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(54) **Title:** MODULAR SHOE SYSTEM

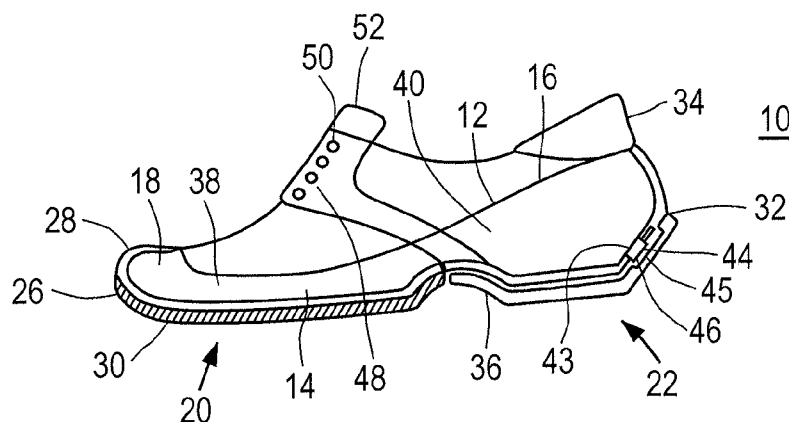


FIG. 1f

(57) **Abstract:** The systems and methods described herein are directed to a modular shoe system that can include an internal support structure. Additionally, the internal support structure can include support features that can at least assist in providing different levels of support, compression, and/or comfort along various areas of the internal support structure. Furthermore, the internal support structure can have customized configurations and characteristics of support features in order to generally improve the fit and feel of the modular shoe system for a user.

MODULAR SHOE SYSTEM

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of priority to U.S. Utility Patent Application Serial No. 13/107,470, filed May 13, 2011. Priority of the aforementioned filing date is hereby claimed and the disclosure of the patent application is hereby incorporated by reference in its entirety.

BACKGROUND

[0002] A shoe typically includes a sole section and an upper section. The sole section includes an outsole or tread section, a midsole and an insole. The foot rests on the innersole and the outsole rests on the ground. The midsole is sandwiched between the innersole and the outsole. The uppers and outsole define the appearance of the shoe. There is a need for a modular shoe system having a midsole with replaceable uppers and outsoles due to a number of reasons. First, as fashions change there is a need to change the outside look of the shoe but not the midsole portion. Second, having a midsole with replaceable uppers and outsoles will reduce shoe production costs, reduce shoe storage in shops and at home in the closet. There is also a need for a modular shoe system having conveniently wholly replaceable uppers and outsoles without the need for additional fasteners in the uppers.

[0003] In addition, people generally apply different amounts of pressure with their foot at various locations within their footwear. Different activities, such as walking, standing and running may result in particular areas of the foot experiencing more applied pressure and/or discomfort than other areas of the foot. For at least these reasons, there is also a need for a modular shoe system that includes features that provide at least varied support, compression, and/or comfort areas in order to better accommodate the different points of contact along a user's foot within a modular shoe system.

SUMMARY

[0004] This document presents modular shoe. In preferred exemplary implementations, the modular shoe includes an internal support structure. The internal support structure includes an insole having at least a vertical heel support portion that defines a longitudinal axis running substantially from the heel support portion to a distal toe area. The internal support structure further includes at least one support feature and a removable cover. The removable cover includes an outsole and a top cover portion, and has a longitudinal axis running substantially from a heel portion to a toe portion. The removable cover is configured to removably couple to the internal support structure when the internal support structure is positioned within the removable cover, where the coupling is substantially by application of pressure to the periphery of the internal support structure. The top cover portion includes a fastening element for removably coupling the cover to a user's foot, and further includes a flap for partially covering a top portion of the internal support structure vertical heel support portion so as to align the longitudinal axis of the internal support structure and the longitudinal axis of the removable cover.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] These and other aspects will now be described in detail with reference to the following drawings.

[0006] FIG. 1*a* is an isometric view of a modular shoe system that is constructed and operable in accordance with a first implementation of the present disclosure;

[0007] FIG. 1*b* is an isometric view of a rear removable cover of the modular shoe system of FIG. 1*a*;

[0008] FIG. 1*c* is an isometric view of the base of an internal support structure of the modular shoe system of FIG. 1*a*;

[0009] FIG. 1 *d* is a cross-sectional view of the internal support structure of FIG. 1*c* being fitted to a foot;

[0010] FIG. 1*e* is a sectional view of the modular shoe system of FIG. 1*a* in an assembled state;

[0011] FIG. 1*f* is a schematic view of the modular shoe system of FIG. 1*a* in an assembled state;

[0012] FIG. 1*g* is an isometric view of the modular shoe system of FIG. 1*a* in an assembled state;

[0013] FIG. 2 is a bottom view of an internal support structure that is constructed and operable in accordance with a second implementation of the present disclosure;

[0014] FIG. 3 is a cross section view taken across section line B-B in FIG. 2.

[0015] FIG. 4 is a cross section view taken across section line C-C in FIG. 2.

[0016] FIG. 5 is a cross section view taken across section line D-D in FIG. 2.

[0017] FIG. 6 is a cross section view taken across section line A-A in FIG. 2.

[0018] FIG. 7 is a partial view taken from section E in FIG. 6.

[0019] FIG. 8 is a partial view taken from section F in FIG. 6.

[0020] FIG. 9 is a bottom view of an internal support structure that is constructed and operable in accordance with a third implementation of the present disclosure.

[0021] FIG. 10 is a cross section view taken across section line G-G in FIG. 9.

[0022] Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION

[0023] This document describes a modular shoe system construction and method of operation thereof. The details of one or more implementations of the modular shoe system are set forth in the accompanying drawings and the description below. Other features and advantages will be apparent from the description and drawings, and from the claims.

[0024] Reference is now made to FIGS. 1a to 1g. FIG. 1a is an isometric view of an implementation of a modular shoe system 10. FIG. 1b is an isometric view of a rear removable cover 32 of modular shoe system 10. FIG. 1c is an isometric view of the base of an internal support structure 12 of modular shoe system 10. FIG. 1d is a cross-sectional view of internal support structure 12 being fitted to a foot. FIG. 1e is a sectional view of modular shoe system 10 in an assembled state. FIG. 1f is a schematic view of modular shoe system 10 in an assembled state (for the sake of clarity and presentation, certain features which would otherwise be hidden are shown making other features semi-transparent). FIG. 1g is an isometric view of modular shoe system 10 in an assembled state. Modular shoe system 10 includes internal support structure 12. Internal support structure 12 includes a midsole 14, a heel counter 16 and a toe box 18. Internal support structure 12 has a front portion 20 which includes toe box 18. Internal support structure 12 has a rear portion 22 which includes heel counter 16. Internal support structure 12 also includes an insole 24 disposed therein (FIG. 1a).

[0025] In one implementation the internal support structure can be formed with injected polyurethane with sanitized comfort lining made of leather, textiles, or man-made fabrics. In additional implementations, the internal support structure 12 can be formed with other materials such as leather, a synthetic compound, thermoplastic, rubber, latex, wood, or cork. In addition, some implementations of the internal support may be comprised of a plurality of materials of which at least two may have different densities.

[0026] The internal support structure 12 preferably includes a heel area, an arc area, and a toe area. The heel area incorporates a heel counter 16 which can help support and hold the wearer's ankle in place so as to limit shoe slipping or other unnecessary movement. In

one implementation, the heel includes an inbuilt shock absorbent. In one implementation, the arc area is orthopedic shaped and is designed to support a wide variety of foot arc shapes. In one implementation, the toe area includes a carefully studied toe-spring angle. The toe area also incorporates a toe-cap which retains and protects the toes. Alternatively, and as described below in an additional implementation of the internal support structure, the toe area may be open-toed. In general, an open-toe configuration of the internal support structure would be limited to supporting the bottom of a user's foot (i.e., the insole) and would generally not extend up the sides and/or across the top of the user's toe area (refer to FIG. 3).

[0027] In general, the modular shoe system 10 includes a plurality of interchangeable first removable covers, for example, a removable cover 26. Each of the first removable covers is configured for being alternately removably attached to the internal support structure 12 by a self aligning pressure mechanism. When modular shoe system 10 is assembled, removable cover 26 substantially covers the internal support structure 12 since the removable cover and internal support structure are made to a particular size to provide for accurate alignment between the longitudinal axis of each. Hence, removable cover 26 is removably attached to internal support structure 12 substantially solely by pressure exerted by internal support structure 12 on removable cover 26. The heel counter 16 serves to support the rear of the cover 26 in an upright position, thus providing a comfortable heel portion in the assembled shoe system 10. The term "attached substantially solely by pressure" is defined herein as, the pressure exerted by internal support structure 12 on removable cover 26 is sufficient to ensure that removable cover 26 remains attached to internal support structure 12 during normal use of modular shoe system 10 even though, for example, other connection means between removable cover 26 and another element of modular shoe system 10 may secure the attachment between removable cover 26 and internal support structure 12.

[0028] Any number of mechanisms may be used to releasably secure the components (i.e., removable covers, internal support structure) of the modular shoe system in an assembled state without departing from the scope of this disclosure. For example, removable cover 32 can include a fastening arrangement 48 configured for securing modular shoe

system 10 to a foot of a wearer. In accordance with the preferred implementation of the present invention, fastening arrangement 48 includes a plurality of eyelets 50 configured for inserting a shoelace 51 through eyelets 50 (FIG. 1g). In accordance with an implementation of the present invention, removable cover 26 includes a tongue 52 configured for being disposed at least partially beneath fastening arrangement 48.

[0029] The removable cover 26 preferably includes two main components, an upper and an outsole. The upper is preferably made of commonly used shoe materials such as leather, textile, man-made synthetic, laminate, coagulate, nonwoven, and patent leather. The upper can appear as a common shoe exterior. However, the internal construction of the upper may not include the common counter, stiff base (usually made of leather, nonwoven, or bonded fibers), or toe-cap stiffeners. Rather, the cover can be constructed by an economic and efficient method similar to those employed to produce gloves and other soft clothing items. Accordingly, by this efficient and economic method a designer has available numerous possibilities and alternatives. The outsole is preferably made of a variety of sole materials such as synthetics or naturals such as leather, synthetics, thermoplastics, rubbers, latex, wood, corks or combinations of the above. The outsole tread, form and aspect are at a designer's discretion and may vary according to fashion, style, and functionality of the intended final use of for the modular shoe. The outsole is preferably attached to the upper by gluing, stitching, direct injection, direct casting, and/or direct vulcanizing.

[0030] FIGS. 2-8 illustrate an additional implementation of an internal support structure 112, which includes an open-toe area 118 and one or more support features 120. The open-toe area 118 of the internal support structure 112 enables the side and top portions of a user's toe area to remain exposed from the internal support structure 112. This configuration of the internal support structure 112 can allow a user to couple the internal support structure 112 to any number of footwear and/or removable covers that expose either the side or top portion of the toe area. For example, the internal support structure 112 of the present implementation may at least be coupled to an open-toe dress shoe or open-toe dress shoe removable cover, which can enable a user to enjoy the benefit of the internal support structure 112 without significantly affecting the appearance of the user's footwear.

[0031] Similar to the implementations described above, the internal support structure 112 includes an insole 124. Additionally, the internal support structure 112 includes a rear portion 122 that may include a heel counter 116. Furthermore, some implementations of the internal support structure 112 may include at least two support features 120, of which at least two support features 120 are formed of different materials having different densities. In general, any single support feature 120 may be formed of a material that has a density that is either greater than or less than the density of a surrounding material that makes up at least a part of the internal support structure 112. Furthermore, each support feature 120 may be sized and shaped differently. Any single support feature 120 can provide at least more or less support, stability, and/or comfort for a user's foot at different points along the internal support structure 112. In general, the placement and material properties (i.e., shore hardness, density, etc.) of the support structures 112 are designed to provide improved support, stability, and/or comfort based on generally expected needs of a user's foot that interacts at particular areas along the internal support structure 112.

[0032] For example, the internal support structure 112 may be customized to have one or more support features 120 placed in one or more locations along the internal support structure 112 to provide one or more features desired by the user. By way of further example, an internal support structure 112 may be customized for a user who would benefit from additional support in the toe area of the internal support structure 112. The additional support may be provided to the user by including support features 120 in the toes area of the internal support structure 112 with an increased density and/or hardness. However, any number of configurations using any number of materials with various properties may be used without departing from the scope of the present disclosure.

[0033] As shown by way of example in FIG. 2, a variety of sized and shaped support features 120 can be positioned in a variety of locations along the internal support structure. For example, a support feature may be a geometric shape, such as a circle, square, triangle, or it may be a modified geometric shape. Furthermore, a support feature may be any number of sizes and shapes without departing from the scope of this disclosure. In addition, a support

feature may have any number of material properties (i.e., density, shore hardness, etc.) without departing from the scope of this disclosure.

[0034] A support feature 120 having a particular size, shape and material property may be completely embedded within a different material that makes up at least a part of the internal support structure 112. Alternatively, a support feature 120 may extend on either side, or completely through a material that makes up at least a part of the internal support structure 112. FIG. 3 illustrates an example cross section of an internal support structure 112 having at least one support feature 120 and a first material 121. A support feature 120a is shown as extending completely through the first material 121. Alternatively, additional support features 120b are shown as not extending completely through the first material 121 of the internal support structure 112. Therefore, the internal support structure 112 can vary in material density vertically and/or horizontally across a cross section. Furthermore, any number of combinations of materials having various properties can be configured across any cross section of the internal support structure 112 to accomplish a variety of support and comfort for a user.

[0035] In general, the characteristics (i.e., density, shape, etc.) and position of the one or more support features 120 may be customized in order to provide at least generally improved support and/or comfort to a user. One benefit of providing an internal support structure 112 comprised of materials having various material properties is that it enables the internal support structure 112 to be lighter weight by minimizing heavier materials to select locations, as necessary. For example, a heavier and denser material may be limited to the heel area of the internal support structure 112 where greater pressure may be applied. However, any variety of materials having any number of different properties may be used throughout the internal support structure 112 without departing from the scope of this disclosure.

[0036] In some implementations of the internal support structure 112 more than one support features 120 may be generally arranged in a pattern along the base of the internal support structure 112. As shown by way of example in FIG. 2, various shaped and sized support structures 120 are arranged in a fanned pattern across the base of the internal support

structure 112. As described above, the support structures can vary in material properties such as density and hardness. Therefore, the support structures 120 arranged along the toe area of the internal support structure 112 may have a smaller density material than the support structures 120 arranged along the heel area of the internal support structure 112.

[0037] FIG. 4 illustrates an additional example cross section of the internal support structure 112 showing, in particular, a variety of base surface features 128. Any one surface feature 128 can be sized and shaped in order to generally provide at least some support and/or comfort for a user. In addition, any single surface feature may extend partially through or completely through the material comprising at least a part of the internal support structure 112.

[0038] FIGS. 5 and 7 illustrate additional example cross sections of the internal support structure showing, in particular, a cross section of a shank 126 that can comprise a part of the internal support structure 112. In general, the shank 126 provides a more rigid support generally along the arch area of the internal support structure 112 (refer to FIG. 7). Therefore, the shank 126 can provide a user with increased support in the arch of the user's foot. However, the shank 126 may extend beyond the arch area of the internal support structure 112 without departing from the scope of this disclosure. For example, the shank 126 can extend completely through any one cross section of the internal support structure 112. Alternatively, the shank 126 can be limited to only extending part way through at least one material along any one cross section, as shown by way of example in FIG. 5 or FIG. 8. Due at least in part to providing increased support to the internal support structure 112, the shank 126 is generally made out of a more rigid material than the other materials comprising the internal support structure 112.

[0039] As described above, and shown by way of example in FIG. 6, the heel area of the internal support structure 112 can include a heel counter 116. Furthermore, the heel counter 116 can be comprised of a variety of materials and support structures in order to provide generally improved support and/or comfort to the heel area of a user.

[0040] FIGS. 9 and 10 illustrate another example implementation of the internal support structure 212. This implementation of the internal support structure 212 illustrates another example arrangement of support structures 120. For example, the support structures 120 shown in FIG. 9 are circular in shape and mostly arranged generally along the toe area and extend into the inner arch area of the internal support structure 212. An additional few support features are also shown as being positioned in the heel area of the internal support structure 212.

[0041] FIG. 10 illustrates an example cross section of the internal support structure 212, which also shows a cross section of a shank 126 comprising a part of the internal support structure 212. Similar to the previous implementation, the shank generally extends along the arc area of the internal support structure 212 and is generally made out of a more rigid material than the other materials comprising the internal support structure 212. Therefore, the shank shown in FIG. 10 can function to provide increased support in the arch area of a user's foot.

[0042] Although a few implementations have been described in detail above, other modifications are possible. Other implementations may be within the scope of the following claims.

WHAT IS CLAIMED IS:

1) A modular shoe, comprising:

an internal support structure comprising an insole having at least a vertical heel support portion and defining a longitudinal axis running substantially from the heel support portion to a distal toe area, wherein the toe area has an open-toe configuration; and

a removable cover comprising an outsole and a top cover portion, the removable cover defining a longitudinal axis running substantially from a heel portion to a toe portion, the removable cover configured to removably couple to the internal support structure when the internal support structure is positioned within the removable cover, the coupling is substantially by application of pressure to the periphery of the internal support structure, the top cover portion including a fastening element for removably coupling the cover to a user's foot, the top cover portion further including a flap for partially covering a top portion of the internal support structure vertical heel support portion so as to align the longitudinal axis of the internal support structure and the longitudinal axis of the removable cover.

2) A modular shoe, comprising:

an internal support structure comprising an insole having at least a vertical heel support portion, the internal support structure defining a longitudinal axis running substantially from the heel support portion to a distal toe area, the internal support structure further comprised of at least two materials having different densities; and a removable cover, the removable cover comprising an outsole and a top cover portion, the removable cover having a longitudinal axis running substantially from a heel portion to a toe portion, the removable cover configured to removably couple to the internal support structure when the internal support structure is positioned within the removable cover, the coupling is substantially by application of pressure to the periphery of the internal support structure, the top cover portion including a fastening element for removably coupling the cover to a user's foot, the top cover portion further including a flap for partially covering a top portion of the

internal support structure vertical heel support portion so as to align the longitudinal axis of the internal support structure and the longitudinal axis of the removable cover.

3) A modular shoe, comprising

an internal support structure, the internal support structure comprising an insole having at least a vertical heel support portion, the internal support structure defining a longitudinal axis running substantially from the heel support portion to a distal toe area, the internal support structure further comprised of at least one support features; and a removable cover, the removable cover comprising an outsole and a top cover portion, the removable cover having a longitudinal axis running substantially from a heel portion to a toe portion, the removable cover configured to removably couple to the internal support structure when the internal support structure is positioned within the removable cover, the coupling is substantially by application of pressure to the periphery of the internal support structure, the top cover portion including a fastening element for removably coupling the cover to a user's foot, the top cover portion further including a flap for partially covering a top portion of the internal support structure vertical heel support portion so as to align the longitudinal axis of the internal support structure and the longitudinal axis of the removable cover.

4) The modular shoe of claim 3, wherein the shape of the at least one support feature is square.

5) The modular shoe of claim 3, wherein the shape of the at least one support feature is circular.

6) The modular shoe of claim 3, wherein the shape of the at least one support feature is a modified geometric shape.

7) The modular shoe of claim 3, wherein the at least one support feature is positioned in at least one of an arch area, a toe area, and a heel area of the internal support structure.

8) The modular shoe of claim 3, wherein the at least one support feature is positioned in the vertical heel support portion of the internal support structure.

- 9) The modular shoe of claim 3, wherein the internal support structure includes a shank.
- 10) The modular shoe of claim 9, wherein the shank is made out of a rigid material.
- 11) The modular shoe of claim 3, wherein the internal support structure includes more than one support feature.
- 12) The modular shoe of claim 11, wherein at least two of the more than one support features are different shaped.
- 13) The modular shoe of claim 11, wherein at least two of the more than one support features have different densities.
- 14) The modular shoe of claim 11, wherein at least two of the more than one support features have different types of shore hardness.

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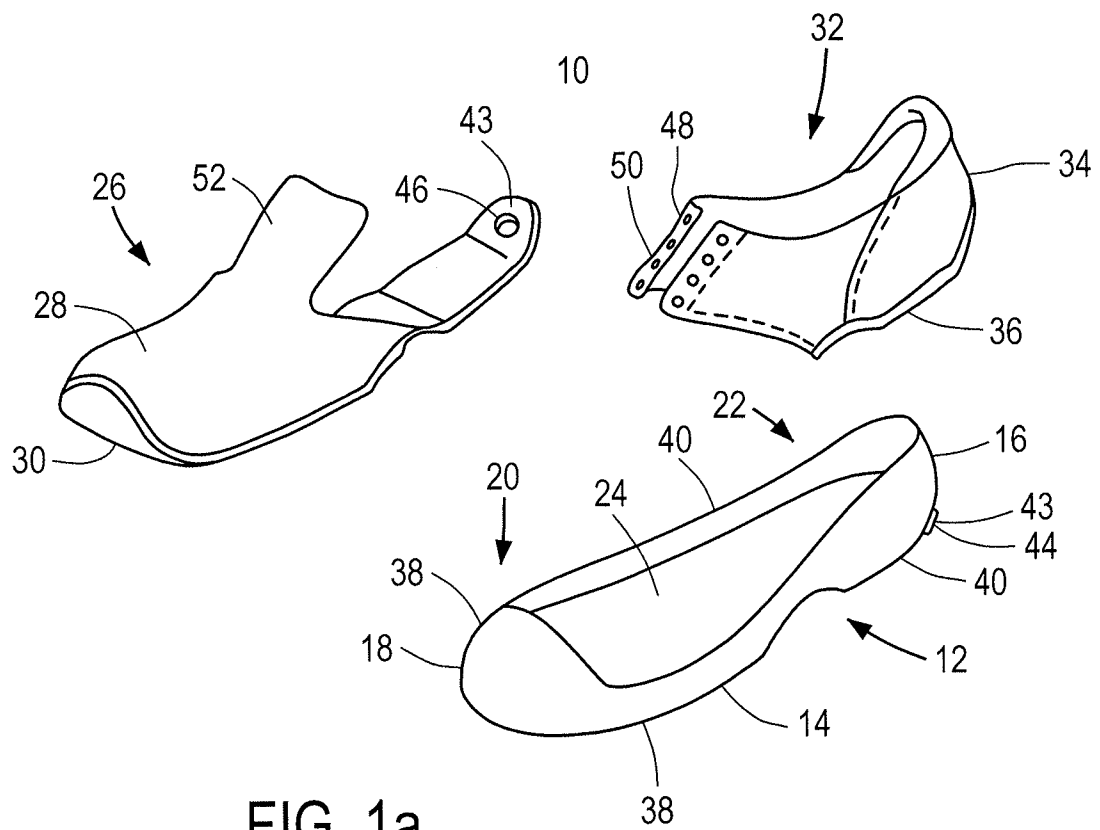


FIG. 1a

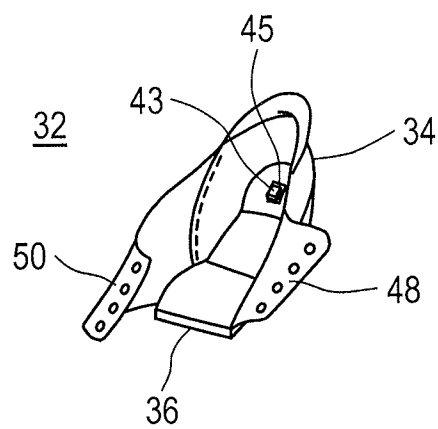


FIG. 1b

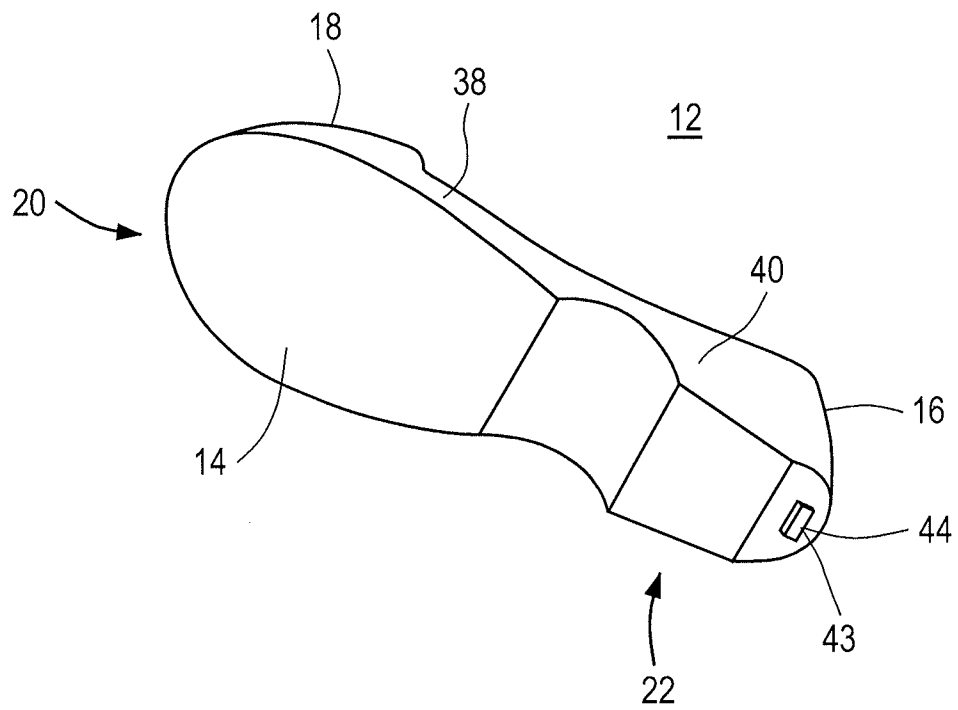


FIG. 1c

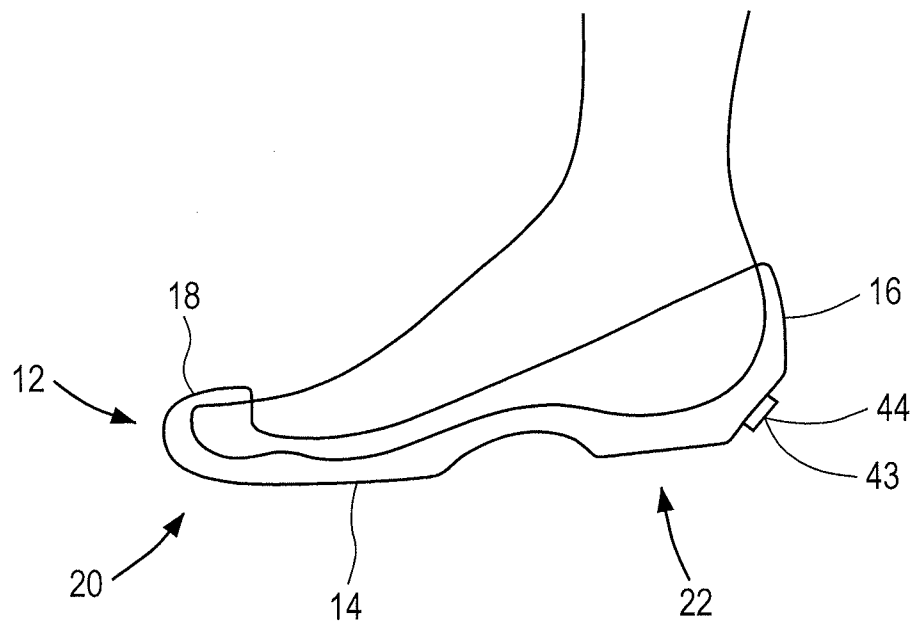


FIG. 1d

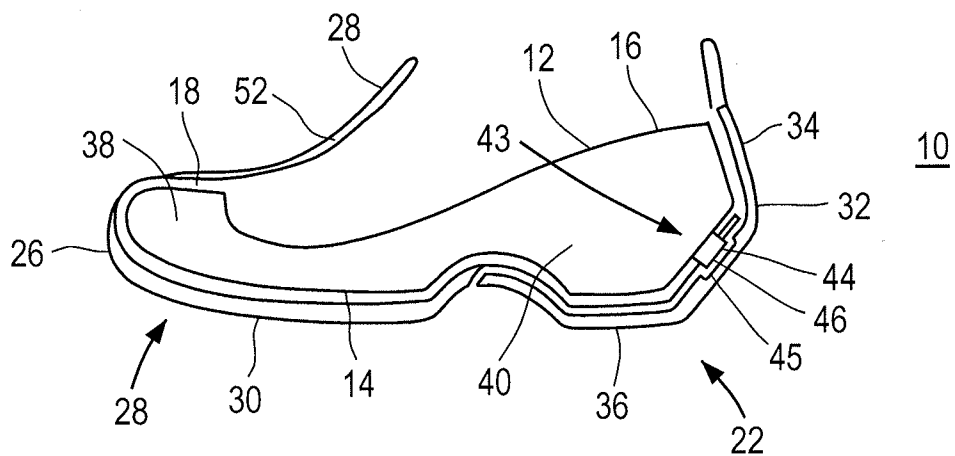


FIG. 1e

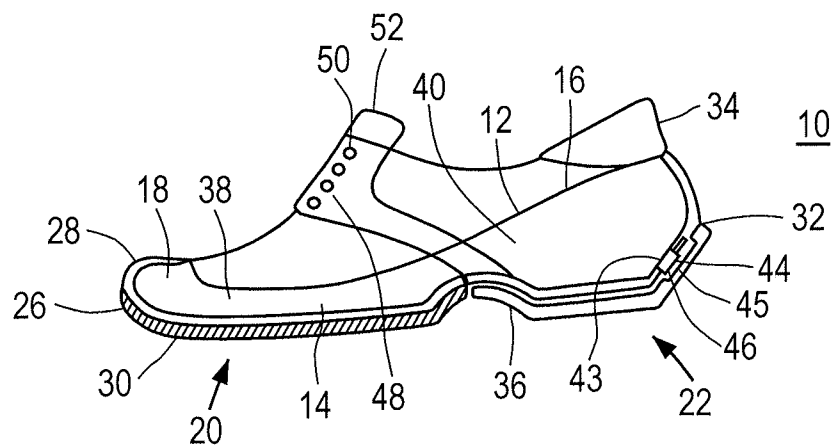


FIG. 1f

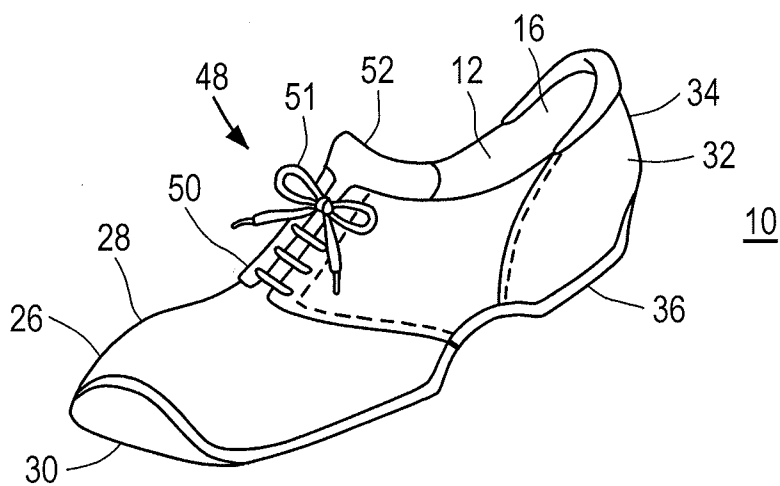


FIG. 1g

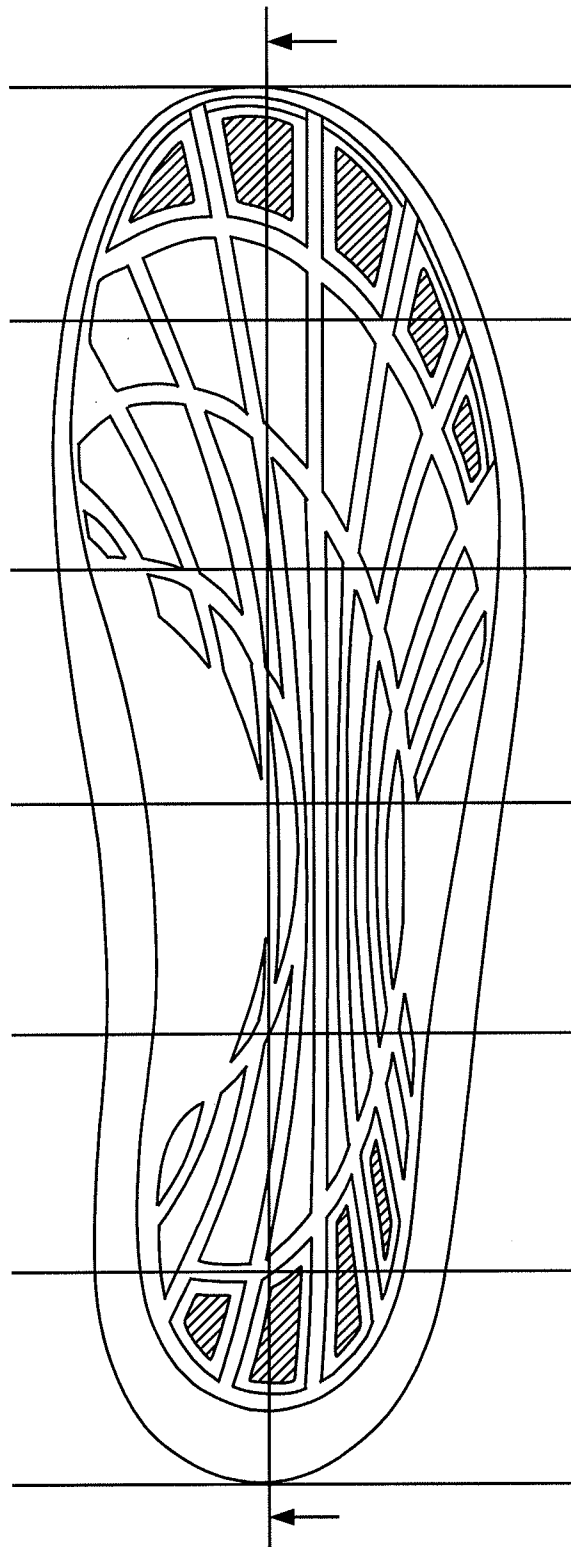


FIG. 2

FIG. 3

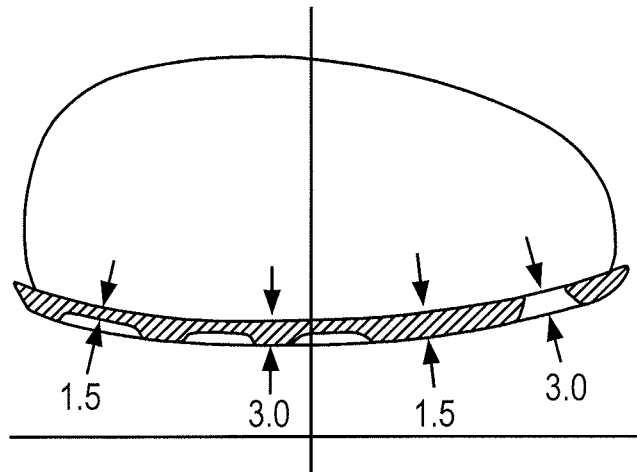


FIG. 4

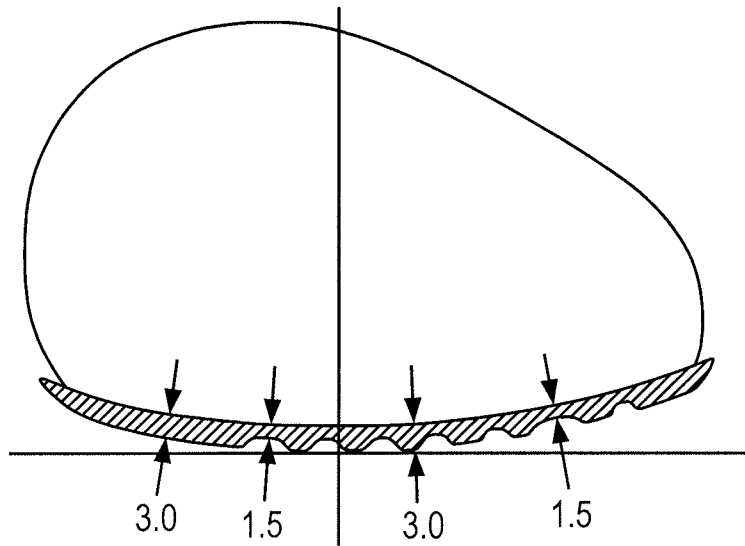
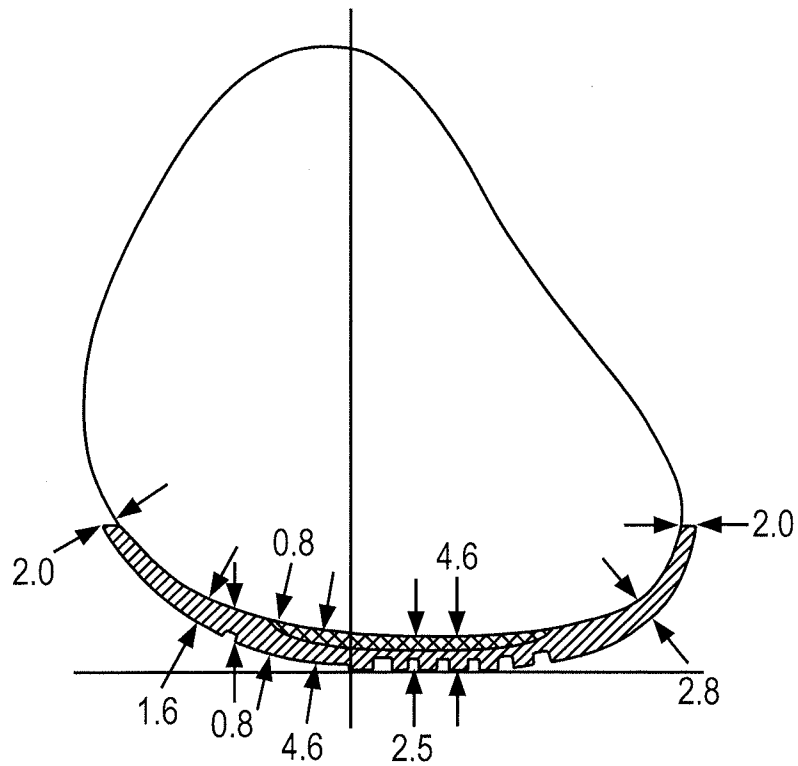


FIG. 5



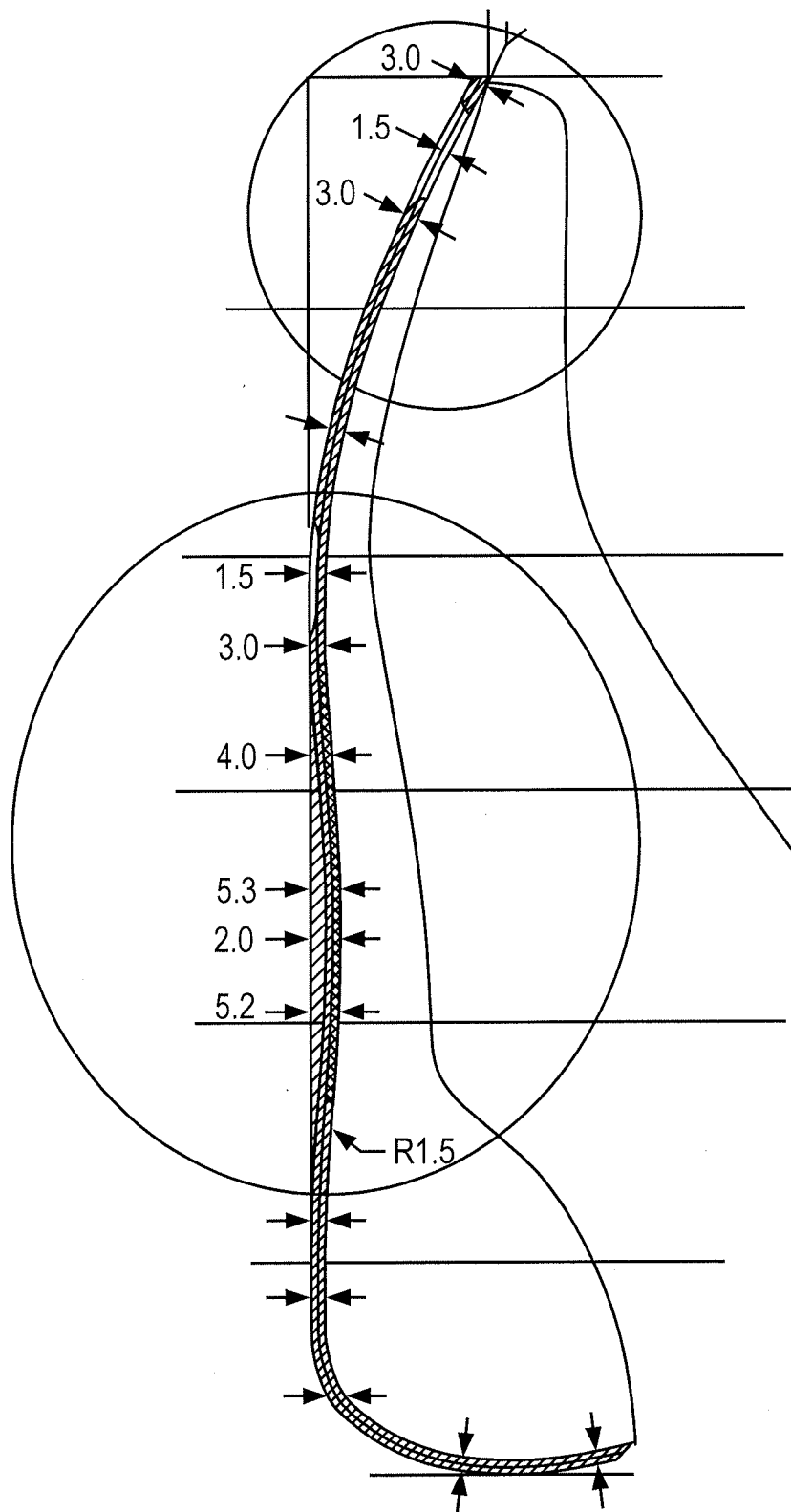


FIG. 6

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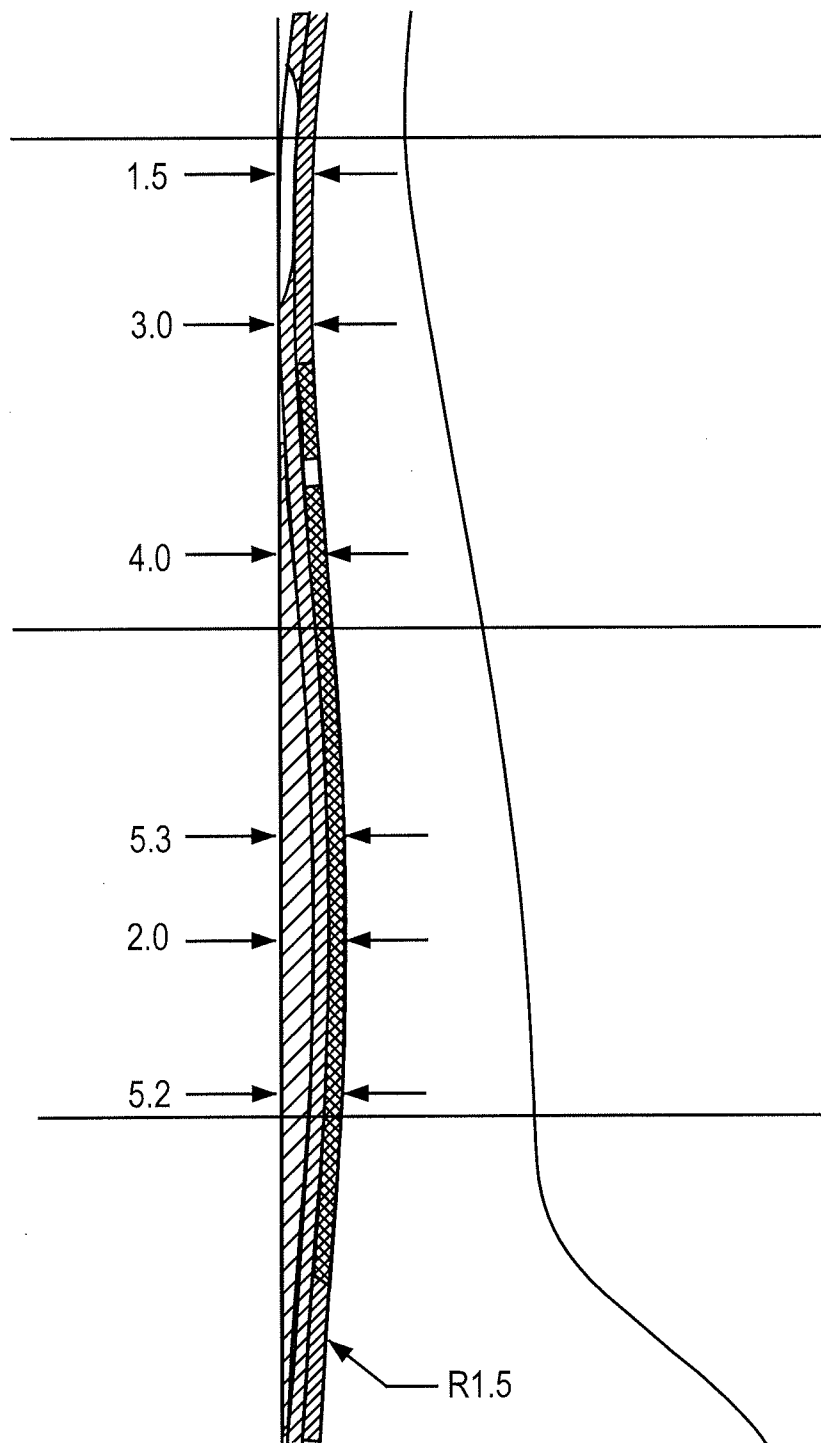


FIG. 7

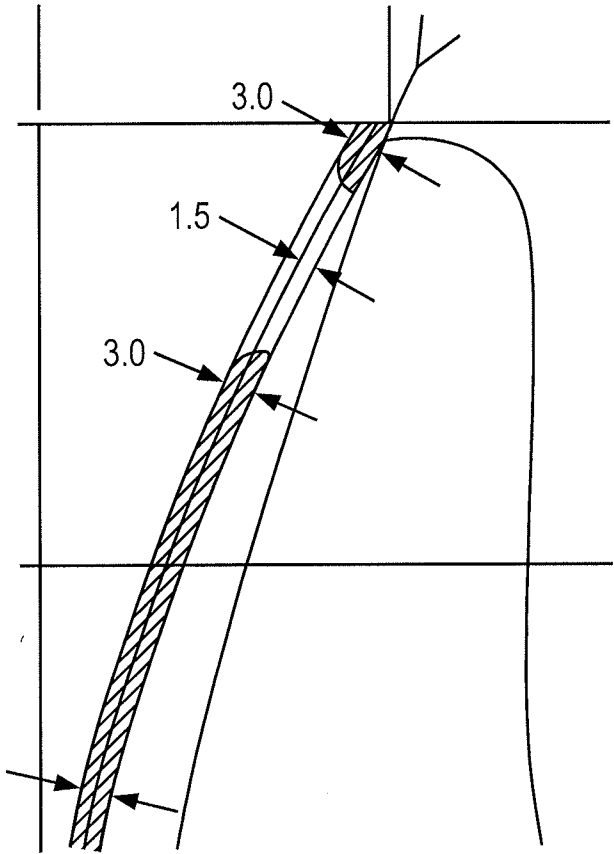


FIG. 8

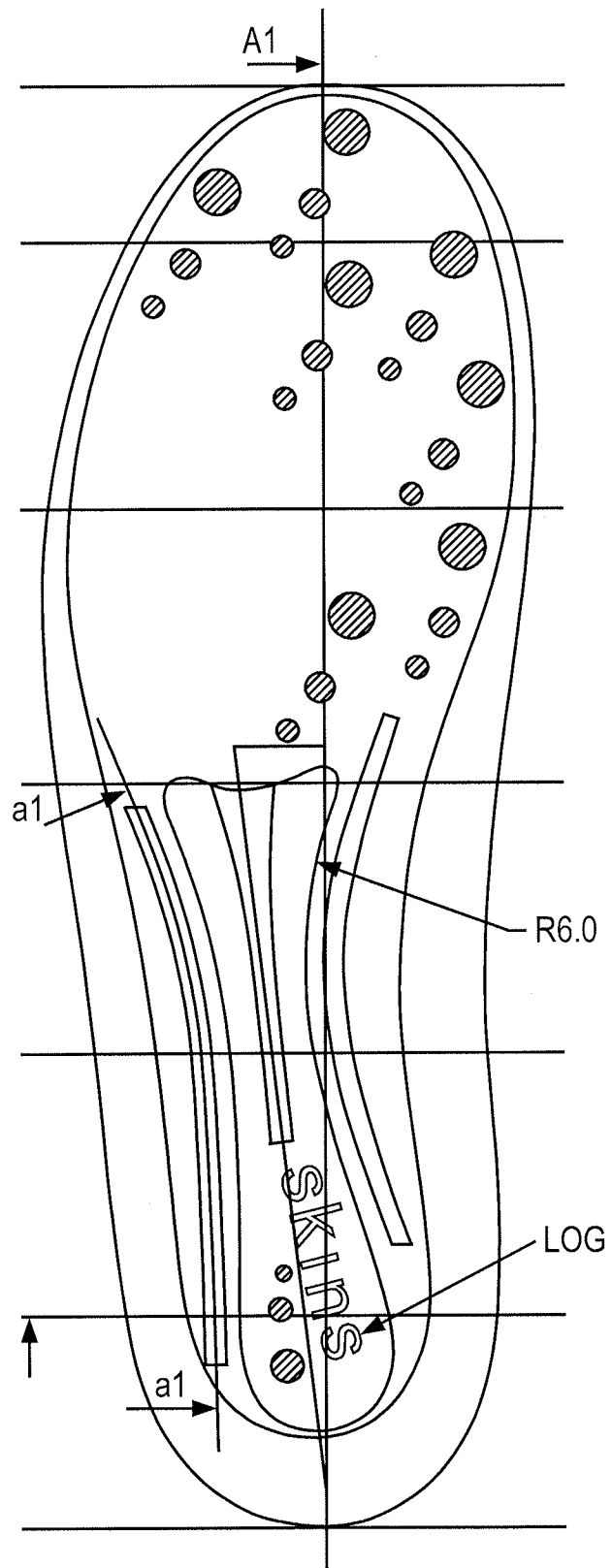


FIG. 9

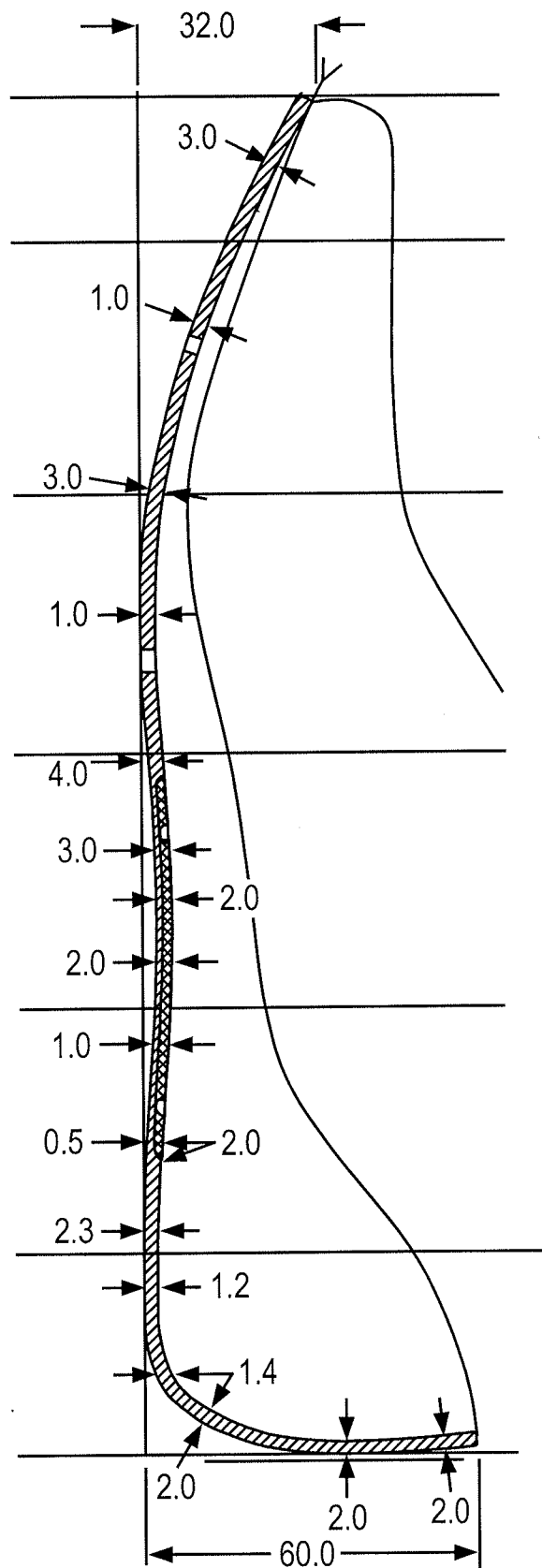


FIG. 10