(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 056 106 A1**

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

(43) Date of publication:
17.08.2016 Bulletin 2016/33

(21) Application number: **13895237.9**

(22) Date of filing: **09.10.2013**

(51) Int Cl.:
A43B 23/02 *(2006.01)* ***A43B 5/00*** *(2006.01)*

(86) International application number:
PCT/JP2013/077461

(87) International publication number:
WO 2015/052792 (16.04.2015 Gazette 2015/15)

(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

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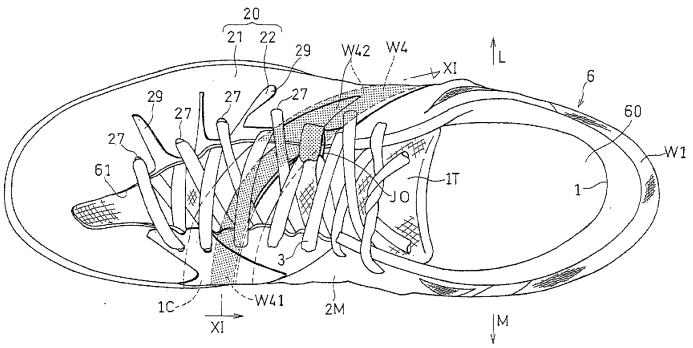
(54) EXERCISE SHOE

(57) An athletic shoe including an interior member **1** in contact with a surface of a foot; and a loop-shaped wrap **W** covering a portion of the interior member **1** and formed by a material less stretchable than the interior member **1,** wherein the wrap **W** includes: a heel portion **W1** continuously covering a medial side **M,** a back surface **B** and a lateral side **L** of a calcaneal bone **BC;** a twisted portion **W2** having a band-shaped and/or cord-shaped configuration continuous with a front end portion of the heel portion **W1** on the medial side **M** of the heel portion **W1** the twisted portion **W2** toward under a foot sole extending while being twisted on the medial side **M** of the foot; a medial bottom portion **W3** continuous with a front end portion of the twisted portion **W2,** the medial bottom portion **W3** extending along a medial side portion of the foot sole to a ball **O1** of a big toe under the foot sole; and a diagonal transverse portion **W4** having a band-shaped and/or cord-shaped configuration continuous with a front end portion of the heel portion **W1** on the lateral side **L** of the heel portion **W1,** the diagonal transverse portion **W4** covering at least a portion of a cuboid bone **BCu** and/or at least a portion of a fifth metatarsal bone **B5** a rough surface **B5f,** and further extending across an upper surface of an instep in a diagonally forward direction so as to cover a portion of an upper surface of the big toe and at least a portion of a side surface of the ball **O1** of the big toe.

FIG 7



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Description

TECHNICAL FIELD

[0001] The present invention relates primarily to indoor shoes such as those for volleyball or basketball.

BACKGROUND ART

[0002] In recent years, with the change in the spiking form in volleyball, there is a significantly increased load on a side brake on the front foot during a jump (i.e., the foot that is placed in front of the body in the forward direction immediately before takeoff). Also in basketball, a violent direction-changing move referred to as "Eurostep" is becoming common.

[0003] With the conventional shoe structure, due to the insufficient rigidity of the upper, in practice, a phenomenon called "lateral bulging" may occur, where the foot laterally slides out of the sole, and the input position when vertically kicking the ground is likely to shift toward the ball of little toe as the heel supinates due to the shift of the lower limbs.

[0004] With the "lateral bulging" or the heel supination, the central position of the force of kicking the ground during a jump shifts toward the ball of little toe, and the supinated heel portion needs to be recovered, which may cause a loss of time during a direction-changing move or a spiking action.

CITATION LIST

PATENT LITERATURE

[0005] First Patent Document: JP2005-152490A (Abstract)

SUMMARY OF INVENTION

[0006] It is an object of the present invention to improve performances in various sports, e.g., by suppressing the shifting of the input position when vertically kicking the ground toward the ball of little toe or by reducing the loss of time during a direction-changing move or a spiking action, by reducing the amount of "lateral bulging" or suppressing the supination of the heel.

[0007] The present invention includes:

an interior member **1** in contact with a surface of a foot; and

a loop-shaped wrap **W** covering a portion of an interior member **1** and formed by a material less stretchable than the interior member **1,** wherein the wrap **W** includes:

a heel portion **W1** continuously covering a medial side **M,** a back surface **B** and a lateral side **L** of a calcaneal bone **BC;**

a twisted portion **W2** having a band-shaped and/or cord-shaped configuration continuous with a front end portion of the heel portion **W1** on the medial side **M** of the heel portion **W1,** a twisted portion **W2** extending while being twisted on the medial side **M** of the foot toward under a foot sole;

a medial bottom portion **W3** continuous with a front end portion of the twisted portion **W2,** a medial bottom portion **W3** extending along a medial side portion of the foot sole to a ball **O1** of a big toe under the foot sole; and

a diagonal transverse portion **W4** having a band-shaped and/or cord-shaped configuration continuous with a front end portion of the heel portion **W1** on the lateral side **L** of the heel portion **W1,** a diagonal transverse portion **W4** covering at least a portion of a cuboid bone **BCu** and/or at least a portion of a tuberosity (a rough surface) **B5f** of a fifth metatarsal bone **B5,** and further extending across an upper surface of an instep of the foot in a diagonally forward direction so as to cover a portion of an upper surface of the big toe and at least a portion of a side surface of the ball **O1** of the big toe.

[0008] On the upper **6,** this loop-shaped wrap **W** extends, on the medial side **M,** from the heel portion **W1** via the twisted portion **W2** into the medial bottom portion **W3** reaching the ball **O1** of the big toe under the foot sole, and extends, on the lateral side **L,** from the heel portion **W1**, covering the side surface and/or the upper surface of the area from the cuboid bone **BCu** to the tuberosity (the rough surface) **B5f** of the fifth metatarsal bone, and further extends over the instep in a diagonally forward direction, reaching the ball **O1** of the big toe.

[0009] Now, during a jump or a direction-changing move, as a force in the vertical direction **Z** is input under the ball **O1** of the big toe, the loop-shaped wrap **W** will pull the lateral side **L** of the heel toward the medial side **M** both from the medial side **M** and from the lateral side **L,** and pull the lateral side **L** of the instep toward the medial side **M**.

[0010] Thus, the "lateral bulging" or the supination of the heel will be less likely to occur. This will improve the performance of the wearer.

[0011] As used herein, "loop-shaped" refers not only to cases where the wrap **W** forms a complete loop (endless), but also to cases where the wrap **W** is locally discontinuous, e.g., in the area of the big toe. Even if it is locally discontinuous, the pulling effect of the wrap **W** will be realized as long as it is substantially loop-shaped.

[0012] As used herein "less-stretchable material" means a non-stretchable material such that the wrap **W** substantially or essentially does not stretch under a load that can be applied thereon during play. Therefore, a "less-stretchable material" is preferably less stretchable than a foamed resin of a midsole **5**, and is more preferably

less stretchable than a rubber outsole **4**.

[0013] As used herein, "band-shaped" includes a belt, and includes a plurality of cords (strings) arranged generally parallel to one another (placed in a parallel arrangement).

[0014] The "medial bottom portion **W3** extending along a medial side portion of the foot sole" means that a member separate from a sole may be arranged along the medial side portion of the upper surface of the sole or that the portion may be formed by the medial side portion itself of the sole extending along the medial side portion of the foot sole.

BRIEF DESCRIPTION OF DRAWINGS

[0015]

FIG. **1** is a medial side view showing the principle of the present invention, showing a relationship between the foot bone structure and the wrap.

FIG. **2** is a lateral side view showing the relationship.

FIG. **3** is a plan view showing the relationship.

FIG. **4** is a perspective view showing one embodiment of the present invention, showing the athletic shoe as seen from the medial side, with the exterior member removed.

FIG. **5** is a perspective view showing the athletic shoe as seen from the medial side.

FIG. **6** is a perspective view showing the athletic shoe as seen from the lateral side.

FIG. **7** is a plan view showing the athletic shoe.

FIG. **8** is a plan view showing the athletic shoe, with the exterior member pulled open.

FIG. **9** is a perspective view showing the athletic shoe, with the lateral-side exterior member pulled open.

FIG. **10** is a schematic lateral cross section showing the athletic shoe taken along line X-X of FIG. **4.**

FIG. **11** is a schematic lateral cross section showing the athletic shoe taken along line XI-XI of FIG. **7,** i.e., along the diagonal transverse portion.

DESCRIPTION OF EMBODIMENTS

[0016] Preferably, the diagonal transverse portion **W4** includes a first portion **W41** and a second portion **W42** each having a band-shaped and/or cord-shaped configuration; and

the athletic shoe further includes a connecting structure **J** for detachably connecting together the first portion **W41** and the second portion **W42.**

[0017] In such a case, the diagonal transverse portion **W4** is provided with the connecting structure **J** for attaching/detaching between the first portion **W41** and the second portion **W42**. Therefore, the wearer can easily switch between the fastened (tightened) state and the loosened state of the wrap **W.**

[0018] Preferably, the connecting structure **J** is such that: a tip portion of the second portion **W42** has a through hole **W40** defined therein, through which the first portion **W41** is passed, and a tip portion of the first portion **W41** is inserted through the through hole **W40** and is folded back.

[0019] In such a case, it is possible to easily maintain the engagement between the first portion **W41** and the second portion **W42,** and the wrap **W** is unlikely to stretch at the engaged portion.

[0020] Preferably, the athletic shoe further includes a shoelace **3** for fastening an upper **6** wrapping around the instep,

a shoelace **3** is engaged with the folded-back tip portion of the first portion **W41.**

[0021] In such a case, when one loosens the shoelace **3,** the wrap **W** also loosens, which will make it easy to put a foot into the upper **6**. On the other hand, if one fastens the medial and lateral side of the upper **6** with the shoelace **3,** the wrap **W** will also tighten, which will make it easy to put the shoe on.

[0022] Preferably, the athletic shoe further includes an exterior member **2** covering at least a portion of the interior member **1**; and

a portion of the diagonal transverse portion **W4** is arranged between the interior member **1** and the exterior member **2**.

[0023] In order to suppress the "lateral bulging" or the supination of the heel, the rigidity (stiffness or stiffer) of the upper **6** inevitably becomes large. However, even if the wrap **W** is arranged on the outer periphery of the upper **6** having a large rigidity, the pulling force from the wrap **W** will unlikely act on the foot.

[0024] If a portion of the diagonal transverse portion **W4** is arranged between the interior member **1** and the exterior member **2,** the pulling force of the wrap **W** acts directly on the foot via the interior member **1,** which is more flexible than the exterior member **2.** This will make it easy to suppress the "lateral bulging" or the supination of the heel.

[0025] Moreover, the wrap **W** is unlikely to be exposed over the exterior member **2,** and the wrap **W** will not possibly hinder play.

[0026] Preferably, the interior member **1** includes a lateral-side interior member **10** in contact with a lateral side surface of the foot;

the exterior member **2** includes a lateral-side exterior member **20** covering the lateral-side interior member **10;** and

a portion of the diagonal transverse portion **W4** is arranged between the lateral-side interior member **10** and the lateral-side exterior member **20.**

[0027] In such a case, on the lateral side of the foot, the wrap **W** is hidden between the interior member **1** and the exterior member **2,** and the wrap **W** will not hinder other players during play.

[0028] Note that "interior member" includes a member, as a part of the tongue, arranged on the medial side **M** or the lateral side **L** of the foot.

[0029] Preferably, in at least a portion of an area of the lateral-side exterior member **20** that is covering the diagonal transverse portion **W4** and at least a portion of an area of the lateral-side exterior member **20** that is anterior to the diagonal transverse portion **W4,** the lateral-side exterior member **20** is not attached to the lateral-side interior member **10;** and
a plurality of engagement portions **27,** with which the shoelace **3** for fastening an upper **6** wrapping around the instep, are provided in a non-attached portion **201** of the lateral-side exterior member **20** that is not attached to the lateral-side interior member **10**.

[0030] In such a case, on the lateral side **L** of the foot, the lateral rigidity of the upper **6** is increased by the lateral-side interior member **10** and the lateral-side exterior member **20,** while facilitating the dorsal flexion of the foot.

[0031] Preferably, between adjacent ones of the engagement portions **27,** the lateral-side exterior member **20** has a cutout (notch) **29** extending downward from an upper end of the lateral-side exterior member **20.**

[0032] In such a case, the cutout **29** further facilitates the dorsal flexion of the foot.

[0033] Preferably, the athletic shoe further includes an attached portion **W10** where the lateral-side exterior member **20** is integrally attached to the lateral-side interior member **10** in the heel portion **W1;** and
a non-attached portion **201** where the lateral-side exterior member **20** is not attached to the lateral-side interior member **10** at least in an upper portion of a middle foot section,
wherein an area from a front end to a rear end of an upper portion of the non-attached portion **201** is set to be non-attached to the lateral-side interior member **10.**

[0034] In such a case, the attached portion **W10** having a high rigidity improves the heel holding property, while the movement of the middle foot portion is unlikely to be hindered because of the non-attached portion **W11** having a low rigidity.

[0035] Preferably, the athletic shoe further includes:

an outsole **4** having a tread surface;
a midsole **5** of which a primary component is a foamed material (foam body) of a thermoplastic resin arranged on the outsole **4**; and
an upper **6** secured to the midsole **5** and wrapping around the instep,
wherein the twisted portion **W2** and the diagonal transverse portion **W4** are formed by a band-shaped and/or cord-shaped (string-shaped) member that is less stretchable than the midsole **5**.

[0036] In such a case, it is possible to suppress the stretching of the wrap.

[0037] Preferably, the athletic shoe further includes:

a sole having a plurality of cleats of which a primary component is a leather or a non-foamed material (a non-foam body) of a synthetic resin; and
an upper **6** secured to the sole and wrapping around the instep,
wherein the medial bottom portion **W3** is formed by at least a portion of the sole.

[0038] The cleats are formed by a non-foamed material of a synthetic resin or by a metal.

[0039] In such a case, the sole of a leather or a non-foamed material of a synthetic resin having a large rigidity may function as the medial bottom portion **W3,** and it may not be needed to separately provide a member for the medial bottom portion **W3.**

[0040] Preferably, an upper **6** wrapping around the instep includes the interior member **1** and an exterior member **2** that is less stretchable than the interior member **1**; a lower edge of the exterior member **2** extends along an inner surface of an upper edge of a sole; and
the lower edge of the exterior member **2** and a portion of the sole form at least a portion of the medial bottom portion **W3**.

[0041] In such a case, the lower edge of the exterior member **2** that is less stretchable and a portion of the sole form at least a portion of the medial bottom portion **W3,** which will allow for a lower cost as compared with a case where a non-stretchable material to be the medial bottom portion **W3** is provided separately.

[0042] Preferably, the sole includes:

an outsole **4** having a tread surface;
a midsole **5** of which a primary component is a foamed material (a foam body) of a thermoplastic resin arranged on the outsole **4**; and
a reinforcement member **7** attached to the midsole **5** along an arch **MA** at least on the medial side **M** of the foot for preventing the arch of the foot from lowering,
wherein the midsole **5** is reinforced by the reinforcement member **7,** thereby reinforcing the medial bottom portion **W3.**

[0043] In such a case, the medial bottom portion **W3** is reinforced by the reinforcement member, thus making it easy to suppress stretching or bending of the medial bottom portion **W3**.

[0044] Preferably, one end portion of the diagonal transverse portion **W4** extends from a side surface of the ball **O1** of the big toe so as to slip under the ball **O1** of the big toe, and extends along an upper surface of the sole (shoe sole) so as to cover at least a portion of a bottom surface of the ball **O1** of the big toe.

[0045] In such a case, with one end portion of the diagonal transverse portion **W4** slipping under the ball **O1** of the big toe, when a stepping force acts in a vertically downward direction at the ball **O1**, of the big toe, the wrap at the ball **O1** of the big toe is stepped on by the ball **O1** of the big toe while being sandwiched between the sole and the ball **O1** of the big toe, thereby increasing the effect of suppressing the "lateral bulging" and the supi-

nation of the heel.

[0046] Preferably, the sole includes a roll-up portion **50** rolled up on a medial side of a middle foot section; and the front end portion of the twisted portion **W2** extends along an upper surface of the roll-up portion **50** so as to slip into (get into) between an arch **MA** on the medial side **M** of the foot sole and the roll-up portion.

[0047] In such a case, the front end portion of the twisted portion **W2** is sandwiched between the arch of the medial side of the foot and the roll-up portion of the sole, and the front end of the twisted portion **W2** of the wrap is held down by the arch on the medial side of the foot, thereby increasing the effect of suppressing the "lateral bulging", etc.

[0048] The expressions "along the upper surface of the sole" and "along the upper surface of the roll-up portion" include cases where one end portion of the diagonal transverse portion **W4** or the front end portion of the twisted portion **W2** is in direct contact with the upper surface, and also include cases where the exterior member **2,** or the like, is interposed between the upper surface and the wrap. Thus, it will typically be a structure where a portion of the wrap is layered on the upper surface.

[0049] Preferably, the diagonal transverse portion **W4** extends spirally and continuously along a surface of the instep along a path to a portion of the upper surface of the big toe starting from an area covering at least a portion of the cuboid bone **BCu** and/or at least a portion of the tuberosity (the rough surface) **B5f** of the fifth metatarsal bone **B5**.

[0050] Herein, the term "extend spirally" means that while the surface of the instep is a complicated curved surface, the diagonal transverse portion **W4** extends along the curved surface so as to be diagonally wound around the curved surface. The term "extend continuously" means that where the diagonal transverse portion **W4** is completely divided between the medial side and the lateral side and an ordinary shoelace connects together the medial side and the lateral side of the upper, the ordinary shoelace itself does not form the diagonal transverse portion **W4**.

[0051] If the medial side and the lateral side of the upper are connected together only with the shoelace itself, the effect of suppressing the "lateral bulging" or the supination of the heel will be significantly lowered because the shoelace is slack so as not to hinder the movement of the instep and because the line along which an ordinary shoelace passes is substantially different from the spiral line.

[0052] If the shoelace is an essentially or substantially non-stretchable shoelace and if the shoelace is arranged along the spiral pattern, that shoelace forms a part of the diagonal transverse portion **W4.**

[0053] Note that "along the surface of the instep" means that the diagonal transverse portion **W4** is arranged over the surface of the instep at least with the interior member **1** interposed therebetween.

EMBODIMENTS

[0054] 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 taken to define 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.

[0055] Before discussing an embodiment of the present invention, the path of the loop-shaped wrap of the present invention will be described.

[0056] In FIG. 1, the wrap **W** includes the heel portion **W1,** the twisted portion **W2,** the medial bottom portion **W3** and the diagonal transverse portion **W4.** Note that in FIG. 1 to FIG. **9,** the wrap **W** is shaded with fine dots.

[0057] As shown in FIG. **1** to FIG. **3,** the heel portion **W1** continuously covers the medial side **M,** the back surface **B and** the lateral side **L** of the calcaneal bone **BC.**

[0058] The twisted portion **W2** of FIG. **1** has a band-shaped and/or cord-shaped configuration and is continuous with the front end portion of the heel portion **W1** on the medial side **M** of the heel portion **W1**, extending toward under the foot sole while being twisted on the medial side **M** of the foot.

[0059] The medial bottom portion **W3** is continuous with the front end portion of the twisted portion **W2,** extending along the medial foot portion of the sole to the ball **O1** of the big toe under the foot sole.

[0060] That is, on the medial side **M** of the foot, the upper edge of the wrap **W** (the heel portion **W1**, the twisted portion **W2** and the medial bottom portion **W3**) is located above the rear end of the calcaneal bone **BC**, and extends toward under the first metatarsal bone **B1**, passing through the side surface of a rear portion of the calcaneal bone **BC**. In other words, the upper edge of the wrap **W** slopes downward while extending in the forward direction, from a position above the rear end of the calcaneal bone **BC.**

[0061] On the lateral side **L** of the heel portion **W1** of FIG. **2,** the diagonal transverse portion **W4** is continuous with the front end portion of the heel portion **W1**, and covers at least a portion of the cuboid bone **BCu** and/or at least a portion of the rough surface **B5f** of the fifth metatarsal bone **B5.** It has a band-shaped and/or cord-shaped configuration and further extends across the upper surface of the instep in a diagonally forward direction, covering a portion of the upper surface of the big toe and at least a portion of the side surface of the ball **O1** of the big toe of FIG. **1.**

[0062] That is, on the lateral side **L** of the foot, the upper edge of the wrap **W** (the heel portion **W1** and the diagonal transverse portion **W4**) slopes downward while extending in the forward direction, passing through the side surface of a rear portion of the calcaneal bone **BC,** from a

position above the rear end of the calcaneal bone **BC.** After extending to a position below a front portion of the calcaneal bone **BC,** it slopes upward while extending in the forward direction, passing through the side surface of a lower portion of the cuboid bone **BCu.** In other words, the wrap **W** extends, from a position above the rear end of the calcaneal bone **BC,** while first sloping downward and then sloping upward.

[0063] The diagonal transverse portion **W4** of FIG. **2** spirally and continuously extends along the surface of the instep on the path starting from an area covering at least a portion of the cuboid bone **BCu** and/or a portion of the rough surface **B5f** of the fifth metatarsal bone **B5** and reaching a portion of the upper surface of the big toe of FIG. **1.**

[0064] As shown in FIG. **3,** the diagonal transverse portion **W4** extends in a diagonally forward direction from the lateral side **L** of the foot to the medial side **M** of the foot, passing through a portion of the base of the fourth metatarsal bone **B4** over the upper surface of the instep, and passing through a portion of the shaft of the third metatarsal bone **B3** and the head of the second metatarsal bone **B2**, and reaching the head (the ball **O1 of** the big toe) of the first metatarsal bone **B1**.

[0065] As shown in FIG. **1**, the diagonal transverse portion **W4** and the medial bottom portion **W3** are connected to each other at a lower end portion **W43** of the diagonal transverse portion **W4** (the front end portion of the medial bottom portion **W3**) located under the ball **O1** of the big toe.

[0066] Next, a specific embodiment will be described with reference to FIG. **4** to FIG. **11.**

[0067] Now, before describing the wrap **W,** the overall structure of the present embodiment will be described. The present embodiment shown in FIG. **4** and FIG. **5** includes the sole **4A,** the upper **6** and the shoelace **3.**

[0068] In FIG. **4,** the sole **4A** includes the outsole **4,** the midsole **5,** the reinforcement member **7** and an insole **8** (FIG. **10**), which are connected together as an integral part. Note that the upper **6** is secured to the midsole **5.**

[0069] As shown in FIG. **10,** the outsole **4** has a tread surface, and the main material thereof is a rubber, a urethane resin, or the like, in the present embodiment; the outsole **4** has a greater Young's modulus than the midsole **5** and is less stretchable. A tread surface **41** of the outsole **4** made of a rubber, or the like, generates a large frictional force against the floor surface in indoor sports.

[0070] The primary component of the midsole **5** may be a foamed material of a thermoplastic resin arranged on the outsole **4,** e.g., a foamed material of EVA, and the midsole **5** may partially include another shock-absorbing member of a gel, or the like.

[0071] The reinforcement member **7** of FIG. **10** is made of a non-foamed material such as a thermoplastic or thermosetting resin, for example; in the present embodiment, it is attached to the midsole 5 along the arch **MA** (FIG. **1**) at least on the medial side **M** of the foot for preventing the arch **MA** of the foot from lowering. The reinforcement member **7** has a greater Young's modulus than the outsole **4** and the midsole **5,** and does not substantially stretch under a load that can be applied thereon while being worn.

[0072] As shown in FIG. **4,** FIG. **10** and FIG. **11,** the midsole **5** and the reinforcement member **7** include roll-up portions **50** and **70** rolled up along the upper **6** both on the medial side **M** and on the lateral side **L.** Therefore, in these roll-up portions **50** and **70,** the midsole **5** and/or the reinforcement member **7** are layered on the lower edge portion of the upper **6.**

[0073] A sock liner (not shown) is placed on the insole **8** (FIG. **10** and FIG. **11**).

[0074] In FIG. **5,** the upper **6** includes the interior member **1** and the exterior member **2.** The upper **6** wraps around the instep and defines a mouth **60** through which a foot is inserted. Note that the upper **6** is fastened by the shoelace **3.**

[0075] As shown in FIG. **10** and FIG. **11,** the interior member **1** is in contact with the upper surface, the side surfaces or the back surface of the foot. The interior member **1** is formed by a material that easily stretches, such as a meshed material or a woven fabric, and it softly wraps around the foot and improves the wearability.

[0076] The interior member **1** of FIG. **10** includes a tongue-shaped interior member **1T,** a medial-side interior member **1M** and the lateral-side interior member **10.** As shown in FIG. **11** and FIG. **4,** in the present embodiment, the tongue-shaped interior member **1T** is arranged innermost of the interior member **1,** and in the forefoot portion, it covers, and is in direct contact with, the medial side **M,** the upper surface and the lateral side **L** of the instep.

[0077] The medial-side interior member **1M** and the lateral-side interior member **10** are arranged outside (around) the tongue-shaped interior member **1T,** and are in indirect contact with the foot, with the tongue-shaped interior member **1T** interposed therebetween, on the medial side surface and the lateral side surface of the foot, in an area from the forefoot portion to the middle foot portion where the tongue-shaped interior member **1T** is present (provided).

[0078] On the other hand, the medial-side interior member **1M** and the lateral-side interior member **10** are in direct contact with the foot on the medial side surface and the lateral side surface of the foot, in an area from the middle foot portion to the rearfoot portion where the tongue-shaped interior member **1T** is absent (not provided).

[0079] The forefoot portion, the middle foot portion and the rearfoot portion refer to areas covering the forefoot section, the middle foot section and the rearfoot section of the foot, respectively. The forefoot section includes five metatarsal bones and fourteen phalanges. The middle foot section includes a navicular bone, a cuboid bone, and three cuneiform bones. The rearfoot section includes a talus bone and a calcaneal bone.

[0080] As shown in FIG. **8** and FIG. **10,** the exterior

member **2** includes a medial-side exterior member **2M** and the lateral-side exterior member **20.** The lateral-side exterior member **20** includes a first lateral-side exterior member **21** and a second lateral-side exterior member **22.**

[0081] The material of the exterior member **2** may be a less stretchable or substantially non-stretchable material such as an artificial leather or a synthetic leather, for example. In order to increase the bendability, through holes may be provided in the exterior member, with a meshed material that is less stretchable than the interior member arranged in the through holes.

[0082] Note that in FIG. **10** and FIG. **11,** bonding or sewing between different members is denoted by multiple x's.

[0083] As shown in FIG. **8** and FIG. **9,** an athletic shoe of the present embodiment includes:

> the attached portion **W10** where the lateral-side exterior member **20** is integrally attached to the lateral-side interior member **10** in the heel portion **W1**; and the non-attached portion **201** where the first lateral-side exterior member **21** of the lateral-side exterior member **20** is not attached to the lateral-side interior member **10** at least in an upper portion of the middle foot portion.

[0084] The area from the front end to the rear end of an upper portion of the non-attached portion **201** is set to be non-attached to the lateral-side interior member **10.**

[0085] Next, a relationship between the loop-shaped wrap **W** and the structure of the shoe will be described.

[0086] The wrap **W** covers a portion of the interior member **1**, and is formed by a material less stretchable than the interior member **1**, and is preferably formed by a material less stretchable than the outsole **4** and the midsole **5**.

[0087] In FIG. **4**, in the present embodiment, the heel portion **W1** includes a band-shaped non-stretchable member shaded with fine dots, and a heel counter **23** for holding (supporting) a lower portion of the heel. In the present example, the heel counter **23** is layered on the skin-surface side (inside) of a lower portion of the band-shaped heel portion **W1**.

[0088] Note that the heel counter **23** typically has a large rigidity, and therefore, if the heel portion **W1** is arranged outside (around) the heel counter **23** as in the present example, the wrap **W** can pull the foot together with the heel counter **23**.

[0089] The twisted portion **W2** is continuous with the heel portion **W1** on the medial side surface of the calcaneal bone **BC** of FIG. **1.** As shown in FIG. **1,** FIG. **4** and FIG. **10,** a front end portion **W21** of the twisted portion **W2** extends along the upper surface of the roll-up portion **50** rolled up on the medial side of the middle foot section, while extending so as to slip into (get into) between the arch **MA** of the medial side **M** of the foot sole and the roll-up portion.

[0090] More specifically, as shown in FIG. **10,** the twisted portion **W2** is inserted between the medial-side interior member **1M** and the medial-side exterior member **2M,** which are attached (bonded and/or sewn) to each other, and is attached to these members **1M** and **2M.**

[0091] As shown in FIG. **4** and FIG. **5,** an exterior member **28,** which covers at least a portion of the calcaneal bone, is arranged while being partially layered on the heel portion **W1.** On the medial side of the foot, the upper edge of the exterior member **28** extends in parallel to the heel portion **W1** and the twisted portion **W2** while overlapping lower portions of the heel portion **W1** (band-shaped member) and the twisted portion **W2.** That is, the upper edge of the exterior member **28** slopes downward while extending in the forward direction, and the lower portions of the heel portion **W1** and the twisted portion **W2** are arranged while being partially layered on the skin-surface side (inside) of the exterior member **28**.

[0092] As shown in FIG. **6,** on the lateral side of the foot, the upper edge of the exterior member **28** extends in parallel to the heel portion **W1** (band-shaped member) while overlapping the lower portion of the heel portion **W1.** That is, the upper edge of the exterior member **28** slopes downward while extending in the forward direction, and the lower portion of the heel portion **W1** is arranged while being partially layered on the skin-surface side (inside) of the exterior member **28.**

[0093] As shown in FIG. **6** to FIG. **9,** the diagonal transverse portion **W4** includes the first portion **W41** and the second portion **W42** each having a band-shaped and/or cord-shaped configuration, and the connecting structure **J.** In the present embodiment, the diagonal transverse portion **W4** is continuous with the heel portion **W1** in a lower portion or below the lateral side surface of the calcaneal bone **BC** of FIG. **3.** The connecting structure **J** will be described below.

[0094] The through hole **W40,** through which the first portion **W41** is passed, is defined in the tip portion of the second portion **W42** of FIG. **6.**

[0095] The tip portion of the first portion **W41** is inserted through the through hole **W40** and folded back.

[0096] The shoelace **3** for fastening the upper **6** is engaged, via the cord (lace)-passing hole **J0** (FIG. **7**), with the folded-back tip portion of the first portion **W41,** thus exerting the fastening force of the wrap **W**.

[0097] Thus, in order to select between the non-worn state where the diagonal transverse portion **W4** is loosened so that the instep can move through under the diagonal transverse portion **W4** and the worn state where the diagonal transverse portion **W4** fastens the instep, the connecting structure **J** detachably connects together the first portion **W41** and the second portion **W42** and maintains the fastening force exerted on the diagonal transverse portion **W4**.

[0098] That is, as shown in FIG. **7**, when the shoe is worn, the first portion W**41** and the second portion **W42** (the diagonal transverse portion **W4**) fasten the instep, via the folded-back portion of the first portion **W41**, by

tightening the shoelace **3**.

[0099] As shown in FIG. **8**, FIG. **9** and FIG. **11**, the majority of the second portion **W42** is arranged between the first lateral-side exterior member **21** and an integral member including the lateral-side interior member **10** and the second lateral-side exterior member **22**. In the present embodiment, the second portion **W42** is attached to the outer surface of the lateral-side interior member **10** and the second lateral-side exterior member **22** attached to each other.

[0100] On the other hand, as shown in FIG. **5** and FIG. **11,** the majority of the first portion **W41** is arranged between an integral member including the tongue-shaped interior member **IT** and a cushioning member **1C** attached together and an integral member including the medial-side interior member **1M** and the medial-side exterior member **2M** attached together. An upper portion of the first portion **W41** is exposed through an opening in the upper **6** between the medial side and the lateral side.

[0101] Note that the first portion **W41** shown in FIG. **4** may be intermittently sewn onto the cushioning member **1C**.

[0102] As shown in FIG. **4** and FIG. **11,** the lower end portion **W43** of the first portion **W41** extends along the upper surface of the midsole **5** and extends from the side surface of the ball **O1** of the big toe so as to slip under the ball **O1** of the big toe so that at least a portion of the reverse surface of the ball **O1** of the big toe of FIG. 1 is covered.

[0103] That is, the lower end portion **W43** is preferably arranged along the upper surface of the midsole **5** so that the stepping force from the ball **O1** of the big toe acts upon the lower end portion **W43** of the first portion **W41**.

[0104] In FIG. **4**, the medial bottom portion **W3** is formed by a part or whole of the sole **4A**. In the present embodiment, the medial bottom portion **W3** is formed by the midsole **5**, the reinforcement member **7** for reinforcing the midsole **5**, and the outsole **4**. In such a case, with the midsole **5** reinforced by the reinforcement member **7**, the medial bottom portion **W3** is reinforced.

[0105] The lower end portion **W43** and the reinforcement member **7** are connected together by the outsole **4** and the midsole **5**, whereas the front end portion **W21** and the reinforcement member **7** are connected together by the midsole **5**. Therefore, the midsole **5** at these connecting portions (mainly the roll-up portion **50**) may stretch slightly. However, during an action which may lead to the "lateral bulging", a strong compressive force acts upon the connecting portions, and therefore substantially no such stretching will occur.

[0106] As described above, a portion of the wrap **W** (the medial bottom portion **W3**) does not need to be formed by a non-stretchable material, but portions of the wrap **W** that are wrapped around the upper **6** (the heel portion **W1,** the twisted portion **W2** and the diagonal transverse portion **W4**) are preferably formed by a non-stretchable material.

[0107] That is, as shown in FIG. **10** and FIG. **11,** the lower edge of the medial-side exterior member **2M** extends along the inner surface of the upper edge of the sole **4A,** and the lower edge of the medial-side exterior member **2M** and a portion of the sole **4A** form at least a portion of the medial bottom portion **W3.**

[0108] Now, for a hard sole that includes a plurality of cleats and of which the primary component is a leather or a non-foamed material of a synthetic resin, rather than a sole for indoor sports, the medial bottom portion **W3** is formed by at least a portion of the hard sole.

[0109] Next, the lateral-side exterior member **20** of FIG. **8** and FIG. **9** will be described.

[0110] In at least a portion of an area of the lateral-side exterior member **20** that is covering the diagonal transverse portion **W4** and at least a portion of an area of the lateral-side exterior member **20** that is anterior to the diagonal transverse portion **W4,** the first lateral-side exterior member **21** is not attached to the lateral-side interior member **10** and the second lateral-side exterior member **22**.

[0111] A plurality of engagement portions (through holes) **27** with which the shoelace **3** engages are provided in the non-attached portion **201** of the first lateral-side exterior member **21** that is not attached to the lateral-side interior member **10** and the second lateral-side exterior member **22.**

[0112] Between adjacent ones of the engagement portions **27,** the first lateral-side exterior member **21** has a cutout **29** of a V-letter shape, a trapezoidal shape, or the like, extending downward from the upper end of the first lateral-side exterior member **21.**

[0113] The wrap **W** arranged as shown in FIG. **5** to FIG. **7** fastens the foot as the shoelace **3** is inserted through the cord-passing hole **J0** with the first portion **W41** and the second portion **W42** engaged with each other. In an indoor sport, if a substantial side brake acts on the medial side of FIG. **4,** the lower end portion **W43** of the first portion **W41** and the front end portion **W21** of the twisted portion **W2** are sandwiched between the foot sole and the sole **4A** on the medial side of the foot. Therefore, on the lateral side of the foot of FIG. **6,** the loop-shaped wrap **W** suppresses the "lateral bulging", the supination of the heel portion, etc.

[0114] Incidentally, the connecting structure **J** may be a belt of which the male surface and the female surface engage with each other.

[0115] Although the wrap **W** is band-shaped except for the medial bottom portion **W3** in the present embodiment, the wrap **W** may be formed by a plurality of cords arranged parallel to each other.

[0116] On the other hand, the diagonal transverse portion **W4** and the twisted portion **W2** may be inserted between the outsole **4** and the midsole **5.** Where the forefoot portion or the mid-rearfoot portion of the midsole **5** has a two-layer structure, the diagonal transverse portion **W4** and the twisted portion **W2** may be inserted between the two layers of the midsole.

[0117] The lower end portion **W43** of the diagonal transverse portion **W4** and the front end portion **W21** of the twisted portion **W2** may be secured to the midsole by means of a fastening device such as a bolt and a tacker (stapler).

[0118] The lower end portion **W43** of the diagonal transverse portion **W4** and the front end portion **W21** of the twisted portion **W2** do not need to be slipping under the foot sole, and there may instead be provided an exterior member, at the lower end portion of the medial side surface of the upper **6**, for connecting together the diagonal transverse portion **W4** and the twisted portion **W2**.

[0119] The non-stretchable member of the wrap **W** may be a combination of a band and a plurality of cords, or may be a band whose width is partially widened or narrowed.

[0120] The diameter of the holes provided in the upper **6** for allowing the shoelace **3** to pass therethrough may be made smaller than the diameter of the shoelace **3.** In such a case, the shoelace **3** can move less easily so that the fastened state of the connecting structure can be maintained more easily.

[0121] The structure of the present invention may be applied only to a shoe for the pivot foot (pivoting foot), or the structure of the present invention may be applied to both feet.

[0122] Thus, such changes and modifications are deemed to fall within the scope of the present invention.

INDUSTRIAL APPLICABILITY

[0123] The present invention is applicable not only to indoor shoes for volleyball, handball, etc., but also to shoes for outdoor sports.

REFERENCE SIGNS LIST

[0124]

1: Interior member, 1C: Cushioning member, 1M: Medial-side interior member, 1T: Tongue-shaped interior member, 10: Lateral-side interior member
2: Exterior member, 2M: Medial-side exterior member, 20: Lateral-side exterior member, 21: First lateral-side exterior member, 22: Second lateral-side exterior member, 23: Heel counter
27: Engagement portion, 28: Exterior member, 29: Cutout
3: Shoelace
4: Outsole, 4A: Sole
5: Midsole, 50: Roll-up portion
6: Upper, 60: Mouth, 61: Opening
7: Reinforcement member, 70: Roll-up portion
8: Insole
B: Back surface, B1 to B5: First to fifth metatarsal bones, B5f: Rough surface, BC: Calcaneal bone
BCu: Cuboid bone
J: Connecting structure, J0: Cord-passing hole
M: Medial side, MA: Arch, L: Lateral side
O1: Ball of big toe
W: Wrap, W1: Heel portion, W2: Twisted portion, W3: Medial bottom portion, W4: Diagonal transverse portion
W10: Attached portion, 201: Non-attached portion
W40: Through hole, W41: First portion, W42: Second portion
Z: Vertical direction, L: Lateral side, M: Medial side

Claims

1. An athletic shoe comprising:

an interior member **1** in contact with a surface of a foot; and
a loop-shaped wrap **W** covering a portion of the interior member **1** and formed by a material less stretchable than the interior member **1,** wherein the wrap **W** includes :

a heel portion **W1** continuously covering a medial side **M,** a back surface **B** and a lateral side **L** of a calcaneal bone **BC;**
a twisted portion **W2** having a band-shaped and/or cord-shaped configuration continuous with a front end portion of the heel portion **W1** on the medial side **M** of the heel portion **W1**, the twisted portion **W2** extending toward under a foot sole while being twisted on the medial side **M** of the foot;
a medial bottom portion **W3** continuous with a front end portion of the twisted portion **W2,** the medial bottom portion **W3** extending along a medial side portion of the foot sole to a ball **O1** of a big toe under the foot sole; and
a diagonal transverse portion **W4** having a band-shaped and/or cord-shaped configuration continuous with a front end portion of the heel portion **W1** on the lateral side **L** of the heel portion **W1,** the diagonal transverse portion **W4** covering at least a portion of a cuboid bone **BCu** and/or at least a portion of a tuberosity **B5f** of a fifth metatarsal bone **B5,** and further extending across an upper surface of an instep in a diagonally forward direction so as to cover a portion of an upper surface of the big toe and at least a portion of a side surface of the ball **O1** of the big toe.

2. The athletic shoe according to claim 1, wherein:

the diagonal transverse portion **W4** includes a first portion **W41** and a second portion **W42** each having a band-shaped and/or cord-shaped con-

figuration; and
the athletic shoe further comprises a connecting structure **J** for detachably connecting together the first portion **W41** and the second portion **W42**.

3. The athletic shoe according to claim 2, wherein the connecting structure **J** is such that:

a tip portion of the second portion **W42** defines a through hole **W40,** through which the first portion **W41** is passed, and a tip portion of the first portion **W41** is inserted through the through hole **W40** and is folded back.

4. The athletic shoe according to claim 3, further comprising a shoelace **3** for fastening an upper **6** wrapping around the instep, wherein:

the shoelace **3** is engaged with the folded-back tip portion of the first portion **W41.**

5. The athletic shoe according to claim 1, further comprising an exterior member **2** covering at least a portion of the interior member **1**, wherein:

a portion of the diagonal transverse portion **W4** is arranged between the interior member **1** and the exterior member **2**.

6. The athletic shoe according to claim 5, wherein:

the interior member **1** includes a lateral-side interior member **10** in contact with a lateral side surface of the foot;
the exterior member **2** includes a lateral-side exterior member **20** covering the lateral-side interior member **10;** and
a portion of the diagonal transverse portion **W4** is arranged between the lateral-side interior member **10** and the lateral-side exterior member **20**.

7. The athletic shoe according to claim 6, wherein:

in at least a portion of an area of the lateral-side exterior member **20** that is covering the diagonal transverse portion **W4** and at least a portion of an area of the lateral-side exterior member **20** that is anterior to the diagonal transverse portion **W4**, the lateral-side exterior member **20** is unattached to the lateral-side interior member **10**; and
a plurality of engagement portions **27**, with which a shoelace **3** for fastening an upper **6** wrapping around the instep, are provided in a non-attached portion **201** of the lateral-side exterior member **20** that is unattached to the lateral-side interior member **10.**

8. The athletic shoe according to claim 7, wherein:

between adjacent ones of the engagement portions **27,** the lateral-side exterior member **20** has a cutout **29** extending downward from an upper end of the lateral-side exterior member **20.**

9. The athletic shoe according to claim 6, further comprising:

an attached portion **W10** where the lateral-side exterior member **20** is integrally attached to the lateral-side interior member **10** in the heel portion **W1;** and
a non-attached portion **201** where the lateral-side exterior member **20** is unattached to the lateral-side interior member **10** at least in an upper portion of a middle foot section,
wherein an area from a front end to a rear end of an upper portion of the non-attached portion **201** is set to be unattached to the lateral-side interior member **10**.

10. The athletic shoe according to any one of claims 1 to 9, further comprising:

an outsole **4** having a tread surface;
a midsole **5** of which a primary component is a foam body of a thermoplastic resin arranged on the outsole **4**; and
an upper **6** secured to the midsole **5** and wrapping around the instep,
wherein the twisted portion **W2** and the diagonal transverse portion **W4** are formed by a band-shaped and/or cord-shaped member that is less stretchable than the midsole **5**.

11. The athletic shoe according to any one of claims 1 to 9, further comprising:

a sole having a plurality of cleats of which a primary component is a leather or a non-foam body of a synthetic resin; and
an upper **6** secured to the sole and wrapping around the instep,
wherein the medial bottom portion **W3** is formed by at least a portion of the sole.

12. The athletic shoe according to any one of claims 1 to 11, wherein:

an upper **6** wrapping around the instep includes the interior member **1** and an exterior member **2** that is less stretchable than the interior member **1**;
a lower edge of the exterior member **2** extends

along an inner surface of an upper edge of a sole; and
the lower edge of the exterior member **2** and a portion of the sole form at least a portion of the medial bottom portion **W3**.

13. The athletic shoe according to claim 12, wherein the sole includes:

an outsole **4** having a tread surface;
a midsole **5** of which a primary component is a foam body of a thermoplastic resin arranged on the outsole **4;** and
a reinforcement member **7** attached to the midsole **5** along an arch **MA** at least on the medial side **M** of the foot for preventing the arch of the foot from lowering,
wherein the midsole **5** is reinforced by the reinforcement member **7,** thereby reinforcing the medial bottom portion **W3.**

14. The athletic shoe according to any one of claims 1 to 13, wherein:

one end portion of the diagonal transverse portion **W4** extends from a side surface of the ball **O1** of the big toe so as to slip under the ball **O1** of the big toe, and extends along an upper surface of a sole so as to cover at least a portion of a bottom surface of the ball **O1** of the big toe.

15. The athletic shoe according to any one of claims 1 to 14, wherein:

a sole comprises a roll-up portion **50** rolled up on a medial side of a middle foot section; and
the front end portion of the twisted portion **W2** extends along an upper surface of the roll-up portion **50** so as to slip into between an arch **MA** on the medial side **M** of the foot sole and the roll-up portion.

16. The athletic shoe according to any one of claims 1 to 15, wherein:

the diagonal transverse portion **W4** extends spirally and continuously along a surface of the instep along a path to a portion of the upper surface of the big toe starting from an area covering at least a portion of the cuboid bone **BCu** and/or at least a portion of the tuberosity **B5f** of the fifth metatarsal bone **B5**.

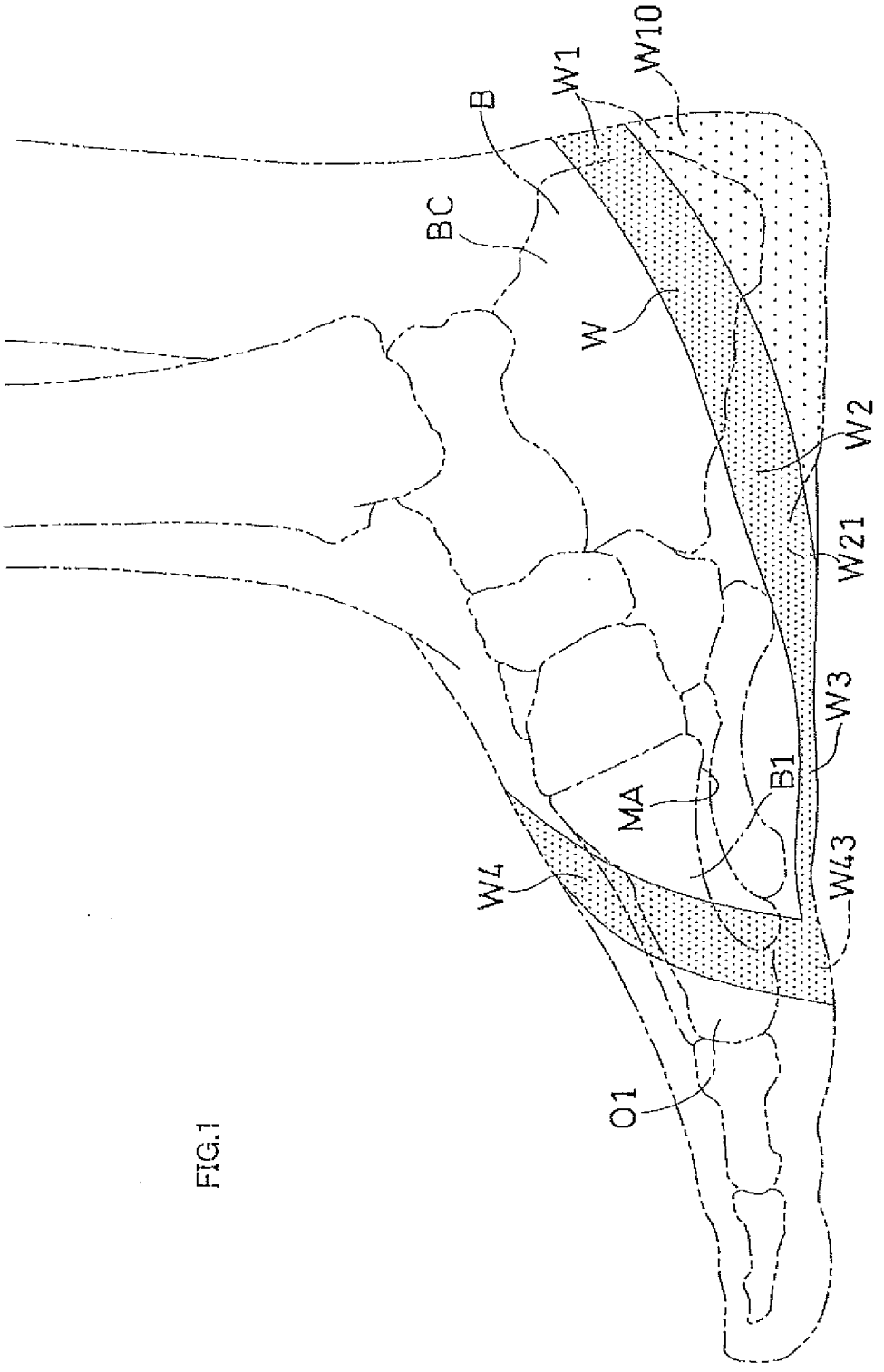


FIG.1

FIG.2

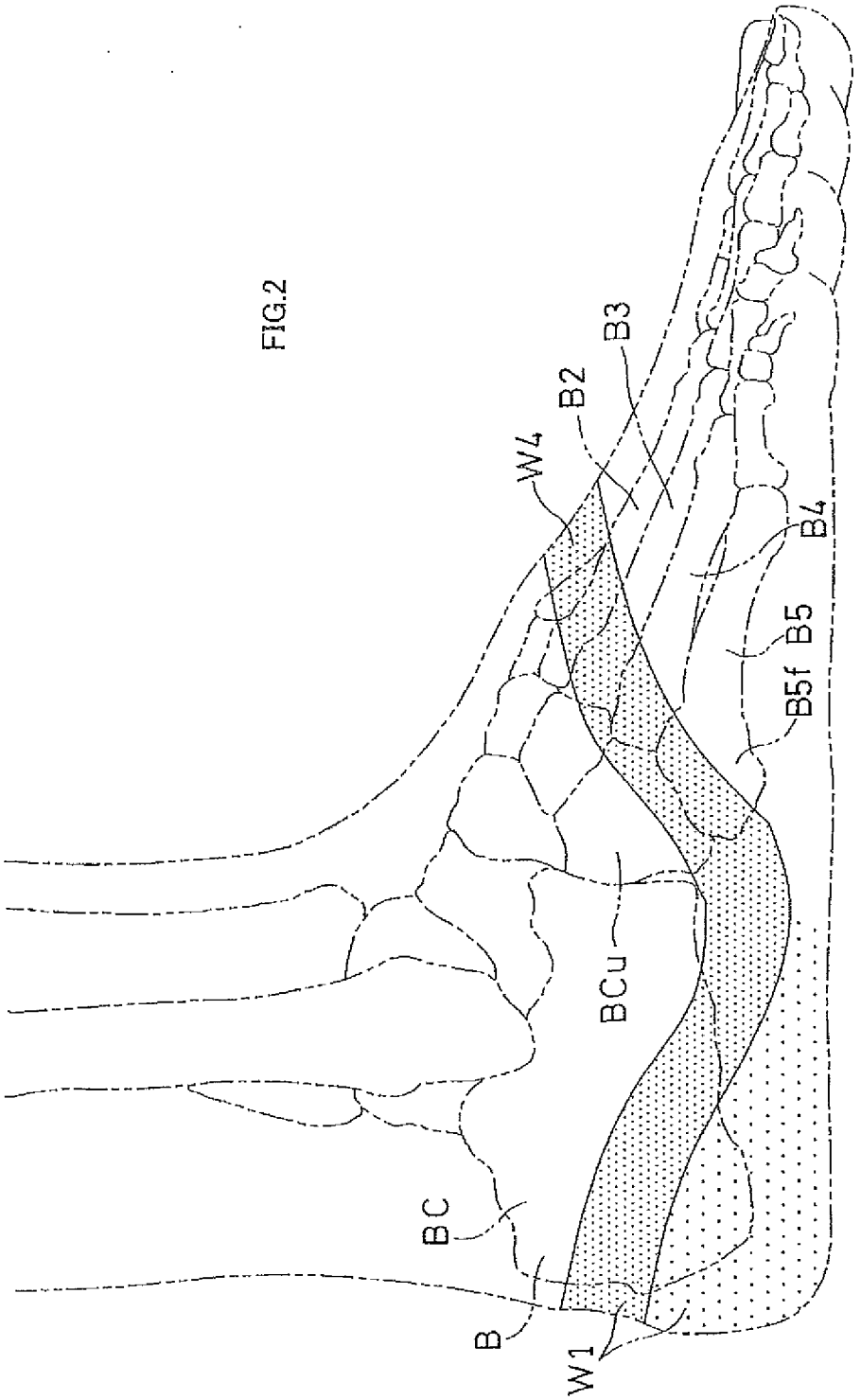
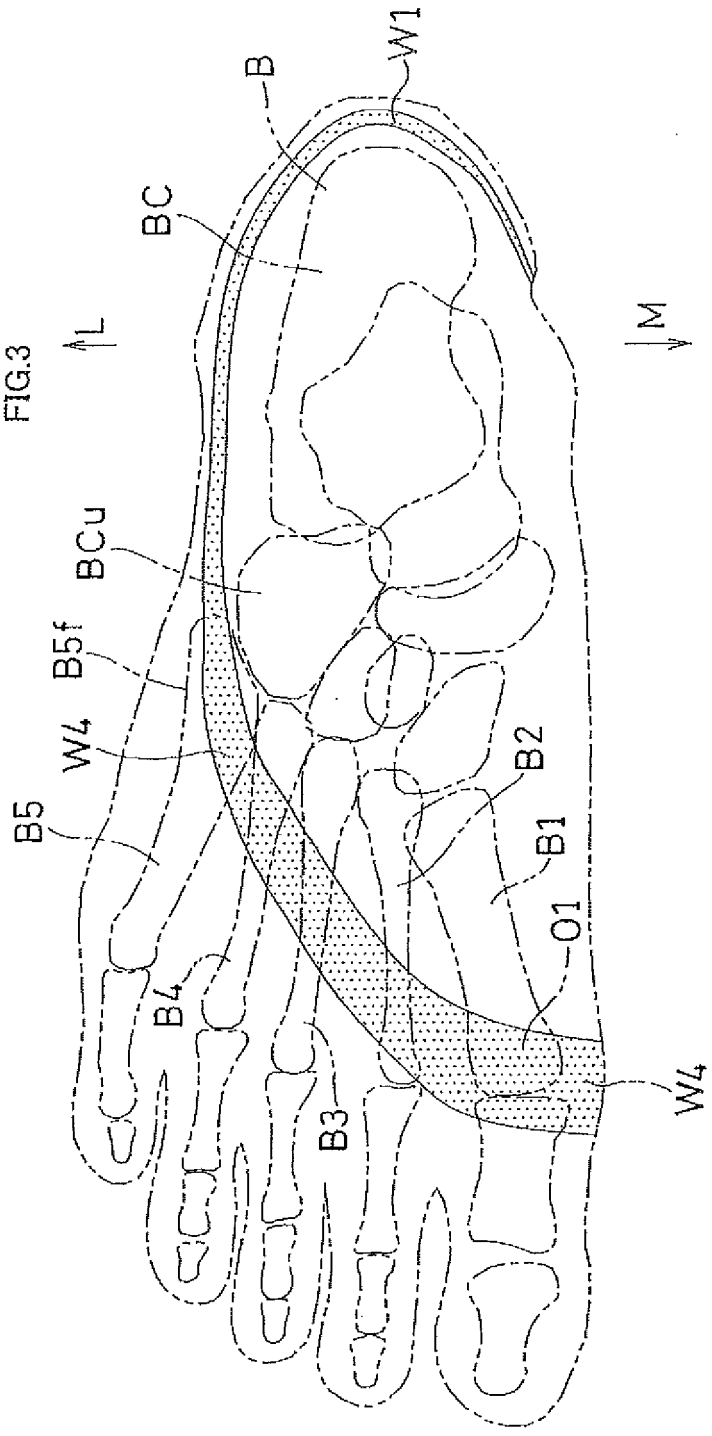


FIG.3



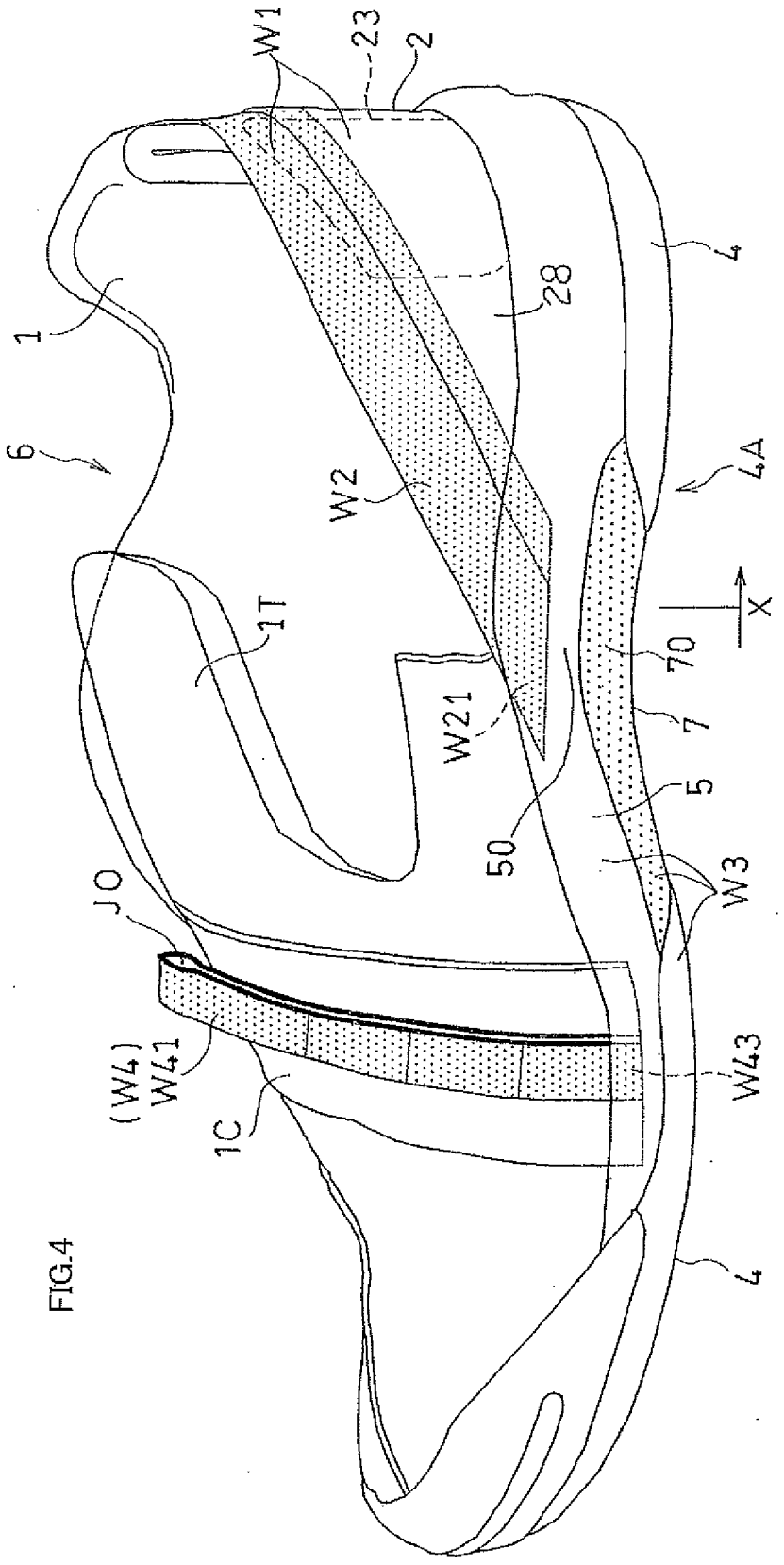


FIG.4

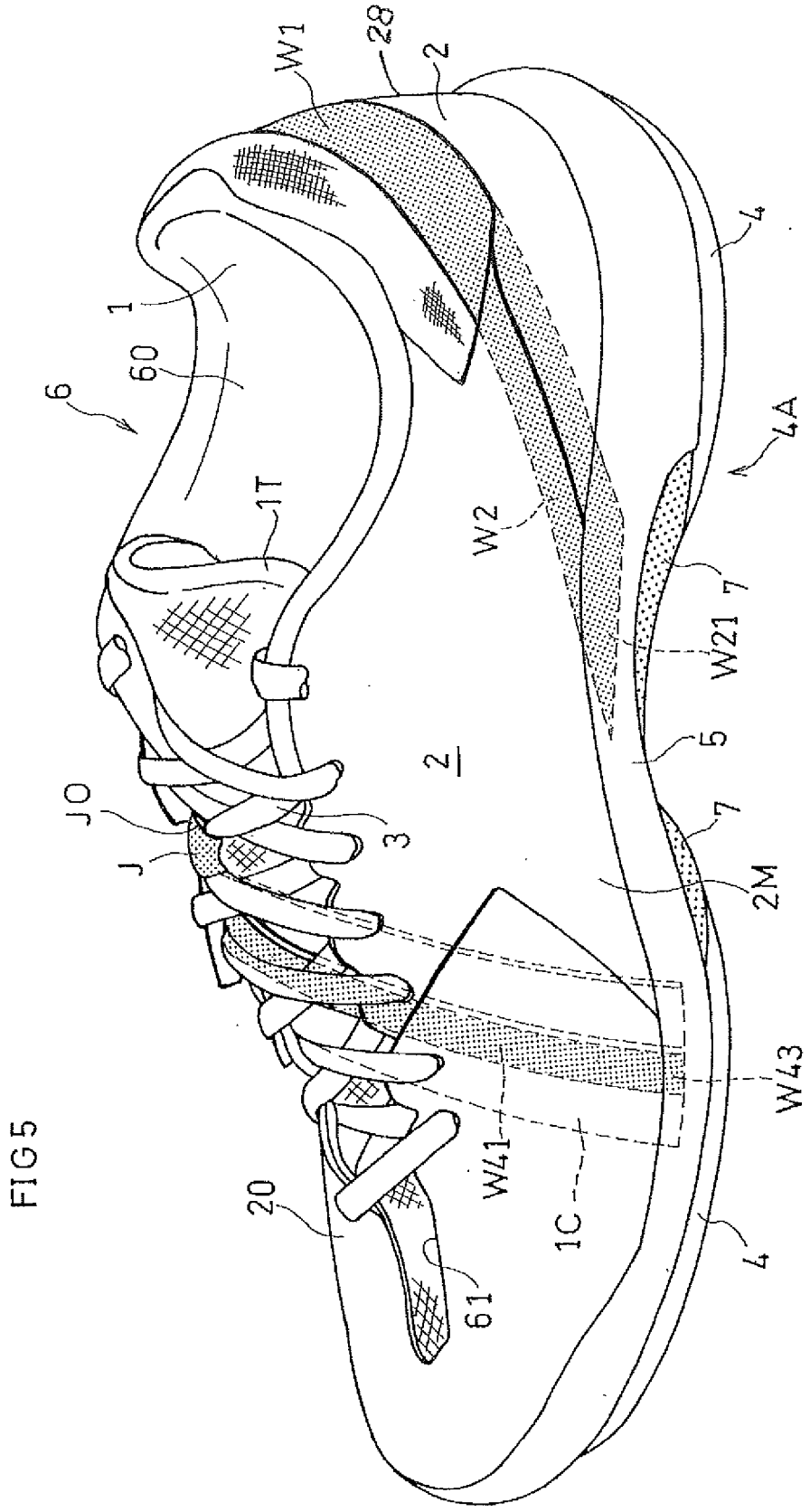
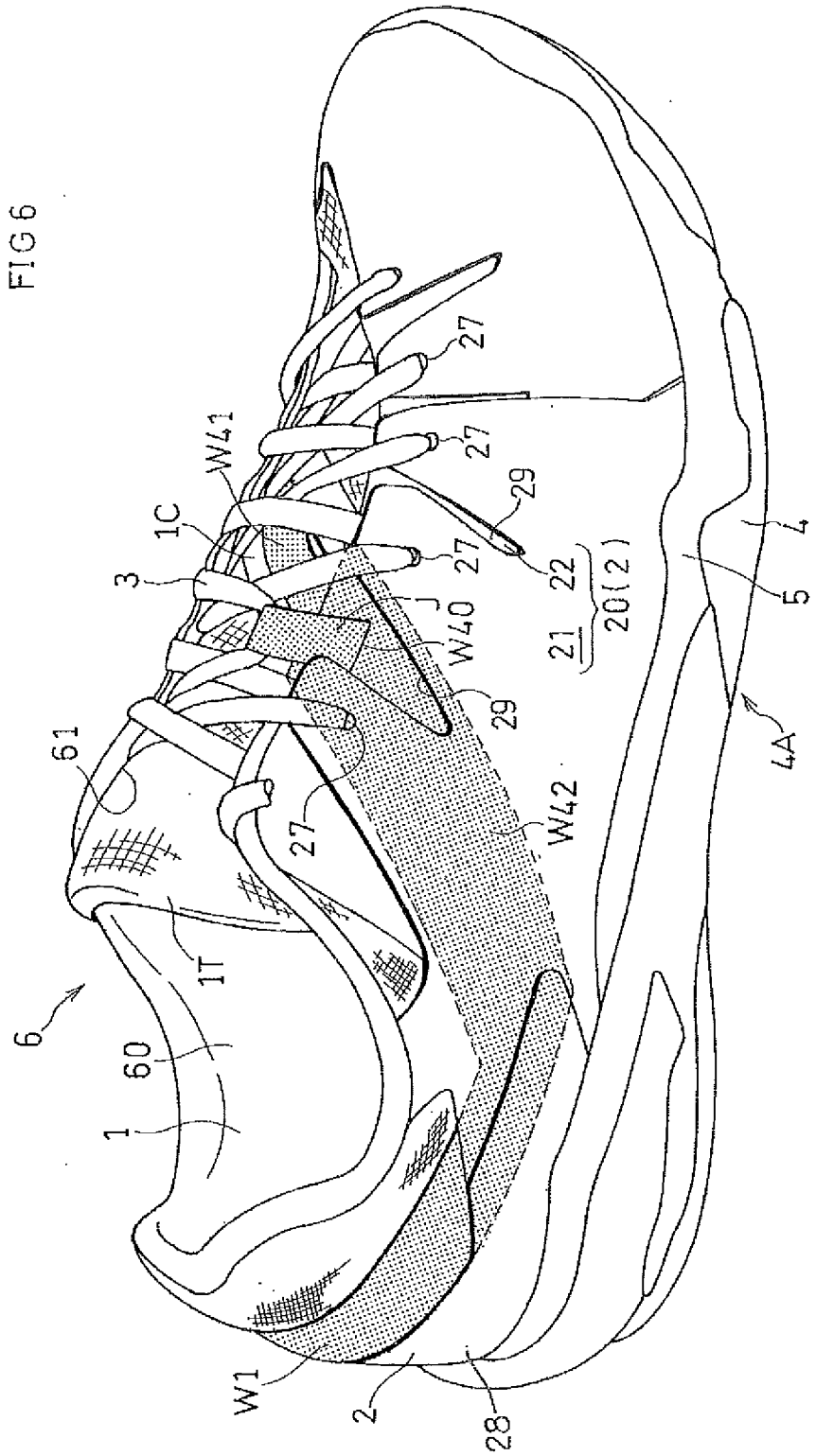


FIG 5

FIG 6



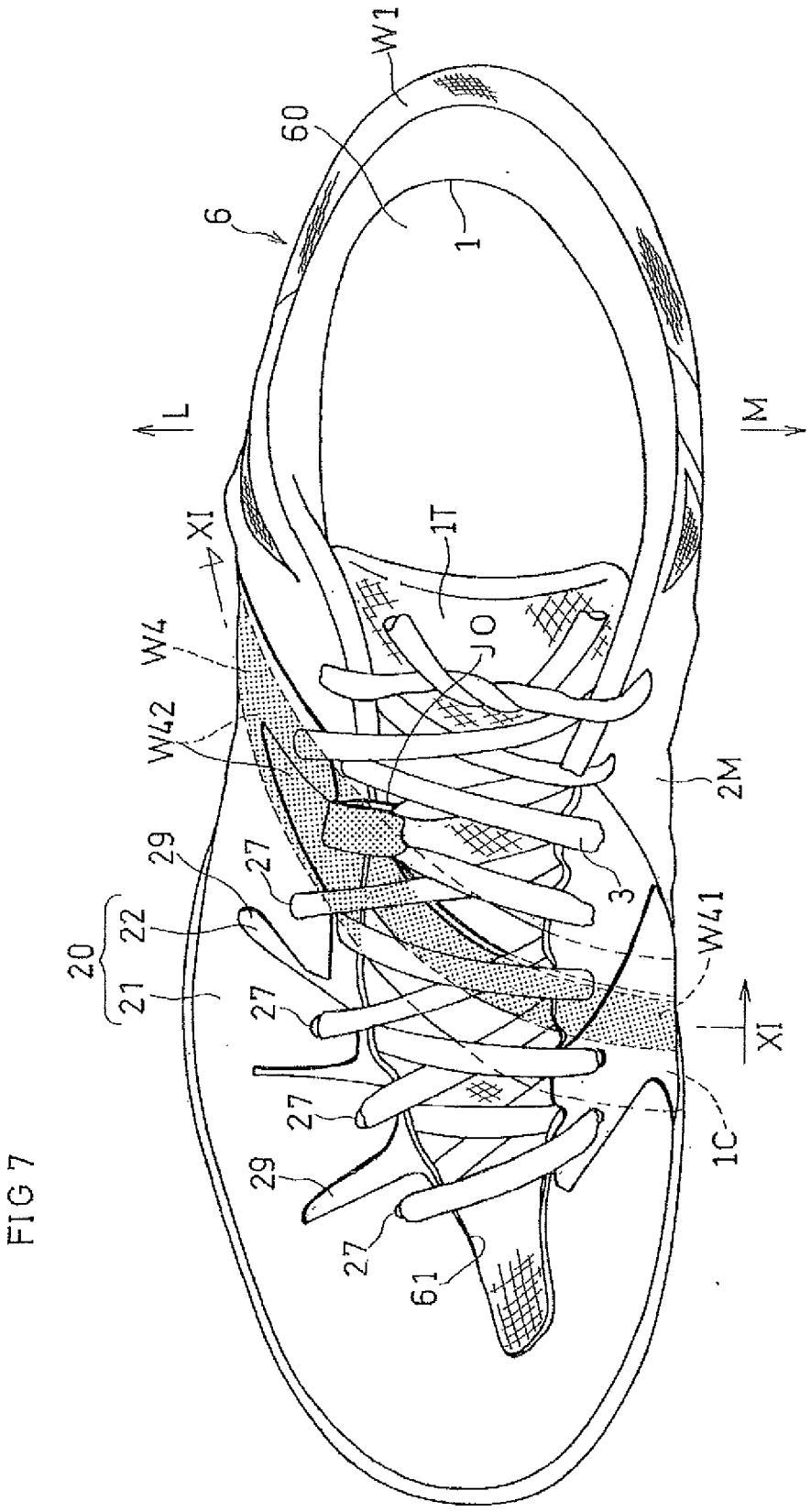


FIG 7

FIG 8

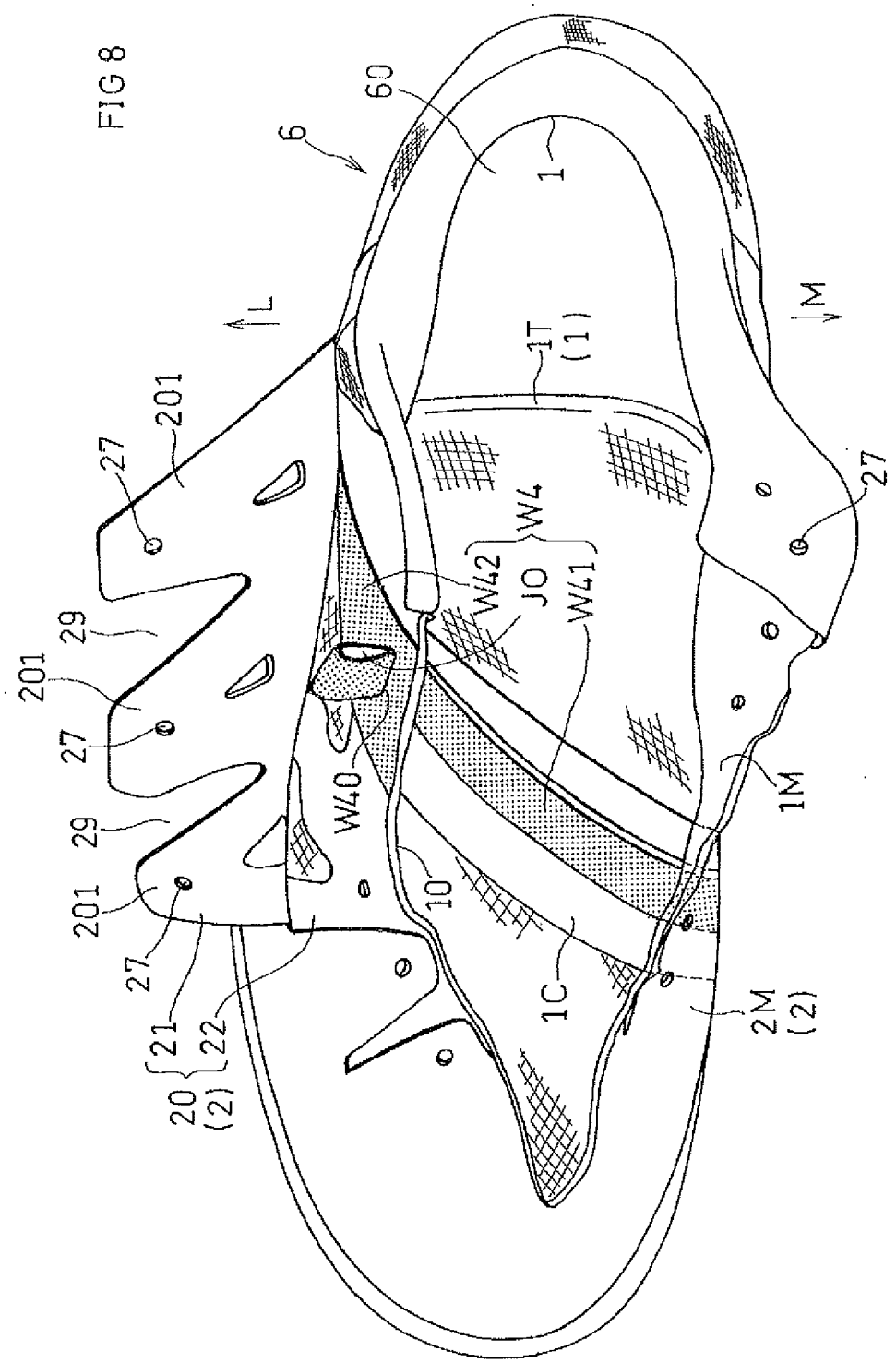
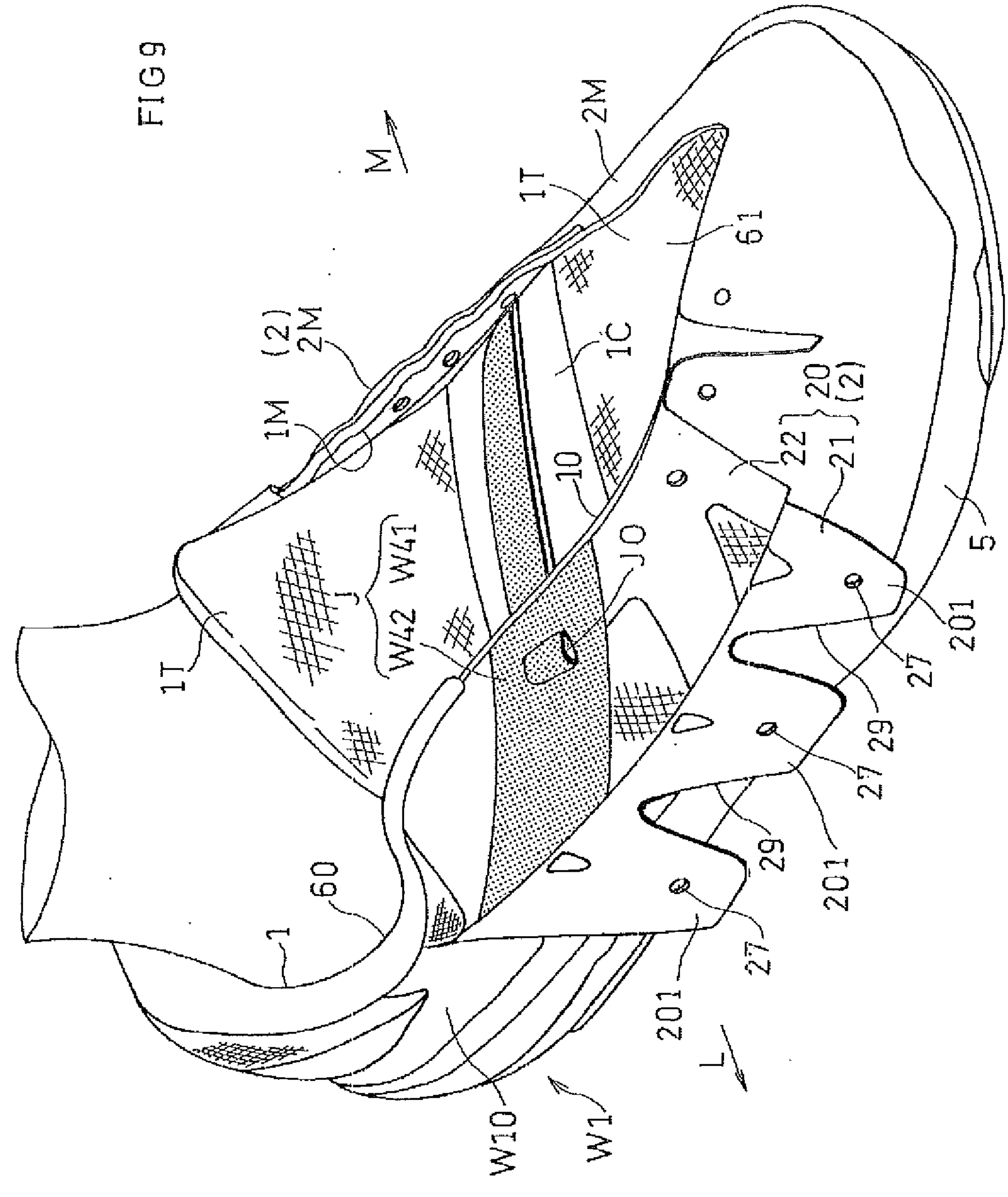


FIG 9



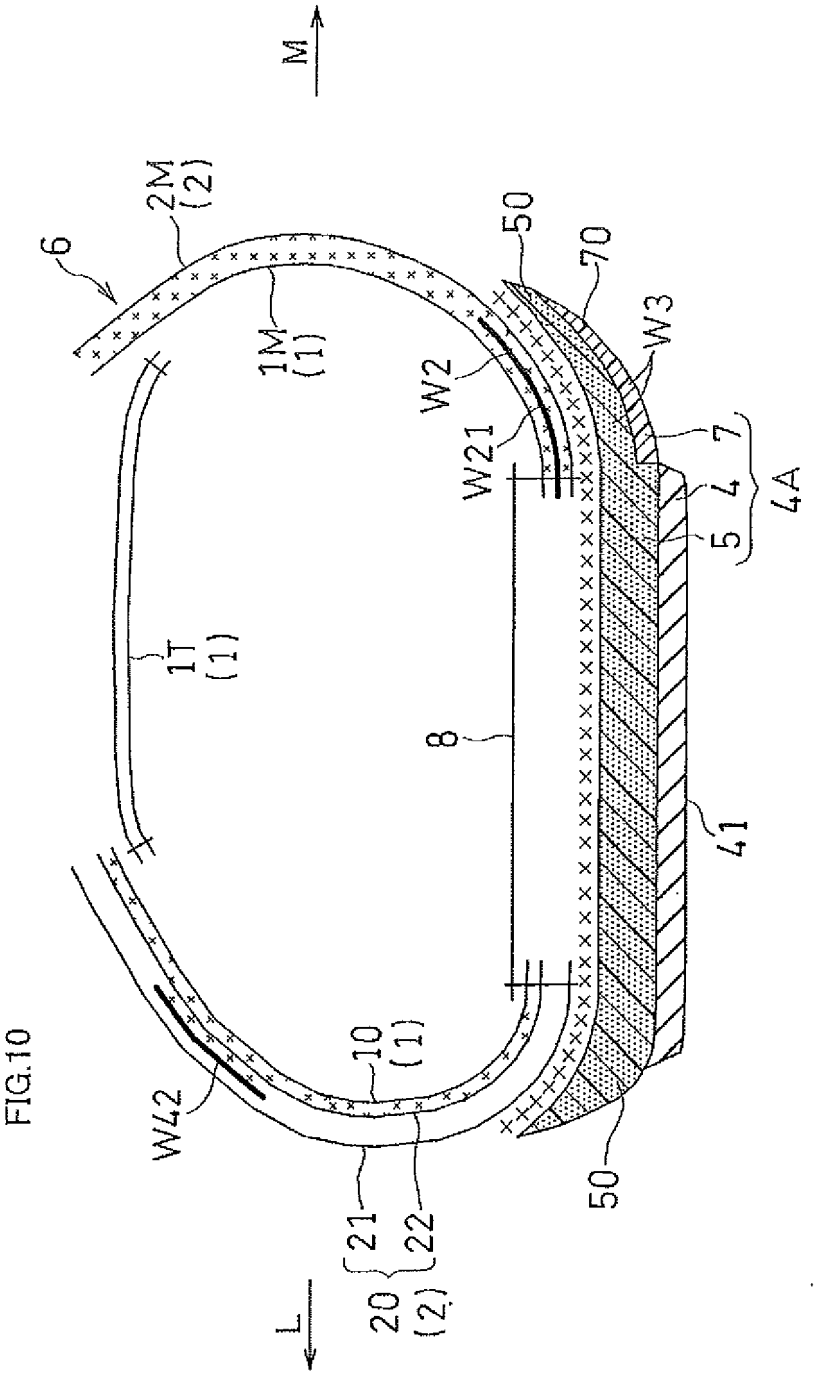


FIG.10

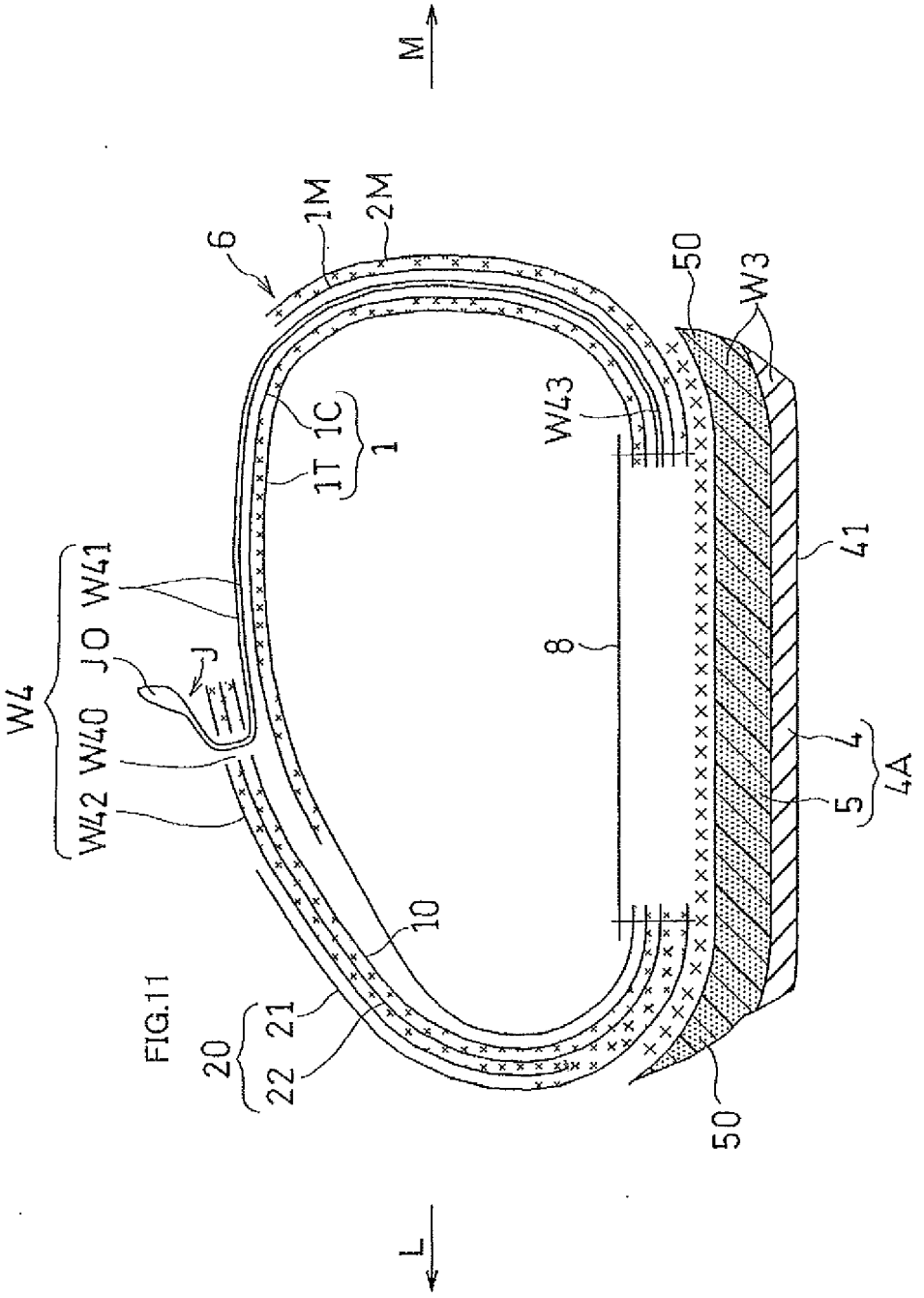

M
L
6
1M
2M
50
W3
W43
1T
1C
1
41
W4
W41
JO
J
W40
W42
8
4
5
4A
10
20
21
22
50

FIG.11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/077461

A. CLASSIFICATION OF SUBJECT MATTER
A43B23/02(2006.01)i, *A43B5/00*(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A43B23/02, A43B5/00

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

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2013
Kokai Jitsuyo Shinan Koho	1971-2013	Toroku Jitsuyo Shinan Koho	1994-2013

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 4219591 B2 (Mizuno Inc.), 04 February 2009 (04.02.2009), entire text; all drawings (Family: none)	1-16
A	JP 3016014 U (Mizuno Inc.), 26 September 1995 (26.09.1995), entire text; all drawings (Family: none)	1-16
A	JP 2005-329270 A (Asics Corp.), 02 December 2005 (02.12.2005), entire text; all drawings & US 2006/0162190 A1	1-16

☐ 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	Date of mailing of the international search report
27 November, 2013 (27.11.13)	10 December, 2013 (10.12.13)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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