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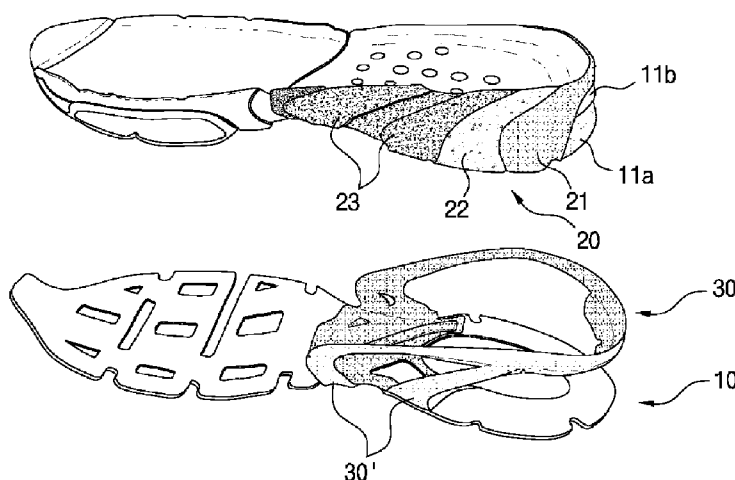
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(54) **Title:** A SHOE HAVING TRIPLE-HARDNESS MIDSOLE, OUTSOLE AND UPPER WITH SUPPORT FOR PREVENTING AN OVERPRONATION

[Fig. 2]



(57) **Abstract:** This invention discloses a shoe comprising a midsole having triple-hardness structures with different hardness to each other, a bridge formed from the midsole to upper of outsole, the bridge being formed onto the outsole and having one or more legs, a mesh-type frame formed on the upper of shoe to support the subtalar articulation, wherein the bridge is formed only at the inside of shoe, and the triple-hardness structures comprises a low-hardness layer, a middle-hardness layer and a high-hardness layer.



Description

Title of Invention: A SHOE HAVING TRIPLE-HARDNESS MIDSOLE, OUTSOLE AND UPPER WITH SUPPORT FOR PREVENTING AN OVERPRONATION

Technical Field

- [1] The present invention relates to the functional shoe having triple-hardness midsole, outsole and upper with support for preventing an overpronation.

Background Art

- [2] Recently, the functional shoe having various functions and designs have been delivered, and as the standard of living has improved, shoes having new functions have been manufacturing.
- [3] In the prior functional shoes, there have been shoes having dual-hardness midsole mechanism to improve the damage absorption function of shoes and to protect the ankle joint by improving absorption and cushioning characteristics during walking.
- [4] For example, Korean Laid-Open Patent publication No. 2010-0020078 discloses a shoe and midsole manufacturing method having 2-State insert structure. Said '20078 discloses a shoe including a midsole having a dual insert structure, the midsole including: a hard nylon injection piece layer; a low-hardness polyurethane layer covering the nylon injection piece layer; and a middle-hardness polyurethane layer covering the low-hardness polyurethane layer. In the '20078, the midsole includes two different polyurethane layers, that is, a polyurethane layer having low hardness and a polyurethane layer having middle hardness.
- [5] Also, Korean Laid-Open Patent publication No. 2000-0036859 discloses a molding method for manufacturing base plate of shoe having different hardness midsole.
- [6] In the '36589, the midsole is formed to have dual-hardness comprised of a low-hardness polyurethane layer and a middle-hardness polyurethane layer to absorb the damage from ground during walking and prevent the damage from transferring to the knee joint or the ankle joint. Also, in the '36589, since the low-hardness and the middle-hardness polyurethane layers are formed by attaching the same materials, an additional adhesive agent to adhesive these polyurethane layers is not necessary, therefore it is possible to prevent the undesirable hydrolysis so that the durability of shoe can be improved.

Disclosure of Invention

Technical Problem

- [7] However, said prior arts have disadvantages that since the midsole is formed to

include only two different polyurethane layers to absorb the impact transferred from the ground when it comes into contact with the ground, it is not sufficient to absorb completely the impact transferred from the ground during walking. Also, it is not possible to prevent completely the overpronation by the midsole formed of only two different polyurethane layers.

- [8] It would be desirable if there were provided a functional shoe which is possible to absorb the damage from ground and the damage from transferring to the knee joint or the ankle joint and to eliminate fundamentally the overpronation during walking.

Solution to Problem

- [9] It is a general object of the invention is to provide a functional shoe which is possible to absorb the damage from ground and the damage from transferring to the knee joint or the ankle joint and to eliminate fundamentally the overpronation during walking.
- [10] In order to accomplish the above object, the present invention provides a shoe comprising a midsole having triple-hardness structure with different hardness to each other; a bridge formed from the midsole to upper of outsole, the bridge formed onto the outsole and having one or more legs; and a mesh-type frame formed on the upper of shoe to support the subtalar articulation, wherein the bridge is formed only at the inside of shoe, and the triple-hardness structures comprises a low-hardness layer, a middle-hardness layer and a high-hardness layer.
- [11] In another aspect of the present invention, the triple-hardness structure with different hardness to each other are formed to have higher hardness toward the front from the rear of shoe.
- [12] In still another aspect of the present invention, the midsole is formed of polyurethane or polyvinyl acetate.
- [13] In still another aspect of the present invention, there is provided a shoe further comprising solid portion formed of polymer material to support the inner of foot, the solid portions formed throughout the inside of middle portion of uppers of the shoe.
- [14] In still another aspect of the present invention, the mesh-type frame is formed of polymer materials.
- [15] In still another aspect of the present invention, the mesh-type frame is formed at the outside of shoe and around shoestring supports for tightening up a shoestring by putting it into the supports.
- [16] In still another aspect of the present invention, there is provided a shoe further comprising cushioning parts, the cushioning parts having a lower cushion attached onto the outsole and an upper cushion attached onto the lower cushion, and the upper cushion having the hardness higher than the lower cushion.
- [17] In still another aspect of the present invention, the triple-hardness structure is

comprised of a low-hardness layer having 47 to 52, a middle-hardness layer having 53 to 58, and a high-hardness layer having 59 to 64, in the shore hardness, respectively.

[18] In still another aspect of the present invention, the triple-hardness structure and two cushions are different to each other in view of the shore hardness.

[19] In still another aspect of the present invention, the mesh-type frame is formed by elongated elements of hard nylon injection piece.

Advantageous Effects of Invention

[20] According to the present invention, it is possible to prevent completely the over-pronation by the midsole formed of three polyurethane layers, absorb the damage from ground and the damage from transferring to the knee joint or the ankle joint, and eliminate effectively the overpronation during walking.

[21] The foregoing and other objects, features and advantages of the invention will be apparent from the following specification and drawings forming a part thereof.

Brief Description of Drawings

[22] Fig. 1 is a left side view of a shoe according to the present invention.

[23] Fig. 2 is an exploded view showing a midsole and an outsole of shoe according to the present invention.

[24] Fig. 3 is a view showing in detail the outsole of the shoe according to the present invention.

[25] Fig. 4 is a view showing the whole construction of each part corresponding to articulations of foot.

[26] Fig. 5 is a right side view of a shoe according to the present invention.

[27] * Reference numerals in drawings

[28] 1: shoe

[29] 10: outsole

[30] 11a: lower cushion member

[31] 11b: upper cushion member

[32] 20: midsole

[33] 21: low-hardness layer

[34] 22: middle-hardness layer

[35] 23: high-hardness layer

[36] 30: bridge

[37] 30': leg

[38] 40: upper of shoe

[39] 41: mesh-type frame

[40] 41': shoestring support

[41] 41" ; shoestring

[42] 42: solid portion

Best Mode for Carrying out the Invention

[43] Exemplary embodiments of the present invention will be described in detail with reference to the attached drawings, where like or similar elements are designated with identical reference numerals throughout the several views.

[44] Fig. 1 shows a left side view of a shoe according to the present invention. As shown, the shoe(1) according to the present invention comprises an outsole(10) forming the bottom of the shoe(1), a midsole(20) attached onto the outsole(10) to provide cushioning to the foot during walking, and uppers(40) coupled onto the midsole(20) to accommodate and protect the foot.

[45] The midsole(20) may be formed of polyurethane(PU) or polyvinyl acetate(EVA), but it is not limited thereto. The midsole(20) is comprised of a low-hardness layer(21), a middle-hardness layer(22) and a high-hardness layer(23), which are formed with approximately perpendicular adjacent to each other. The low-hardness layer(21), the middle-hardness layer(22) and the high-hardness layer(23) are formed only at the inside of the midsole(20), and legs of bridge which will be described later, are joined to the high-hardness layer(23) in the inside of the midsole(20).

[46] Meanwhile, the low-hardness layer(21), the middle-hardness layer(22) and the high-hardness layer(23) are not formed at the outside of the midsole(20), while the low hardness layer(21) and an upper and lower cushion members(11a,11b) are formed at the outside of the midsole(20). As shown, the lower cushion member(11a) is joined onto the outsole of shoe(1), the upper cushion member(11b) is joined onto the lower cushion member (11a), and the low-hardness layer(21) is joined onto the upper cushion member(11b), to form a portion of the midsole(20).

[47] According to the exemplary one embodiment of the invention, the low-hardness layer(21) is formed of a polyurethane material having about 37 to 52, the middle-hardness layer(22) is formed of a polyurethane material having about 53 to 58, and the high-hardness layer(22) is formed of a polyurethane material having about 59 to 64, in the shore hardness, respectively. Preferably, three members(21,22,23) are formed to have a higher hardness towards the front from the rear of the shoe(1), so that the impact when making a landing firstly can be absorbed by the cushioning effect of the low-hardness layer(21), subsequently the middle-hardness layer(22) and the high-hardness layer(23) can be landed in turn, thereby improving the absorption ability to the impact of foot.

[48] Fig. 2 is an exploded view showing a midsole and an outsole of shoe according to the present invention. As shown, the bridge(30) is joined onto the outsole(10). Preferably, the bridge(30) is formed of a rigid polymer material to wrap and protect of the rear part

of foot and has one or more legs to prevent the overpronation of foot. As shown, the bridge(30) is formed only at the inside of foot to prevent the adduction of foot and has two legs, but the number of legs is not limited thereto, in the other embodiment, the bridge(30) may be formed to have one or three or more legs.

[49] Upper(40) of shoe(1) is provided with the mesh-type frame(41) to wrap and protect the foot, and the frame(41) may be a rigid polymer material to support the inside of foot and are formed at the inside of foot(1). The mesh-type frame(41) is adapted to reinforce the upper(40) of the shoe formed of woven fabric or synthetic leather, etc. and is formed to have the mesh shape to remove effectively the overpronation of foot.

[50] The mesh-type frame(41) is formed at the inside and the outside of shoe(1), and as shown in Fig 1, it also may be formed around shoestring supports(41') to protect the supports(41'). The mesh-type frame(41) is formed by elongated elements such as, for example, hard nylon injection pieces.

[51] Also, referring to Fig. 1, a polymer solid portion(42), which is shown in a black-colored portion, is formed at a portion of the inside of upper(40) in the shoe(1) to positively support the foot inside. The solid portion(42) is added and joined onto the upper(40) as shown in black-colored portion in Fig. 1 throughout lower and middle portions in the inside of shoe(1), thereby supporting tightly the foot against to the impact strength applied to the inside of foot. That is, the overpronation to the foot can be effectively suppressed by the cooperating operation of the mesh-type frame(41) with the solid portion(42).

[52] Fig. 3 is a detail view showing the outsole of the shoe according to the present invention. As shown, the bridge(30) is attached onto the outsole. In an exemplary embodiment, the bridge(30) has two legs(30') to wrap the rear of foot. The legs(30') are joined onto the high-hardness layer(23); one being added to about middle portion of the high-hardness layer(23), the other one being added and joined to front portion of the high-hardness layer(23).

[53] A dual cushion member(11) is formed at the rear of shoe and is comprised of a lower cushion member(11a) and an upper cushion member(11b) joined onto the member(11a). Preferably, the upper and lower cushion members(11a,11b) may be a polymer material having an appropriate hardness as necessary. In an exemplary embodiment, the lower cushion member(11a) has the shore hardness of about 48 to 52, and an upper cushion member(11b) has the shore hardness lower than the member(11a). The lower and upper cushion members(11a,11b) may be formed of a polyurethane foam.

[54] By forming the dual cushion member(11) comprised of the lower and the upper cushion members(11a,11b) with different hardness to each other, the cushion function of the shoe can be more effectively reinforced as compared to a single cushion

member, so that the fatigue degree of foot can be remarkably reduced.

[55] Fig. 4 is a view showing the whole construction of each part corresponding to articulations of foot. As shown, the mesh type frame(41), which may be a polymer material, is formed to support the subtalar articulation of foot as shown in dashed-lines. The mesh type frame(41) is adapted to support the subtalar articulation of foot by cooperating with the solid portion(42) to suppress the overpronation of foot.

[56] Fig. 5 is a right side view of a shoe according to the present invention. As shown, in the right side of shoe, the midsole(20) is only provided with the low-hardness layer(21) by the cushion members(11a,11b), unlike the left side of shoe where the low-hardness layer(21), the middle-hardness layer(22) and the high-hardness layer(23) are formed. The mesh-type frame(41) and the solid portion(42) are formed at the uppers(40) of the right side in the shoe.

[57] By forming the shoe such that the shape of the left side is different from that of the right side, the shoe cushioning effect can be remarkably improved and is possible to control effectively the overpronation of foot.

[58] Referring to Fig. 5, a plurality of shoestring supports(41') are formed on the upper of the shoe(1), which is for tightening up a shoestring(41") by putting it into the shoestring supports(40').

[59] The midsole having triple-hardness structures with different hardness to each other is illustrated, but in the other embodiment, the midsole may be comprised of four or more structures with different hardness to each other. Furthermore, it is possible to form the shoe such that five pieces including triple-hardness structures and lower/upper cushion members have different hardness to each other.

[60] According to the present invention, when shoe comes into contact with the ground during walking, it is possible to prevent more effectively the overpronation by the midsole formed of three or more different polyurethane layers, absorb the damage from ground and the damage from transferring to the knee joint or the ankle joint, and eliminate fundamentally the overpronation during walking.

[61] By forming the dual cushion member(11) comprised of the lower and the upper cushion members(11a,11b) with different hardness to each other, the cushion effect can be remarkably reinforced as compared to a single cushion member, so that the fatigue degree of foot can be effectively reduced.

[62] In this way, the impact occurring during walking can be uniformly dispersed from the low hardness layer(21) through the middle hardness layer(22) to the high hardness layer(21), so that the cushioning ability of the shoe can be remarkably improved.

[63] The shoe including the midsole having triple-hardness structure, the bridge having one or more legs, and the upper having the mesh-type frames has not only very excellent effect in view of elasticity, cushioning and supporting for foot, and but also is

possible to prevent effectively the overpronation.

[64] Although specific structure are described herein, it is to be understood that these descriptions are exemplary and alternative embodiments and equivalents may be readily made by those skilled in the art without departing from the spirit and the scope of this invention, Accordingly, the invention is intended to embrace all such alternatives and equivalents that fall within the spirit and the scope of the appended claims.

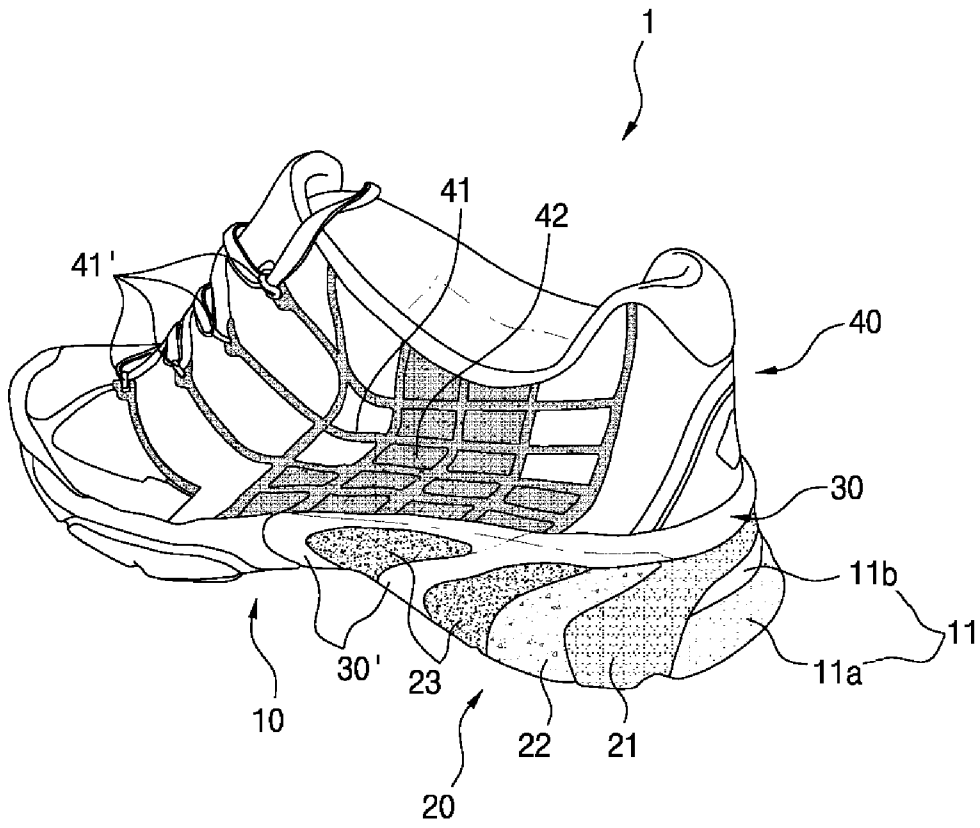
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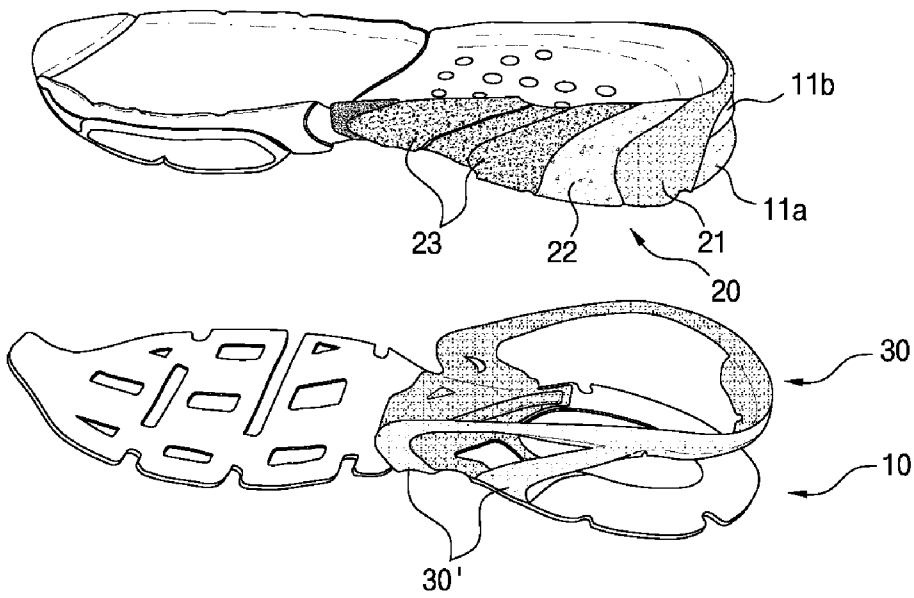
Claims

- [Claim 1] A shoe comprising a midsole having triple-hardness structures with different hardness to each other;
a bridge formed from the midsole to upper of outsole, the bridge being formed onto the outsole and having one or more legs; and
a mesh-type frame formed on the upper of shoe to support the subtalar articulation,
wherein the bridge is formed only at the inside of shoe, and the triple-hardness structures comprises a low-hardbness layer, a middle-hardbness layer and a high-hardbness layer.
- [Claim 2] The shoe according to claim 1, wherein the triple-hardness structure with different hardness to each other are formed to have higher hardness toward the front from the rear of shoe.
- [Claim 3] The shoe according to claims 1, the midsole is formed of polyurethane or polivinyll acetate.
- [Claim 4] The shoe according to claims 1, further comprising a solid portion formed of polymer material to surppoort the inner of foot, the solid portion being formed throughout the inside of middle portion of uppers of the shoe.
- [Claim 5] The shoe according to claim 1, wherein the mesh-type frame is formed of polymer materials.
- [Claim 6] The shoe according to claim 1 or 4, wherein the the mesh-type frame is formed at the outside of shoe and around shoestring supports for tightenning up a shoestring by putting it into the supports.
- [Claim 7] The shoe according to claim 1, further comprising cushioning parts, the cushioning parts having a lower cushion attached onto the outsole and an upper cushion attached onto the lower cushion, and the upper cushion having the hardeness higher than the lower cushion.
- [Claim 8] The shoe according to claim 1, wherein the triple-hardness structure is comprised of a low-hardness layer having 47 to 52, a middle-hardness layer having 53 to 58, and a high-hardness layer having 59 to 64, in the shore hardness, respectively.
- [Claim 9] The shoe according to claim 1, wherein the triple-hardness structure and two cushions are different to each other in view of the shore hardness.
- [Claim 10] The shoe according to claim 1, wherein the mesh-type frame is formed by elongated elements of hard nylon injection piece.

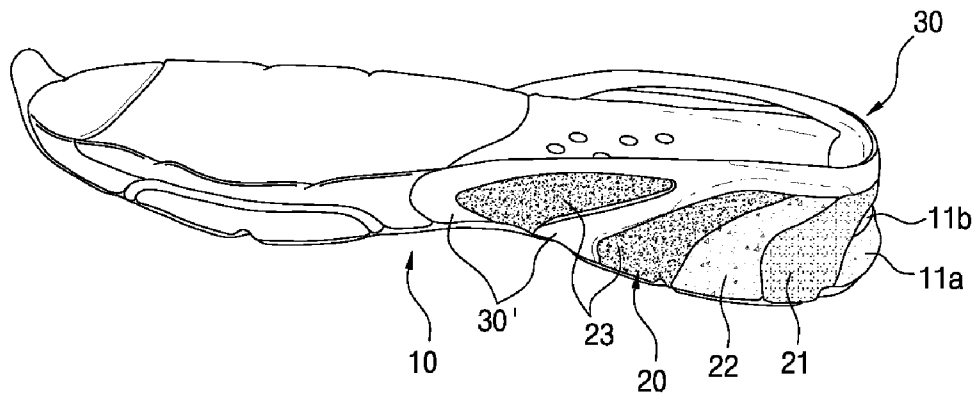
[Fig. 1]



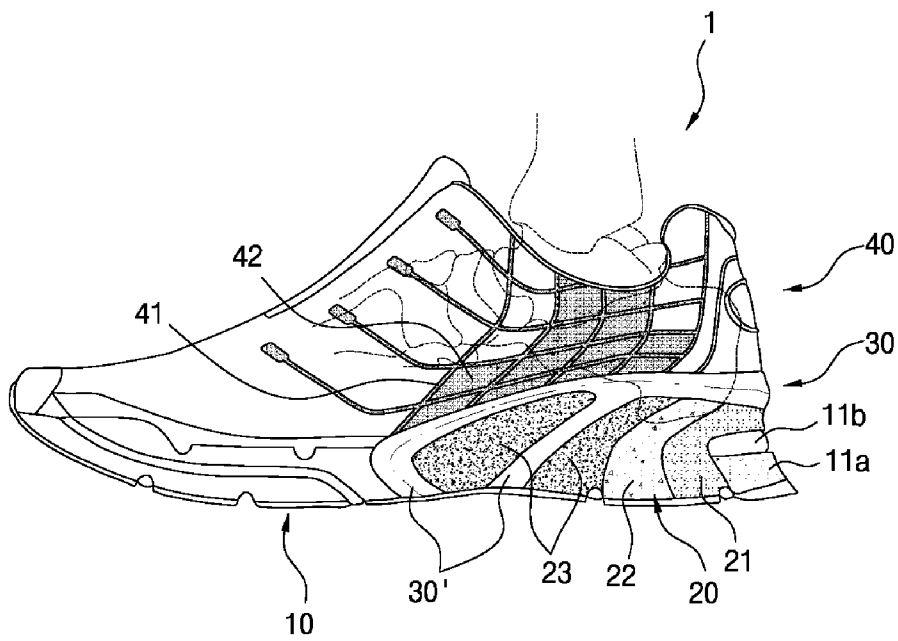
[Fig. 2]



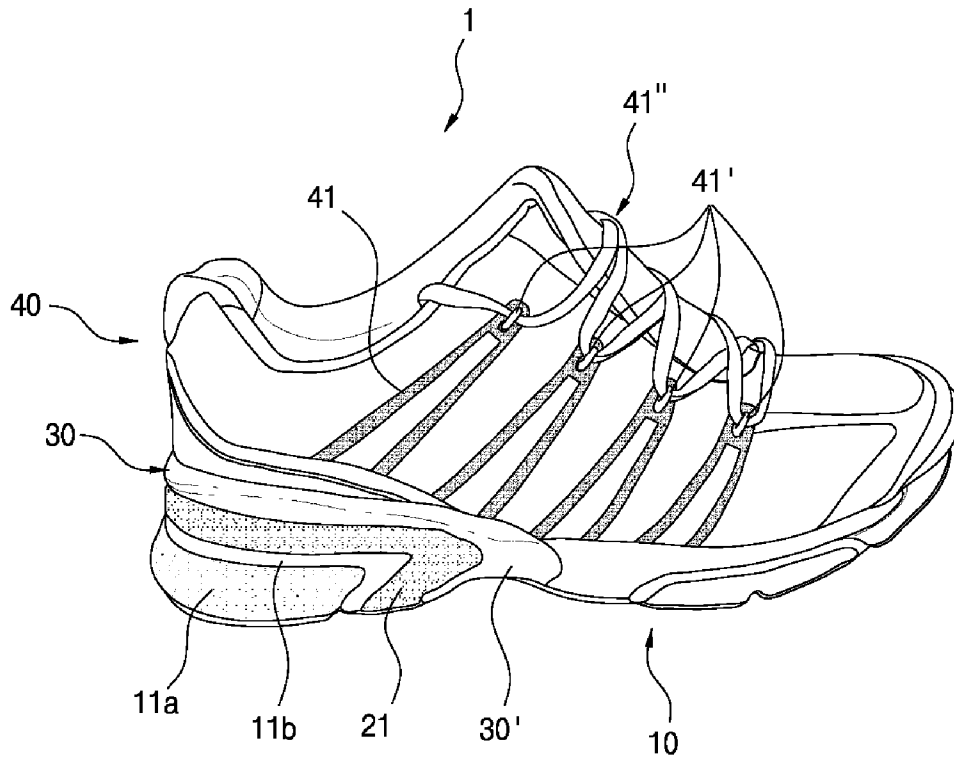
[Fig. 3]



[Fig. 4]



[Fig. 5]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2011/003934**A. CLASSIFICATION OF SUBJECT MATTER***A43B 13/40(2006.01)i, A43B 13/18(2006.01)i, A43B 7/32(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)

A43B 13/40; A43B 13/38; A61F 5/14; A43B 5/00; A43C 11/00; A43B 13/14; A43B 13/04

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: hardness,midsole,triple,brige,wing,frame

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 05-329005 A (ACHILLES CORP) 14 December 1993 See abstract, paragraphs [0014]-[0029] & figs. 3-6	1-10
A	US 2006-0123664 A1 (ROBERT BOYD et al.) 15 June 2006 See abstract, FIGs. 1-2 & paragraphs [0019][0021]	1-10
A	JP 2005-304653 A (ASICS CORP) 04 November 2005 See paragraphs [0032]-[0044] & figs. 1-2	1-10
A	US 2008-0052960 A1 (MANON BELLEY et al.) 06 March 2008 See abstract, Fig. 2 & paragraphs [0020]-[0036]	1-10

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

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2011/003934

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