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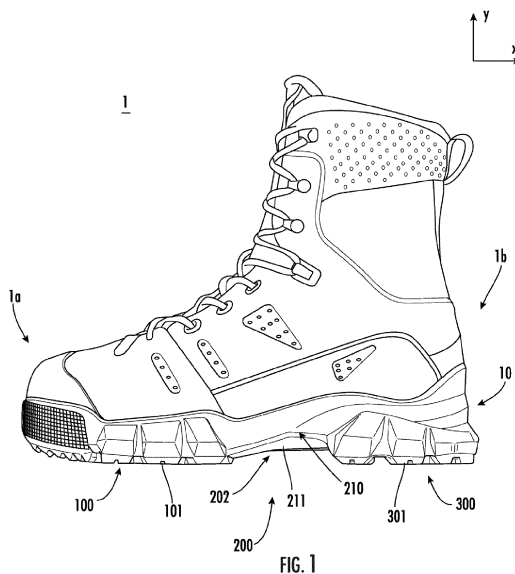
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OUTSOLE FOR A FOOTWEAR ARTICLE

- (57)

Various embodiments are directed to an outsole for a footwear article. In various embodiments, the outsole comprises a forefoot outsole portion defining a forefoot portion bottom surface configured for contact with a ground surface; a heel outsole portion defining a heel portion bottom surface configured for contact with the ground surface; a bridging portion defined between the forefoot outsole portion and the heel outsole portion, the bridging portion having a recessed configuration relative to the forefoot outsole portion and the heel outsole portion such that the bridging portion defines a bridging portion cavity that extends between the forefoot outsole portion and the heel outsole portion; and an arc-shaped bridge that extends along the bridging portion and is configured to be disposed out of an adjacent bridging portion surface of the bridging portion such that the arc-shaped bridge is defined by a bridge height protruding from the adjacent bridging portion surface.



Description

FIELD OF THE INVENTION

[0001] Various embodiments described herein relate generally to footwear. In particular, various embodiments are directed to outsoles for footwear articles.

BACKGROUND

[0002] Various applications may require the use of one or more footwear articles configured to be worn on the feet of a user. In particular, a pair of footwear articles may include an outsole provided at a bottom portion of the footwear article that may be designed to contact a ground surface and provide support for the footwear article. Through applied effort, ingenuity, and innovation, Applicant has solved problems relating to footwear articles by developing solutions embodied in the present disclosure, which are described in detail below.

BRIEF SUMMARY

[0003] Various embodiments are directed to outsoles for footwear articles and methods of using the same. In various embodiments, an outsole for a footwear article may comprise An outsole for a footwear article, the outsole comprising a forefoot outsole portion defining a forefoot portion bottom surface configured for contact with a ground surface; a heel outsole portion defining a heel portion bottom surface configured for contact with the ground surface; a bridging portion defined between the forefoot outsole portion and the heel outsole portion, the bridging portion having a recessed configuration relative to the forefoot outsole portion and the heel outsole portion such that the bridging portion defines a bridging portion cavity that extends between the forefoot outsole portion and the heel outsole portion; and an arc-shaped bridge extending along at least a portion of the bridging portion, wherein the arc-shaped bridge is configured to be disposed out of an adjacent bridging portion surface of the bridging portion such that the arc-shaped bridge is defined at least in part by a bridge height protruding from the adjacent bridging portion surface.

[0004] In various embodiments, the outsole may further comprise a second arc-shaped bridge extending along at least a portion of the bridging portion, wherein the second arc-shaped bridge is configured to be disposed out of the adjacent bridging portion surface such that the second arc-shaped bridge is defined at least in part by a second bridge height protruding from the adjacent bridging portion surface, wherein the arc-shaped bridge and the second arc-shaped bridge are laterally spaced from one another. In certain embodiments, an arc-shaped configuration of the arc-shaped bridge may be defined by a first radius of curvature of a first bridge bottom surface and a second arc-shaped configuration of the second arc-shaped bridge is defined by a second

radius of curvature of a second bridge bottom surface, wherein the first radius of curvature is at least substantially equal to the second radius of curvature.

[0005] In various embodiments, the arc-shaped bridge may define a bridge width, the bridge width being defined between opposing lateral sides of the arc-shaped bridge in a direction at least substantially perpendicular to a bridge length of the arc-shaped bridge, and wherein the bridge width is between 9 mm and 22 mm. In various embodiments, the bridge width of the arc-shaped bridge may be at least substantially variable along the bridge length of the arc-shaped bridge. In various embodiments, the outsole may define a central longitudinal outsole axis extending along a length of the outsole between the heel outsole portion and the forefoot outsole portion, wherein the arc-shaped bridge extends along the bridging portion in a direction defined between the forefoot outsole portion and the heel outsole portion. In various embodiments, outsole may define a central longitudinal outsole axis extending along a length of the outsole between the heel outsole portion and the forefoot outsole portion, wherein a bridge length of the arc-shaped bridge is arranged at an angled configuration relative to the central longitudinal outsole axis such that the arc-shaped bridge is tapered toward the heel outsole portion. In certain embodiments, the angled configuration of the arc-shaped bridge relative to the central longitudinal outsole axis may be defined at least in part by a bridge length of the arc-shaped bridge extending along the bridging portion in a first direction, wherein the outsole is configured such that the first direction and the central longitudinal outsole axis are separated by an angle of separation of at least substantially less than 7 degrees.

[0006] In various embodiments, in an instance in which the bridging portion engages an external surface having an external surface length less than a distance between the forefoot outsole portion and the heel outsole portion, the arc-shaped bridge may be configured to flex about a lateral axis while the footwear article remains supported by the arc-shaped bridge and substantially unflexed about a central longitudinal outsole axis defined along a length of the outsole between the heel outsole portion and the forefoot outsole portion, the lateral axis being defined in a direction corresponding to a bridging portion width. In various embodiments, an arc-shaped configuration of the arc-shaped bridge may be configured such that a bridge bottom surface peak height is greater than a first bridge bottom surface height defined at a first bridge bottom surface end and a second bridge bottom surface height defined at a second bridge bottom surface end, as measured relative to a lowermost surface defined by the outsole. In certain embodiments, a first curvature height defined between the bridge bottom surface peak and the first bridge bottom surface end of the bridge bottom surface and a second curvature height defined between the bridge bottom surface peak and the second bridge bottom surface end of a bridge bottom surface of the arc-shaped bridge may each be at least approximate-

ly between 2 mm and 5 mm. In certain embodiments, the second bridge bottom surface height may be greater than the first bridge bottom surface height, as measured relative to the lowermost surface defined by the outsole. Further, in certain embodiments, the second bridge bottom surface end may be arranged closer to the heel outsole portion than is the first bridge bottom surface end. In various embodiments, the second bridge bottom surface height and the first bridge bottom surface height may be at least substantially similar such that the second bridge bottom surface end and the first bridge bottom surface end are at least substantially level.

[0007] In various embodiments, the arc-shaped bridge may span the bridging portion such that a bridge length of the arc-shaped bridge extends from the heel outsole portion to the forefoot outsole portion. In various embodiments, the arc-shaped bridge may further comprise a plurality of protrusions distributed along an at least substantially smooth bridge bottom surface of the arc-shaped bridge such that the arc-shaped bridge is defined at least in part by the bridge bottom surface having a 3D pattern formed thereon, each of the plurality of protrusions having an at least substantially linear configuration so as to extend along the bridge bottom surface in a perpendicular direction relative to a lateral end of the arc-shaped bridge. In certain embodiments, each of the plurality of protrusions may be defined by a protrusion thickness that is between 1.5 mm and 3.0 mm. In certain embodiments, the plurality of protrusions may be distributed about the bridge bottom surface such that each protrusion of the plurality is separated from an adjacent protrusion of the plurality by a separation distance of between 1 mm and 2.5 mm.

[0008] Various embodiments are directed to a footwear article comprising an outsole comprising a forefoot outsole portion defining a forefoot portion bottom surface configured for contact with a ground surface; a heel outsole portion defining a heel portion bottom surface configured for contact with the ground surface; a bridging portion defined between the forefoot outsole portion and the heel outsole portion, the bridging portion having a recessed configuration relative to the forefoot outsole portion and the heel outsole portion such that the bridging portion defines a bridging portion cavity that extends between the forefoot outsole portion and the heel outsole portion; and an arc-shaped bridge extending along at least a portion of the bridging portion, wherein the arc-shaped bridge is configured to be disposed out of an adjacent bridging portion surface of the bridging portion such that the arc-shaped bridge is defined at least in part by a bridge height protruding from the adjacent bridging portion surface. In various embodiments, the outsole of the footwear article may further comprise a second arc-shaped bridge extending along at least a portion of the bridging portion, wherein the second arc-shaped bridge is configured to be disposed out of the adjacent bridging portion surface such that the second arc-shaped bridge is defined at least in part by a second bridge height pro-

truding from the adjacent bridging portion surface.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

FIG. 1 illustrates a side view of a footwear article and various aspects of an exemplary haptic system according to various embodiments described herein; FIG. 2 illustrates a side view of an exemplary outsole according to various embodiments described herein; FIG. 3 illustrates a perspective view of an exemplary outsole according to various embodiments described herein; FIGS. 4A and 4B illustrate schematic bottom views of exemplary outsoles according to various embodiments described herein; FIGS. 5A-5C illustrate various schematic views of various aspects of exemplary outsoles according to various embodiments described herein; and FIG. 6 illustrates an isolated perspective view of various components of an exemplary outsole according to various embodiments described herein.

DETAILED DESCRIPTION

[0010] The present disclosure more fully describes various embodiments with reference to the accompanying drawings. It should be understood that some, but not all embodiments are shown and described herein. Indeed, the embodiments may take many different forms, and accordingly this disclosure should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

[0011] It should be understood at the outset that although illustrative implementations of one or more aspects are illustrated below, the disclosed assemblies, systems, and methods may be implemented using any number of techniques, whether currently known or not yet in existence. The disclosure should in no way be limited to the illustrative implementations, drawings, and techniques illustrated below, but may be modified within the scope of the appended claims along with their full scope of equivalents. While values for dimensions of various elements are disclosed, the drawings may not be to scale.

[0012] The words "example," or "exemplary," when used herein, are intended to mean "serving as an example, instance, or illustration." Any implementation described herein as an "example" or "exemplary embodiment" is not necessarily preferred or advantageous over other implementations. The use of directional terms should not be interpreted to limit the invention to any specific orientation. Further, as used herein, the term "arch

region" (or arch or midfoot) refers generally to a portion of a footwear article and/or a wearer's foot corresponding to the arch or midfoot of the wearer's foot; the term "forefoot region" (or forefoot) refers generally to a portion of a footwear article and/or a wearer's foot forward of the arch region corresponding to the forefoot (for example, including the ball and the toes) of a wearer's foot; and the term "heel region" (or heel) refers generally to that portion of a footwear article and/or a wearer's foot rearward of the arch region corresponding to the heel of the wearer's foot.

[0013] Workers in various industries (e.g., soldiers, firefighters, relief workers, and/or the like) may be tasked with working in environments that require walking on surfaces having a unique terrain. For example, various surfaces may be defined by uneven terrain, small surface area, and/or various other physical characteristics that can make it difficult for the worker to comfortably navigate such surfaces while avoiding slipping, falling, and/or experiencing physical injury. As such, footwear articles include outsoles designed for engagement with underlying surfaces.

[0014] The present invention relates to an outsole for a footwear article that comprises a bridging portion having a recessed configuration defined between a forefoot outsole portion and a heel outsole portion, with at least one arc-shaped bridge extending along a bridging portion bottom surface of the bridging portion that is configured to increase the torsional rigidity of the outsole and facilitate a stable engagement of a footwear article relative to an underlying surface. As described herein, an exemplary outsole may comprise a bridging portion having a dual-bridge configuration defined by a first arc-shaped bridge and a second arc-shaped bridge provided along an outer lateral side and an inner lateral side of the bridging portion, respectively, wherein the dual-bridge configuration is configured to increase the stability of the outsole during engagement with an uneven stepping surface by at least substantially mitigating torsional forces, rotational forces, moments, and/or the like within the bridging portion of the outsole.

[0015] Further, in various embodiments, the recessed configuration of the bridging portion may be configured to provide an increased stability of the outsole relative to a stepping surface based at least in part on the stepping surface being at least partially secured within a bridging portion cavity defined in between a forefoot outsole portion and a heel outsole portion. For example, the outsole may be configured such that a rear end of the forefoot outsole portion and a front end of the heel outsole portion may at least partially restrict the movement of the stepping surface (e.g., the portion of the stepping surface positioned within the bridging portion cavity) relative to the outsole in a longitudinal direction defined along a length of the outsole.

[0016] Further still, in various embodiments, an exemplary outsole may comprise at least one arc-shaped bridge defined along a bridging portion and comprising

a bridge bottom surface that has an arc-shaped and is disposed within the bridging portion cavity such that the outsole may be configured for engagement with a stepping surface disposed within the bridging portion cavity at the bridge bottom surface of the arc-shaped bridge. In various embodiments, the arc-shaped configuration of the bridge bottom surface of an exemplary arc-shaped bridge defined at least in part by an at least substantially curved bridge profile that is configured to establish a robust engagement between the outsole and the stepping surface position within the bridging portion that enables the footwear article to be stabilized relative to the stepping surface. Further, in various embodiments, the at least one arc-shaped bridge of an exemplary outsole may comprise a plurality of protrusions provided on the bridge bottom surface of the arc-shaped bridge. As described herein, the plurality of protrusions may comprise a plurality of linear protrusions protruding from the bottom bridge surface and extending in a direction at is at least substantially transverse to the bridge length of the arc-shaped bridge. In such an exemplary configuration, the plurality of protrusions may be configured to increase the friction present between the bridging portion and a stepping surface engaged therewith to stabilize the position of the outsole relative to the stepping surface.

[0017] FIG. 1 illustrates a side view of a footwear article and various aspects of an exemplary haptic system according to various embodiments described herein. In particular, FIG. 1 illustrates a right-side perspective view of an outer side of an exemplary left-foot footwear article 1 that is configured to be worn on the left foot of a user. As illustrated, a footwear article 1 may comprise an outsole 10 provided at a bottom portion of the footwear article 1 such that the outsole 10 defines a lowermost surface of the footwear article 1 that is configured for engaging an underlying surface so as to provide a traction between the footwear article 1 and the underlying surface. For example, the outsole 10 may be configured for contacting a ground surface and providing support for the footwear article 1 and/or the foot of a user wearing the footwear article 1. As described herein, a ground surface may be defined as any underlying surface upon which a footwear article 1 may be positioned such that the outsole 10 is engaged therewith, such as, for example, a ground surface, a stepping surface (e.g., a ladder rung), and/or any other underlying surface that may be stepped on by a user. In various embodiments, an exemplary outsole 10 may comprise a forefoot outsole portion 100 defining a front end of the outsole 10 configured to provide support for a forefoot area of a user's foot as the user is wearing the footwear article 1, a heel outsole portion 300 defining a rear end of the outsole 10 configured to provide support for a heel area of the user's foot as the user is wearing the footwear article 1, and a bridging portion 200 defined between the forefoot outsole portion 100 and the heel outsole portion 300.

[0018] In various embodiments, an exemplary outsole 10 may comprise a forefoot outsole portion 100 provided

in a forefoot region of a footwear article 1 such that a front end 1a of the footwear article 1 is defined at least in part by the forefoot outsole portion 100. The forefoot outsole portion 100 of the outsole 10 may define a forefoot portion bottom surface 101 comprising a lowermost surface (e.g., a collective of lowermost surfaces) of the forefoot outsole portion 100 that is configured for contact with a ground surface. Further, in various embodiments, an exemplary outsole 10 may comprise a heel outsole portion 300 provided in a heel region of a footwear article 1 such that a rear end 1b of the footwear article 1 is defined at least in part by the heel outsole portion 300. The heel outsole portion 300 of the outsole 10 may define a heel portion bottom surface 301 comprising a lowermost surface (e.g., a collective of lowermost surfaces) of the heel outsole portion 300 that is configured for contact with a ground surface.

[0019] In various embodiments, an exemplary outsole 10 may comprise a bridging portion 200 provided along an arch region of the footwear article 1 in between the forefoot outsole portion 100 and the heel outsole portion 300. The bridging portion 200 may define a bridging portion bottom surface that extends between the forefoot outsole portion 100 and the heel outsole portion 300 in a recessed position relative to the forefoot portion bottom surface 101 and the heel portion bottom surface 301. As described herein, the bridging portion 200 may comprise a recessed configuration that is defined at least in part by the recessed position of the bridging portion bottom surface relative to both the forefoot portion bottom surface 101 and the heel portion bottom surface 301. For example, the bridging portion 200 may have a recessed configuration relative to the forefoot outsole portion 100 and the heel outsole portion 300 such that the bridging portion 200 defines a bridging portion cavity 202 in between the forefoot outsole portion 100 and the heel outsole portion 300. In various embodiments, the bridging portion cavity 202 may be defined by a separation between the bridging portion 200 of the outsole 10 and the ground surface underneath the footwear article. For example, the bridging portion cavity 202 may embody a channel that extends in a lateral direction underneath the bridging portion 200 between an outer side of the outsole 10 and an inner side of the outsole 10, the channel being defined by a separation between the bridging portion 200 and a ground surface in a vertical direction (e.g., in a y-direction as defined in the exemplary orientation illustrated in FIG. 1). For example, in various embodiments, the bridging portion cavity 202 may be at least partially defined by a separation between the bridging portion bottom surface of the bridging portion 200 and the ground surface. Further, in various embodiments, as described herein, at least a portion of the bridging portion cavity 202 may be defined by a separation between a bridge bottom surface 211 of an arc-shaped bridge 210 provided at the bridging portion 200 and the ground surface.

[0020] In various embodiments, the bridging portion 200 of the outsole 10 may comprise at least one arc-

shaped bridge 210 that is configured to extend along at least a portion of the bridging portion 200 to at least substantially increase the torsional rigidity of the outsole 10. For example, in various embodiments, the outsole 10 may comprise a bridging portion 200 having a dual-bridge configuration defined by a first arc-shaped bridge 210 being provided along an outer lateral side of the bridging portion 200 and second arc-shaped bridge being provided along an inner lateral side of the bridging portion 200, wherein the dual-bridge configuration is configured to increase the stability of the footwear article 1 during engagement with an uneven stepping surface by at least substantially mitigating torsional forces, rotational forces, moments, and/or the like exerted about a central longitudinal outsole axis within the bridging portion 200 of the outsole 10. For example, an exemplary outsole 10 may be configured such that, in an instance in which the bridging portion 200 engages an external surface, such as, for example, a ladder rung, having an external surface length less than a distance between the forefoot outsole portion 100 and the heel outsole portion 300, the arc-shaped bridge 210 flexes about a lateral axis (as defined in a direction corresponding to a bridging portion width) while the footwear article remains supported by the arc-shaped bridge 210 and substantially unflexed about the central longitudinal outsole axis. The bridging portion 200 of an exemplary outsole 10 may be stiffer than the forefoot outsole portion 100 and/or the heel outsole portion 300 of the outsole 10 based at least in part on the configuration of one or more arc-shaped bridges 210.

[0021] The arc-shaped bridge 210 may be defined at least in part by a bridge length that extends along a bridging portion bottom surface of the bridging portion 200 at least partially between the forefoot outsole portion 100 and the heel outsole portion 300. Further, an exemplary arc-shaped bridge 210 may comprise a bridge bottom surface 211 defining a lowermost surface of the arc-shaped bridge 210. As described in further detail herein, the bridge bottom surface 211 of the arc-shaped bridge 210 may have an at least substantially arc-shaped configuration. In various embodiments, an arc-shaped bridge 210 may define a raised configuration relative to a bridging portion bottom surface of the bridging portion 200, wherein the arc-shaped bridge 210 protrudes from the bridging portion bottom surface of the bridging portion 200 such that the bridge bottom surface 211 of the arc-shaped bridge 210 is separated from the bridging portion bottom surface by a perpendicular distance (e.g., as measured in a direction that is at least substantially perpendicular to the bridging portion bottom surface) that defines a bridge height of the arc-shaped bridge 210. For example, as illustrated, the arc-shaped bridge 210 may be configured such that the bridge bottom surface 211 is disposed within the bridging portion cavity 202 defined by the bridging portion 200.

[0022] FIG. 2 illustrates a side view of an exemplary outsole according to various embodiments described herein. As illustrated, the exemplary outsole 10 may in-

clude a bridging portion 200 having a recessed configuration such that the outsole 10 defines a bridging portion cavity 202 underneath the bridging portion 200. In various embodiments, the outsole 10 may be configured to receive at least a portion of a stepping surface 500 (e.g., a ladder rung, a log, and/or the like) within bridging portion cavity 202 to establish a robust engagement between the outsole 10 and the stepping surface 500 that enables the footwear article 1 to be stabilized relative to the stepping surface 500. For example, the bridging portion 200 may be configured such that, upon the stepping surface 500 being received within the bridging portion cavity 202 and engaged by one or more surfaces of the bridging portion 200 (e.g., the bridge bottom surface 211 of one or more arc-shaped bridges 210), at least a portion of the stepping surface 500 may be disposed in between a rear end 102 of the forefoot outsole portion 100 and a front end 302 of the heel outsole portion 300. In such an exemplary circumstance, the recessed configuration of the bridging portion 200 may be configured to provide an increased stability of the outsole 10 relative to the stepping surface 500 based at least in part on the stepping surface 500 being at least partially secured in between the forefoot outsole portion 100 (e.g., the rear end 102) and the heel outsole portion 300 (e.g., the front end 302). For example, the rear end 102 the forefoot outsole portion 100 and the front end 302 of the heel outsole portion 300 may at least partially restrict the movement of the stepping surface 500 (e.g., the portion of the stepping surface 500 positioned within the bridging portion cavity 202) relative to the outsole 10 in a longitudinal direction defined along a length of the outsole 10, such as, for example, in an x-direction as defined in the exemplary orientation illustrated in FIG. 2.

[0023] In various embodiments, the bridging portion 200 of an exemplary outsole 10 may comprise one or more arc-shaped bridges 210 configured for engagement with at least a portion of a stepping surface (e.g., stepping surface 500) disposed within the bridging portion cavity 202. In various embodiments, an arc-shaped configuration of an exemplary arc-shaped bridge 210 may be defined at least in part by the arc-shaped configuration of the bridge bottom surface 211 thereof. As illustrated in FIG. 2, the bridge bottom surface 211 of an arc-shaped bridge 210 may be defined at least in part by an at least substantially curved bridge profile. For example, the bridge profile may comprise a vertical curvature that is at least partially defined in an upward vertical direction (e.g., in a positive y-direction, as illustrated) such that a bridge bottom surface peak (e.g., an apex of the curvature of the bridge bottom surface 211) is disposed at least substantially above the opposing ends of the bridge bottom surface, as measured in the vertical direction. In various embodiments, the bridge profile of an exemplary arc-shaped bridge 210 may comprise a vertical curvature defined by an at least substantially continuous radius of curvature. Alternatively, or additionally, in various embodiments, the bridge profile of an exemplary

arc-shaped bridge 210 may comprise at least one discrete change in a radius of curvature defined along the bridge bottom surface 211. As a non-limiting illustrative example, in various embodiments, an exemplary outsole 10 may comprise an arc-shaped bridge 210 having a bridge bottom surface 211 with a bridge profile defined at least in part by a vertical curvature having a radius of curvature of at least substantially between 0.4 mm and 3.0 mm (e.g., between 1.0 mm and 2.0 mm).

[0024] In various embodiments, an arc-shaped bridge 210 may be defined by a bridge length that extends along at least a portion of the bridging portion bottom surface in between a first bridge end 210a and a second bridge end 210b. As an illustrative example, FIG. 3 illustrates a perspective view of an exemplary outsole according to various embodiments described herein. In particular, FIG. 3 illustrates an exemplary outsole 10 comprising a bridging portion 200 having a recessed configuration so as to define a bridging portion cavity disposed between the forefoot outsole portion 100 and the heel outsole portion 300, as described herein. In various embodiments, the front edge of the bridging portion 200 adjacent to the forefoot outsole portion 100 may be defined by an at least substantially non-linear interface between the bridging portion 200 and the forefoot outsole portion 100. Further, in various embodiments, the rear edge of the bridging portion 200 adjacent to the heel outsole portion 300 may be defined by an at least substantially non-linear interface between the bridging portion 200 and the heel outsole portion 300.

[0025] As illustrated in FIG. 3, the exemplary outsole 10 comprises an arc-shaped bridge 210 that protrudes from a bridging portion bottom surface 201 of the bridging portion 200 into the bridging portion cavity. In various embodiments, the arc-shaped bridge 210 is configured to be spaced from a lowermost surface of the outsole defined by, for example, a plane extending between a tread of the forefoot outsole portion 100 and a tread of the heel outsole portion 300. For example, the arc-shaped bridge 210 may be configured to be spaced from a flat ground surface in an instance in which the outsole is placed unflexed on the flat ground surface. For example, in various embodiments, the arc-shaped bridge 210 may be configured to be disposed out of an adjacent bridging portion surface of the bridging portion 200 (e.g., a bridging portion bottom surface 210). The arc-shaped bridge 210 may protrude from the bridging portion bottom surface 201 such that the bridge bottom surface 211 of the arc-shaped bridge 210 is disposed at a position in between the bridging portion bottom surface 201 and the lowermost surface of the outsole 10 (e.g., collectively defined by the forefoot portion bottom surface 101 and the heel portion bottom surface 301), as measured in a direction at least substantially perpendicular to the bridging portion bottom surface 201 (e.g., in the z-direction, as defined in the exemplary orientation illustrated in FIG. 3). As illustrated, an arc-shaped bridge 210 of the bridging portion 200 may be defined by a bridge length L1 that

extends between a first bridge end 210a and a second bridge end 210b. As described herein, an exemplary arc-shaped bridge 210 may be arranged within the bridging portion 200 of the outsole 10 such that the bridge length L1 of the arc-shaped bridge 210 extends along at least a portion of the bridging portion bottom surface 201 defined in between the rear end of the forefoot outsole portion 100 and the front end of the heel outsole portion 300. In various embodiments, an exemplary arc-shaped bridge (e.g., a first arc-shaped bridge 210, a second arc-shaped bridge 220) may have at least one of the bridge ends thereof defined at the rear end 102 of the forefoot outsole portion 100 and/or at the front end 302 of the heel outsole portion 300.

[0026] In various embodiments, an exemplary outsole 10 may comprise a plurality of arc-shaped bridges, including a first arc-shaped bridge 210 and a second arc-shaped bridge 220, each provided within the bridging portion 200 of the outsole 10. In various embodiments, as illustrated, the first arc-shaped bridge 210 and the second arc-shaped bridge 220 may each protrude from the bridging portion bottom surface 201 so as to define a respective raised configuration relative to the bridging portion bottom surface 201. For example, the plurality of arc-shaped bridges may define a dual-bridge configuration of an exemplary outsole 10, wherein the first and second arc-shaped bridge 210, 220 are configured to extend along opposing lateral sides of the outsole 10. For example, as illustrated, a first arc-shaped bridge 210 may be arranged to extend along an outer lateral side of the outsole 10 and a second arc-shaped bridge 220 may be arranged to extend along an inner lateral side of the outsole 10.

[0027] In various embodiments, the second arc-shaped bridge 220 may be defined by a second bridge length that extends along at least a portion of the bridging portion bottom surface 201 such that a second bridge bottom surface 221 thereof is positioned in between the rear end of the forefoot outsole portion 100 and the front end of the heel outsole portion 300. For example, the second bridge bottom surface 221 of the second arc-shaped bridge 220 may have an at least substantially arc-shaped configuration, wherein the second arc-shaped bridge 220 defines a second raised configuration relative to the bridging portion bottom surface 201 such that the second arc-shaped bridge 220 is defined at least in part by a second bridge height protruding from the bridging portion bottom surface 201. In various embodiments, the first bridge height of the first arc-shaped bridge 210 and the second bridge height of the second arc-shaped bridge 220 may be at least substantially similar to one another such that the first bridge bottom surface 211 and the second bridge bottom surface 221 are arranged in an at least substantially level configuration. Further, in various embodiments, the first arc-shaped configuration of the first arc-shaped bridge 210 (e.g., the first bridge bottom surface 211) and the second arc-shaped configuration of the second arc-shaped bridge

220 (e.g., the second bridge bottom surface 221) may be at least substantially similar to one another such that the first bridge bottom surface 211 and the second bridge bottom surface 221 define an identical and/or mirrored configuration relative to one another.

[0028] FIGS. 4A and 4B illustrate schematic bottom views of exemplary outsoles according to various embodiments described herein. In particular, FIGS. 4A and 4B illustrate an exemplary outsole 10 comprising a bridging portion 200 including a first arc-shaped bridge 210 and a second arc-shaped bridge 220. In various embodiments, a first arc-shaped bridge 210 may extend along an outer lateral side 11 of the outsole 10 and a second arc-shaped bridge 220 may extend along an inner lateral side 12 of the outsole 10. As illustrated, an exemplary arc-shaped bridge, such as, for example, the first arc-shaped bridge 210 and/or the second arc-shaped bridge 220, may extend along the bridging portion bottom surface 201 such that a bridge length of the arc-shaped bridge defines at least a portion of the longitudinal distance between the rear end 102 of the forefoot outsole portion 100 and the front end 302 of the heel outsole portion 300. In various embodiments, an exemplary arc-shaped bridge (e.g., a first arc-shaped bridge 210, a second arc-shaped bridge 220) may have at least one of the bridge ends thereof defined at the rear end 102 of the forefoot outsole portion 100 and/or at the front end 302 of the heel outsole portion 300. For example, in various embodiments, an exemplary arc-shaped bridge may have a first bridge end that is defined at the rear end 102 of the forefoot outsole portion 100 and a second bridge end that is defined at the front end 302 of the heel outsole portion 300 such that the arc-shaped bridge has a bridge length that spans the bridging portion 200, extending between the forefoot and heel outsole portions 100, 300. Alternatively, and/or additionally, in various embodiments, as illustrated in FIGS. 4A and 4B, an exemplary arc-shaped bridge 210 may have at least one of the bridge ends (e.g., both the first and second bridge ends) thereof defined within the bridging portion 200 such that the bridge length of the arc-shaped bridge 210 does not extend fully between the forefoot and heel outsole portions 100, 300.

[0029] Further, in various embodiments, an exemplary arc-shaped bridge, 210, 220 may be defined at least in part by a bridge width that is defined between opposing lateral sides of the arc-shaped bridge in a direction at least substantially perpendicular to the bridge length. For example, as illustrated in FIG. 4A, the first arc-shaped bridge 210 may be defined by a first bridge width W1 and the second arc-shaped bridge 220 may be defined by a second bridge width W2, each bridge width W1, W2 being defined by the distance between the lateral ends of the respective arc-shaped bridge 210, 220 as measured in a direction transverse to the bridge length of the respective bridge 210, 220. In various embodiments, an arc-shaped bridge 210, 220 may have a bridge width that is at least substantially uniform throughout the bridge length

of the arc-shaped bridge 210, 220. Alternatively, and/or additionally, an arc-shaped bridge 210, 220 may have a bridge width that is at least substantially variable throughout the bridge length of the arc-shaped bridge 210, 220. In various embodiments, an exemplary outsole 10 may comprise an arc-shaped bridge having a bridge width that is at least approximately between 5.0 mm and 35.0 mm (e.g., between 9.0 mm and 22.0 mm).

[0030] As illustrated, an exemplary outsole 10 may define a central longitudinal outsole axis 13 that extends along a length of the outsole 10 in a longitudinal direction (e.g., in a y-direction, as defined by the exemplary orientation illustrated in FIGS. 4A and 4B) between a rear end 15 defined by the heel outsole portion 300 and a front end 14 defined by the forefoot outsole portion 100. In various embodiments, an exemplary arc-shaped bridge (e.g., first arc-shaped bridge 210, second arc-shaped bridge 220) may extend along the bridging portion 200 in a direction that is at least substantially parallel to the central longitudinal outsole axis 13 of the outsole 10. For example, FIG. 4A illustrates an exemplary outsole 10 having a first arc-shaped bridge 210 and a second arc-shaped bridge 220 that are each arranged so as to define a parallel configuration relative to the central longitudinal outsole axis 13. Further, in various embodiments, an exemplary arc-shaped bridge (e.g., first arc-shaped bridge 210, second arc-shaped bridge 220) may define an angled configuration relative to the central longitudinal outsole axis 13, wherein the arc-shaped bridge is tapered toward the heel outsole portion, as illustrated in the exemplary outsole 10 shown in FIG. 4B. As illustrated in FIG. 4B, the first arc-shaped bridge 210 may be arranged in an angled configuration relative to the central longitudinal outsole axis 13, wherein the angled configuration is defined at least in part by the bridge length of the first arc-shaped bridge 210 extending in a first direction that is angled away from the central longitudinal outsole axis 13 by an angle of separation A1. In various embodiments, an exemplary arc-shaped bridge may be tapered towards the heel outsole portion 300, as illustrated, such that the angled configuration of the arc-shaped bridge relative to the central longitudinal outsole axis 13 is defined by an angle of separation that is at least approximately between 0.1 degrees and 7.0 degrees (e.g., 1.0 degrees and 3.0 degrees).

[0031] For example, as illustrated in the schematic views of various exemplary inner collar portion profiles shown in FIGS. 5A-5C, an arc-shaped bridge 210 provided at the bridging portion 200 of an exemplary outsole 10 may comprise a bridge bottom surface 211 having an arc-shaped configuration that includes a vertical curvature that is at least partially defined in an upward vertical direction (e.g., in a positive y-direction, as illustrated). As illustrated, the vertical curvature defining the arc-shaped configuration of the arc-shaped bridge 210 (e.g., the bridge bottom surface 211) may be configured such that a bridge bottom surface peak 211c is disposed at least substantially above each of the opposing ends (e.g.,

along the bridge length) of the bridge bottom surface 211 defined by an arc-shaped bridge 210 at a bridge bottom surface peak position that is in between the opposing bridge bottom surface ends. For example, the arc-shaped bridge 210 may have a bridge length that at least partially defined by a linear distance between a first bridge bottom surface end 211a and a second bridge bottom surface end 211b of the bridge bottom surface 211 (e.g., between a first bridge end and a second bridge end of the arc-shaped bridge 210). In various embodiments, as shown in FIG. 5A, the bridge bottom surface profile defining the arc-shaped configuration of an exemplary arc-shaped bridge 210 may be configured such that an bridge bottom surface peak 211c thereof is disposed above both the first bridge bottom surface end 211a and the second bridge bottom surface end 211b, as measured in the vertical direction (e.g., in the y-direction as defined in the exemplary orientation illustrated in FIGS. 5A-5C), at a bridge bottom surface peak position that is defined at least substantially halfway between the first and second bridge bottom surface ends 211a, 211b, as measured along the bridge length of the arc-shaped bridge 210.

[0032] Further, in various embodiments, the curved bridge bottom surface profile of the arc-shaped configuration of the arc-shaped bridge 210 may be defined by the respective heights of the bridge bottom surface peak 211c, the first bridge bottom surface end 211a, and the second bridge bottom surface end 211b of the bridge bottom surface 211. For example, as illustrated, a first bridge bottom surface height H1, a second bridge bottom surface height H2, and a bridge bottom surface peak height H3 may be defined by the vertical separation distances between the first bridge bottom surface end 211a, the second bridge bottom surface end 211b, and the bridge bottom surface peak 211c, respectively, and a bottom end 202a of the bridging portion cavity 202, which may be defined between the back end 102 of the forefoot outsole portion and the front end 302 of the heel outsole portion of the outsole 10. In various embodiments, the arc-shaped configuration of the arc-shaped bridge 210 may be defined by a bridge bottom surface peak height H3 that is greater than both the first bridge bottom surface height H1 and the second bridge bottom surface height H2. For example, the bridge bottom surface peak 211c may be positioned relative to the first bridge bottom surface end 211a such that a first curvature height H4 is defined by the vertical separation distance between the bridge bottom surface peak 211c and the first bridge bottom surface end 211a. The first curvature height H4 may define the difference between the bridge bottom surface peak height H3 and the first bridge bottom surface height H1. Further, the bridge bottom surface peak 211c may be positioned relative to the second bridge bottom surface end 211b such that a second curvature height H5 is defined by the vertical separation distance between the bridge bottom surface peak 211c and the second bridge bottom surface end 211b. The second curvature

height H5 may define the difference between the bridge bottom surface peak height H3 and the second bridge bottom surface height H2. In various embodiments, an arc-shaped bridge 210 may be configured such that the curvature height defined between a bridge bottom surface peak (e.g., bridge bottom surface peak 211c, as illustrated) and a bridge bottom surface end of the bridge bottom surface (e.g., first and/or second bottom surface ends 211a, 211b, as illustrated) may be at least approximately between 0.5 mm and 10.0 mm (e.g., between 2.0 mm and 5.0 mm).

[0033] In various embodiments, as illustrated in FIG. 5A, the arc-shaped bridge 210 may be configured such that the first bridge bottom surface height H1 and the second bridge bottom surface height H2 are at least substantially equal to one another such that the first bridge bottom surface end 211a and the second bridge bottom surface end 211b are at least substantially level. Alternatively, or additionally, in various embodiments, the arc-shaped bridge 210 may be configured such that the first bridge bottom surface height H1 and the second bridge bottom surface height H2 are at least substantially different from one another. As an illustrative example, the arc-shaped configuration of the exemplary arc-shaped bridge illustrated in FIG. 5B is configured such that the second bridge bottom surface height H2 of the second bridge bottom surface end 211b is at least substantially greater than the first bridge bottom surface height H1 of the first bridge bottom surface end 211a. As a further illustrative example, the arc-shaped configuration of the exemplary arc-shaped bridge illustrated in FIG. 5C is configured such that the first bridge bottom surface height H1 of the first bridge bottom surface end 211a is at least substantially greater than the second bridge bottom surface height H2 of the second bridge bottom surface end 211b.

[0034] In various embodiments, an exemplary outsole 10 may comprise an arc-shaped bridge 210 having a plurality of protrusions distributed along the bridge bottom surface 211 of the arc-shaped bridge. For example, FIG. 6 illustrates an isolated perspective view of various components of an exemplary outsole according to various embodiments described herein. In particular, FIG. 6 illustrates an arc-shaped bridge 210 comprising a plurality of protrusions 230 protruding in an outward direction away from the bottom bridge surface 211 of the arc-shaped bridge 210. In various embodiments, the plurality of protrusions 230 of an arc-shaped bridge 210 may be distributed along an at least substantially smooth bridge bottom surface 211 of the arc-shaped bridge 210 such that the arc-shaped bridge 210 is defined at least in part by a bridge bottom surface 211 having a 3D pattern formed thereon. In various embodiments, the 3D pattern defining the plurality of protrusions 230 may be specifically configured to facilitate the gripping of an at least substantially smooth, hard stepping surface (e.g., a metal surface, a hard plastic surface, and/or the like) by the outsole 10. For example, the 3D pattern defining the plu-

ality of protrusions 230 may be specifically designed to optimize the coefficient of friction of the arc-shaped bridge 210 for engagement with the rung of a ladder to facilitate the gripping of the ladder rung by the bridging portion 200 of the outsole 10.

[0035] In various embodiments, the plurality of protrusions 230 provided on the bridge bottom surface of an exemplary arc-shaped bridge (e.g., a plurality distributed along respective bridge bottom surfaces of first and second arc-shaped bridges 210, 220) may be configured to increase the friction present between the bridging portion 200 (e.g., the arc-shaped bridges 210, 220) and a stepping surface (e.g., a ladder rung, a log, and/or the like) engaged therewith to stabilize the position of the outsole 10 relative to the stepping surface. In various embodiments, each of the plurality of protrusions may be defined by a protrusion height, as measured in a direction perpendicular to the bridge bottom surface 211 (e.g., in the z-direction, as defined in the exemplary orientation illustrated in FIG. 6), a protrusion width, as measured in a direction parallel to the bridge width between lateral sides of the bridge bottom surface 211 (e.g., in the x-direction, as defined in the exemplary orientation illustrated in FIG. 6), and a protrusion thickness, as measured in a direction parallel to the bridge length L1 and transverse to the bridge width (e.g., in the y-direction, as defined in the exemplary orientation illustrated in FIG. 6). In various embodiments, for example, an exemplary protrusion of the plurality of protrusions 230 may comprise a protrusion thickness of at least approximately between 0.5 mm and 7.0 mm (e.g., between 1.5 mm and 3.0 mm).

[0036] In various embodiments, as illustrated, at least a portion of the plurality of protrusions 230 may be defined by an at least substantially linear configuration extending along a bridge width of the arc-shaped bridge 210, such as, for example, in a lateral direction (e.g., in an x-direction as defined in the exemplary orientation illustrated in FIG. 6). For example, the plurality of protrusions 230 may comprise a plurality of linear protrusions extending along the bridge bottom surface 211 in a perpendicular direction relative to a lateral end of the arc-shaped bridge 210, such as, for example, in a direction transverse to the bridge length L1 of the arc-shaped bridge 210. Further, in various embodiments, at least a portion of the plurality of protrusions 230 may be arranged about the bridge bottom surface 211 in an at least substantially parallel configuration relative to one another. As illustrated, the plurality of protrusions 230 may be configured such that adjacent protrusions of the plurality 230, such as, for example, a first protrusion 231 and a second protrusion 232 adjacent thereto, may extend between lateral sides of the arc-shaped bridge 210 in respective directions that are at least substantially parallel to one another. For example, the plurality of protrusions 230 may be distributed about the bridge bottom surface 211 such that each protrusion of the plurality is separated from an adjacent protrusion of the plurality by a protrusion separation distance defined in a direction parallel to the bridge length L1 and

transverse to the bridge width (e.g., in the y-direction, as defined in the exemplary orientation illustrated in FIG. 6). In various embodiments, for example, an exemplary plurality of protrusions 230 may be defined by a protrusion separation distance between each of the adjacent protrusions of the plurality that is at least approximately between 0.0 mm and 6.0 mm (e.g., between 1.0 mm and 2.5 mm).

[0037] Many modifications and other embodiments will come to mind to one skilled in the art to which this disclosure pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the disclosure is not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

Claims

1. An outsole for a footwear article, the outsole comprising:

a forefoot outsole portion defining a forefoot portion bottom surface configured for contact with a ground surface;

a heel outsole portion defining a heel portion bottom surface configured for contact with the ground surface;

a bridging portion defined between the forefoot outsole portion and the heel outsole portion, the bridging portion having a recessed configuration relative to the forefoot outsole portion and the heel outsole portion such that the bridging portion defines a bridging portion cavity that extends between the forefoot outsole portion and the heel outsole portion; and

an arc-shaped bridge extending along at least a portion of the bridging portion, wherein the arc-shaped bridge is configured to be disposed out of an adjacent bridging portion surface of the bridging portion such that the arc-shaped bridge is defined at least in part by a bridge height protruding from the adjacent bridging portion surface.

2. The outsole of claim 1, further comprising a second arc-shaped bridge extending along at least a portion of the bridging portion, wherein the second arc-shaped bridge is configured to be disposed out of the adjacent bridging portion surface such that the second arc-shaped bridge is defined at least in part by a second bridge height protruding from the adjacent bridging portion surface, wherein the arc-shaped bridge and the second arc-shaped bridge

are laterally spaced from one another.

3. The outsole of claim 2, wherein an arc-shaped configuration of the arc-shaped bridge is defined by a first radius of curvature of a first bridge bottom surface and a second arc-shaped configuration of the second arc-shaped bridge is defined by a second radius of curvature of a second bridge bottom surface, wherein the first radius of curvature is at least substantially equal to the second radius of curvature.

4. The outsole of claim 1, wherein the arc-shaped bridge defines a bridge width, the bridge width being defined between opposing lateral sides of the arc-shaped bridge in a direction at least substantially perpendicular to a bridge length of the arc-shaped bridge, and wherein the bridge width is between 9 mm and 22 mm.

5. The outsole of claim 4, wherein the bridge width of the arc-shaped bridge is at least substantially variable along the bridge length of the arc-shaped bridge.

6. The outsole of claim 1, wherein the outsole defines a central longitudinal outsole axis extending along a length of the outsole between the heel outsole portion and the forefoot outsole portion, wherein the arc-shaped bridge extends along the bridging portion in a direction defined between the forefoot outsole portion and the heel outsole portion.

7. The outsole of claim 1, wherein the outsole defines a central longitudinal outsole axis extending along a length of the outsole between the heel outsole portion and the forefoot outsole portion, wherein a bridge length of the arc-shaped bridge is arranged at an angled configuration relative to the central longitudinal outsole axis such that the arc-shaped bridge is tapered toward the heel outsole portion.

8. The outsole of claim 1, wherein, in an instance in which the bridging portion engages an external surface having an external surface length less than a distance between the forefoot outsole portion and the heel outsole portion, the arc-shaped bridge is configured to flex about a lateral axis while the footwear article remains supported by the arc-shaped bridge and substantially unflexed about a central longitudinal outsole axis defined along a length of the outsole between the heel outsole portion and the forefoot outsole portion, the lateral axis being defined in a direction corresponding to a bridging portion width.

9. The outsole of claim 1, wherein an arc-shaped configuration of the arc-shaped bridge is configured such that a bridge bottom surface peak height is greater than a first bridge bottom surface height de-

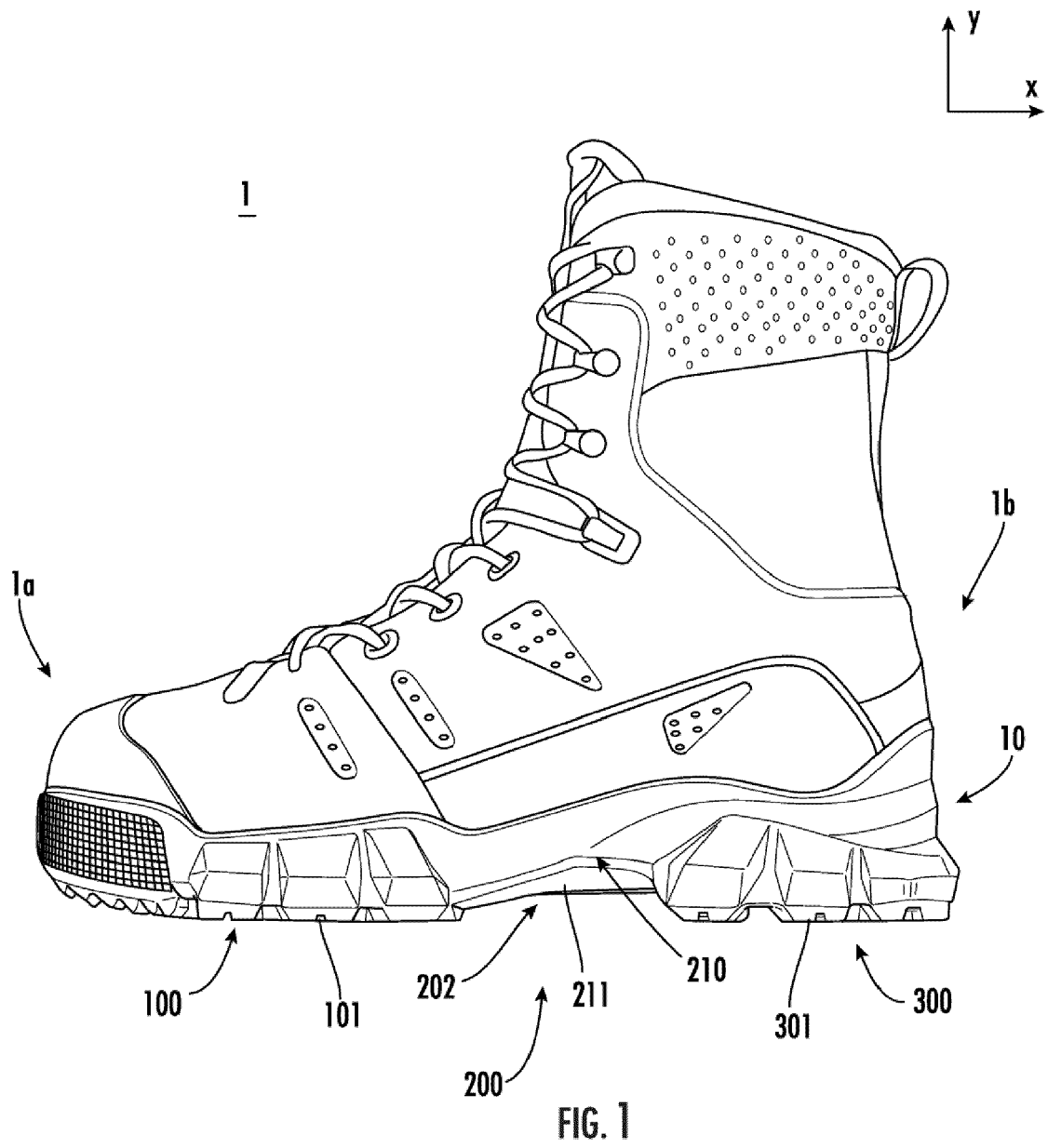
defined at a first bridge bottom surface end and a second bridge bottom surface height defined at a second bridge bottom surface end, as measured relative to a lowermost surface defined by the outsole.

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10. The outsole of claim 9, wherein a first curvature height defined between the bridge bottom surface peak and the first bridge bottom surface end of the bridge bottom surface and a second curvature height defined between the bridge bottom surface peak and the second bridge bottom surface end of a bridge bottom surface of the arc-shaped bridge are each at least approximately between 2 mm and 5 mm. 10
11. The outsole of claim 9, wherein the second bridge bottom surface height is greater than the first bridge bottom surface height, as measured relative to the lowermost surface defined by the outsole. 15
12. The outsole of claim 9, wherein the second bridge bottom surface height and the first bridge bottom surface height are at least substantially similar such that the second bridge bottom surface end and the first bridge bottom surface end are at least substantially level. 20
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13. The outsole of claim 1, wherein the arc-shaped bridge spans the bridging portion such that a bridge length of the arc-shaped bridge extends from the heel outsole portion to the forefoot outsole portion. 30
14. The outsole of claim 1, wherein the arc-shaped bridge further comprises a plurality of protrusions distributed along an at least substantially smooth bridge bottom surface of the arc-shaped bridge such that the arc-shaped bridge is defined at least in part by the bridge bottom surface having a 3D pattern formed thereon, each of the plurality of protrusions having an at least substantially linear configuration so as to extend along the bridge bottom surface in a perpendicular direction relative to a lateral end of the arc-shaped bridge. 35
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15. A footwear article comprising the outsole of claim 1. 45

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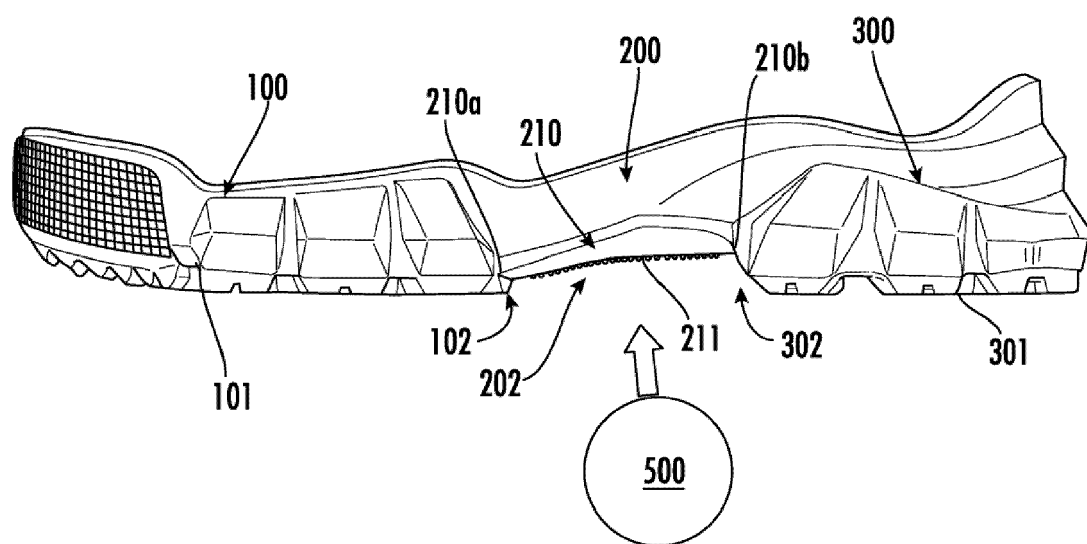


FIG. 2

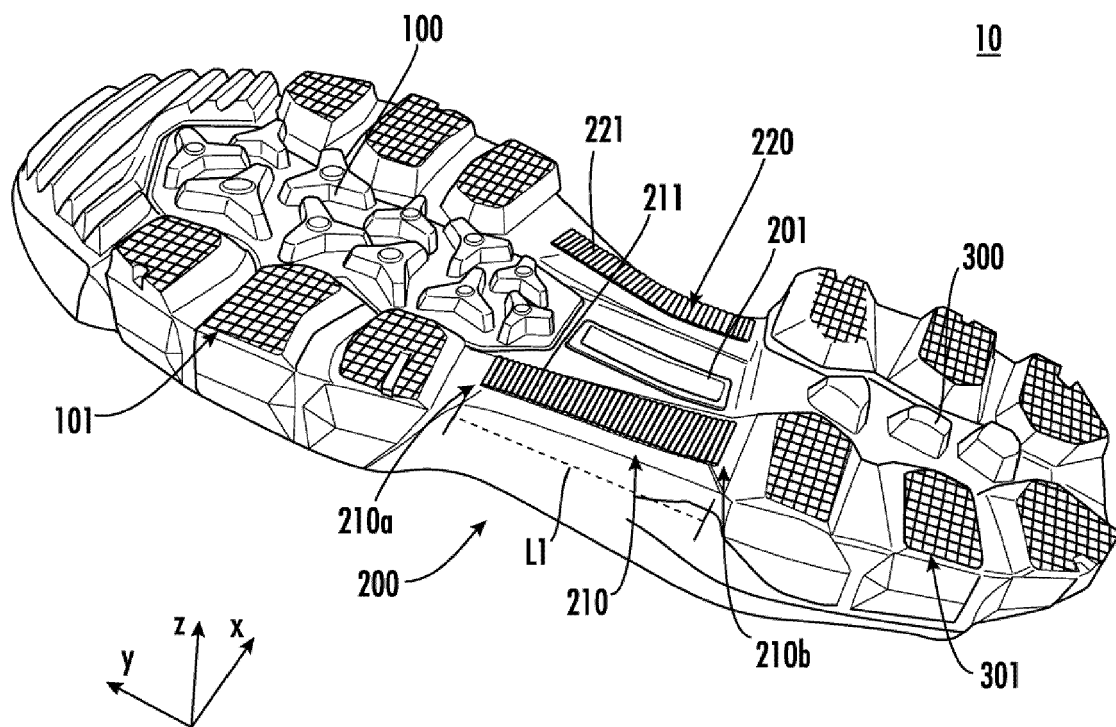


FIG. 3

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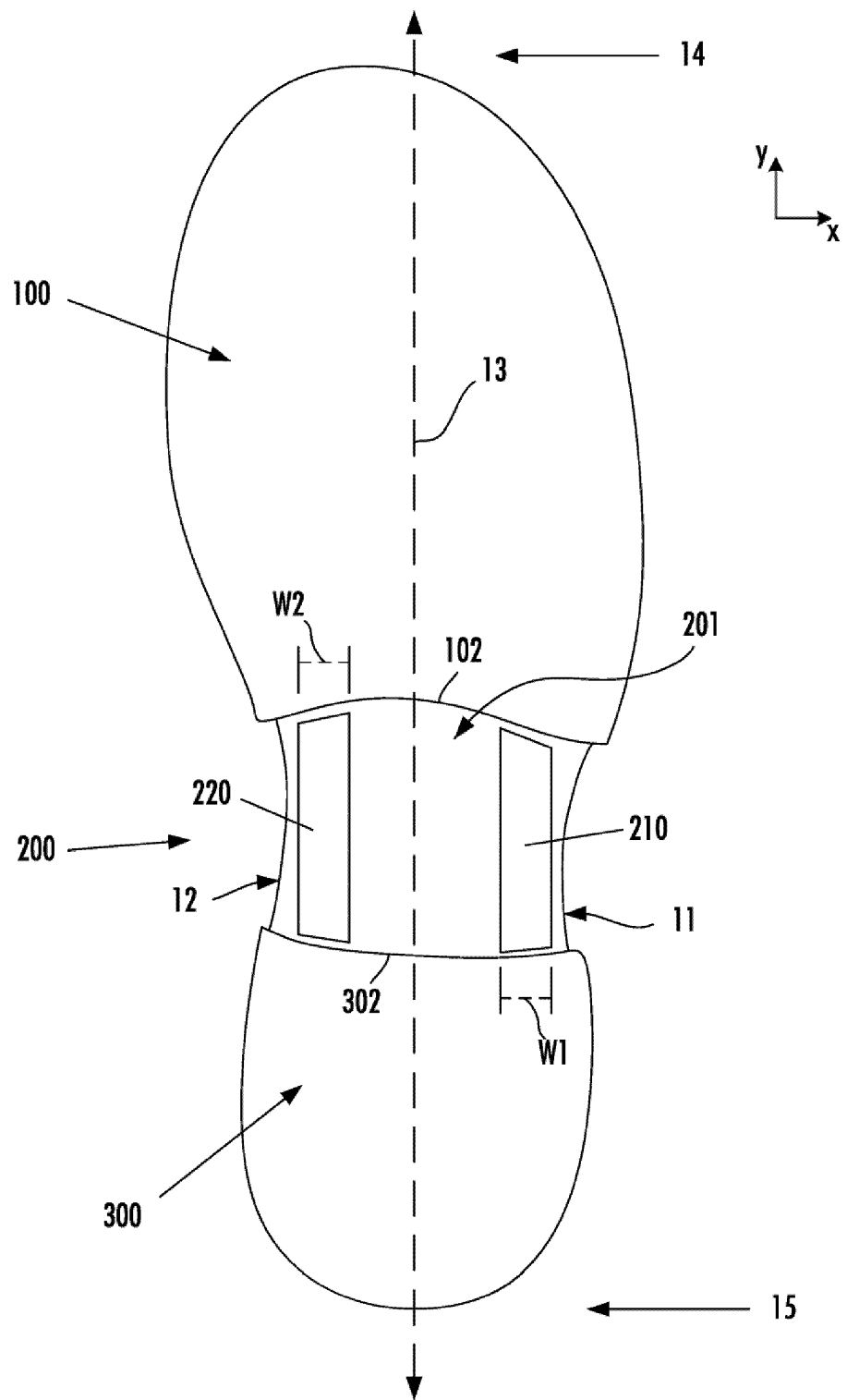
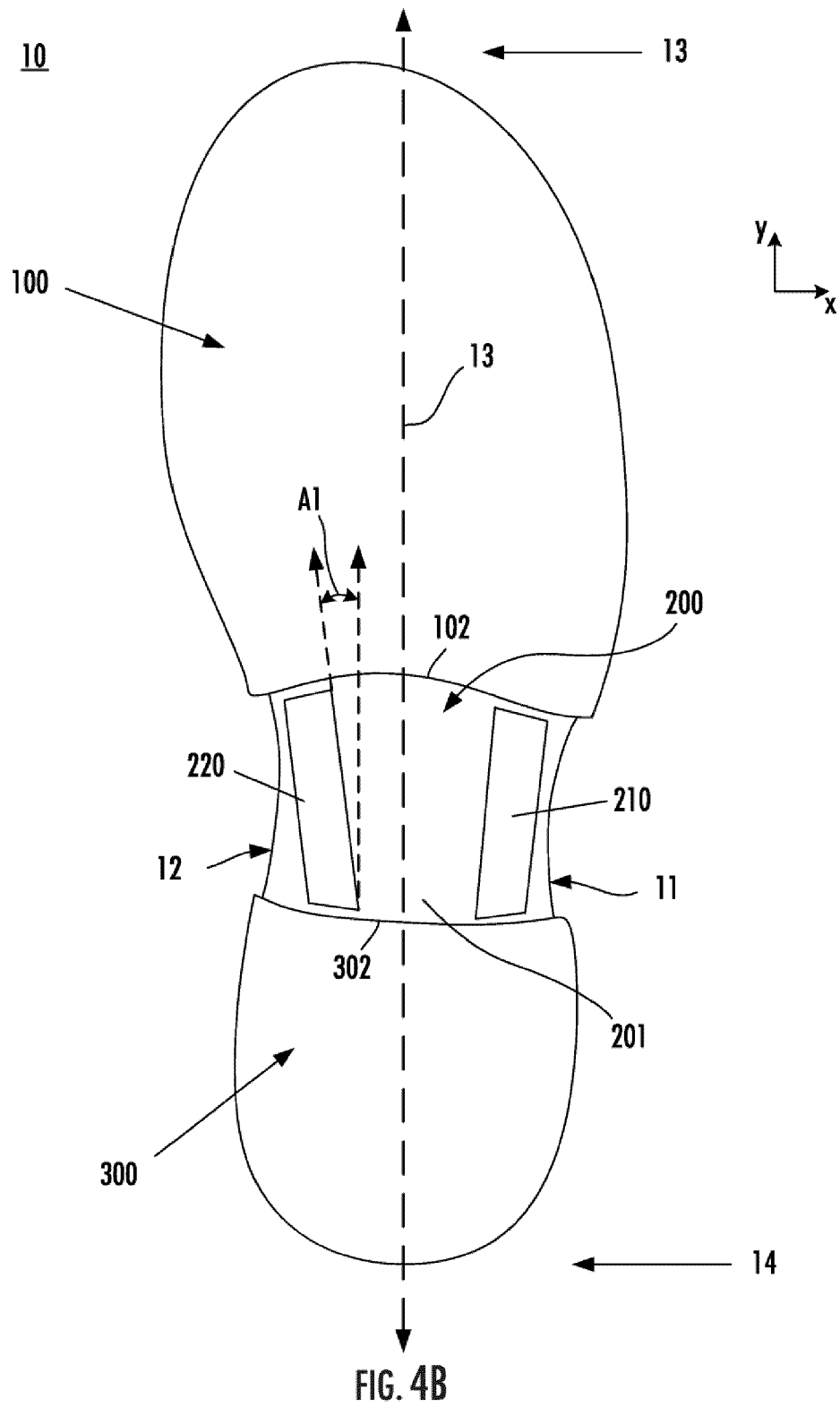


FIG. 4A



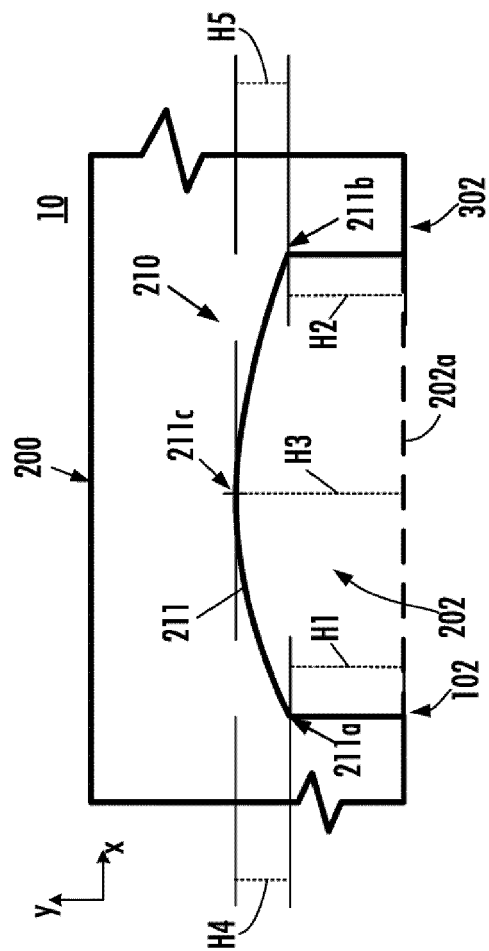


FIG. 5A

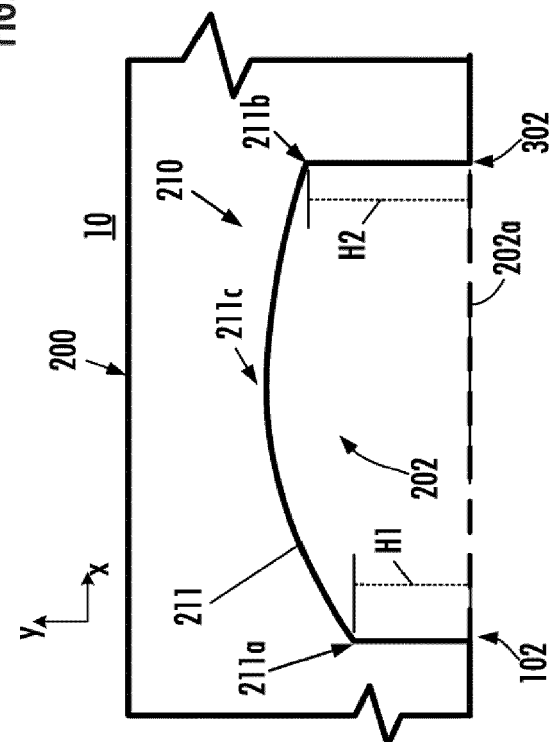


FIG. 5B

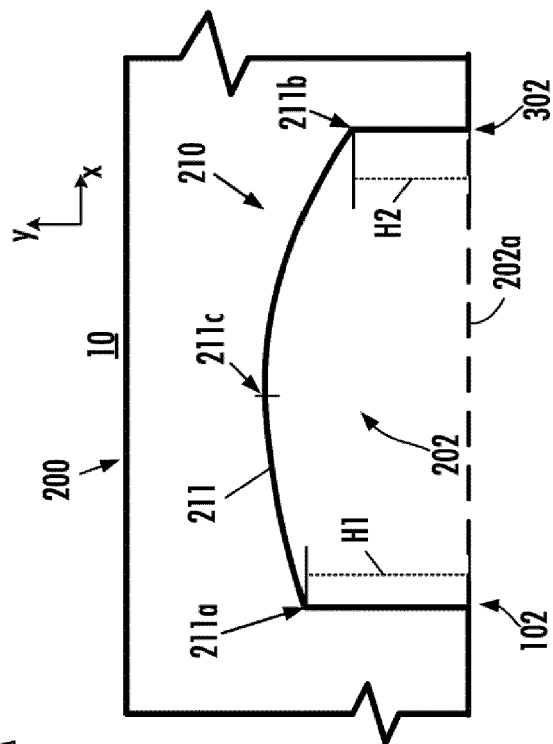


FIG. 5C

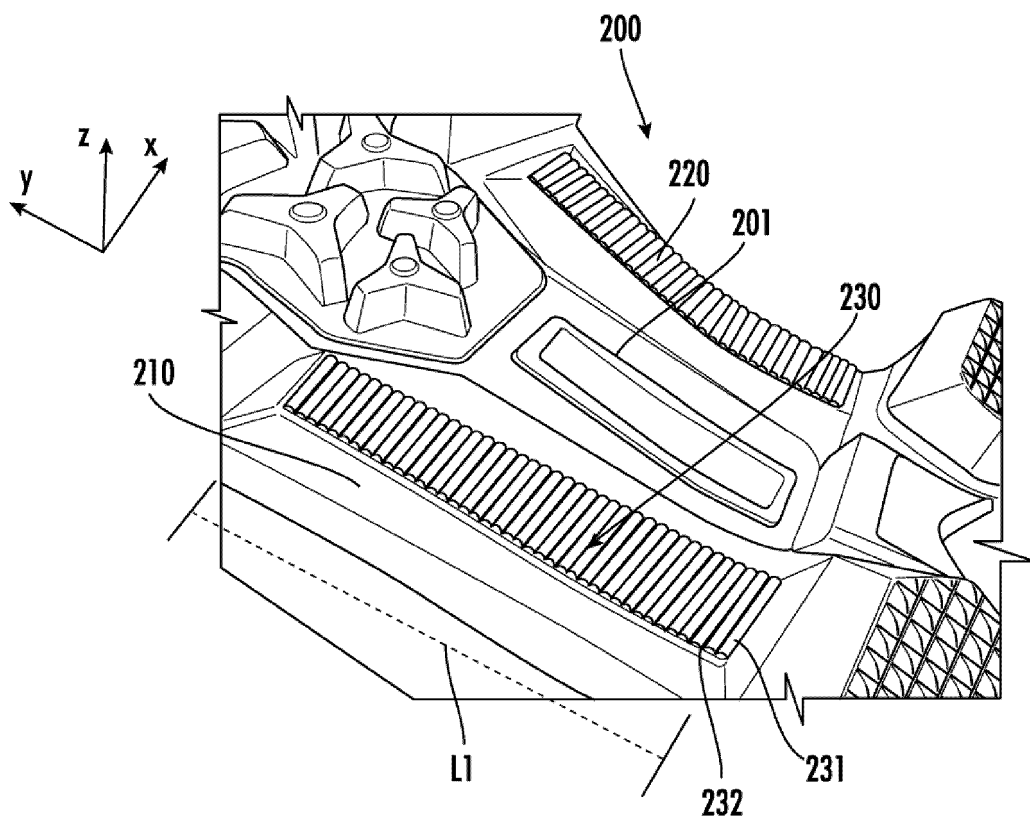


FIG. 6



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Application Number

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Place of search The Hague		Date of completion of the search 26 October 2023	Examiner Papatheofrastou, M
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