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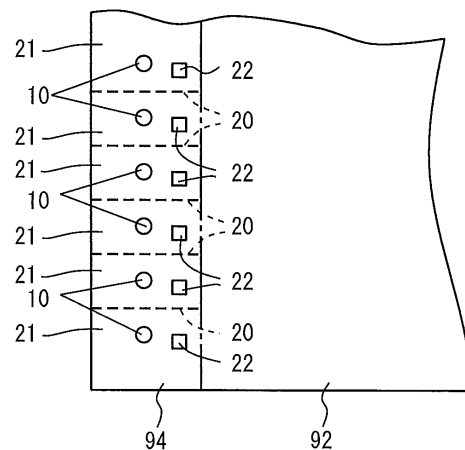
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(54) **SHOE UPPER**

(57) A shoe upper comprising a knitted fabric has tubular portions having axial directions parallel to a tongue of the shoe upper, being knitted tubularly, and having shoelace holes. The tubular portions are filled with a filler so that the knitted fabric of the tubular portions is reinforced. The knitted fabric around the shoelace holes may be easily reinforced.

FIG. 9



Description

Technical Field

[0001] The present invention relates to a shoe upper made of a knitted fabric and particularly relates to reinforcing shoelace holes.

Background Art

[0002] Some of shoe uppers for sports shoes, sneakers, trekking boots, other boots, and the like are made of knitted fabrics in order to reduce the traditional processes such as cutting and sewing for making shoe uppers of woven fabrics. For example, Patent Document 1 (JP 2013-220357A) proposes shoe uppers made of knitted fabrics with polymer material coatings on required portions thereof so as to restrict the stretchabilities of the knitted fabrics. Furthermore, it proposes multilayer polymer coatings on the shoelace hole portions to reinforce the portions.

[0003] Patent Document 2 (JP 2008-266854A) is a prior patent filed by the applicant and proposes to knit hollow knitted fabrics and to fill the hollow portions with cushion materials, heat insulating materials, heat retaining materials, or the like so as to impart to the knitted fabrics desired properties such as cushioning properties or heat retaining properties.

Citation List

Patent Literatures

[0004]

Patent Document 1: JP 2013-220357A

Patent Document 2: JP 2008-266854A

Summary of the Invention

Problems to be Solved by the Invention

[0005] The shoelace holes of shoe uppers are repeatedly subjected to strong forces from the shoelaces, and the knitted fabrics without reinforcement are sometimes split from the holes. For this problem, when the multilayer polymer coatings proposed by Patent Document 1 are performed, accurate coating technology for performing coatings according to the desired patterns is needed, and the number of processes increases due to the multi-layer coatings. Further, the original textures of the knitted fabrics of the shoe uppers are lost.

[0006] It is an object of the present invention to reinforce the knitted fabrics around the shoelace holes easily.

Means for Solving the Problem

[0007] A shoe upper according to the present invention

is made of at least a knitted fabric,

in the knitted fabrics, tubular portions knitted seamlessly and tubularly, having a closed periphery, having an inside space, and extending in a direction joining a toe and an ankle are provided, the tubular portions have shoelace holders provided with shoelace holes, the tubular portions are filled with a filler and the knitted fabric around the shoelace holes is reinforced.

[0008] The tubular portions comprise a front knitted fabric and a rear knitted fabric and are knitted tubularly. Inside the tubes, at least a filler is filled, and the knitted fabrics are reinforced around the shoelace holes. Furthermore, it is not necessary to perform coatings plural times to reinforce the knitted fabrics. A pair of the tubular portions are provided on both sides of the tongue, and the axial directions of the tubular portions are parallel to the direction of the tongue (direction joining the toe and the ankle).

[0009] Preferably, the filler contains a thermofusing or thermosetting synthetic resin, and in either case, the synthetic resin is fused and adhering to the knitted fabrics of the tubular portions. The synthetic resin in the filler is fused and adhering to the knitted fabrics to reinforce the knitted fabrics around the shoelace holes. The fusion of the synthetic resin in the tubular portions generates at least a structure which supports a shoelace and reinforces the knitted fabrics around the shoelace holes. By selecting a heating temperature, type, and the like of the synthetic resin, degree of swelling and elasticity of the tubular portions are controlled from a state where the tubular portions are hardened in a shape of a plate or film and are slightly swollen to a state where the synthetic resin is made foam-like (cushion-like), and the tubular portions swell and have substantial elasticity. Furthermore, with adjusting the material of the synthetic resin and the heating temperature, the synthetic resin is prevented from leaking onto the surface of the tubular portions, and the original texture of the knitted fabrics is maintained.

[0010] Preferably, the filler containing a thermofusing synthetic resin or a thermosetting synthetic resin is injected in a string form or a fibrous form, while may be injected in a bead form or a powder form. Although a filler in a liquid form may be injected, the liquid may leak onto the surface of the knitted fabrics and damage the texture of the knitted fabrics. In any case, it is preferable to inject the filler with an air stream.

[0011] The tubular portions have a length of, for example, about a several centimeters, and it is not easy to uniformly fill the tubular portions with the filler. Whether injection is uniform or not affects whether the tubular portions uniformly swell and have a uniform thickness or not, or whether the tubular portions have a uniform hardness or not. Accordingly, by dividing each tubular portion into a plurality of sections and injecting each section with a filler, a uniform filling is easily performed, because the range of one filling is made smaller. In order to provide the sections, it is preferable to intersect knitting yarns of

the front and rear knitted fabrics so as to close the tube, or to bind the front and rear knitted fabrics with tucks or the like. Note that a filling machine including a plurality of injection nozzles may also be used to perform uniform filling.

[0012] Preferably, the tubular portions are respectively provided with at least an inlet through which the filler is injected. The inlets are formed in a knitted structure of a mesh structure or the like having holes in the tubular portions, and the holes serve as the inlets. Thus, the injection nozzles may be inserted into the tubular portions without damaging the knitted fabric. Note that, if the gauge of the knitted fabric is wide and the size of the stitches is sufficiently larger than the diameter of the nozzles, the nozzles may be inserted into the stitches without the inlets. Note that the diameter of the nozzles may be smaller if fibers are injected, but may be larger if beads or the like are injected.

[0013] Preferably, the tubular portions are further provided with collars that enclose the ankle. This shoe upper includes the collars and the shoelace holders that are filled with a filler or fillers and may be easily knitted on a flat knitting machine or the like.

[0014] Further preferably, the collars are filled with an elastic filler, and the shoelace holders are filled with a filler including a thermally-fused synthetic resin or a thermally-set synthetic resin. In this shoe upper, the collars are elastic, and the shoelace holders are strong to support the shoelace and are durable.

[0015] Particularly preferably, tubular stretch stoppers extending from the shoelace holders into both side surfaces of the shoe upper are further provided in the tubular portions, and the stretch stoppers are filled with a filler that includes a thermally-fused synthetic resin or a thermally-set synthetic resin. In this shoe upper, the stretch stoppers prevent the deformation of the shoelace holders that are pulled by the shoelace.

Brief Description of Drawings

[0016]

FIG. 1 is a plan view of a shoe upper according to an embodiment.

FIG. 2 is a cross-sectional view of a tubular portion having a shoelace hole, along the short side direction thereof.

FIG. 3 is a plan view of a shoe upper according to the best embodiment.

FIG. 4 is a diagram illustrating the stitch structure in the tubular portion according to the best embodiment.

FIG. 5 is a diagram illustrating a manufacturing procedure for the tubular portions having shoelace holes.

FIG. 6 is a diagram illustrating a knitting procedure for the shoelace holes.

FIG. 7 is a diagram illustrating sections of the tubular

portion and meshes for injection.

FIG. 8 is a diagram illustrating a filling machine for filling the tubular portion with a filler.

FIG. 9 is a plan view illustrating the main portion of the shoe upper.

[0017] From now on, the best embodiment for carrying out the present invention will be described.

10 Embodiment

[0018] FIG. 1 shows a shoe upper according to an embodiment, and addition of an un-shown outsole makes it a shoe. The reference numeral 4 denotes an instep, and the reference numeral 5 denotes an inner sole which may not be provided. The reference numeral 6 denotes a tongue, and the reference numerals 8 and 8 denote tubular portions on both sides of the tongue 6. They are made of tubular knitted fabrics comprising a front knitted fabric and a rear knitted fabric and have a plurality of holes 10 for passing a shoelace 12 through and supporting the shoelace. The shoes may be of any type, such as sports shoes, sneakers, trekking boots, and knitted boots.

[0019] FIG. 2 shows the structure of the tubular portions 8. The reference numeral 14 denotes the front knitted fabric appearing on the front surface of the shoe upper, and the reference numeral 15 denotes the rear knitted fabric that does not appear on the front surface. The front and rear knitted fabrics 14 and 15 are closed with each other so that the tubular portions 8 are made tubular. By the way, the entire shoe upper 2 may be provided with the front and rear knitted fabrics, or only the tubular portions 8 may be provided with the front and rear knitted fabrics. Inside the tubular portions 8, there is a structure 16 made of a fused thermofusing resin or a thermosetting resin already set. The structure 16 adheres to the front and rear knitted fabrics 14 and 15, reinforces the holes 10, and supports the shoelace 12 in contact with it. The thermofusing resin is, for example, a string-like resin comprising a core made of a highly heat-resistant fibers and a sheath which enclose the core made of resin fibers made of a thermoplastic or thermosetting resin having a softening temperature or polymerization temperature lower than that of the core. The thermosetting resin is, for example, a polyurethane resin. For example, a structure 16 which is elastic and foam-like is gotten from a soft polyurethane resin, a harder structure 16 is gotten from a hard polyurethane resin, and a film-like or plate-like structure 16 without a swell is gotten from an elastomer of polyurethane resin. Although a thermoplastic resin with a melting temperature lower than that of the knitting yarn of the shoe upper 2 may be used for the structure 16, the tubular portions 8 may become soft when heated. The filler may be in a string form or a fibrous form, also may be in a bead form or a powder form, and may include another fiber material or the like, in addition to the thermofusing resin or the thermosetting resin.

[0020] FIGS. 3 and 4 show a shoe upper 30 according to the best embodiment, and, on a flat knitting machine having, for example, at least a pair of front and rear needle beds, areas 32 and 33 are knitted with two carriers from knitting start lines L1 and L2, namely, from the heel portion of the shoe upper. From a line L3, for example, with one carrier the remaining area 34 is knitted toward the toe. During the knitting, decreasing and widening of the knitted fabric are performed according to the shape of the shoe upper 30, and double-sided knitting (interlock knitting), smooth knitting, or the like is performed so that the knitted fabric is difficult to stretch. In addition to the areas 32 to 34, a tongue may be knitted simultaneously or may be knitted separately for connecting later by sewing or the like.

[0021] Collars 35, shoelace holders 36, and stretch stoppers 37 are tubular, and the collars 35 and the shoelace holders 36 are located at one ends of the areas 32 and 33. The collars 35 are knitted as shown in FIG. 4, for example, and the shoelace holders 36 are knitted similarly. The area 32 is knitted by double-sided knitting, and the tubular collars 35 are knitted by plain knitting. The stretch stoppers 37 are knitted such that, for example, one face of the tube is knitted with needles of the front needle bed and the other face of the tube is knitted with the needles of the rear needle bed.

[0022] FIG. 5 illustrates a procedure for manufacturing the tubular portions 8 and the structures 16. In step S1, the tubular portions 8 are knitted, and, at this time, the shoelace holes 10 are formed as shown in FIG. 6, for example. In step S2, a filler containing a thermofusing resin is injected via inlets 22 shown in FIG. 7, by a filling machine 80 of FIG. 8 or the like. In step S3, a thermal treatment makes the thermofusing resin fuse and adhere to the knitted fabric of the tubular portions and makes the structures 16 reinforce the shoelace holes 10. By the way, the shoelace 12 has been passed through the holes 10 between steps S1 and S2.

[0023] FIG. 6 shows knitting the shoelace hole 10, and in 1), the front knitted fabric 14 (dashed line) and the rear knitted fabric 15 (solid line) of the tubular portion 8 are knitted with a knitting yarn 64 on a flat knitting machine having a pair of front and rear needle beds, for example. The reference letters A to H and a to h designate the needles used in the knitting. In 2), on the needles C, c, F, and f in the periphery of the hole 10 are formed four double stitches 68; for example, the stitches of the needles d and e of the front knitted fabric are transferred on the needles C and F of the rear knitted fabric to form double stitches, and the stitches of the needles D and E of the rear knitted fabric are transferred on the needles c and f of the front knitted fabric to form double stitches. Thus, both sides of the hole 10 are closed by the knitting yarn 64. In 3), four hooked stitches 69 are formed on the needles D, d, E, and e within the hole 10 so that the prolongations of the stitches intersect in the shape of X. In 4), usual stitches are formed on the hooked stitches 69 so that the knitting of the hole 10 is completed. Other

methods may be used for knitting the hole 10.

[0024] FIG. 7 shows the structure of the tubular portion 8; the longitudinal direction of the tubular portion 8 (axial direction of the tube) is parallel to the longitudinal direction of the tongue 6, and the tubular portion 8 is divided along the longitudinal direction into a plurality of sections 21 at dividing portions 20, for example. Each of the sections 21 is provided with an inlet 22 of a mesh structure or the like. At the dividing portions 20, the front knitted fabric and the rear knitted fabric are closed, or bound and may be closed by, for example, intersecting the knitting yarn of the front knitted fabric and the knitting yarn of the rear knitted fabric. Furthermore, the front knitted fabric and the rear knitted fabric may be bound by connecting the front knitted fabric and the rear knitted fabric by tuck stitches or the like. The dividing portions 20 are provided in order to restrict the filler injection range within the sections 21, and it is enough for the dividing portions, if they can divide the tubular portion 8 to the extent that the filler injection range can be restricted. Furthermore, the dividing portions 20 and the sections 21 have the effect of restricting the tubular portion 8 from excessively swelling. Moreover, arrangement of prolongations connecting the front and rear of the tubular portion 8 such as a spacer fabric may also restrict the tubular portion 8 from excessively swelling. Note that a filling machine including a plurality of nozzles may be used to fill up the tubular portions 8 with a filler uniformly and in a short time. In this case, the dividing portions 20 and the sections 21 may not be provided. The inlets 22 comprising mesh holes in a mesh structure are provided at inconspicuous positions such as the rear surface of the tubular portions 8. The inlets 22 are holes for allowing the nozzles of the filling machine being inserted, and are preferably provided at inconspicuous positions such as those on the rear knitted fabric. However, if there are large gaps between stitches of the tubular portions 8, the inlets 22 do not need to be provided.

[0025] FIG. 8 shows an example of the filling machine 80, and the reference numeral 82 denotes a nozzle. An air pipe 84 supplies compressed air, and a filler supplying part 86 supplies a filler in a string form, fibrous form, bead form, powder form, or the like. The filler is then mixed with air, and the mixture is injected from the nozzle 82. The filler is preferably a thermofusing resin or a thermosetting resin, but may be a simple thermoplastic resin, a mixture of a thermofusing resin or a thermosetting resin and fibers having the same or higher heat resistance as that of the knitting yarn of the knit shoe upper, or the like. By the way, a string of thermofusing resin comprises a core made of fibers having a high heat resistance and a sheath enclosing the core made of thermoplastic fibers having a low softening temperature. Instead of the structure of the core and the sheath, simply, a mixture of fibers having a high heat resistance and fibers having a polymerization temperature or heatproof temperature lower than the heatproof temperature of the knitting yarn of the knit upper may be filled.

[0026] FIG. 9 schematically shows a main portion of the shoe upper 90 according to the embodiment. The reference numeral 92 denotes an instep, and the reference numeral 94 denotes a shoelace holder that is tubular and swollen. The inside of the tube of the shoelace holder 94 is filled with a thermofusing resin or a thermosetting resin that is injected through the inlets 22, and the thermofusing resin or the thermosetting resin is fused or thermally set so as to reinforce the shoelace holder 44. Furthermore, the shoelace holder 94 is sectioned into the sections 21, and each of the sections 21 is provided with an inlet 22. However, the sections 21 and the inlets 22 may not be provided.

[0027] The embodiments have the following features.

- 1) The tubular portions 8 are provided, and the structures 16 are provided so as to reinforce the shoelace holes 10. Repetitive polymer coatings or the like are not needed, a coating of different material is not performed, and the filler does not leak from the tubular portions 8. Therefore, the original texture of the knitted fabric is kept.
- 2) The tubular portions 8 are strong, in addition, thick, elastic and are feel-good to the touch.
- 3) The structures 16 made of a thermosetting resin filler are not softened by insulation or the like.
- 4) The tubular portions 8 are divided into a plurality of sections 21, and therefore, the filler is easily and uniformly filled.
- 5) The inlets 22 are provided in a mesh structure or the like, and therefore, the nozzles 82 are inserted without damaging the knitted fabric of the tubular portions 8.
- 6) The shoe upper having collars, shoelace holders, and stretch stoppers may be knitted easily.
- 7) The collars may be provided with elasticity, the shoelace holders and the stretch stoppers may be provided with strength, and therefore, breakage or deformation due to repeated tensions by the shoelace may be prevented.

DESCRIPTION OF REFERENCE NUMERALS

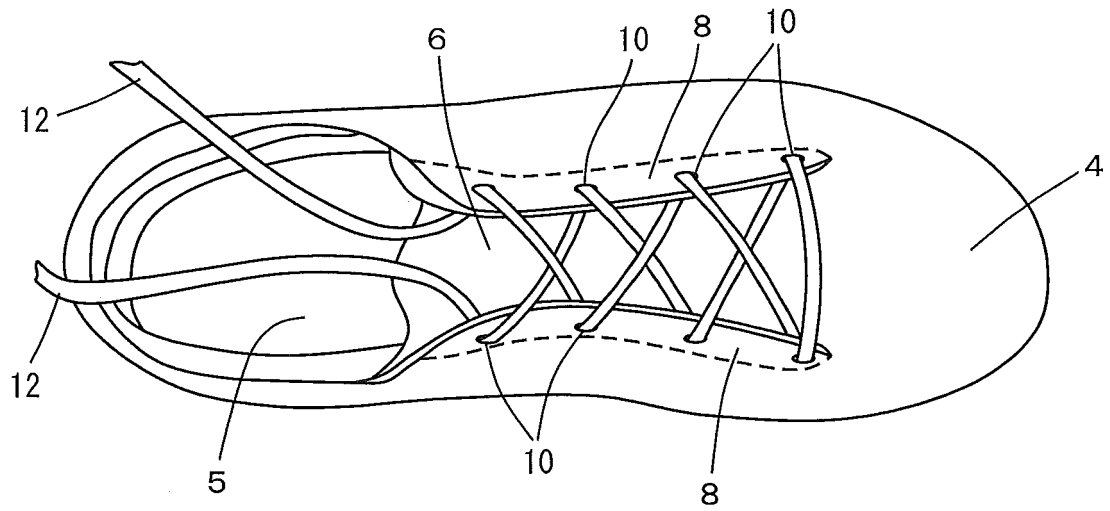
[0028]

- | | |
|----------------------------|----|
| 2, 30 Shoe upper | 45 |
| 4 Instep | |
| 5 Inner sole | |
| 6 Tongue | |
| 8 Tubular portion | |
| 10 Hole | |
| 12 Shoelace | |
| 14 Front knitted fabric | |
| 15 Rear knitted fabric | |
| 16 Structure | |
| 20 Dividing portion | |
| 21 Sections | |
| 22 Inlet | |
| 32 to 34 Area | 50 |
| 35 Collar | |
| 36 Shoelace holder | |
| 37 Stretch stopper | |
| 64 Knitting yarn | |
| 68 Double stitch | |
| 69 Hooked stitch | |
| 80 Filling machine | |
| 82 Nozzle | |
| 84 Air pipe | |
| 86 Filler supplying part | |
| 90 Shoe upper | |
| 92 Instep | |
| 94 Shoelace holder | 55 |
| L1, L2 Knitting start line | |
| L3 Line | |

Claims

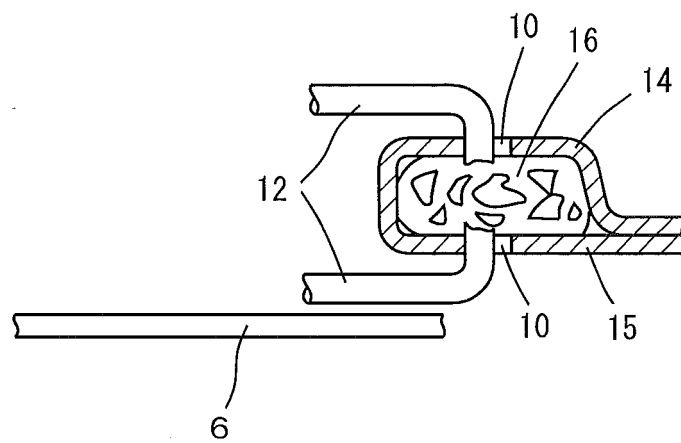
1. A shoe upper made of at least a knitted fabric and reinforced around shoelace holes,
characterized in that tubular portions knitted seamlessly and tubularly, having a closed periphery, having an inside space, and extending in a direction joining a toe and an ankle are provided, that the tubular portions have shoelace holders provided with shoelace holes, and
that the tubular portions are filled with a filler.
2. The shoe upper according to claim 1 **characterized in that** the filler contains a thermofusing or thermosetting synthetic resin fused and adhered to the tubular portions inside the tubular portions.
3. The shoe upper according to claim 1 or 2 **characterized in that** the tubular portions are respectively divided into a plurality of sections.
4. The shoe upper according to any one of claims 1 to 3 **characterized in that** the tubular portions are respectively provided with at least an inlet for allowing injection of the filler.
5. The shoe upper according to any one of claims 1 to 4 **characterized in that** the tubular portions are respectively further provided with collars that enclose an ankle.
6. The shoe upper according to claim 5 **characterized in that** an elastic filler is filled inside the collars and that a filler containing a thermally-fused synthetic resin or a thermally-set synthetic resin is filled inside the shoelace holders.
7. The shoe upper according to claim 6 **characterized in that** the tubular portions are respectively further provided with tubular stretch stoppers extending from the shoelace holders into both side surfaces of the shoe upper and
that the stretch stoppers are filled with a filler containing a thermally-fused synthetic resin or a thermally-set synthetic resin.

FIG. 1



2

FIG. 2



8

FIG. 3

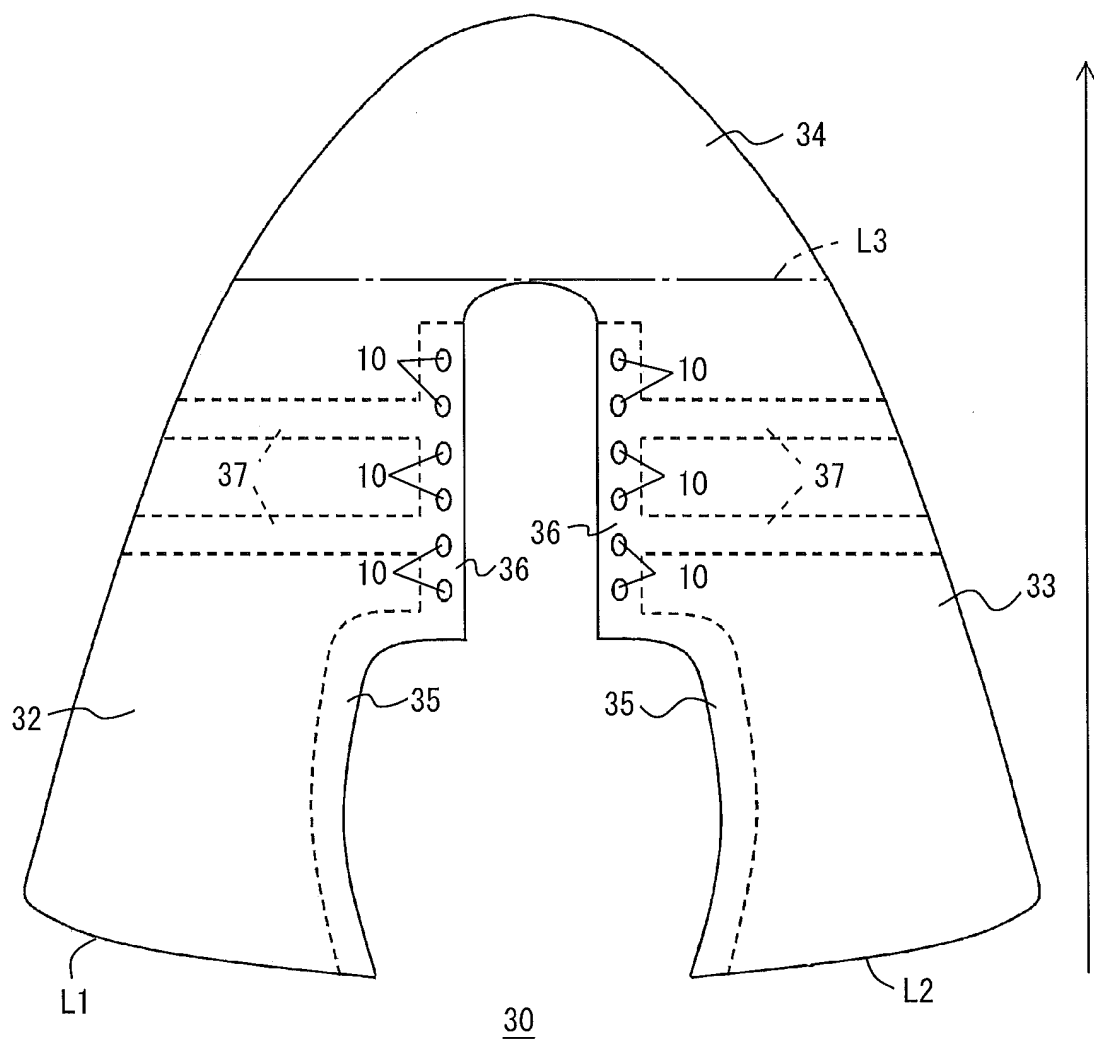
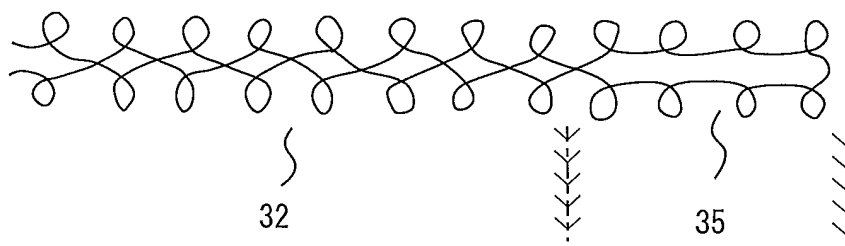


FIG. 4



F I G. 5

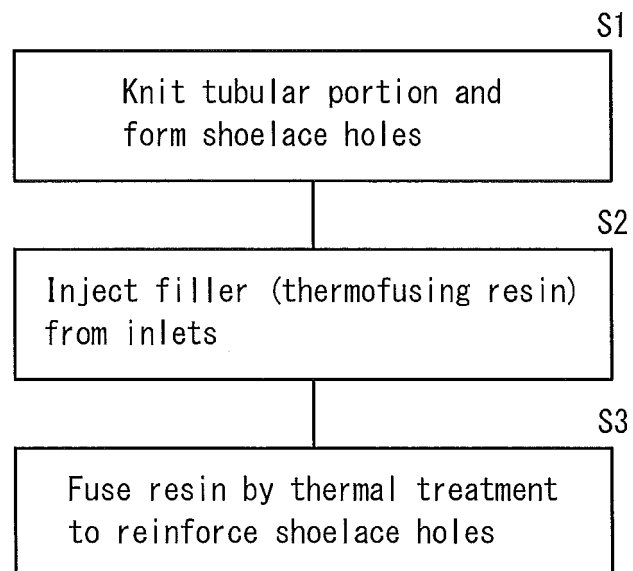


FIG. 6

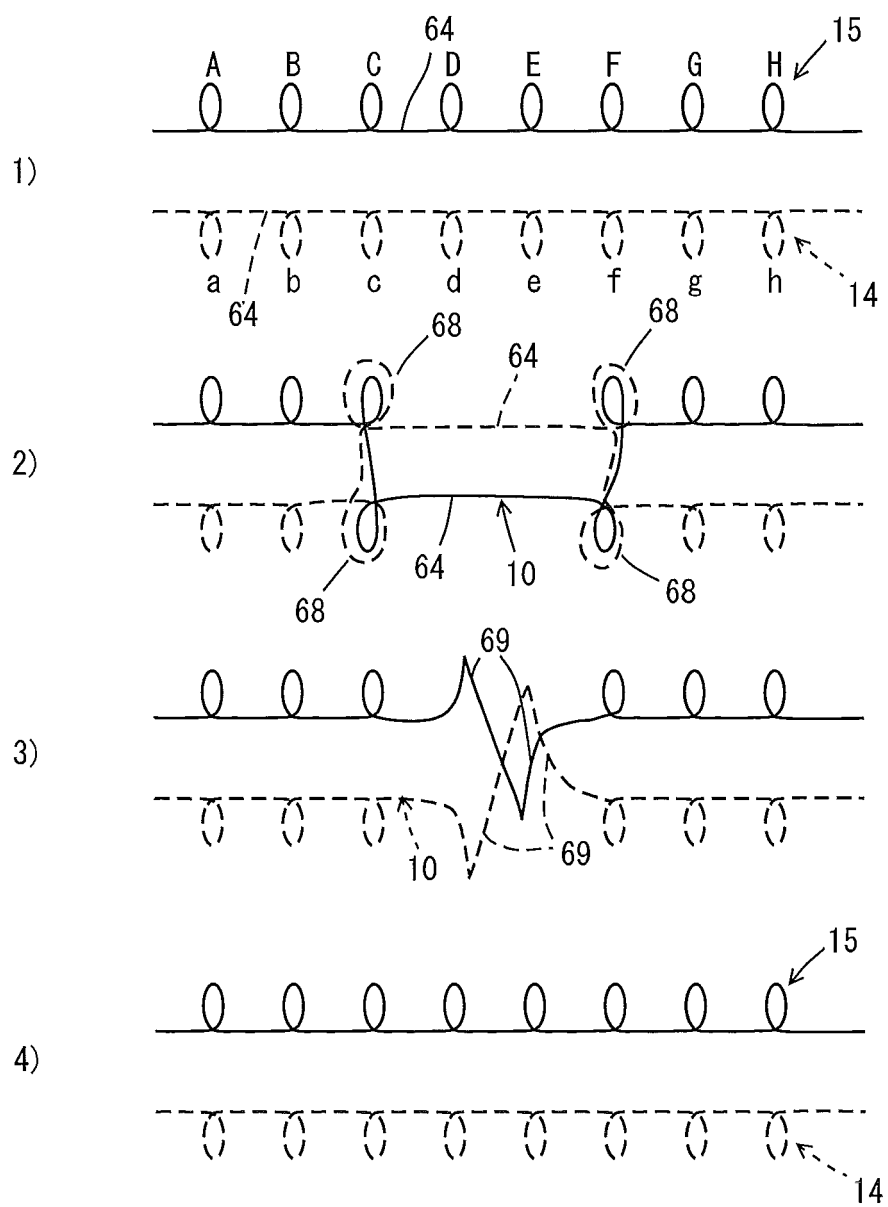


FIG. 7

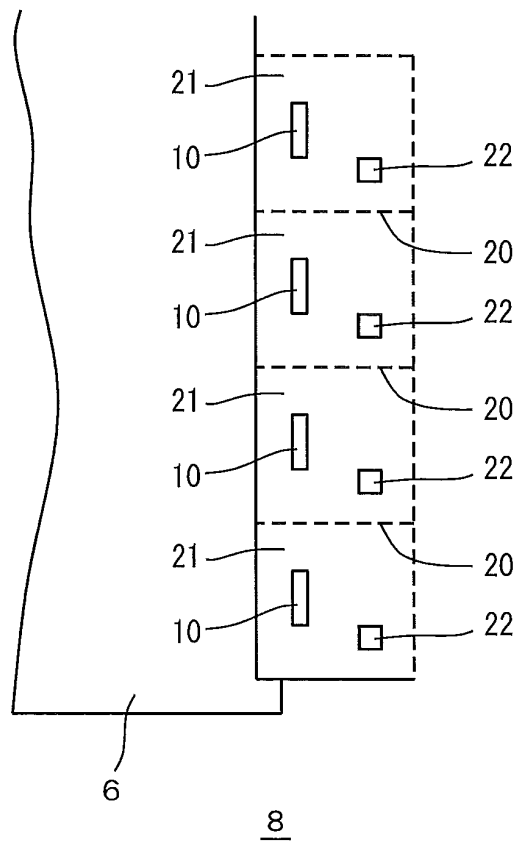


FIG. 8

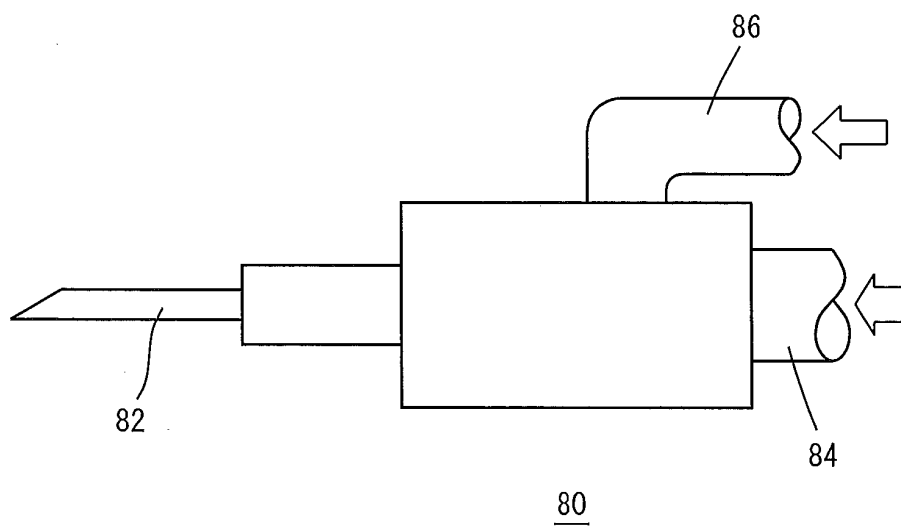
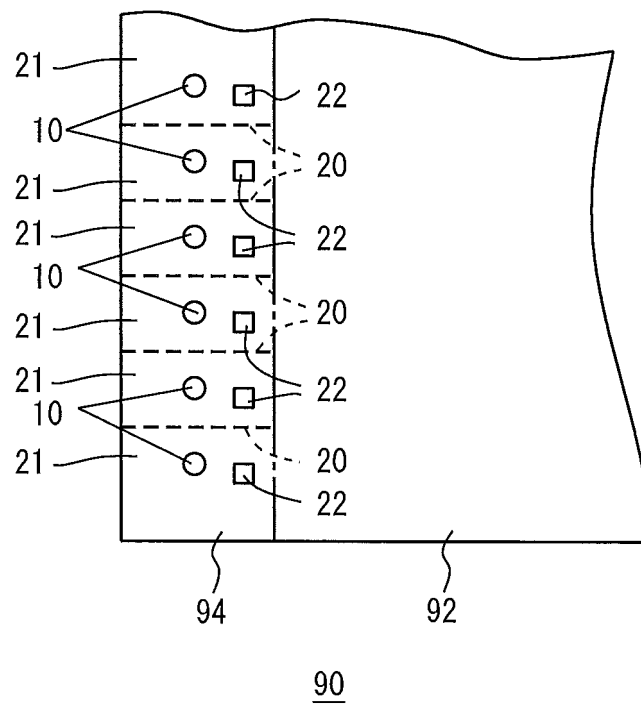


FIG. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/067998

A. CLASSIFICATION OF SUBJECT MATTER

A43B23/02(2006.01)i, A43D21/00(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, A43D21/00

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 1996-2015
 Kokai Jitsuyo Shinan Koho 1971-2015 Toroku Jitsuyo Shinan Koho 1994-2015

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	JP 2006-511306 A (Nike, Inc.), 06 April 2006 (06.04.2006), paragraphs [0019] to [0020]; fig. 1 & US 2004/0118018 A1 & WO 2004/060093 A1 & EP 1571938 A	1-7
A	JP 10-57109 A (Moonstar Chemical Corp.), 03 March 1998 (03.03.1998), paragraphs [0010] to [0011]; all drawings (Family: none)	1-7
A	JP 54-60042 A (Kokoku Kagaku Kogyo Kabushiki Kaisha), 15 May 1979 (15.05.1979), all drawings (Family: none)	1-7

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

* Special categories of cited documents:

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Date of the actual completion of the international search
03 September 2015 (03.09.15)Date of mailing of the international search report
15 September 2015 (15.09.15)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/067998

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2012-512698 A (Nike International, Ltd.), 07 June 2012 (07.06.2012), all drawings & US 2010/0154256 A1 & WO 2010/080182 A1 & EP 2378910 A & CN 102271548 A	1-7
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 161649/1978 (Laid-open No. 77403/1980) (Koichi ASAKAWA), 28 May 1980 (28.05.1980), all drawings (Family: none)	1-7

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2013220357 A [0002] [0004]
- JP 2008266854 A [0003] [0004]