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

(11) **EP 4 087 435 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
06.11.2024 Bulletin 2024/45

(21) Application number: **21705292.7**

(22) Date of filing: **06.01.2021**

(51) International Patent Classification (IPC):
A43B 3/26 *(2006.01)* ***A43B 13/16*** *(2006.01)*
A43B 23/02 *(2006.01)* ***A43C 11/00*** *(2006.01)*
A43C 11/12 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A43B 13/16; A43B 3/26; A43B 23/027; A43B 23/0295; A43C 11/002; A43C 11/12

(86) International application number:
PCT/US2021/012357

(87) International publication number:
WO 2021/142023 (15.07.2021 Gazette 2021/28)

(54) ARTICLES OF FOOTWEAR WITH ADJUSTABLE DIMENSIONS

SCHUHWERK MIT VERSTELLBAREN ABMESSUNGEN

ARTICLES CHAUSSANTS DE DIMENSIONS RÉGLABLES

(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

(30) Priority: **07.01.2020 US 202062958254 P**

(43) Date of publication of application:
16.11.2022 Bulletin 2022/46

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Description

FIELD

[0001] This disclosure relates generally to articles of footwear and more particularly to articles of footwear with adjustable dimensions.

BACKGROUND

[0002] An article of footwear (also referred to herein as "the article" or "the footwear") typically includes two main components: a sole structure and an upper. The sole structure is configured for supporting the wearer's foot and providing cushioning between the wearer's foot and the ground. The upper is coupled to the sole structure and is configured for securing the wearer's foot to the sole structure.

[0003] US 2013/125420 A1 describes an expandable shoe.

[0004] US 2015/040429 A1 describes an article with tensioning system including driven tensioning members.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005]

FIG. 1 is a perspective view of an exemplary article of footwear (not according to the claimed invention).

FIG. 2 is a side elevation view of a lateral side of the footwear of FIG. 1 (not according to the claimed invention).

FIG. 3 is a side elevation view of a medial side of the footwear of FIG. 1 (not according to the claimed invention).

FIG. 4 is a cross-sectional view of the footwear of FIG. 1, taken along the line 4-4 as depicted in FIG. 2 (not according to the claimed invention).

FIG. 5 is a bottom plan view of the footwear of FIG. 1 (not according to the claimed invention).

FIG. 6 is a side elevation view of another exemplary article of footwear, depicting the footwear in a compressed configuration (not according to the claimed invention).

FIG. 7 is a side elevation view of the footwear of FIG. 6, depicting the footwear in an expanded configuration (not according to the claimed invention).

FIG. 8 is a side elevation view of another exemplary article of footwear, depicting the footwear in a compressed configuration (not according to the claimed invention).

FIG. 9 is a side elevation view of the footwear of FIG. 8, depicting the footwear in an expanded configuration (not according to the claimed invention).

FIG. 10 is a perspective view of another exemplary article of footwear, depicting the footwear in a compressed configuration (not according to the claimed invention).

FIG. 11 is a perspective view of the footwear of FIG. 10, depicting the footwear in an expanded configuration (not according to the claimed invention).

FIG. 12 is a perspective view of another exemplary article of footwear, depicting a forefoot portion of the footwear in a compressed configuration (not according to the claimed invention).

FIG. 13 is a perspective view of the footwear of FIG. 12, depicting the forefoot portion of the footwear in an expanded configuration (not according to the claimed invention).

FIG. 14 is a perspective view of the footwear of FIG. 12, depicting a heel portion of the footwear in the compressed configuration (not according to the claimed invention).

FIG. 15 is a perspective view of the footwear of FIG. 12, depicting the heel portion of the footwear in the expanded configuration (not according to the claimed invention).

FIG. 16 is a bottom plan view of the footwear of FIG. 12, depicting a sole structure of the footwear in the compressed configuration (not according to the claimed invention).

FIG. 17 is a bottom plan view of the footwear of FIG. 12, depicting the sole structure of the footwear in the expanded configuration (not according to the claimed invention).

FIG. 18 is a side elevation view of another exemplary article of footwear, depicting the footwear in a compressed configuration (not according to the claimed invention).

FIG. 19 is a side elevation view of the footwear of FIG. 18, depicting the footwear in an expanded configuration (not according to the claimed invention).

FIG. 20 is a bottom plan view of the footwear of FIG. 18, depicting a sole structure of the footwear in the compressed configuration (not according to the claimed invention).

FIG. 21 is a bottom plan view of the footwear of FIG.

18, depicting the sole structure of the footwear in the expanded configuration (not according to the claimed invention).

FIG. 22 is a perspective view of another exemplary article of footwear, depicting the footwear in a compressed configuration.

FIG. 23 is a perspective view of the footwear of FIG. 22, depicting the footwear in an expanded configuration.

FIG. 24 is a side elevation view of another exemplary article of footwear, depicting the footwear in a compressed configuration (not according to the claimed invention).

FIG. 25 is a side elevation view of the footwear of FIG. 24, depicting the footwear in an expanded configuration (not according to the claimed invention).

DETAILED DESCRIPTION

General Considerations

[0006] The systems and methods described herein, and individual components thereof, should not be construed as being limited to the particular uses or systems described herein in any way. Instead, this disclosure is directed toward all novel and non-obvious features and aspects of the various disclosed embodiments, alone and in various combinations and subcombinations with one another. For example, any features or aspects of the disclosed embodiments can be used in various combinations and subcombinations with one another, as will be recognized by an ordinarily skilled artisan in the relevant field(s) in view of the information disclosed herein. In addition, the disclosed systems, methods, and components thereof are not limited to any specific aspect or feature or combinations thereof, nor do the disclosed things and methods require that any one or more specific advantages be present or problems be solved.

[0007] As used in this application, the singular forms "a," "an," and "the" include the plural forms unless the context clearly dictates otherwise. Additionally, the term "includes" means "comprises." Further, the terms "coupled" or "secured" encompass mechanical and chemical couplings, as well as other practical ways of coupling or linking items together, and do not exclude the presence of intermediate elements between the coupled items unless otherwise indicated, such as by referring to elements, or surfaces thereof, being "directly" coupled or secured. Furthermore, as used herein, the term "and/or" means any one item or combination of items in the phrase.

[0008] As used herein, the term "exemplary" means serving as a non-limiting example, instance, or illustration. As used herein, the terms "e.g.," and "for example," introduce a list of one or more non-limiting embodiments, examples, instances, and/or illustrations.

[0009] Although the operations of some of the disclosed methods are described in a particular, sequential order for convenient presentation, it should be understood that this manner of description encompasses rearrangement, unless a particular ordering is required by specific language set forth below. For example, operations described sequentially may in some cases be rearranged or performed concurrently. Moreover, for the sake of simplicity, the attached figures may not depict the various ways in which the disclosed things and methods can be used in conjunction with other things and methods. Additionally, the description sometimes uses terms like "provide" and "produce" to describe the disclosed methods. These terms are high-level descriptions of the actual operations that are performed. The actual operations that correspond to these terms will vary depending on the particular implementation and are readily discernible by one of ordinary skill in the art having the benefit of this disclosure.

[0010] As used herein, the directional terms (e.g., "upper" and "lower") generally correspond to the orientation of an article of footwear or sole assembly as it is configured to be worn by a wearer. For example, an "upwardly-facing surface" and/or an "upper surface" of a sole assembly refers to the surface oriented in the "superior" anatomical direction (i.e., toward the head of a wearer) when the article of footwear is being worn by the wearer. Similarly, the directional terms "downwardly" and/or "lower" refer to the anatomical direction "inferior" (i.e., toward the ground and away from the head of the wearer). "Front" means "anterior" (e.g., towards the toes), and "rear" means "posterior" (e.g., towards the heel). "Medial" means "toward the midline of the body," and "lateral" means "away from the midline of the body." "Longitudinal axis" refers to a centerline of the article from the heel to toe. Similarly, a "longitudinal length" refers to a length of the article along the longitudinal axis and a "longitudinal direction" refers to a direction along the longitudinal axis.

[0011] As used herein, the term "sole structure" refers to any combination of materials that provides support for a wearer's foot and bears the surface that is in direct contact with the ground or playing surface, such as, for example, a single sole; a combination of an outsole and an inner sole; a combination of an outsole, a midsole, and an inner sole; and a combination of an outer covering, an outsole, a midsole and an inner sole.

[0012] As used herein, the terms "attached" and "coupled" generally mean physically connected or linked, which includes items that are directly attached/coupled and items that are attached/coupled with intermediate elements between the attached/coupled items, unless specifically stated to the contrary.

[0013] As used herein, the terms "fixedly attached" and "fixedly coupled" refer to two components joined in a manner such that the components may not be readily separated from one another without destroying and/or

damaging one or both of the components. Exemplary modalities of fixed attachment may include joining with permanent adhesive, stitches, welding or other thermal bonding, and/or other joining techniques. In addition, two components may be "fixedly attached" or "fixedly coupled" by virtue of being integrally formed, for example, in a molding process. In contrast, the terms "temporarily attached," "temporarily coupled," or "temporarily fixed," refer to two components joined in a manner such that the components can be readily separated from one another to return to their separate, discrete forms without destroying and/or damaging either component. Exemplary modalities of temporary attachment may include removable stitches or other temporary joining techniques.

[0014] As used herein, the terms "articles of footwear" or "articles" mean any type of footwear, including, for example, casual shoes, walking shoes, sneakers, tennis shoes, running shoes, soccer shoes, football shoes, rugby shoes, basketball shoes, baseball shoes, boots, sandals, etc.

[0015] Although the figures may illustrate an article of footwear intended for use on only one foot (e.g., a right foot) of a wearer, one skilled in the art and having the benefit of this disclosure will recognize that a corresponding article of footwear for the other foot (e.g., a left foot) would be a mirror image of the right article of footwear.

[0016] Unless explained otherwise, all technical and scientific terms used herein have the same meaning as commonly understood to one of ordinary skill in the art to which this disclosure belongs. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present disclosure, suitable methods and materials are described below. The materials, methods, and examples are illustrative only and not intended to be limiting. Other features of the disclosure are apparent from the detailed description, abstract, and drawings.

The Disclosed Technology

[0017] The subject matter of the claimed invention is defined in the appended set of claims.

[0018] An article of footwear typically includes two main components: a sole structure and an upper. The sole structure is configured for supporting the wearer's foot and providing cushioning between the wearer's foot and the ground. The upper is coupled to the sole structure and forms a foot-receiving cavity. The upper is configured for securing the wearer's foot to the sole structure and/or can protect the wearer's foot.

[0019] For example, FIGS. 1-5 depict an article of footwear 100, according to one embodiment. The article of footwear 100 can also be referred to as "the article 100" or "the footwear 100." FIG. 1 depicts a perspective view of the footwear 100. FIG. 2 depicts an elevation view of a lateral side of the footwear 100. FIG. 3 depicts an elevation view of a medial side of the footwear 100. FIG. 4 depicts a cross-sectional view of the footwear 100, taken along the line 4-4 as depicted in FIG. 2. FIG. 5 depicts a bottom plan view of the footwear 100.

[0020] Referring to FIG. 1, the footwear 100 comprises a sole structure 102 and an upper 104. The upper 104 is coupled to and extends from the sole structure 102 so as to form a foot-receiving cavity 106 between the sole structure 102 and the upper 104. The foot-receiving cavity 106 can be widened to make it easier for a wearer to insert their foot into the foot-receiving cavity 106. The foot-receiving cavity 106 can also be tightened to secure the wearer's foot within the foot-receiving cavity 106. In some embodiments, the upper 104 can comprise stretchable material to allow the foot-receiving cavity 106 to widen while the wearer is inserting their foot into the foot-receiving cavity 106. In some embodiments, the footwear 100 can comprise a closure system to accommodate widening and/or tightening of the foot-receiving cavity 106. Exemplary closure systems include laces, straps, bands, cables, cords, ratcheting mechanisms, hook-and-loop, etc.

[0021] The footwear 100 may be divided into one or more portions (which may also be referred to as "zones" or "regions"). For example, referring to FIG. 3, the portions can include a forefoot portion 108, a midfoot portion 110, and a heel portion 112. The forefoot portion 108 of the footwear 100 can correspond to anterior portions of a foot, including toes and joints connecting metatarsal bones with phalanx bones of the foot. The midfoot portion 110 of the footwear 100 can correspond with an arch area of the foot. The heel portion 112 of the footwear 100 can correspond with posterior portions of the foot, including a calcaneus bone.

[0022] The footwear 100 can also be divided into a lateral side 114 and a medial side 116, both of which extend through the forefoot portion 108, the midfoot portion 110, and the heel portion 112. For example, FIG. 2 depicts the lateral side 114 of the footwear 100, and FIG. 3 depicts the medial side 116 of the footwear 100.

[0023] Referring now to FIG. 4, the sole structure 102 of the footwear 100 comprises a midsole 118 and an outsole 120. In the illustrated embodiment, the midsole 118 and the outsole 120 are formed as separate components that are fixedly coupled together. This can be accomplished in various ways, including with adhesive, fasteners, stitching, and/or other means for fastening. In other embodiments, the midsole 118 and the outsole 120 can be integrally formed as a unitary component.

[0024] The midsole 118 of the sole structure 102 is configured to be positioned under the wearer's foot. As such, the midsole 118 can, for example, be configured to provide cushioning and support. The midsole 118 can be configured to flex and/or elastically deform as wearer's foot applies pressure upon the midsole 118 and/or as the footwear 100 impacts a ground surface. In some embodiments, the midsole 118 can comprise relatively flexible foam material.

[0025] The outsole 120 of the sole structure 102 is configured to be positioned between the midsole 118 and

the ground surface. Accordingly, the outsole 120 can, for example, be configured to provide increased traction and/or to protect the midsole 118. In some embodiments, the outsole 120 can comprise various traction elements (e.g., nubs, ribs, cleats, lugs, patterns, etc.) configured for engaging one or more types of ground surfaces. In some embodiments, the outsole 120 can comprise a flexible polymeric material (e.g., rubber).

[0026] In some embodiments, the sole structure 102 can also comprise one or more additional components. For example, the sole structure 102 can include one or more cushioning elements (e.g., a fluid-filled capsule such as an airbag) and/or foam member (e.g., a foam pad).

[0027] Referring to FIG. 1, the upper 104 comprises a throat portion 122 separating the lateral side of the upper 104 and the medial side of the upper 104. The upper 104 also comprises a tongue 124 disposed at least partially within the throat portion 122. In other embodiments, the upper 104 can be formed without a throat portion and/or a tongue.

[0028] The upper 104 of the footwear 100 can be formed of various materials. For example, the upper 104 can be formed of one or more of the following materials: textiles, foam, leather, polymers, and/or synthetic leather. In some embodiments, the upper 104 can be formed as a single, unitary component (e.g., by knitting or molding). In other embodiments, the upper 104 can comprise a plurality of components that are coupled together (e.g., by stitching, adhesive, fasteners, etc.).

[0029] The upper 104 can be fixedly coupled to the sole structure 102 in various ways. For example, as depicted in FIG. 4, the upper 104 is attached (e.g., stitched) to a strobel 126, and the strobel 126 is attached to the midsole 118 (e.g., with an adhesive). In other embodiments, the strobel can be omitted, and the upper 104 can be attached to a component of the sole structure 102. In some such embodiments, the upper 104 can be attached to the midsole 118 and/or a cushioning element (e.g., an airbag) of the sole structure 102 via adhesive, stitching, and/or other means for coupling.

[0030] As depicted, the footwear 100 further comprises a sockliner 128 (which may also be referred to as "an insole"). The sockliner 128 is configured to be positioned directly underfoot and is configured to cushion and/or support the wearer's foot. The sockliner 128 can comprise various materials including textile, leather, foam, and/or other types of materials.

[0031] The footwear 100 can be configured in one or more sizes (e.g., U.S. women's size 4-12) and/or widths (e.g., A, B, C, D, E, EE, and/or EEE). The footwear 100 can also be also be configured in other sizing conventions (e.g., UK, EUR, cm etc.) and/or sizes (e.g., U.S. men's size 1-18).

[0032] Under normal circumstances, the dimensions of a wearer's feet can change throughout the day and/or over the course of an activity. Such changes in dimensions can include slight swelling (i.e., expansion) of the feet. Typical footwear can accommodate slight variation in the dimensions of the wearer's feet. In some circumstances, however, the dimensions of the wearer's feet may change relatively more drastically. These circumstances may include pregnancy, growth, injury, and/or other circumstances or conditions that result in changes in the dimensions of a person's feet. Such circumstances may result in the dimensions of a wearer's feet changing beyond the tolerance afforded by a single size of footwear. Thus, a person experiencing these circumstances or conditions may be required to purchase and/or frequently change sizes of footwear. This can be particularly problematic during circumstances in which a person's feet change sizes relatively quickly (e.g., throughout the day and/or during a pregnancy).

[0033] Unlike typical footwear, the dimensions of the articles of footwear disclosed herein can adjust and/or or be adjusted to account for relatively large changes and/or fluctuation in the dimensions of a wearer's feet. Accordingly, the disclosed footwear can, for example, improve comfort. It can also reduce the need for multiple sizes and/or increase the range of feet that can be accommodated by a single size of footwear.

Exemplary Embodiments of the Disclosed Technology

[0034] FIGS. 6-7 depict an article of footwear 200, according to one embodiment. The footwear 200 comprises a sole structure 202 and an upper 204. The upper 204 is coupled to the sole structure 202, and the footwear comprises a foot-receiving cavity 206 between the sole structure 202 and the upper 204. The dimensions of the foot-receiving cavity 206 can be adjusted by moving the upper 204 between a compressed configuration and an expanded configuration. FIG. 6 depicts the upper 204 in the compressed configuration, and FIG. 7 depicts the upper 204 in the expanded configuration. The volume of the foot-receiving cavity 206 is greater when the upper 204 is in the expanded configuration than when the upper 204 is in the compressed configuration.

[0035] Referring to FIG. 7, the upper 204 of the footwear 200 comprises an expandable panel 208 disposed between and coupled to a first portion 210 of the upper 204 and a second portion 212 of the upper 204. The first and second portions 210, 212 generally divide the upper 204 in an inferior/superior direction (e.g., down/up as depicted), with the first portion 210 being disposed superior relative to the second portion 212. In this manner, the expanded configuration of the upper 204 primarily increases the height (e.g., up/down as depicted) of the foot-receiving cavity 206, though the length (e.g., left/right as depicted) and/or the width (e.g., into/out of the page as depicted) of the foot-receiving cavity 206 may also increase at least slightly.

[0036] The first portion 210 and the second portion 212 of the upper 204 are coupled together by an adjustable closure mechanism (e.g., a zipper). The closure mechanism is movable between a closed configuration and an

open configuration. When the closure mechanism is in a closed configuration (FIG. 6), the first portion 210 and the second portion 212 of the upper 204 are held adjacent to each other by the closure mechanism. Also, the expandable panel 208 is hidden in the closed configuration. When the closure mechanism is in an open configuration (FIG. 7), the closure mechanism releases the first portion 210 and the second portion 212 of the upper 204 from each other such that they can separate. The expandable panel 208 is exposed when the first portion 210 and the second portion 212 separate.

[0037] Separating the first portion 210 and the second portion 212 expands the upper 204, which expands the dimensions of the foot-receiving cavity 206 of the footwear 200. The dimensions of the first portion 210, the second portion 212, and/or expandable panel 208 can be selected to determine the dimensions of the foot-receiving cavity 206 in the compressed configuration and/or the expanded configuration. For example, configuring the upper 204 with a relatively wide expandable panel provides greater expansion of the foot-receiving cavity 206 from the compressed configuration to the expanded configuration than when the upper 204 is configured with a relative narrow expandable panel.

[0038] In some embodiments, the expandable panel 208 can be formed of a material comprising one or more of the same or similar properties (e.g., stretchabilily) as the first and second portions 210, 212 of the upper 204. In other embodiments, the expandable panel 208 can be formed of a material comprising one or more different properties than the first and second portions 210, 212 of the upper 204. For example, the first and second portions 210, 212 can be formed of a relatively less stretchy material than the expandable panel 208. As another example, the first and second portions 210, 212 can be formed of a relatively more stretchy material than the expandable panel 208.

[0039] In the illustrated embodiment, the closure mechanism comprises a zipper with a slider 214, a first plurality of teeth 216, and a second plurality of teeth 218. The first plurality of teeth 216 is coupled to the first portion 210 of the upper 204, and the second plurality of teeth 218 is coupled to the second portion 212 of the upper 204. The slider 214 is movably coupled to the teeth 216, 218. The slider 214 is configured to move the teeth 216, 218 to an engaged state as the slider 214 passes over the teeth 216, 218 in a first direction and to move the teeth 216, 218 to a disengaged state as the slider passes over the teeth 216, 218 in a second direction. For example, FIG. 6 depicts the slider 214 on a lateral side of the upper 204, which corresponds to the engaged state of the teeth 216, 218 and the compressed configuration of the upper 204. FIG. 7 depicts the slider 214 (hidden from view) on a medial side of the upper 204, which corresponds to the disengaged sate of the teeth 216, 218 and the expanded configuration of the upper 204.

[0040] Various other types of zipper mechanisms can also be used. For example, a zipper comprising a slider and a plurality of rails (as opposed to teeth) on which the slider is adjustable coupled can be used.

[0041] In lieu of or in additional to a zipper, various other types of closure mechanism can be used to selectively couple the first and second portions 210, 212 of the upper together. For example, the closure mechanism can include one or more hook-and-loop fasteners, snap buttons, magnets, and/or other mechanism adapted selectively couple the first and second portions 210, 212 of the upper together.

[0042] In the illustrated embodiment, the first portion 210 and the second portion 212 of the upper 204 are directly coupled together (e.g., integrally formed) at the heel portion of the upper 204. In other embodiments, the first section and the second section can be discrete components that are not directly coupled together, as further described below.

[0043] The expandable panel can be positioned at various other locations on the upper relative to the location of the expandable panel 208 in the illustrated embodiment. For example, in some embodiments, the expandable panel can be positioned farther in the inferior direction (e.g., toward the sole structure) or farther in the superior direction (e.g., away from the sole structure) than the expandable panel 208 depicted in the illustrated embodiment. Additionally or alternatively, the expandable panel can extend over a greater or lesser portion of the upper than the expandable panel 208 depicted in the illustrated embodiment. For example, in some embodiments, the expandable panel can be disposed on only one side (e.g., a lateral side) of the upper.

[0044] The footwear 200 allows a wearer to selectively adjust the dimensions of the foot-receiving cavity 206 as desired. For example, a wearer can position the upper 204 of the footwear 200 in the compressed configuration (e.g., at the beginning of a pregnancy). As the wearer's foot expands (e.g., later in pregnancy), the wearer can move the upper 204 of the footwear 200 from the compressed configuration to the expanded configuration. As such, the footwear 200 provides adjustability that can accommodate changes to the wearer's foot that is beyond the adjustability of typical footwear.

[0045] FIGS. 8-9 depict an article of footwear 300, according to another embodiment. The footwear 300 comprises a sole structure 302 and an upper 304. The upper 304 is coupled to the sole structure 302, and the footwear comprises a foot-receiving cavity 306 between the sole structure 302 and the upper 304. The dimensions of the foot-receiving cavity 306 can be adjusted by moving the upper 304 between a compressed configuration and an expanded configuration. FIG. 8 depicts the upper 304 in the compressed configuration, and FIG. 9 depicts the upper 304 in the expanded configuration. The volume of the foot-receiving cavity 306 is less when the upper 304 is in the compressed configuration than when the upper 204 is in the expanded configuration.

[0046] The footwear 300 is configured generally similar to the footwear 200 in that it comprises an expandable

panel 308 (FIG. 9) disposed between a first portion 310 and a second portion 312 of the upper 304. The first and second portions 310, 312 divide the upper 304 in an inferior/superior direction (i.e., down/up as depicted), with the first portion 310 being disposed superior relative to the second portion 312. In this manner, the expanded configuration of the upper 304 primarily increases the height (e.g., up/down as depicted) of the foot-receiving cavity 306, though the length (e.g., left/right as depicted) and/or the width (e.g., into/out of the page as depicted) of the foot-receiving cavity 306 may also increase at least slightly.

[0047] One difference between the footwear 300 and the footwear 200 is that the first and second portions 310, 312 are not coupled directly together and that the expandable panel 308 and a closure mechanism (e.g., a zipper 314) extend around the entire upper 304. This can, for example, allow the upper 304 of the footwear 300 to expand relatively more uniformly around the entire footwear 300, whereas the upper 204 tends to pivot or splay apart at the heel portion of the footwear 200 where the first and second portions 210, 212 of the upper 204 join.

[0048] As noted above, the first and second portions 310, 312 of the upper 304 are coupled together by the adjustable closure mechanism (e.g., the zipper 314). The closure mechanism is movable between a closed configuration and an open configuration. When the closure mechanism is in a closed configuration (FIG. 8), the first and second portions 310, 312 of the upper 304 are held adjacent to each other by the closure mechanism. Also, the expandable panel 308 is hidden in the closed configuration. When the closure mechanism is in an open configuration (FIG. 9), the closure mechanism releases the first and second portions 310, 312 of the upper 304 from each other such that they can separate. The expandable panel 308 is exposed when the first and second portions 310, 312 separate.

[0049] The expandable panel can be positioned at various other locations on the upper relative to the location the expandable panel 308 in the illustrated embodiment. For example, in some embodiments, the expandable panel can be positioned farther in the inferior direction (e.g., toward the sole structure) or farther in the superior direction (e.g., away from the sole structure) than the expandable panel 308 depicted in the illustrated embodiment.

[0050] FIGS. 10-11 depict an article of footwear 400, according to yet another embodiment. The footwear 400 comprises a sole structure 402 and an upper 404. The upper 404 is coupled to the sole structure 402, and the footwear comprises a foot-receiving cavity 406 between the sole structure 402 and the upper 404. The dimensions of the foot-receiving cavity 406 can be adjusted by moving the upper 404 between a compressed configuration and an expanded configuration. FIG. 10 depicts the upper 404 in the compressed configuration, and FIG. 11 depicts the upper 404 in the expanded configuration. The volume of the foot-receiving cavity 406 is greater when the upper 404 is in the expanded configuration than when the upper 404 is in the compressed configuration.

[0051] The footwear 400 is configured generally similar to the footwear 200 in that it comprises an expandable panel 408 (FIG. 11) disposed between a first portion 410 and a second portion 412 of the upper 404. One difference between the footwear 400 and the footwear 200 is that the first and second portions 410, 412 are oriented in the anterior/posterior direction, with the first portion 410 being disposed anterior relative to the second portion 412. In this manner, the expanded configuration of the upper 404 primarily increases the length of the foot-receiving cavity 406, though the width of the foot-receiving cavity 406 may also increase at least slightly (e.g., at the location of the expandable panel 408).

[0052] The first and second portions 410, 412 of the upper 404 are coupled together by an adjustable closure mechanism (e.g., a zipper 414). The closure mechanism is movable between a closed configuration and an open configuration. When the closure mechanism is in a closed configuration (FIG. 10), the first and second portions 410, 412 of the upper 404 are held adjacent to each other by the closure mechanism. Also, the expandable panel 408 is hidden in the closed configuration. When the closure mechanism is in an open configuration (FIG. 11), the closure mechanism releases the first and second portions 410, 412 of the upper 404 from each other such that they can separate. The expandable panel 408 is exposed when the first and second portions 410, 412 separate.

[0053] The expandable panel can be positioned at various other locations on the upper relative to the location of the expandable panel 408 that is depicted in the illustrated embodiment. For example, in some embodiments, the expandable panel can be positioned at locations farther in the anterior direction (e.g., toward the toe) or farther in the posterior direction (e.g., toward the heel) than the expandable panel 408 depicted in the illustrated embodiment. Additionally or alternatively, the expandable panel can extend over a greater or lesser portion of the upper than the expandable panel 408 depicted in the illustrated embodiment. For example, in the illustrated embodiment the expandable panel 408 extends along the entire inferior/superior height of the upper 404 (i.e., from an inferior position where the upper meets the sole structure (which can also be referred to as "the bite line") to the superior edge of the upper 404). In other embodiments, the expandable panel can extend along only a portion of the height of the upper (e.g., from the superior edge of the upper 404 to an intermediate location between the superior edge and the sole structure 402).

[0054] FIGS. 12-17 depict an article of footwear 500, according to yet another embodiment. The footwear 500 comprises a sole structure 502 and an upper 504. The upper 504 is coupled to the sole structure 502, and the footwear comprises a foot-receiving cavity 506 between the sole structure 502 and the upper 504. The dimensions of the foot-receiving cavity 506 can be adjusted by moving the sole structure 502 and the upper 504 between a

compressed configuration and an expanded configuration. The width of the foot-receiving cavity 506 is greater when the sole structure 502 and the upper 504 are in the expanded configuration than when the sole structure 502 and the upper 504 are in the compressed configuration. As a result, the footwear 500 can accommodate a larger foot in the expanded configuration than in the compressed configuration.

[0055] FIG. 12 depicts a forefoot portion of the upper 504 in the compressed configuration, and FIG. 13 depicts the forefoot portion of the upper 504 in the expanded configuration. FIG. 14 depicts a heel portion of the upper 504 in the compressed configuration, and FIG. 15 depicts the heel portion of the upper 504 in the expanded configuration. FIG. 16 depicts the sole structure 502 in the compressed configuration, and FIG. 17 depicts the sole structure 502 in the expanded configuration.

[0056] As depicted in FIGS. 13, 15, and 17, the footwear 500 comprises an expandable panel 508 disposed between a lateral side portion 510 and a medial side portion 512 of the footwear 500. The expandable panel 508 extends from a forefoot portion of the upper 504 adjacent to the tongue to a toe portion of the upper, continues from the toe portion of the sole structure 502 to the heel portion of the sole structure, and continues to the collar of the upper. In some embodiments, the expandable panel 508 can extend over the tongue of the footwear.

[0057] The lateral side portion 510 and the medial side portion 512 of the footwear 500 can be selectively coupled together by a closure mechanism (e.g., a zipper 514). The closure mechanism can be moved between a closed state (e.g., FIGS. 12, 14, and 16) and an open state (e.g., FIGS. 13, 15, and 17). With the closure mechanism in the closed state, the zipper 514 retains a medial edge of the lateral side portion 510 adjacent to a lateral edge of the medial side portion 512. In the closed state, the expandable panel 508 collapses and is concealed. With the closure mechanism in the open state, the lateral side portion 510 and the medial side portion 512 can move away from each other, thereby exposing the expandable panel 508. In the open state, the width (i.e., medial/lateral) dimension of the footwear 500 increases by the exposed width of the expandable panel 508. Thus, the volume of the foot-receiving cavity 506 increases when the footwear is in the expanded configuration. In this manner, the footwear 500 can accommodate a relatively broad range of foot widths by adjusting the footwear between the compressed configuration and the expanded configuration.

[0058] The expandable panel 508 can comprise various widths. For example, configuring the footwear 500 with a relatively wide expandable panel 508 allows for a greater change in width between the compressed configuration and the expanded configuration.

[0059] In some embodiments, the expandable panel 508 can comprise bias and/or the footwear 500 can comprise one or more biasing members (e.g., springs, bands, etc.) configured to bias the footwear 500 to the expanded configuration. In other words, the width of the footwear 500 is essentially binary (i.e., fully expanded or fully compressed). In such embodiments, the zipper 514 can provide sufficient opposing force to overcome the bias and therefore can retain the footwear 500 in the compressed configuration.

[0060] In other embodiments, the expandable panel 508 can comprise bias and/or the footwear 500 can comprise one or more biasing members (e.g., springs, bands, etc.) configured to bias the footwear 500 to the compressed configuration. In such embodiments, the wearer's foot can provide sufficient opposing force to overcome the bias and therefore can retain the footwear 500 in the expanded configuration. This configuration can, for example, allow the footwear 500 to adjust to various intermediate widths of the wearer's foot between a minimum width (i.e., the width when the zipper 514 is in the closed state) and a maximum width (i.e., the width when the zipper 514 is in the open state and the expandable panel 508 is fully expanded). In other words, the width of the footwear 500 is non-binary. The intermediate widths occur when the zipper 514 is in the open state and the expandable panel 508 is expanded somewhat but is not fully expanded. The biasing force toward the compressed state can be low enough that the footwear does not put so much pressure on the sides of the wearer's foot that the footwear is uncomfortable and can be high enough that the footwear fits snugly against the sides of the wearer's foot.

[0061] In the illustrated embodiment, the expandable panel 508 evenly bisects the lateral side portion 510 and the medial side portion 512 of the footwear 500 in the width dimension. In other embodiments, the expandable panel can be offset toward the lateral side or the medial side so that the lateral and medial side portions 510, 512 are unevenly divided.

[0062] FIGS. 18-21 depict an article of footwear 600, according to yet another embodiment. The footwear 600 comprises a sole structure 602 and an upper 604. The upper 604 is coupled to the sole structure 602, and the footwear comprises a foot-receiving cavity 606 between the sole structure 602 and the upper 604. The dimensions of the foot-receiving cavity 606 can be adjusted by moving the sole structure 602 and the upper 604 between a compressed configuration and an expanded configuration. The length of the foot-receiving cavity 606 is greater when the sole structure 602 and the upper 604 are in the expanded configuration than when the sole structure 602 and the upper 604 are in the compressed configuration. As such, the footwear 600 can accommodate a larger foot in the expanded configuration that in the compressed configuration.

[0063] FIG. 18 depicts a lateral side portion of the footwear 600 in the compressed configuration, and FIG. 19 depicts the lateral side portion of the footwear 600 in the expanded configuration. FIG. 20 depicts the sole structure 602 in the compressed configuration, and FIG. 21 depicts the sole structure 602 in the expanded configu-

ration.

[0064] As depicted in FIGS. 19 and 21, the footwear 600 comprises an expandable panel 608 disposed between an anterior portion 610 (or front portion) and a posterior portion 612 (or back portion) of the footwear 600. The expandable panel 608 extends from a superior-most edge of a lateral side of the upper 604, across the sole structure 602, and to a superior-most edge of a medial side of the upper 604.

[0065] The anterior portion 610 and the posterior portion 612 of the footwear 600 can be selectively coupled together by a closure mechanism (e.g., a zipper 614). The closure mechanism can be moved between a closed state (e.g., FIGS. 18 and 20) and an open state (e.g., FIGS. 19 and 21). With the closure mechanism in the closed state, the zipper 614 retains a posterior edge of the anterior portion 610 adjacent to an anterior edge of the posterior portion 612. In the closed state, the expandable panel 608 collapses and is concealed. With the closure mechanism in the open state, the anterior portion 610 and the posterior portion 612 can move away from each other, thereby exposing the expandable panel 608. In the open state, the length (i.e., anterior/posterior) dimension of the footwear 600 increases by the exposed width of the expandable panel 608. Thus, the volume of the foot-receiving cavity 606 increases when the footwear is in the expanded configuration. In this manner, the footwear 600 can accommodate a relatively broad range of foot lengths by adjusting the footwear 600 between the compressed configuration and the expanded configuration.

[0066] The expandable panel 608 can comprise various lengths. For example, configuring the footwear 600 with a relatively wide expandable panel 608 allows for a greater change in length between the compressed configuration and the expanded configuration.

[0067] In some embodiments, the expandable panel 608 can comprise bias and/or the footwear 600 can comprise one or more biasing members (e.g., springs, bands, etc.) configured to bias the footwear 600 to the expanded configuration. In other words, the length of the footwear 600 is essentially binary (i.e., fully expanded or fully compressed). In such embodiments, the zipper 614 can provide sufficient opposing force to overcome the bias and therefore can retain the footwear 600 in the compressed configuration.

[0068] In other embodiments, the expandable panel 608 can comprise bias and/or the footwear 600 can comprise one or more biasing members (e.g., springs, bands, etc.) configured to bias the footwear 600 to the compressed configuration. In such embodiments, the wearer's foot can provide sufficient opposing force to overcome the bias and therefore can retain the footwear 600 in the expanded configuration. This configuration can, for example, allow the footwear 600 to adjust to various intermediate lengths of the wearer's foot between a minimum length (i.e., the length when the zipper 614 is in the closed state) and a maximum length (i.e., the length when the zipper 614 is in the open state and the expandable panel 608 is fully expanded). In other words, the length of the footwear 600 is non-binary. The intermediate lengths occur when the zipper 614 is in the open state and the expandable panel 608 is expanded to some extent but not fully expanded. The biasing force toward the compressed state can be low enough that the footwear does not put so much pressure on the wearer's toes or heel that the footwear is uncomfortable and can be high enough that the footwear fits snugly against the wearer's foot.

[0069] In the illustrated embodiment, the expandable panel 608 essentially bisects the anterior portion 610 and the posterior portion 612 of the footwear 600 evenly in the length dimension. In other embodiments, the expandable panel can be offset in the anterior direction or the posterior dimension such that the anterior and posterior portions 610, 612 are unevenly divided.

[0070] It should be noted that in embodiments not belonging to the claimed invention a sole structure can comprise a recessed channel configured for receiving an expandable panel and/or closure mechanism. The recessed channel can, for example, prevent (or reduce the likelihood of) the closure mechanism from contacting the ground surface during use. This can help prevent the closure mechanism from becoming damaged.

[0071] FIGS. 22-23 depict an article of footwear 700. The footwear 700 comprises a sole structure 702 and an upper 704. The upper 704 is coupled to the sole structure 702, and the footwear 700 comprises a foot-receiving cavity 706 between the sole structure 702 and the upper 704. The dimensions of the foot-receiving cavity 706 can be adjusted by moving the upper 704 between a compressed configuration (FIG. 22) and an expanded configuration (FIG. 23). The volume of the foot-receiving cavity 706 is greater when the upper 704 is in the expanded configuration than when the upper 704 is in the compressed configuration. Accordingly, the footwear 700 can accommodate a larger foot in the expanded configuration than in the compressed configuration.

[0072] To allow for expansion, the upper 704 of the footwear 700 comprises a gusset 708. The footwear 700 also comprises a cord 710 (or strand) that is coupled to the upper 704 and/or the gusset 708. The cord 710 can be tensioned to collapse the gusset 708, as depicted in FIG. 22. The cord 710 can be slackened to allow the gusset 708 to expand, as depicted in FIG. 23.

[0073] In some embodiments (not according to the claimed invention), the gusset 708 is integrally formed with the upper 704. This can be accomplished, for example, by forming the upper 704 and the gusset 708 from a knitted or a woven material. The cord 710 can also be integrally formed with the upper 704 and/or the gusset 708 in some embodiments. According to the claimed invention, the gusset 708 and the upper 704 are formed as separate components, and the upper 704 comprises an expandable opening in which the gusset 708 is disposed. In such embodiments, the upper 704 and the gus-

set 708 can be coupled together in various ways (e.g., stitching, adhesive, fasteners, and/or other means for coupling). The cord 710 can also be formed as a separate component from the upper 704 and/or the gusset 708. In such embodiments, the cord 710 can be coupled to the upper 704 and/or the gusset in various ways (e.g., eyelets, fasteners, etc.).

[0074] In particular implementations, the gusset 708 can be configured so as to fold or lay in an organized manner in the compressed configuration and/or the expanded configuration. For example, the gusset 708 can comprise folds, pleats, and/or can be shape-set. This can, for example, reduce bunching of the gusset 708, thereby improving comfort and/or appearance of the footwear 700.

[0075] In some embodiments, the footwear 700 can comprise a locking member 712 configured to selectively secure the cord 710 relative to the upper 704 and/or the gusset 708. In this manner, the locking member 712 allows the wearer to adjust the tension in the cord 710 and/or the expansion of the gusset 708 and then secure the configuration by restricting relative movement between the cord 710, the gusset 708, and/or the upper 704. In some examples, the locking member 712 can be a cord lock.

[0076] In some embodiments, the upper 704 can be biased to the expanded configuration. In other embodiments, the upper 704 can be biased to the compressed configuration. This can be accomplished, for example, by shape-setting the material of the upper 704 and/or the gusset 708.

[0077] In the illustrated embodiment, the gusset 708 is disposed on a lateral side portion of the footwear 700. In other embodiments, the gusset can be disposed on a medial side portion of the footwear. The gusset can also be oriented in various ways so as to adjust the height, width, and/or length of the upper.

[0078] The gusset 708 comprises a generally elliptical shape in the expanded configuration.

[0079] FIGS. 24-25 depict an article of footwear 800. The footwear 800 comprises a sole structure 802, an upper 804, and an adjustment mechanism. The upper 804 is coupled to the sole structure 802, and the footwear 800 comprises a foot-receiving cavity 806 between the sole structure 802 and the upper 804. The dimensions of the foot-receiving cavity 806 can be adjusted by via the adjustment mechanism between a compressed configuration (FIG. 24) and an expanded configuration (FIG. 25). The volume of the foot-receiving cavity 806 is greater in the expanded configuration than the compressed configuration. Accordingly, the footwear 800 can accommodate a larger foot in the expanded configuration than in the compressed configuration.

[0080] The adjustment mechanism of the footwear 800 comprises a cable 808 and a plurality of cable guides 810. The cable guides 810 are secured to the upper 804 and/or the sole structure 802. The cable guides 810 can be configured for engaging the cable 808 and for allowing the cable 808 to move with low friction relative to the cable guides. For example, the cable guides 810 can be eyelets, hooks, posts, and/or other type of member which the cable 808 can adjustably move through and/or around.

[0081] The cable 808 is fixedly coupled at one end to the cable guides 810. For example, in the illustrated embodiment, the cable 808 is fixedly coupled to the right-most cable guide. In this manner, the right-most cable guide 810 can be referred to as "an anchor." The cable 808 extends between the cable guides 810 and a lace member 812 in an undulating or zig-zag pattern. In other embodiments, the cable guides 810 and/or the cable 808 can be configured in various other patterns. The cable 808 is interconnected with the lace member 812, and the cable 808 is movable relative to the lace member 812 and the cable guides 810 (except the right-most cable guide). As such, adjusting tension in the cable 808 also adjusts tension in the lace member 812, and vice versa. In this manner, the cable 808 and/or lace member 812 can be used to adjust the dimensions of the upper 804 and the foot-receiving cavity 806. For example, FIG. 24 depicts a first configuration (i.e., a compressed configuration) in which the cable 808 is relatively taut. This draws the lace member 812 downwardly and thereby compresses the upper and reduces the volume of the foot-receiving cavity 806. In some instances, the upper 804 at least slightly gathers or bunches up as a result of the compression applied to the upper 804 via the cable 808. As desired, a wearer can slacken the cable 808, which allows the upper 804 and the foot-receiving cavity to expand. Accordingly, the footwear 800 can accommodate feet of various dimensions and can allow a wearer to adjust the footwear as their foot changes (e.g., throughout the day and/or over the course of a pregnancy.

[0082] In some embodiments, the adjustment mechanism of the footwear 800 can also comprise a locking mechanism configured for securing the cable 808 relative to the cable guides 810, which thereby secures the upper 804 in a desired configuration (e.g., expanded and/or compressed). For example, the locking mechanism can comprise a cord lock. In some embodiments, one or more of the cable guides 810 (e.g., the left-most cable guide as illustrated) can comprise a locking mechanism. In this manner, the left-most cable guide 810 (e.g., as illustrated) can be referred to as "a lock." Additionally or alternatively, a locking mechanism can be a structure configured to secure the "tail" of the cable 808 to the upper 804. For example, the tail of the cable can comprise a hook configured for engaging the upper 804 (and/or some structure coupled to the upper such as eyelets or loops). In other embodiments, the cable can be releasably and/or adjustably coupled to the upper in various other ways (e.g., magnets, snap buttons, etc.)

[0083] In some instances, the footwear can comprise a plurality of adjustment mechanisms with cables and cable guides.

[0084] Any feature(s) of any example(s) disclosed

herein can be combined with or isolated from any feature(s) of any example(s) disclosed herein, unless otherwise stated. For example, in some embodiments, an article of footwear can comprise a plurality of expandable panels, including one or more expandable panels in the upper and/or one or more expandable panels in the sole structure. As one example, any feature of the footwear 200 can be combined with the footwear 400, or vice versa. As another example, any feature of the footwear 500 can be combined with the footwear 600, or vice versa. As yet another example, any feature of the footwear 700 can be combined with the footwear 800, or vice versa.

[0085] In view of the many possible embodiments to which the principles of the disclosure may be applied, it should be recognized that the illustrated embodiments are only examples and should not be taken as limiting the scope of the disclosure.

Claims

1. An article of footwear (700) comprising:

   a sole structure (702); and
   an upper (704) coupled to the sole structure (702) so as to form a foot-receiving cavity (706) therebetween, wherein the upper (704) comprises a gusset (708), wherein the gusset (708) is movable between a compressed configuration and an expanded configuration, wherein one or more dimensions of the foot-receiving cavity (706) are larger when the gusset (708) is in the expanded configuration than when the gusset (708) is in the compressed configuration,
   wherein the gusset (708) and the upper (704) are formed as separate components, and the upper (704) comprises an expandable opening in which the gusset 708 is disposed,
   wherein the gusset (708) is disposed either on a medial side of the article of footwear (700) or a lateral side of the article of footwear (700),
   wherein the gusset (708) comprises a generally elliptical shape in the expanded configuration,
   wherein the article of footwear (700) further comprises a cord (710) that is coupled to the upper (704) and/or the gusset (708), and
   wherein the cord (710) is suitable to be tensioned to collapse the gusset (708), and the cord (710) is suitable to be slackened to allow the gusset (708) to expand.

2. The article of footwear (700) of claim 1, wherein the gusset (708) comprises folds to reduce bunching of the gusset (708) when in the compressed configuration.

Patentansprüche

1. Schuhwerk (700), umfassend:

   eine Sohlenstruktur (702); und
   ein Oberteil (704), das mit der Sohlenstruktur (702) verbunden ist, um dazwischen einen fußaufnehmenden Hohlraum (706) zu bilden, wobei das Oberteil (704) einen Zwickel (708) umfasst, wobei der Zwickel (708) zwischen einer komprimierten Konfiguration und einer expandierten Konfiguration beweglich ist, wobei eine oder mehrere Abmessungen des fußaufnehmenden Hohlraums (706) größer sind, wenn der Zwickel (708) in der expandierten Konfiguration ist, als wenn der Zwickel (708) in der komprimierten Konfiguration ist,
   wobei der Zwickel (708) und das Oberteil (704) als separate Komponenten ausgebildet sind und das Oberteil (704) eine dehnbare Öffnung aufweist, in der der Zwickel (708) angeordnet ist,
   wobei der Zwickel (708) entweder auf einer medialen Seite des Schuhwerks (700) oder einer lateralen Seite des Schuhwerks (700) angeordnet ist,
   wobei der Zwickel (708) eine allgemein elliptische Form in der expandierten Konfiguration aufweist,
   wobei das Schuhwerk (700) weiter eine Kordel (710) umfasst, die mit dem Oberteil (704) und/oder dem Zwickel (708) verbunden ist, und wobei die Kordel (710) geeignet ist, gespannt zu werden, um den Zwickel (708) zusammenzuziehen, und die Kordel (710) geeignet ist, gelockert zu werden, damit sich der Zwickel (708) ausdehnen kann.

2. Schuhwerk (700) nach Anspruch 1, wobei der Zwickel (708) Falten aufweist, um eine Bündelung des Zwickels (708) in der komprimierten Konfiguration zu verringern.

Revendications

1. Article chaussant (700) comprenant :

   une structure de semelle (702) ; et
   une tige (704) couplée à la structure de semelle (702) de manière à former une cavité de réception de pied (706) entre elles, dans lequel la tige (704) comprend un gousset (708), dans lequel le gousset (708) est mobile entre une configuration comprimée et une configuration dilatée, dans lequel une ou plusieurs dimensions de la cavité de réception de pied (706) sont plus grandes lorsque le gousset (708) est dans la configuration dilatée à lorsque le gousset (708) est

dans la configuration comprimée,
dans lequel le gousset (708) et la tige (704) sont formés en tant que composants séparés, et la tige (704) comprend une ouverture pouvant être dilatée dans laquelle le gousset 708 est disposé,
dans lequel le gousset (708) est disposé sur un côté médial de l'article chaussant (700) ou un côté latéral de l'article chaussant (700),
dans lequel le gousset (708) comprend une forme généralement elliptique dans la configuration dilatée,
dans lequel l'article chaussant (700) comprend en outre un cordon (710) qui est couplé à la tige (704) et/ou au gousset (708), et
dans lequel le cordon (710) convient à être mis sous tension pour replier le gousset (708), et le cordon (710) convient à être relâché pour permettre au gousset (708) de se dilater.

2. Article chaussant (700) selon la revendication 1, dans lequel le gousset (708) comprend des plis pour réduire le fait de faire des plis du gousset (708) lorsqu'il est dans la configuration comprimée.

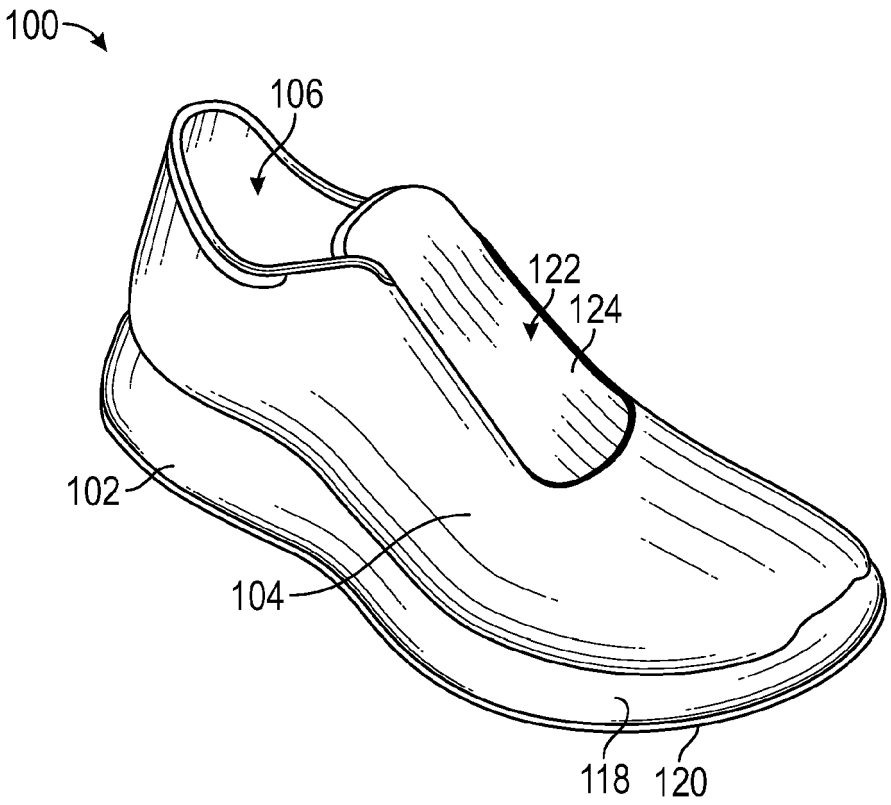

FIG. 1

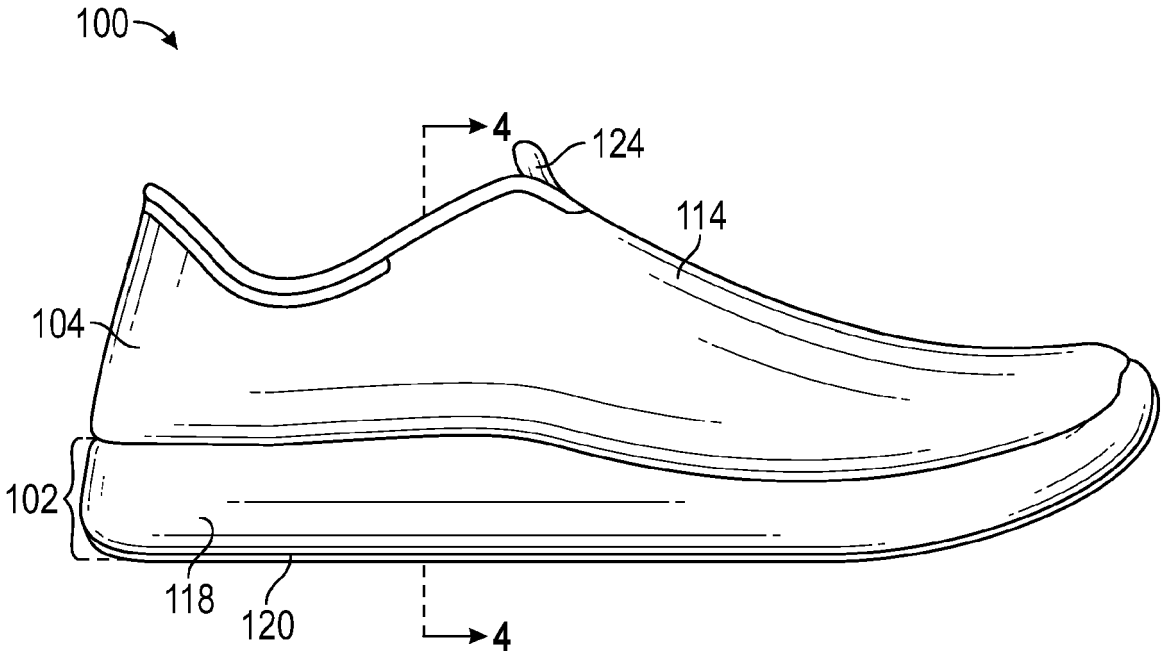

FIG. 2

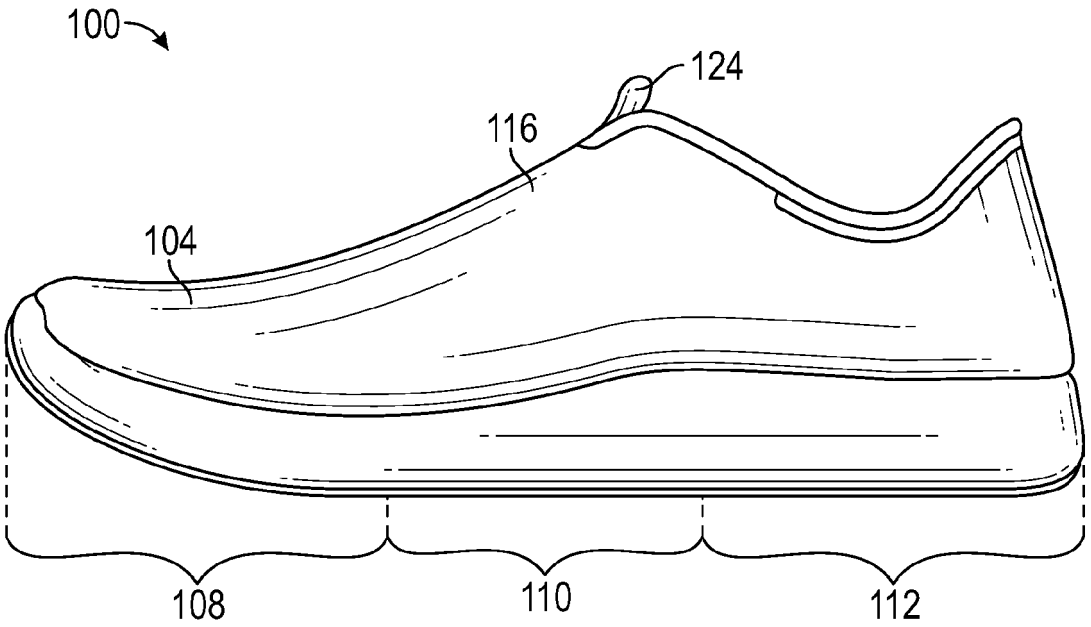
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FIG. 3

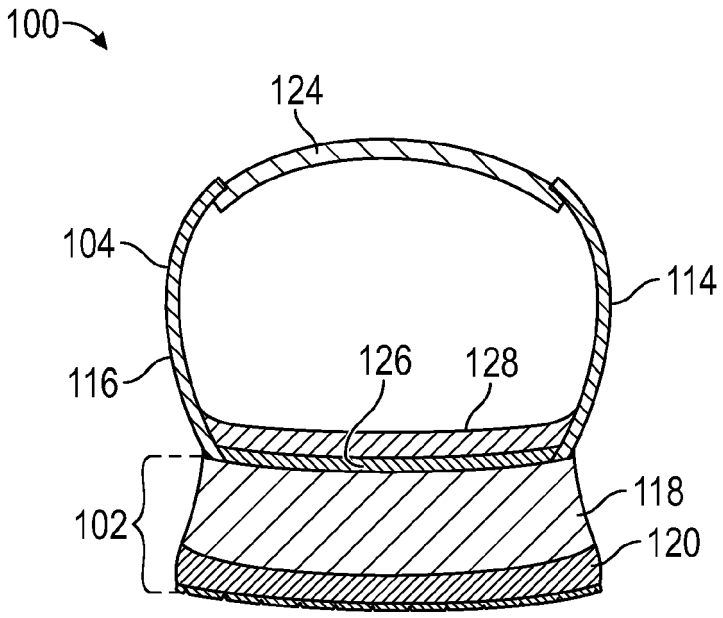
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FIG. 4

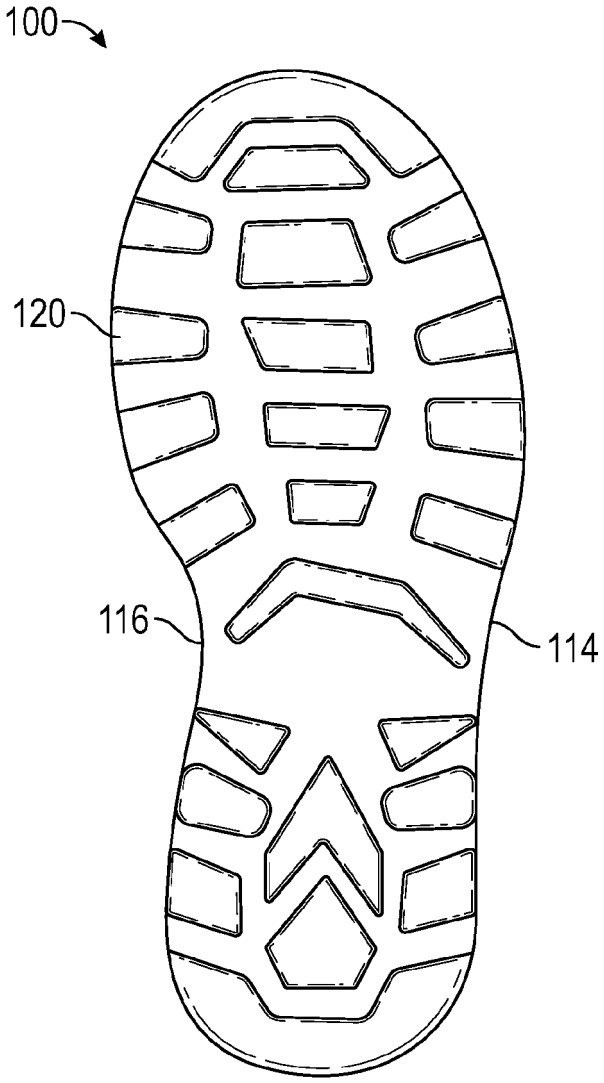

FIG. 5

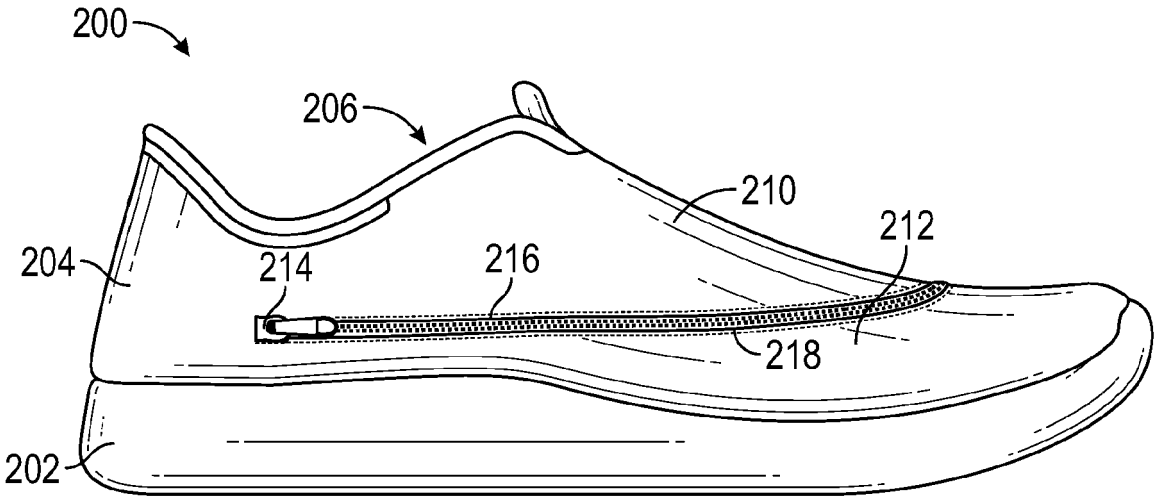

FIG. 6

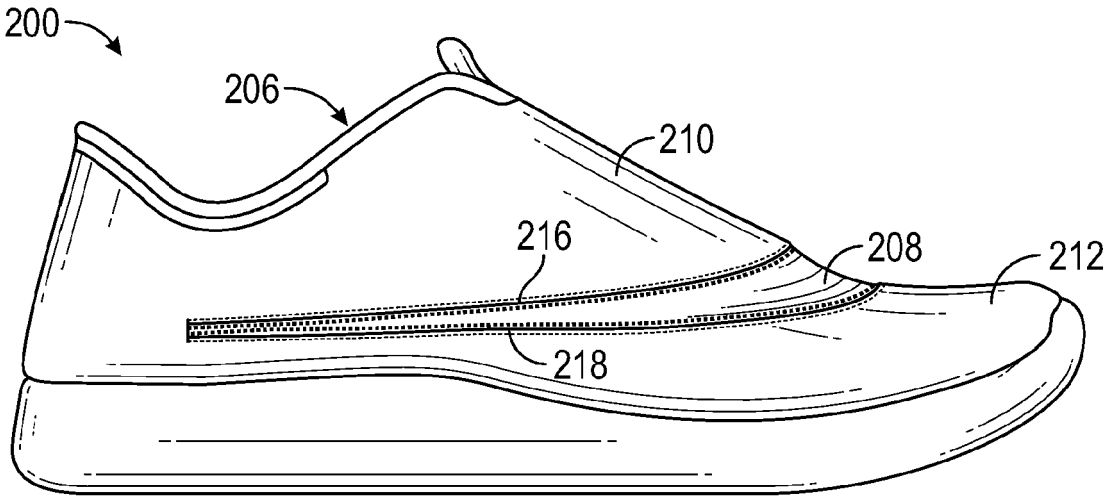

FIG. 7

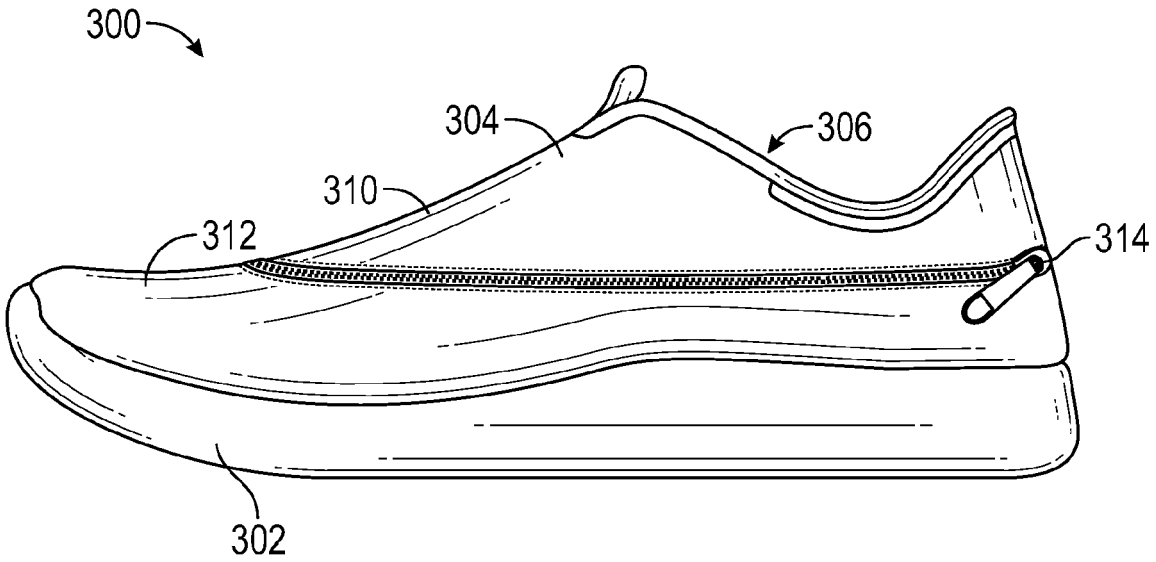

FIG. 8

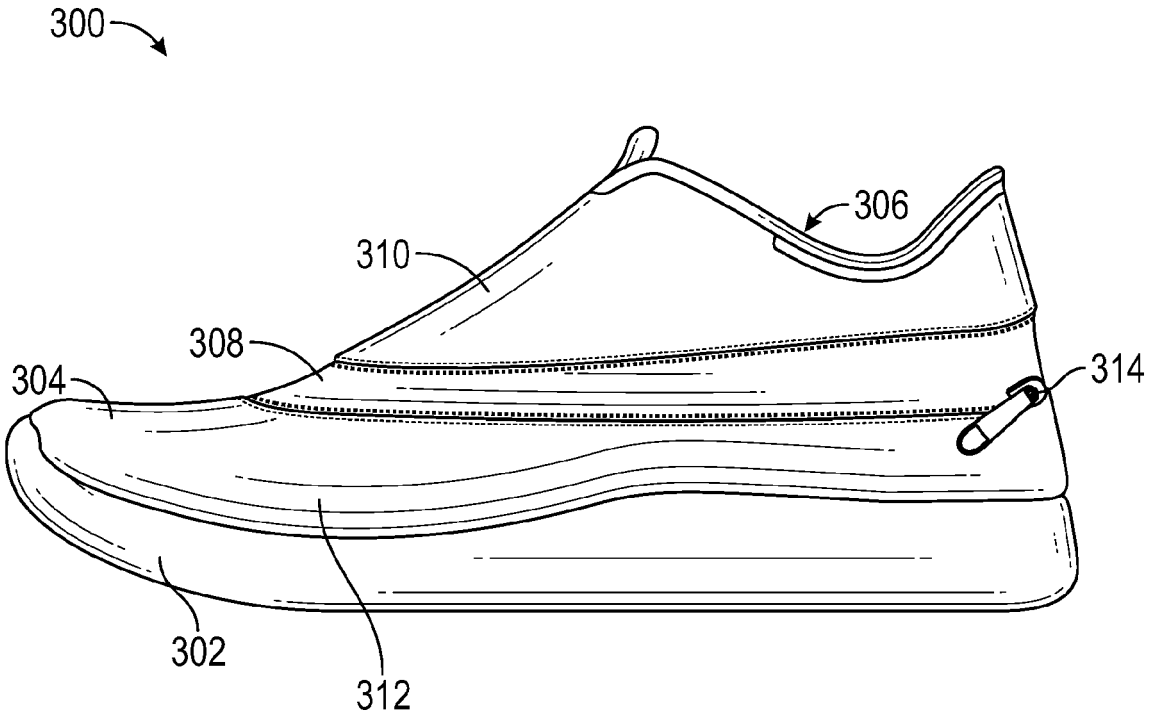

FIG. 9

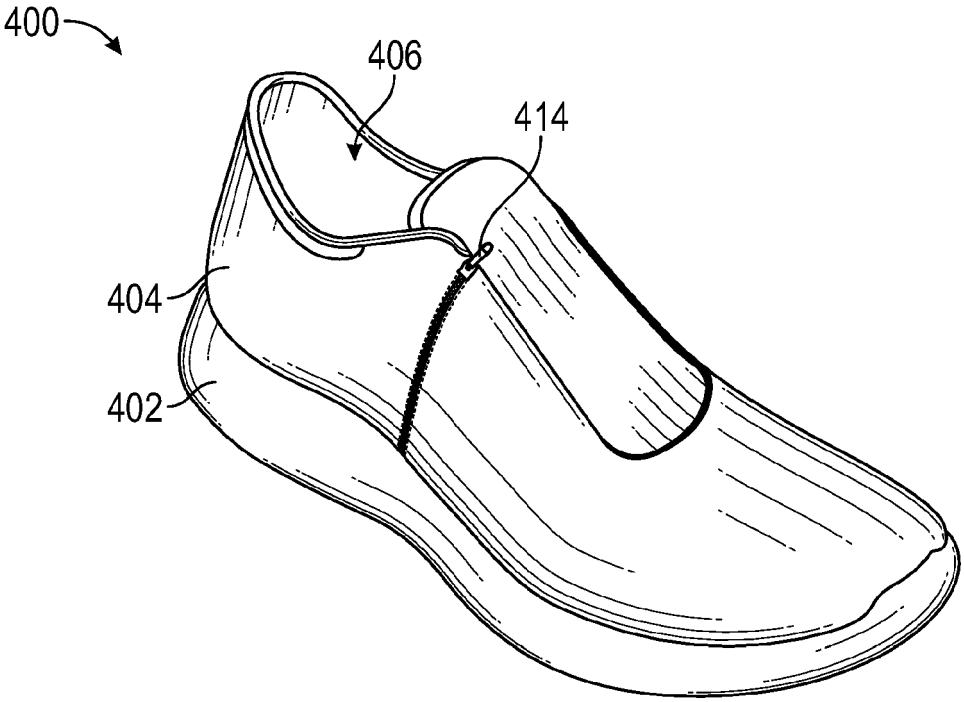

FIG. 10

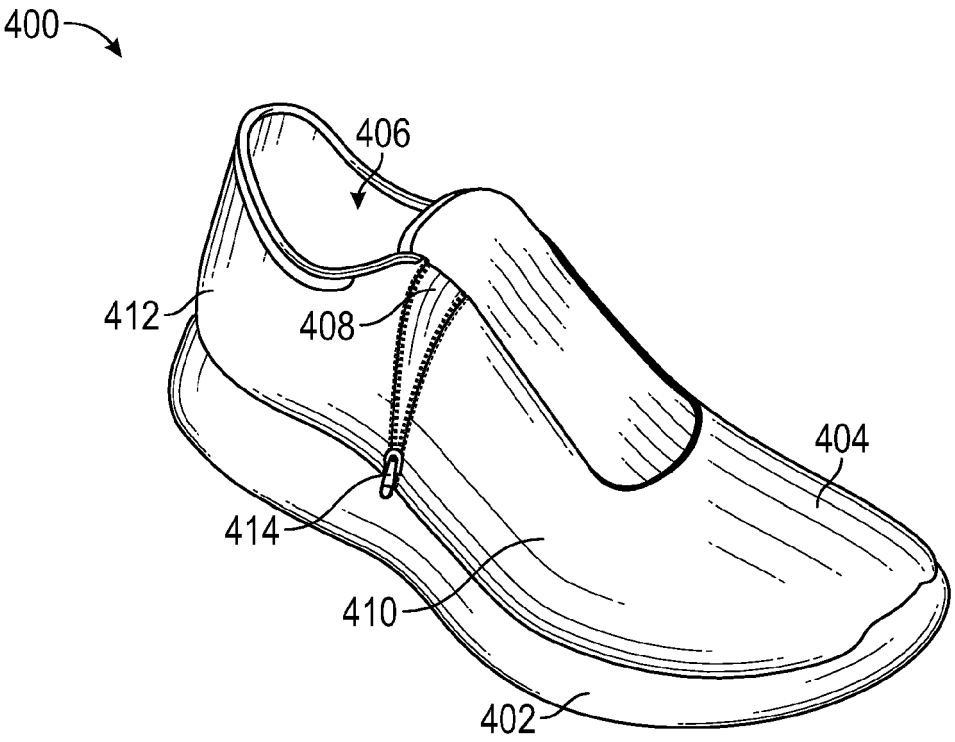

FIG. 11

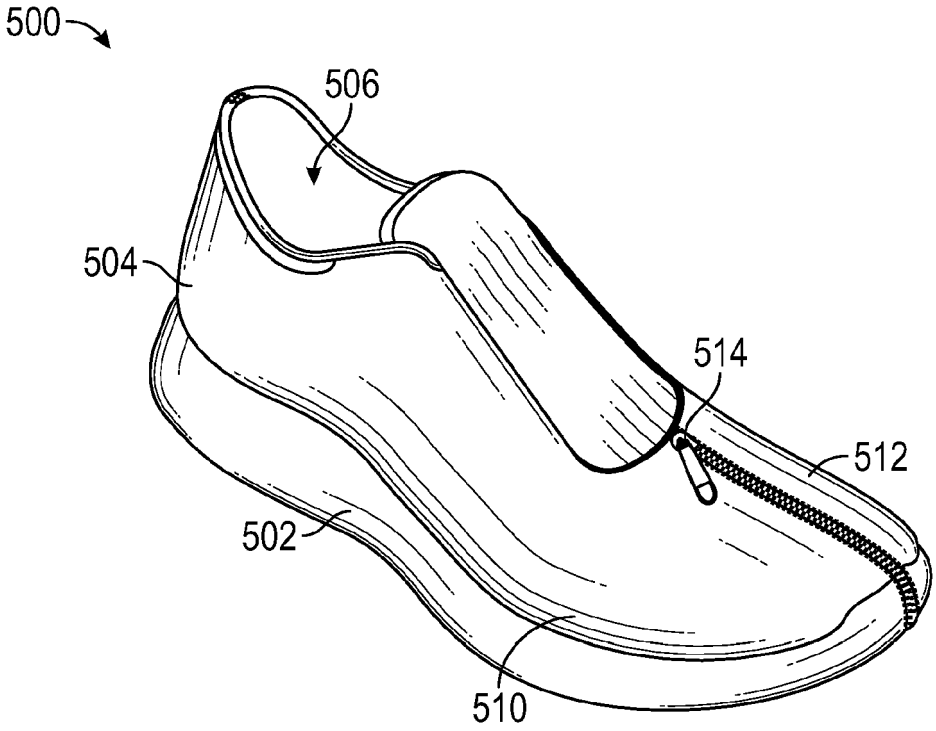

FIG. 12

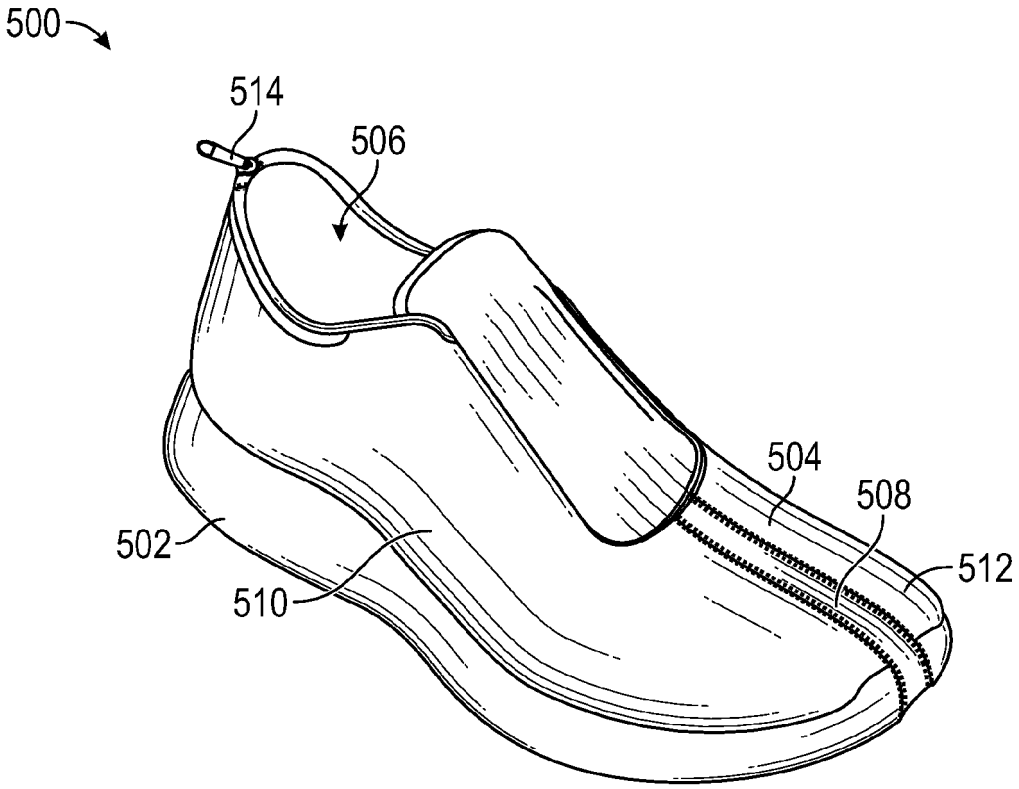

FIG. 13

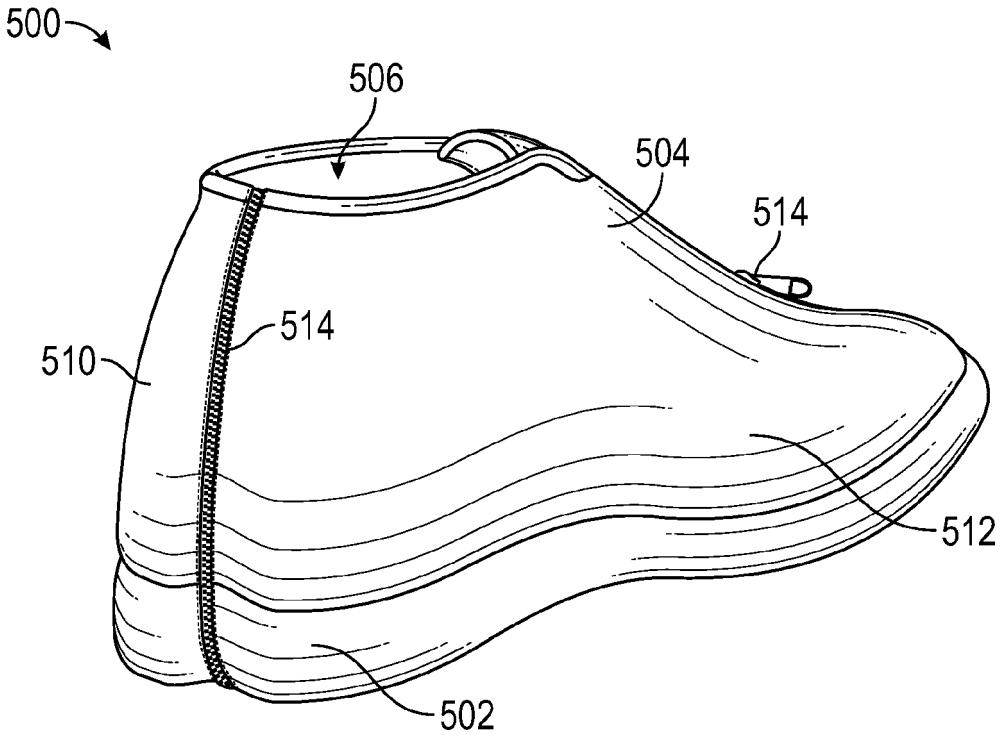

FIG. 14

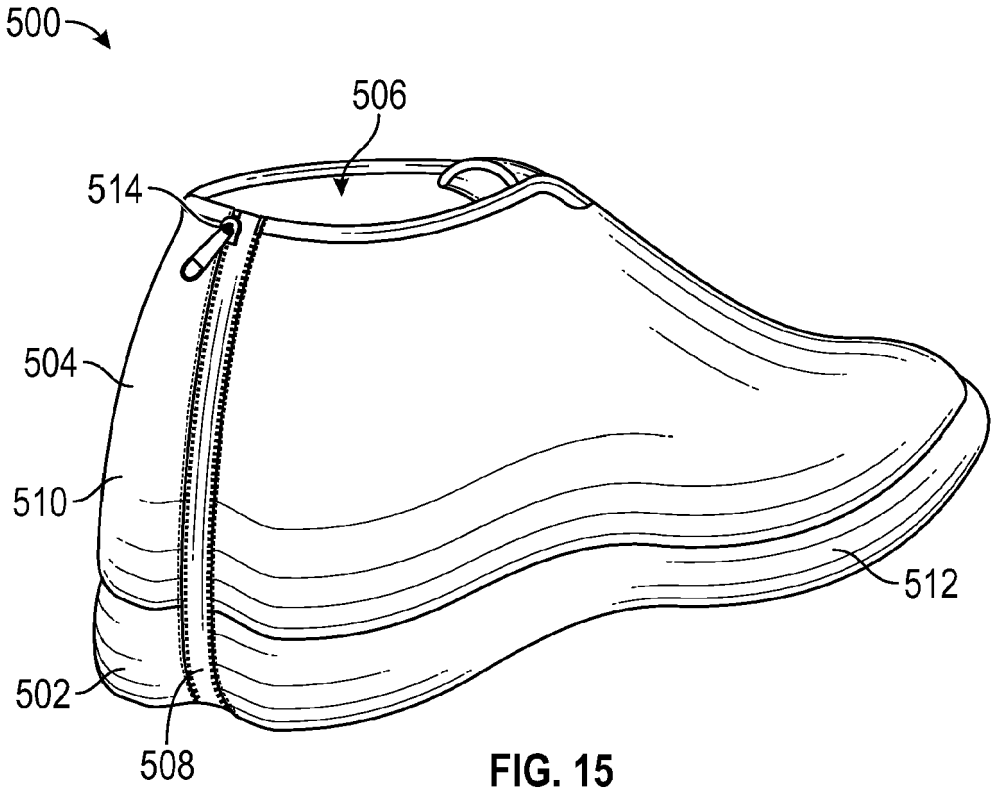

FIG. 15

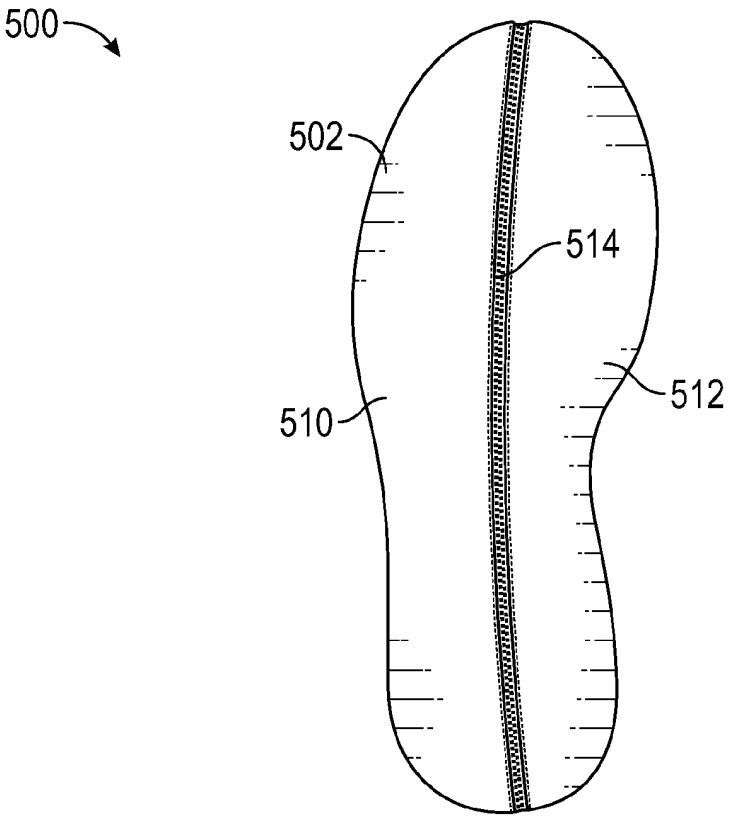

FIG. 16

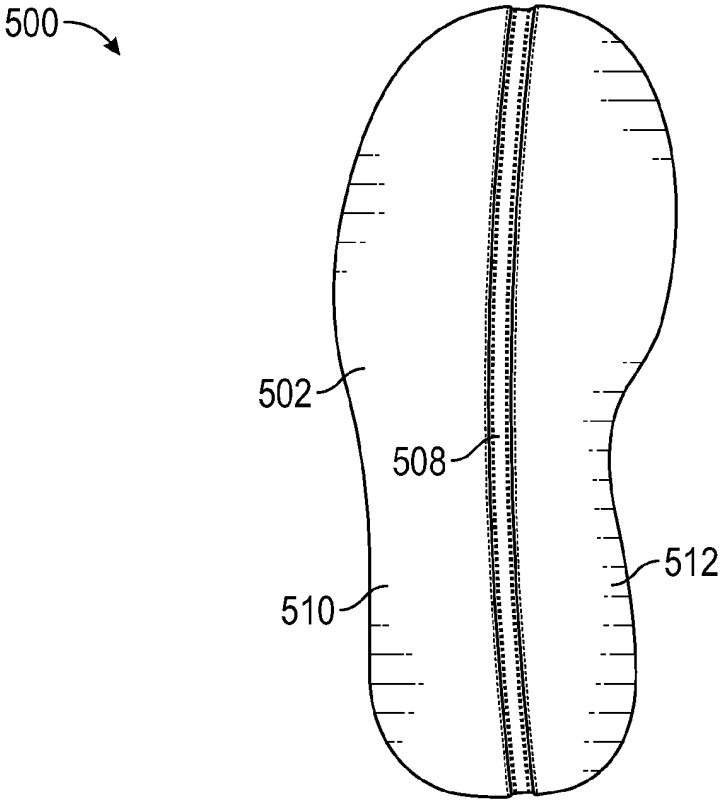

FIG. 17

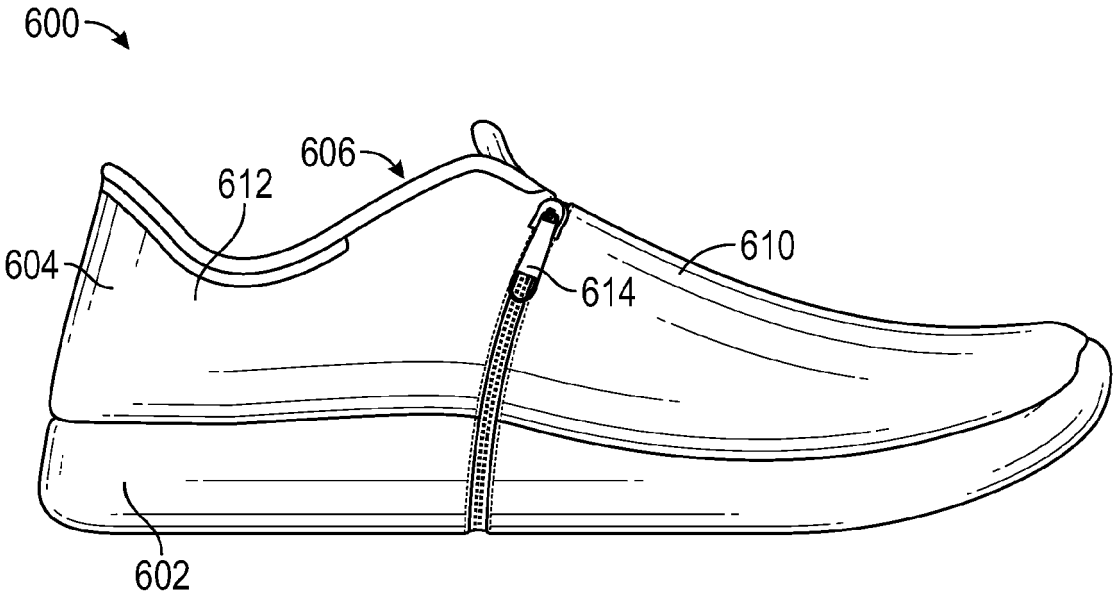

FIG. 18

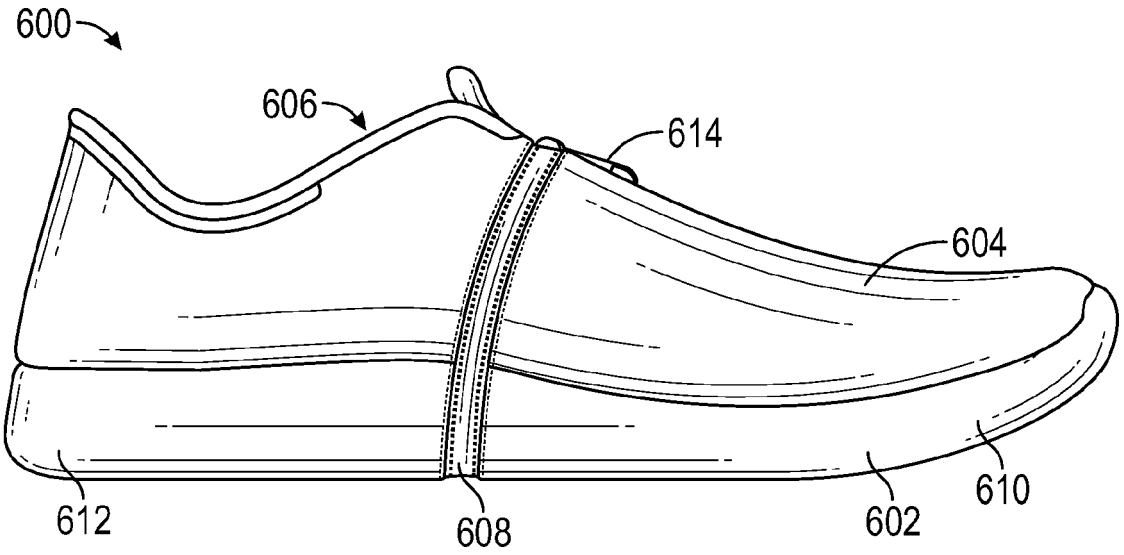

FIG. 19

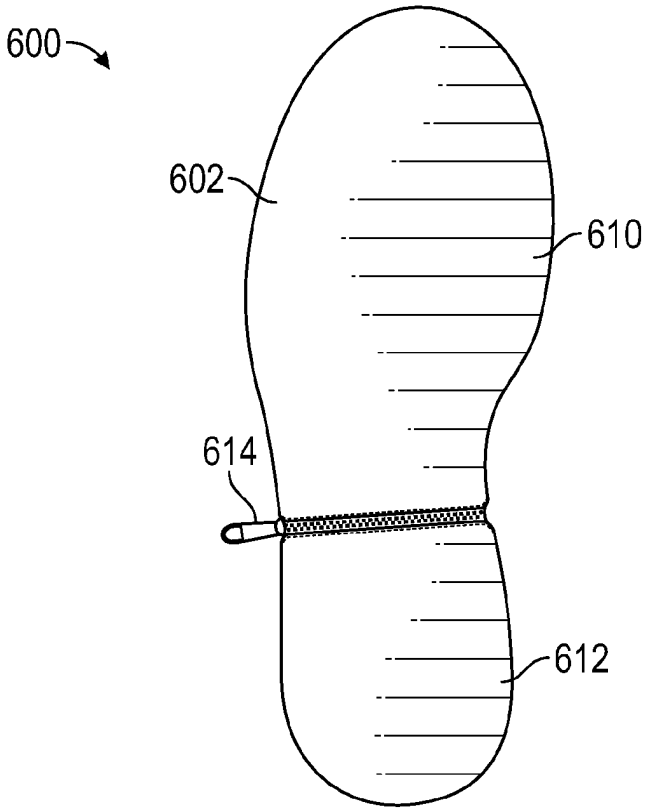

FIG. 20

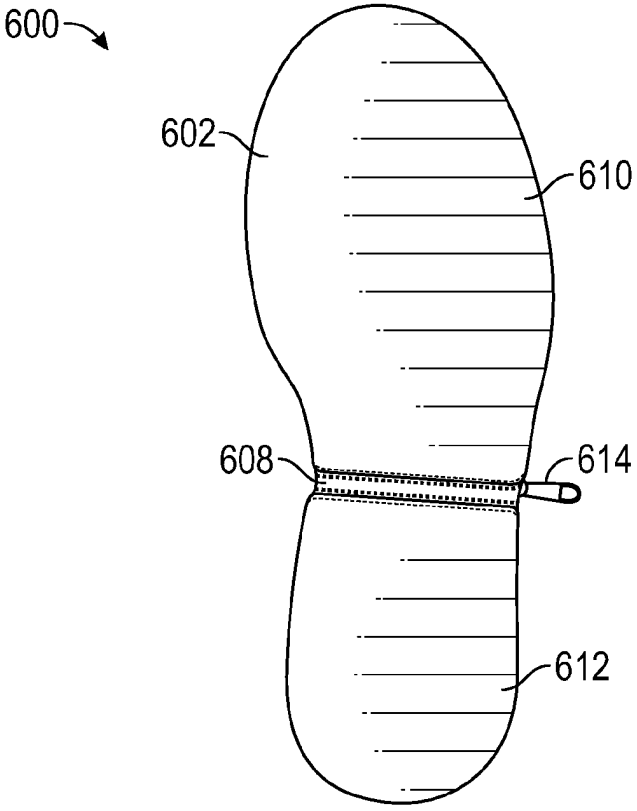

FIG. 21

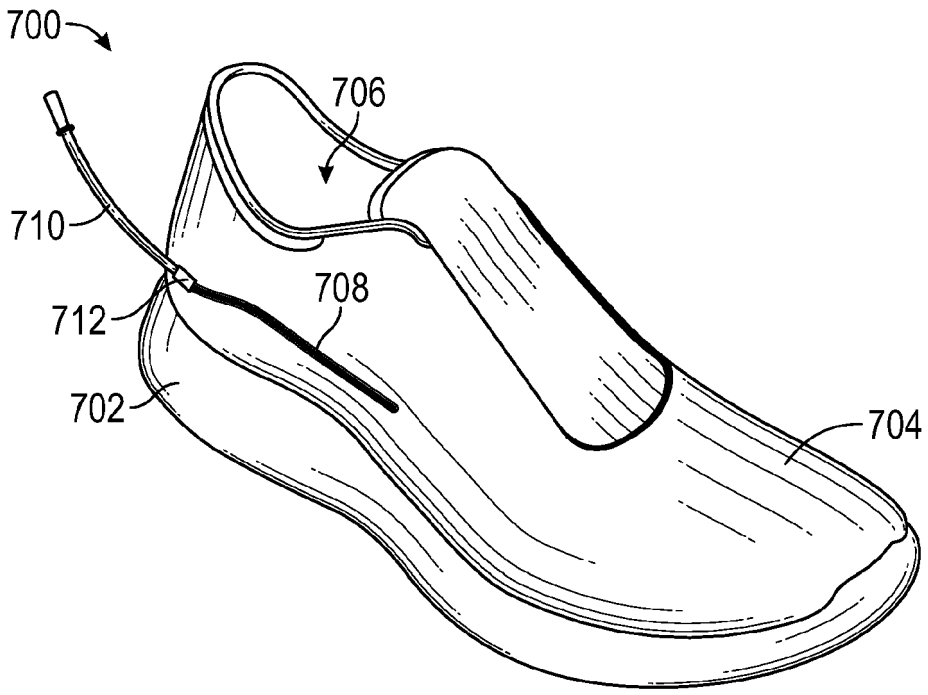

FIG. 22

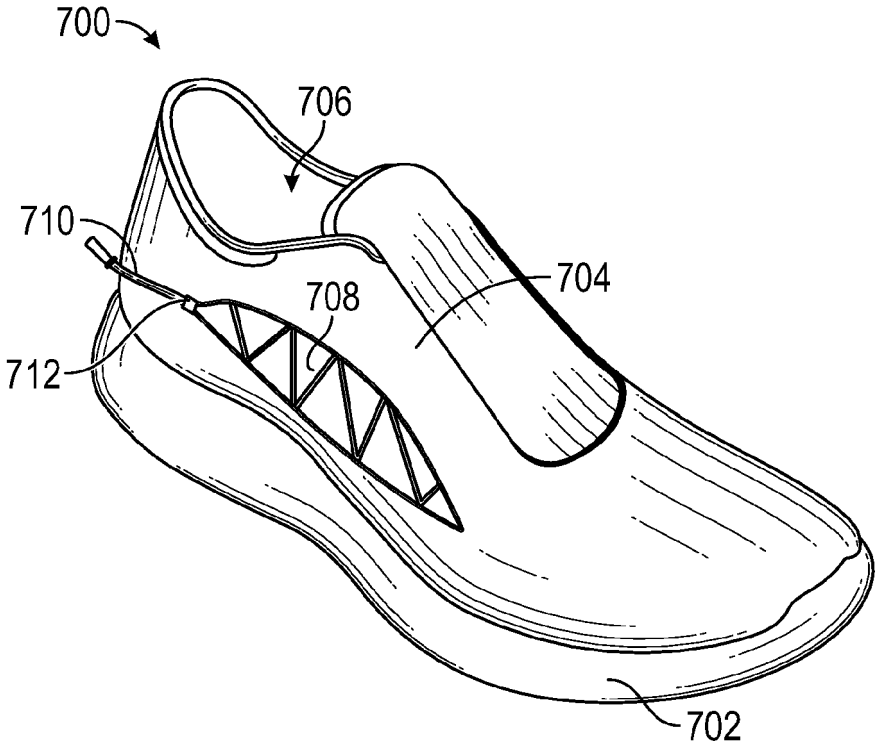

FIG. 23

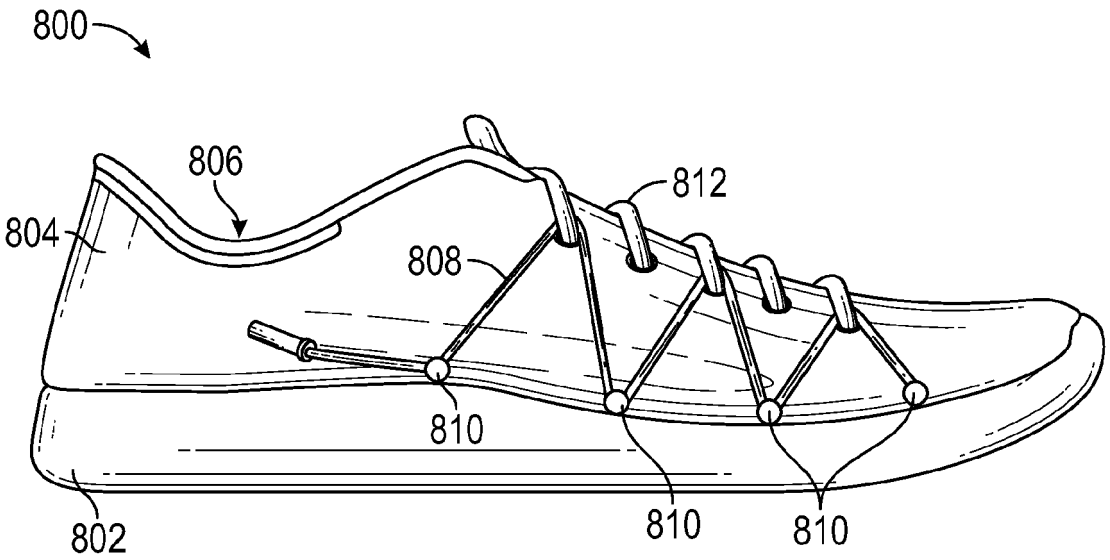
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FIG. 24

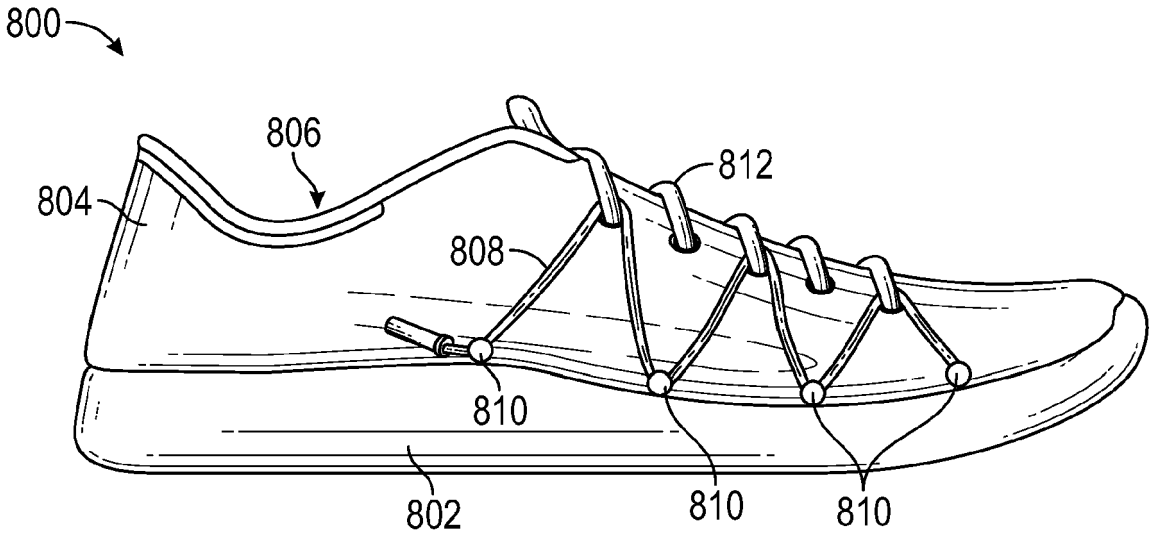
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FIG. 25

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2013125420 A1 **[0003]**
- US 2015040429 A1 **[0004]**