion (2) facing each other in a front-back direction of needle beds; knitting an additional knitted fabric portion (3) that is separate from the base knitted fabric portion (2), and is bag-shaped with one end open and the other end closed, before or during the knitting of the base knitted fabric portion (2); and joining, using double stitches, a part of an opening edge of the additional knitted fabric portion (3) with a toe-side edge part or a heel-side edge part of an edge of the foot insertion opening (5) of the base knitted fabric portion (2).

Fig. 2



EP 3 238 560 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a method for knitting footwear that is knitted seamlessly using a flat knitting machine, a footwear manufacturing method, and footwear.

BACKGROUND ART

[0002] Techniques for seamlessly knitting footwear such as shoe uppers and socks using a flat knitting machine are known. For example, Patent Document 1 discloses footwear provided with a base knitted fabric portion that has an opening and has a shape of an item of footwear that covers a foot of a wearer, and a method for knitting the same. In Patent Document 1, similar to the base knitted fabric portion, an additional knitted fabric portion that has a shape of an item of footwear is further knitted. The additional knitted fabric portion and the base knitted fabric portion are coupled to each other at a portion serving as a foot insertion opening. Accordingly, by folding the additional knitted fabric portion into the base knitted fabric portion, it is possible to produce footwear that has a two-layer structure. Footwear that has a two-layer structure is superior in strength, and can withstand long periods of use.

PRIOR ART DOCUMENT

PATENT DOCUMENT

[0003] [Patent Document 1] WO 2013/108506A

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0004] Knitted footwear has advantages such as being lightweight and thin, and having flexibility to not be excessively tight on the foot of a wearer. Particularly, women's footwear such as pumps require flexibility, which leads to improved foot comfort. Accordingly, there is demand for footwear that has a two-layer structure only in a part that requires strength and not for footwear that overall has a two-layer structure like the footwear of Patent Document 1.

[0005] The present invention was made in view of the above-described circumstances, and it is an object of the present invention to provide a footwear knitting method for knitting footwear that partially has a two-layer structure. Furthermore, it is another object of the present invention to provide a footwear manufacturing method for manufacturing footwear that partially has a two-layer structure, and footwear that is obtained by this footwear manufacturing method.

MEANS OF SOLVING THE PROBLEMS

[0006] An aspect of the present invention relates to a footwear knitting method for knitting footwear provided with a base knitted fabric portion that has a foot insertion opening, and is formed in a shape of an item of footwear that covers a foot of a wearer, using a flat knitting machine provided with a front needle bed and a back needle bed that face each other in a front-back direction. In the footwear knitting method of the present invention, knitting of the base knitted fabric portion is started from a toe side or a heel side of the base knitted fabric portion to complete the base knitted fabric portion with a left side part and a right side part of the base knitted fabric portion facing each other in the front-back direction of the needle beds, and an additional knitted fabric portion that is separate from the base knitted fabric portion, and is bag-shaped with one end open and the other end closed is knitted before or during the knitting of the base knitted fabric portion. Then, a part of an opening edge of the additional knitted fabric portion is joined to a toe-side edge part or a heel-side edge part of an edge of the foot insertion opening of the base knitted fabric portion, using double stitches.

[0007] An aspect of the present invention relates to a footwear manufacturing method including a preparation step, a folding step, and a fixation step. The preparation step is a step of preparing footwear that is obtained by the footwear knitting method of the present invention. The folding step is a step of folding over the additional knitted fabric portion of the footwear so that a part of the base knitted fabric portion is in a two-layer state in which the base knitted fabric portion and the additional knitted fabric portion overlap each other. The fixation step is a step of fixing the additional knitted fabric portion to the base knitted fabric portion to maintain the two-layer state.

[0008] According to one aspect of the footwear manufacturing method of the present invention, in the folding step, the additional knitted fabric portion may be laid on an outer side of the base knitted fabric portion.

[0009] An aspect of the present invention relates to a footwear provided with a base knitted fabric portion that has a foot insertion opening, and has a shape of an item of footwear that covers a foot of a wearer. The footwear of the present invention includes an additional knitted fabric portion that is bag-shaped with one end open and the other end closed, the additional knitted fabric portion having a part of an opening edge that is joined to a toe-side edge part or a heel-side edge part of an edge of the foot insertion opening of the base knitted fabric portion. The base knitted fabric portion and the additional knitted fabric portion are joined to each other using double stitches, and the base knitted fabric portion partially has a two-layer region in which the additional knitted fabric portion that has been folded over to overlap the base knitted fabric portion.

EFFECTS OF THE INVENTION

[0010] According to the footwear knitting method of the present invention, it is possible to knit an additional knitted fabric portion for forming a two-layer region in which knitted fabrics overlap each other in two layers in a toe part or a heel part of the base knitted fabric portion in a shape of an item of footwear.

[0011] According to the footwear manufacturing method of the present invention, only by folding over the additional knitted fabric portion knitted as per the above-described knitting method, and fixing the additional knitted fabric portion to the base knitted fabric portion, it is possible to produce footwear that has the two-layer region in the toe part or the heel part of the base knitted fabric portion.

[0012] According to the footwear manufacturing method of the present invention in which the additional knitted fabric portion is laid on the outer side of the base knitted fabric portion, it is possible to make the additional knitted fabric portion visible from the outside of the footwear, and to serve as a part of the design of the footwear. For example, it is possible to vary the design of the footwear by adjusting the size of the additional knitted fabric portion, or by knitting the additional knitted fabric portion with knitting yarn of a different color from that of the knitting yarn used for the base knitted fabric portion. Furthermore, it may be possible to use the additional knitted fabric portion to hide a place such as a joint part that is aesthetically unpleasant depending on the design, by laying the additional knitted fabric portion on the outer side of the base knitted fabric portion.

[0013] The footwear according to the present invention is reinforced partially in the toe part or the heel part by the two-layer region, and thus footwear whose characteristics as knit products such as being lightweight, thin, and flexible are not impaired is realized.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

FIG. 1 is a diagram schematically illustrating a configuration of a shoe upper in the shape of a pump according to an embodiment.

FIGS. 2 illustrate schematic diagrams of a procedure of knitting the shoe upper of the embodiment.

FIG. 3 is a diagram illustrating knitting steps of a procedure in which a base knitted fabric portion and an additional knitted fabric portion are joined to each other.

MODE FOR CARRYING OUT THE INVENTION

[0015] Hereinafter, embodiments of the present invention will be described with reference to the drawings.

<Embodiment 1>

«Footwear»

[0016] FIG. 1 shows footwear (a shoe upper) 1 in the shape of a pump. The footwear 1 is provided with a base knitted fabric portion 2 that has a foot insertion opening 5 and is formed in a shape of an item of footwear, and an additional knitted fabric portion 3 (see the hatched portion) that is laid on a toe part of the base knitted fabric portion 2. The base knitted fabric portion 2 is constituted by a sole cover 20 that covers the sole of a foot of a wearer, and an instep cover 21 that covers the instep-side portion of the wearer. The part of the base knitted fabric portion 2 that has the same shape as the additional knitted fabric portion 3 is present on the inner side of the additional knitted fabric portion 3, although this part is not visible in FIG. 1. By attaching an outer sole with a heel to the bottom of the footwear 1, it is possible to produce a pump.

[0017] The base knitted fabric portion 2 and the additional knitted fabric portion 3 are knitted into one piece seamlessly using a flat knitting machine. The additional knitted fabric portion 3 is joined by being knitted to a part, on the toe side, of the edge of the foot insertion opening 5 formed in the base knitted fabric portion 2. Here, in FIG. 1, black arrows indicate positions that are essential for knitting. The capital letters added to the black arrows correspond to the letters shown in FIGS. 2 and 3, which will be referenced in a later description of a footwear knitting method.

[0018] Knitting yarn for knitting the base knitted fabric portion 2 and the additional knitted fabric portion 3 is not particularly limited, and in this example, knitting yarn that contains thermal fusion yarn is used to knit both portions 2 and 3. Knitting yarn containing thermal fusion yarn allows the footwear 1 to be molded in a desired shape as a result of the footwear 1 being fitted into a shoe last and subjected to thermal treatment.

[0019] The base knitted fabric portion 2 and the additional knitted fabric portion 3 are fixed so as not to be shifted in position with respect to each other. Both portions 2 and 3 may be fixed to each other by adhesion using thermal fusion yarn, adhesion using an adhesive agent, or sewing. Both adhesion and sewing may also of course be used to fix the portions 2 and 3 to each other.

[0020] «Footwear knitting method»

[0021] An example of a method for knitting the footwear 1 will be described with reference to the schematic diagrams in FIGS. 2. In FIGS. 2, letters are added to positions that are essential for knitting the footwear 1. Furthermore, in FIGS. 2, thick arrows indicate the directions in which knitting proceeds (the directions are the same as the orientation of stitches). The flat knitting machine used in knitting may be a two-bed flat knitting machine that includes a front needle bed and a back needle bed, and in which a stitch can be transferred between the front and the back needle beds. A flat knitting machine, such as a four-bed flat knitting machine, other than the two-

bed flat knitting machine may also of course be used to knit the footwear 1.

[0022] First, as shown in FIG. 2(A), knitting of the base knitted fabric portion 2 is started from the toe side of the base knitted fabric portion 2, and the knitting is performed until a part of the opening 5 is formed. The part, on the front side of the drawing, of the base knitted fabric portion 2 corresponds to the right side part of the base knitted fabric portion 2, and the part, on the rear side of the drawing, of the base knitted fabric portion 2 corresponds to the left side part of the base knitted fabric portion. The right side part is knitted with the front needle bed of the flat knitting machine, and the left side part is knitted with the back needle bed. Accordingly, a line E-F-H of an end part, in the wale direction, of the base knitted fabric portion 2 is held on the front needle bed, and a line E-G-H is held on the back needle bed. When knitting the base knitted fabric portion 2, it is preferable to gradually increase the knitting width of the base knitted fabric portion 2 from the toe so that the toe side part of the base knitted fabric portion 2 conforms to the shape of a foot.

[0023] Furthermore, in addition to the above-described base knitted fabric portion 2, the additional knitted fabric portion 3 that is bag-shaped with one end open and the other end closed is also knitted as shown in FIG. 2 (A). The additional knitted fabric portion 3 of this example is knitted into the shape of a bag whose starting end is closed. The starting end of the additional knitted fabric portion 3 is arranged on the toe side of the footwear 1 shown in FIG. 1, and thus it is preferable to gradually increase the knitting width of the additional knitted fabric portion 3 from the starting end to the termination end. A line A-B-D of the additional knitted fabric portion 3 is held on the front needle bed, and a line A-C-D is held on the back needle bed. Knitting of the additional knitted fabric portion 3 may be performed before or during the knitting of the base knitted fabric portion 2.

[0024] Then, a line B-D-C of the additional knitted fabric portion 3 is subjected to a bind-off process, and the base knitted fabric portion 2 and the additional knitted fabric portion 3 are gradually joined to each other while increasing the number of knitting courses of the base knitted fabric portion 2 (see FIG. 3 which will be described later). As a result, as shown in FIG. 2(B), a part of the opening edge of the additional knitted fabric portion 3 is joined to a toe-side edge part of the edge of the foot insertion opening 5 (see FIG. 1) of the base knitted fabric portion 2. Both ends X and Y of the joint part in which the base knitted fabric portion 2 and the additional knitted fabric portion 3 are joined to each other correspond to the positions of X and Y that are shown in FIG. 1.

[0025] The method for joining the base knitted fabric portion 2 and the additional knitted fabric portion 3 is not particularly limited as long as it is a joining method that uses double stitches. An example of the joining method will be described with reference to the diagram of FIG. 3 showing knitting steps. In the example of knitting shown in FIG. 3, the base knitted fabric portion 2 and the addi-

tional knitted fabric portion 3 are gradually joined to each other while increasing the number of knitting courses of the base knitted fabric portion 2. In FIG. 3, "S + numeric character" denotes a knitting step number, "FB" denotes the front needle bed, and "BB" denotes the back needle bed.

[0026] S0 shows the state of stitches held on the needle beds at the time of FIG. 2(A). From this state, stitches of the B-D-C of the additional knitted fabric portion 3 that are indicated by dotted lines in S1 are subjected to the bind-off process. "Bind-off process" refers to a well-known knitting process for repeatedly performing a process in which adjacent stitches are overlapped each other to form a double stitch, and a stitch that is contiguous in its wale direction with the double stitch is formed, so as to remove stitches at an end, in the wale direction, of the additional knitted fabric portion 3 from a needle bed.

[0027] Then, as shown by two-way arrows in S1, adjacent stitches of the base knitted fabric portion 2 and the additional knitted fabric portion 3 that are held on the FB (BB) are overlapped each other (see S2). Note here that, when the stitches of the respective portions 2 and 3 are overlapped each other, the additional knitted fabric portion 3 may be moved to the base knitted fabric portion 2 side as shown in S2, or in contrast to the shown example, the base knitted fabric portion 2 may be moved to the additional knitted fabric portion 3 side.

[0028] As shown in S2, after the double stitches indicated by double circles have been formed, a row of stitches, as shown by a C-shaped two-way arrow, that are contiguous in the wale direction with the stitches of the base knitted fabric portion 2 that include the double stitches is knitted. By performing such C-shaped knitting, the double stitches are fixed, and a part of the base knitted fabric portion 2 and a part of the additional knitted fabric portion 3 are joined to each other. Thereafter, by repeatedly performing the process in which the additional knitted fabric portion 3 is moved to the base knitted fabric portion 2 side to form double stitches on the respective FB and BB, and a row of stitches that are contiguous in the wale direction with the stitches of the base knitted fabric portion 2 that include the double stitches is knitted, it is possible to join the base knitted fabric portion 2 to the additional knitted fabric portion 3 using the double stitches. Since the joint part that is formed by joining the base knitted fabric portion 2 to the additional knitted fabric portion 3 of course includes the double stitches, it is possible to view the double stitches by looking at the footwear 1.

[0029] When, as shown in FIG. 2(B), the joining of the base knitted fabric portion 2 and the additional knitted fabric portion 3 is complete, the remaining part of the base knitted fabric portion 2 is knitted as shown in FIG. 2(C). The remaining part of the base knitted fabric portion 2 can be knitted using a C-shaped knitting method with the FB and the BB, or the like. By appropriately increasing or decreasing the knitting width of the remaining part, it is possible to obtain the base knitted fabric portion 2 that

conforms to the shape of a foot.

<<Footwear Manufacturing Method>>

[0030] When the footwear 1 shown in FIG. 2(C) is obtained as per the above-described footwear knitting method, the additional knitted fabric portion 3 is folded so as to be turned inside out, and is laid on the outer side of the toe part of the base knitted fabric portion 2, so that the toe part is in a two-layer state in which the base knitted fabric portion 2 and the additional knitted fabric portion 3 overlap each other. Laying the additional knitted fabric portion 3 on the outer side of the base knitted fabric portion 2 makes the additional knitted fabric portion 3 visible from the outside of the footwear 1, and to serve as a part of the design of the footwear 1. For example, it is possible to vary the design of the footwear 1 by adjusting the size of the additional knitted fabric portion 3, or by knitting the additional knitted fabric portion 3 with knitting yarn of a different color from that of the knitting yarn used for the base knitted fabric portion 2.

[0031] The orientation of the stitches of the base knitted fabric portion 2 and the orientation of the stitches of the additional knitted fabric portion 3 that is laid on the base knitted fabric portion 2 are identical. This is because the base knitted fabric portion 2 and the additional knitted fabric portion 3 were knitted as per the method for knitting the footwear 1 that has been described with reference to FIGS. 2 and 3.

[0032] Note here that it is also possible to fold the additional knitted fabric portion 3 into the base knitted fabric portion 2 so that the additional knitted fabric portion 3 is arranged on the inner side of the toe portion of the base knitted fabric portion 2. In this case, the additional knitted fabric portion 3 is not visible from the outside of the footwear 1, making it possible to obtain footwear 1 of a simple design.

[0033] Lastly, by fitting the footwear 1 into the shoe last and subjecting it to thermal treatment, the footwear 1 shown in FIG. 1 is complete. Here, the thermal fusion yarn that is contained in the knitting yarn with which the base knitted fabric portion 2 is knitted and in the knitting yarn with which the additional knitted fabric portion 3 is knitted is fused to fix the additional knitted fabric portion 3 to the base knitted fabric portion 2. As a result, the footwear 1 that maintains the two-layer state in which the base knitted fabric portion 2 and the additional knitted fabric portion 3 overlap each other is obtained. Note here that an adhesive agent may be applied between the base knitted fabric portion 2 and the additional knitted fabric portion 3, or the thermally treated footwear 1 may be sewn, in order to maintain the two-layer state.

«Effects»

[0034] The above-described footwear 1 is reinforced partially in the toe part by the additional knitted fabric portion 3. The footwear 1 that is reinforced partially in the

toe, which requires strength, has the advantages of knit products such as being thin, lightweight, and flexible, and is superior in foot comfort.

5 <Embodiment 2>

[0035] In Embodiment 1, knitting of the footwear 1 is started from the position that corresponds to the toe of the footwear 1 (base knitted fabric portion 2). In contrast, it is also possible to start knitting the footwear 1 from the position that corresponds to the heel of the footwear 1 (base knitted fabric portion 2) shown in FIG. 1, and to form an additional knitted fabric portion at the position of the heel. In this case, it is preferable that the heel side part of the base knitted fabric portion 2 be knitted, the bag-shaped additional knitted fabric portion 3 that is to be joined to this heel side part be knitted, and a heel-side edge part of the edge of the foot insertion opening 5 of the base knitted fabric portion 2 and a part of the opening edge of the additional knitted fabric portion 3 be joined to each other. The joining method may be the same as in Embodiment 1.

<Others>

[0036] Footwear that is provided with an additional knitted fabric portion that partially reinforces a base knitted fabric portion may be a sock. Examples of such socks include short socks that only extend near the malleolus of a wearer.

DESCRIPTION OF REFERENCE NUMERALS

[0037]

- 1 Footwear
- 2 Base knitted fabric portion
- 20 Sole cover
- 21 Instep cover
- 3 Additional knitted fabric portion
- 5 Foot insertion opening

Claims

1. A footwear knitting method for knitting footwear provided with a base knitted fabric portion that has a foot insertion opening, and is formed in a shape of an item of footwear that covers a foot of a wearer, using a flat knitting machine provided with a front needle bed and a back needle bed that face each other in a front-back direction, the method comprising:

starting knitting of the base knitted fabric portion from a toe side or a heel side of the base knitted fabric portion to complete the base knitted fabric portion with a left side part and a right side part

of the base knitted fabric portion facing each other in the front-back direction of the needle beds; knitting an additional knitted fabric portion that is separate from the base knitted fabric portion, and is bag-shaped with one end open and the other end closed, before or during the knitting of the base knitted fabric portion; and joining, using double stitches, a part of an opening edge of the additional knitted fabric portion to a toe-side edge part or a heel-side edge part of an edge of the foot insertion opening of the base knitted fabric portion.

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2. A footwear manufacturing method comprising:

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a preparation step of preparing footwear that is obtained by the footwear knitting method according to claim 1;

a folding step of folding over the additional knitted fabric portion of the footwear so that a part of the base knitted fabric portion is in a two-layer state in which the base knitted fabric portion and the additional knitted fabric portion overlap each other; and

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a fixation step of fixing the additional knitted fabric portion to the base knitted fabric portion to maintain the two-layer state.

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3. The footwear manufacturing method according to claim 2, wherein, in the folding step, the additional knitted fabric portion is laid on an outer side of the base knitted fabric portion.

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4. A footwear provided with a base knitted fabric portion that has a foot insertion opening, and has a shape of an item of footwear that covers a foot of a wearer, comprising:

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an additional knitted fabric portion that is bag-shaped with one end open and the other end closed, the additional knitted fabric portion having a part of an opening edge that is joined to a toe-side edge part or a heel-side edge part of an edge of the foot insertion opening of the base knitted fabric portion,

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wherein the base knitted fabric portion and the additional knitted fabric portion are seamlessly joined to each other using double stitches, and the base knitted fabric portion partially has a two-layer region in which the additional knitted fabric portion that has been folded over to overlap the base knitted fabric portion.

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Fig. 1

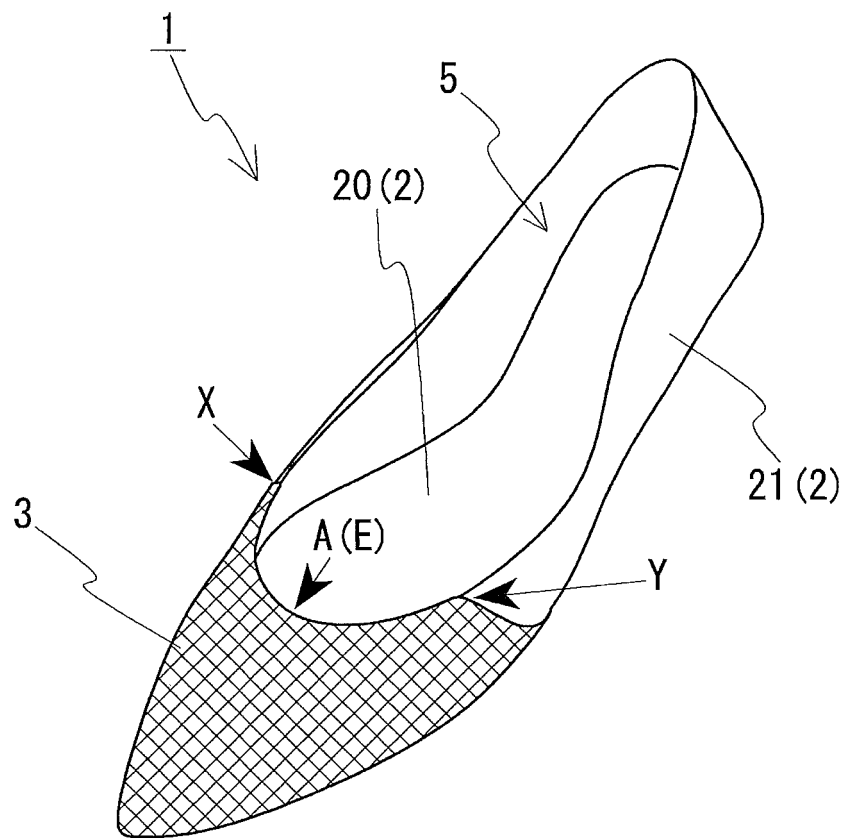


Fig. 2

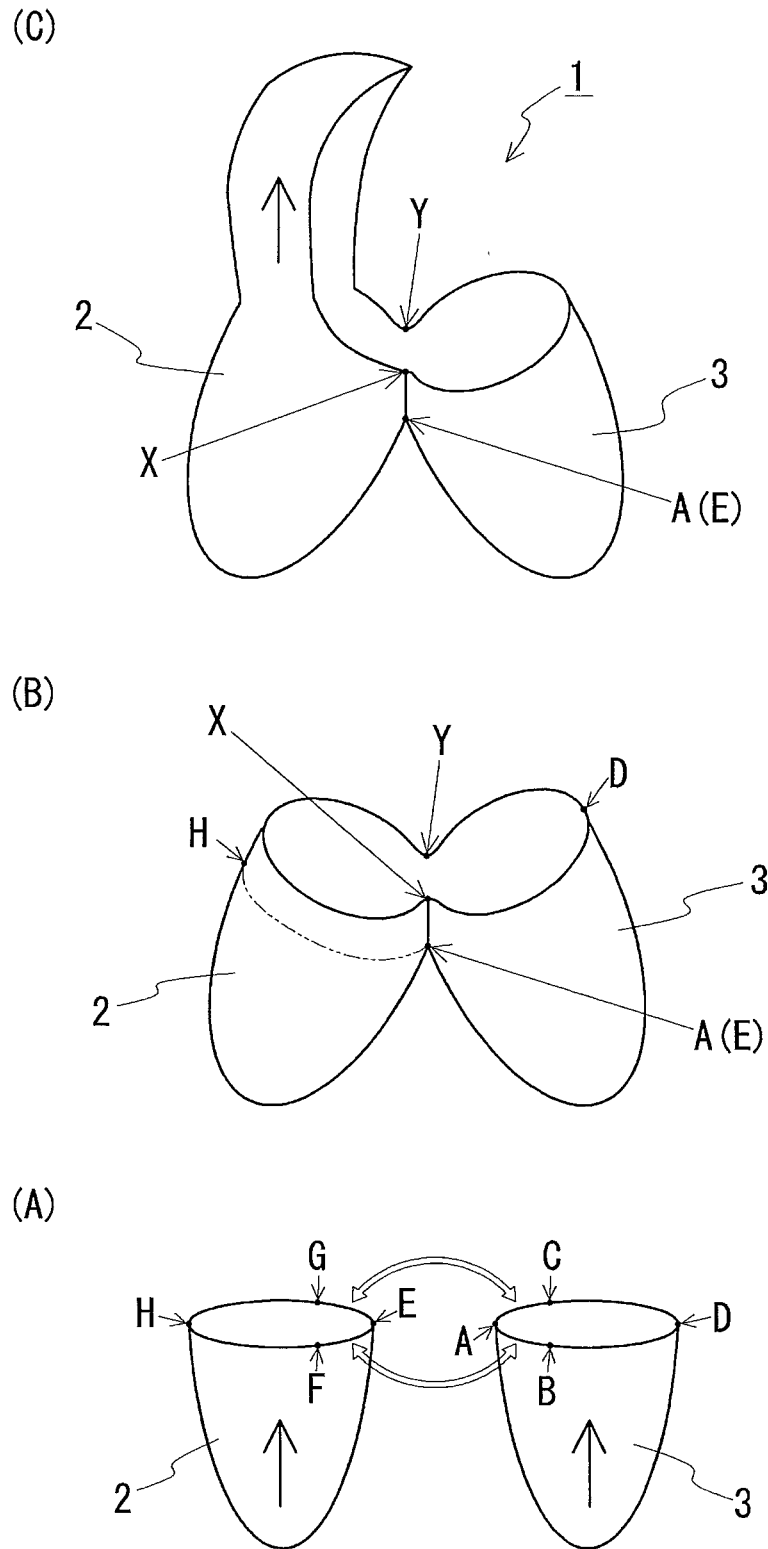
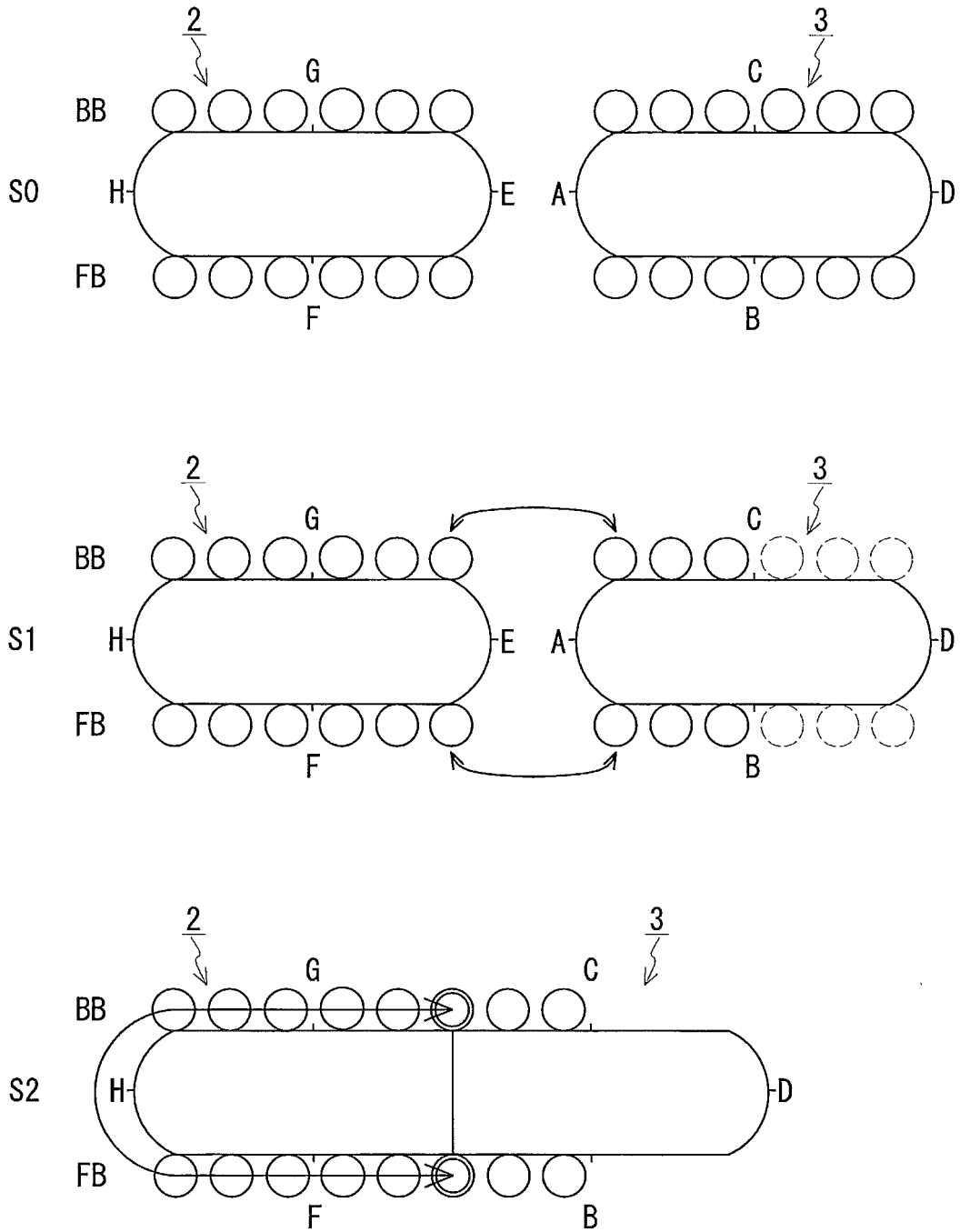


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/083712

A. CLASSIFICATION OF SUBJECT MATTER

A43B23/02(2006.01)i, A41B11/00(2006.01)i, D04B1/22(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A43B23/02, A41B11/00, D04B1/22

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2016

Kokai Jitsuyo Shinan Koho 1971-2016 Toroku Jitsuyo Shinan Koho 1994-2016

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2013/108506 A1 (Shima Seiki Mfg., Ltd.), 25 July 2013 (25.07.2013), entire text; all drawings & US 2015/0107307 A1 & EP 2805638 A1 & CN 104066350 A & KR 10-2014-0105032 A	1-4
A	JP 2014-210178 A (Adidas AG), 13 November 2014 (13.11.2014), entire text; all drawings & US 2014/0310985 A1 & EP 2792260 A2 & DE 102013207153 A & CN 104106872 A	1-4
A	JP 3865307 B2 (Mizuno Inc.), 10 January 2007 (10.01.2007), entire text; all drawings (Family: none)	1-4

 Further documents are listed in the continuation of Box C.
 See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
10 February 2016 (10.02.16)Date of mailing of the international search report
01 March 2016 (01.03.16)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/083712

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2001-234401 A (Unebi Co., Ltd.), 31 August 2001 (31.08.2001), entire text; all drawings (Family: none)	1-4
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 59399/1980 (Laid-open No. 160905/1981) (Datsushiyuman Kabushiki Kaisha), 30 November 1981 (30.11.1981), entire text; all drawings (Family: none)	1-4
A	JP 2006-530 A (Keika YAMAMOTO), 05 January 2006 (05.01.2006), entire text; all drawings (Family: none)	1-4
A	EP 0632972 A1 (CALZIFICIO GI-EMME di PEDRINI G. MARIO & C.S.n.c.), 11 January 1995 (11.01.1995), entire text; all drawings & DE 69400558 C	1-4

Form PCT/ISA/210 (continuation of second sheet) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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