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(54) **SHOE SOLES HAVING INCLINED GROOVES**

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Description

TECHNICAL FIELD

[0001] The present invention relates to a shoe sole having a diagonal groove.

BACKGROUND ART

[0002] Shoe soles having a diagonal groove are known in the art, for example in JP 2008-620 A (FIG. 4, FIG. 10(b)) or in JP H07-236503 A.

[0003] On the other hand, document DE 201 07 343 U1 discloses (the references in brackets applying to this document): A shoe sole comprising (see, e.g. figs. 2, 6): an outsole (1) having a tread surface to be in contact with a road surface; and a midsole (3) arranged on the outsole, wherein: in a central section and a lateral side section of a rear foot section of the shoe sole, a diagonal groove (8) is formed extending in a diagonal front-rear direction in the rear foot section to an outer edge of a lateral side of the rear foot section; an angle, formed by a virtual center line of the diagonal groove and a longitudinal axis connecting between a center of a heel and a middle point between a big-toe ball and a little-toe ball, is set in a range of 12° to 35° (as it can be clearly derived from fig. 6); and a virtual intersection point between the longitudinal axis and the center line is set within a range of 21% to 43% of a full length of the longitudinal axis of the shoe sole from a posterior end of the shoe sole, the diagonal groove extending to a point anterior and medial to the intersection point (see the measurements at fig. 6).

SUMMARY OF INVENTION

[0004] As is well known in the art, a shoe sole is required to be light in weight, be capable of suppressing eversion of the heel area, and serve to absorb the impact on the heel area.

[0005] However, these functions cannot be realized sufficiently only by forming a diagonal groove in a shoe sole.

[0006] It is therefore an object of the present invention to form an appropriate diagonal groove so as to realize these functions.

[0007] The present invention in one aspect is a shoe sole according to the appended claims.

BRIEF DESCRIPTION OF DRAWINGS

[0008] The following description of the drawings has the purpose to help to understand the invention. However, the scope of protection of the invention is defined solely by the appended claims. Accordingly, any "embodiment" or any other kind of the example no covered by the subject-matter of the claims is not part of the invention, but simply an example useful for understanding it.

[0009]

FIG. 1 is a perspective view showing a shoe according to one embodiment of the present invention as seen from the bottom rear side.

FIG. 2 is a perspective view showing the shoe as seen from the bottom lateral side.

FIG. 3 is a bottom view showing a shoe sole.

FIG. 4 is a bottom view showing the shoe sole.

FIG. 5 is an enlarged bottom view showing an arch section and a rear foot section of the shoe sole.

FIG. 6 is a plan view showing the foot bone structure.

FIG. 7A is a cross-sectional view taken along line VIIA-VIIA of FIG. 3, and FIG. 7B is a cross-sectional view taken along line VIIB-VIIB of FIG. 3.

FIGS. 8A to 8C show another embodiment, wherein FIG. 8A is a cross-sectional view showing a shoe sole in the arch section, FIG. 8B is a cross-sectional view of the shoe sole in the front half section of the rear foot section, and FIG. 8C is a cross-sectional view of the shoe sole at the posterior end of the rear foot section.

FIG. 9 is a bottom view of a shoe sole illustrating still another embodiment.

DESCRIPTION OF EMBODIMENTS

[0010] Preferably, the diagonal groove 4 includes a front section 4F located anterior to the intersection point O, and a rear section 4B located posterior to the intersection point O; and

a volume of the diagonal groove 4 in the rear section 4B is larger than a volume of the diagonal groove 4 in the front section 4F.

[0011] Then, in the rear section 4B where the volume of the diagonal groove 4 is large, deformation is relatively substantial, and the upper surface of the midsole 2 easily sinks, thereby making it possible to easily absorb the impact of the first strike upon landing. On the other hand, in the front section 4F where the volume of the diagonal groove 4 is small, the upper surface of the midsole 2 less easily sinks, and the center of gravity is unlikely to remain stagnant on the medial side of the arch of the foot.

[0012] Preferably, the diagonal groove 4 does not extend to a medial edge of the shoe sole.

[0013] Then, the upper surface of the midsole 2 less easily sinks in the arch section M or the middle foot section.

[0014] Preferably, the diagonal groove 4 of the outsole 1 flares toward a diagonally posterior direction (widens in its width as it extends in a diagonally posterior direction).

[0015] Then, it is possible to easily absorb the impact of the first strike as described above, and the center of gravity is unlikely to remain stagnant on the medial side of the arch of the foot.

[0016] Preferably, the shoe sole further includes a transversal groove 5 extending in a direction perpendicular to the diagonal groove 4.

[0017] Such a transversal groove 5 will divide the out-

sole **1** into pieces on the lateral side of the foot, and will facilitate the deformation of the outsole **1** and the midsole **2** on the lateral side of the foot.

[0018] Preferably, the outsole **1** is divided into pieces arranged in a front foot section **F** and in the rear foot section **R**, thereby leaving uncovered an arch section **M** between the front foot section **F** and the rear foot section **R**;

a reinforcement member **3** formed by a non-foamed body of a resin is attached on a lower surface of the midsole **2** in the arch section **M**; and

the reinforcement member **3** has a diagonal section **31** extending generally parallel to the diagonal groove **4**, and the diagonal section **31** is arranged in a vicinity of the diagonal groove **4** and anterior to the diagonal groove **4**.

[0019] In this case, the lowering of the arch section **M** due to the diagonal groove **4** in the arch section **M** or in the vicinity of the arch section **M** will be prevented by the diagonal section **31** of the reinforcement member **3**.

[0020] Preferably, a position of the virtual intersection point **O** is arranged anterior to a centroid **G** of the central section **Rc**.

[0021] With such an arrangement, the diagonal groove **4** is arranged over, or in the vicinity of, the subtalar joint axis **A1**.

[0022] Preferably, the diagonal groove **4** formed in the midsole **2** in the central section **Rc** of the rear foot section **R** is defined by one pair of first and second edge lines **L1** and **L2** which face each other;

the diagonal groove **4** formed in the outsole **1** is defined by one pair of third and fourth edge lines **L3** and **L4** which face each other; and

the third and fourth edge lines **L3** and **L4** are generally parallel to the first and second edge lines **L1** and **L2**, respectively, or flare (gradually widen therebetween) to form an angle therebetween larger than an angle formed by the first and second edge lines **L1** and **L2**.

[0023] In this case, the diagonal groove **4** of the midsole **2** and that of the outsole **1** cooperate with each other, thereby enhancing the advantageous effect of the present invention.

[0024] Preferably, the diagonal groove **4** extends to a medial side section **20** of the midsole **2** in the arch section **M**; and an average value of a cross-sectional area perpendicular to the center line **Lc** of the diagonal groove **4** in the arch section **M** is smaller than an average value of a cross-sectional area perpendicular to the center line **Lc** of the diagonal groove **4** in the central section **Rc** of the rear foot section **R** in the midsole **2**.

[0025] Preferably, the diagonal groove **4** does not extend to an edge of the medial side section **20** of the midsole **2** in the arch section **M**; and a tip of the diagonal groove **4** is arranged posterior to an anterior end of the arch section **M**.

[0026] In these cases, the cross-sectional area of the diagonal groove **4** is small on the medial side of the arch section **M**, or the diagonal groove **4** does not extend to the medial edge of the arch section **M**, so that the sinking

of the upper surface of the midsole is small on the medial side of the arch section **M**. Therefore, it is possible to suppress pronation of the foot, and to prevent the center of gravity from remaining stagnant on the medial side of the arch section **M**.

[0027] Preferably, the diagonal groove **4** of the outsole **1** flares toward a posterior direction (widens in its width as it extends in a posterior direction).

[0028] Preferably, the shoe sole further includes a transversal groove perpendicular to the diagonal groove **4**.

[0029] Preferably, a reinforcement member **3** formed by a non-foamed body of a resin is attached to a lower surface of the midsole **2** in the arch section **M**; and

the reinforcement member **3** has a diagonal section **31** extending generally parallel to the diagonal groove **4**, and the diagonal section **31** is arranged in a vicinity of the diagonal groove **4** and anterior to the diagonal groove **4**.

[0030] In this case, the lowering of the arch section **M** due to the diagonal groove **4** in the arch section **M** or in the vicinity of the arch section **M** will be prevented by the diagonal section **31** of the reinforcement member **3**.

[0031] Preferably, the diagonal section **31** extends to the front foot section **F**.

[0032] In this case, excessive bending of the sole is prevented, thereby enabling efficient running.

[0033] Preferably, the reinforcement member **3** further includes a lateral side section **32** extending along a lateral edge of the midsole **2** in the arch section **M**; and the lower surface of the midsole **2** is exposed between the lateral side section **32** and the diagonal section **31**.

[0034] In this case, it is possible to reduce the weight of the reinforcement member **3**.

[0035] The present invention in one aspect is a shoe sole including: an outsole **1** having a tread surface to be in contact with a road surface; and a midsole **2** arranged on the outsole **1**, the shoe sole supporting a foot in a front foot section **F**, an arch section **M**, and a rear foot section **R**, wherein:

the outsole **1** is divided into pieces arranged in the front foot section **F** and in the rear foot section **R**, thereby leaving uncovered the arch section **M**;

a diagonal groove **4** is formed in the midsole **2** and the outsole **1**, the diagonal groove **4** extending in a diagonal front-rear direction in the rear foot section **R** to an outer edge of a lateral side of the rear foot section **R**;

an angle β , formed by a virtual center line **Lc** of the diagonal groove **4** and a longitudinal axis **A2** connecting between a center of a heel and a middle point **03** between a big-toe ball **01** and a little-toe ball **05**, is set in a range of 12° to 35°;

a virtual intersection point **O** between the longitudinal axis **A2** and the center line **Lc** is arranged within a region from a rear half section **Mb** of the arch section **M** to a front half section **Rf** of the rear foot section **R**; a reinforcement member **3** formed by a non-foamed

body of a resin is attached on a lower surface of the midsole **2** in the arch section **M**; and the reinforcement member **3** has a diagonal section **31** extending generally parallel to the diagonal groove **4**, and the diagonal section **31** is arranged in a vicinity of the diagonal groove **4** and anterior to the diagonal groove **4**.

[0036] In this aspect, the lowering of the arch section **M** due to the diagonal groove **4** in the arch section **M** or in the vicinity of the arch section **M** will be prevented by the diagonal section **31** of the reinforcement member **3**.

[0037] Preferably, the diagonal section **31** extends to the front foot section **F**.

[0038] In this case, excessive bending of the sole is prevented, thereby enabling efficient running.

[0039] Preferably, the reinforcement member **3** further includes a lateral side section **32** extending along a lateral side of the midsole **2** in the arch section **M**; and the lower surface of the midsole **2** is exposed between the lateral side section **32** and the diagonal section **31**.

[0040] In this case, it is possible to reduce the weight of the reinforcement member **3**.

Embodiment

[0041] The present invention will be understood more clearly from the following description of preferred embodiments taken in conjunction with the accompanying drawings. Note however that the embodiments and the drawings are merely illustrative, and should not be relied upon in defining the scope of the present invention. The scope of the present invention shall be defined only by the appended claims. In the accompanying drawings, like reference numerals denote like components throughout the plurality of figures.

[0042] One embodiment of the present invention will now be described with reference to the drawings.

[0043] As shown in FIGS. 1 and 2, the shoe sole includes the outsole **1** and the midsole **2**. Note that FIGS. 1 to 5 do not show small grooves (so called "design") formed in the tread surface of the outsole **1**.

[0044] As indicated by the regular dots in FIG. 3, the outsole **1** is arranged over the front foot section **F** and the rear foot section **R**. The outsole **1** is formed by a foamed body or a non-foamed body of a rubber, for example, and has a tread surface **1s** (FIG. 7A) to be in contact with the road surface. Note that in FIG. 3, the outsole **1** is shaded with regular large dots.

[0045] The midsole **2** is formed by a foamed body of a resin such as EVA, for example, and is arranged on the outsole **1**, as shown in FIG. 2, for absorbing the impact upon landing. Therefore, the midsole **2** is formed to be thicker than the outsole **1**.

[0046] As shown in FIGS. 1 to 3, a lower surface **2u** (FIG. 7A) of the midsole **2** is provided with the diagonal groove **4** and the transversal groove **5** to be described later, and with the outsole **1** divided into a plurality of

parts. As shown in these figures, the midsole **2** may be exposed in the central section **Rc** of the rear foot section **R** and/or the arch section **M**.

[0047] As clearly shown in FIG. 3, the outsole **1** is divided into pieces arranged in the front foot section **F** and in the rear foot section **R**, thereby leaving uncovered the arch section **M**, and is formed in the rear foot section **R** in a U shape in which the central section **Rc** is cut out. That is, in the central section **Rc** of the rear foot section **R**, the outsole **1** is not provided on the surface of the midsole **2**.

[0048] Here, "a U shape in which the central section **Rc** of the outsole **1** is cut out" includes arrangements where the outsole **1** is divided into a plurality of parts in the rear foot section **R** by a plurality of diagonal and transversal grooves **4** and **5**, and further means that the outsole **1** is absent in the central section **Rc** and that the outsole **1** at the anterior end of the rear foot section **R** is divided into medial and lateral pieces by the diagonal groove **4**.

[0049] Note that in the elliptical area of the central section **Rc**, the midsole **2** may be slightly dented.

[0050] In FIGS. 1 to 3, the bottom surfaces of the diagonal groove **4** and the transversal groove **5** are shaded with irregular, fine dots.

[0051] In the medial side section **20** of the arch section **M** of the midsole **2**, the central section **Rc** of the rear foot section **R** of the midsole **2**, and the lateral side section **11** of the outsole **1**, the diagonal groove **4** extends in a diagonal front-rear direction from the medial edge on the medial side **IN** of the arch section **M** to the lateral edge on the lateral side **OUT** of the rear foot section **R**.

[0052] The depth of the deepest portion of the diagonal groove **4** in the central section **Rc** is preferably about 5 mm to about 10 mm, for example, and the depth of the deepest portion of the diagonal groove **4** in the lateral side section **11** is preferably about 5 mm to about 15 mm, for example. This is because the advantageous effects such as the light weight cannot be obtained sufficiently if the depth is too small, whereas the stable foot support cannot be obtained if the depth is too large.

[0053] The width of the diagonal groove **4** in the central section **Rc** is preferably about 5 mm to about 15 mm, for example, except for the area of the transversal groove **5**. The torsional rigidity lowers significantly if the width of the groove is too large, whereas the advantageous effects such as the light weight cannot be obtained if the width of the groove is small.

[0054] As shown in FIG. 9, the diagonal groove **4** does not need to extend to the medial edge on the medial side **IN** in the arch section **M**. Where the diagonal groove **4** does not extend to the medial side section **20** of the midsole **2** in the arch section **M**, the anterior end of the diagonal groove **4** may be arranged posterior to the arch section **M** or the anterior end of the rear foot section **R**.

[0055] Referring to FIG. 6, the angle α formed between the subtalar joint axis **A1** and the longitudinal axis **A2** is said to be $23^\circ \pm 11^\circ$. Now, the longitudinal axis **A2** is rep-

resented by a straight line connecting between the center **04** of the heel and the middle point **03** between the center of the big-toe ball **01** and the center of the little-toe ball **05**.

[0056] On the other hand, the subtalar joint axis **A1** is represented by a straight line connecting between the head **06** of the talus and the calcaneus lateral tubercle **07**.

[0057] The diagonal groove **4** is formed along the subtalar joint axis **A1**. That is, in FIG. 5, the angle β formed by the longitudinal axis **A2** and the virtual center line **Lc** of the diagonal groove **4** is set in the range of 12° to 35°, and is set to about 30° in the present embodiment, for example.

[0058] The virtual intersection point **O** between the center line **Lc** and the longitudinal axis **A2** is set in a region from the rear half section of the arch section **M** to the front half section **Rf** of the rear foot section **R**. Represented by a dimensional proportion, the virtual intersection point **O** of FIG. 5 is set in a range of 21% to 43% of the full length of the longitudinal axis **A2** of the shoe sole from the posterior end. The diagonal groove **4** extends anterior and medial to the intersection point **O** and extends posterior and lateral to the intersection point **O**.

[0059] In the present embodiment, the position of the virtual intersection point **O** is provided in the central section **Rc** of the rear foot section **R**, and is arranged anterior to the centroid **G** of the central section **Rc**. With such an arrangement, the diagonal groove **4** is arranged over the subtalar joint axis **A1** (FIG. 6). Note that the centroid **G** refers to the center of the planar shape of the central section **Rc**.

[0060] The diagonal groove **4** includes the front section **4F** anterior to the intersection point **O**, and the rear section **4B** posterior to the intersection point **O**. The volume **Vb** of the diagonal groove **4** in the rear section **4B** is greater than the volume **Vf** of the diagonal groove **4** in the front section **4F**.

[0061] Now, the volume **Vb**, **Vf** of the diagonal groove **4** is the cross-sectional area of the diagonal groove **4** multiplied by the length of the diagonal groove **4** across the corresponding section. Therefore, the diagonal groove **4** in the arch section **M** is shallow, for example, and the average value of the cross-sectional area perpendicular to the center line **Lc** is as shown in FIGS. 8A to 8C, where the average value of the cross-sectional area of the diagonal groove **4** in the arch section **M** is smaller than the average value of the cross-sectional area of the diagonal groove **4** in the central section **Rc** of the rear foot section **R** of the midsole **2**.

[0062] In the present embodiment, the depth of the diagonal groove **4** in the arch section **M** of FIG. 2 gradually decreases as the groove **4** extends in the diagonally anterior direction. The cross-sectional area of the diagonal groove **4** may be largest in the central section **Rc** of the rear foot section **R** of FIG. 7A, and the cross-sectional area of the diagonal groove **4** may be slightly smaller in a rear portion of the rear foot section **R** of FIG. 7B.

[0063] In FIG. 5, the diagonal groove **4** formed in the central section **Rc** of the rear foot section **R** of the midsole

2 is defined by one pair of first and second edge lines **L1** and **L2** which are parallel to and facing each other. On the other hand, the diagonal groove **4** formed in the outsole **1** is defined by one pair of third and fourth edge lines **L3** and **L4** which are parallel to and facing each other.

[0064] While the third and fourth edge lines **L3** and **L4** are generally parallel to the first and second edge lines **L1** and **L2**, respectively, in the present embodiment, the third and fourth edge lines **L3** and **L4** may be formed to flare (gradually widen in width therebetween) with an angle greater than the angle formed by the first and second edge lines **L1** and **L2** as shown in FIG. 9. That is, the diagonal groove **4** in the lateral side section **11** of the outsole **1** may be formed to flare toward the diagonally posterior direction.

[0065] While the transversal groove **5** of FIG. 5 extends in a direction perpendicular to the diagonal groove **4**, and the transversal groove **5** is arranged so as to be perpendicular to the diagonal groove **4** in the present embodiment, the angle formed between the transversal groove **5** and the diagonal groove **4** may be set to about 70° to about 90°.

[0066] The transversal groove **5** divides the outsole **1** into pieces in the medial side section **10** and in the lateral side section **11** of the U-shaped outsole **1**. Note that as shown in FIG. 9, the transversal groove **5** may be formed to flare (gradually widen) in the direction from the medial side **IN** toward the lateral side **OUT**.

[0067] As indicated by the dots in FIG. 4, the reinforcement member **3** formed by a non-foamed body of a resin is attached on the lower surface of the midsole **2** in the arch section **M**. The reinforcement member **3** has the diagonal section **31** extending generally parallel to the diagonal groove **4**, and the diagonal section **31** is arranged in the vicinity of the diagonal groove **4** and anterior to the diagonal groove **4**. The diagonal section **31** may be extending from the arch section **M** to at least the posterior end of the front foot section **F**.

[0068] The reinforcement member **3** further includes the lateral side section **32** extending along the lateral side of the midsole **2** in the arch section **M**. An exposed section **22**, which is the lower surface of the midsole **2**, is exposed between the lateral side section **32** and the diagonal section **31**.

[0069] A connecting section **33** is provided to bridge between the diagonal section **31** and the lateral side section **32** so as to connect between these sections **31** and **32**. That is, the exposed section **22** of the midsole **2** is exposed in the area surrounded by the diagonal section **31**, the lateral side section **32** and the connecting section **33**.

[0070] The diagonal section **31** only needs to be arranged along the diagonal groove **4** above the diagonal groove **4**, and therefore even a reinforcement member **3** that covers generally the entire area of the arch section **M**, as shown in FIG. 9, has a diagonal section **31**.

[0071] While preferred embodiments have been described above with reference to the drawings, various

obvious changes and modifications will readily occur to those skilled in the art upon reading the present specification.

[0072] For example, the outsole **1** may be provided generally over the entire length from the front foot section **F** to the rear foot section **R** and across the entire area thereof. Moreover, in the arch section **M** or the rear foot section **R**, the midsole **2** may not be exposed. The reinforcement member **3** and the transversal groove **5** may be absent.

[0073] Thus, such changes and modifications are deemed to fall within the scope of the present invention, which is defined by the appended claims.

INDUSTRIAL APPLICABILITY

[0074] The present invention is applicable to various athletic shoes such as for running.

REFERENCE SIGNS LIST

[0075]

1: Outsole 1s: Tread surface 10: Medial side section
 11: Lateral side section
 2: Midsole 2u: Lower surface 20: Medial side section
 22: Exposed section
 3: Reinforcement member 31: Diagonal section 32:
 Lateral side section 33: Connecting section
 4: Diagonal groove 4F: Front section 4B: Rear section
 5: Transversal groove
 A1: Subtalar joint axis A2: Longitudinal axis
 Lc: Center line L1 to L4: First to fourth lines
 F: Front foot section
 R: Rear foot section Rc: Central section Rf: Front
 half section
 M: Arch section Mb: Rear half section
 O: Intersection point
 O1: Big-toe ball O2: little-toe ball
 IN: Medial side OUT: Lateral side
 α , β : Angle

Claims

1. A shoe sole comprising: an outsole (1) having a tread surface to be in contact with a road surface; and a midsole (2) arranged on the outsole (1), the shoe sole supporting a foot in a front foot section (F), an arch section (M), and a rear foot section (R), wherein:

in a central section and a lateral side section of a rear foot section (R) of the shoe sole, a diagonal groove (4) is formed extending in a diagonal front-rear direction in the rear foot section (R) to an outer edge of a lateral side of the rear foot section (R);

an angle (β), formed by a virtual center line (Lc) of the diagonal groove (4) and a longitudinal axis (A2) connecting between a center (O4) of a heel and a middle point (O3) between a big-toe ball (O1) and a little-toe ball (O5), is set in a range of 12° to 35°; and

a virtual intersection point (O) between the longitudinal axis (A2) and the center line (Lc) is set within a range of 21% to 43% of a full length of the longitudinal axis (A2) of the shoe sole from a posterior end of the shoe sole, the diagonal groove (4) extending to a point anterior and medial to the intersection point (O);

the outsole (1) is divided into pieces arranged in the front foot section (F) and in the rear foot section (R), thereby leaving uncovered the arch section (M), and

characterized in that the outsole (1) is formed in the rear foot section (R) in a U shape, with a central section (Rc) cut out between a medial side (IN) and a lateral side (OUT) of the foot; the midsole (2) is exposed in the arch section (M) and the central section (Rc) of the rear foot section (R);

the diagonal groove (4) is formed in the midsole (2) in the central section (Rc) of the rear foot section (R) and in the outsole (1) in a lateral side section (11) of the rear foot section (R), the diagonal groove (4) extending in a diagonal front-rear direction in the rear foot section (R) to an outer edge of the lateral side (OUT) of the rear foot section (R).

2. The shoe sole according to claim 1, wherein a virtual intersection point (O) between the longitudinal axis (A2) and the center line (Lc) is arranged within a region from a rear half section (Mb) of the arch section (M) to a front half section (Rf) of the rear foot section (R).

3. The shoe sole according to claim 2, wherein a position of the virtual intersection point (O) is arranged anterior to a centroid (G) of the central section (Rc).

4. The shoe sole according to claim 3, wherein:

the diagonal groove (4) formed in the midsole (2) in the central section (Rc) of the rear foot section (R) is defined by one pair of first and second edge lines (L1) and (L2) which face each other;

the diagonal groove (4) formed in the outsole (1) is defined by one pair of third and fourth edge lines (L3) and (L4) which face each other; and the third and fourth edge lines (L3) and (L4) are generally parallel to the first and second edge lines (L1) and (L2), respectively, or flare to form an angle therebetween larger than an angle

formed by the first and second edge lines (L1) and (L2).

5. The shoe sole according to any one of claims 1 to 4, wherein:
 - the diagonal groove (4) extends to a medial side section (20) of the midsole (2) in the arch section (M); and
 - an average value of a cross-sectional area perpendicular to the center line (Lc) of the diagonal groove (4) in the arch section (M) is smaller than an average value of a cross-sectional area perpendicular to the center line (Lc) of the diagonal groove (4) in the central section (Rc) of the rear foot section (R) in the midsole (2).
6. The shoe sole according to any one of claims 1 to 4, wherein:
 - the diagonal groove (4) is unextended to an edge of the medial side section (20) of the midsole (2) in the arch section (M); and
 - a tip of the diagonal groove (4) is arranged posterior to an anterior end of the arch section (M).
7. The shoe sole according to any one of claims 1 to 6, wherein the diagonal groove (4) of the outsole (1) flares toward a diagonally posterior direction.
8. The shoe sole according to any one of claims 1 to 7, further comprising a transversal groove perpendicular to the diagonal groove (4).
9. The shoe sole according to any one of claims 1 to 8, wherein:
 - a reinforcement member (3) formed by a non-foamed body of a resin is attached to a lower surface of the midsole (2) in the arch section (M); and
 - the reinforcement member (3) has a diagonal section (31) extending generally parallel to the diagonal groove (4), and the diagonal section (31) is arranged in a vicinity of the diagonal groove (4) and anterior to the diagonal groove (4).

Patentansprüche

1. Schuhsohle mit: einer Laufsohle (1), die eine Lauffläche aufweist, die in Kontakt mit einer Straßenoberfläche stehen soll; und einer Zwischensohle (2), die auf der Laufsohle (1) angeordnet ist, wobei die Schuhsohle einen Fuß in einem vorderen Fußabschnitt (F), einem Fußgewölbeabschnitt (M) und einem hinteren Fußabschnitt (R) unterstützt, wobei:

in einem mittleren Abschnitt und einem lateralen Seitenabschnitt eines hinteren Fußabschnitts (R) der Schuhsohle eine diagonale Kerbe (4) ausgebildet ist, die sich in eine diagonale Richtung von vorn nach hinten im hinteren Fußabschnitt (R) zu einem Außenrand einer lateralen Seite des hinteren Fußabschnitts (R) erstreckt; ein Winkel (β), der durch eine virtuelle Mittellinie (Lc) der diagonalen Kerbe (4) und eine Längsachse (A2) gebildet wird, die zwischen einer Mitte (04) einer Ferse und einem Mittelpunkt (03) zwischen einem Ballen (01) des großen Zehs und einem Ballen (05) des kleinen Zehs verbindet, in einem Bereich von 12° bis 35° festgelegt ist; und ein virtueller Schnittpunkt (O) zwischen der Längsachse (A2) und der Mittellinie (Lc) innerhalb eines Bereichs von 21% bis 43% einer Gesamtlänge der Längsachse (A2) der Schuhsohle von einem posterioren Ende der Schuhsohle festgelegt ist, wobei sich die diagonale Kerbe (4) zu einem Punkt anterior und medial zum Schnittpunkt (O) erstreckt; die Laufsohle (1) in Teile unterteilt ist, die im vorderen Fußabschnitt (F) und im hinteren Fußabschnitt (R) angeordnet sind, wodurch sie den Fußgewölbeabschnitt (M) unbedeckt lassen, und **dadurch gekennzeichnet, dass** die Laufsohle (1) im hinteren Fußabschnitt (R) in einer U-Form ausgebildet ist, wobei ein mittlerer Abschnitt (Rc) zwischen einer medialen Seite (IN) und einer lateralen Seite (OUT) des Fußes ausgeschnitten ist; die Zwischensohle (2) im Fußgewölbeabschnitt (M) und im mittleren Abschnitt (Rc) des hinteren Fußabschnitts (R) freiliegt; die diagonale Kerbe (4) in der Zwischensohle (2) im mittleren Abschnitt (Rc) des hinteren Fußabschnitts (R) und in der Laufsohle (1) in einem lateralen Seitenabschnitt (11) des hinteren Fußabschnitts (R) ausgebildet ist, wobei sich die diagonale Kerbe (4) in eine diagonale Richtung von vorn nach hinten im hinteren Fußabschnitt (R) zu einem Außenrand der lateralen Seite (OUT) des hinteren Fußabschnitts (R) erstreckt.

2. Schuhsohle nach Anspruch 1, wobei ein virtueller Schnittpunkt (O) zwischen der Längsachse (A2) und der Mittellinie (Lc) innerhalb eines Bereichs von einem hinteren Halbabschnitt (Mb) des Fußgewölbeabschnitts (M) zu einem vorderen Halbabschnitt (Rf) des hinteren Fußabschnitts (R) angeordnet ist.
3. Schuhsohle nach Anspruch 2, wobei eine Position des virtuellen Schnittpunkts (O) anterior zu einem Schwerpunkt (G) des mittleren Abschnitts (Rc) ange-

ordnet ist.

4. Schuhsohle nach Anspruch 3, wobei:

die diagonale Kerbe (4), die in der Zwischen-
sohle (2) im mittleren Abschnitt (Rc) des hintere-
ren Fußabschnitts (R) ausgebildet ist, durch ein
Paar einer ersten und zweiten Kantenlinie (L1)
und (L2) definiert wird, die einander gegenüber-
liegen;

die diagonale Kerbe (4), die in der Laufsohle (1)
ausgebildet ist, durch ein Paar einer dritten und
vierten Kantenlinie (L3) und (L4) definiert wird,
die einander gegenüberliegen; und

die dritte und vierte Kantenlinie (L3) und (L4) im
Allgemeinen parallel zur ersten bzw. zweiten
Kantenlinie (L1) und (L2) verlaufen oder sich
aufweiten, um einen Winkel dazwischen zu bil-
den, der größer als ein Winkel ist, der durch die
erste und zweite Kantenlinie (L1) und (L2) ge-
bildet wird.

5. Schuhsohle nach einem der Ansprüche 1 bis 4, wo-
bei:

sich die diagonale Kerbe (4) zu einem medialen
Seitenabschnitt (20) der Zwischensohle (2) im
Fußgewölbeabschnitt (M) erstreckt; und
ein Durchschnittswert einer Querschnittsfläche
senkrecht zur Mittellinie (Lc) der diagonalen
Kerbe (4) im Fußgewölbeabschnitt (M) kleiner
als ein Durchschnittswert einer Querschnittsflä-
che senkrecht zur Mittellinie (Lc) der diagonalen
Kerbe (4) im mittleren Abschnitt (Rc) des hintere-
ren Fußabschnitts (R) in der Zwischensohle (2)
ist.

6. Schuhsohle nach einem der Ansprüche 1 bis 4, wo-
bei:

sich die diagonale Kerbe (4) nicht zu einem
Rand des medialen Seitenabschnitts (20) der
Zwischensohle (2) im Fußgewölbeabschnitt (M)
erstreckt; und
eine Spitze der diagonalen Kerbe (4) posterior
zu einem anterioren Ende des Fußgewölbeab-
schnitts (M) angeordnet ist.

7. Schuhsohle nach einem der Ansprüche 1 bis 6, wo-
bei sich die diagonale Kerbe (4) der Laufsohle (1)
zu einer diagonalen posterioren Richtung aufweitet.

8. Schuhsohle nach einem der Ansprüche 1 bis 7, die
ferner eine transversale Kerbe senkrecht zur diago-
nalen Kerbe (4) aufweist.

9. Schuhsohle nach einem der Ansprüche 1 bis 8, wo-
bei:

ein Verstärkungselement (3), das durch einen
nicht geschäumten Körper aus Harz gebildet
wird, an einer Unterseite der Zwischensohle (2)
im Fußgewölbeabschnitt (M) angebracht ist;
und

das Verstärkungselement (3) einen diagonalen
Abschnitt (31) aufweist, der sich im Allgemeinen
parallel zur diagonalen Kerbe (4) erstreckt, und
der diagonale Abschnitt (31) in der Nähe der di-
agonalen Kerbe (4) und anterior zur diagonalen
Kerbe (4) angeordnet ist.

Revendications

1. Semelle de chaussure, comprenant : une semelle
extérieure (1) ayant une surface de marche destinée
à être en contact avec une surface de sol ; et une
semelle intercalaire (2) montée sur la semelle exté-
rieure (1), ladite semelle de chaussure supportant
un pied sur une section avant du pied (F), une section
de voûte plantaire (M) et une section arrière du pied
(R), où :

dans une partie centrale et une partie de côté
latéral de la section arrière du pied (R) de la
semelle de chaussure, une rainure diagonale (4)
est formée, s'étendant dans une direction dia-
gonale avant-arrière sur la section arrière du
pied (R) vers un bord extérieur d'un côté latéral
de la section arrière du pied (R) ;

un angle (β) formé par une ligne centrale virtuel-
le (Lc) de la rainure diagonale (4) et un axe lon-
gitudinal (A2) reliant le centre (04) du talon et
un point central (03) entre la saillie du gros orteil
(O1) et la saillie du petit orteil (O5), est défini
dans une plage entre 12° et 35° ; et

un point d'intersection virtuel (O) entre l'axe lon-
gitudinal (A2) et la ligne centrale (Lc) est défini
dans une plage entre 21 % et 43 % de la lon-
gueur totale de l'axe longitudinal (A2) de la se-
melle de chaussure depuis l'extrémité posté-
rieure de la semelle de chaussure, la rainure
diagonale (4) s'étendant vers un point antérieur
et médial par rapport au point d'intersection (O) ;
la semelle extérieure (1) est divisée en pièces
disposées dans la section avant du pied (F) et
dans la section arrière du pied (R), en laissant
ainsi découverte la section de voûte plantaire
(M),

caractérisée en ce que la semelle extérieure
(1) présente une forme en U dans la section ar-
rière du pied (R), avec une partie centrale (Rc)
en découpe entre le côté médial (IN) et le côté
latéral (OUT) du pied ;

la semelle intercalaire (2) est exposée dans la
section de voûte plantaire (M) et la partie cen-
trale (Rc) de la section arrière du pied (R) ;

- la rainure diagonale (4) est formée sur la semelle intercalaire (2) dans la partie centrale (Rc) de la section arrière du pied (R) et sur la semelle extérieure (1) dans la partie de côté latéral (11) de la section arrière du pied (R), ladite rainure diagonale (4) s'étendant dans une direction diagonale avant-arrière sur la section arrière du pied (R) vers un bord extérieur du côté latéral (OUT) de la section arrière du pied (R).
2. Semelle de chaussure selon la revendication 1, où un point d'intersection virtuel (O) entre l'axe longitudinal (A2) et la ligne centrale (Lc) est disposé à l'intérieur d'une zone allant d'une moitié arrière (Mb) de la section de voûte plantaire (M) à une moitié avant (Rf) de la section arrière du pied (R).
3. Semelle de chaussure selon la revendication 2, où le point d'intersection virtuel (O) est positionné antérieurement par rapport au centre de gravité (G) de la partie centrale (Rc).
4. Semelle de chaussure selon la revendication 3, où :
- la rainure diagonale (4) formée sur la semelle intercalaire (2) dans la partie centrale (Rc) de la section arrière du pied (R) est définie par une paire constituée d'une première et d'une deuxième lignes de bord (L1) et (L2) opposées l'une à l'autre ;
- la rainure diagonale (4) formée sur la semelle extérieure (1) est définie par une paire constituée d'une troisième et d'une quatrième lignes de bord (L3) et (L4) opposées l'une à l'autre ; et où
- la troisième et la quatrième lignes de bord (L3) et (L4) sont sensiblement parallèles à la première et à la deuxième lignes de bord (L1) et (L2), respectivement, ou divergent de manière à former entre elles un angle supérieur à un angle formé par la première et la deuxième lignes de bord (L1) et (L2).
5. Semelle de chaussure selon l'une des revendications 1 à 4, où :
- la rainure diagonale (4) s'étend vers une partie de côté médial (20) de la semelle intercalaire (2) dans la section de voûte plantaire (M) ; et où une valeur moyenne d'une surface de section transversale perpendiculaire à la ligne centrale (Lc) de la rainure diagonale (4) dans la section de voûte plantaire (M) est inférieure à une valeur moyenne d'une surface de section transversale perpendiculaire à la ligne centrale (Lc) de la rainure diagonale (4) dans la partie centrale (Rc) de la section arrière du pied (R) de la semelle intercalaire (2).
6. Semelle de chaussure selon l'une des revendications 1 à 4, où :
- la rainure diagonale (4) ne se prolonge pas vers le bord de la partie de côté médial (20) de la semelle intercalaire (2) dans la section de voûte plantaire (M) ; et un bout de la rainure diagonale (4) est disposé postérieurement par rapport à une extrémité antérieure de la section de voûte plantaire (M).
7. Semelle de chaussure selon l'une des revendications 1 à 6, où la rainure diagonale (4) de la semelle extérieure (1) s'élargit dans la direction diagonalement postérieure.
8. Semelle de chaussure selon l'une des revendications 1 à 7, comprenant en outre une rainure transversale perpendiculaire à la rainure diagonale (4).
9. Semelle de chaussure selon l'une des revendications 1 à 8, où :
- un élément de renfort (3) formé par un corps non mousseux en résine est fixé sur une surface inférieure de la semelle intercalaire (2) dans la section de voûte plantaire (M) ; et où ledit élément de renfort (3) a une section diagonale (31) s'étendant sensiblement parallèlement à la rainure diagonale (4), ladite section diagonale (31) étant située à proximité de la rainure diagonale (4) et antérieurement par rapport à la rainure diagonale (4).

FIG. 1

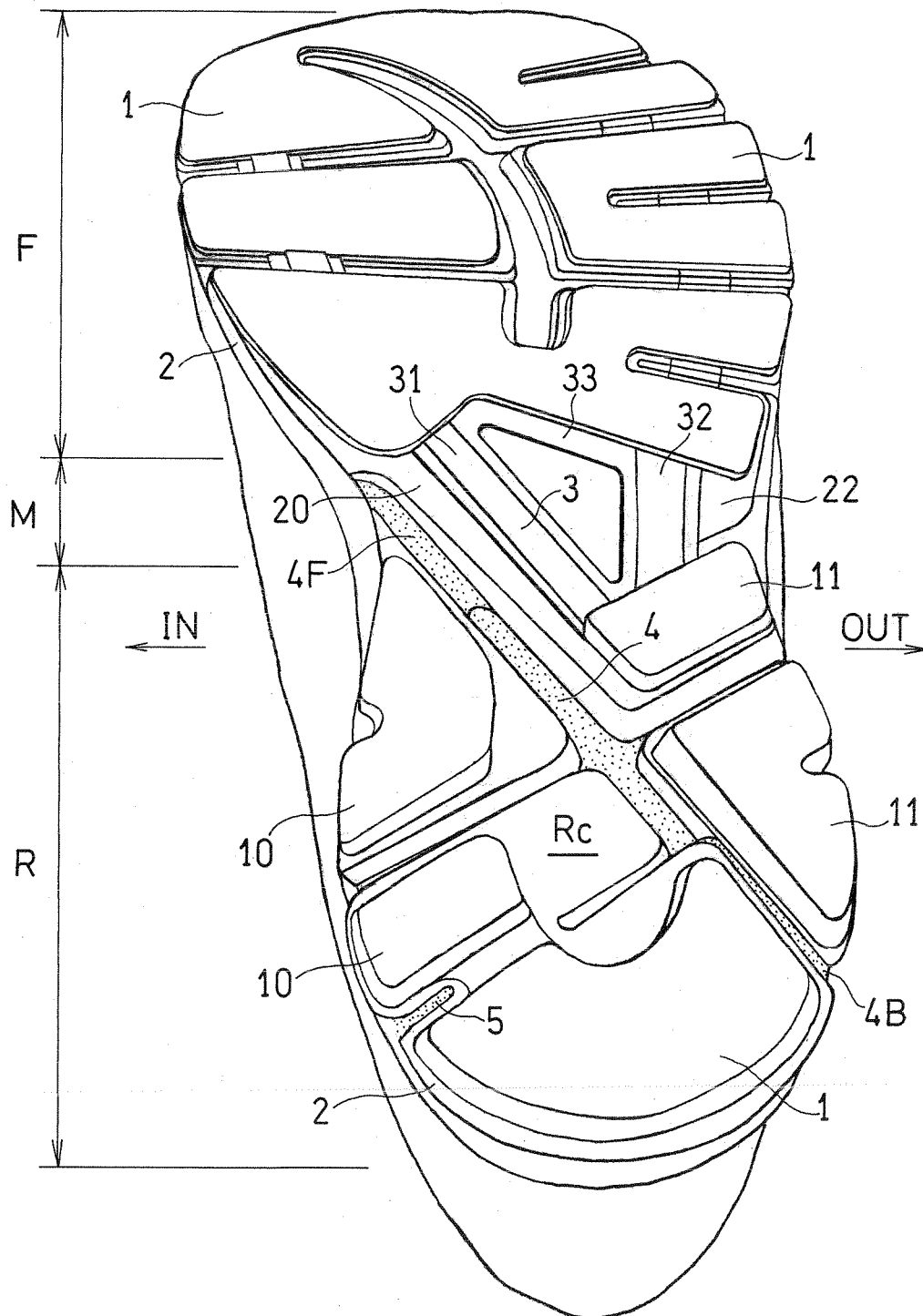


FIG. 2

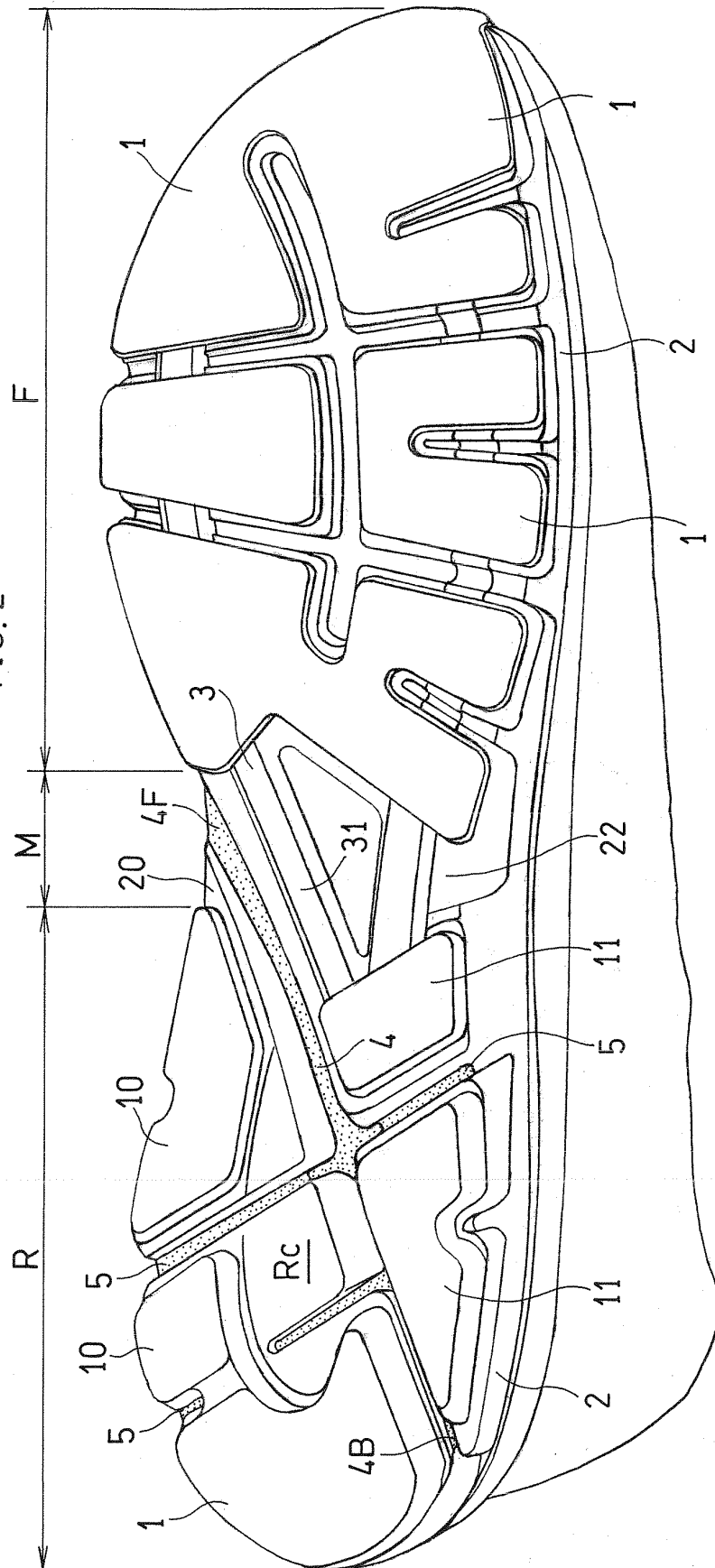


FIG. 3

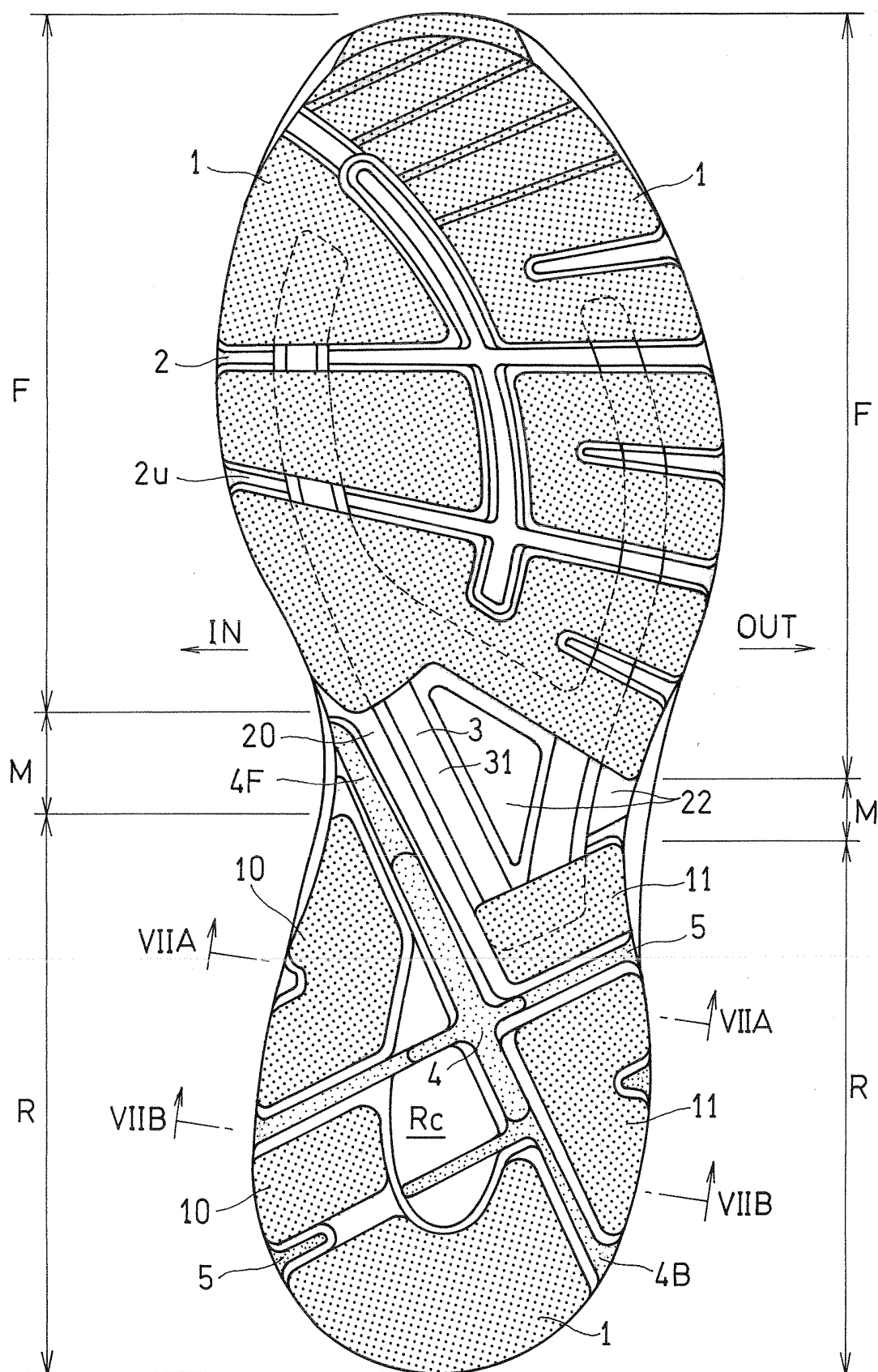


FIG. 4

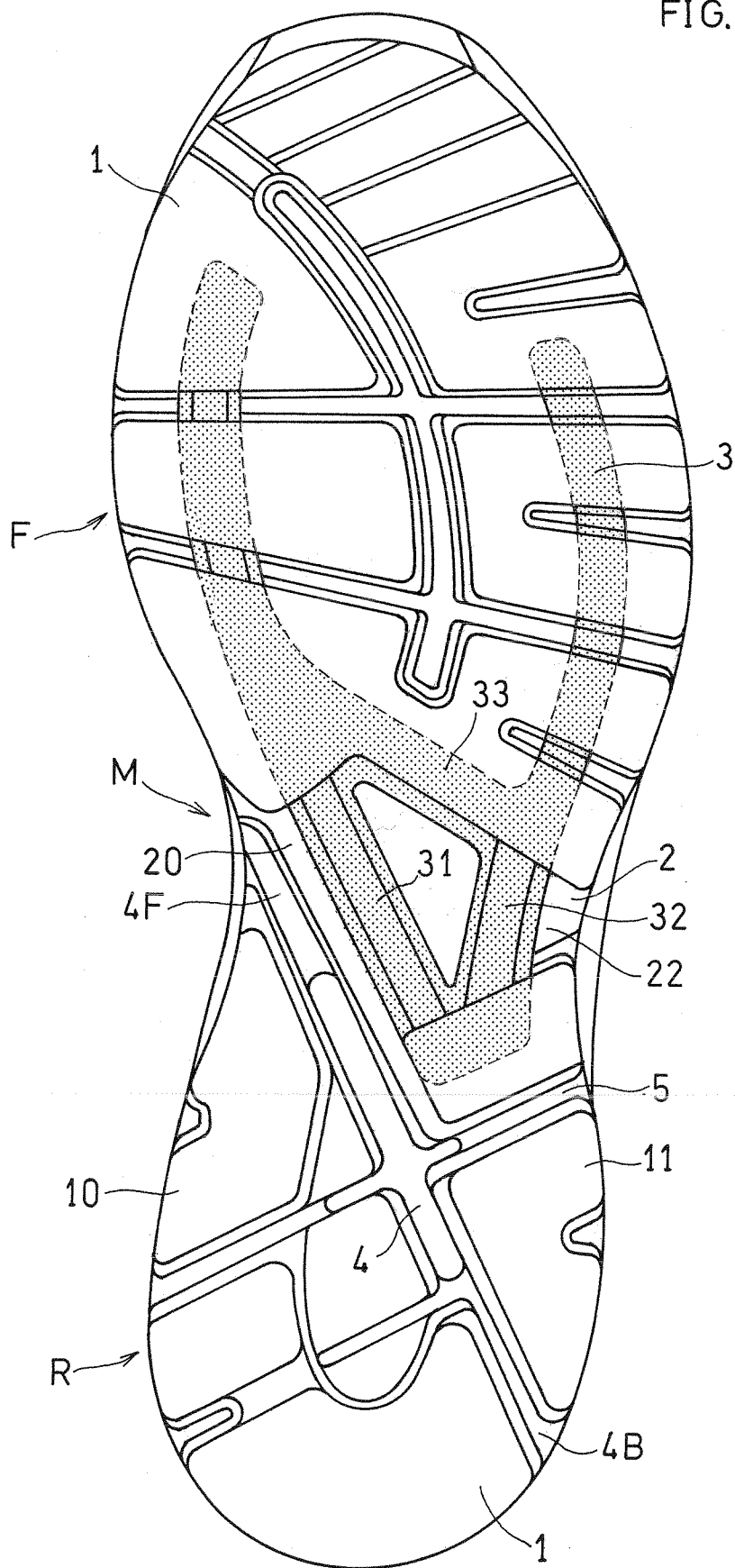


FIG. 5

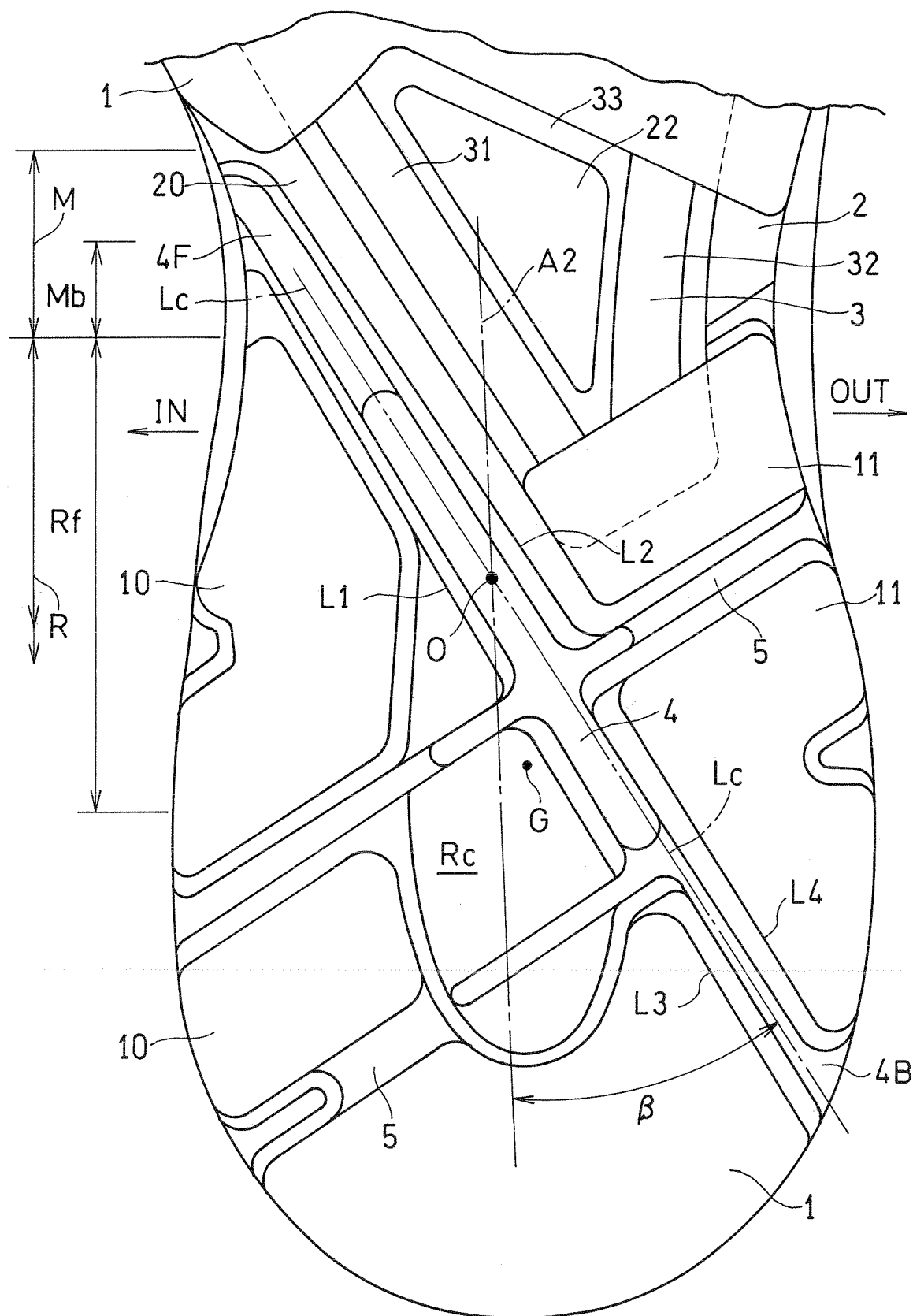


FIG. 6

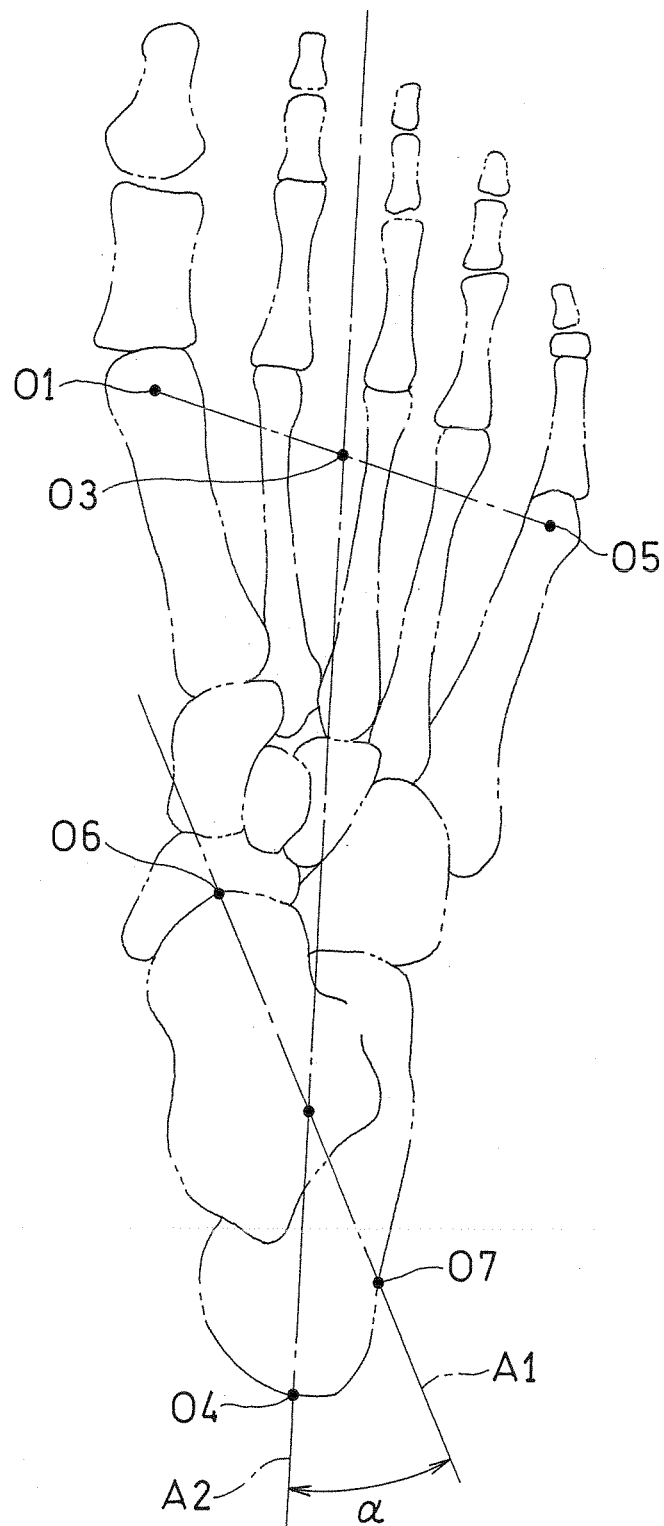


FIG.7A

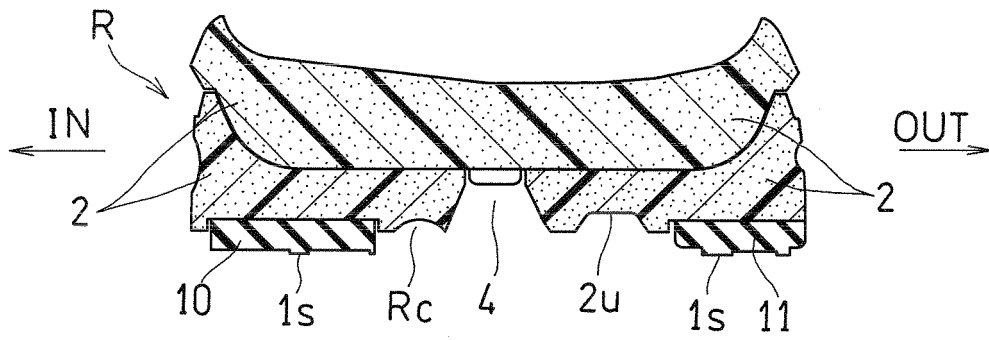


FIG.7B

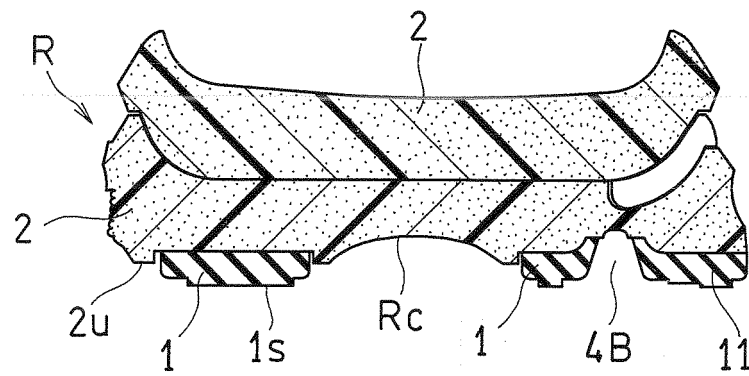


FIG.8A

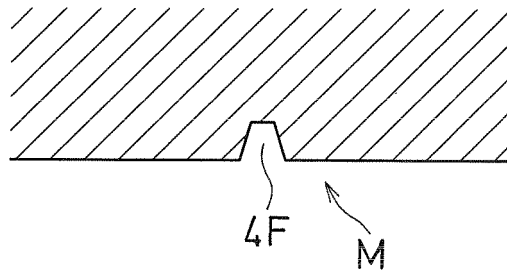


FIG.8B

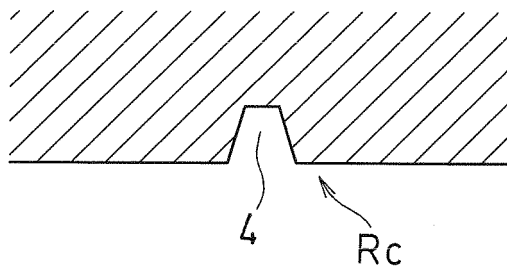


FIG.8C

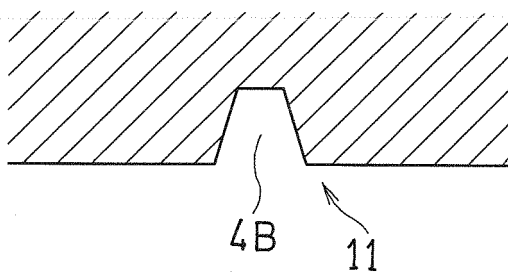
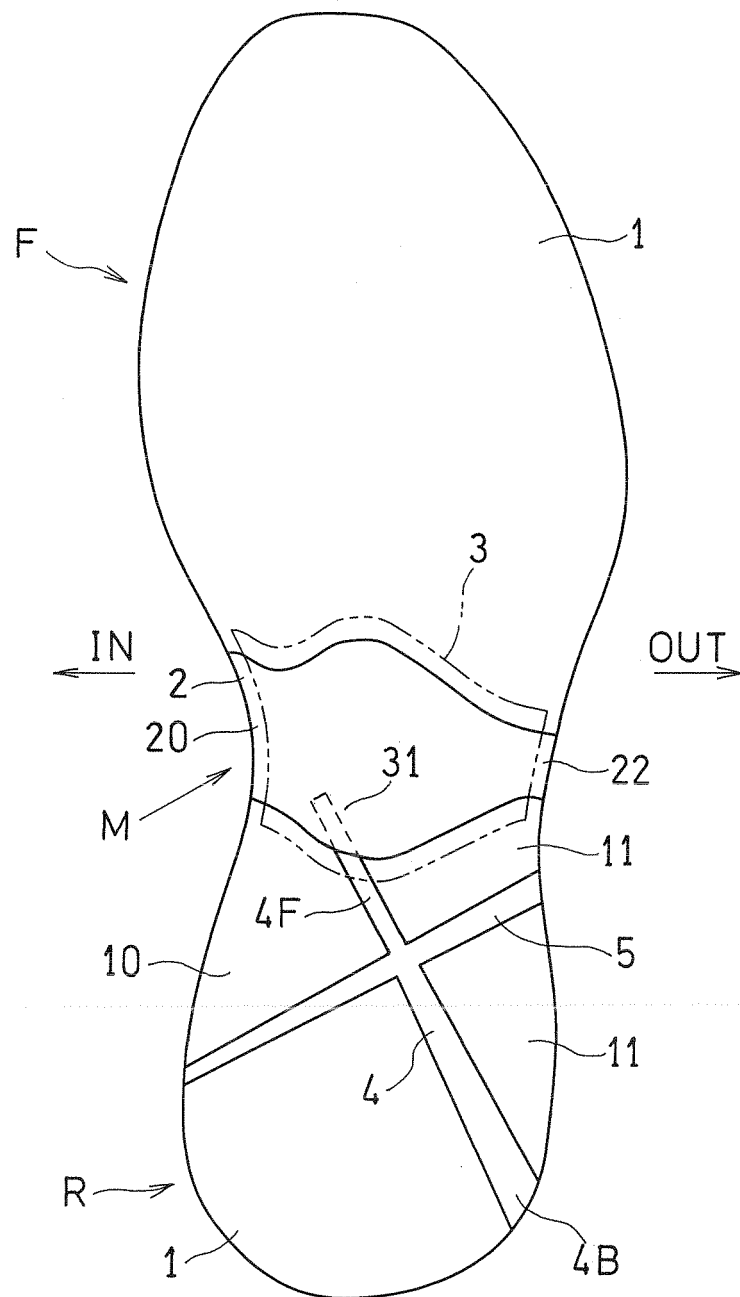


FIG.9



REFERENCES CITED IN THE DESCRIPTION

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