



(11)

EP 4 056 067 A1

(12)

EUROPEAN PATENT APPLICATION
published in accordance with Art. 153(4) EPC

(43) Date of publication:
14.09.2022 Bulletin 2022/37

(51) International Patent Classification (IPC):
A43B 13/12 (2006.01)

(21) Application number: **19956084.8**

(52) Cooperative Patent Classification (CPC):
A43B 13/12

(22) Date of filing: **12.12.2019**

(86) International application number:
PCT/JP2019/048704

(87) International publication number:
WO 2021/117190 (17.06.2021 Gazette 2021/24)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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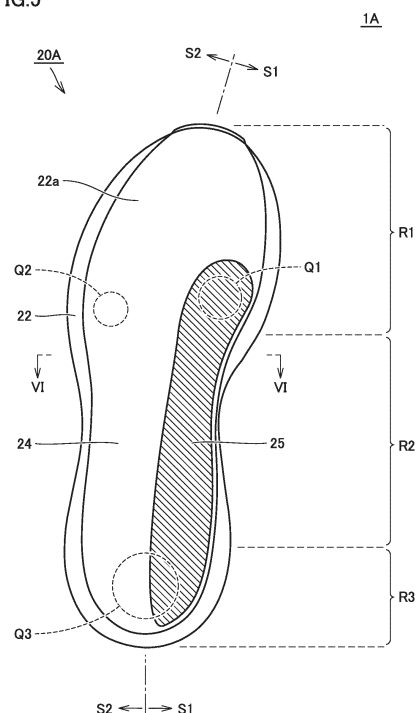
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(54) **SHOE SOLE AND SHOE COMPRISING SAME**

(57) A shoe sole (20A) includes an outsole and a sole body (22). The sole body (22) includes a low hardness portion (24) made of a foam material having relatively low hardness and a high hardness portion (25) made of a foam material having relatively high hardness. The low hardness portion (24) is provided to define an entire area of a lower surface of the sole body (22). The high hardness portion (25) is disposed only in a specific region of a region located above the low hardness portion (24) of the sole body (22).

FIG.5



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Description

TECHNICAL FIELD

[0001] The present invention relates to a shoe sole and a shoe including the shoe sole.

BACKGROUND ART

[0002] During walking or running, a phenomenon called a pronation occurs in which a heel portion of a foot collapses inward. This pronation is an original function of a human foot, by which, when the foot contacts the ground (strictly speaking, immediately after it contacts the ground), the heel portion properly collapses inward, thereby mitigating the impact applied to the foot upon contact with the ground.

[0003] However, the degree to which the heel portion collapses varies among individuals. There are some who tend to suffer from a phenomenon called an overpronation in which the heel portion collapses inward more than necessary, and some who tend to suffer from a phenomenon called an underpronation in which the heel portion does not sufficiently collapse inward. Such an overpronation and an underpronation may cause problems with walking or running.

[0004] Further, a person with what is called pes plano-valgus tends to receive more load on a part on the medial foot side of his/her foot on contact with the ground. Also, a person with what is called bowlegs tends to receive more load on a part on the lateral foot side of his/her foot on contact with the ground. Accordingly, as they get older, their big toes or little toes may deform, which may also result in problems with walking or running.

[0005] Thus, developments have conventionally been conducted for achieving a shoe sole provided with a high rigidity portion or a high hardness portion at a prescribed position of the shoe sole to enhance the stability of the wearer's foot on contact with the ground, to thereby adjust the collapsing degree of the heel portion and prevent excessive concentration of a load upon a part of the foot on the medial foot side or the lateral foot side.

[0006] For example, Japanese Patent Laying-Open No. 2000-225002 (PTL 1) discloses a shoe sole configured such that a plate made of resin, for example, is disposed as a high rigidity portion higher in flexural rigidity than other portions so as to extend in the front-rear direction of the shoe sole, thereby increasing the torsional rigidity about the longitudinal axis of the shoe sole, and thus enhancing the stability on contact with the ground.

[0007] Further, Japanese Patent Laying-Open No. 2016-59555 (PTL 2) discloses a shoe sole configured, for the purpose of providing a shoe suitable to a person with bowlegs, such that a high rigidity portion higher in compression rigidity than other portions is provided in a portion on the lateral foot side in a midsole formed of a foam material so as to extend from the lower surface to the upper surface of the midsole, to thereby enhance the

stability on contact with the ground.

[0008] In addition, there is also known a shoe sole configured such that a high rigidity portion or a high hardness portion is provided at a prescribed position in a lower layer portion of a midsole made of a foam material, to thereby enhance the stability on contact with the ground.

CITATION LIST

10 PATENT LITERATURE

[0009]

PTL 1: Japanese Patent Laying-Open No. 2000-225002

PTL 2: Japanese Patent Laying-Open No. 2016-59555

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0010] However, the shoe sole disclosed in Japanese Patent Laying-Open No. 2000-225002 has a configuration in which a resin-made plate formed of a non-foam material is provided in a relatively large area of the shoe sole. This causes problems that such a too hard plate results in a poor fit on a wear's foot, and the shoe is considerably heavy in weight.

[0011] Further, the shoe sole disclosed in Japanese Patent Laying-Open No. 2016-59555 has a configuration in which a high rigidity portion having high compression rigidity is provided in a portion on the lateral foot side of the shoe sole so as to extend from a lower surface to an upper surface of a midsole made of a foam material. This increases the thickness of the high rigidity portion to a considerable extent, which may result in a poor fit on a foot.

[0012] Accordingly, an object of the present invention is to provide: a shoe sole that is excellent in stability on contact with the ground, that enables an excellent fit on a foot, and that is reduced in weight; and a shoe including the shoe sole.

45 SOLUTION TO PROBLEM

[0013] A shoe sole according to the present invention includes: a forefoot portion that supports a toe portion and a ball portion of a foot; a midfoot portion that supports an arch portion of the foot; and a rearfoot portion that supports a heel portion of the foot, in which the forefoot portion, the midfoot portion, and the rearfoot portion are connected in a front-rear direction. The shoe sole includes: an outsole provided with a ground contact surface; and a sole body located above the outsole. The sole body includes a low hardness portion made of a foam material having relatively low hardness, and a high hardness portion made of a foam material having rela-

tively high hardness. The low hardness portion is provided to define an entire area of a lower surface of the sole body. The high hardness portion is disposed only in a specific region of a region located above the low hardness portion in the sole body.

[0014] A shoe according to the present invention includes: the shoe sole according to the above-described present invention; and an upper located above the shoe sole.

ADVANTAGEOUS EFFECTS OF INVENTION

[0015] The present invention can provide: a shoe sole that is excellent in stability on contact with the ground, that enables an excellent fit on a foot, and that is reduced in weight; and a shoe including the shoe sole.

BRIEF DESCRIPTION OF DRAWINGS

[0016]

Fig. 1 is a perspective view of a shoe according to a first embodiment.

Fig. 2 is an exploded perspective view of the shoe shown in Fig. 1.

Fig. 3 is a side view of a shoe sole (excluding an insole) shown in Fig. 1 as seen from a lateral foot side.

Fig. 4 is a bottom view of the shoe sole shown in Fig. 1.

Fig. 5 is a top view of the shoe sole (excluding an insole) shown in Fig. 1.

Fig. 6 is a cross-sectional view taken along a line VI-VI shown in Fig. 5.

Fig. 7 is a top view of each of shoe soles (each excluding an insole) of shoes according to first and second modifications.

Fig. 8 is a top view of each of shoe soles (each excluding an insole) of shoes according to third and fourth modifications.

Fig. 9 is a cross-sectional view of a shoe sole (excluding an insole) of a shoe according to a fifth modification.

Fig. 10 is a cross-sectional view of a shoe sole (excluding an insole) of a shoe according to a sixth modification.

Fig. 11 is a cross-sectional view of a shoe sole (excluding an insole) of a shoe according to a seventh modification.

Fig. 12 is a cross-sectional view of a shoe sole of a shoe according to an eighth modification.

Fig. 13 is a cross-sectional view of a shoe sole of a shoe according to a ninth modification.

Fig. 14 is a top view of a shoe sole (excluding an insole) of a shoe according to a second embodiment.

Fig. 15 is a cross-sectional view taken along a line XV-XV shown in Fig. 14.

Fig. 16 is a top view of each of shoe soles (each

excluding an insole) of shoes according to tenth and eleventh modifications.

Fig. 17 is a top view of each of shoe soles (each excluding an insole) of shoes according to twelfth and thirteenth modifications.

Fig. 18 is a top view of a shoe sole (excluding an insole) of a shoe according to a third embodiment.

Fig. 19 is a cross-sectional view taken along a line XIX-XIX shown in Fig. 18.

DESCRIPTION OF EMBODIMENTS

[0017] Hereinafter, embodiments of the present invention will be described in detail with reference to the accompanying drawings. In the embodiments described below, the same or corresponding components are denoted by the same reference characters in accompanying drawings, and the description thereof will not be repeated.

[0018] In the embodiments described below, in a plan view of a shoe, the extending direction of the straight line connecting both ends of a shoe sole in its longitudinal axis direction will be referred to as a front-rear direction. Also, in a plan view of a shoe, the direction orthogonal to the front-rear direction will be referred to as a foot width direction.

[0019] In the front-rear direction, the direction from the end on which the portion of the shoe sole that supports a heel portion of a foot is located toward the end on which the portion of the shoe sole that supports a toe portion of the foot is located will be referred to as a front direction. Also, in the front-rear direction, the direction from the end on which the portion of the shoe sole that supports the toe portion of the foot is located toward the end on which the portion of the shoe sole that supports the heel portion of the foot is located will be referred to as a rear direction.

[0020] With reference to the front end of the shoe sole, a first boundary position is defined at a position located at 40% of the dimension of the shoe sole from the front end in the front-rear direction, and a second boundary position is defined at a position located at 80% of the dimension of the shoe sole from the front end in the front-rear direction. In this case, a portion included between the front end and the first boundary position in the front-rear direction will be referred to as a forefoot portion of the shoe sole, a portion included between the first boundary position and the second boundary position in the front-rear direction will be referred to as a midfoot portion of the shoe sole, and a portion included between the second boundary position and the rear end of the shoe sole in the front-rear direction will be referred to as a rearfoot portion of the shoe sole.

[0021] In this case, the forefoot portion of the shoe sole corresponds to a portion that supports a toe portion and a ball portion of a foot, the midfoot portion of the shoe sole corresponds to a portion that supports an arch portion of the foot, and the rearfoot portion of the shoe sole corresponds to a portion that supports a heel portion of

the foot.

[0022] Further, the medial side of the foot in anatomical position (that is, the side closer to the median) will be referred to as a medial foot side, and the side opposite to the medial side of the foot in anatomical position (that is, the side farther from the median) will be referred to as a lateral foot side.

[0023] Further, the thickness direction means a direction orthogonal to the ground contact surface of the shoe sole unless otherwise specified, and the thickness means a dimension in the thickness direction unless otherwise specified.

(First Embodiment)

[0024] Fig. 1 is a perspective view of a shoe according to the first embodiment. Fig. 2 is an exploded perspective view of the shoe shown in Fig. 1. First, the configuration of a shoe 1A according to the present embodiment will be described with reference to Figs. 1 and 2.

[0025] As shown in Figs. 1 and 2, the shoe 1A includes an upper 10, a shoe sole 20A, and a sockliner 30. The upper 10 has a shape that covers the entire portion on the instep side of a foot inserted into the shoe. The shoe sole 20A is located below the upper 10 so as to cover the sole of a foot. The sockliner 30 is accommodated inside the upper 10 so as to cover the inner bottom surface of the upper 10.

[0026] The upper 10 includes an upper body 11, a shoe tongue 12, a toe-side reinforcing portion 13, a heel-side reinforcing portion 14, an eyelet reinforcing portion 15, and a shoelace 16. Among them, the shoe tongue 12, the toe-side reinforcing portion 13, the heel-side reinforcing portion 14, the eyelet reinforcing portion 15, and the shoelace 16 each are fixed or attached to the upper body 11.

[0027] The upper body 11 has a lower portion provided with a lower opening covered with the shoe sole 20A. The upper body 11 has an upper portion provided with an upper opening through which an upper portion of an ankle and a part of the instep of a foot are exposed. The shoe tongue 12 is fixed to the upper body 11 by sewing, welding, bonding, or a combination thereof so as to cover a portion of the upper opening provided in the upper body 11 through which a part of the instep of a foot is exposed. For the upper body 11 and the shoe tongue 12, for example, woven fabric, knitted fabric, synthetic leather, resin, or the like may be used. For shoes particularly required to be air permeable and lightweight, a double raschel warp knitted fabric with a polyester yarn knitted therein may be used.

[0028] The toe-side reinforcing portion 13 and the heel-side reinforcing portion 14 are provided for reinforcing the portions of the upper body 11 that cover a toe and a heel, respectively, of a foot and that are particularly required to have durability. Also, the toe-side reinforcing portion 13 and the heel-side reinforcing portion 14 are positioned so as to cover the outer surface of the upper

body 11 that corresponds to these portions.

[0029] The eyelet reinforcing portion 15 is provided for reinforcing the peripheral edge of the upper opening, which is provided in the upper body 11 and through which a part of the instep of a foot is exposed (the peripheral edge is specifically a portion to which the shoelace 16 is attached). The peripheral edge is also a portion particularly required to have durability similarly to the toe-side reinforcing portion 13 and the heel-side reinforcing portion 14. The eyelet reinforcing portion 15 is positioned so as to cover the outer surface of the upper body 11 that corresponds to the above-mentioned portion.

[0030] The toe-side reinforcing portion 13, the heel-side reinforcing portion 14, and the eyelet reinforcing portion 15 each are made, for example, of woven fabric, knitted fabric, synthetic leather, resin, or the like fixed to the outer surface of the upper body 11 by sewing, welding, bonding, or a combination thereof.

[0031] The shoelace 16 is formed of a string-shaped member for pulling, close in the foot width direction, the peripheral edge of the upper opening which is provided in the upper body 11 and through which a part of the instep of a foot is exposed. The shoelace 16 is passed through a plurality of holes provided in the peripheral edge of the upper opening. When a foot is inserted into the upper body 11 and the shoelace 16 is tightened, the upper body 11 can be brought into close contact with the foot.

[0032] The shoe sole 20A includes an outsole 21, a midsole 22, and an insole 23. Among them, the midsole 22 and the insole 23 correspond to a sole body.

[0033] The outsole 21 and the midsole 22 are integrally formed to have a substantially flat shape as a whole. The outsole 21 has a lower surface including a ground contact surface 21b (see Figs. 3, 4, and the like). The midsole 22 is located above the outsole 21.

[0034] The insole 23 is attached to the upper body 11 so as to cover the above-mentioned lower opening of the upper body 11. More specifically, the insole 23 is fixed by sewing to the lower edge of the upper body 11. Further, the insole 23 is fixed to the upper surface of the midsole 22 by bonding, welding, or the like. The insole 23 is formed for example of: woven fabric, knitted fabric, or nonwoven fabric made of synthetic resin fibers such as polyester; or a resin-made foam material containing a resin material as a main component, and a foaming agent and a crosslinking agent as sub-components. Note that the insole 23, which is a member constituting a part of the shoe sole 20A as described above, is not indispensable and may not be provided. In this case, the shoe sole 20A is formed of the outsole 21 and the midsole 22 as a sole body.

[0035] The sockliner 30 is accommodated inside the upper 10 as described above, and is detachably attached onto the inner bottom surface of the upper 10 or fixed to the inner bottom surface of the upper 10 by welding, bonding, or the like. The sockliner 30 is formed of: woven fabric, knitted fabric, or nonwoven fabric made of syn-

thetic resin fibers such as polyester; or a resin-made foam material containing a resin material as a main component, and a foaming agent and a crosslinking agent as sub-components. The sockliner 30 is provided for the purpose of achieving an excellent fit on a foot. The sockliner 30 is not indispensable and may not be provided.

[0036] Fig. 3 is a side view of a shoe sole (excluding an insole) shown in Fig. 1 as seen from the lateral foot side. Figs. 4 and 5 are a bottom view and a top view, respectively, of the shoe sole (excluding an insole) shown in Fig. 1. Fig. 6 is a cross-sectional view taken along a line VI-VI shown in Fig. 5. The following describes the configuration of the shoe sole 20A according to the present embodiment in greater detail with reference to Figs. 3 to 6.

[0037] As described above, the shoe sole 20A according to the present embodiment includes the insole 23 in addition to the outsole 21 and the midsole 22. In this case, the insole 23 is formed of a sufficiently thin member that is generally 2 mm or less in thickness. Thus, the insole 23 has relatively less influence on the shock absorbing performance, the stability, the fit on a foot, and the like of the shoe sole 20A on contact with the ground. Rather, the shock absorbing performance, the stability, the fit on a foot, and the like are determined mainly by the outsole 21 and the midsole 22. Thus, the following basically describes specifically the outsole 21 and the midsole 22 in the shoe sole 20A.

[0038] As shown in Figs. 3 to 6, the shoe sole 20A includes the outsole 21 and the midsole 22 as described above. The outsole 21 has an upper surface 21a and a ground contact surface 21b as a lower surface, and constitutes a lower portion of the shoe sole 20A. The midsole 22 has an upper surface 22a and a lower surface 22b, and constitutes an upper portion of the shoe sole 20A.

[0039] The shoe sole 20A is shaped such that a peripheral edge portion of the upper surface 22a of the midsole 22 that defines the upper surface of the shoe sole 20A protrudes as compared with the surround area. Thereby, the upper surface 22a has a recessed portion. The recessed portion serves to receive the upper 10 and the insole 23 therein. Also, the upper surface 22a corresponding to the bottom surface of the recessed portion and excluding the peripheral edge portion has a smooth curved surface shape so as to fit to the shape of the sole of a foot.

[0040] The outsole 21 is preferably excellent in wear resistance and grip performance. From this viewpoint, the outsole 21 is formed using a member made of a material, for example, containing a rubber material as a main component and a plasticizer, a reinforcing agent, and a crosslinking agent as sub-components.

[0041] Thus, the outsole 21 is generally formed of a member that is higher in Young's modulus and harder than the midsole 22. As shown in Figs. 3 and 4, a tread pattern is provided on the ground contact surface 21b of the outsole 21 by forming protrusions and recesses on the exposed surface thereof in order to improve the grip

performance. The tread pattern and the shape of the outsole 21 may be designed as appropriate according to the intended use of the shoe 1A, and the shapes shown in Figs. 3 and 4 are provided merely by way of example.

[0042] The midsole 22 preferably excellently absorbs shock while having an appropriate strength. From this viewpoint, the midsole 22 is formed, for example, using: a resin material as a main component; and a resin-made foam material containing a foaming agent and a crosslinking agent as sub-components. Alternatively, the midsole 22 may be formed using a rubber-made foam material containing: a rubber material as a main component; and a plasticizer, a foaming agent, a reinforcing agent, and a crosslinking agent as sub-components.

[0043] As the above-mentioned resin material, a thermoplastic resin and a thermosetting resin may be used. As a thermoplastic resin, ethylene-vinyl acetate (EVA) copolymer may be suitably used. As a thermosetting resin, for example, polyurethane (PU) may be suitably used. As the above-mentioned rubber material, for example, butadiene rubber may be suitably used.

[0044] Thus, the midsole 22 is generally formed of a member that is lower in Young's modulus and softer than the outsole 21. Note that the midsole 22 may include various types of shock absorbing parts or reinforcing parts in prescribed portions.

[0045] As shown in Figs. 3 to 5, the shoe sole 20A includes a forefoot portion R1 that supports a toe portion and a ball portion of a foot, a midfoot portion R2 that supports an arch portion of the foot, and a rearfoot portion R3 that supports a heel portion of the foot. The forefoot portion R1, the midfoot portion R2, and the rearfoot portion R3 are positioned to be connected in the front-rear direction of the shoe sole 20A.

[0046] As shown in Figs. 5 and 6, in the shoe sole 20A according to the present embodiment, the midsole 22 includes a low hardness portion 24 made of a foam material having relatively low hardness and a high hardness portion 25 made of a foam material having relatively high hardness. The low hardness portion 24 and the high hardness portion 25 are bonded to each other and thereby integrally formed.

[0047] In general, a foam material with low hardness is low in hardness (i.e., soft), and thus, is low in compressive rigidity and more likely to deform. On the other hand, a foam material with high hardness is high in hardness (i.e., hard), and thus, is high in compressive rigidity and less likely to deform.

[0048] Accordingly, by providing the low hardness portion 24 in the midsole 22, the low hardness portion 24 receives a load to thereby deform more significantly than the high hardness portion 25, and thus, mainly serves to absorb the impact received when the foot contacts the ground. On the other hand, by providing the high hardness portion 25 in the midsole 22, the high hardness portion 25 receives a load but does not significantly deform as compared with the low hardness portion 24, and thereby, mainly serves to ensure the stability on contact with

the ground.

[0049] As described above, there is conventionally known a shoe sole having a high rigidity portion or a high hardness portion disposed at a prescribed position in a lower layer portion of a midsole made of a foam material. In the case of the shoe sole having the above-described configuration, the high rigidity portion or the high hardness portion is provided in the midsole, thereby enhancing the stability on contact with the ground. Further, a low rigidity portion or a low hardness portion is to be provided in an upper layer portion of the midsole so as to cover the high rigidity portion or the high hardness portion, thereby enabling a relatively excellent fit on a foot.

[0050] However, when the above-described configuration is adopted, it is also conceivable that the low rigidity portion or the low hardness portion provided in the upper layer portion of the midsole so as to cover the high rigidity portion or the high hardness portion may excessively deform under load on contact with the ground. In that case, consequently, the desired stability may not be sufficiently achieved.

[0051] In this regard, in the shoe sole 20A according to the present embodiment, the low hardness portion 24 is provided in the midsole 22 so as to define the entire area of the lower surface of the midsole 22 while the high hardness portion 25 is disposed only in a specific region of the region located above the low hardness portion 24 in the midsole 22.

[0052] More specifically, the high hardness portion 25 is disposed in a specific region (a region indicated by oblique lines in Fig. 5) in the upper layer portion L1 (see Fig. 6) of the midsole 22 so as to define a part of the upper surface 22a of the midsole 22.

[0053] On the other hand, so as to define the remaining portion of the upper surface 22a of the midsole 22 and the lower surface 22b of the midsole 22, the low hardness portion 24 is disposed: in a region excluding the above-mentioned specific region (the region other than the region indicated by oblique lines in Fig. 5) from the upper layer portion L1 (see Fig. 6) of the midsole 22; and entirely in the lower layer portion L2 (see Fig. 6) of the midsole 22 that includes the region located below the above-mentioned specific region.

[0054] In the present embodiment, the above-mentioned specific region is located in a portion on the medial foot side (on the side indicated by a reference character S1 in the figure) in the midsole 22, and more specifically located to extend in: a portion on the medial foot side in the forefoot portion R1 that includes a part Q1 for supporting a big toe; a portion on the medial foot side in the midfoot portion R2; and a portion on the medial foot side in the rearfoot portion R3. Also, the portion on the medial foot side in the rearfoot portion R3 includes a portion on the medial foot side in the rearfoot portion R3 that includes a part Q3 for supporting a heel bone.

[0055] In other words, in the present embodiment, the high hardness portion 25 is disposed almost entirely in a portion on the medial foot side in the midsole 22, which

excludes a toe side portion from a portion on the upper layer portion L1 side. The low hardness portion 24 is disposed in a remaining portion of the midsole 22.

[0056] The shoe sole 20A according to the present embodiment configured as described above and the shoe 1A including the shoe sole 20A can suppress occurrence of an overpronation in which the heel portion collapses inward more than necessary on contact with the ground (an excessive collapse of the heel portion in the direction indicated by an arrow AR1 shown in Fig. 6). In other words, when a person who is more likely to suffer from an overpronation wears the shoes 1A according to the present embodiment, the sole of each foot can be stably supported at the portion on the medial foot side. Thus, the pressure acting on the midsole 22 can be dispersed to thereby allow suppression of excessive deformation of the midsole 22, with the result that occurrence of an overpronation can be suppressed.

[0057] Further, the shoe sole 20A according to the above-described present embodiment and the shoe 1A including the shoe sole 20A can stably support the sole of each foot at the portion on the medial foot side as described above. Thus, the pressure acting on the midsole 22 can be dispersed to thereby allow suppression of excessive deformation of the midsole 22. Accordingly, when a person with pes planovalgus wears the shoes 1A according to the present embodiment, concentration of a load on the medial foot side portion of each foot on contact with the ground can be avoided.

[0058] In addition, by adopting the above-described configuration, the low hardness portion 24 is located below the high hardness portion 25, so that the high hardness portion 25 itself has a relatively reduced thickness. Also, the high hardness portion 25 is formed of a foam material similarly to the low hardness portion 24. Thus, the fit on a foot is not impaired but an excellent fit on a foot can be achieved, and further, the shoe sole and the shoe can be reduced in weight.

[0059] In this way, the shoe sole 20A according to the present embodiment and the shoe 1A including the shoe sole 20A can provide: a shoe sole that is particularly suitable for a person more likely to suffer from an overpronation and a person with pes planovalgus, that is excellent in stability on contact with the ground, that enables an excellent fit on a foot, and that is reduced in weight; and a shoe including the shoe sole.

[0060] As the hardness of the low hardness portion 24, for example, its Asker C hardness is preferably 20 degrees or more and 70 degrees or less, and more preferably 40 degrees or more and 60 degrees or less. On the other hand, as the hardness of the high hardness portion 25, for example, its Asker C hardness is preferably 60 degrees or more and 85 degrees or less on the condition that the high hardness portion 25 is higher in Asker C hardness than the low hardness portion 24. By satisfying these conditions, while ensuring the stability on contact with the ground, the boundary between the low hardness portion 24 and the high hardness portion 25 can be made

hard to be felt by the sole of each foot, to thereby enable a more excellent fit on a foot. Further, the difference between the Asker C hardness of the high hardness portion 25 and the Asker C hardness of the low hardness portion 24 is preferably 8 degrees or more, and more preferably 10 degrees or more.

[0061] Further, as shown in Fig. 6, in the configuration in which a thickness t of the high hardness portion 25 decreases toward the lateral foot side in the edge portion of the high hardness portion 25 on the lateral foot side in the foot width direction (on the side indicated by a reference character S2 in the figure), the boundary between the low hardness portion 24 and the high hardness portion 25 can be made hard to be felt by the sole of each foot, to thereby enable a more excellent fit on a foot. Also, in order to further improve a fit on a foot, the high hardness portion 25 may have a configuration in which its thickness t is a maximum at the position closest to the edge portion on the medial foot side in the midsole 22 in the foot width direction, and this thickness decreases with distance from the edge portion in the foot width direction (i.e., decreases toward the lateral foot side). However, the thickness t of the high hardness portion 25 does not necessarily have to change in the foot width direction, but may be uniform.

[0062] In this case, in the present embodiment, since the shoe 1A includes the insole 23 and the sockliner 30, the boundary between the low hardness portion 24 and the high hardness portion 25 can be made hard to be felt by the sole of each foot. However, the insole 23 and the sockliner 30 do not necessarily have to be provided, but one or both of the insole 23 and the sockliner 30 may not be provided in the shoe.

[0063] Further, in the shoe sole 20A according to the present embodiment, the low hardness portion 24 and the high hardness portion 25 are bonded to each other as described above, so that the midsole 22 is integrally formed. Such a configuration can be manufactured, for example, in such a way that a foam material of the low hardness portion 24 and a foam material of the high hardness portion 25 are superimposed on each other and press-molded and then welded to each other. Therefore, by using this manufacturing method, the shoe sole 20A can be readily and inexpensively manufactured.

[0064] However, the above-described manufacturing method does not necessarily have to be used for manufacturing the shoe sole 20A, but a foam material of the low hardness portion 24 and a foam material of the high hardness portion 25 may be bonded, for example, by adhesion and the like through an adhesive layer, or the shoe sole 20A may be manufactured by two-color molding that is a type of injection molding.

[0065] When the low hardness portion 24 and the high hardness portion 25 each made of a foam material are molded simultaneously, the melting point of the material of the low hardness portion 24 is preferably the same as the melting point of the material of the high hardness portion 25. These melting points are preferably 50 °C or

more and 200 °C or less, and more preferably 50 °C or more and 140 °C or less.

(First to Fourth Modifications)

[0066] Figs. 7(A), 7(B), 8(A), and 8(B) are top views of shoe soles (each excluding an insole) of shoes according to the first, second, third, and fourth modifications, respectively. With reference to these figures, the following describes shoe soles 20A1 to 20A4 according to the first to fourth modifications based on the above-described first embodiment. In place of the above-described shoe sole 20A, each of the shoe soles 20A1 to 20A4 according to the first to fourth modifications is provided in the shoe 1A.

[0067] As shown in Fig. 7(A), in the shoe sole 20A1 according to the first modification, a specific region of the midsole 22 where the high hardness portion 25 is provided is reduced as compared with the above-described shoe sole 20A. Also in the shoe sole 20A1 according to the present modification, the specific region is located in a portion on the medial foot side in the midsole 22.

[0068] More specifically, in the shoe sole 20A1 according to the present modification, the specific region is located mainly in the portion on the medial foot side in the forefoot portion R1 that includes the part Q1 for supporting a big toe. In other words, in the present modification, the high hardness portion 25 is disposed only in the above-described portion in a portion on the medial foot side and on the upper layer portion L1 side in the midsole 22, and the low hardness portion 24 is disposed in the remaining portion of the midsole 22.

[0069] As shown in Fig. 7(B), in the shoe sole 20A2 according to the second modification, a specific region of the midsole 22 where the high hardness portion 25 is provided is reduced as compared with the above-described shoe sole 20A. Also in the shoe sole 20A2 according to the present modification, the specific region is located in a portion on the medial foot side in the midsole 22.

[0070] More specifically, in the shoe sole 20A2 according to the present modification, the specific region is located mainly in a portion on the medial foot side in the rearfoot portion R3. Note that the portion on the medial foot side in the rearfoot portion R3 includes a portion on the medial foot side in a part Q3 for supporting a heel bone in the rearfoot portion R3. In other words, in the present modification, the high hardness portion 25 is disposed only in the above-described portion in a portion on the medial foot side and on the upper layer portion L1 side in the midsole 22, and the low hardness portion 24 is disposed in the remaining portion of the midsole 22.

[0071] As shown in Fig. 8(A), in the shoe sole 20A3 according to the third modification, a specific region of the midsole 22 where the high hardness portion 25 is provided is reduced as compared with the above-described shoe sole 20A. Also in the shoe sole 20A3 according to the present modification, the specific region is located in a portion on the medial foot side in the midsole

22.

[0072] More specifically, in the shoe sole 20A3 according to the present modification, the specific region is located mainly in: a portion on the medial foot side in the forefoot portion R1 that includes the part Q1 for supporting a big toe; and a portion on the medial foot side in the rearfoot portion R3, in which these portions of the forefoot portion R1 and the rearfoot portion R3 are independent of each other. Note that the portion on the medial foot side in the rearfoot portion R3 includes a portion on the medial foot side in the part Q3 for supporting a heel bone in the rearfoot portion R3. In other words, in the present modification, the high hardness portion 25 is disposed only in the above-described two portions on the medial foot side and on the upper layer portion L1 side in the midsole 22, and the low hardness portion 24 is disposed in the remaining portion of the midsole 22.

[0073] As shown in Fig. 8(B), in the shoe sole 20A4 according to the fourth modification, a specific region of the midsole 22 where the high hardness portion 25 is provided is enlarged as compared with the above-described shoe sole 20A. In the shoe sole 20A4 according to the present modification, the specific region is located not only in the portion on the medial foot side in the midsole 22 but also partially located in the portion on the lateral foot side in the midsole 22.

[0074] More specifically, in the shoe sole 20A4 according to the present modification, the specific region is located to extend in: the portion on the medial foot side in the forefoot portion R1 that includes the part Q1 for supporting a big toe; the portion on the medial foot side in the midfoot portion R2; the portion on the medial foot side in the rearfoot portion R3; and the portion on the lateral foot side in the rearfoot portion R3. Note that the portions on the medial foot side and the lateral foot side in the rearfoot portion R3 include the part Q3 for supporting a heel bone in the rearfoot portion R3. In other words, in the present modification, the high hardness portion 25 is disposed in: the almost entire area on the medial foot side in the midsole 22 that excludes the toe side portion from a portion on the upper layer portion L1 side; and the above-described portion in the portion on the lateral foot side and on the upper layer portion L1 side. Also, the low hardness portion 24 is disposed in the remaining portion of the midsole 22.

[0075] The shoe soles 20A1 to 20A4 according to the first to fourth modifications and the shoe 1A including one of the shoe soles 20A1 to 20A4 can also achieve the effect according to the above-described first embodiment though the resulting effect is different to some degree. Thus, it becomes possible to achieve: a shoe sole that is particularly suitable for a person more likely to suffer from an overpronation and a person with pes planovalgus, that is excellent in stability on contact with the ground, that enables an excellent fit on a foot, and that is reduced in weight; and a shoe including the shoe sole.

(Fifth to Seventh Modifications)

[0076] Figs. 9 to 11 are cross-sectional views of shoe soles (each excluding an insole) of shoes according to the respective fifth to seventh modifications. With reference to these figures, the following describes shoe soles 20A5 to 20A7 according to the fifth to seventh modifications based on the above-described first embodiment. In place of the above-described shoe sole 20A, each of the shoe soles 20A5 to 20A7 according to the fifth to seventh modifications is provided in the shoe 1A.

[0077] As shown in Fig. 9, in the shoe sole 20A5 according to the fifth modification, the configuration of the midsole 22 is different from that of the above-described shoe sole 20A. Thus, the configuration of the specific region in the midsole 22 where the high hardness portion 25 is provided is also different from that in the case of the above-described shoe sole 20A.

[0078] Specifically, in the shoe sole 20A5 according to the present modification, the midsole 22 is formed of a lower midsole portion 221 and an upper midsole portion 222 that are bonded and thereby integrated with each other. In other words, the midsole 22 includes the lower midsole portion 221 and the upper midsole portion 222 each having a flat plate shape that are stacked in its thickness direction and bonded together by welding, adhesion, or the like, to thereby form a flat shape in its entirety.

[0079] A specific region of the midsole 22 where the high hardness portion 25 is provided is disposed at a prescribed position in the upper midsole portion 222. This specific region is positioned so as to reach each of the upper surface and the lower surface of the upper midsole portion 222. In a plan view of the shoe sole 20A5, the position where the specific region is formed is the same as that in the case of the above-described shoe sole 20A.

[0080] Also in the case of the shoe sole 20A5 according to the present modification, similarly to the above-described shoe sole 20A, the low hardness portion 24 is provided in the midsole 22 so as to define the entire area of the lower surface of the midsole 22, and the high hardness portion 25 is disposed only in a specific region of the region located above the low hardness portion 24 in the midsole 22. Therefore, the above-described effect according to the first embodiment is achieved.

[0081] In the present modification, the lower midsole portion 221 and the low hardness portion 24 of the upper midsole portion 222 may be formed of different types of foam materials or may be formed of the same type of foam material. In particular, when the lower midsole portion 221 and the low hardness portion 24 of the upper midsole portion 222 are formed of different types of foam materials, the midsole 22 can have various functions by such a combination of the foam materials.

[0082] As shown in Fig. 10, the shoe sole 20A6 according to the sixth modification is different in configuration from the shoe sole 20A5 according to the above-described fifth modification only in that the specific region of the midsole 22 where the high hardness portion 25 is

provided is different.

[0083] Specifically, the specific region of the midsole 22 where the high hardness portion 25 is provided is provided only in the portion on the lower surface side in the upper midsole portion 222, but not provided in the portion on the upper surface side in the upper midsole portion 222. Accordingly, the high hardness portion 25 is to be embedded in the midsole 22 in the thickness direction, and the upper surface and the lower surface of the midsole 22 are to be defined by the low hardness portion 24. In a plan view of the shoe sole 20A6, the position where the specific region is formed is the same as that in the case of the above-described shoe sole 20A.

[0084] In the configuration as described above, the low hardness portion 24 is located above the high hardness portion 25. However, in the present modification, assuming that the minimum value of the thickness dimension of the midsole 22 is defined as T1 and the maximum value of the thickness of the portion of the midsole 22 that is located below the high hardness portion 25 is defined as T2, these T1 and T2 satisfy the condition of $T2 \geq (1/2) \times T1$. In the configuration as described above, the portion of the low hardness portion 24 that is located above the high hardness portion 25 is sufficiently thin in thickness, so that the stability on contact with the ground can be ensured. In order to further enhance the stability, the thickness of the portion of the low hardness portion 24 that is located above the high hardness portion 25 may be less than one-fourth of the value of T1.

[0085] Also in the case of the shoe sole 20A6 according to the present modification, similarly to the case of the above-described shoe sole 20A, the low hardness portion 24 is provided in the midsole 22 so as to define the entire area of the lower surface of the midsole 22, and the high hardness portion 25 is disposed only in a specific region of the region located above the low hardness portion 24 in the midsole 22. Therefore, the effect according to the above-described first embodiment is achieved.

[0086] In the present modification, the lower midsole portion 221 and the low hardness portion 24 of the upper midsole portion 222 may be formed of different types of foam materials or may be formed of the same type of foam material. In particular, when the lower midsole portion 221 and the low hardness portion 24 of the upper midsole portion 222 are formed of different types of foam materials, the midsole 22 can have various functions by such a combination of the foam materials.

[0087] As shown in Fig. 11, the shoe sole 20A7 according to the seventh modification is different in configuration from the shoe sole 20A5 according to the above-described fifth modification only in that the specific region of the midsole 22 where the high hardness portion 25 is provided is different.

[0088] Specifically, the specific region of the midsole 22 where the high hardness portion 25 is provided is provided only in the portion on the upper surface side in the lower midsole portion 221, but not provided in the portions on the lower surface side in the upper midsole portion

222 and the lower midsole portion 221. Accordingly, the high hardness portion 25 is to be embedded in the midsole 22 in the thickness direction, and the upper surface and the lower surface of the midsole 22 are to be defined by the low hardness portion 24. In a plan view of the shoe sole 20A7, the position where the specific region is formed is the same as that in the case of the above-described shoe sole 20A.

[0089] In the configuration as described above, the low hardness portion 24 is located above the high hardness portion 25. However, also in the present modification, assuming that the minimum value of the thickness dimension of the midsole 22 is defined as T1 and the maximum value of the thickness of the portion of the midsole 22 that is located below the high hardness portion 25 is defined as T2, these T1 and T2 satisfy the condition of $T2 \geq (1/2) \times T1$. In the configuration as described above, the portion of the low hardness portion 24 that is located above the high hardness portion 25 is sufficiently thin in thickness, so that the stability on contact with the ground can be ensured. In order to further enhance the stability, the thickness of the portion of the low hardness portion 24 that is located above the high hardness portion 25 may be less than one-fourth of the value of T1.

[0090] Also in the case of the shoe sole 20A7 according to the present modification, similarly to the case of the above-described shoe sole 20A, the low hardness portion 24 is provided in the midsole 22 so as to define the entire area of the lower surface of the midsole 22, and the high hardness portion 25 is disposed only in a specific region of the region located above the low hardness portion 24 in the midsole 22. Therefore, the effect according to the above-described first embodiment is achieved.

[0091] In the present modification, the low hardness portion 24 of the lower midsole portion 221 and the upper midsole portion 222 may be formed of different types of foam materials or may be formed of the same type of foam material. In particular, when the low hardness portion 24 of the lower midsole portion 221 and the upper midsole portion 222 are formed of different types of foam materials, the midsole 22 can have various functions by such a combination of the foam materials.

(Eighth and Ninth Modifications)

[0092] Figs. 12 and 13 are cross-sectional views of shoe soles of shoes according to the eighth and ninth modifications, respectively. With reference to these figures, the following describes shoe soles 20A8 and 20A9 according to the eighth and ninth modifications, respectively, based on the above-described first embodiment. In place of the above-described shoe sole 20A, each of the shoe soles 20A8 and 20A9 according to the eighth and ninth modifications is provided in the shoe 1A.

[0093] As shown in Fig. 12, the shoe sole 20A8 according to the eighth modification is different from the above-described shoe sole 20A in configurations of the midsole 22 and the insole 23, and accordingly, is signif-

icantly different from the above-described shoe sole 20A in configuration of the sole body where the low hardness portion 24 and the high hardness portion 25 are provided.

[0094] Specifically, in the shoe sole 20A8 according to the present modification, not only the midsole 22 but also the insole 23 is made of a foam material, the midsole 22 is entirely formed of the low hardness portion 24 made of a foam material having relatively low hardness, and the insole 23 is formed of the low hardness portion 24 made of a foam material having relatively low hardness and the high hardness portion 25 made of a foam material having relatively high hardness.

[0095] Thereby, in the shoe sole 20A8 according to the present modification, the low hardness portion 24 is provided in the midsole 22 so as to define the entire area of the lower surface of the midsole 22, and the high hardness portion 25 is disposed only in a specific region of the region of the insole 23 that is located above the low hardness portion 24 provided in the midsole 22. In a plan view of the shoe sole 20A8, the position where the specific region is formed is the same as that in the case of the above-described shoe sole 20A.

[0096] Therefore, the effect according to the above-described first embodiment is achieved also in the case of the shoe sole 20A8 according to the present modification. Thus, it becomes possible to achieve: a shoe sole that is particularly suitable for a person more likely to suffer from an overpronation and a person with pes plano-valgus, that is excellent in stability on contact with the ground, that enables an excellent fit on a foot, and that is reduced in weight; and a shoe including the shoe sole.

[0097] In this case, the insole 23 is generally formed of a sufficiently thin member as described above, and therefore, the insole 23 has relatively small influence on the shock absorbing performance, the stability, the fit on a foot, and the like of the shoe sole 20A8 on contact with the ground. However, if the high hardness portion 25 provided in the insole 23 is configured to have relatively high hardness, or if the insole 23 itself is formed thicker than usual to thereby increase the thickness of the high hardness portion 25, the insole 23 can exert relatively significant influence on the shock absorbing performance, the stability, the fit on a foot, and the like of the shoe sole 20A8.

[0098] Therefore, by adopting the above-described configuration in consideration of the above-described circumstances, the effect according to the above-described first embodiment can be achieved as described above. The present modification has exemplified the case where the low hardness portion 24 of the insole 23 is formed of a foam material having relatively low hardness, but the low hardness portion 24 may be formed of woven fabric, knitted fabric, synthetic leather, or the like.

[0099] As shown in Fig. 13, when the shoe sole 20A9 according to the ninth modification is compared with the above-described shoe sole 20A, the configuration of the midsole 22 is the same but the configuration of the insole 23 is different therebetween. Thus, the configuration of

the sole body where the low hardness portion 24 and the high hardness portion 25 are provided is different from that in the case of the above-described shoe sole 20A.

[0100] Specifically, in the shoe sole 20A9 according to the present modification, similarly to the case of the shoe sole 20A8 according to the above-described eighth modification, the insole 23 is formed of the low hardness portion 24 made of a foam material having relatively low hardness and the high hardness portion 25 made of a foam material having relatively high hardness, and the insole 23 is disposed above the midsole 22 and bonded thereto. Thereby, the high hardness portion 25 provided in the midsole 22 and the high hardness portion provided in the insole 23 are integrated with each other. In a plan view of the shoe sole 20A9, the position where the specific region is formed is the same as that in the case of the above-described shoe sole 20A.

[0101] The shoe sole 20A9 according to the present modification also has substantially the same configuration as that in the case of the above-described shoe sole 20A.

[0102] Thus, the low hardness portion 24 is provided in the midsole 22 so as to define the entire area of the lower surface of the midsole 22, and the high hardness portion 25 is disposed only in a specific region of the region located above the low hardness portion 24 in each of the midsole 22 and the insole 23. Therefore, the effect according to the above-described first embodiment is achieved.

(Second Embodiment)

[0103] Fig. 14 is a top view of a shoe sole (excluding an insole) of a shoe according to the second embodiment, and Fig. 15 is a cross-sectional view taken along a line XV-XV shown in Fig. 14. The following describes a shoe sole 20B according to the present embodiment and a shoe 1B including the shoe sole 20B with reference to Figs. 14 and 15. Note that the shoe 1B according to the present embodiment includes an upper and a sockliner having the same configurations as those in the shoe 1A according to the above-described embodiment.

[0104] As shown in Figs. 14 and 15, similarly to the shoe sole 20A according to the above-described first embodiment, the shoe sole 20B according to the present embodiment includes the midsole 22 including: the low hardness portion 24 made of a foam material having relatively low hardness; and the high hardness portion 25 made of a foam material having relatively high hardness. Also, the low hardness portion 24 and the high hardness portion 25 are bonded to each other and thereby integrally formed.

[0105] In the shoe sole 20B according to the present embodiment, the high hardness portion 25 is disposed in a specific region (a region indicated by oblique lines in Fig. 14) of the upper layer portion L1 (see Fig. 15) in the midsole 22 so as to define a part of the upper surface 22a of the midsole 22.

[0106] On the other hand, the low hardness portion 24 is disposed: in the region excluding the specific region (a region other than the region indicated by oblique lines in Fig. 14) from the upper layer portion L1 (see Fig. 15) in the midsole 22; and entirely in the lower layer portion L2 (see Fig. 15) of the midsole 22 that includes the region located below the above-mentioned specific region, so as to define the remaining portion of the upper surface 22a of the midsole 22 and the lower surface 22b of the midsole 22.

[0107] In the present embodiment, the above-described specific region is located in the portion on the lateral foot side (on the side indicated by the reference character S2 in the figure) in the midsole 22, and more specifically located to extend in: the portion on the lateral foot side in the forefoot portion R1 that includes a part Q2 for supporting a little toe; the portion on the lateral foot side in the midfoot portion R2; and the portion on the lateral foot side in the rearfoot portion R3. Note that the portion on the lateral foot side in the rearfoot portion R3 includes the portion on the lateral foot side in the part Q3 for supporting a heel bone in the rearfoot portion R3.

[0108] In other words, in the present embodiment, the high hardness portion 25 is disposed almost entirely in a portion on the lateral foot side in the midsole 22, which excludes a toe side portion from the portion on the upper layer portion L1 side, and the low hardness portion 24 is disposed in the remaining portion of the midsole 22.

[0109] The shoe sole 20B according to the present embodiment configured as described above and the shoe 1B including the shoe sole 20B can suppress occurrence of an underpronation in which the heel portion does not sufficiently collapse inward on contact with the ground (insufficient collapse of the heel portion in the direction indicated by the arrow AR1 shown in Fig. 15). In other words, when a person more likely to suffer from an underpronation wears the shoes 1B according to the present embodiment, the sole of each foot can be stably supported at the portion on the lateral foot side. Thus, the pressure acting on the midsole 22 can be dispersed to thereby allow suppression of excessive deformation of the midsole 22, with the result that the occurrence of underpronation can be suppressed.

[0110] Further, the shoe sole 20B according to the above-described present embodiment and the shoe 1B including the shoe sole 20B can stably support the sole of each foot at the portion on the lateral foot side. Thus, the pressure acting on the midsole 22 can be dispersed to thereby allow suppression of excessive deformation of the midsole 22. Accordingly, when a person with bowlegs wears the shoes 1B according to the present embodiment, concentration of a load on the lateral foot side portion of each foot on contact with the ground can be avoided.

[0111] In addition, by adopting the above-described configuration, the low hardness portion 24 is located below the high hardness portion 25, so that the high hardness portion 25 itself has a relatively reduced thickness.

Also, the high hardness portion 25 is formed of a foam material similarly to the low hardness portion 24. Thus, the fit on a foot is not impaired but an excellent fit on a foot can be achieved, and further, the shoe sole and the shoe can be reduced in weight.

[0112] The shoe sole 20B according to the present embodiment and the shoe 1B including the shoe sole 20B can provide: a shoe sole that is particularly suitable for a person more likely to suffer from an underpronation and a person with bowlegs, that is excellent in stability on contact with the ground, that enables an excellent fit on a foot, and that is reduced in weight; and a shoe including the shoe sole.

[0113] As shown in Fig. 15, in the configuration in which the thickness t of the high hardness portion 25 decreases toward the medial foot side in the edge portion of the high hardness portion 25 on the medial foot side in the foot width direction (on the side indicated by the reference character S1 in the figure), the boundary between the low hardness portion 24 and the high hardness portion 25 can be made hard to be felt by the sole of each foot, to thereby enable a more excellent fit on a foot. Also, in order to further improve a fit on a foot, the high hardness portion 25 may have a configuration in which its thickness t is a maximum at the position closest to the edge portion on the lateral foot side in the midsole 22 in the foot width direction, and this thickness decreases with distance from the edge portion in the foot width direction (i.e., decreases toward the medial foot side). However, the thickness t of the high hardness portion 25 does not necessarily have to change in the foot width direction, but the thickness t may be uniform.

(Tenth to Thirteenth Modifications)

[0114] Figs. 16(A), 16(B), 17(A), and 17(B) are top views of shoe soles (each excluding an insole) of shoes according to the tenth, eleventh, twelfth, and thirteenth modifications, respectively. With reference to these figures, the following describes shoe soles 20B1 to 20B4 according to the tenth to thirteenth modifications based on the above-described second embodiment. In place of the above-described shoe sole 20B, each of the shoe soles 20B1 to 20B4 according to the tenth to thirteenth modifications is provided in the shoe 1B.

[0115] As shown in Fig. 16(A), in the shoe sole 20B1 according to the tenth modification, a specific region of the midsole 22 where the high hardness portion 25 is provided is reduced as compared with the above-described shoe sole 20B. Also in the shoe sole 20B1 according to the present modification, the specific region is located in the portion on the lateral foot side in the midsole 22.

[0116] More specifically, in the shoe sole 20B1 according to the present modification, the above-mentioned specific region is located mainly in the portion on the lateral foot side in the forefoot portion R1 that includes the part Q2 for supporting a little toe. In other words, in the

present modification, the high hardness portion 25 is disposed only in the above-described portion in a portion on the lateral foot side and on the upper layer portion L1 side in the midsole 22, and the low hardness portion 24 is disposed in the remaining portion of the midsole 22.

[0117] As shown in Fig. 16(B), in the shoe sole 20B2 according to the eleventh modification, a specific region of the midsole 22 where the high hardness portion 25 is provided is reduced as compared with the above-described shoe sole 20B. Also in the shoe sole 20B2 according to the present modification, the specific region is located in the portion on the lateral foot side in the midsole 22.

[0118] More specifically, in the shoe sole 20B2 according to the present modification, the above-mentioned specific region is located mainly in the portion on the lateral foot side in the rearfoot portion R3. Note that the portion on the lateral foot side in the rearfoot portion R3 includes the portion on the lateral foot side in the part Q3 for supporting a heel bone in the rearfoot portion R3. In other words, in the present modification, the high hardness portion 25 is disposed only in the above-described portion in a portion on the lateral foot side and on the upper layer portion L1 side in the midsole 22, and the low hardness portion 24 is disposed in the remaining portion of the midsole 22.

[0119] As shown in Fig. 17(A), in the shoe sole 20B3 according to the twelfth modification, the specific region of the midsole 22 where the high hardness portion 25 is provided is reduced as compared with the above-described shoe sole 20B. Also in the shoe sole 20B3 according to the present modification, the specific region is located in the portion on the lateral foot side in the midsole 22.

[0120] More specifically, in the shoe sole 20B3 according to the present modification, the above-mentioned specific region is located mainly in: the portion on the lateral foot side in the forefoot portion R1 that includes the part Q2 for supporting a little toe; and the portion on the lateral foot side in the rearfoot portion R3, in which these portions of the forefoot portion R1 and the rearfoot portion R3 are independent of each other. Note that the portion on the lateral foot side in the rearfoot portion R3 includes the portion on the lateral foot side in the part Q3 for supporting a heel bone in the rearfoot portion R3. In other words, in the present modification, the high hardness portion 25 is disposed only in the above-described two portions on the lateral foot side and on the upper layer portion L1 side in the midsole 22, and the low hardness portion 24 is disposed in the remaining portion of the midsole 22.

[0121] As shown in Fig. 17(B), in the shoe sole 20B4 according to the thirteenth modification, a specific region of the midsole 22 where the high hardness portion 25 is provided is enlarged as compared with the above-described shoe sole 20B. In the shoe sole 20B4 according to the present modification, the specific region is located not only in the portion on the lateral foot side in the mid-

sole 22 but also partially located in the portion on the medial foot side in the midsole 22.

[0122] More specifically, in the shoe sole 20B4 according to the present modification, the specific region is located to extend in: the portion on the lateral foot side in the forefoot portion R1 that includes the part Q2 for supporting a little toe; the portion on the lateral foot side in the midfoot portion R2; the portion on the lateral foot side in the rearfoot portion R3; and the portion on the medial foot side in the rearfoot portion R3. Note that the portions on the lateral foot side and the medial foot side in the rearfoot portion R3 include the part Q3 for supporting a heel bone in the rearfoot portion R3. In other words, in the present modification, the high hardness portion 25 is disposed in: the almost entire area on the lateral foot side in the midsole 22 that excludes the toe side portion from the portion on the upper layer portion L1 side; and the above-described portion in the portion on the medial foot side and on the upper layer portion L1 side. Also, the low hardness portion 24 is disposed in the remaining portion of the midsole 22.

[0123] The shoe soles 20B1 to 20B4 according to the tenth to thirteenth modifications and the shoe 1B including one of the shoe soles 20B1 to 20B4 can also achieve the effect according to the above-described second embodiment though the resulting effect is different to some degree. Thus, it becomes possible to achieve: a shoe sole that is particularly suitable for a person more likely to suffer from an underpronation and a person with bowlegs, that is excellent in stability on contact with the ground, that enables an excellent fit on a foot, and that is reduced in weight; and a shoe including the shoe sole.

(Third Embodiment)

[0124] Fig. 18 is a top view of a shoe sole (excluding an insole) of a shoe according to the third embodiment, and Fig. 19 is a cross-sectional view taken along a line XIX-XIX shown in Fig. 18. The following describes a shoe sole 20C according to the present embodiment and a shoe 1C including the shoe sole 20C with reference to Figs. 18 and 19. Note that the shoe 1C according to the present embodiment includes an upper and a sockliner having the same configurations as those of the shoe 1A according to the above-described embodiment.

[0125] As shown in Figs. 18 and 19, similarly to the shoe sole 20A according to the above-described first embodiment, the shoe sole 20C according to the present embodiment includes the midsole 22 including: the low hardness portion 24 made of a foam material having relatively low hardness; and the high hardness portion 25 made of a foam material having relatively high hardness. Also, the low hardness portion 24 and the high hardness portion 25 are bonded to each other and thereby integrally formed.

[0126] In the shoe sole 20C according to the present embodiment, the high hardness portion 25 is disposed in a specific region (a region indicated by oblique lines

in Fig. 18) of the upper layer portion L1 (see Fig. 19) in the midsole 22 so as to define a part of the upper surface 22a of the midsole 22.

[0127] On the other hand, the low hardness portion 24 is disposed to extend: in the region excluding the above-mentioned specific region (the region other than the region indicated by oblique lines in Fig. 18) from the upper layer portion L1 (see Fig. 19) of the midsole 22; and entirely in the lower layer portion L2 (see Fig. 19) of the midsole 22 that includes a region located below the specific region, so as to define the remaining portion of the upper surface 22a of the midsole 22 and the lower surface 22b of the midsole 22.

[0128] In the present embodiment, the above-described specific region is located mainly in a portion of the rearfoot portion R3 that includes the part Q3 for supporting a heel bone. In other words, in the present embodiment, the high hardness portion 25 is disposed only in the above-described portion in a portion on the posterior-end side and on the upper layer portion L1 side in the midsole 22, and the low hardness portion 24 is disposed in the remaining portion of the midsole 22.

[0129] The shoe sole 20C according to the present embodiment configured as described above and the shoe 1C including the shoe sole 20C allow the heel portion to be stably supported by the midsole 22 on contact with the ground. Thus, the pressure acting on the midsole 22 can be dispersed to thereby allow suppression of excessive deformation of the midsole 22. Therefore, unsteadiness of the heel portion on contact with the ground (for example, the situation that the heel portion is inclined more than necessary in the direction indicated by the arrow AR1 or an arrow AR2 shown in Fig. 19) can be suppressed.

[0130] In addition, by adopting the above-described configuration, the low hardness portion 24 is located below the high hardness portion 25, so that the high hardness portion 25 itself has a relatively reduced thickness. Also, the high hardness portion 25 is formed of a foam material similarly to the low hardness portion 24. Thus, the fit on a foot is not impaired but an excellent fit on a foot can be achieved, and further, the shoe sole and the shoe can be reduced in weight.

[0131] In this way, the shoe sole 20C according to the present embodiment and the shoe 1C including the shoe sole 20C can provide: a shoe sole that is excellent in stability on contact with the ground, that enables an excellent fit on a foot, and that is reduced in weight; and a shoe including the shoe sole.

(Summary of the Disclosure in Embodiments)

[0132] The following summarizes characteristic configurations disclosed in the first to third embodiments and the modifications thereof as described above.

[0133] A shoe sole according to an aspect of the present disclosure includes: a forefoot portion that supports a toe portion and a ball portion of a foot; a midfoot

portion that supports an arch portion of the foot; and a rearfoot portion that supports a heel portion of the foot, in which the forefoot portion, the midfoot portion, and the rearfoot portion are connected in a front-rear direction.

5 The shoe sole includes: an outsole provided with a ground contact surface; and a sole body located above the outsole. The sole body includes a low hardness portion made of a foam material having relatively low hardness, and a high hardness portion made of a foam material having relatively high hardness. The low hardness portion is provided to define an entire area of a lower surface of the sole body, and the high hardness portion is disposed only in a specific region of a region located above the low hardness portion in the sole body.

10 **[0134]** In the shoe sole according to an aspect of the present disclosure, the sole body may include a midsole. In this case, each of the low hardness portion and the high hardness portion may be provided in the midsole. Also, the low hardness portion and the high hardness portion may be bonded to each other such that the midsole is integrally formed.

15 **[0135]** In the shoe sole according to an aspect of the present disclosure, the high hardness portion may be disposed in the specific region of an upper layer portion of the midsole to define a part of an upper surface of the midsole. In this case, the low hardness portion may be disposed to extend: in a region excluding the specific region from the upper layer portion of the midsole; and entirely in a lower layer portion of the midsole that includes a region located below the specific region, so as to define a remaining portion of the upper surface of the midsole and a lower surface of the midsole.

20 **[0136]** In the shoe sole according to an aspect of the present disclosure, the high hardness portion may be embedded in the midsole in a thickness direction. In this case, the low hardness portion may be disposed entirely in a region excluding the specific region from the midsole so as to define an upper surface and a lower surface of the midsole.

25 **[0137]** In the shoe sole according to an aspect of the present disclosure, the midsole may include a lower midsole portion and an upper midsole portion stacked in the thickness direction. In this case, the high hardness portion may be provided in a portion on an upper surface side in the lower midsole portion and/or in a portion on a lower surface side in the upper midsole portion.

30 **[0138]** In the shoe sole according to an aspect of the present disclosure, the sole body may include a midsole and an insole. In this case, the high hardness portion may be provided in the insole, and the low hardness portion may be provided in the midsole.

35 **[0139]** In the first embodiment of the shoe sole according to an aspect of the present disclosure, the specific region is located in a portion on a medial foot side in the sole body.

40 **[0140]** In the first embodiment, the specific region may be located in a portion on the medial foot side in the rearfoot portion.

[0141] In the first embodiment, the specific region may be located in: a portion on the medial foot side in the forefoot portion, the portion including a part for supporting a big toe; and a portion on the medial foot side in the rearfoot portion, in which the specific region in the forefoot portion and the specific region in the rearfoot portion may be independent of each other.

[0142] In the first embodiment, the specific region may be located to extend in: a portion on the medial foot side in the forefoot portion, the portion including a part for supporting a big toe; a portion on the medial foot side in the midfoot portion; and a portion on the medial foot side in the rearfoot portion.

[0143] In the first embodiment, the specific region may be located to extend in: a portion on the medial foot side in the forefoot portion, the portion including a part for supporting a big toe; a portion on the medial foot side in the midfoot portion; a portion on the medial foot side in the rearfoot portion; and a portion on a lateral foot side in the rearfoot portion.

[0144] In the first embodiment, in an edge portion of the high hardness portion on a lateral foot side in a foot width direction, a thickness of the high hardness portion may decrease toward the lateral foot side.

[0145] In a second embodiment of the shoe sole according to an aspect of the present disclosure, the specific region is located in a portion on a lateral foot side in the sole body.

[0146] In the second embodiment, the specific region may be located to extend in: a portion on the lateral foot side in the forefoot portion, the portion including a part for supporting a little toe; and a portion on the lateral foot side in the midfoot portion.

[0147] In the second embodiment, in an edge portion of the high hardness portion on a medial foot side in a foot width direction, a thickness of the high hardness portion may decrease toward the medial foot side.

[0148] In a third embodiment of the shoe sole according to an aspect of the present disclosure, the specific region is located in a portion of the sole body that includes a part for supporting a heel bone.

[0149] In the shoe sole according to an aspect of the present disclosure, it is preferable that an Asker C hardness of the low hardness portion is 40 degrees or more and 60 degrees or less, and an Asker C hardness of the high hardness portion is 60 degrees or more and 85 degrees or less on a condition that the high hardness portion is higher in Asker C hardness than the low hardness portion.

[0150] A shoe according to an aspect of the present disclosure includes: the shoe sole according to an aspect of the above-described present disclosure; and an upper located above the shoe sole.

(Other Embodiments)

[0151] Specific shapes, configurations, numbers, positions, and the like of the respective portions presented

in the first to third embodiments and the modifications thereof described above can be modified as appropriate. For example, in the illustrations in the figures, each of the boundary surface between the midsole and the outsole, and the boundary surface between the lower midsole portion and the upper midsole portion is formed in a planar shape, but these boundary surfaces each may be formed in a curved surface shape. Further, shock absorbing parts each for performing a further shock absorbing function may be provided in a specific portion of the sole body formed of the midsole or formed of the insole in addition to the midsole.

[0152] Further, the characteristic configurations presented in the above-described first to third embodiments and the modifications thereof can be combined with one another. For example, the configuration of the midsole and/or the insole in the thickness direction as in each of the fifth to ninth modifications based on the first embodiment may be applicable to the shoe sole according to the second or third embodiment and the shoe including the shoe sole.

[0153] Further, the first to third embodiments and the modifications thereof have been described above by way of example with reference to the shoe configured such that a shoelace is used to bring an upper body into close contact with a foot, but the shoe may be configured such that the upper body is brought into close contact with a foot by a hook-and-loop fastener, or the shoe may be configured to include a sock-shaped upper body so as to allow the upper body to be brought into close contact with a foot only by inserting the foot into the upper body.

[0154] The above-described embodiments and the modifications thereof disclosed herein are illustrative and non-restrictive in any respect. The technical scope of the present invention is defined by the terms of the claims, and is intended to include any modifications within the meaning and scope equivalent to the terms of the claims.

REFERENCE SIGNS LIST

[0155] 1A to 1C shoe, 10 upper, 11 upper body, 12 shoe tongue, 13 toe-side reinforcing portion, 14 heel-side reinforcing portion, 15 eyelet reinforcing portion, 16 shoelace, 20A, 20A1 to 20A9, 20B, 20B1 to 20B4, 20C shoe sole, 21 outsole, 21a upper surface, 21b ground contact surface, 22 midsole, 22a upper surface, 22b lower surface, 221 lower midsole portion, 222 upper midsole portion, 23 insole, 24 low hardness portion, 25 high hardness portion, 30 sockliner, L1 upper layer portion, L2 lower layer portion, Q1 part for supporting a big toe, Q2 part for supporting a little toe, Q3 part for supporting a heel bone, R1 forefoot portion, R2 midfoot portion, R3 rearfoot portion.

Claims

1. A shoe sole including a forefoot portion that supports

a toe portion and a ball portion of a foot, a midfoot portion that supports an arch portion of the foot, and a rearfoot portion that supports a heel portion of the foot, the forefoot portion, the midfoot portion, and the rearfoot portion being connected in a front-rear direction, the shoe sole comprising:

an outsole provided with a ground contact surface; and
a sole body located above the outsole, wherein the sole body includes

a low hardness portion made of a foam material having relatively low hardness, and
a high hardness portion made of a foam material having relatively high hardness,

the low hardness portion is provided to define an entire area of a lower surface of the sole body, and

the high hardness portion is disposed only in a specific region of a region located above the low hardness portion in the sole body.

2. The shoe sole according to claim 1, wherein

the sole body includes a midsole,
each of the low hardness portion and the high hardness portion is provided in the midsole, and
the low hardness portion and the high hardness portion are bonded to each other such that the midsole is integrally formed.

3. The shoe sole according to claim 2, wherein

the high hardness portion is disposed in the specific region of an upper layer portion of the midsole to define a part of an upper surface of the midsole, and
the low hardness portion is disposed to extend: in a region excluding the specific region from the upper layer portion of the midsole; and entirely in a lower layer portion of the midsole that includes a region located below the specific region, so as to define a remaining portion of the upper surface of the midsole and a lower surface of the midsole.

4. The shoe sole according to claim 2, wherein

the high hardness portion is embedded in the midsole in a thickness direction, and
the low hardness portion is disposed entirely in a region excluding the specific region from the midsole so as to define an upper surface and a lower surface of the midsole.

5. The shoe sole according to claim 4, wherein

the midsole includes a lower midsole portion and an upper midsole portion stacked in the thickness direction, and

the high hardness portion is provided in a portion on an upper surface side in the lower midsole portion and/or in a portion on a lower surface side in the upper midsole portion.

6. The shoe sole according to claim 1, wherein

the sole body includes a midsole and an insole, the high hardness portion is provided at least in the insole, and
the low hardness portion is provided at least in the midsole.

7. The shoe sole according to any one of claims 1 to 6, wherein the specific region is located in a portion on a medial foot side in the sole body.

8. The shoe sole according to claim 7, wherein the specific region is located in a portion on the medial foot side in the rearfoot portion.

9. The shoe sole according to claim 7, wherein the specific region is located in: a portion on the medial foot side in the forefoot portion, the portion including a part for supporting a big toe; and a portion on the medial foot side in the rearfoot portion, and the specific region in the forefoot portion and the specific region in the rearfoot portion are independent of each other.

10. The shoe sole according to claim 7, wherein the specific region is located to extend in: a portion on the medial foot side in the forefoot portion, the portion including a part for supporting a big toe; a portion on the medial foot side in the midfoot portion; and a portion on the medial foot side in the rearfoot portion.

11. The shoe sole according to claim 7, wherein the specific region is located to extend in: a portion on the medial foot side in the forefoot portion, the portion including a part for supporting a big toe; a portion on the medial foot side in the midfoot portion; a portion on the medial foot side in the rearfoot portion; and a portion on a lateral foot side in the rearfoot portion.

12. The shoe sole according to any one of claims 1 to 6, wherein, in an edge portion of the high hardness portion on a lateral foot side in a foot width direction, a thickness of the high hardness portion decreases toward the lateral foot side.

13. The shoe sole according to any one of claims 1 to 6, wherein the specific region is located in a portion on a lateral foot side in the sole body.

14. The shoe sole according to claim 13, wherein the specific region is located to extend in: a portion on the lateral foot side in the forefoot portion, the portion including a part for supporting a little toe; and a portion on the lateral foot side in the midfoot portion. 5
15. The shoe sole according to claim 13 or 14, wherein, in an edge portion of the high hardness portion on a medial foot side in a foot width direction, a thickness of the high hardness portion decreases toward the medial foot side. 10
16. The shoe sole according to any one of claims 1 to 6, wherein the specific region is located in a portion of the sole body that includes a part for supporting a heel bone. 15
17. The shoe sole according to any one of claims 1 to 16, wherein 20
- an Asker C hardness of the low hardness portion is 40 degrees or more and 60 degrees or less, and
- an Asker C hardness of the high hardness portion is 60 degrees or more and 85 degrees or less on a condition that the high hardness portion is higher in Asker C hardness than the low hardness portion. 25
18. A shoe comprising: 30
- the shoe sole according to any one of claims 1 to 17; and
- an upper located above the shoe sole. 35

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FIG.1

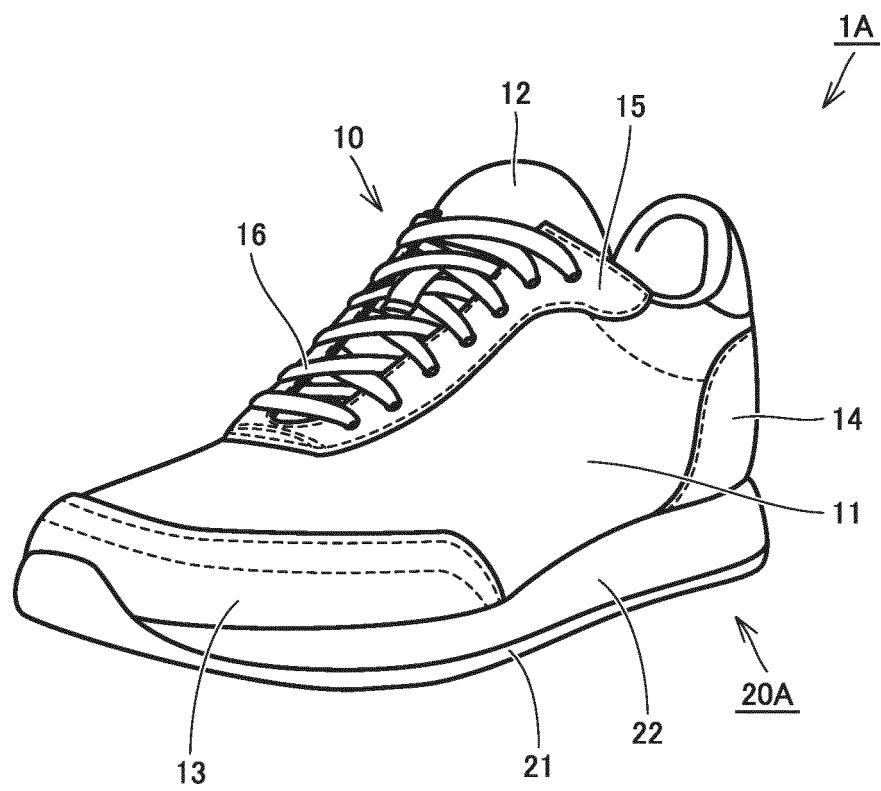


FIG.2

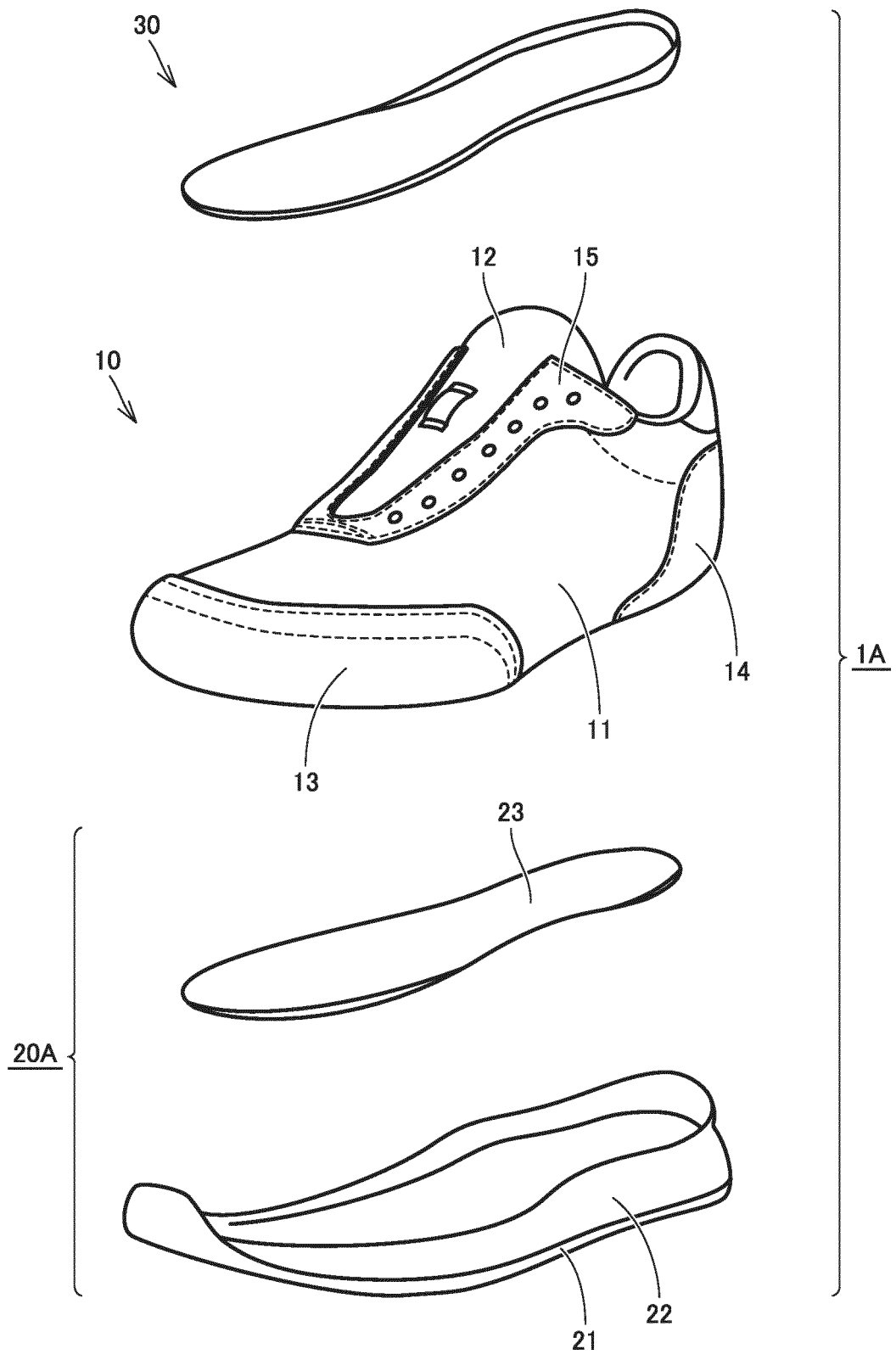


FIG.3

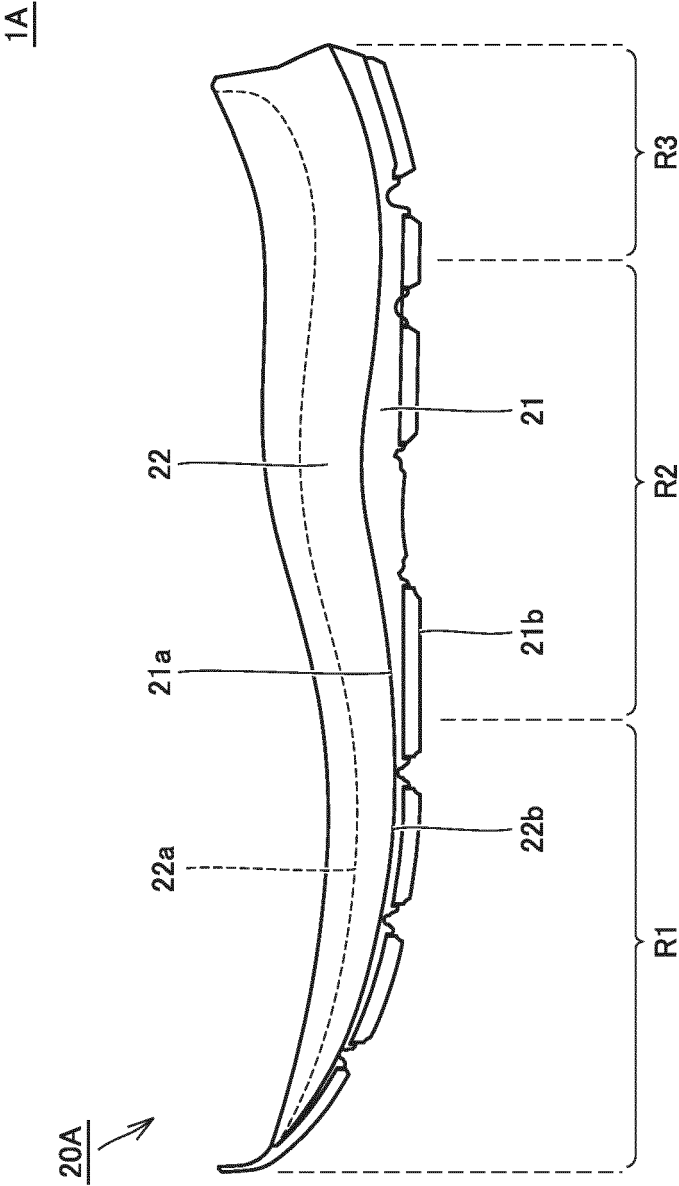


FIG.4

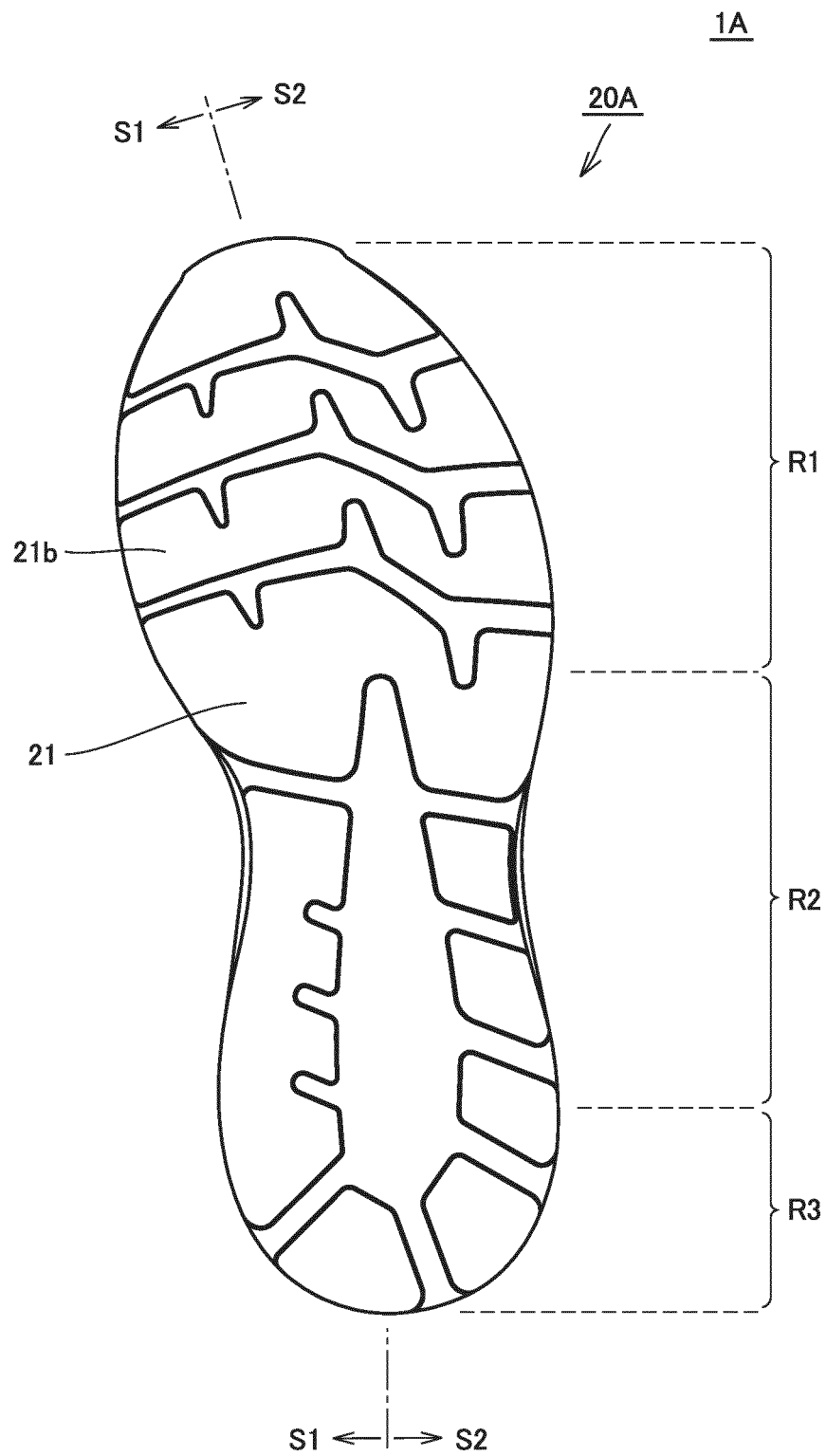


FIG.5

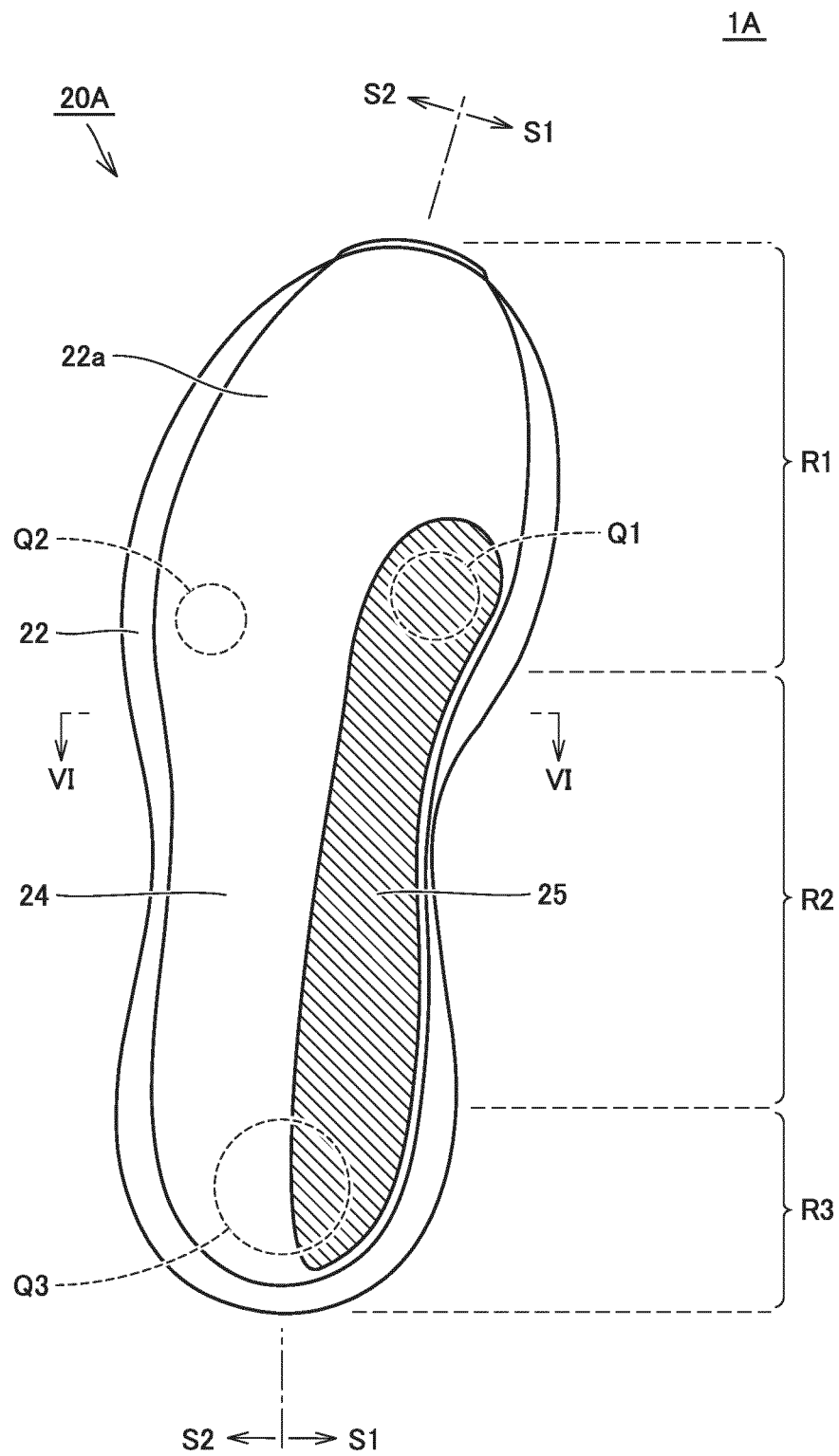


FIG. 6

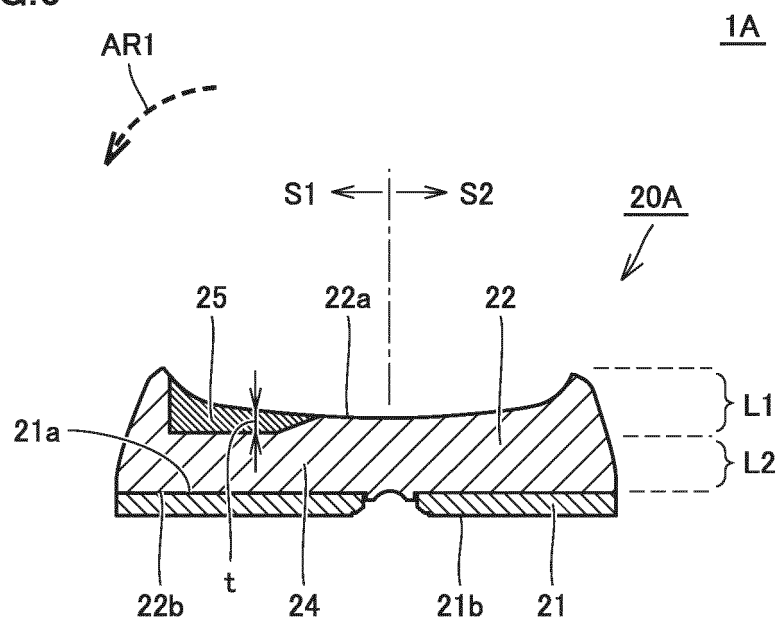


FIG.7

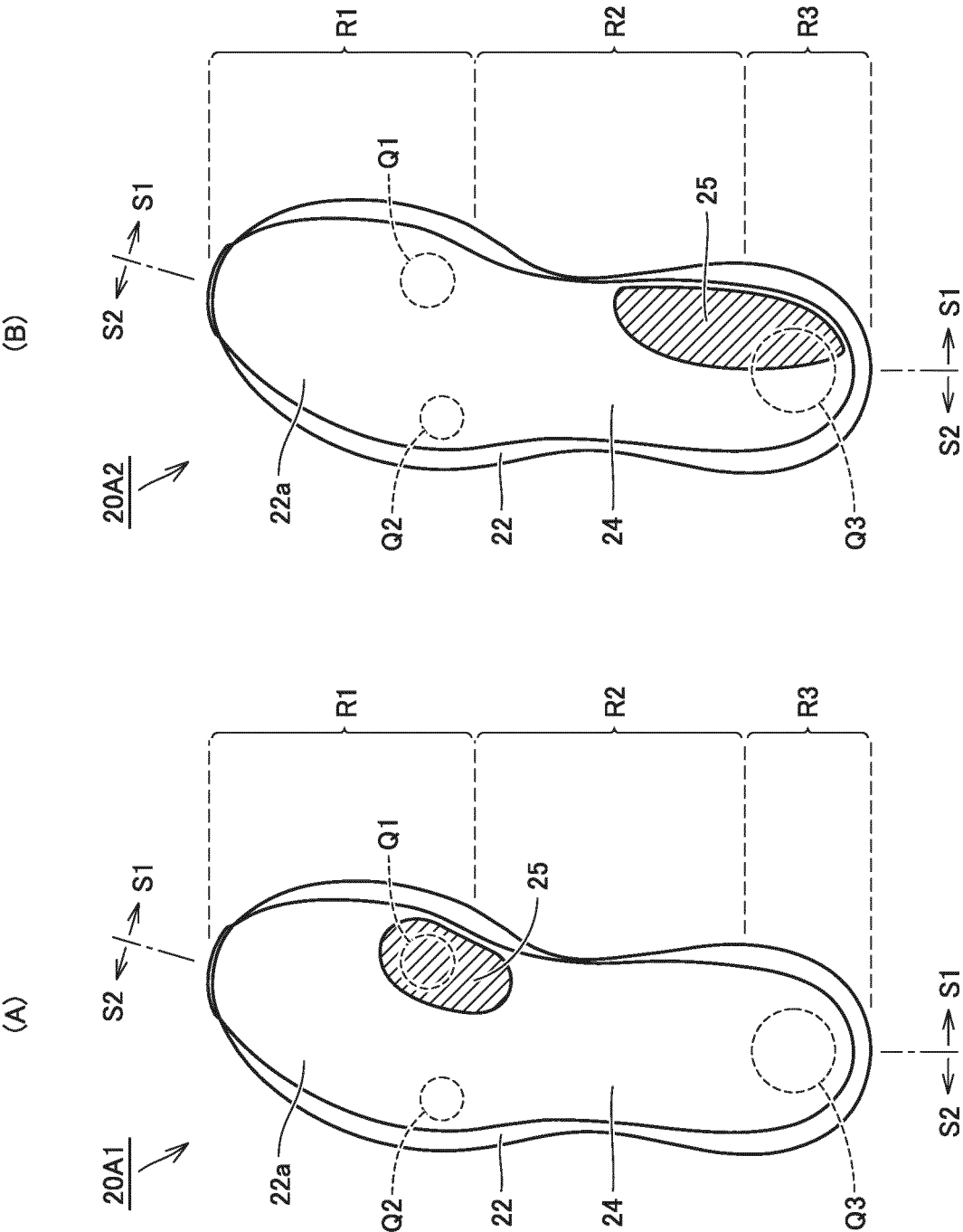


FIG.8

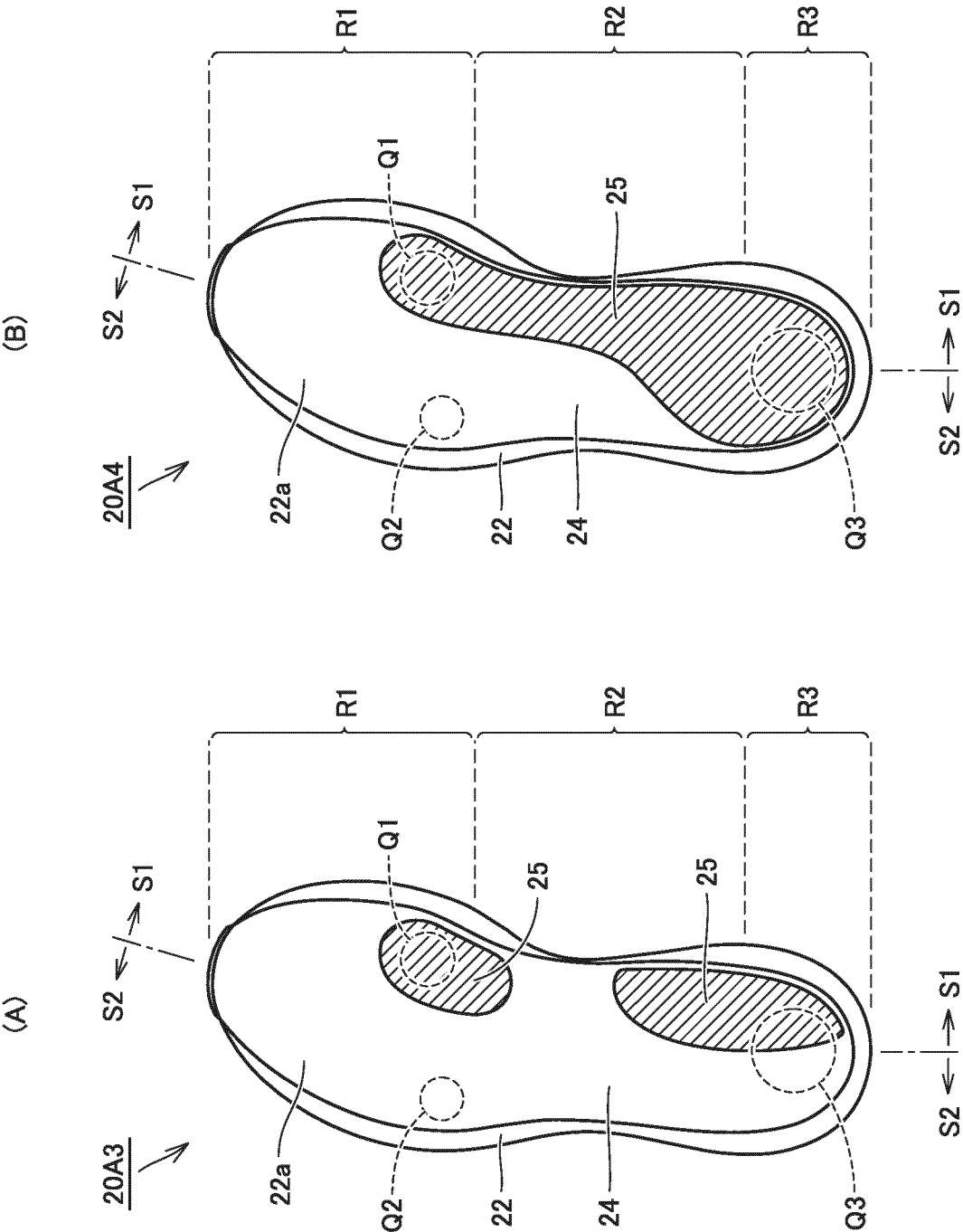


FIG.9

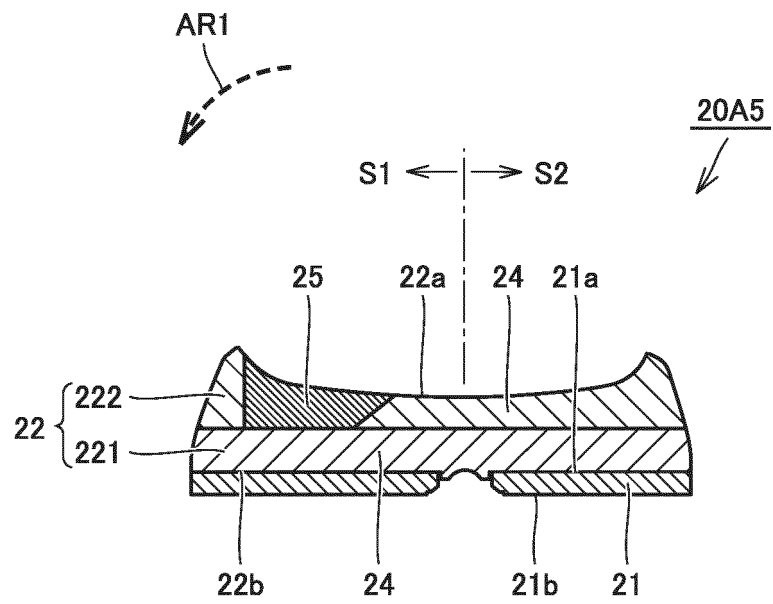


FIG.10

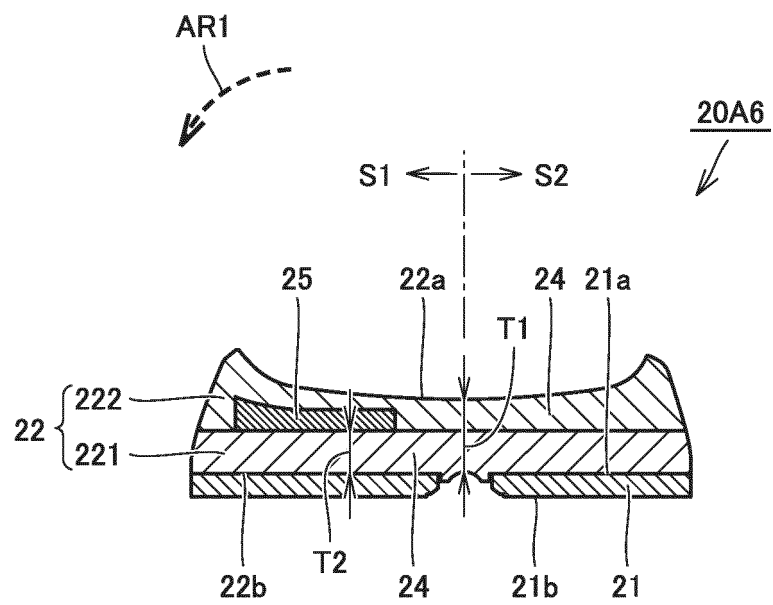


FIG.11

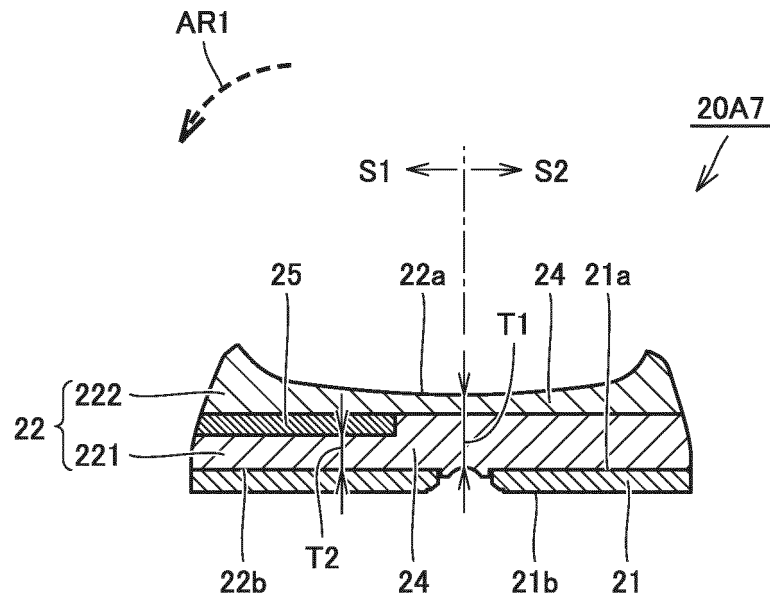


FIG.12

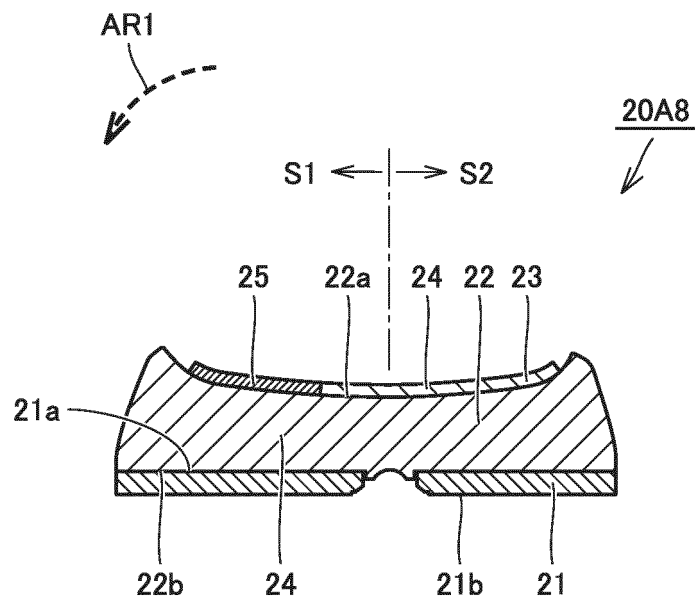


FIG.13

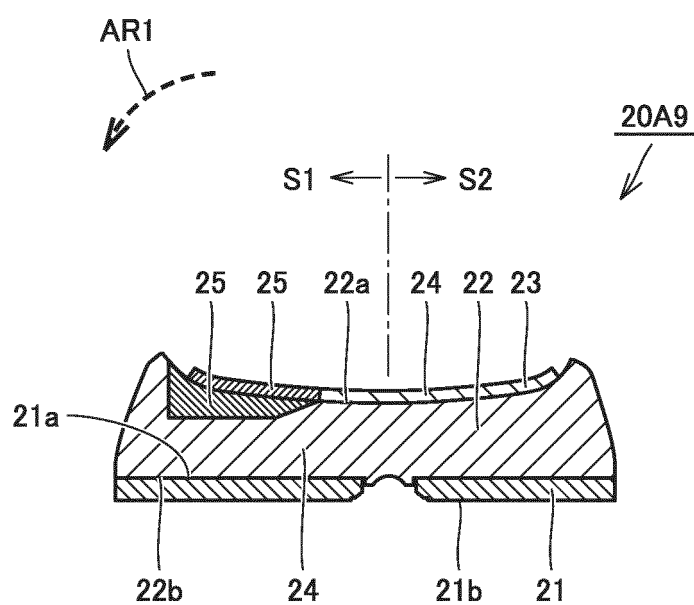


FIG.14

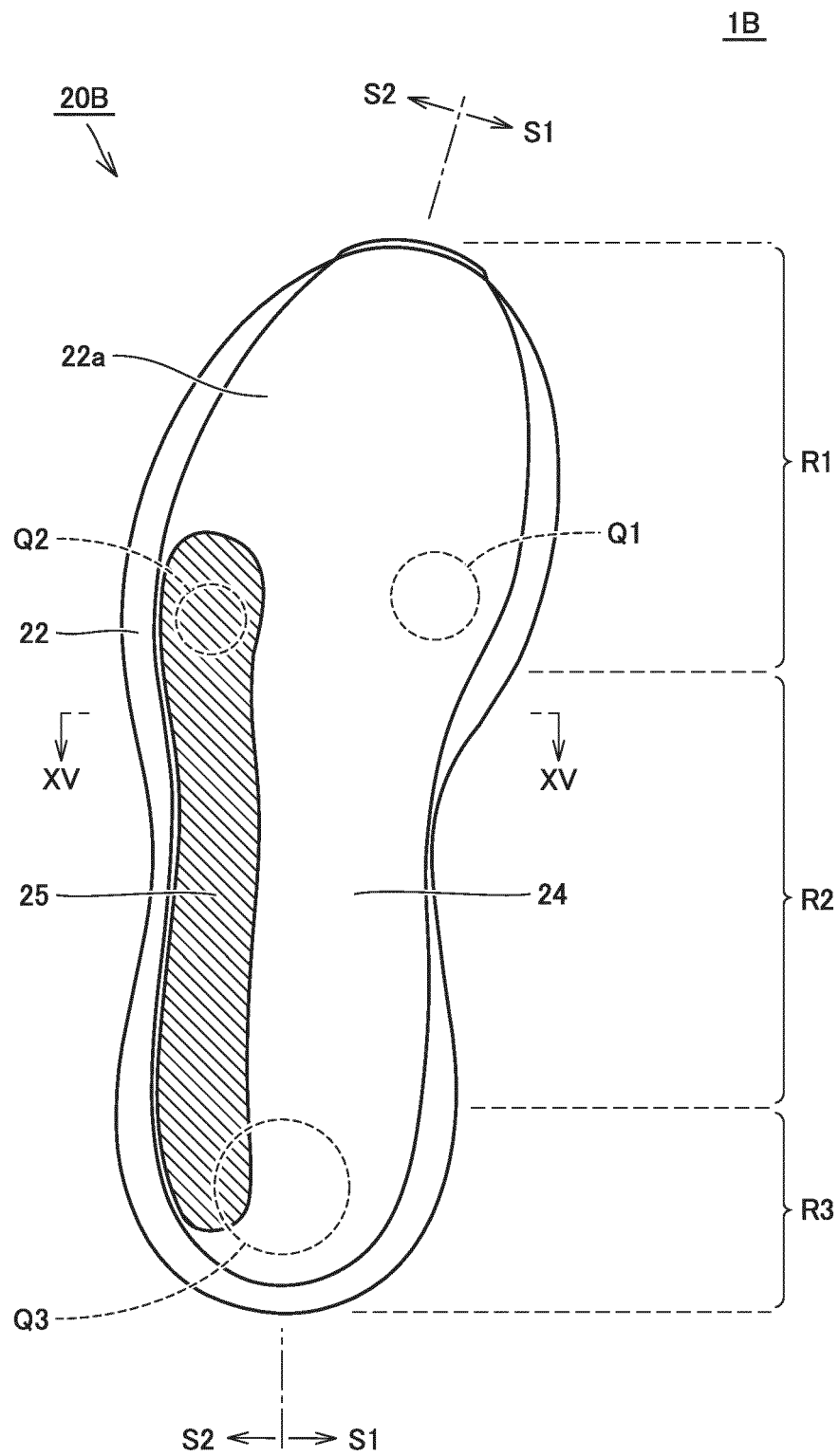


FIG.15

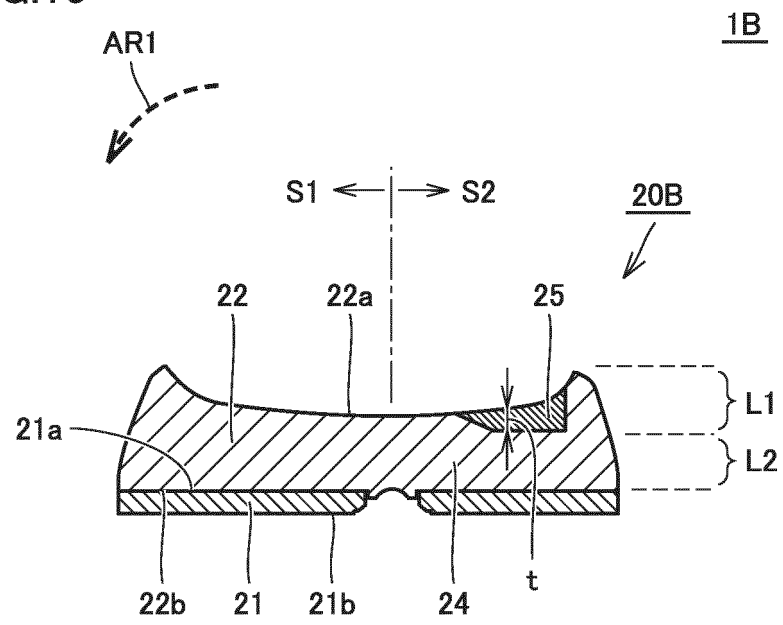


FIG.16

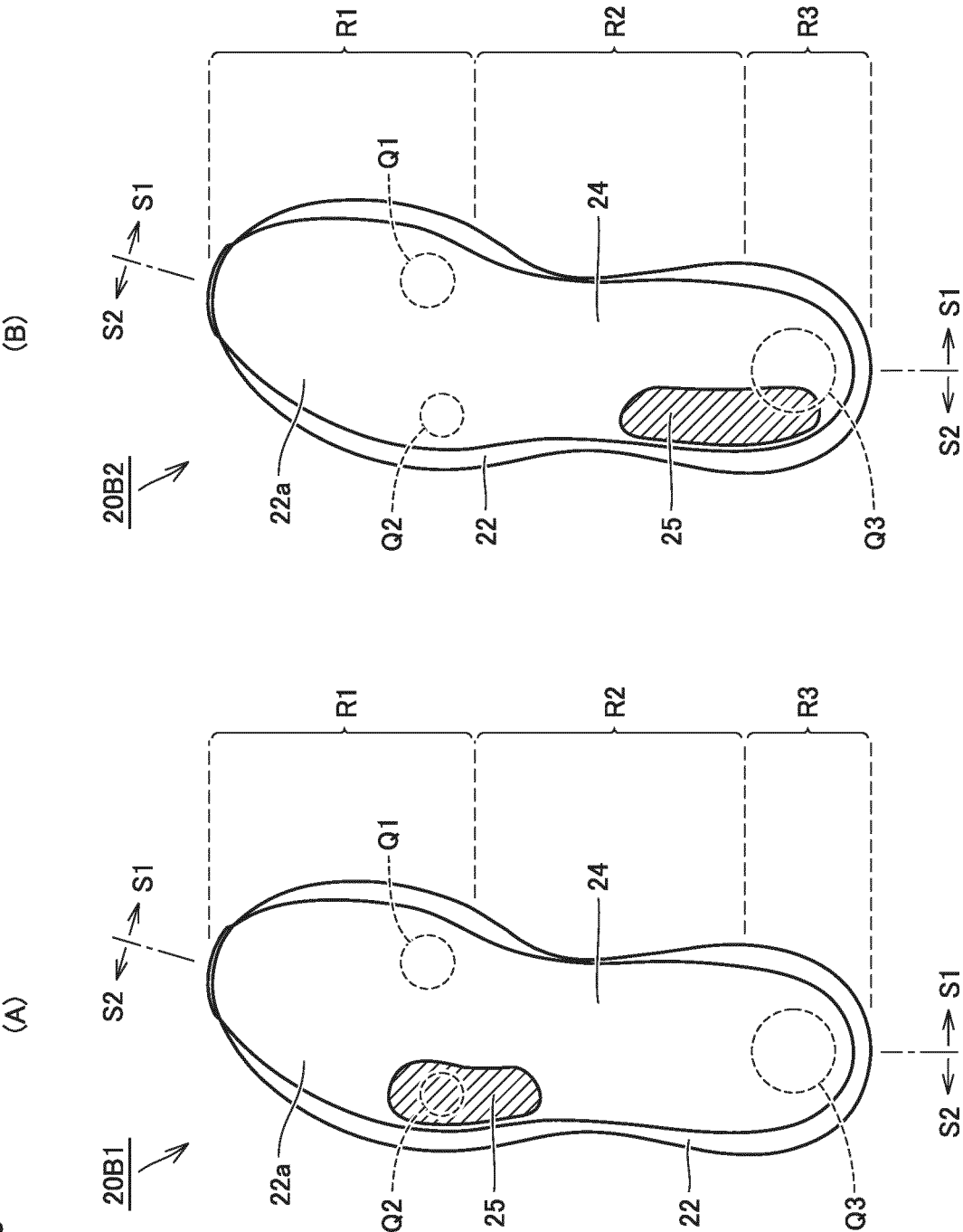


FIG.17

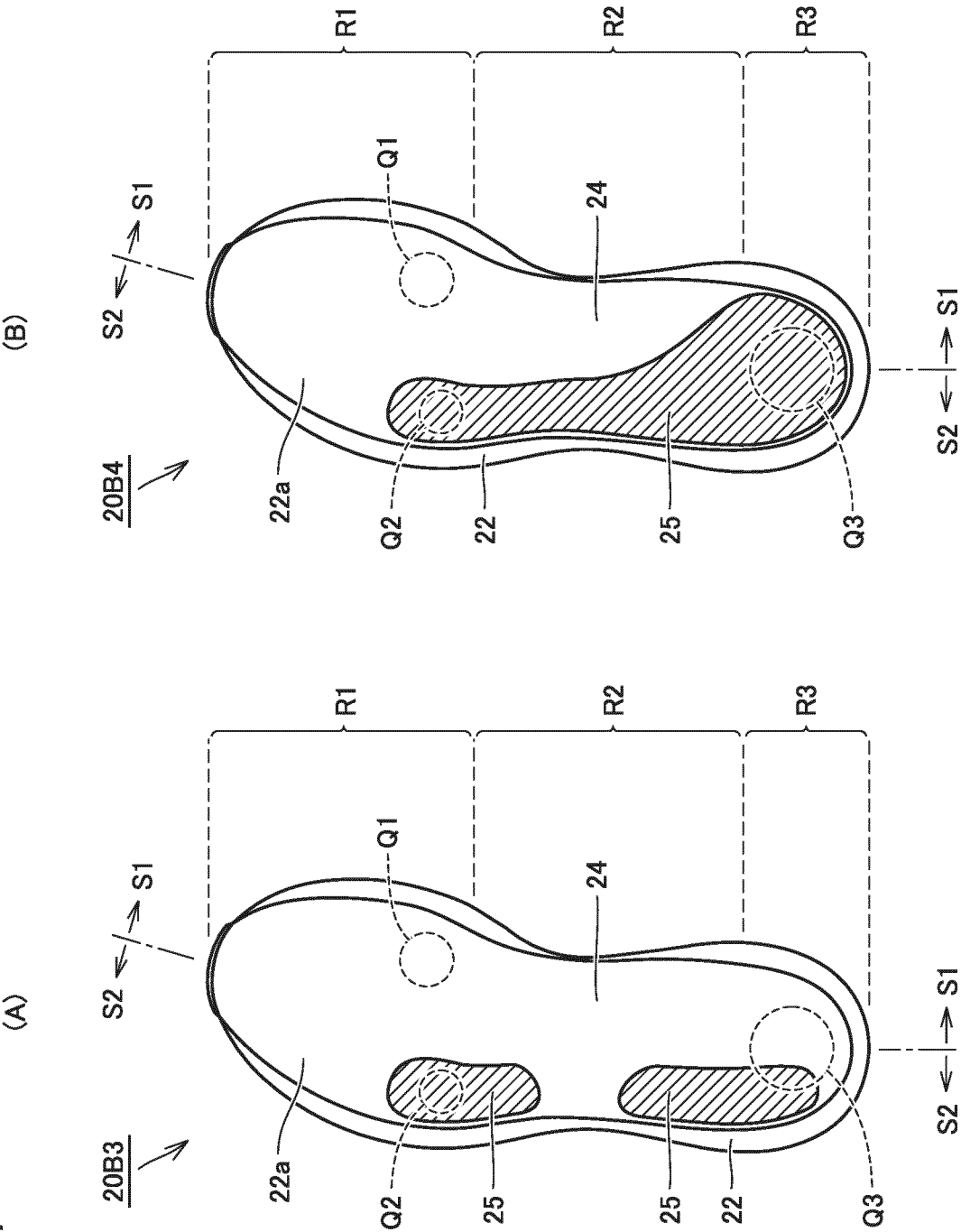


FIG.18

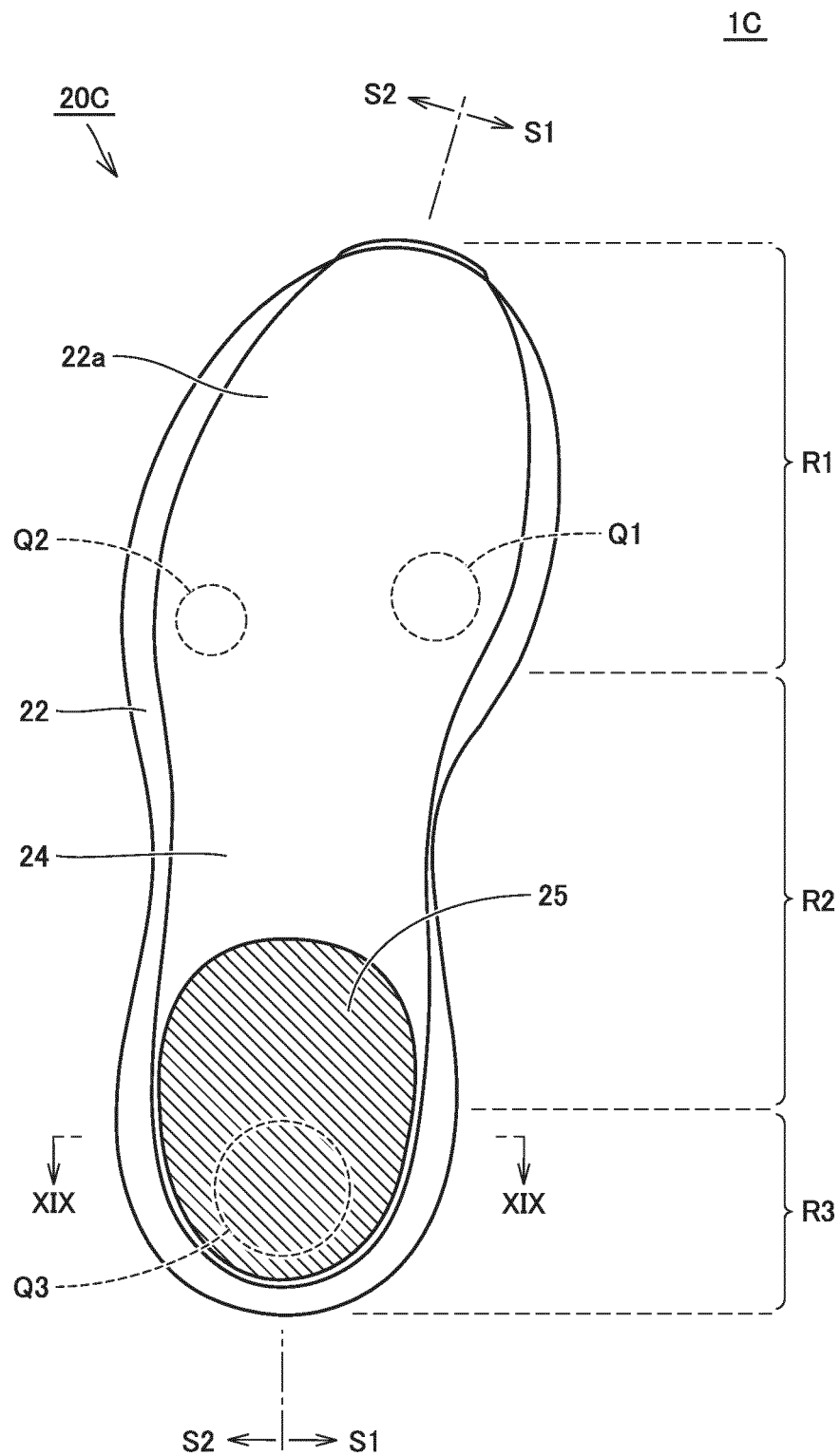
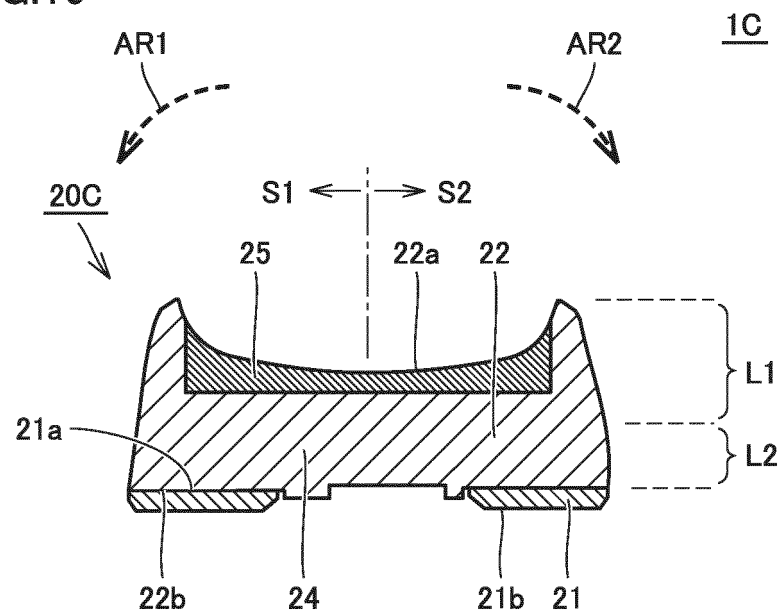


FIG.19



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2019/048704

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. A43B13/12 (2006.01) i
FI: A43B13/12Z

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)

Int.Cl. A43B13/12

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

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2020
Registered utility model specifications of Japan	1996-2020
Published registered utility model applications of Japan	1994-2020

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.
X Y	JP 11-266906 A (ASICS CORP.) 05.10.1999 (1999-10-05), paragraphs [0007]-[0026], fig. 1-6	1-3 4-18
Y	JP 7-308203 A (SUMITOMO RUBBER INDUSTRIES, LTD.) 28.11.1995 (1995-11-28), paragraphs [0014]-[0025], fig. 1-4	4-5, 7-18
Y	JP 2016-059555 A (ASICS CORP.) 25.04.2016 (2016-04-25), paragraphs [0037]-[0092], fig. 1-11	5, 7-18
Y	JP 6-501184 A (INSOLE CONTROL INC.) 10.02.1994 (1994-02-10), page 4, upper left column, line 19 to page 5, line 21, fig. 1-5	6-18
Y	JP 5-329005 A (ACHILLES CORPORATION) 14.12.1993 (1993-12-14), paragraphs [0007]-[0029], fig. 1-7	8-9, 17-18
Y	JP 2000-225002 A (ADIDAS INTERNATL BV) 15.08.2000 (2000-08-15), paragraphs [0024]-[0048], fig. 1-14	10-11, 17-18



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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

"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

"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

"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

"&"

document member of the same patent family

Date of the actual completion of the international search

21.02.2020

Date of mailing of the international search report

03.03.2020

Name and mailing address of the ISA/

Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

Information on patent family members

Information on patent family members

International application No.

PCT/JP2019/048704

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specification, page 4, line 3 to
page 8, line 2, fig. 1-4

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 column 3, line 10 to column 7,
 line 21, fig. 1-5
 EP 541732 A
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paragraphs [0041]-[0065], fig. 1-13b
EP 1369049 A1

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2000225002 A [0006] [0009] [0010]
- JP 2016059555 A [0007] [0009] [0011]