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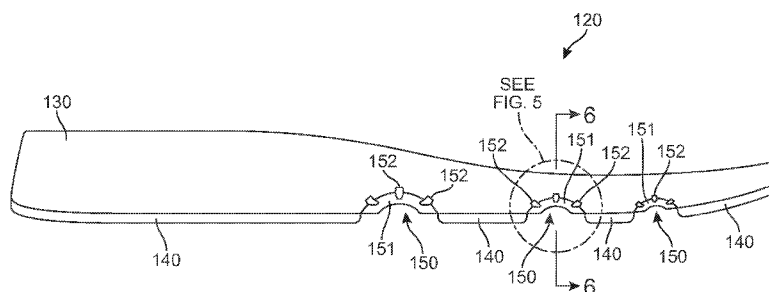


FIG. 3

(57) **Abstract:** An article of footwear (100) includes an upper (110) and a sole structure (120) secured to the upper. The sole structure (120) includes a midsole (130), an outsole (140), and at least one groove. The groove includes a macro groove (151) and at least one micro groove (152) located within the macro groove. The macro groove may be formed by an indentation or area of reduced thickness in the sole structure (120). The micro groove (152) may be formed by an indentation or area of reduced thickness in a surface of the macro groove (151).



ARTICLE OF FOOTWEAR HAVING A SOLE STRUCTURE
WITH A FLEXIBLE GROOVE

BACKGROUND

- [0001]** Articles of footwear generally include two primary elements: an upper and a sole structure. The upper is often formed from a plurality of material elements (e.g., textiles, polymer sheet layers, polymer foam layers, leather, synthetic leather) that are stitched or adhesively bonded together to form a void within the footwear for comfortably and securely receiving a foot. More particularly, the upper forms a structure that extends over instep and toe areas of the foot, along medial and lateral sides of the foot, and around a heel area of the foot. The upper may also incorporate a lacing system to adjust the fit of the footwear, as well as permitting entry and removal of the foot from the void within the upper. In addition, the upper may include a tongue that extends under the lacing system to enhance adjustability and comfort of the footwear, and the upper may incorporate a heel counter for stabilizing the heel area of the foot.
- [0002]** The sole structure is secured to a lower portion of the upper and positioned between the foot and the ground. In athletic footwear, for example, the sole structure often includes a midsole and an outsole. The midsole may be formed from a polymer foam material that attenuates ground reaction forces (i.e., cushion the foot) during walking, running, and other ambulatory activities. The midsole may also include fluid-filled chambers, plates, moderators, or other elements that further attenuate forces, enhance stability, or influence motions of the foot, for example. In some configurations, the midsole may be primarily formed from a fluid-filled chamber. The outsole forms a ground-contacting element of the footwear and is usually fashioned from a durable and wear-resistant rubber material that includes texturing to impart traction. The sole structure may also include a sockliner positioned within the void of the upper and proximal a lower surface of the foot to enhance footwear comfort.

SUMMARY

- [0003]** According to one configuration, an article of footwear may include an upper and a sole structure secured to the upper. The sole structure may extend through a length of the footwear and from a lateral side to an opposite medial side of the footwear. The sole structure may define a first surface and an opposite second surface. The first surface may be joined to the upper. The second surface may form a ground-contacting area of the footwear that defines: a macro groove and a plurality of micro grooves. The macro groove may have (a) a length extending from the lateral side and toward the medial side and (b) a depth extending into the sole structure and toward the first surface. The micro grooves may be located within the macro groove and have (a) lengths extending from the lateral side and toward the medial side and (b) depths extending into the sole structure and toward the first surface. The length of the macro groove may be greater than the lengths of the micro grooves, and the depth of the macro groove may be at least three times the depths of the micro grooves.
- [0004]** According to one configuration, an article of footwear may include an upper and a sole structure secured to the upper. The sole structure may have an upper surface and an opposite ground-contacting surface. The ground-contacting surface may define a first indentation and a plurality of second indentations. The first indentation may have a first length and a first depth. The second indentations may be located within the first indentation. Each of the second indentations may have a second length and a second depth, with the first length being greater than the second length, the first depth being at least three times the second depth, and the first depth being at least twenty-five percent of a distance between the upper surface and the ground-contacting surface.
- [0005]** According to a configuration, an article of footwear may include an upper and a sole structure secured to the upper. The sole structure may include a midsole and an outsole. The midsole may include a first surface and a second surface, the first surface being located adjacent to the upper, and the second surface

being located opposite the first surface and defining a depression that extends in a direction between opposite sides of the footwear. The outsole may be secured to at least a portion of the second surface, the outsole forming at least a portion of a ground-contacting surface of the footwear. A macro groove may be located at the depression and extend in the direction between the opposite sides of the footwear. The macro groove may form an indentation in the ground-contacting surface. A plurality of micro grooves may be located within the macro groove. The micro grooves may extend in the direction between the opposite sides of the footwear. The micro grooves may form additional indentations in the ground-contacting surface

[0006] The advantages and features of novelty characterizing aspects of the invention are pointed out with particularity in the appended claims. To gain an improved understanding of the advantages and features of novelty, however, reference may be made to the following descriptive matter and accompanying figures that describe and illustrate various configurations and concepts related to the invention.

FIGURE DESCRIPTIONS

[0007] The foregoing Summary and the following Detailed Description will be better understood when read in conjunction with the accompanying figures.

[0008] Figure 1 is a perspective view of an article of footwear.

[0009] Figure 2 is an exploded perspective view of the article of footwear.

[0010] Figure 3 is a side elevational view of a sole structure from the article of footwear.

[0011] Figure 4 is a bottom plan view of the sole structure.

[0012] Figure 5 is a perspective view of a portion of the sole structure, as defined in Figure 3.

- [0013] Figure 6 is a cross-sectional view of the sole structure, as defined in Figure 3.
- [0014] Figures 7A-7C are bottom plan views depicting additional configurations of the sole structure.
- [0015] Figure 8 is a side elevational view depicting an additional configuration of the sole structure.
- [0016] Figure 9 is a perspective view of a portion of the sole structure, as defined in Figure 8.
- [0017] Figure 10 is a cross-sectional view of the sole structure, as defined in Figure 8.
- [0018] Figure 11 is a perspective view of a portion of the sole structure, depicting an additional configuration of the sole structure.
- [0019] Figure 12 is a side elevational view depicting an additional configuration of the sole structure.
- [0020] Figure 13 is a perspective view of a portion of the sole structure, depicting an additional configuration of the sole structure.
- [0021] Figure 14 is a side elevational view depicting an additional configuration of the sole structure.
- [0022] Figure 15 is a cross-sectional view of the sole structure, as defined in Figure 4.

DETAILED DESCRIPTION

- [0023] The following discussion and accompanying figures disclose various configurations of an article of footwear. Although the footwear is disclosed as having a configuration that is suitable for running, concepts associated with the footwear may be applied to a wide range of athletic footwear styles, including basketball shoes, cross-training shoes, football shoes, golf shoes, hiking shoes

and boots, ski and snowboarding boots, soccer shoes, tennis shoes, and walking shoes, for example. Concepts associated with the footwear may also be utilized with footwear styles that are generally considered to be non-athletic, including dress shoes, loafers, and sandals. Accordingly, the concepts disclosed herein may be utilized with a variety of footwear styles.

[0024] An article of footwear 100 is depicted in Figures 1 and 2 as including an upper 110 and a sole structure 120. Upper 110 provides a comfortable and secure covering for a foot of a wearer. As such, the foot may be located within upper 110 to effectively secure the foot within footwear 100. Sole structure 120 is secured to a lower area of upper 110 and extends between upper 110 and the ground. When the foot is located within upper 110, sole structure 120 extends under the foot to attenuate ground reaction forces (i.e., cushion the foot), provide traction, enhance stability, and influence the motions of the foot, for example.

[0025] For reference purposes, footwear 100 may be divided into three general regions: a forefoot region 101, a midfoot region 102, and a heel region 103. Forefoot region 101 generally includes portions of footwear 100 corresponding with the toes and the joints connecting the metatarsals with the phalanges. Midfoot region 102 generally includes portions of footwear 100 corresponding with an arch area of the foot. Heel region 103 generally corresponds with rear portions of the foot, including the calcaneus bone. Footwear 100 also includes a lateral side 104 and a medial side 105, which extend through each of regions 101-103 and correspond with opposite sides of footwear 100. More particularly, lateral side 104 corresponds with an outside area of the foot (i.e. the surface that faces away from the other foot), and medial side 105 corresponds with an inside area of the foot (i.e., the surface that faces toward the other foot). Regions 101-103 and sides 104-105 are not intended to demarcate precise areas of footwear 100. Rather, regions 101-103 and sides 104-105 are intended to represent general areas of footwear 100 to aid in the following discussion. In addition to footwear 100, regions 101-103 and sides 104-105 may also be applied to upper 110, sole structure 120, and individual elements thereof.

[0026] Upper 110 is depicted as having a substantially conventional configuration formed from a variety of elements (e.g., textiles, polymer sheet layers, polymer foam layers, leather, synthetic leather) that are stitched, bonded, or otherwise joined together to provide a structure for receiving and securing the foot relative to sole structure 120. The various elements of upper 110 define a void 111, which is a generally hollow area of footwear 100 with a shape of the foot, that is intended to receive the foot. As such, upper 110 extends along the lateral side of the foot, along the medial side of the foot, over the foot, around a heel of the foot, and under the foot. Access to void 111 is provided by an ankle opening 112 located in at least heel region 103. A lace 113 extends through various lace apertures 114 and permits the wearer to modify dimensions of upper 110 to accommodate the proportions of the foot. More particularly, lace 113 permits the wearer to tighten upper 110 around the foot, and lace 113 permits the wearer to loosen upper 110 to facilitate entry and removal of the foot from void 111 (i.e., through ankle opening 112). In addition, upper 110 includes a tongue 115 that extends between void 111 and lace 113 to enhance the comfort and adjustability of footwear 100. Accordingly, upper 110 is formed from a variety of elements that form a structure for receiving and securing the foot.

[0027] The primary elements of sole structure 120 are a midsole 130 and an outsole 140, as depicted in Figures 3-6. Midsole 130 is generally formed from a polymer foam material (e.g., polyurethane or ethylvinylacetate foam) that attenuates ground reaction forces (i.e., cushion the foot) during walking, running, and other ambulatory activities. Although not depicted, midsole 130 may also include fluid-filled chambers, plates, moderators, or other elements that further attenuate forces, enhance stability, or influence the motions of the foot. In another configuration, which will be discussed below, midsole 130 may be primarily formed from a fluid-filled chamber. Although absent in some configurations, outsole 140 is secured to a lower surface of midsole 130 and forms at least a portion of a ground-contacting surface of footwear 100. In order to provide a durable and wear-resistant surface for engaging the ground, outsole 140 may be formed from a rubber material. In addition, outsole 140 may be textured to

enhance the traction (i.e., friction) properties between footwear 100 and the ground. Sole structure 120 may further include a sockliner (not shown), which is a compressible member located within void 111 and adjacent a lower surface of the foot to enhance the comfort of footwear 100.

[0028] Sole structure 120 incorporates various features that provide an advantage of enhancing the ability of footwear 100 to flex, bend, or otherwise deform during walking and running. More particularly, sole structure 120 includes three flexion regions 150 that impart flexibility to specific areas of sole structure 120, as shown in the example of Figure 3. Flexion regions 150 may, therefore, provide the wearer of footwear 100 with improved comfort or movement when wearing footwear 100 due to an enhanced ability of sole structure 120 to flex and conform with movements of a foot of the wearer. Such an increase in the flexibility of sole structure 120 may be provided while continuing to attenuate ground reaction forces and impart stability.

[0029] The various flexion regions 150 may be generally described as an area of reduced thickness in sole structure 120. Given the reduced thickness, flexion regions 150 flex, bend, or otherwise deform with less force than other areas of sole structure 120. Flexion regions 150 are located in various areas of sole structure 120 and may extend between sides 104 and 105. Although the specific locations of each flexion region 150 may vary significantly, the three flexion regions 150 are located (a) in forefoot region 101, (b) at an interface between forefoot region 101 and midfoot region 102, and (c) in midfoot region 102. In this arrangement, flexion regions 150 are located proximal to the joints connecting the metatarsals with the phalanges. That is, flexion regions 150 are located around the joints where the toes join with the rest of the foot. As such, flexion regions 150 may enhance or otherwise facilitate flex in the area of footwear 100 corresponding with the joints connecting the metatarsals with the phalanges.

[0030] Each of flexion regions 150 include a macro groove 151 and a plurality of micro grooves 152. Macro grooves 151 form relatively large indentations in the

ground-contacting surface of sole structure 120 and extend entirely across sole structure 120, as shown in Figure 4. In other configurations, one or more of macro grooves 151 may extend only partially across sole structure 120. For example, portions of macro grooves 151 may be absent from a central area of sole structure 120 (i.e., an area spaced inwards from both of sides 104 and 105).

[0031] Micro grooves 152 are located within macro grooves 151 and form relatively small indentations in the ground-contacting surface of sole structure 120. Although micro grooves 152 are located proximal to each of sides 104 and 105 and extend toward the central area of sole structure 120, micro grooves 152 are absent from the central area. As such, the lengths of macro grooves 151 may be greater than the length of micro grooves 152. For example, micro grooves 152 may have a length that is approximately 5-100% of the length of a macro groove 151 in which the micro grooves 152 are located. In another example, individual micro grooves 151 may have a length that is approximately 5-20% of the length of a macro groove 151 in which the micro grooves 152 are located. In other configurations, micro grooves 152 may extend entirely across sole structure 120.

[0032] Macro grooves 151 and micro grooves 152 operate cooperatively to enhance the flex of sole structure 120 in the areas of flexion regions 150. More particularly, each of grooves 151 and 152 effectively reduce the thickness of sole structure 120, thereby permitting flexion regions 150 to flex, bend, or otherwise deform with less force than other areas of sole structure 120. Although macro grooves 151 have a depth that forms a majority of the reduced thickness of sole structure 120, the plurality of micro grooves 152 within each of macro grooves 151 have depths that combine to further reduce the thickness of sole structure 120. In combination, therefore, grooves 151 and 152 provide the wearer of footwear 100 with improved comfort or movement when wearing footwear 100 due to an enhanced ability of sole structure 120 to flex and conform with movements of a foot of the wearer.

[0033] The amount of flex provided by flexion regions 150 depends upon various factors, including the depths of macro grooves 151. Referring to Figures 5 and 6, one of macro grooves 151 is depicted as having a varying depth. More particularly, the depth is greater at each of sides 104 and 105 than in the central area of sole structure 120. Macro grooves 151 may have, therefore, a tapered aspect where the depth is greatest at sides 104 and 105 and least in the central area of sole structure 120. In order to impart a noticeable or beneficial amount of flex, macro grooves 151 generally have a depth that is at least twenty-five percent of a thickness of sole structure 120. That is, macro grooves 151 form an indentation in sole structure 120 that extends through at least twenty-five percent of a distance between an upper surface of sole structure 120 (i.e., the surface that is secured to upper 110) and the ground-contacting surface. Referring to Figure 6, for example, the depth of macro groove 151 at lateral side 104 is greater than twenty-five percent of the thickness of sole structure 120 at lateral side 104, and the depth of macro groove 151 in the central area of sole structure 120 is greater than twenty-five percent of the thickness of sole structure 120 in the central area of sole structure 120. In another example, macro grooves 151 have a depth of approximately 3-12 mm.

[0034] In addition to the depths of macro grooves 151, the relative depths of micro grooves 152 also affect the amount of flex provided by flexion regions 150. Micro grooves 152 may have a depth of, for example, approximately 1-4 mm or a depth equal to 5% or more of the sole structure 120 thickness. In another example, micro grooves 152 may have a depth of approximately 5-12% of the sole structure 120 thickness. In general, the depth of a macro groove 151 is in general substantially greater than the depth of micro grooves 152. For instance, macro grooves 151 may have a depth that is 3-5 times larger than the depth of micro grooves 152. In another example, macro grooves 151 may have a depth that is 3 times larger than the depth of micro grooves 152. Micro grooves 152 may also have a varying depth. For example, micro grooves 152 may have a tapering structure, such that the depth of micro grooves 152 is greater at each of sides 104 and 105 than in or towards the central area of sole structure 120.

[0035] As discussed above, macro grooves 151 and micro grooves 152 operate cooperatively to enhance the flex of sole structure 120 in the areas of flexion regions 150. Given that multiple micro grooves 152 are present in specific areas of flexion regions 150, forming micro grooves 152 to have depths that are less than at least one-third the depth of macro grooves 151 imparts considerable additional flex, while retaining the structural integrity of sole structure 120 in the area of micro grooves 151.

[0036] In the configuration of sole structure 120 discussed above, portions of grooves 151 and 152 are formed in midsole 130, thereby exposing a portion of midsole 130. Given this configuration, outsole 140 includes four discrete sections, as depicted in Figure 2, that are spaced from each other. Moreover, the sections of outsole 140 are separated by various gaps that correspond in location with flexion regions 150. In further configurations, outsole 140 may extend into depressions in midsole 130 to form the various grooves 151 and 152. In yet other configurations, outsole 140 alone may form indentations that correspond with the various grooves 151 and 152.

[0037] Based upon the above discussion, sole structure 120 includes the various flexion regions 150, which enhance the flex properties of footwear 100. Each of the flexion regions 150 include various indentations, specifically macro grooves 151 and micro grooves 152. Macro grooves 151 form relatively large indentations in sole structure 120, with micro grooves 152 forming smaller indentations in the surface of macro grooves 151. In some configurations, macro grooves 151 have depths that (a) extend through at least twenty-five percent of a thickness of sole structure 120 and (a) are at least three times the depths of micro grooves 152. Macro grooves 151 may also have greater lengths than micro grooves 152. Although macro grooves 151 exhibit greater length and depth than micro grooves 152, grooves 151 and 152 operate cooperatively to impart flex to footwear 100.

[0038] Further Configurations

- [0039] The configuration of sole structure 120 discussed above and depicted in Figures 1-6 is intended to provide an example of a suitable structure for use in footwear 100. Various aspects of sole structure 120 may, however, vary significantly to affect the flex in footwear 100, modify other properties of footwear 100, and impart other features to footwear 100. As examples, Figures 7A-7C depict configurations wherein each of flexion regions 150 are modified.
- [0040] Referring to Figure 7A, a flexion region 160, which includes a macro groove 161 and micro grooves 162, extends inward from each of sides 104 and 105, but does not extend entirely across the width of sole structure 120. That is, a portion of macro groove 161 is absent from the central area of sole structure 120, forming a gap 166 in macro groove 161. Another flexion region 170 extends from lateral side 104 to the central area, but is absent from medial side 105, thereby passing through approximately one-half of the width of sole structure 120. A similar flexion region 172 extends from medial side 105 to the central area, thereby passing through approximately one-third of the width of sole structure 120.
- [0041] Whereas many of the flexion regions are substantially perpendicular to a longitudinal axis of footwear 100, Figure 7A depicts a flexion region 180 as being angled with respect to other flexion regions. For example, medial end 182 and lateral end 184 of flexion region 180 may be located at different locations in a direction extending between a toe and heel of sole structure 120. As a result, a longitudinal axis 186 extending along flexion region 180 may be oriented at an angle 189 relative to a direction 188 extending across sole structure 120 in a medial to lateral direction. Direction 188 may be substantially perpendicular to a longitudinal axis extending between the forefoot region 101 and heel region 103 of sole structure 120. Angle 189 may be, for example, approximately 1 to 60°, or, in another example, approximately 5 to 45°. In addition, although the example of Figure 7A depicts medial end 182 as being closer to forefoot region 101 than lateral end 184, other embodiments may be provided in which medial end 182 is closer to heel region 103 than lateral end 184.

- [0042]** Another flexion region 190 in Figure 7A includes a first end 192 that is larger than a second end 194. First end 192 may be larger by extending towards forefoot region 101 and heel region 103 by a greater amount than second end 194 and/or by extending to a greater depth than second end 194. Such a configuration may be advantageous when a greater amount of flexion is desired on one side of a sole structure than another. As shown in the example of Figure 7A, first end 192 may be located on medial side 105 and second end 194 may be located on lateral side 104. In another embodiment, first end 192 may be instead located on lateral side 104 and second end 194 may be located on medial side 105.
- [0043]** Referring to Figure 7B, flexion regions of a sole structure 120 may exhibit various other configurations. For example, a flexion region 200 may include a non-tapered shape in a direction extend between sides 104, 105. In another example, flexion region 210 has a shape that has greater depth or width in the central area 212 than at either of sides 104 and 105. As shown in the example of Figure 7B, central area 212 of flexion region 210 may include micro grooves 214, or central area 212 may lack micro grooves 214. Flexion region 220 may have an angled shape, such that central portion 222 of flexion region 220 is oriented at an angle relative to ends 224, 226. Ends 224, 226 may be oriented at the same angle relative to a medial to lateral direction across sole structure 120.
- [0044]** Referring to Figure 7C, various aspects of flexion regions having modified micro groove structures are depicted. Specifically, a flexion region 230 includes micro grooves 232 that extend further toward the central area of sole structure 120. For example, micro grooves 232 may extend from tapered ends 234 of flexion region 230 and into a central area 236 of flexion region have a substantially uniform depth and/or width in a medial to lateral direction. Another flexion region 240 includes micro grooves 242 that extend entirely across sole structure 120 in a medial to lateral direction. In another flexion region 250, the number of micro grooves 252 may varies to include five micro grooves 252 adjacent to each of sides 104 and 105.

- [0045]** Referring to Figures 8-10, a sole structure 300 is depicted which includes a midsole 310 and an outsole 320. Midsole 310 may be formed from a polymer foam material and outsole 320 may be formed from a durable and wear-resistant rubber material that includes texturing to impart traction. As shown in Figure 8, outsole 320 may include flexion regions 331-334. As depicted in Figure 9, each flexion region 333 may include a macro groove 341 and micro grooves 342. Because flexion regions 331-334 are formed by outsole 320, midsole 310 includes a corresponding depression to receive each of the flexion regions 332-334. For example, midsole 310 includes depression 312 to receive macro groove 341 and micro grooves 342, as shown in Figure 9.
- [0046]** According to an embodiment, flexion grooves may be formed in the outsole of a sole structure but the midsole may lack a depression to receive the macro groove of a flexion region. As shown in Figure 11, outsole 320 may form flexion region 333 having macro groove 341 and micro groove 342. In contrast, midsole 310 may have a relatively flat surface 312 without any depression or shape corresponding to macro groove 341 or flexion region 333.
- [0047]** A sole structure may include additional components or layers besides a midsole and outsole that form a shape of a groove. Turning to Figure 12, a sole structure may include, for example, a midsole 350, an outsole 370, and an intermediate layer 360 between midsole 350 and outsole 370. Intermediate layer 360 can be, for example, a layer of foam or other material that may provide additional cushioning and/or support to the sole structure. Intermediate layer 360 may include flexion regions 361-363. As shown in Figure 13, flexion region 361 includes a macro groove 364 and micro grooves 365. Midsole 350 includes a depression 352 to receive macro groove 364 and micro grooves 365 of flexion region 361. Outsole 370 may conform to the shape of intermediate layer 360 and include indentations 372 that extend into micro grooves 365 and otherwise conform or correspond in shape to micro grooves 365 of intermediate layer 360.

[0048] According to an embodiment, the midsole of a sole structure may include or itself be a fluid-filled bladder. A fluid-filled chamber may include the features of a fluid-filled bladder described in U.S. Patent No. 7,141,131, which is hereby incorporated by reference in its entirety. Turning to Figure 14, a sole structure may be provided that includes a fluid-filled bladder 380 and an outsole 390. Outsole 390 includes flexion regions 391, 392 having the features of the embodiments described herein. Fluid-filled bladder 380 includes a depression 382 in its bottom surface that faces a ground surface to receive flexion regions 391, 392.

[0049] The invention is disclosed above and in the accompanying figures with reference to a variety of configurations. The purpose served by the disclosure, however, is to provide an example of the various features and concepts related to the invention, not to limit the scope of the invention. One skilled in the relevant art will recognize that numerous variations and modifications may be made to the configurations described above without departing from the scope of the present invention, as defined by the appended claims.

CLAIMS:

1. An article of footwear comprising an upper and a sole structure secured to the upper, the sole structure extending through a length of the footwear and from a lateral side to an opposite medial side of the footwear, and the sole structure defining a first surface and an opposite second surface, the first surface being joined to the upper, and the second surface forming a ground-contacting area of the footwear that defines:

a macro groove having (a) a length extending from the lateral side and toward the medial side and (b) a depth extending into the sole structure and toward the first surface; and

a plurality of micro grooves located within the macro groove, the micro grooves having (a) lengths extending from the lateral side and toward the medial side and (b) depths extending into the sole structure and toward the first surface,

the length of the macro groove being greater than the lengths of the micro grooves, and the depth of the macro groove being at least three times the depths of the micro grooves.

2. The article of footwear recited in claim 1, wherein the macro groove extends from the lateral side to at least a central area of the second surface.

3. The article of footwear recited in claim 2, wherein the depth of the macro groove is greater at the lateral side than in the central area.

4. The article of footwear recited in claim 2, wherein the micro grooves are absent from the central area.

5. The article of footwear recited in claim 1, wherein the macro groove extends from the lateral side to the medial side.

6. The article of footwear recited in claim 5, wherein the depth of the macro groove is greater at the lateral side and the medial side than in the central area.

7. The article of footwear recited in claim 5, wherein the micro grooves are absent from the central area, and a plurality of additional micro grooves are located within the macro groove and at the medial side.

8. The article of footwear recited in claim 1, wherein the depth of the macro groove at the lateral side extends through at least twenty-five percent of a distance between the first surface and the second surface.

9. The article of footwear recited in claim 1, wherein the sole structure includes a midsole and an outsole, the macro groove and the micro grooves being formed in the midsole, and the outsole being absent in an area of the macro groove and the micro grooves.

10. The article of footwear recited in claim 1, wherein the sole structure includes a midsole and an outsole, the midsole defining the first surface and a depression located opposite the first surface, and the outsole forming the second surface and extending into the depression.

11. The article of footwear recited in claim 1, wherein the sole structure includes a midsole and an outsole, the midsole being a fluid-filled chamber, and the outsole being secured to the midsole.

12. The article of footwear recited in claim 1, wherein the micro grooves have a depth of approximately 5-12% of a thickness of the sole structure.

13. An article of footwear comprising an upper and a sole structure secured to the upper, the sole structure having a ground-contacting surface that defines a plurality of macro grooves extending from opposite sides of the footwear and toward a central area of the footwear, at least one of the macro grooves having (a) a depth that is greater at the sides of the footwear than in the central area and (b) a plurality of micro grooves located adjacent to the sides of the footwear and extending toward the central area,

each of the macro grooves and the micro grooves being indentations in the ground-contacting surface that extend into the sole structure.

14. The article of footwear recited in claim 13, wherein the micro grooves are absent from the central area.

15. The article of footwear recited in claim 13, wherein lengths of the macro grooves are greater than lengths of the micro grooves.

16. The article of footwear recited in claim 13, wherein the depth at the sides of the footwear is at least three times depths of the micro grooves at the sides of the footwear.

17. The article of footwear recited in claim 13, wherein the depth at the sides of the footwear extends through at least twenty-five percent of a thickness of the sole structure.

18. The article of footwear recited in claim 13, wherein the micro grooves have a depth of approximately 5-12% of a thickness of the sole structure.

19. The article of footwear recited in claim 13, wherein the sole structure includes a midsole and an outsole, the macro grooves and the micro grooves being formed in the midsole, and the outsole being absent in areas of the macro grooves and the micro grooves.

20. The article of footwear recited in claim 13, wherein the sole structure includes a midsole and an outsole, a lower surface of the midsole defines a plurality of depressions in areas of the macro grooves, and the outsole forms the ground-contact surface and extends into the depressions of the midsole to form the macro grooves.

21. The article of footwear recited in claim 13, wherein the macro grooves have a depth of approximately 3-5 times a depth of the micro grooves.

22. The article of footwear recited in claim 13, wherein the sole structure includes a midsole and an outsole, the midsole being a fluid-filled chamber, and the outsole being secured to the midsole.
23. An article of footwear comprising an upper and a sole structure secured to the upper, the sole structure having an upper surface and an opposite ground-contacting surface that defines:
- a first indentation having a first length and a first depth; and
 - a plurality of second indentations located within the first indentation, each of the second indentations having a second length and a second depth,
- the first length being greater than the second length, the first depth being at least three times the second depth, and the first depth being at least twenty-five percent of a distance between the upper surface and the ground-contacting surface.
24. The article of footwear recited in claim 23, wherein the first indentation extends between opposite sides of the footwear.
25. The article of footwear recited in claim 23, wherein the first indentation is absent from at least a portion of a central area of the footwear.
26. The article of footwear recited in claim 23, wherein the first depth is greater at a side of the footwear than in a central area of the footwear.
27. The article of footwear recited in claim 23, wherein the second indentations are (a) located adjacent to at least one side of the footwear and (b) absent from a central area of the footwear.
28. The article of footwear recited in claim 23, wherein the sole structure includes a midsole and an outsole, the first indentation and the second indentation being formed in the midsole, and the outsole being absent in an area of the first indentation and the second indentation.

29. The article of footwear recited in claim 23, wherein the sole structure includes a midsole and an outsole, the midsole defining a depression located at the first indentation, and the outsole forming the ground-contacting surface and extending into the depression.

30. The article of footwear recited in claim 23, wherein the sole structure includes a midsole and an outsole, the midsole being a fluid-filled chamber, and the outsole being secured to the midsole.

31. An article of footwear having an upper and a sole structure secured to the upper, the sole structure comprising:

- a midsole having a first surface and a second surface, the first surface being located adjacent to the upper, and the second surface being located opposite the first surface and defining a depression that extends in a direction between opposite sides of the footwear;
- an outsole secured to at least a portion of the second surface, the outsole forming at least a portion of a ground-contacting surface of the footwear;
- a macro groove located at the depression and extending in the direction between the opposite sides of the footwear, the macro groove forming an indentation in the ground-contacting surface; and
- a plurality of micro grooves located within the macro groove, the micro grooves extending in the direction between the opposite sides of the footwear, and the micro grooves forming additional indentations in the ground-contacting surface.

32. The article of footwear recited in claim 31, wherein the outsole is absent in an area of the depression and exposes a portion of the second surface that defines the depression, the portion of the second surface that defines the depression forms an area of the ground-contacting surface, and the micro grooves are formed in the second surface.

33. The article of footwear recited in claim 31, wherein the outsole extends into the depression to form the macro groove.

34. The article of footwear recited in claim 31, wherein the midsole is a fluid-filled chamber.

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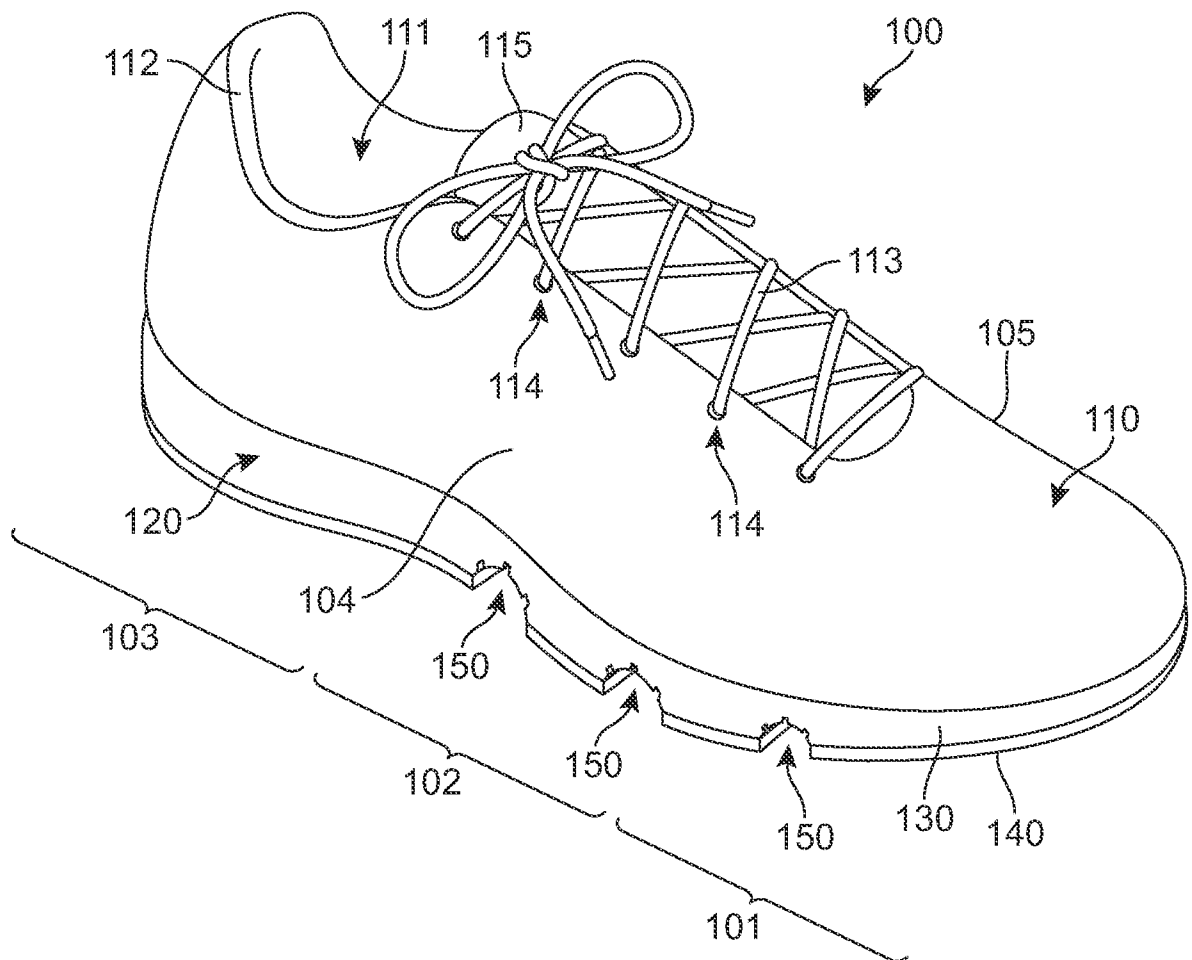


FIG. 1

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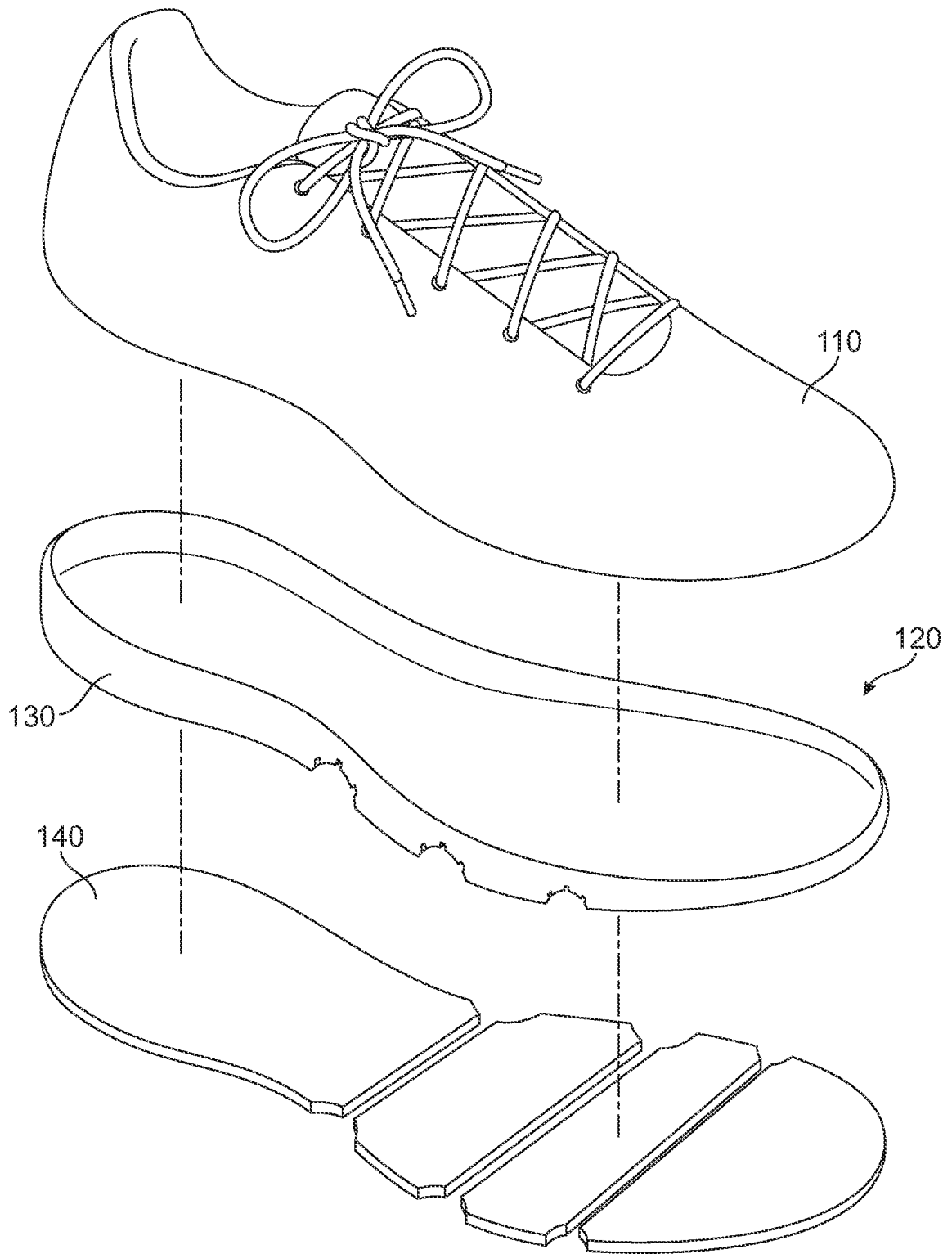


FIG. 2

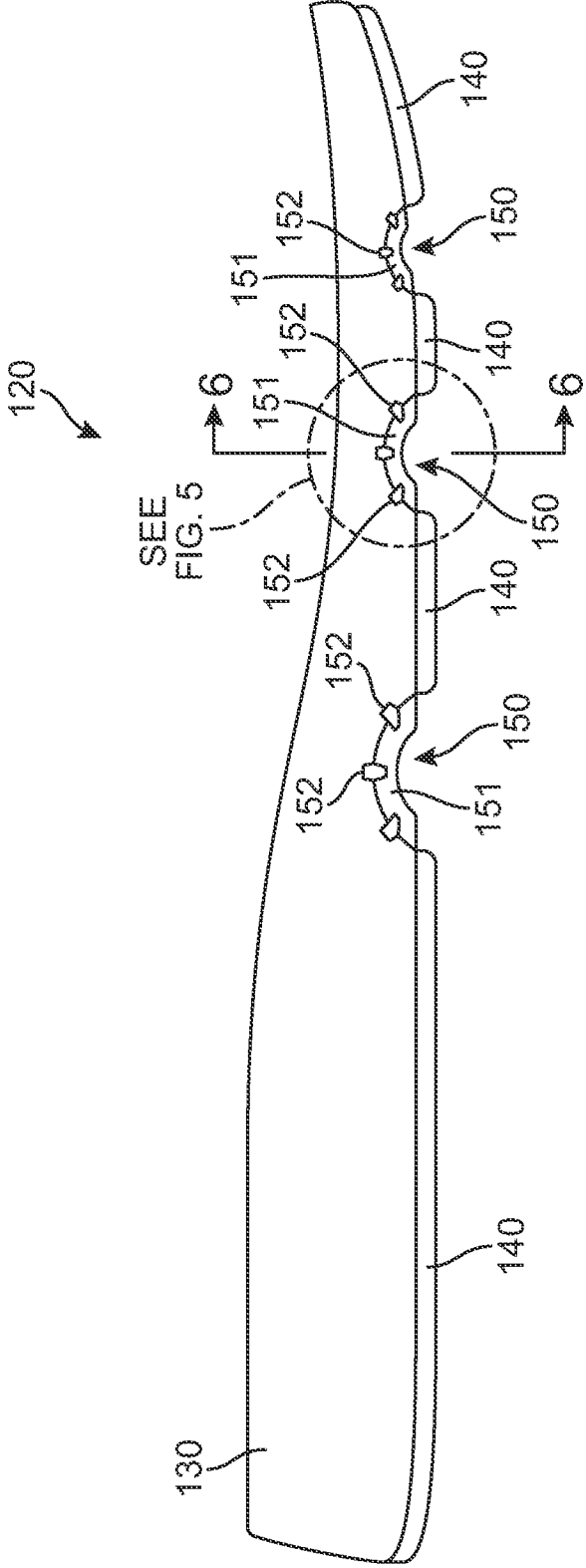


FIG. 3

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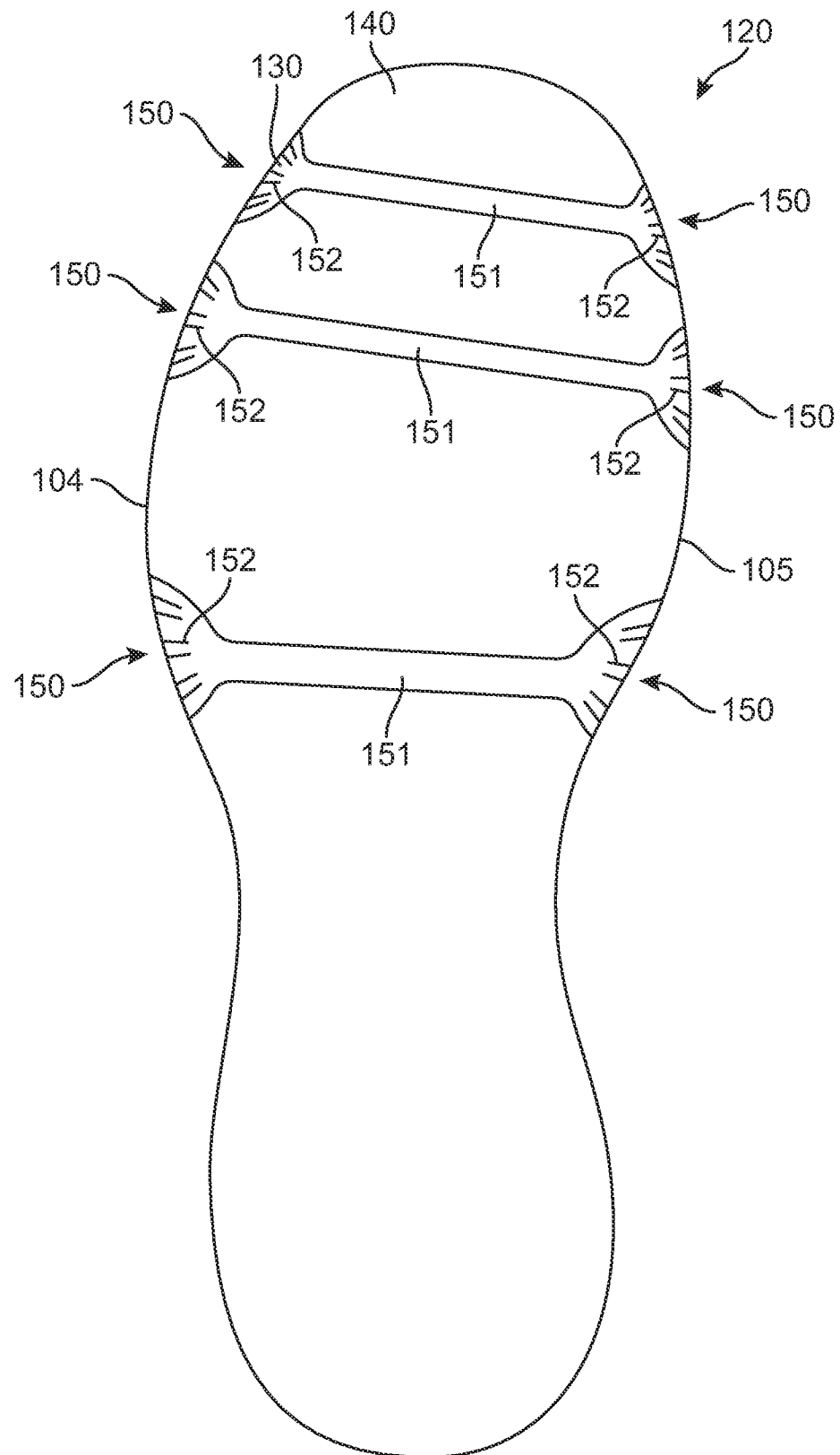
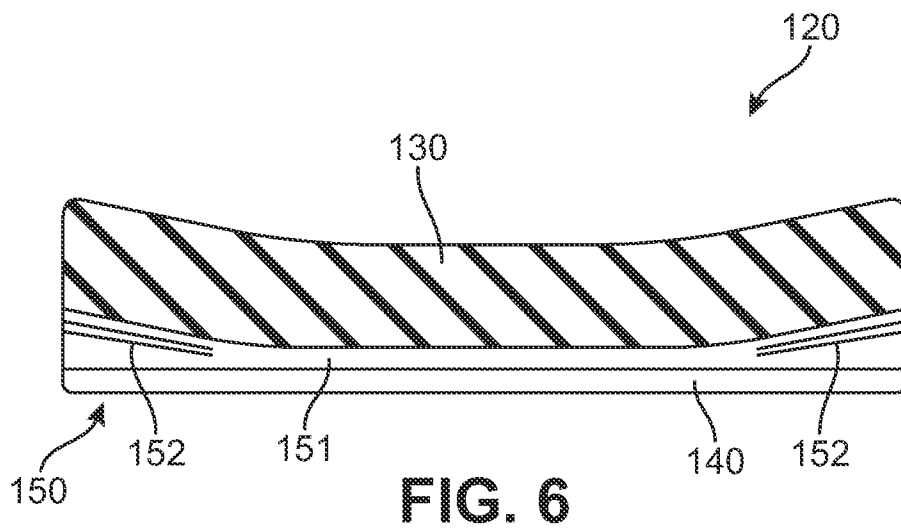
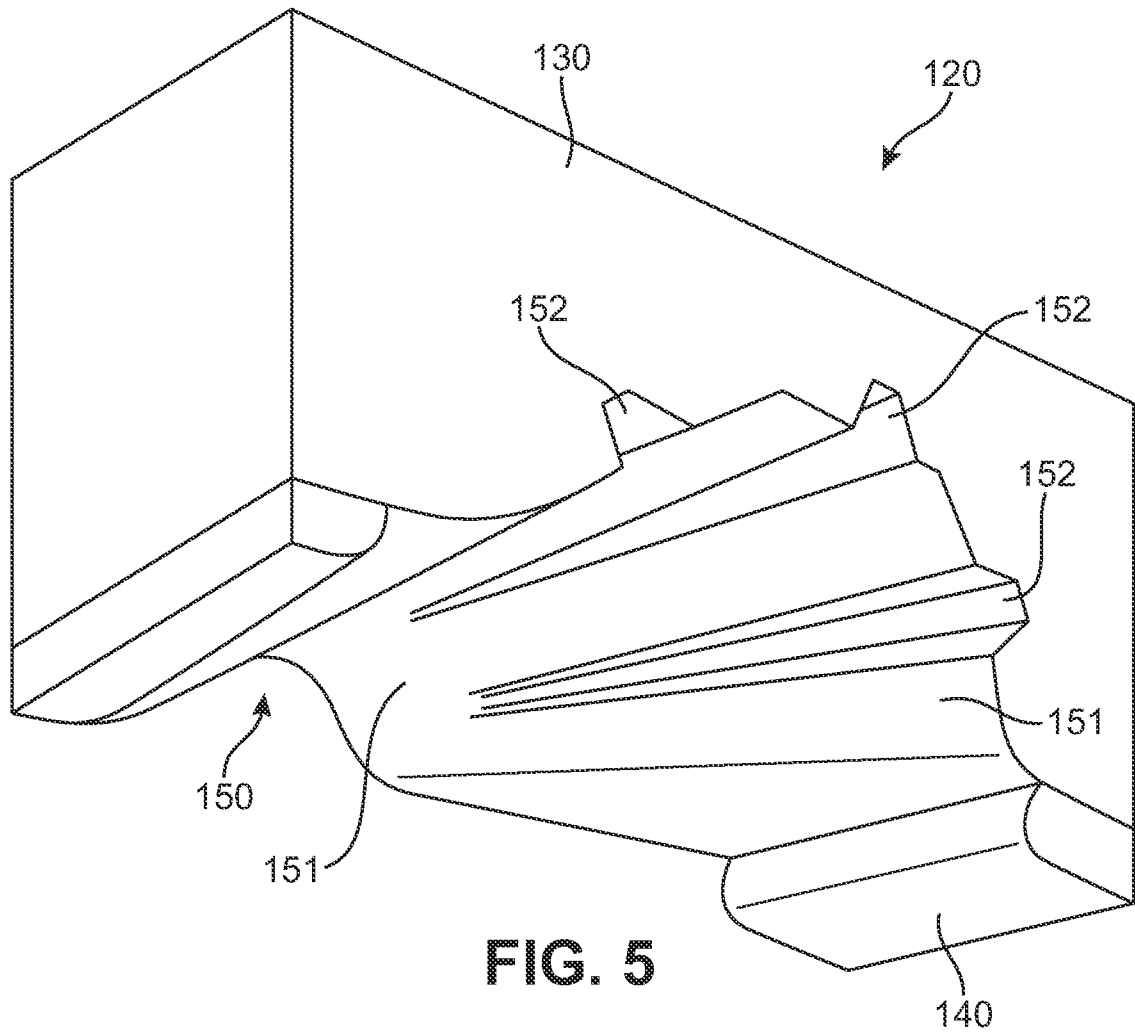


FIG. 4

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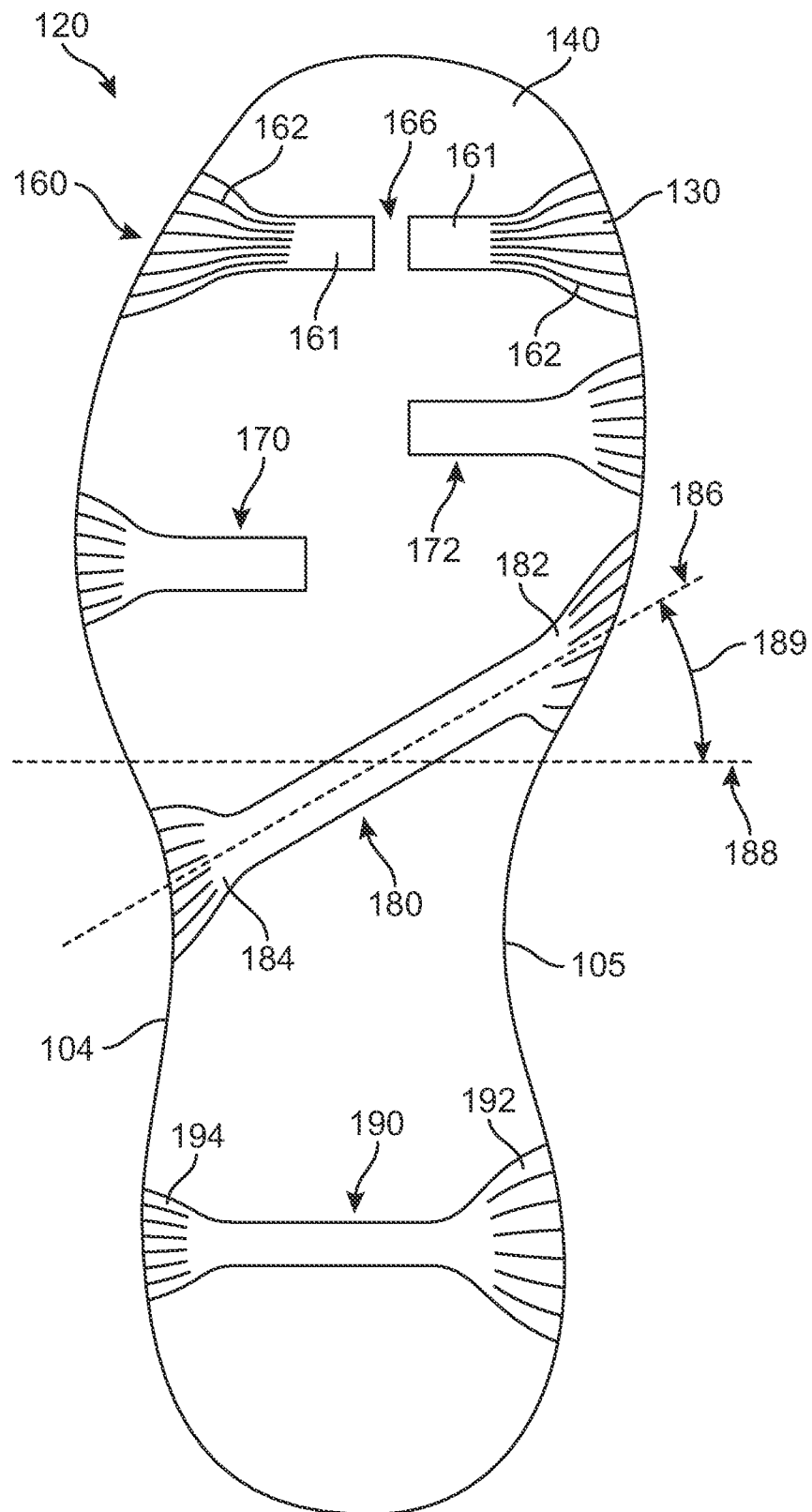


FIG. 7A

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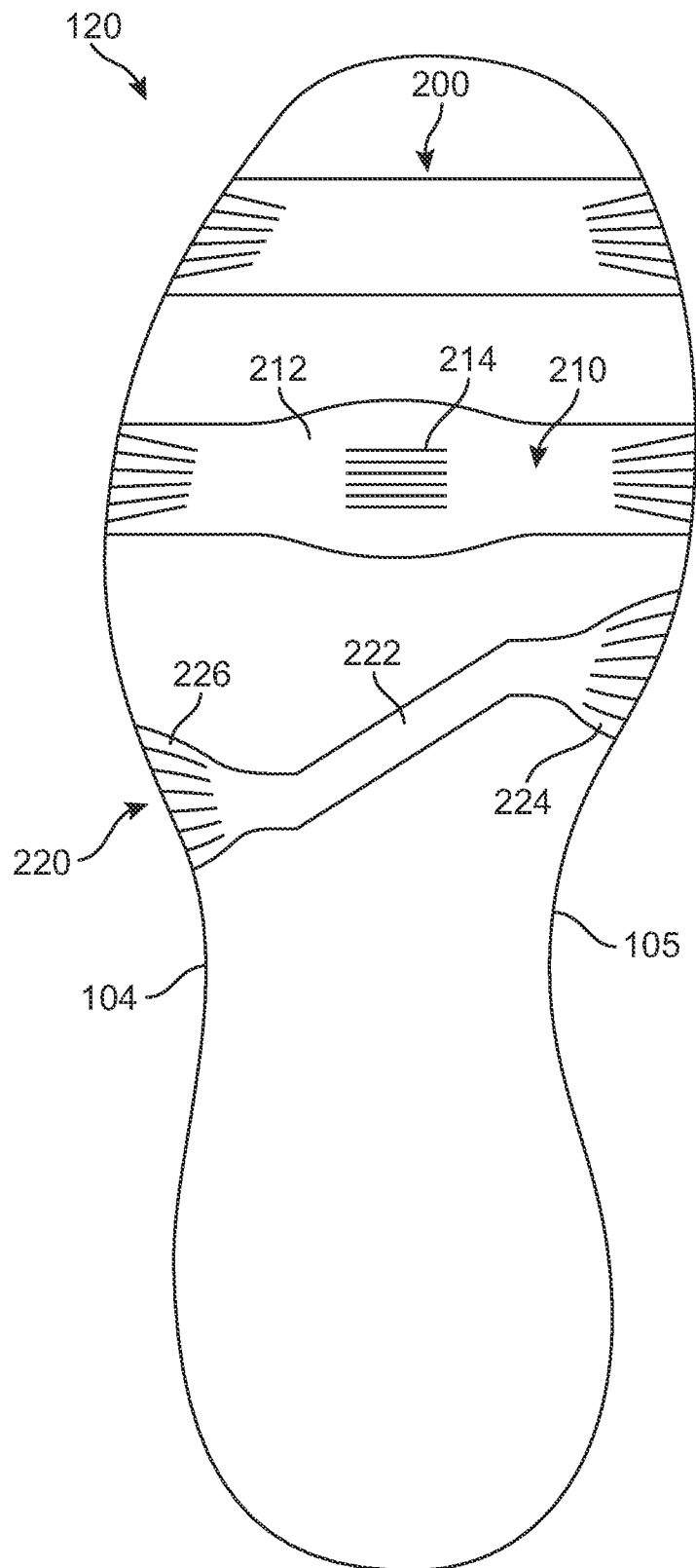
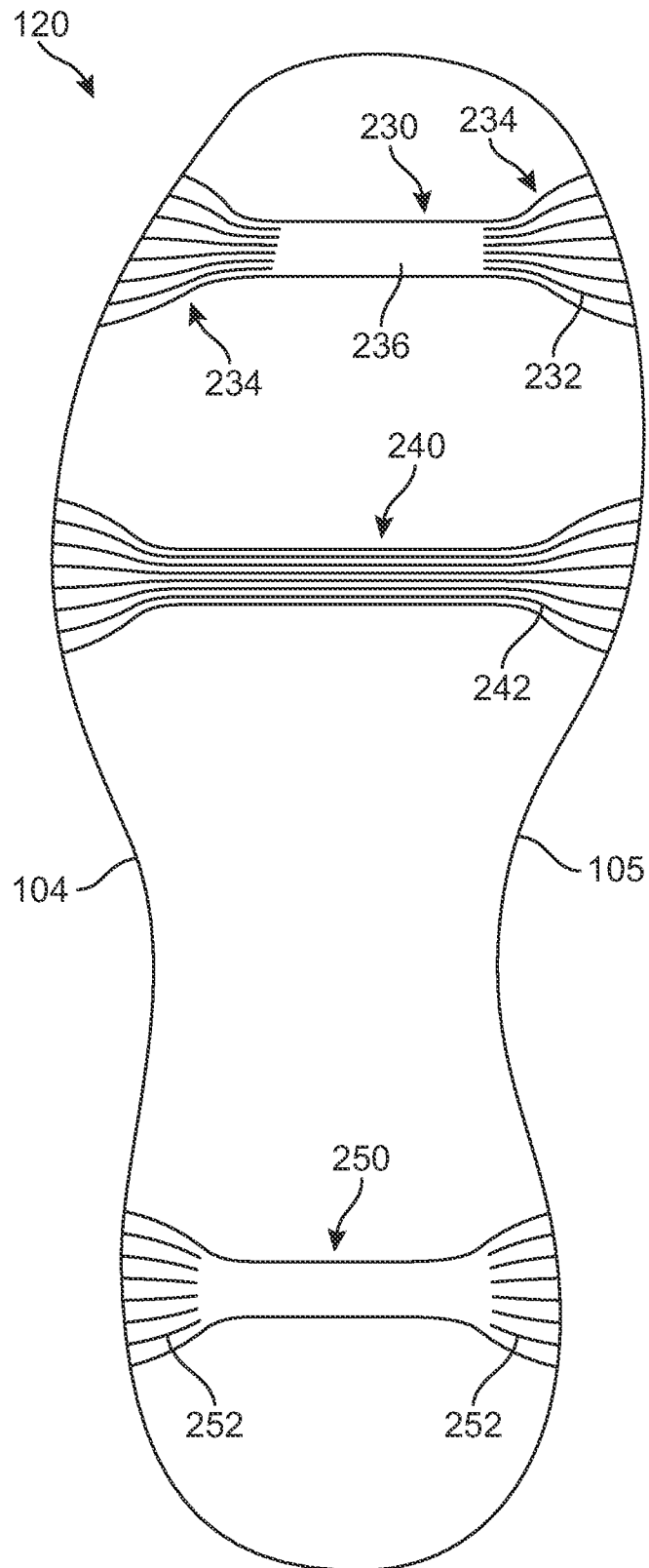


FIG. 7B

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**FIG. 7C**

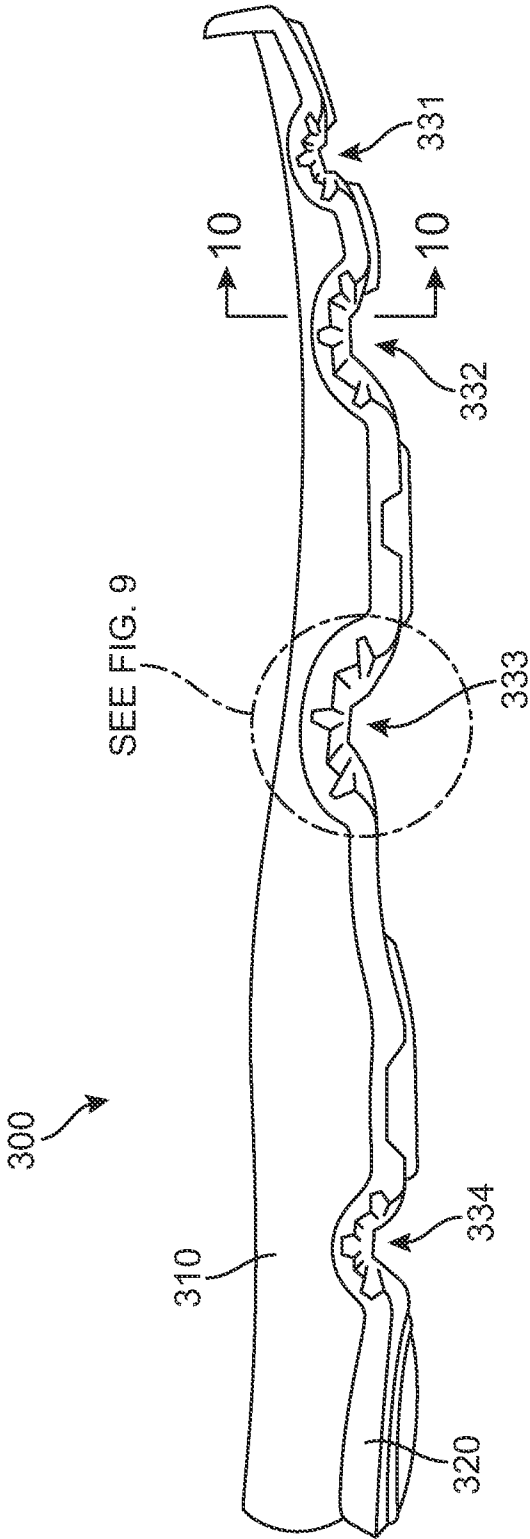


FIG. 8

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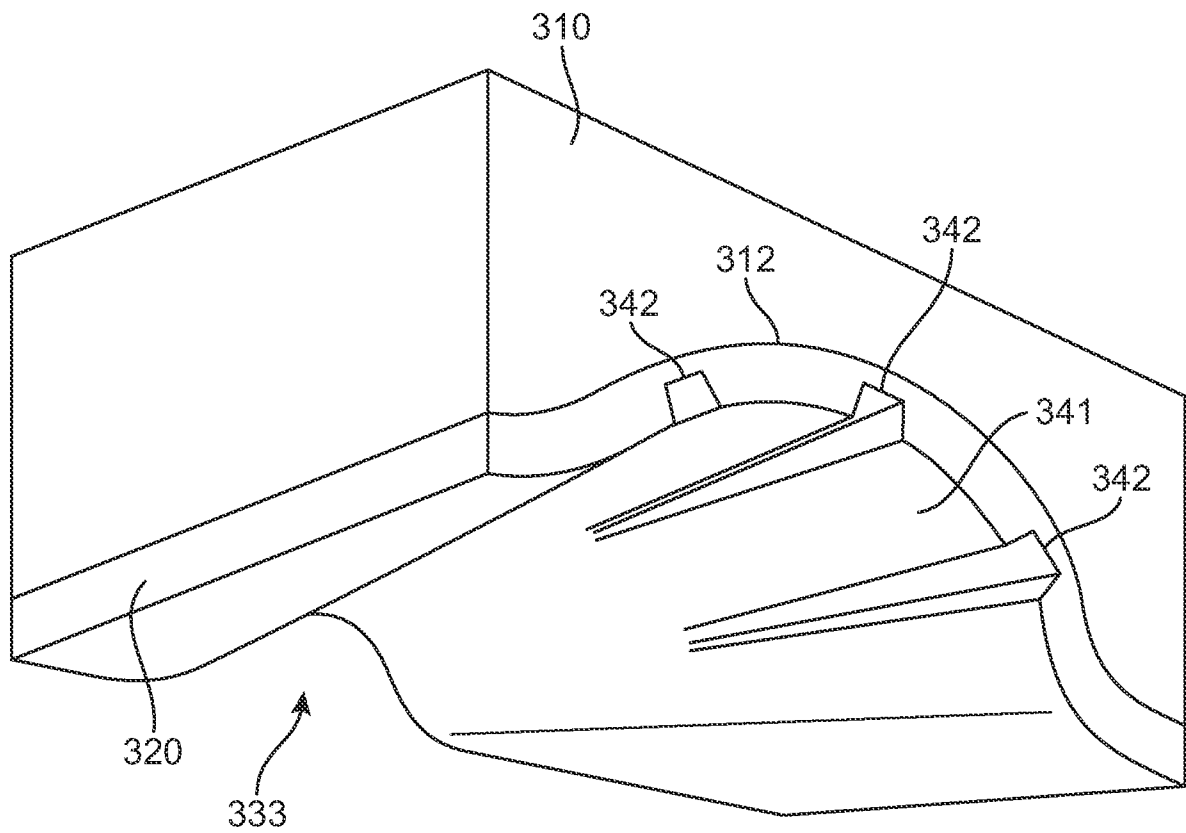


FIG. 9

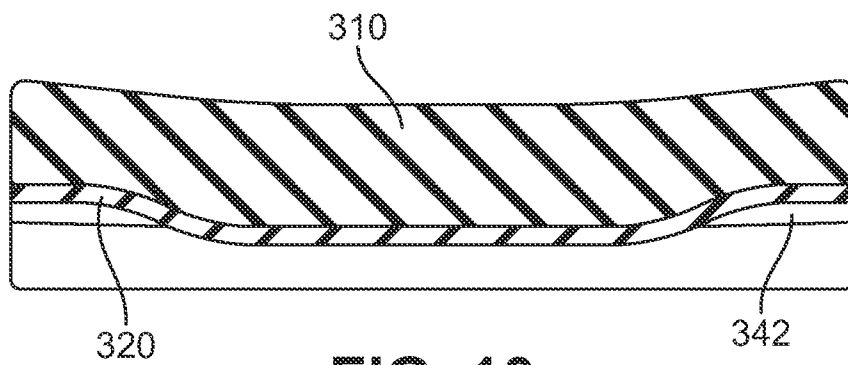


FIG. 10

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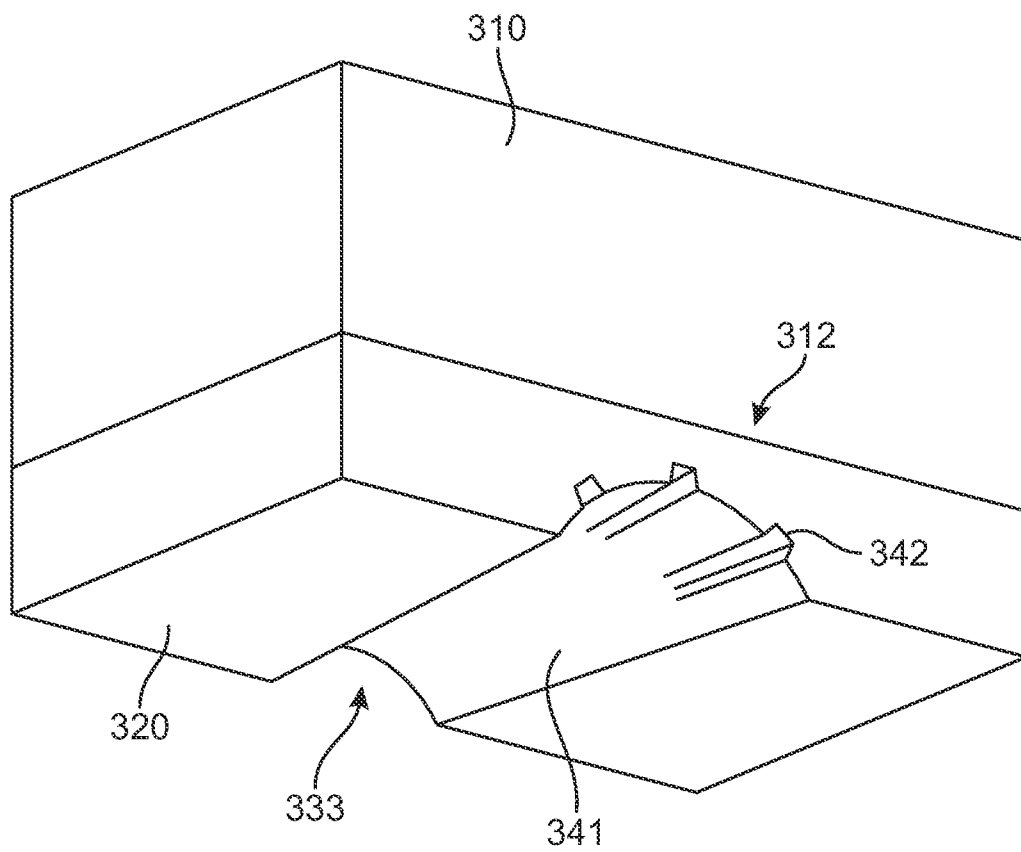


FIG. 11

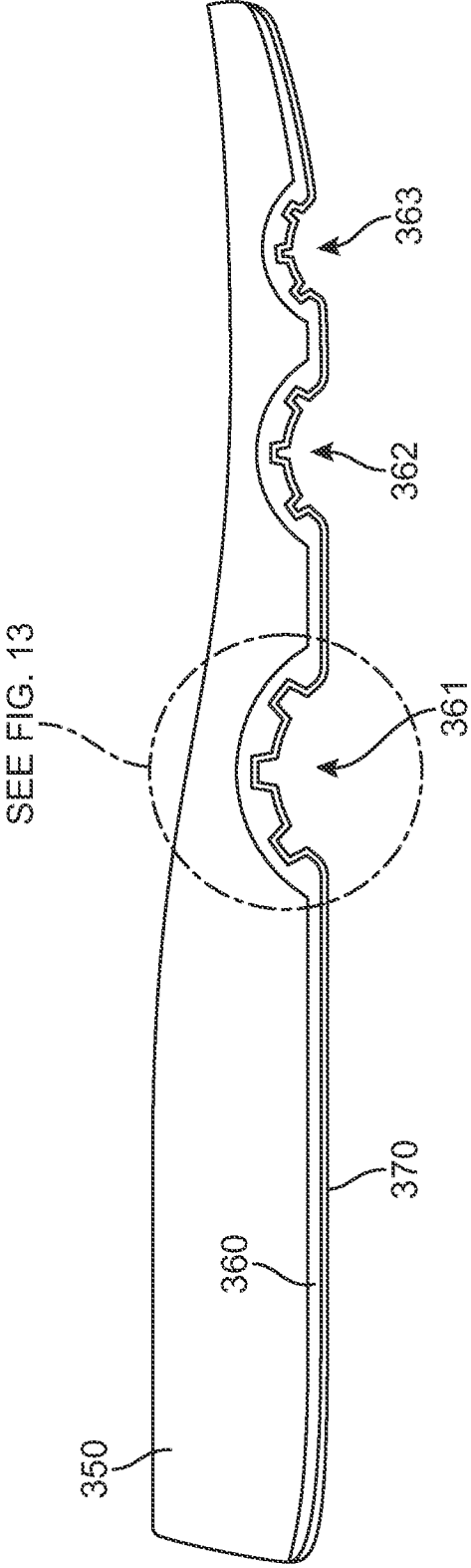


FIG. 12

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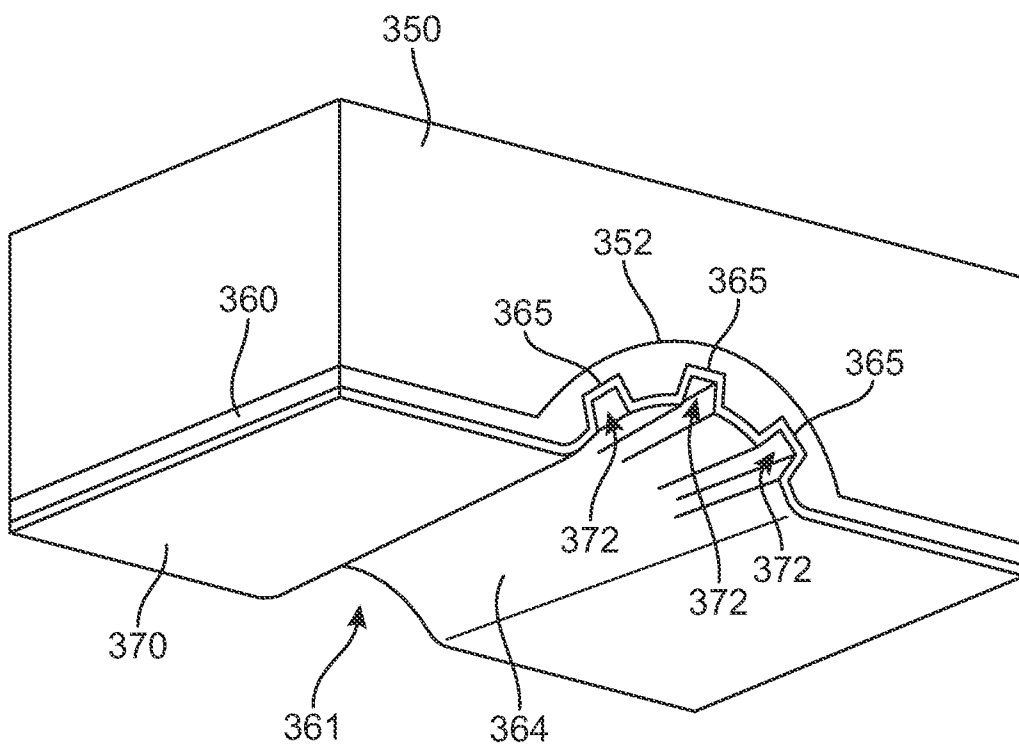


FIG. 13

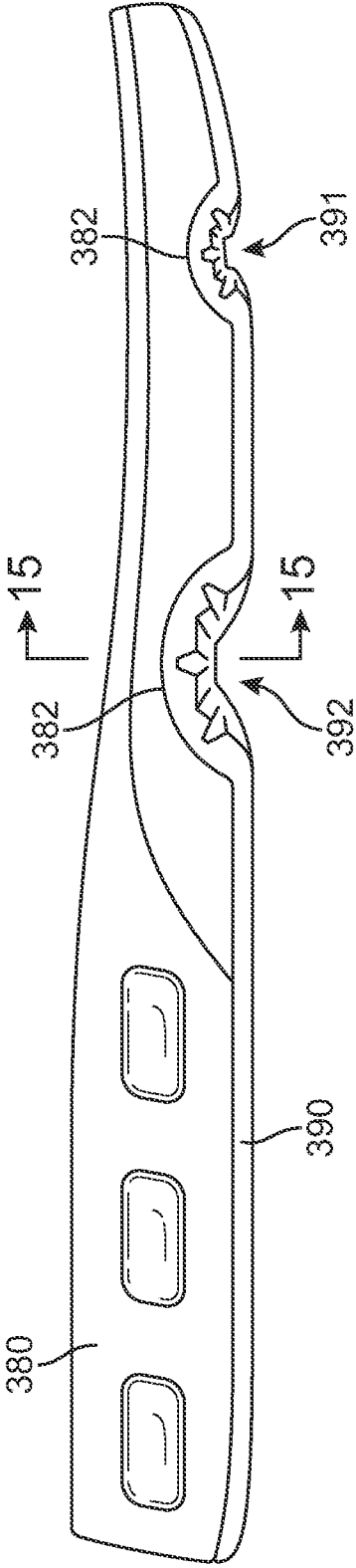


FIG. 14

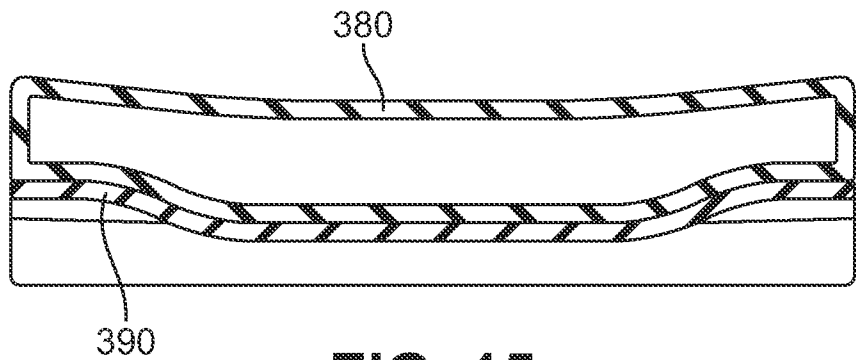


FIG. 15

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2013/028999

A. CLASSIFICATION OF SUBJECT MATTER

INV. A43B13/14 A43B13/18
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A43B

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

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2010/299965 A1 (AVAR ERIC P [US] ET AL) 2 December 2010 (2010-12-02) paragraphs [0021], [0032], [0049]; figures 1, 5	1-12
A	----- WO 2009/146231 A1 (NIKE INC [US]; NIKE INTERNATIONAL LTD [US]; DEKOVIC DENIS [US]; DAVERS) 3 December 2009 (2009-12-03) claims; figures	1
A	----- US 2008/289224 A1 (SINK JEFFREY A [US]) 27 November 2008 (2008-11-27) claims; figures	1
A	----- US 2005/133968 A1 (FOXEN THOMAS [US] ET AL) 23 June 2005 (2005-06-23) cited in the application claims; figures	1



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

22 July 2013

Date of mailing of the international search report

30/07/2013

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
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Authorized officer

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/028999

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 13-34
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 13-34

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

In view of the number of independent claims (4 independent claims) and also the wording of the claims presently on file, which render it difficult, if not impossible, to determine the matter for which protection is sought, the present application fails to comply with the clarity and conciseness requirements of Article 6 PCT (see also Rule 6.1(a) PCT) to such an extent that a meaningful search is impossible.

In the present case and prima facie, the claimed subject-matters are so numerous and different that they simply preclude the detailed analysis necessary to come to a firm conclusion regarding to the essential technical features of the invention and also the unity of the present application.

At least some of the independent claims differ from independent claim 1, in that they are drafted by means of removing features and/or adding features, thus lacking conciseness and clarity about the subject-matter to be searched.

Consequently, the search has been carried out for those parts of the application which do appear to be clear (and concise), namely independent claim 1 (product claim), and dependent claims 2-12.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/028999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010299965	A1	02-12-2010	NONE

WO 2009146231	A1	03-12-2009	CN 102083335 A 01-06-2011
			CN 102578751 A 18-07-2012
			EP 2280622 A1 09-02-2011
			US 2009293314 A1 03-12-2009
			US 2012159815 A1 28-06-2012
			WO 2009146231 A1 03-12-2009

US 2008289224	A1	27-11-2008	US 2008289224 A1 27-11-2008
			US 2013152429 A1 20-06-2013

US 2005133968	A1	23-06-2005	NONE



(12) 发明专利申请

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(51) Int. Cl.

(22) 申请日 2013. 03. 05

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(30) 优先权数据

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13/414, 857 2012. 03. 08 US

(85) PCT国际申请进入国家阶段日

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W02013/134195 EN 2013. 09. 12

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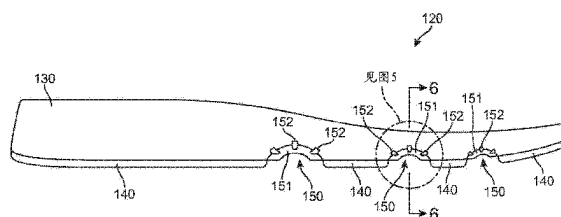
权利要求书3页 说明书7页 附图13页

(54) 发明名称

具有带有柔性槽的鞋底结构的鞋类物品

(57) 摘要

鞋类物品 (100) 包括鞋面 (110) 和固定至鞋面的鞋底结构 (120)。鞋底结构 (120) 包括鞋底夹层 (130)、鞋外底 (140) 以及至少一个槽。该槽包括大槽 (151) 和位于该大槽内的至少一个微槽 (152)。大槽可由鞋底结构 (120) 中的凹口或减少的厚度的区域形成。微槽 (152) 可由大槽 (151) 的表面中的凹口或减少的厚度的区域形成。



1. 一种鞋类物品,包括鞋面和固定至所述鞋面的鞋底结构,所述鞋底结构延伸穿过所述鞋类的长度并从所述鞋类的外侧面延伸至相对的内侧面,并且所述鞋底结构界定第一表面和相对的第二表面,所述第一表面连接至所述鞋面,且所述第二表面形成所述鞋类的接触地面的区域,所述第二表面界定:

大槽,其具有 (a) 从所述外侧面并朝向所述内侧面延伸的长度,以及 (b) 延伸至所述鞋底结构中并朝向所述第一表面延伸的深度;及

多个微槽,其位于所述大槽内,所述微槽具有 (a) 从所述外侧面并朝向所述内侧面延伸的长度,以及 (b) 延伸至所述鞋底结构中并朝向所述第一表面延伸的深度,

所述大槽的长度大于所述微槽的长度,且所述大槽的深度是所述微槽的深度的至少三倍。

2. 如权利要求 1 所述的鞋类物品,其中所述大槽从所述外侧面延伸至所述第二表面的至少中心区域。

3. 如权利要求 2 所述的鞋类物品,其中所述大槽在所述外侧面处的深度大于在所述中心区域中的深度。

4. 如权利要求 2 所述的鞋类物品,其中所述微槽不存在于所述中心区域中。

5. 如权利要求 1 所述的鞋类物品,其中所述大槽从所述外侧面延伸至所述内侧面。

6. 如权利要求 5 所述的鞋类物品,其中所述大槽在所述外侧面和所述内侧面处的深度大于在所述中间区域中的深度。

7. 如权利要求 5 所述的鞋类物品,其中所述微槽不存在于所述中心区域中,且多个另外的微槽位于所述大槽内和所述内侧面处。

8. 如权利要求 1 所述的鞋类物品,其中所述大槽在所述外侧面处的深度延伸穿过所述第一表面和所述第二表面之间的距离的至少百分之二十五。

9. 如权利要求 1 所述的鞋类物品,其中所述鞋底结构包括鞋底夹层和鞋外底,所述大槽和所述微槽形成在所述鞋底夹层中,并且所述鞋外底在所述大槽和所述微槽的区域中不存在。

10. 如权利要求 1 所述的鞋类物品,其中所述鞋底结构包括鞋底夹层和鞋外底,所述鞋底夹层界定所述第一表面和与所述第一表面相对地定位的凹部,并且所述鞋外底形成所述第二表面且延伸至所述凹部中。

11. 如权利要求 1 所述的鞋类物品,其中所述鞋底结构包括鞋底夹层和鞋外底,所述鞋底夹层为流体填充室,且所述鞋外底固定至所述鞋底夹层。

12. 如权利要求 1 所述的鞋类物品,其中所述微槽具有所述鞋底结构的厚度的大约 5% -12% 的深度。

13. 一种鞋类物品,包括鞋面和固定至所述鞋面的鞋底结构,所述鞋底结构具有接触地面的表面,所述接触地面的表面界定从所述鞋类的相对的侧面并朝向所述鞋类的中心区域延伸的多个大槽,所述大槽中的至少一个具有:(a) 在所述鞋类的所述侧面处比在所述中心区域中大的深度,和 (b) 邻近所述鞋类的所述侧面定位且朝向所述中心区域延伸的多个微槽,所述大槽和所述微槽中的每一个是延伸至所述鞋底结构中的在所述接触地面的表面中的凹口。

14. 如权利要求 13 所述的鞋类物品,其中所述微槽不存在于所述中心区域中。

15. 如权利要求 13 所述的鞋类物品,其中所述大槽的长度大于所述微槽的长度。
16. 如权利要求 13 所述的鞋类物品,其中在所述鞋类的所述侧面处的深度是在所述鞋类的所述侧面处所述微槽的深度的至少三倍。
17. 如权利要求 13 所述的鞋类物品,其中在所述鞋类的所述侧面处的深度延伸穿过所述鞋底结构的厚度的至少百分之二十五。
18. 如权利要求 13 所述的鞋类物品,其中所述微槽具有所述鞋底结构的厚度的大约 5% -12% 的深度。
19. 如权利要求 13 所述的鞋类物品,其中所述鞋底结构包括鞋底夹层和鞋外底,所述大槽和所述微槽形成于所述鞋底夹层中,且所述鞋外底在所述大槽和所述微槽的区域中不存在。
20. 如权利要求 13 所述的鞋类物品,其中所述鞋底结构包括鞋底夹层和鞋外底,所述鞋底夹层的下表面界定在所述大槽的区域中的多个凹部,且所述鞋外底形成所述接触地面的表面并延伸至所述鞋底夹层的所述凹部中以形成所述大槽。
21. 如权利要求 13 所述的鞋类物品,其中所述大槽具有所述微槽的深度的大约 3-5 倍的深度。
22. 如权利要求 13 所述的鞋类物品,其中所述鞋底结构包括鞋底夹层和鞋外底,所述鞋底夹层为流体填充室,且所述鞋外底固定至所述鞋底夹层。
23. 一种鞋类物品,包括鞋面和固定至所述鞋面的鞋底结构,所述鞋底结构具有上表面和相对的接触地面的表面,所述接触地面的表面界定:
第一凹口,其具有第一长度和第一深度;以及
多个第二凹口,其位于所述第一凹口内,所述第二凹口中的每一个具有第二长度和第二深度,
所述第一长度大于所述第二长度,所述第一深度是所述第二深度的至少三倍,且所述第一深度是所述上表面和所述接触地面的表面之间的距离的至少百分之二十五。
24. 如权利要求 23 所述的鞋类物品,其中所述第一凹口在所述鞋类的相对侧之间延伸。
25. 如权利要求 23 所述的鞋类物品,其中所述第一个凹口不存在于所述鞋类的中心区域的至少一部分中。
26. 如权利要求 23 所述的鞋类物品,其中所述第一深度在所述鞋类的侧面处比在所述鞋类的中心区域中大。
27. 如权利要求 23 所述的鞋类物品,其中所述第二凹口 (a) 邻近所述鞋类的至少一侧定位且 (b) 不存在于所述鞋类的中心区域中。
28. 如权利要求 23 所述的鞋类物品,其中所述鞋底结构包括鞋底夹层和鞋外底,所述第一凹口和所述第二凹口形成于所述鞋底夹层中,且所述鞋外底在所述第一凹口和所述第二凹口的区域中不存在。
29. 如权利要求 23 所述的鞋类物品,其中所述鞋底结构包括鞋底夹层和鞋外底,所述鞋底夹层界定位于所述第一凹口处的凹部,且所述鞋外底形成所述接触地面的表面且延伸至所述凹部中。
30. 如权利要求 23 所述的鞋类物品,其中所述鞋底结构包括鞋底夹层和鞋外底,所述

鞋底夹层为流体填充室,且所述鞋外底固定至所述鞋底夹层。

31. 一种鞋类物品,其具有鞋面和固定至所述鞋面的鞋底结构,所述鞋底结构包括:

鞋底夹层,其具有第一表面和第二表面,所述第一表面邻近所述鞋面定位,且所述第二表面与所述第一表面相对地定位且界定在所述鞋类的相对侧之间的方向上延伸的凹部;

鞋外底,其固定至所述第二表面的至少一部分,所述鞋外底形成所述鞋类的接触地面的表面的至少一部分;

大槽,其位于所述凹部处且在所述鞋类的所述相对侧之间的方向上延伸,所述大槽形成所述接触地面的表面中的凹口;以及

多个微槽,其位于所述大槽内,所述微槽在所述鞋类的所述相对侧之间的方向上延伸,且所述微槽形成所述接触地面的表面中的另外的凹口。

32. 如权利要求 31 所述的鞋类物品,其中所述鞋外底在所述凹部的区域中不存在并且暴露所述第二表面的界定所述凹部的部分,所述第二表面的界定所述凹部的所述部分形成所述接触地面的表面的区域,且所述微槽形成于所述第二表面中。

33. 如权利要求 31 所述的鞋类物品,其中所述鞋外底延伸至所述凹部中以形成所述大槽。

34. 如权利要求 31 所述的鞋类物品,其中所述鞋底夹层为流体填充室。

具有带有柔性槽的鞋底结构的鞋类物品

[0001] 背景

[0002] 鞋类物品通常包括两个主要元件：鞋面和鞋底结构。鞋面通常由多个材料元件形成（比如，纺织物、聚合物片层、聚合物泡沫层、皮革、合成皮革），其被缝制或粘接地结合在一起以形成鞋类内的空腔以用于舒适地和牢固地接纳足部。更具体地说，鞋面形成一种结构，其在足部的脚背和脚趾区域上方沿着足部的内侧面和外侧面且围绕足部的后跟区域延伸。鞋面也可包含鞋带系统，以调整鞋类的配合度，以及允许足部从鞋面内的空腔进入和移出。另外，鞋面可包括鞋舌，该鞋舌在鞋带系统下方延伸以提高鞋类的可调性和舒适性，且鞋面可包含用于稳定足部的脚跟区域的脚跟稳定器。

[0003] 鞋底结构固定至鞋面的下部部分且位于足部和地面之间。例如，在运动鞋类中，鞋底结构通常包括鞋底夹层和鞋外底。鞋底夹层可由聚合物泡沫材料形成，该材料在行走、跑步以及其它走动活动期间缓冲地面的反作用力（即，为足部提供缓冲）。鞋底夹层还可包括例如流体填充室、板、稳定器或进一步缓冲力、提高稳定性或影响足部的运动的其它元件。在某些构造中，鞋底夹层可主要由流体填充室形成。鞋外底形成鞋类的接触地面的元件且通常由耐久的且耐磨的橡胶材料制成，该橡胶材料包括纹理以赋予附着摩擦力。鞋底结构还可包括鞋垫，其在鞋面的空腔内且接近足部的下表面定位以提高鞋类舒适性。

[0004] 概述

[0005] 根据一个构造，鞋类物品可包括鞋面和固定至鞋面的鞋底结构。鞋底结构可延伸穿过鞋类的长度并且从鞋类的外侧面延伸至相对的内侧面。鞋底结构可界定第一表面和相对的第二表面。第一表面可连接至鞋面。第二表面可形成鞋类的接触地面的区域，其界定：大槽（macro groove）和多个微槽（micro groove）。大槽可具有（a）从外侧面且朝向内侧面延伸的长度，以及（b）延伸至鞋底结构中且朝向第一表面延伸的深度。微槽可以位于大槽内且具有（a）从外侧面且朝向内侧面延伸的长度，以及（b）延伸至鞋底结构中且朝向第一表面延伸的深度。大槽的长度可大于微槽的长度，且大槽的深度可为微槽的深度的至少三倍。

[0006] 根据一个构造，鞋类物品可包括鞋面和固定至鞋面的鞋底结构。鞋底结构可具有上表面和相对的接触地面的表面。接触地面的表面可界定第一凹口和多个第二凹口。第一凹口可具有第一长度和第一深度。第二凹口可位于第一凹口内。第二凹口中的每一个可具有第二长度和第二深度，其中第一长度大于第二长度，第一深度为第二深度的至少三倍，且第一个深度为上表面与接触地面的表面之间的距离的至少百分之二十五。

[0007] 根据一种构造，鞋类物品可包括鞋面和固定至鞋面的鞋底结构。鞋底结构可包括鞋底夹层和鞋外底。鞋底夹层可包括第一表面和第二表面，第一表面邻近鞋面定位，且第二表面与第一表面相对地定位且界定在鞋类的相对侧之间的方向上延伸的凹部。鞋外底可固定至第二表面的至少一部分，鞋外底形成鞋类的接触地面的表面的至少一部分。大槽可位于凹部处且在鞋类的相对侧之间的方向上延伸。大槽可形成在接触地面的表面中的凹口。多个微槽可以位于大槽内。微槽可以在鞋类的相对侧之间的方向上延伸。微槽可形成接触地面的表面中的另外的凹口。

[0008] 表征本发明的方面的新颖性的优势及特征在所附权利要求中被特别地指出。但是,为了获得创新性的特征和优势的更进一步的理解,可参考下面的描述内容和附图,描述内容和附图描述并示出了涉及本发明的多种构造和概念。

[0009] 附图描述

[0010] 结合附图阅读将会更好地理解前述概述和下面的详细描述。

[0011] 图 1 为鞋类物品的透视图。

[0012] 图 2 为鞋类物品的分解透视图。

[0013] 图 3 为来自该鞋类物品的鞋底结构的侧视图。

[0014] 图 4 为鞋底结构的仰视图。

[0015] 图 5 为图 3 所界定的鞋底结构的一部分的透视图。

[0016] 图 6 为图 3 所界定的鞋底结构的横截面图。

[0017] 图 7A-7C 为描述鞋底结构的另外的构造的仰视图。

[0018] 图 8 为描述鞋底结构的另外的构造的侧视图。

[0019] 图 9 为图 8 所界定的鞋底结构的一部分的透视图。

[0020] 图 10 为图 8 所界定的鞋底结构的横截面图。

[0021] 图 11 为鞋底结构的一部分的透视图,描述了鞋底结构的另外的构造。

[0022] 图 12 为描述鞋底结构的另外的构造的侧视图。

[0023] 图 13 为鞋底结构的一部分的透视图,描述了鞋底结构的另外的构造。

[0024] 图 14 为描述鞋底结构的另外的构造的侧视图。

[0025] 图 15 为图 4 所界定的鞋底结构的横截面图。

[0026] 详细描述

[0027] 下面的讨论和附图公开了鞋类物品的多种构造。虽然鞋类被公开为具有适合于跑步的构造,但是与鞋类有关的概念可应用于广泛的运动鞋类类型,比如包括篮球鞋、交叉训练鞋、橄榄球鞋、高尔夫球鞋、旅游鞋和旅游靴、滑雪靴及滑板靴、足球鞋、网球鞋以及步行鞋。与鞋类有关的概念还可用于通常被认为是非运动的鞋类类型,包括时装鞋、平底便鞋以及凉鞋。因此,此处所公开的概念可用于多种鞋类类型。

[0028] 鞋类物品 100 在图 1 和图 2 中被描述为包括鞋面 110 和鞋底结构 120。鞋面 110 为穿戴者的足部提供舒适的和牢固的覆盖物。正因如此,足部可位于鞋面 110 内以有效地将足部固定在鞋类 100 内。鞋底结构 120 固定至鞋面 110 的下方区域且在鞋面 110 和地面之间延伸。当足部位于鞋面 110 内时,鞋底结构 120 在足部下方延伸以例如缓冲地面反作用力(也就是,为足部提供缓冲)、提供附着摩擦力、提高稳定性以及影响足部的运动。

[0029] 为了参考的目的,鞋类 100 可分成三个大体区域:鞋前部区 101、鞋中部区 102、以及鞋跟区 103。鞋前部区 101 大体包括鞋类 100 的对应于脚趾和连接跖骨与趾骨的关节的部分。鞋中部区 102 大体包括鞋类 100 的对应于足部的足弓区域的部分。鞋跟区 103 大体对应于足部的后部部分,包括跟骨。鞋类 100 还包括外侧面 104 和内侧面 105,其延伸穿过区域 101-103 中的每一个且对应于鞋类 100 的相对侧。更特别地,外侧面 104 对应于足部的外侧区域(即,背离另一只脚的表面),而内侧面 105 对应于足部的内侧区域(即,面向另一只脚的表面)。区域 101-103 和侧面 104-105 不意在区分鞋类 100 的准确区域。而是,区域 101-103 和侧面 104-105 旨在表示鞋类 100 的大体区域来帮助下面的讨论。除了鞋类

100 之外,区域 101-103 和侧面 104-105 还可应用于鞋面 110、鞋底结构 120 以及其单个元件。

[0030] 鞋面 110 被描述为具有由多种元件(例如,织物、聚合物片层、聚合物泡沫层、皮革、合成皮革)形成的实质上常规的构造,这些元件被缝制、结合或以其它方式连接在一起以提供用于接纳足部并将足部相对于鞋底结构 120 固定的结构。鞋面 110 的各种元件界定空腔 111,该空腔 111 是鞋类 100 的具有足部的形状的大体空心的区域,其旨在接纳足部。正因如此,鞋面 110 沿着足部的外侧面、沿着足部的内侧面、在足部之上、围绕足部的后跟并且在足部之下而延伸。通过位于至少鞋跟区 103 中的踝部开口 112 提供空腔 111 的入口。鞋带 113 延伸穿过各个鞋带孔 114 而且允许穿戴者来修改鞋面 110 的尺寸以适应足部的比例。更特别地,鞋带 113 允许穿戴者围绕足部收紧鞋面 110,并且鞋带 113 允许穿戴者放松鞋面 110 以帮助足部从空腔 111(即,穿过踝部开口 112)的进入或移出。另外,鞋面 110 包括鞋舌 115,鞋舌 115 在空腔 111 和鞋带 113 之间延伸以提高鞋类 100 的舒适性和可调性。因此,鞋面 110 由形成用于接纳和固定足部的结构的多种元件形成。

[0031] 鞋底结构 120 的主要元件是如图 3-6 所描述的鞋底夹层 130 和鞋外底 140。鞋底夹层 130 一般由聚合泡沫材料形成(例如,聚氨基甲酸酯泡沫或乙烯醋酸乙烯酯(ethylvinylacetate)泡沫),该材料在行走、跑步和其它走动活动期间缓和地面反作用力(即,为足部提供缓冲)。虽然没有被描述,但是鞋底夹层 130 也可包括流体填充室、板、调节器或进一步缓冲力、提高稳定性或影响足部的运动的其它元件。在另外的构造中(其将在下面讨论),鞋底夹层 130 可主要由流体填充室形成。虽然在某些构造中不存在,但是鞋外底 140 固定至鞋底夹层 130 的下表面并且形成鞋类 100 的接触地面的表面的至少一部分。为了提供用于接合地面的持久和耐磨的表面,鞋外底 140 可由橡胶材料形成。另外,鞋外底 140 可具有纹理以提高鞋类 100 与地面之间的附着摩擦力(也就是摩擦力)的特性。鞋底结构 120 还可包括鞋垫(未示出),其为位于空腔 111 内且邻近足部的下表面以提高鞋类 100 的舒适性的可压缩构件。

[0032] 鞋底结构 120 包含多种特征,该多种特征提供增强在行走和跑步期间鞋类 100 的弯曲、折曲或以其它方式变形的能力的优势。更特别地,鞋底结构 120 包括三个弯曲区域 150,如图 3 的示例中所示出的,该弯曲区域 150 赋予鞋底结构 120 的特定区域柔性。当穿着鞋类 100 时,由于鞋底结构 120 随着穿着者的足部的移动而弯曲和顺应的增强的能力,因此,弯曲区域 150 可向鞋类 100 的穿戴者提供改进的舒适性或移动。在继续缓冲地面的反作用力和给予稳定性的同时,这种在鞋底结构 120 的柔性的增加可被提供。

[0033] 多种弯曲区域 150 可大体被描述为在鞋底结构 120 中的减少的厚度的区域。鉴于减少的厚度,弯曲区域 150 以少于鞋底结构 120 的其它区域的力进行折曲、弯曲或以其他方式变形。弯曲区域 150 位于鞋底结构 120 的多种区域中且可在侧面 104 和 105 之间延伸。虽然每个弯曲区域 150 的特定位置可显著变化,但三个弯曲区域 150 位于(a)鞋前部区 101 中、(b)在鞋前部区 101 和鞋中部区 102 之间的交界处以及(c)鞋中部区 102 中。以这种布置,弯曲区域 150 接近连接趾骨与跖骨的关节定位。即,弯曲区域 150 围绕脚趾与足部的其它部分连接的关节定位。正因如此,弯曲区域 150 可提高或以其他方式帮助在鞋类 100 的对应于连接跖骨与趾骨的关节的区域中的弯曲。

[0034] 弯曲区域 150 中的每一个包括大槽 151 和多种微槽 152。大槽 151 在鞋底结构 120

的接触地面的表面内形成相对大的凹口并完全地延伸穿过鞋底结构 120, 如图 4 中所示。在其它构造中, 大槽 151 中的一个或多个可仅仅部分地延伸穿过鞋底结构 120。例如, 大槽 151 的部分可不存在于鞋底结构 120 的中心区域 (即, 从侧面 104 和 105 两者向内隔开的区域) 中。

[0035] 微槽 152 位于大槽 151 内且形成鞋底结构 120 的接触地面的表面中的相对小的凹口。虽然微槽 152 接近侧面 104 和 105 中的每一个定位且向鞋底结构 120 的中心区域延伸, 但是微槽 152 不存在于中心区域中。正因如此, 大槽 151 的长度可大于微槽 152 的长度。比如, 微槽 152 可具有接近于该微槽 152 位于其中的大槽 151 的长度的 5% -100% 的长度。在另外一个例子中, 单个的微槽 151 可具有接近于该微槽 152 位于其中的大槽 151 的长度的 5% -20% 的长度。在其它构造中, 微槽 152 可完全地延伸穿过鞋底结构 120。

[0036] 大槽 151 和微槽 152 共同起作用来提高鞋底结构 120 在弯曲区域 150 的区域中的弯曲。更特别地, 槽 151 和 152 中的每一个有效地减少了鞋底结构 120 的厚度, 由此允许弯曲区域 150 以小于鞋底结构 120 的其它区域的力来弯曲、折曲或以其他方式变形。虽然大槽 151 具有形成鞋底结构 120 的减少的厚度的大部分的深度, 但是在在大槽 151 中的每一个内的多个微槽 152 具有组合以进一步减少鞋底结构 120 的厚度的深度。当穿着鞋类 100 时, 由于鞋底结构 120 随着穿戴者的足部的移动而弯曲和顺应的提高的能力, 因此, 组合中的槽 151 和 152 向鞋类 100 的穿戴者提供了改进的舒适性或移动。

[0037] 通过弯曲区域 150 所提供的弯曲的量依赖于多种因素, 包括大槽 151 的深度。参考图 5 和图 6, 大槽 151 中的一个被描述为具有变化的深度。更特别地, 在侧面 104 和 105 中的每一个处的深度大于在鞋底结构 120 的中心区域中的深度。因此, 大槽 151 可具有锥形面, 其中深度在侧面 104 和 105 处最大并且在鞋底结构 120 的中心区域中最小。为了赋予显著的或有利的弯曲量, 大槽 151 一般具有鞋底结构 120 的厚度的至少百分之二十的深度。即, 大槽 151 在鞋底结构 120 中形成凹口, 该凹口延伸穿过鞋底结构 120 的上表面 (即, 固定至鞋面 110 的表面) 与接触地面的表面之间的距离的至少百分之二十五。例如, 参考图 6, 在外侧面 104 处的大槽 151 的深度比在外侧面 104 处的鞋底结构 120 的厚度大百分之二十五, 并且鞋底结构 120 的中心区域中的大槽 151 的深度比鞋底结构 120 的中心区域中的鞋底结构 120 的厚度大百分之二十五。在另一个示例中, 大槽 151 具有大约 3-12mm 的深度。

[0038] 除了大槽 151 的深度之外, 微槽 152 的相对深度也影响着由弯曲区域 150 所提供的弯曲的量。例如, 微槽 152 可具有大约 1-4mm 的深度或等于鞋底结构 120 的厚度的 5% 或更多的深度。在另一个示例中, 微槽 152 可具有鞋底结构 120 厚度的大约 5% -12% 的深度。一般来说, 大槽 151 的深度一般说明明显大于微槽 152 的深度。比如, 大槽 151 可具有比微槽 152 的深度大 3-5 倍的深度。在另一个例子中, 大槽 151 可具有比微槽 152 的深度大 3 倍的深度。微槽 152 也可具有变化的深度。例如, 微槽 152 可具有逐渐变细的结构, 使得微槽 152 的深度在侧面 104 和 105 中的每一个处大于在鞋底结构 120 的中心区域中或朝向鞋底结构 20 的中心区域的深度。

[0039] 如上述所讨论的, 大槽 151 和微槽 152 共同起作用来提高鞋底结构 120 在弯曲区域 150 的区域中的弯曲。鉴于多个微槽 152 存在于弯曲区域 150 的特定区域中, 形成具有小于大槽 151 的深度的至少三分之一的深度的微槽 152 赋予相当大的附加弯曲, 同时保持

鞋底结构 120 在微槽 151 的区域中的结构完整性。

[0040] 在上述所讨论的鞋底结构 120 的构造中,槽 151 和 152 的部分形成于鞋底夹层 130 中,由此暴露鞋底夹层 130 的一部分。鉴于这种构造,鞋外底 140 包括四个彼此隔开的分立部分,如图 2 中所描述的。此外,鞋外底 140 的部分通过在位置上与弯曲区域 150 相对应的多种间隙被分开。在另外的构造中,鞋外底 140 可延伸至鞋底夹层 130 中的凹部中以形成多种槽 151 和 152。在其它构造中,鞋外底 140 单独可形成对应于多种槽 151 和 152 的凹口。

[0041] 基于以上的讨论,鞋底结构 120 包括多种弯曲区域 150,该弯曲区域 150 提高鞋类 100 的弯曲特性。弯曲区域 150 中的每一个包括多种凹口,特别是大槽 151 和微槽 152。大槽 151 形成鞋底结构 120 中相对大的凹口,微槽 152 形成大槽 151 的表面中的较小的凹口。在某些构造中,大槽 151 具有这样的深度,该深度 (a) 延伸穿过鞋底结构 120 的厚度的至少百分之二十五且 (a) 是微槽 152 的深度的至少三倍。大槽 151 也可具有比微槽 152 大的长度。虽然大槽 151 比微槽 152 呈现更大的长度和深度,但是槽 151 和 152 共同起作用来赋予鞋类 100 弯曲。

[0042] 另外的构造

[0043] 上述所讨论的和在图 1-6 中所描述的鞋底结构 120 的构造旨在提供用于在鞋类 100 中使用的合适的结构的例子。但是,鞋底结构 120 的各个方面可显著变化以影响鞋类 100 中的弯曲、改变鞋类 100 的其它特性以及赋予鞋类 100 其它特征。作为示例,图 7A-7C 描述了其中弯曲区域 150 中的每一个被改变的构造。

[0044] 参考图 7A,包括大槽 161 和微槽 162 的弯曲区域 160 从侧面 104 和 105 中的每一个向内延伸,但不完全延伸穿过鞋底结构 120 的宽度。即,大槽 161 的一部分不存在于鞋底结构 120 的中心区域中,形成大槽 161 中的间隙 166。另一个弯曲区域 170 从外侧面 104 延伸至中心区域,但不存在于内侧面 105 中,由此穿过鞋底结构 120 的大约二分之一的宽度。相似的弯曲区域 172 从内侧面 105 延伸至中心区域,由此穿过鞋底结构 120 的大约三分之一的宽度。

[0045] 尽管弯曲区域中的许多大体上垂直于鞋类 100 的纵向轴线,但是图 7A 将弯曲区域 180 描述为相对于其它弯曲区域有角度。例如,弯曲区域 180 的内侧端 182 和外侧端 184 可以在鞋底结构 120 的脚趾部分和鞋跟之间延伸的方向上位于不同位置处。因此,沿着弯曲区域 180 延伸的纵向轴线 186 定向成相对于方向 188 成角度 189,方向 188 在由内侧到外侧的方向上延伸穿过鞋底结构 120。方向 188 可大体上垂直于在鞋底结构 120 的鞋前部区 101 和鞋跟区 103 之间延伸的纵向轴线。比如,角度 189 可大约为 1° 到 60° ,或在另一个示例中大约为 5° 到 45° 。另外,虽然图 7A 的例子将内侧端 182 描述为比外侧端 184 更靠近鞋前部区 101,但是其它的实施方式可被提供,其中内侧端 182 比外侧端 184 更靠近鞋跟区 103。

[0046] 图 7A 中的另一个弯曲区域 190 包括大于第二端 194 的第一端 192。通过比第二端 194 以更大的量朝向鞋前部区 101 和鞋跟区 103 延伸和 / 或通过延伸至比第二端 194 更深的深度,第一端 192 可更大。当在鞋底结构的一侧上比另一侧上期望更大的量的弯曲时,这种构造可能是有利的。如在图 7A 的示例中所示出的,第一端 192 可位于内侧面 105 上且第二端 194 可位于外侧面 104 上。在另一个实施方式中,第一端 192 可相反地位于外侧面

104 上且第二端 194 可位于内侧面 105 上。

[0047] 参考图 7B, 鞋底结构 120 的弯曲区域可呈现多种其它的构造。例如, 弯曲区域 200 可包括在侧面 104、105 之间延伸的方向上的非锥形形状。在另一个示例中, 弯曲区域 210 具有在中心区域 212 中比在侧面 104 和 105 中任一个处具有更大的深度或宽度的形状。如在图 7B 的示例中所示出的, 弯曲区域 210 的中心区域 212 可包括微槽 214 或中心区域 212 可不存在微槽 214。弯曲区域 220 可具有有角度的形状, 使得弯曲区域 220 的中心部分 222 定向成相对于端部 224、226 成某一角度。端部 224、226 可相对于由内侧至外侧方向横穿鞋底结构 120 成相同的角度而定向。

[0048] 参考图 7C, 描述了具有改变的微槽结构的弯曲区域的多种方面。特别地, 弯曲区域 230 包括进一步向鞋底结构 120 的中心区域延伸的微槽 232。例如, 微槽 232 可从弯曲区域 230 的逐渐变细端 234 延伸并且延伸至弯曲区域的中心区域 236 中, 该弯曲区域的中心区域 236 具有在由内侧至外侧的方向上的大体上一致的深度和 / 或宽度。另一个弯曲区域 240 包括在由内侧至外的方向上完全地延伸穿过鞋底结构 120 的微槽 242。在另一个弯曲区域 250 中, 微槽 252 的数量可变化以包括邻近侧面 104 和 105 中的每一个的五个微槽 252。

[0049] 参考图 8-10, 描述了鞋底结构 300, 其包括鞋底夹层 310 和鞋外底 320。鞋底夹层 310 可由聚合泡沫材料形成且鞋外底 320 可由耐久的和耐磨的橡胶材料形成, 该橡胶材料包括纹理以赋予附着摩擦力。如在图 8 中所示, 鞋外底 320 可包括弯曲区域 331-334。如在图 9 中所描述的, 每个弯曲区域 333 可包括大槽 341 和微槽 342。因为弯曲区域 331-334 由鞋外底 320 形成, 因此鞋底夹层 310 包括对应的凹部以接纳弯曲区域 332-334 中的每一个。例如, 鞋底夹层 310 包括凹部 312 以接纳大槽 341 和微槽 342, 如图 9 中所示。

[0050] 根据一种实施方式, 弯曲槽可形成于鞋底结构的鞋外底中, 但是鞋底夹层可不存在接纳弯曲区域的大槽的凹部。如图 11 中所示, 鞋外底 320 可形成具有大槽 341 和微槽 342 的弯曲区域 333。相比之下, 鞋底夹层 310 可具有相对平坦的表面 312 而没有任何凹部或与大槽 341 或弯曲区域 333 对应的形状。

[0051] 除形成槽的形状的鞋底夹层和鞋外底之外, 鞋底结构可包括另外的部件或层。转到图 12, 例如, 鞋底结构可包括鞋底夹层 350、鞋外底 370 以及在鞋底夹层 350 和鞋外底 370 之间的中间层 360。例如, 中间层 360 可以是一层泡沫或者其它材料, 其可为鞋底结构提供另外的缓冲和 / 或支撑。中间层 360 可包括弯曲区域 361-363。如图 13 中所示, 弯曲区域 361 包括大槽 364 和微槽 365。鞋底夹层 350 包括凹部 352 以接纳弯曲区域 361 的大槽 364 和微槽 365。鞋外底 370 可符合中间层 360 的形状且包括凹口 372, 该凹口 372 延伸至微槽 365 中且以其它方式来在形状上与中间层 360 的微槽 365 符合或对应。

[0052] 根据一种实施方式, 鞋底结构的鞋底夹层可包括流体填充囊或本身是流体填充囊。流体填充室可包括在第 7, 141, 131 号美国专利中所描述的流体填充囊的特征, 该专利在此通过引用全部并入。转到图 14, 可提供包括流体填充囊 380 和鞋外底 390 的鞋底结构。鞋外底 390 包括具有在此所描述的実施方式的特征的弯曲区域 391、392。流体填充囊 380 包括在其底部表面中的凹部 382, 该凹部 382 面对地表表面以接纳弯曲区域 391、392。

[0053] 本发明在上面和在附图中参考多种构造来公开。但是, 本公开所服务的目的是提供与本发明有关的多种特征和概念的示例, 而不是限制本发明的范围。相关领域的技术人员将意识到, 可对以上描述的构造进行许多改变和修改而不脱离由所附权利要求所界定的

本发明的范围。

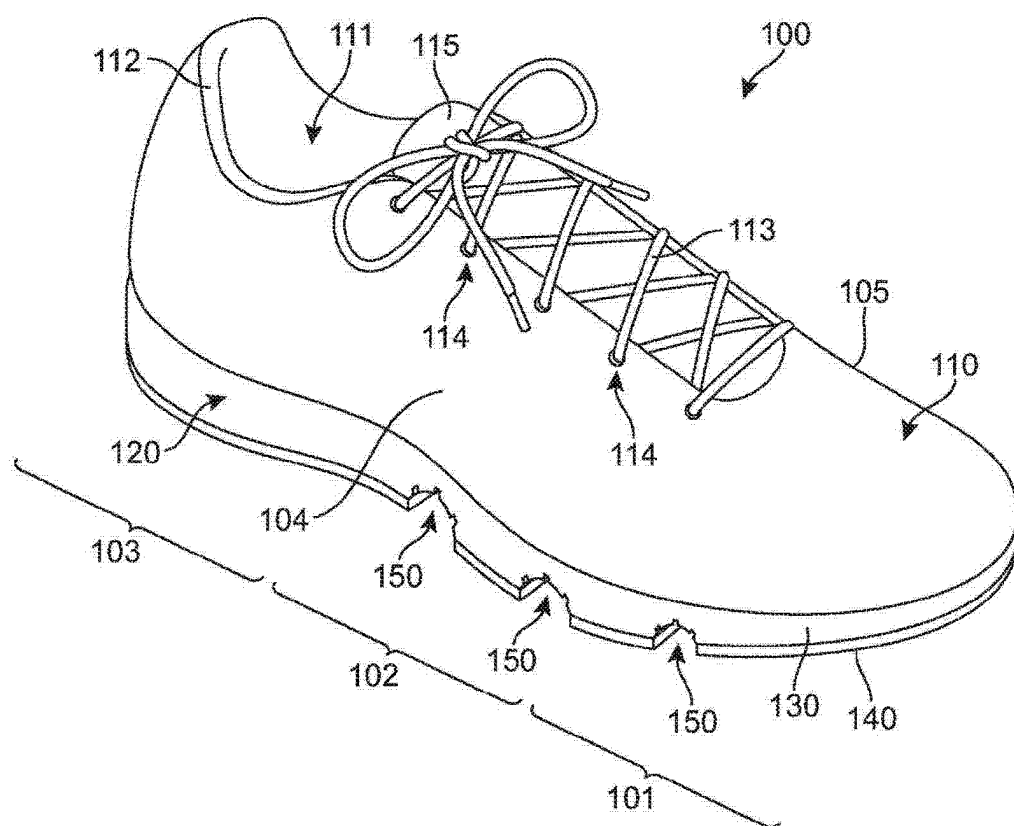


图 1

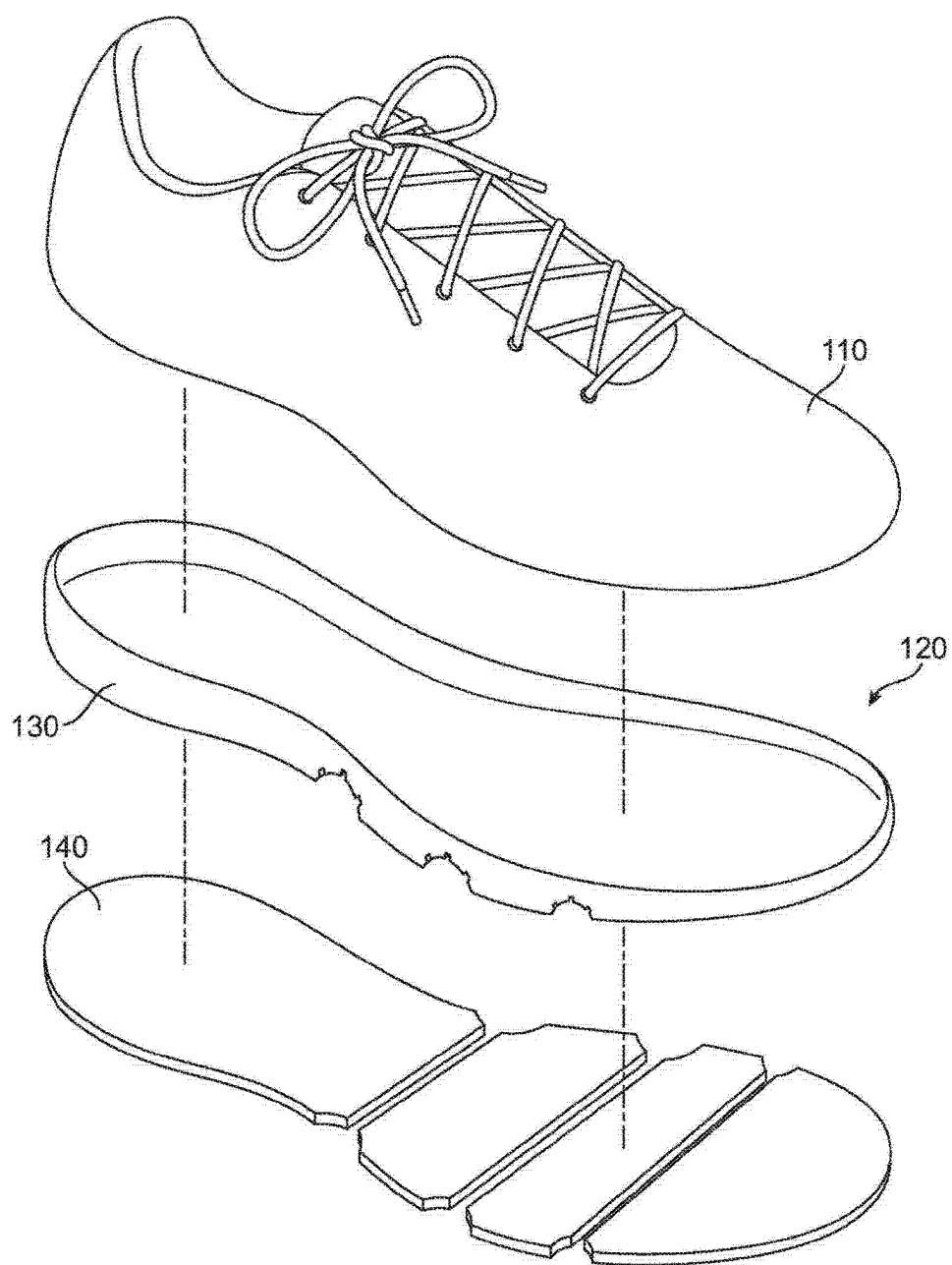


图 2

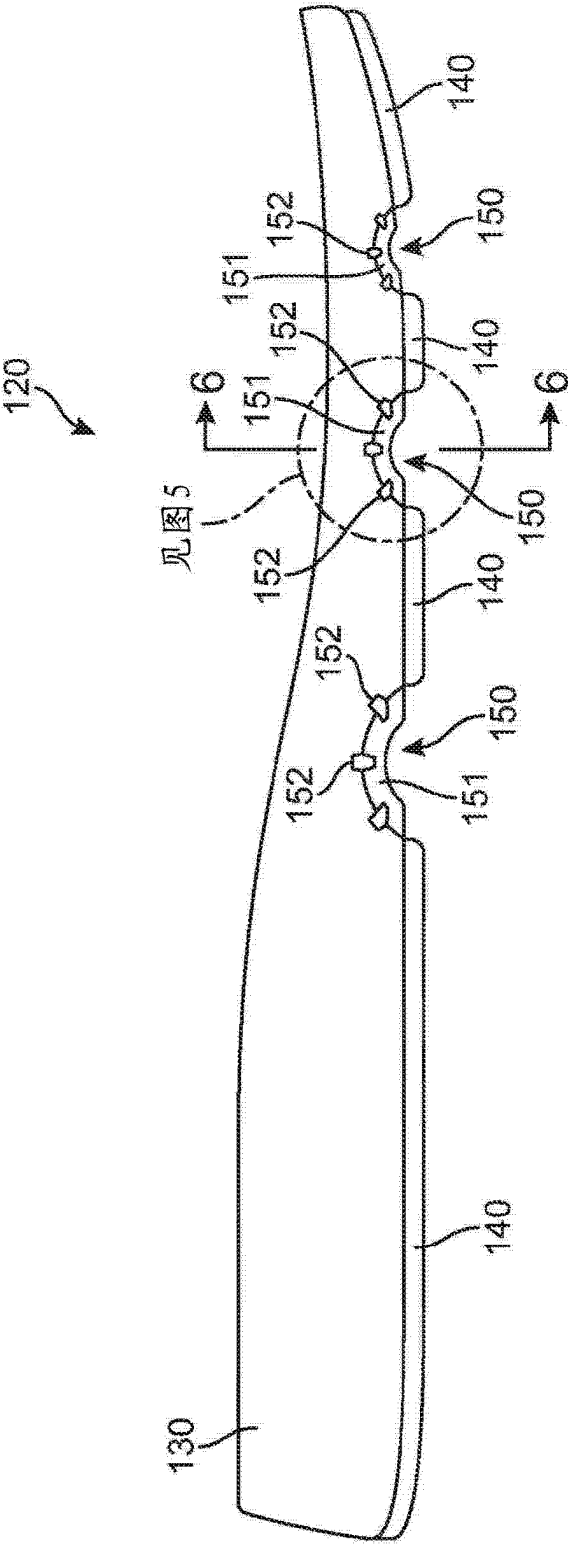


图 3

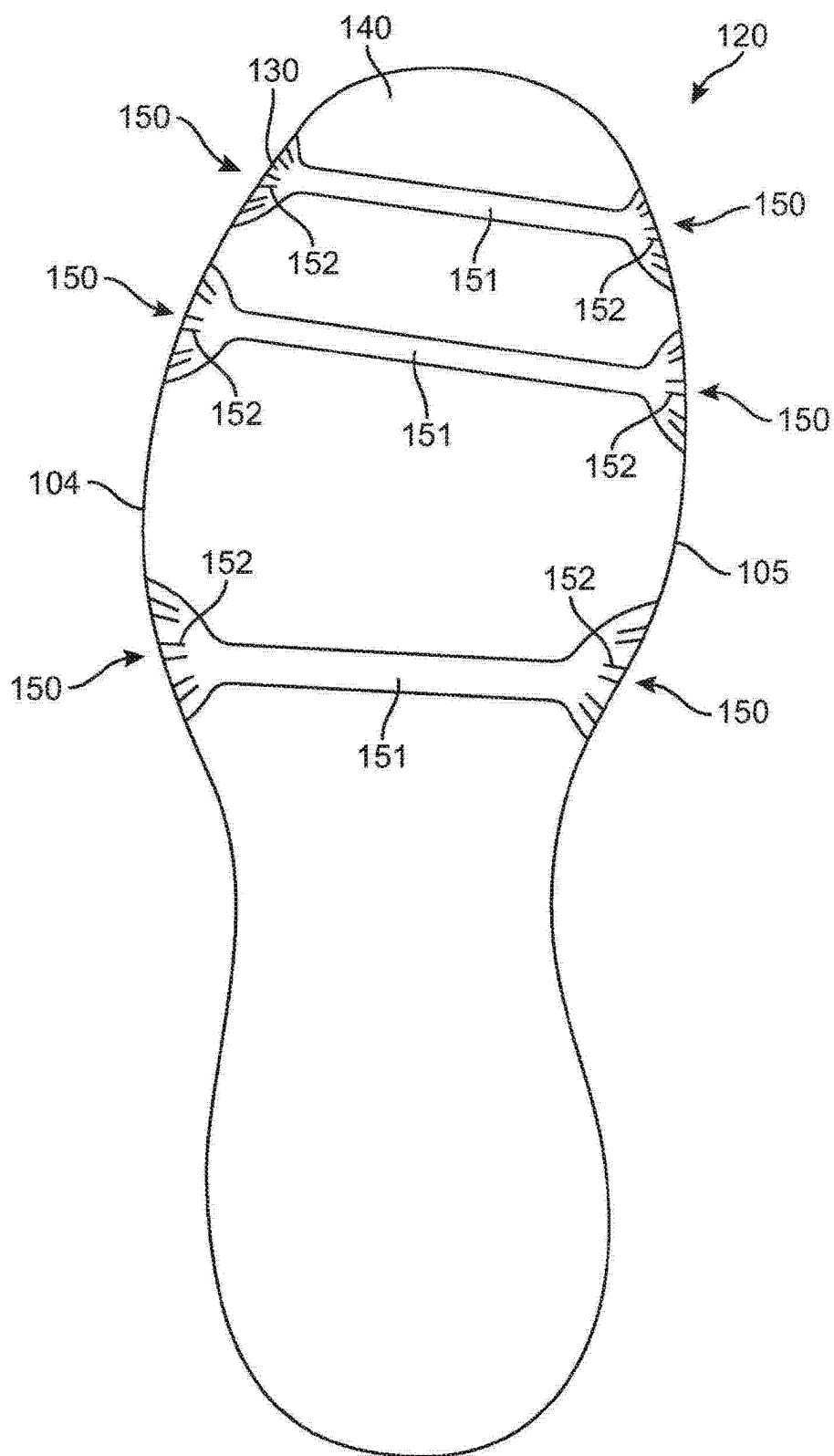


图 4

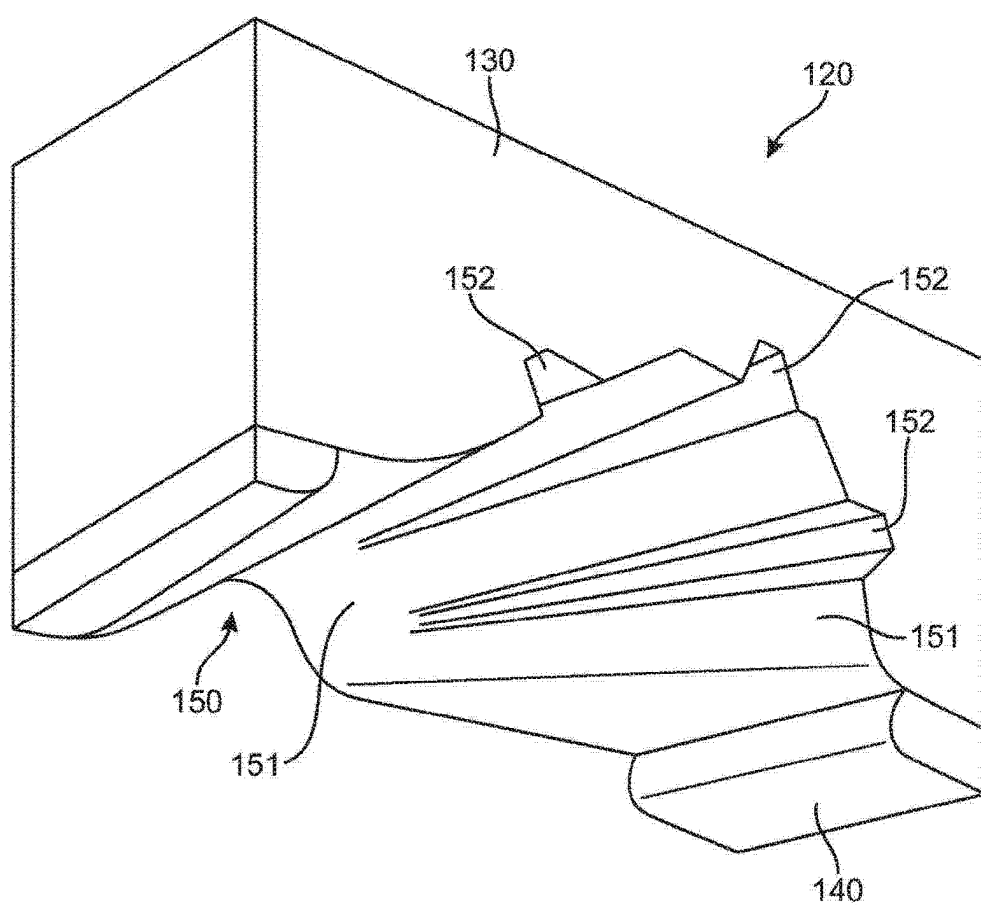


图 5

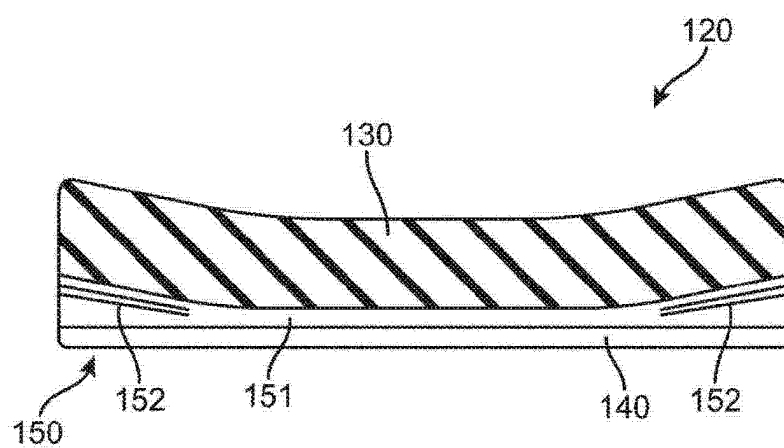


图 6

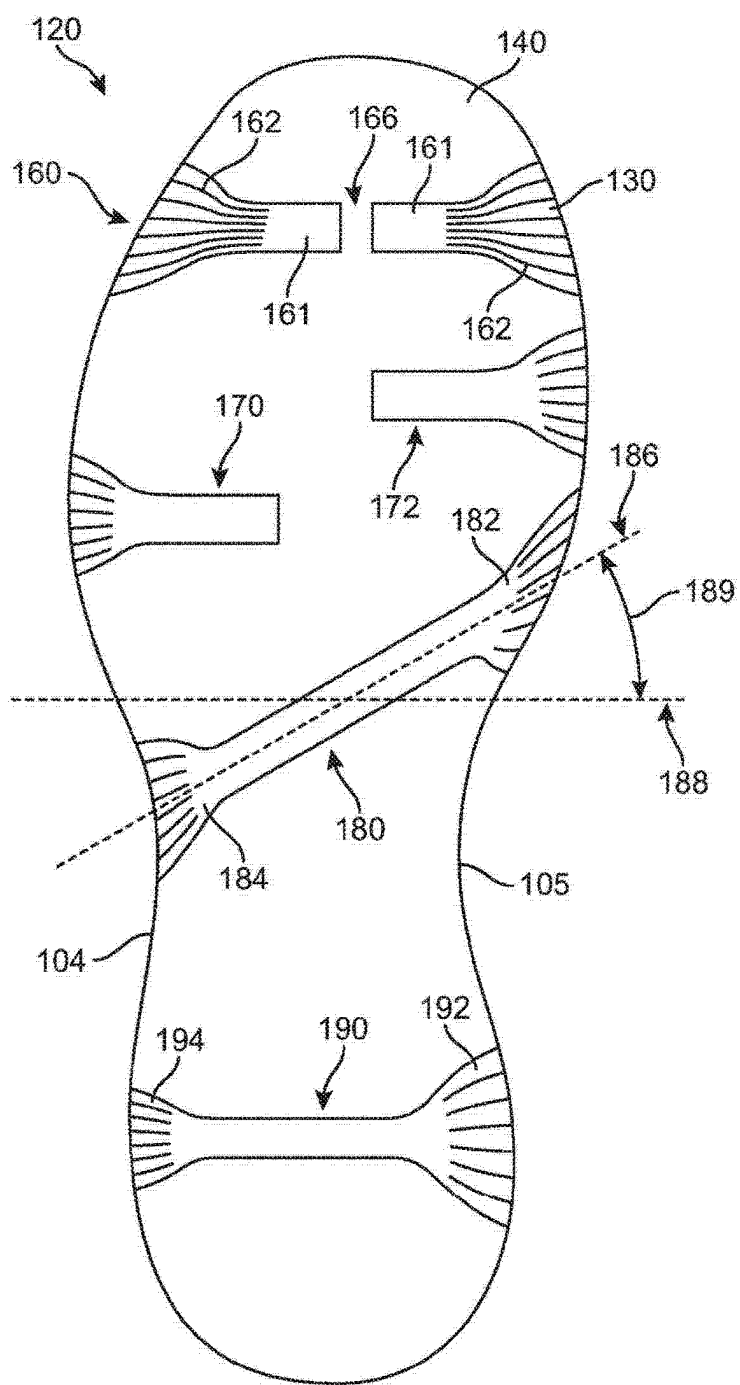


图 7A

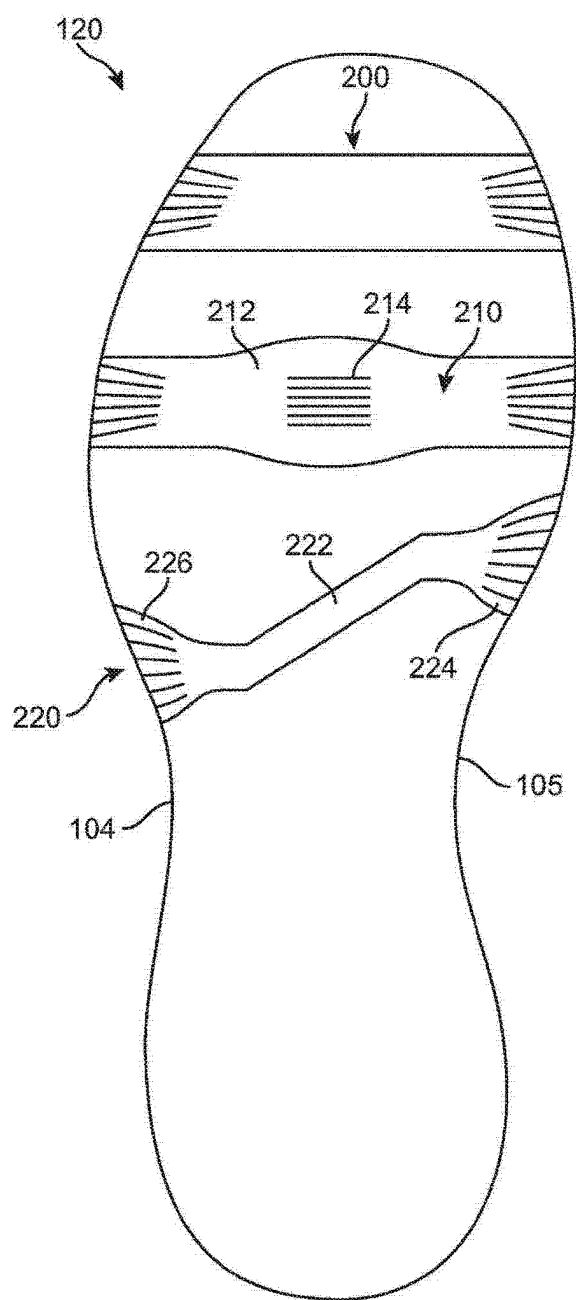


图 7B

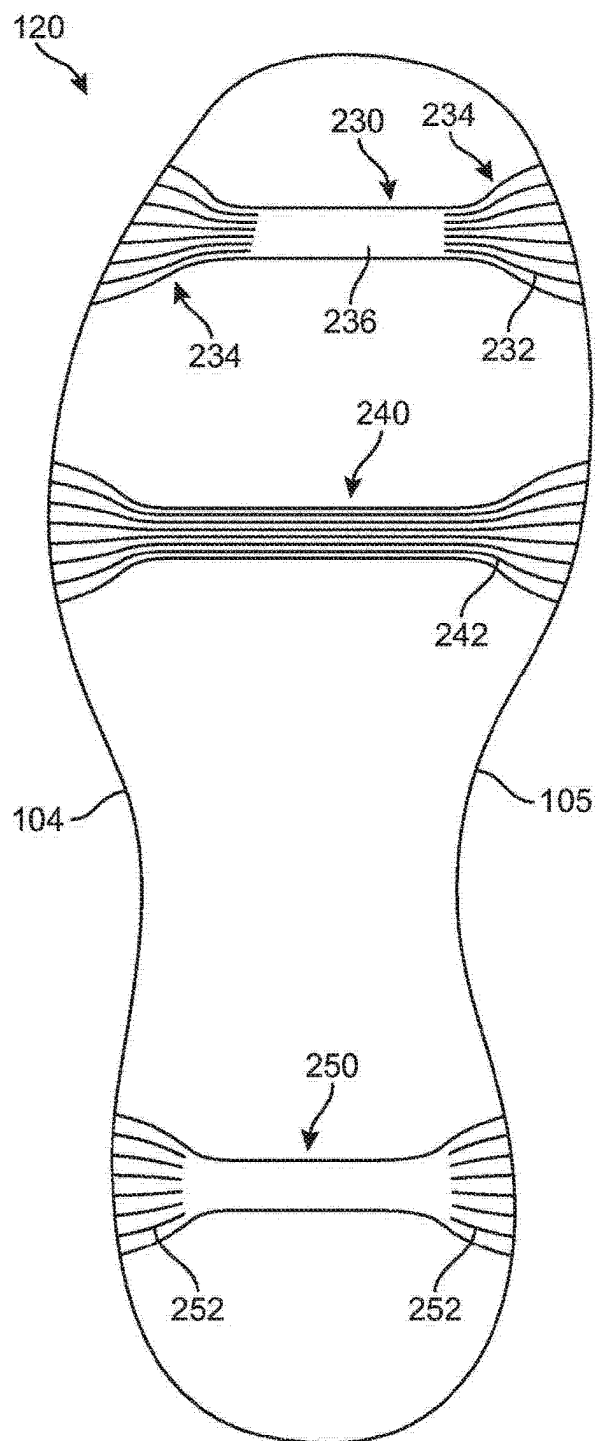


图 7C

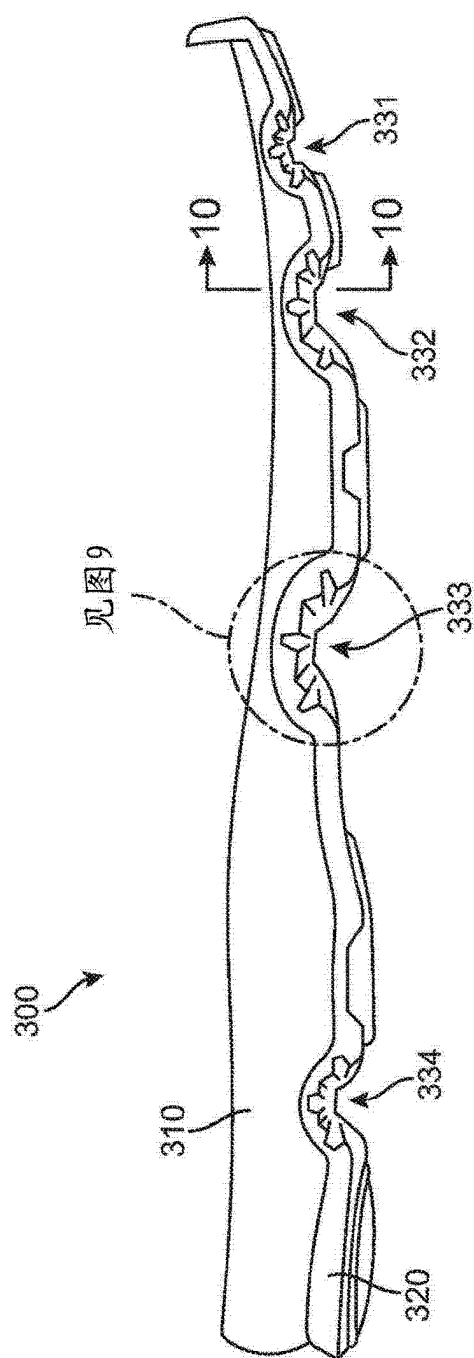


图 8

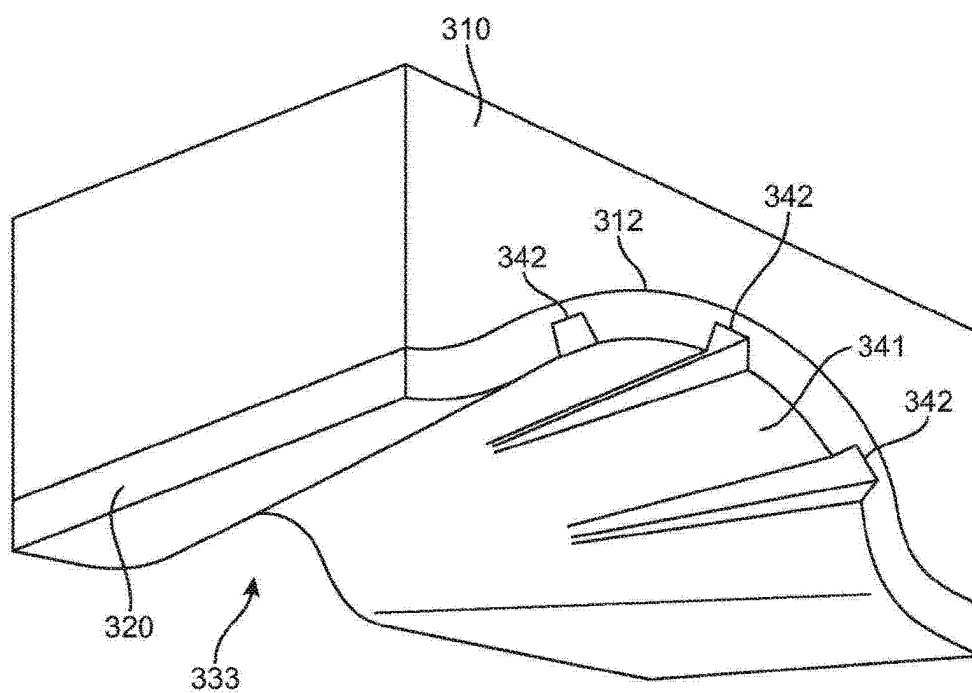


图 9

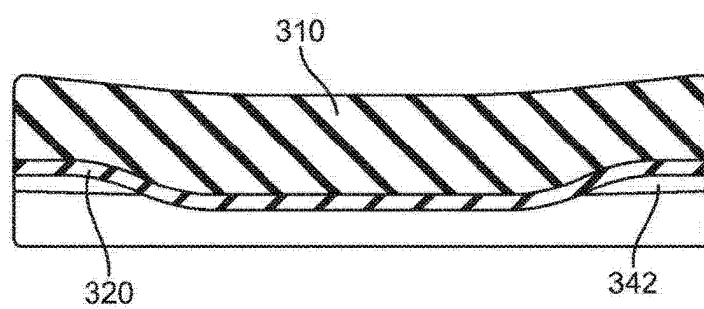


图 10

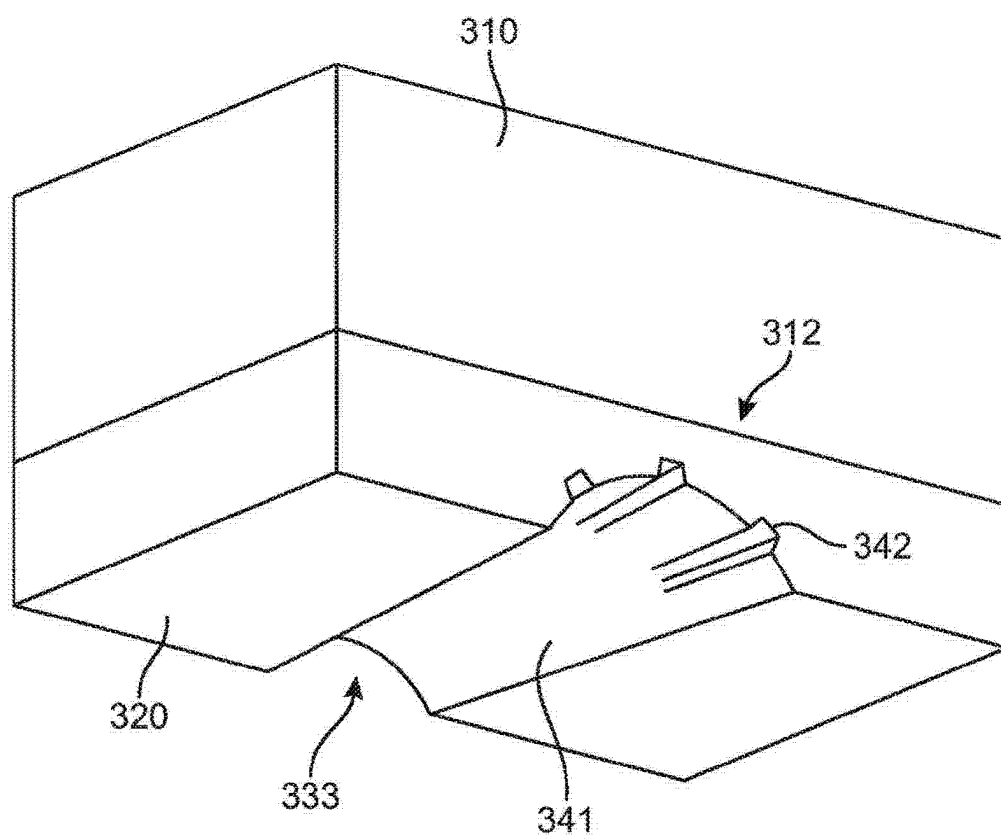


图 11

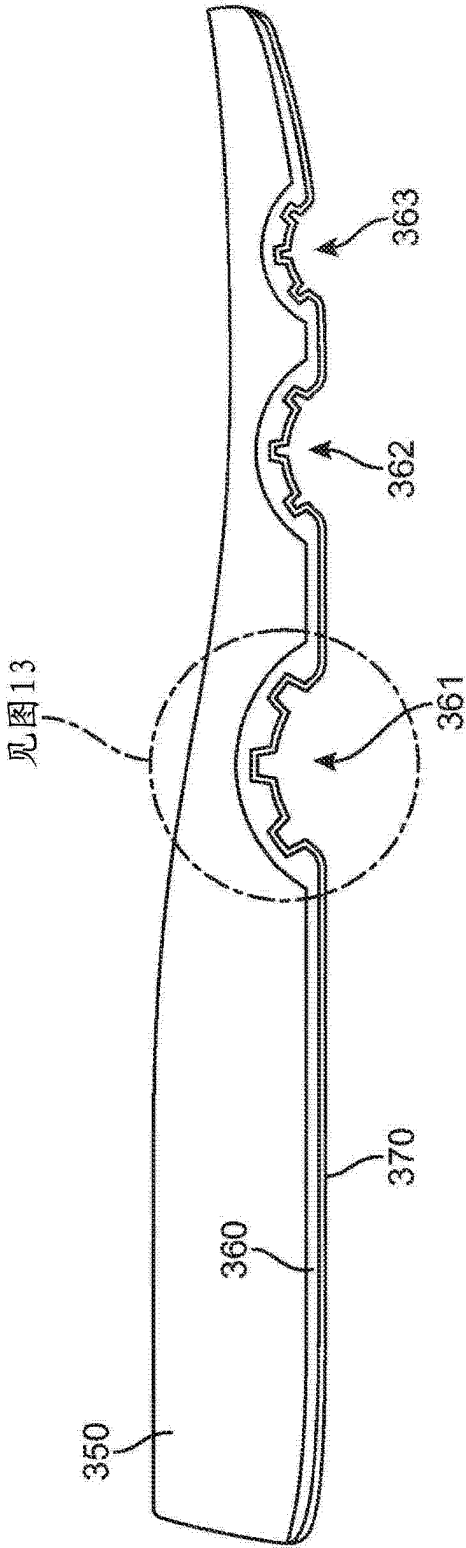


图 12

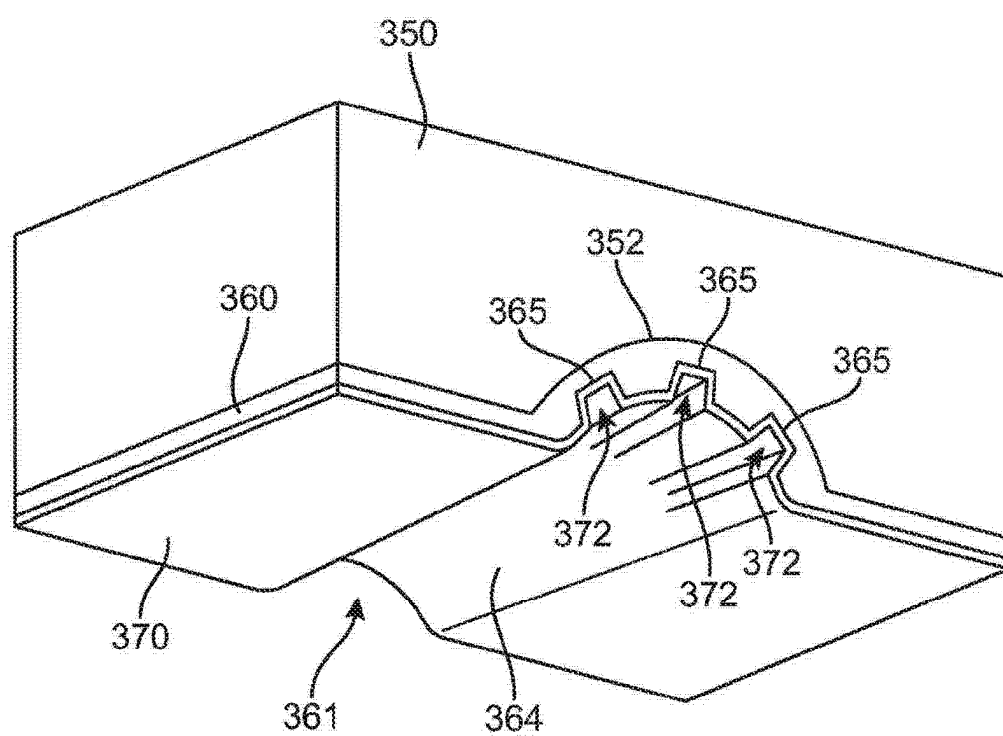


图 13

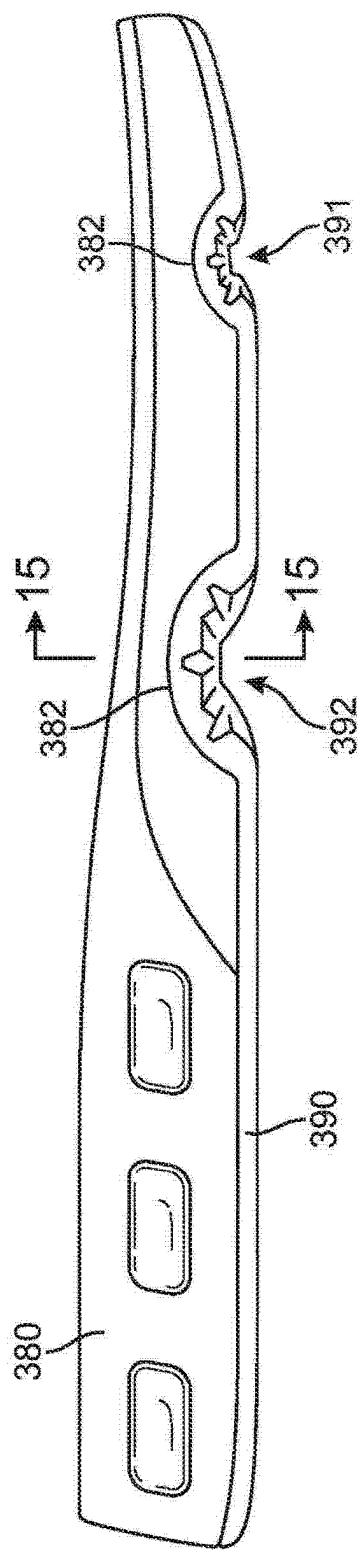


图 14

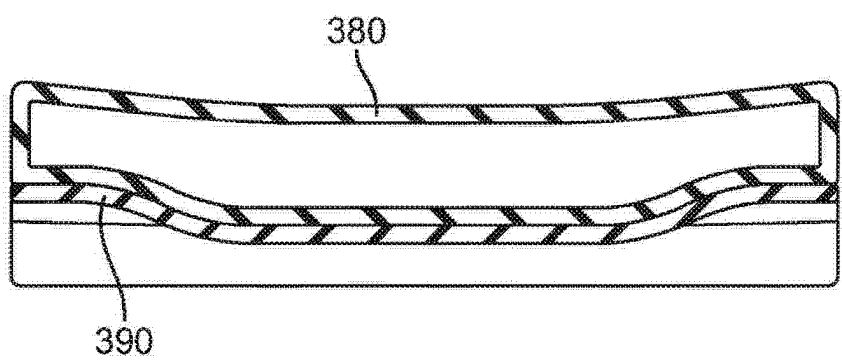


图 15

Abstract

An article of footwear (100) includes an upper (110) and a sole structure (120) secured to the upper. The sole structure (120) includes a midsole (130), an outsole(140), and at least one groove. The groove includes a macro groove (151) and at least one micro groove (152) located within the macro groove. The macro groove may be formed by an indentation or area of reduced thickness in the sole structure (120). The micro groove (152) may be formed by an indentation or area of reduced thickness in a surface of the macro groove (151).