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(54) **ARTICLE OF FOOTWEAR INCORPORATING A KNITTED COMPONENT WITH MONOFILAMENT AREAS**

SCHUHWERK MIT EINEM GESTRICKTEIL MIT MONOFILAMENTZONEN

ARTICLE CHAUSSANT COMPRENANT UN TRICOT AVEC DES REGIONS EN MONOFILAMENTS

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Description

BACKGROUND

[0001] Conventional articles of footwear generally include two primary elements, an upper and a sole structure. The upper and the sole structure, at least in part, define a foot-receiving chamber that may be accessed by a user's foot through a foot-receiving opening. The sole structure is secured to a lower area of the upper, thereby being positioned between the upper and the ground.

[0002] In athletic footwear, for example, the sole structure may include a midsole and an outsole. The midsole often includes a polymer foam material that attenuates ground reaction forces to lessen stresses upon the foot and leg during walking, running, and other ambulatory activities. Additionally, the midsole may include fluid-filled chambers, plates, moderators, or other elements that further attenuate forces, enhance stability, or influence the motions of the foot. The outsole is secured to a lower surface of the midsole and provides a ground-engaging portion of the sole structure formed from a durable and wear-resistant material, such as rubber. The sole structure may also include a sockliner positioned within the void and proximal a lower surface of the foot to enhance footwear comfort.

[0003] A variety of material elements (e.g. textiles, polymer foam, polymer sheets, leather, synthetic leather) are conventionally utilized in manufacturing the upper. In athletic footwear, for example, the upper may have multiple layers that each includes a variety of joined material elements. As examples, the material elements may be selected to impart stretch-resistance, wear resistance, flexibility, air-permeability, compressibility, comfort, and moisture-wicking to different areas of the upper. In order to impart the different properties to different areas of the upper, material elements are often cut to desired shapes and then joined together, usually with stitching or adhesive bonding. Moreover, the material elements are often joined in layered configuration to impart multiple properties to the same areas.

[0004] Reducing the number and type of material elements incorporated into the upper may decrease the time and expense associated with transporting, stocking, cutting, and joining the material elements. Waste material from cutting and stitching processes may also decrease as the number and type of material elements incorporated into the upper decreases. Moreover, uppers with a lesser number of material elements may be easier to recycle than uppers formed from greater types and numbers of material elements. Further, fewer pieces that are stitched together may decrease the concentration of forces in certain areas, while fewer stitch junctions may provide greater comfort when worn. Thus, advantageously, decreasing the number of material elements utilized in the upper, therefore, waste may be decreased while increasing the manufacturing efficiency, the comfort, per-

formance, and the recyclability of the upper.

[0005] WO 2010/080182 A1 discloses an article of footwear which has an upper that includes a knitted component and a sole structure secured to the upper. The knitted component may define a tube formed of unitary knit construction, and a strand may extend through a length of the tube. As another example, the knitted component may have a pair of at least partially coextensive knitted layers formed of unitary knit construction, and a plurality of floating yarns may extend between the knitted layers. In some configurations, the knit type or yarn type may vary in different regions of the knitted component to impart different properties. Additionally, the knitted component may incorporate a thermoplastic yarn that is fused in different regions of the knitted component to impart different properties. A flat knitting process or a variety of other knitting processes may be utilized to form the knitted component. In terms of claim 1, this document discloses in Figures 5B to 6 an article of footwear comprising: a knitted component comprising at least one first area (between adjacent tubes 42) comprising a strand, the at least one first area having a shape (see e.g. Figure 6); a second area (42) adjacent to the at least one first area, the second area (42) comprising at least two overlapping knit layers (see Figure 5B) of yarn, wherein the at least two overlapping knit layers form a first unsecured area there between; a third area (42) adjacent to the at least one first area, wherein the second area (42) and the third area (42) define at least a portion of the shape of the at least one first area (see e.g. Figure 6); and a first tensile element (43) extending through at least a portion of the first unsecured area.

[0006] US 3 306 081 A discloses a covered elastic yarn which is formed by closely wrapping a first inelastic thermoplastic synthetic wrap yarn in one direction about a core made from a long chain synthetic polymer composed of at least 85% of a segmented polyurethane, closely wrapping a second inelastic thermoplastic synthetic wrap yarn in an opposite direction about said first yarn, and treating the covered elastic yarn with heat to shrink and set the yarns and to embed the first yarn in the core. The yarns are applied while the core is elongated about 153% of its relaxed length.

[0007] US 2007/094762 A1 discloses an article of apparel that is at least partially formed from a material element having a substrate and a plurality of projections. The substrate has a first surface and an opposite second surface.

[0008] The projections extend from the first surface of the substrate, and the projections each have terminal ends located opposite the substrate. The material element has a first permeability when the first surface has a convex configuration, and the material element has a second permeability when the first surface has a concave configuration, the first permeability being greater than the second permeability. The apparel may be reversible such that either the first surface or the second surface of the substrate faces outward.

SUMMARY

[0009] In one aspect, an article of footwear comprises a knitted component. The knitted component comprises at least one monofilament area comprising a monofilament strand, the at least one monofilament area having a shape. A first multifilament area is adjacent to the at least one monofilament area, the first multifilament area comprising at least two overlapping knit layers of multifilament yarn, wherein the at least two overlapping knit layers form a first unsecured area there between. A second multifilament area is adjacent to the at least one monofilament area. The first multifilament area and the second multifilament area defines at least a portion of the shape of the at least one monofilament area. A first tensile element extends through at least a portion of the first unsecured area.

[0010] In another aspect, the second multifilament area can comprise at least two overlapping knit layers of multifilament yarn, wherein the at least two overlapping knit layers form a second unsecured area there between.

[0011] In another aspect, a second tensile element can extend through at least a portion of the second unsecured area.

[0012] In another aspect, the article can further comprise an instep border portion and a sole border portion and the instep border portion and the sole border portion can further define at least a portion of the shape of the at least one monofilament area.

[0013] In another aspect, the at least two overlapping layers of the first multifilament area can comprise an interior layer and an exterior layer and wherein the interior layer and the exterior layer can be at least partially connected to each other to form the first unsecured area.

[0014] In another aspect, the first unsecured area can comprise a tubular structure through which the first tensile element can extend.

[0015] In another aspect, the interior layer and the exterior layer of the first unsecured area can provide a barrier between the first tensile element and the at least one monofilament area.

[0016] In another aspect, the first multifilament area can be disposed on at least a portion of an outer surface of the at least one monofilament area.

[0017] In another aspect, the exterior layer can include a first number of courses and the interior layer includes can include a second number of courses, the first number of courses being greater than the second number of courses.

[0018] In another aspect, the at least one monofilament area can be located in a first plane and the exterior layer of the first multifilament area can be located in a second plane.

[0019] In another aspect, the first tensile element can extend from the first unsecured area to the second unsecured area to form a loop.

[0020] In another aspect, the at least one monofilament area can define a width and wherein the first multifilament

area can define a width, and wherein the width of the at least one monofilament area can be less than or equal to the width of the first multifilament area.

[0021] In another aspect, the at least one monofilament area can define a width and wherein the first multifilament area can define a width, and wherein the width of the at least one monofilament area can be greater than the width of the first multifilament area.

[0022] In another aspect, an article of footwear comprises a knitted component. The knitted component can comprise a plurality of monofilament areas comprising a monofilament strand, the plurality of monofilament areas comprising a shape. The knitted component can further comprise a plurality of multifilament areas comprising at least two overlapping knit layers of multifilament yarn, wherein the at least two overlapping knit layers can comprise an interior layer and an exterior layer and wherein the plurality of multifilament areas can define at least a portion of the shape of the plurality of monofilament areas. The plurality of monofilament areas can be located in a first plane and wherein at least the exterior layer of the plurality of multifilament areas can be located in a second plane.

[0023] In another aspect, the second plane can be located radially outwardly of the first plane.

[0024] In another aspect, the knitted component can further comprise a forefoot region, a midfoot region and a heel region and wherein a plurality of monofilament areas can be located in each of the forefoot, midfoot and heel regions.

[0025] In another aspect, the shape and orientation of the plurality of monofilament areas located within the forefoot region can differ from the shape and orientation of the plurality of monofilament areas located within the midfoot region and the heel region.

[0026] In another aspect, at least a portion of the plurality of monofilament areas located in the heel region can comprise an elongated shape and wherein at least a portion of the plurality of monofilament areas located in the midfoot region can comprise an elongated shape.

[0027] In another aspect, the plurality of monofilament areas located in each of the forefoot, midfoot and heel regions can comprise a selected shape and orientation and wherein the selected shape and orientation of the plurality of monofilament areas can impart different stretch properties to the different regions.

DESCRIPTION OF THE DRAWINGS

[0028]

FIG. 1 is a perspective view of an embodiment of an article of footwear.

FIG. 2 is a lateral side view of an embodiment of an article of footwear.

FIG. 3 is a medial side view of an embodiment of an article of footwear.

FIG. 4 is a top view of an embodiment of an article

of footwear.

FIG. 5 is a top view of an embodiment of a knitted component incorporated into an upper of an article of footwear.

FIG. 6 is an exploded view of the components of an embodiment of an article of footwear with an upper incorporating a knitted component.

FIG. 7 is a side view of an embodiment of an article of footwear with monofilament and multifilament portions.

FIG. 7A is an enlarged view of a portion of FIG. 7.

FIG. 8 is a side view of an embodiment of footwear with monofilament and multifilament areas.

FIG. 8A is an enlarged view of a portion of FIG. 8.

FIG. 9 is a side view of an embodiment of footwear with monofilament and multifilament areas.

FIG. 9A is a looping diagram of a portion of the article of footwear of FIG. 9.

FIG. 10 is a lateral side view of an alternate embodiment of an article of footwear incorporating monofilament areas.

FIG. 11 is a lateral side view of another alternate embodiment of an article of footwear incorporating monofilament areas.

FIG. 12 is a lateral side view of another alternate embodiment of an article of footwear incorporating monofilament areas.

FIG. 13 is a lateral side view of another alternate embodiment of an article of footwear incorporating monofilament areas.

FIG. 14 is a side view of an embodiment of footwear with monofilament and multifilament areas.

FIG. 14A is a looping diagram of a portion of the article of footwear of FIG. 14.

FIG. 15 is a perspective view of another embodiment of an article of footwear.

FIG. 16 is a lateral side view of the article of footwear of FIG. 15.

FIG. 17 is a medial side view of the article of footwear of FIG. 15.

FIG. 18 is a rear view of the article of footwear of FIG. 15.

FIG. 19 is a top view of an embodiment of a knitted component incorporated into an upper of the article of footwear of FIG. 15.

FIG. 20 is a top view of an embodiment of a heel portion of the article of footwear of FIG. 15.

FIG. 21 is a top view of an embodiment of a body portion of a knitted component of the article of footwear of FIG. 15.

FIG. 22 is an exploded view of the components of the article of footwear of FIG. 15.

FIG. 23 is a side view of an embodiment of the article of footwear of FIG. 15.

FIG. 23A is an enlarged view of a portion of FIG. 23.

FIG. 24 is a top view of an embodiment of the article of footwear of FIG. 15.

FIG. 24A is an enlarged view of a forefoot region of

FIG. 24.

FIG. 25 is a rear view of an embodiment of the article of footwear of FIG. 15.

FIG. 25A is an enlarged view of a portion of FIG. 25.

FIG. 26 is a top view of an embodiment of a heel portion of an article of footwear subjected to a tensile force.

FIG. 27 is a side view of an embodiment of an article of footwear.

FIG. 27A is an enlarged cross-sectional view of a portion of FIG. 27.

FIG. 28 is a side view of an embodiment of an article of footwear.

FIG. 28A is a looping diagram of a portion of the knitting configuration for the article of FIG. 28.

FIG. 29 is a top view of a heel portion of an embodiment of an article of footwear.

FIG. 29A is an enlarged view of a portion of FIG. 29.

FIG. 29B is a looping diagram of a portion of the knitting configuration for the article of FIG. 29.

FIG. 30 is a rear view of a heel portion of an embodiment of an article of footwear.

FIG. 30A is an enlarged cross-sectional view of a portion of FIG. 30.

FIG. 31 is a rear view of a heel portion of an embodiment of an article of footwear.

FIG. 31A is a looping diagram for a portion of a knitting configuration of FIG. 31.

30 DETAILED DESCRIPTION

[0029] The following discussion and accompanying Figures disclose a variety of concepts relating to knitted components and the manufacture of knitted components.

Although the knitted components may be utilized in a variety of products, an article of footwear that incorporates the knitted components is disclosed below as an example. In addition to footwear, the knitted components may be utilized in other types of apparel (e.g., shirts, pants, socks, jackets, undergarments), athletic equipment (e.g., golf bags, baseball and football gloves, soccer ball restriction structures), containers (e.g., backpacks, bags), and upholstery for furniture (e.g., chairs, couches, car seats). The knitted components may also be utilized in bed coverings (e.g., sheets, blankets), table coverings, towels, flags, tents, sails, and parachutes. The knitted components may be utilized as technical textiles for industrial purposes, including structures for automotive and aerospace applications, filter materials, medical textiles (e.g. bandages, swabs, implants), geotextiles for reinforcing embankments, agrotexiles for crop protection, and industrial apparel that protects or insulates against heat and radiation. Accordingly, the knitted components and other concepts disclosed herein may be incorporated into a variety of products for both personal and industrial purposes.

[0030] For consistency and convenience, directional adjectives are employed throughout this description cor-

responding to the illustrated embodiments. The term "longitudinal" as used throughout this description and in the claims refers to a direction extending a length or major axis of an article. In some cases, the longitudinal direction may extend from a forefoot region to a heel region of the article. Also, the term "lateral" as used throughout this description and in the claims refers to a direction extending a width or minor axis of an article. In other words, the lateral direction may extend between a medial side and a lateral side of an article. Furthermore, the term "vertical" as used throughout this description and in the claims refers to a direction generally perpendicular to a lateral and longitudinal direction. For example, in cases where an article is planted flat on a ground surface, the vertical direction may extend from the ground surface upward. It will be understood that each of these directional adjectives may be applied to one or more individual components of an article, including an upper, a knitted component and portions thereof, and/or a sole structure.

Footwear Configuration

[0031] FIGS. 1 and 15 illustrate exemplary embodiments of an article of footwear 100, also referred to simply as article 100. Alternative embodiments of the article 100 shown in FIG. 1 are further illustrated in FIGS. 10 (identified as article 1004), FIG. 11 (identified as article 1108), FIG. 12 (identified as article 1212) and FIG. 13 (identified as article 1306). In some embodiments, article 100 may include a sole structure 110 and an upper 120. Although article 100 shown in FIGS. 1 through 14A is illustrated as having a general configuration suitable for running while article 100 shown in FIGS. 15 through 31A is illustrated as having a general configuration suitable for basketball, the concepts associated with article 100 may also be applied to a variety of other athletic footwear types, including baseball shoes, soccer shoes, cycling shoes, football shoes, tennis shoes, training shoes, walking shoes, and hiking boots, for example. The concepts may also be applied to footwear types that are generally considered to be non-athletic, including dress shoes, loafers, sandals, and work boots. Accordingly, the concepts disclosed with respect to article 100 may be applied to a wide variety of footwear types.

[0032] For reference purposes, article 100 may be divided into three general regions: a forefoot region 10, a midfoot region 12, and a heel region 14, as shown in FIGS. 1-3 and FIGS. 15-17. Forefoot region 10 generally includes portions of article 100 corresponding with the toes and the joints connecting the metatarsals with the phalanges. Midfoot region 12 generally includes portions of article 100 corresponding with an arch area of the foot. Heel region 14 generally corresponds with rear portions of the foot, including the calcaneus bone.

[0033] Article 100 also includes a lateral side 16 and a medial side 18, which extend through each of forefoot region 10, midfoot region 12, and heel region 14 and correspond with opposite sides of article 100. More par-

ticularly, lateral side 16 corresponds with an outside area of the foot (i.e., the surface that faces away from the other foot), and medial side 18 corresponds with an inside area of the foot (i.e., the surface that faces toward the other foot). Forefoot region 10, midfoot region 12, and heel region 14 and lateral side 16, medial side 18 are not intended to demarcate precise areas of article 100. Rather, forefoot region 10, midfoot region 12, and heel region 14, and lateral side 16 and medial side 18 are intended to represent general areas of article 100 to aid in the following discussion. In addition to article 100, forefoot region 10, midfoot region 12, and heel region 14 and lateral side 16 and medial side 18 may also be applied to sole structure 110, upper 120, and individual elements thereof.

[0034] In an exemplary embodiment, sole structure 110 is secured to upper 120 and extends between the foot and the ground when article 100 is worn, as shown generally in FIGS. 6 and 22. In some embodiments, sole structure 110 may include one or more components, including a midsole, an outsole, a strobrel and/or a sockliner or insole. The sole structure 110 may include an outsole 112 that is secured to a lower surface of upper 120 and/or a base portion configured for securing sole structure 110 to upper 120. The outsole 112 may be formed from a wear-resistant rubber material that is textured to impart traction to a particular surface. Although this configuration for sole structure 110 provides an example of a sole structure that may be used in connection with upper 120, a variety of other configurations for sole structure 110 may also be used. Accordingly, the features of sole structure 110 or any sole structure used with upper 120 may vary.

[0035] In other embodiments, sole structure 110 may include a midsole, a strobrel and/or a sockliner. A midsole may be secured to a lower surface of an upper and in some cases may be formed from a compressible polymer foam element (e.g., a polyurethane or ethylvinylacetate foam) that attenuates ground reaction forces (i.e., provides cushioning) when compressed between the foot and the ground during walking, running, or other ambulatory activities. In another example, a strobrel, generally comprising a thin sheet of material such as EVA, may be attached to the midsole, and the upper is then stitched to the strobrel material, often around the perimeter of the foot bed. In other cases, a midsole may incorporate plates, moderators, fluid-filled chambers, lasting elements, or motion control members that further attenuate forces, enhance stability, or influence the motions of the foot. In still other cases, the midsole may be primarily formed from a fluid-filled chamber that is located within an upper and is positioned to extend under a lower surface of the foot to enhance the comfort of an article.

[0036] The upper 120 defines a void within article 100 for receiving and securing a foot relative to sole structure 110. The void is shaped to accommodate the foot and extends along a lateral side of the foot, along a medial side of the foot, over the foot, around the heel, and under

the foot. As shown in FIGS. 1 and 15, the upper 120 includes an exterior surface 121 and an opposite interior surface 122. Exterior surface 121 faces radially outwardly and away from the foot of a wearer of article 100, whereas interior surface 122 faces inward and defines a majority or a relatively large portion of the void within article 100 for receiving the foot. Moreover, interior surface 122 may lie against the foot or a sock covering the foot. Access to the void is provided by a throat opening 140 located in at least heel region 14. More particularly, the foot may be inserted into upper 120 through throat opening 140, and the foot may be withdrawn from upper 120 through throat opening 140. As shown in FIGS. 4 and 15, an instep area 150 extends from throat opening 140 in heel region 14 over an area corresponding to an instep of the foot to an area adjacent to forefoot region 10.

[0037] As shown in FIGS. 1 and 3, a lace 154 may extend through a plurality of loops 158 located in upper 120. The loops 158 permit the wearer to modify dimensions of upper 120 to accommodate proportions of the foot. More particularly, lace 154 permits the wearer to tighten upper 120 around the foot, and lace 154 permits the wearer to loosen upper 120 to facilitate entry and removal of the foot from the void (i.e., through throat opening 140). As shown in FIGS. 15 and 16, lace 154 may additionally pass through loops 158, which may further permit the wearer to tighten the upper 120 around the foot. In addition, as shown in FIG. 22, a tongue 152 extends through instep area 150 from a forward portion of upper 120 in forefoot region 10 to a top portion of upper 120 adjacent to throat opening 140 in heel region 14. The tongue 152 may extend under lace 154 to enhance the comfort of article 100. In addition to, or in alternative of loops 158 and/or lace apertures 156, article 100 may include other lace-receiving elements, such as D-rings, hooks or various looped tensile elements. In further configurations, upper 120 may include additional elements, such as (a) a heel counter in heel region 14 that enhances stability, (b) a toe guard in forefoot region 10 that is formed of a wear-resistant material, and (c) logos, trademarks, and placards with care instructions and material information.

[0038] Footwear uppers may be formed from multiple material elements (e.g., textiles, polymer foam, polymer sheets, leather, synthetic leather) that are joined through stitching or bonding, for example. As shown in exemplary FIGS. 1 and 15, upper 120 may be formed from a knitted component 130, which will be discussed in more detail below. Knitted component 130 may, for example, be manufactured through a flat knitting process. The knitted component 130 may extend through each of forefoot region 10, midfoot region 12 and heel region 14, along both lateral side 16 and medial side 18, over forefoot region 10 and around heel region 14. In an exemplary embodiment, knitted component 130 forms at least a portion of, and may form substantially all of, upper 120, including exterior surface 121 and/or interior surface 122, thereby defining a portion of the void within upper 120. The knitted

component 130 may also extend under the foot and/or the knitted component 130 may be secured to upper surface 114 of sole structure 110. In other embodiments, however, a strobil sock or thin sole-shaped piece of material is secured to knitted component 130 to form a base portion of upper 120 that extends under the foot for attachment with sole structure 110.

[0039] In one non-limiting example as shown in FIGS. 1 through 3 and FIGS. 15 through 17 the, knitted component 130 may be formed from multiple knitted components. In an exemplary embodiment illustrated in FIGS. 15 through 17, knitted component 130 may include a body portion 124 and a heel portion 126. The body portion 124 may be formed from a knitted textile material and may extend along article 100 in a longitudinal direction from forefoot region 10 of upper 120 through midfoot region 12 and extend over a vamp portion of upper 120 that corresponds with an instep of a foot of a wearer. In an exemplary embodiment, at least a portion of body portion 124 may further extend rearwards from midfoot region 12 into heel region 14. Additionally, body portion 124 may extend continuously between lateral side 16 and medial side 18 around forefoot region 10 of upper 120. With this configuration, body portion 124 of knitted component 130 may be configured to substantially cover a foot of a wearer.

[0040] In some embodiments, as shown generally in FIGS. 15-18, heel portion 126 may be formed from a knitted textile material and may extend along article 100 in a vertical direction in heel region 14 from sole structure 110 towards the top of throat opening 140. In an exemplary embodiment, heel portion 126 may further extend at least partially into midfoot region 12 of upper 120 along the longitudinal direction of article 100. Additionally, heel portion 126 may extend continuously between lateral side 16 and medial side 18 around heel region 14 of upper 120. With this configuration, heel portion 126 of knitted component 130 may be configured as a cuff to cover at least a portion of an ankle of the wearer. Together, body portion 124 and heel portion 126 may be joined along corresponding edges to form knitted component 130, as will be described in more detail below. For example, edge 127 of body portion 124 may be connected to heel portion 126 along edge 128 of heel portion 126. In some embodiments, edge 127 and edge 128 may extend in an approximately diagonal direction from instep area 150 towards a rear of article 100 at heel region 14. Alternatively, body portion 124 and heel portion 126 may not be formed separately and then joined, but rather the body portion 124 and the heel portion 126 may be formed as a single unitary knitted component 130.

[0041] As shown in FIGS. 1 through 14A, the upper 120 shown in FIGS. 15 through 31 not only covers the foot of a wearer but also extends upward and covers a portion of the ankle. For reference purposes, the upper 120 may be described as being divided into two general regions: a foot region 20 and an ankle region 30, as shown in FIGS. 15-18. Foot region 20 extends through

each of forefoot region 10, midfoot region 12, and heel region 14 and generally encompasses portions of upper 120 corresponding with the foot. In many configurations of article 100, foot region 20 corresponds with portions of upper 120 that are intended to be below the lateral malleolus and the medial malleolus (i.e., the bony prominences on each side of the ankle) of the wearer. Ankle region 30 is primarily located in heel region 14 and generally encompasses portions of upper 120 corresponding with the ankle. Ankle region 30 may correspond with portions of upper 120 that are intended to cover and extend above the lateral malleolus and the medial malleolus.

[0042] In the embodiment of FIGS. 15 through 31, the body portion 124 of knitted component 130 is primarily and substantially associated with foot region 20 of upper 120 and heel portion 126 is associated with at least a portion of foot region 20 and a substantial majority of ankle region 30. As seen in FIG. 18, heel portion 126 extends from a lower area of upper 120 adjacent to sole structure 110 to a top edge of upper 120 extending around throat opening 140.

[0043] As mentioned above, heel portion 126 may form a cuff generally having a C-shape with front perimeter edges extending along opposite sides of instep area 150 to provide support for the ankle of a wearer of article 100 by surrounding and substantially encircling the ankle of the wearer when disposed within upper 120 through throat opening 140. Heel portion 126 includes a top edge forming a cuff extending around throat opening 140 from lateral side 16 to medial side 18 in a continuous manner around heel region 14 at the back of article 100, as shown in FIG. 15, while remaining open along the front of article 100 at instep area 150 to accommodate tongue 152. In an exemplary embodiment, tongue 152 may fit between opposite front perimeter edges of heel portion 126.

[0044] The upper 120 may include distinct areas with differing properties. In some embodiments, a portion of upper 120 may include multifilament yarn and/or may include monofilament strands. Monofilament strands may be made from a plastic or polymer material that is extruded to form the monofilament strand. Generally, monofilament strands may be lightweight and have a high tensile strength, i.e., the monofilament strands are able to sustain a large degree of stress prior to tensile failure or breaking, so as to provide a large amount or degree of resistance to stretch to upper 120. In an exemplary embodiment, portions of upper 120 that include monofilament strands may be located in one or more monofilament areas. The term "monofilament areas" is used to reference a portion of upper 120 that is formed substantially entirely from knitted monofilament strands.

[0045] Various portions of upper 120 may also include monofilament groups. The term monofilament groups may be used to refer to a general region of a group of monofilament areas. In other words, monofilament groups may comprise multiple monofilament areas. In one embodiment, a medial monofilament group 160 is disposed on medial side 18 of upper 120 and a lateral

monofilament group 164 disposed on lateral side 16 of upper 120 as shown in FIGS. 4, 16 and 17. Medial monofilament group 160 and lateral monofilament group 164 may be generally located in midfoot region 12. In some embodiments, as shown in FIGS. 19 and 21, a forefoot monofilament group 162 is disposed forward of instep area 150 in forefoot region 10 of upper 120. Additionally, in some embodiments, heel region 14 may include a monofilament group 166 as shown in FIGS. 18-20.

[0046] The monofilament groups may comprise monofilament areas that are arranged in a certain orientation. For example, referring to lateral monofilament group 164, some of the monofilament areas are oriented in a similar diagonal orientation. Likewise, heel monofilament group 166 may include monofilament areas that are oriented in a largely horizontal manner. Although monofilament groups may include similarly situated monofilament areas, in other embodiments monofilament groups may include variously oriented monofilament areas.

[0047] As previously mentioned, knitted component 130 is formed from at least one yarn that is manipulated (e.g., with a knitting machine) to form a plurality of intermeshed loops that define a variety of courses and wales, to form the structure of a knit textile. The knitted component 130 of upper 120 may be a one-piece element, or, stated differently, upper 120 may be formed of a single unitary component or piece of knitted textile. Alternatively, upper 120 may include one or multiple knitted component portions, including body portion 124 and heel portion 126 as described above. In one example, referring to FIGS. 19-22, the respective body portion 124 and heel portion 126 of knitted component 130, are depicted individually and separate from a remainder of article 100. The individual component portions of knitted component 130, including body portion 124 and/or heel portion 126, are each formed of unitary knit construction. Although seams may be present in the knitted component 130, a majority of the knitted component portions (e.g., body portion 124 and heel portion 126) have a substantially seamless configuration.

[0048] As utilized herein, a knitted component (e.g., body portion 124 and/or heel portion 126 and/or knitted component 130) is defined as being formed of "unitary knit construction" when formed as a one-piece element through a knitting process. That is, the knitting process substantially forms the various features and structures of the knitted component without the need for significant additional manufacturing steps or processes. A unitary knit construction may be used to form a knitted component or portion having structures or elements that include one or more courses of yarn or other knit material that are joined such that the structures or elements include at least one course in common (i.e., sharing a common yarn) and/or include courses that are substantially continuous between each of the structures or elements. With this arrangement, a one-piece element of unitary knit construction is provided.

[0049] Although the respective knitted component por-

tions forming knitted component 130 may be joined to each other (e.g., edge 127 of body portion 124 and edge 128 of heel portion 126 being joined together) following the knitting process, each individual knitted component portion remains formed of unitary knit construction

because it is formed as a one-piece knit element. As shown in FIG. 15, knitted component 130 includes body portion 124 forming a portion of exterior surface 121 and opposite interior surface 122 of upper 120. Knitted component 130 further includes heel portion 126 that similarly forms a portion of exterior surface 121 and opposite interior surface 122 of upper 120. Together, body portion 124 and heel portion 126 may be joined together to form a substantial majority of exterior surface 121 and opposite

interior surface 122 of upper 120. Moreover, knitted component portions remain formed of unitary knit construction when other elements (e.g., a lace, logos, trademarks, placards with care instructions and material information, structural elements) are added following the knitting process.

[0050] Examples of various configurations of knitted components, including configurations that include an in-laid strand or tensile element which may be used with and/or in one or more of the component portions of knitted component 130 are disclosed in U.S. Patent Number 6,931,762 to Dua; U.S. Patent Number 7,347,011 to Dua, et al.; U.S. Patent Application Publication 2008/0110048 to Dua, et al.; and U.S. Patent Application Publication 2010/0154256 to Dua.

Knitted Component Configurations and Manufacture Thereof

[0051] Although the knitting process that forms knitted component 130 and/or the knitted component portions may be performed by hand, the commercial manufacture of multiple knitted components 130 and/or the knitted component portions, including the overall knitted component 130, the body portion 124 and/or heel portion 126, will generally be performed by knitting machines. As FIG. 5 illustrates, the knitted component 130 may be formed largely as a two-dimensional structure, that when assembled may take the shape of a three-dimensional structure. In one example, as shown in the view of FIG. 5, monofilament areas of medial monofilament group 160 extend in a lateral direction and the monofilament areas of lateral monofilament group 164 extend largely in a lateral direction when the knitted component 130 is generally a two-dimensional structure. Then, as shown in FIG. 6, the monofilament areas extend generally in a vertical direction when upper 120 is formed into a three-dimensional structure.

[0052] In general, knitting involves forming courses and wales of intermeshed loops of a yarn or multiple

yarns. In production, knitting machines may be programmed to mechanically-manipulate one or more yarns into the configuration of a knitted component 130 or a knitted component portion, for example, body portion 124 and heel portion 126. That is, knitted component 130 may be formed by mechanically-manipulating one or more yarns to form a one-piece textile element that has the shape and features of body portion 124 and heel portion 126. As such, knitted component 130 may be formed of unitary knit construction utilizing a knitting machine.

[0053] The knitted component 130 and/or the respective body portion 124 and heel portion 126 may be formed through a variety of different knitting processes and using a variety of different knitting machines with the capability of forming knitted component 130 and/or knitted component portions, including body portion 124 and heel portion 126, to have the various features discussed above. In general, weft knitting involves forming a plurality of courses and wales. As an example, courses are rows of intermeshed loops of knit material that extend approximately laterally across each of body portion 124 and heel portion 126. That is, courses may extend along the width of body portion 124 and along the width of heel portion 126. Wales are columns of loops that extend perpendicular to the courses and extend generally along a length of each of body portion 124 and heel portion 126.

[0054] In one embodiment, a flat knitting process may be used to form knitted component 130 and/or the knitted component portions, including body portion 124 and heel portion 126. In other embodiments, circular knitting (i.e., the use of a circular knitting machine) may be used to form knitted component 130 and/or the knitted component portions, including body portion 124 and heel portion 126. Although general or conventional knitting processes may be used to form knitted component 130 and/or the knitted component portions, including body portion 124 and heel portion 126, specific examples of knitting processes that may be used include, but are not limited to: warp knitting or weft knitting, including flat knitting or circular knitting, wide tube circular knitting, narrow tube circular knitting, narrow tube circular knit jacquard, single knit circular knit jacquard, double knit circular knit jacquard, and warp knit jacquard, for example.

[0055] Knitted component 130 may be formed from a single type of yarn that imparts common properties to each of the individual component portions, including body portion 124 and/or heel portion 126. In order to vary the properties of knitted component 130, however, different yarns may be utilized in different component portions of knitted component 130. That is, body portion 124 and/or heel portion 126, as well as different localized areas of body portion 124 and/or heel portion 126, may be formed from different yarns to vary the properties between the respective portions 124, 126 or between localized areas of a single portion of knitted component 130. Further, knitted component 130 may also comprise monofilament areas formed from a monofilament strand, thus imparting different properties within monofilament areas as com-

pared to other areas of knitted component 130.

[0056] In some embodiments, monofilament areas may be formed using a single monofilament strand. In other embodiments, monofilament areas may be formed using a monofilament strand and fusible thermoplastic yarn. The fusible thermoplastic yarn and monofilament strand may be in a plated orientation. The thermoplastic yarn may stabilize or strengthen monofilament areas or portions of monofilament areas. Moreover, one portion of knitted component 130 may be formed from a first type of yarn or combination of yarns that imparts a first set of properties, and another portion of knitted component 130 may be formed from a second type of yarn or combination of yarns that imparts a second set of properties. Properties may vary throughout knitted component 130 by selecting specific yarns for different portions of knitted component 130. Examples of properties that may be varied through choice of yarn include color, pattern, luster, stretch, recovery, loft, hand, moisture absorption, biodegradability, abrasion-resistance, durability, and thermal conductivity. It should also be noted that two or more yarns may be utilized in combination to take advantage of properties from both yarns, such as when yarns are plated or form different courses in the same area.

[0057] The properties that a particular type of yarn will impart to a knitted component 130 or to the body portion 124 and/or heel portion 126 partially depend upon the materials that form the various filaments and fibers within the yarn. Cotton, for example, provides a soft hand, natural aesthetics, and biodegradability. Elastane and stretch polyester each provide substantial stretch and recovery, with stretch polyester also providing recyclability. Rayon provides high luster and moisture absorption. Wool also provides high moisture absorption, in addition to insulating properties and biodegradability. Nylon is durable, abrasion-resistant, and has relatively high strength. Polyester is a hydrophobic material that also provides relatively high durability. Yarns that incorporate thermoplastic materials may also permit portions or areas of knitted component 130 to be fused or stabilized through the application of heat.

[0058] In addition to the material(s) that form the yarn, other aspects of the yarns selected for portions or areas of knitted component 130 may affect properties. For example, a yarn forming knitted component 130, including body portion 124 and/or heel portion 126, may be a monofilament strand or a multifilament yarn. The yarn may also include separate filaments that are each formed of different materials. In addition, the yarn may include filaments that are each formed of two or more different materials, such as a bi-component yarn with filaments having a sheath-core configuration or two halves formed of different materials. Different degrees of twist and crimping, as well as different deniers, may also affect the properties of knitted component 130 and the individual portions thereof. Accordingly, both the materials forming the yarn and other aspects of the yarn may be selected to impart a variety of properties to the knitted component

130 and or to particular portions of knitted component including body portion 124 and/or heel portion 126.

[0059] Portions of knitted component 130 may be formed from monofilament strands, while other portions of knitted component 130 may be formed from multifilament yarn, whereby the multifilament yarn may have differing properties than the properties of monofilament strands. In one example, multifilament yarn may be used to form a portion of knitted component 130, with multifilament yarn providing a higher resistance to abrasion than monofilament strands. Additionally, although certain areas of knitted component 130 may be formed from different strands or yarns, knitted component 130 may still be of unitary knit construction. For example, areas of knitted component 130 formed of monofilament yarn may be knitted adjacent to areas of knitted component formed of multifilament yarn, thereby forming an upper 120 of unitary knit construction.

[0060] As previously discussed, a monofilament area refers to a portion of knitted component 130 formed of a monofilament strand. In one example, a monofilament area may not include multifilament yarn. As shown in FIGS. 7 through 9A, 14 and 14A and 23 through 31A, the monofilament area(s) may be adjacent to and/or bounded by multifilament areas of knitted component 130.

[0061] In some embodiments, monofilament areas may be adjacent to tunnels or channels formed in the knitted component 130. The tunnels or channels may sometimes referred to herein as "welts" which are shown generally in FIG. 7 and FIG. 27 and shown in further detail in FIGS. 8, 9, 14 and FIGS. 27, 28 and 30. The welts 170 of FIG. 7 are shown in an enlarged view in FIG. 7A, identified there as welts 700. The welts 700 are shown in even further detail in cross-section in FIG. 8A, accompanied by a loop diagram for knitting the welts 700 of FIG. 9 shown in FIG. 9A and described in further detail below. Similarly, welts 170 shown in connection with article 100 in FIG. 27 are shown in an enlarged cross-sectional view in FIG. 27A, identified there as welt 1400. A loop diagram for knitting welts 1400 of FIG. 27 is shown in FIG. 28A and described in further detail below. In an alternative embodiment of the article 100, identified as article 1306 shown in FIG. 14, welts 170 are shown in an enlarged cross-sectional view in FIG. 14A and are identified as welts 1301 and 1303.

[0062] Generally, the welts 170 can be areas of knitted component 130 constructed with two or more co-extensive and overlapping knit layers, such as an inner layer and an outer layer. The knit layers may be portions of knitted component 130 that are formed from knitted material, for example, threads, yarns, or strands. Two or more knit layers may be formed of unitary knit construction in such a manner so as to form the welts in knitted component 130. Although the sides or edges of the knit layers forming welts 170 may be secured to the other layer, a central area is generally unsecured to form a hollow or tunnel between the two layers of knitted material

forming each knit layer. In some embodiments, the central unsecured area of welts 170 may be configured such that another element (e.g., a tensile element) may be located between the two layers of knitted material and extend or pass through the hollow or channel between the two knit layers of the welts 170. In an exemplary embodiment, each of the knit layers forming welts 170 may be associated with one of the exterior surface 121 and interior surface 122 of knitted component 130. For example, in one embodiment, welts 170 may include an interior layer associated with interior surface 122 and an exterior layer associated with exterior surface 121 which is located radially outwardly from interior surface 122 as shown generally in FIG. 27A.

[0063] In some embodiments, the welts 170 may be formed from multifilament yarn. The welts 170 may include inlaid strands or tensile elements which extend through the tunnel formed by the welts. Mesh knit structures, mock mesh knit structures and other suitable knit structures with accompanying looping diagrams for knitting such knit structures for use in the present embodiments are described in U.S. Patent Application Publication 2012/0233882 to Huffa et al..

[0064] The welts 170 may be located throughout the upper 120 of article 100. In one example, the welts 170 may be located adjacent to monofilament areas. In one embodiment of article 100 as shown in FIG. 8 the welts 170 may comprise an interior layer or portion 802 and an exterior layer or portion 800. In another embodiment of article 100 shown in FIG. 27, the welts 170 may comprise an interior layer or portion

172 and an exterior layer or portion 173. The interior portion 172, 802 may be located adjacent the foot of the user while the exterior portion 173, 800 may extend radially outwardly away from the foot of a user. The exterior portion 173, 800 may be connected to interior portion 172, 802 along the edges of interior portion 172, 802 so as to form an unsecured opening or channel between exterior portion 173, 800 and interior portion 172, 802.

[0065] As shown in exemplary FIG. 27A, the monofilament areas may be located toward interior surface 122 of knitted component 130. That is, monofilament areas may be located in a plane toward the foot of a user. In some embodiments, monofilament areas may be aligned with the interior portion 172, (or interior portion 802 in FIG. 8A) of the welts 170. That is, the monofilament areas may extend along a plane that is similarly aligned with the plane along which interior portion 172, 802 is formed. As such, monofilament areas may be set back from exterior portion 173 (or exterior portion 800 in FIG. 8A) of the welts 170. In some embodiments, such a configuration may be utilized in order to increase the likelihood that exterior portion 173, 800, which may be located radially outwardly of the interior portion and the monofilament areas may be contacted before the monofilament areas are contacted. In this manner, monofilament areas may be protected from abrasion.

[0066] The width of any one or more of the monofila-

ment areas may reduce the likelihood of the monofilament areas being subjected to abrasion. The monofilament areas may be relatively narrow, for example, approximately one to four courses wide. In other embodiments, the monofilament areas may be wider. Alternatively, welts 170 may be approximately the same width as the monofilament areas or the welts 170 may be wider or narrower than the monofilament areas. When the welts 170 and the monofilament areas are approximately the same width, approximately 50% or more of the area of the knitted component 130 that is surrounded by the welts 170 may comprise a purely monofilament structure. That is, approximately half or more than half of the surface area of knitted component 130 may be comprised of monofilament areas. This may allow for the article 100 to have a see-through nature, or a translucent view through a large area of knitted component 130. In other embodiments however, less than 50% of the area of the knitted component 130 that is surrounded by the welts 170 may comprise a purely monofilament structure. Although a large area of knitted component 130 may include monofilament areas, the monofilament areas may be relatively narrow and set back from exterior portion 173, 800 of the welts 170, and as such, the monofilament areas may be protected from abrasion.

[0067] The spacing of monofilament areas and multifilament areas including welts 170 may be varied and in addition, the monofilament areas may be of varying widths. For example, as previously mentioned, some monofilament areas may be from approximately one to four courses wide, while other monofilament areas may be four to eight courses wide or even wider. Similarly, some multifilament areas that are adjacent to the monofilament areas, including the welts may be from approximately one to four courses wide, while other welts may be from approximately four to eight courses in width or even wider. Additionally, the width of individual multifilament areas including the welts may be varied throughout knitted component 130. The combination of different widths of multifilament areas including the welts 170 and different widths of monofilament areas may provide for varied spacing of the monofilament areas, as shown in several non-limiting examples of article 100 in FIGS. 1, 10-13 and 15. With the multifilament areas, including welts 170, being generally located adjacent to and/or between monofilament areas, the size and shape of the multifilament areas, including welts 170, may impact the size and spacing and orientation of monofilament areas.

[0068] The height of welts may additionally provide protection to monofilament areas. The height 812 of one example of a welt 700 in FIG. 8A and the height 1412 of another example of a welt 1400 (in FIG. 27A) may be defined as the distance between exterior portion 173, 800 of the respective welts 1400, 700 and exterior surface 121 (see FIG. 27A) of the monofilament areas. In other words, height 812 and height 1412 is the distance in which the exterior portion of the respective welt extends radially outwardly away from the inner surface of the welt.

The welts 170 may have additional courses in exterior portion 173, 800 and fewer courses in interior portion 172, 802. Because the respective exterior portions 173, 800 and respective interior portions 172, 802 are attached to each other at an edge as shown in FIG. 8A and FIG. 27A, the exterior portion 173, 800 may form a bulge or bump. This bulge or bump may extend radially outwardly away from interior portion 172, 802 and monofilament areas 703 and 705 in FIG. 8A and monofilament areas 1408, 1410 in FIG. 27A. The larger bump or bulge may further protect the respective monofilament areas from abrasion. A larger bump or bulge may be formed by including more courses in the exterior portion 173, 800 and fewer courses in interior portion 172, 802. In combination with respectively narrow monofilament areas, a larger height of welts 170 may limit the likelihood of an impact between an object and the monofilament areas, because an impact may be absorbed by the welts.

[0069] In some embodiments, welts 170 may include an inlaid strand or tensile element. The tensile element may be used as a loop 158 configured to receive lace 154 as shown in FIG. 15. Additionally, in conjunction with lace 154, loop 158 may assist in adjusting the fit and feel of article 100. In some embodiments, tensile elements may provide support to welts 170, which in turn may support the adjacent monofilament areas. Additionally, tensile elements may allow for greater support when used as a loop 158, because the tensile elements may allow for the tension from a lace 154 to extend over a portion of upper 120.

[0070] In some embodiments, monofilament areas may be formed from a translucent material and/or may be substantially clear such that light may pass through monofilament areas. In addition, the monofilament areas may allow for the interior void of article 100 to be viewed through knitted component 130. Additionally, monofilament areas may include coloring or may be tinted to a certain hue. For example, monofilament areas may be tinted a black or grey color or any other color. In still further embodiments, monofilament areas may be a solid opaque color such that the monofilament areas may not permit light to pass from exterior surface 121 to interior surface 122 of a monofilament area. The transparency of monofilament areas may be impacted by the transparency or lack thereof of a monofilament strand used to form the respective monofilament area(s).

[0071] In one example, the transparency of one or more of the monofilament areas may be impacted by the diameter of monofilament strands. In some embodiments, a single monofilament strand may have a diameter in a range of approximately 0.08 mm to approximately 0.125 mm, however, a single monofilament strand may have a smaller or larger diameter. A larger diameter monofilament strand may inhibit the passing of light through the monofilament strand. Additionally, various stitch densities may be utilized in the formation of a monofilament area. A relatively higher density stitch configuration may inhibit light from passing through exterior sur-

face 121 of the article 100 to the interior void formed by knitted component 130.

[0072] One or more monofilament areas within a monofilament group may be oriented in a particular direction. For example, the monofilament areas may be oriented in a largely vertical manner. That is, the monofilament areas may extend from sole structure 110 toward instep area 150. Alternatively, monofilament areas may extend in a diagonal manner. That is, the monofilament areas may be oriented such that monofilament areas do not extend in a directly vertical manner. Vertical and/or diagonal monofilament areas are shown generally in exemplary FIGS. 6, 15 and 19. Further, in other embodiments, the monofilament areas may extend in a longitudinal direction. For example, the monofilament areas of heel monofilament group 166 are shown in FIGS. 25 and 26 to extend in a substantially longitudinal direction. The respective monofilament areas of the various above-mentioned examples may be parallel to one another or they may be oriented perpendicularly and/or oriented independently from one another.

[0073] In some embodiments, monofilament areas may be of a variety of shapes. Referring to FIGS. 5, 7 and 15-17 and 19, the monofilament areas of the lateral monofilament group 164 and/or of the medial monofilament group 160 may have a substantially trapezoidal-shape, rectangular shape and/or elongated rectangular shape. For example, monofilament area 181 of FIG. 23A, may be elongated and generally in a rectangular shape. As shown, the shape of monofilament area 181 may be defined by welt 184 on an end located closer to heel region 14, and by welt 185 on an end located close to forefoot region 20. Additionally, the shape of monofilament area 181 may further be defined by instep border portion 186. Instep border portion 186 may be an area of upper 120 that surrounds instep area 150. In some embodiments, instep border portion 186 may include lace apertures 156 and/or loops 158. The shape of monofilament area 181 may additionally be defined by sole border portion 187. The sole border portion 187 may be located adjacent to sole structure 110. Additionally, a portion of sole border portion 187 may be covered by sole structure 110 for aesthetic or other purposes. The sole border portion 187 may extend under a foot of a user and attach to a central portion of sole structure 110. The shape of monofilament area 181 is therefore defined by welt 184, welt 185, instep border portion 186 and sole border portion 110 as shown in FIG. 23. Therefore, as the shape and orientation of welt 184, welt 185, instep border portion 186 and sole border portion 187 change, so too may the shape of monofilament area 181. It should be recognized that monofilament area 181 may occupy the space surrounded or bordered by welt 184, welt 185, instep border portion 186 and sole border portion 187.

[0074] In another example, monofilament area 705 shown in FIG. 7A may be an elongated trapezoidal shape and have an angular end or termination point (like angled end 704 of the adjacent monofilament areas) near instep

area 150. As shown, the shape of monofilament area 705 may be defined, at least on one side, by welt 700. Additionally, the shape of the monofilament area 705 may further be defined by instep border portion 186 and by sole border portion 187. The shape of monofilament area 705 is therefore defined, at least in part, by welt 702, welt 700, instep border portion 186 and sole border portion 187 as shown in FIG. 7. Therefore, as the shape and orientation of welt 702, welt 700, instep border portion 186 and sole border portion 187 change, so too may the shape of monofilament area 705. As such, many different shaped monofilament areas are possible including triangular shaped, as shown generally in FIGS. 10-13, rectangular and/or elongated rectangular shaped as shown generally in FIGS. 15-18 and 23. Alternatively, other monofilament areas may be oval, circular, shark-tooth shaped and/or irregularly shaped monofilament areas as shown generally in FIGS. 19 and 23-26 and as described in further detail herein.

[0075] In some embodiments, welts that surround monofilament areas may include a tensile element which at least partially extends through the welts. For example, as shown in FIGS. 7 and 8, welt 700 includes a tensile element 804 and/or 806 extending there through. In another example, as shown in FIG. 27, welt 1400 includes a tensile element 1402 which extends there through. While some welts have tensile elements extending through at least a portion thereof, other multifilament areas or welts may not include tensile elements extending there through, as for example welt 702 of FIG. 7 and/or welt 188 shown in FIG. 23. Additionally, the tensile element may exit and enter a particular welt multiple times. That is, the tensile element may be exposed along various portions of a welt.

[0076] As previously mentioned, the monofilament areas may be an oval or triangular or shark-tooth shape, for example monofilament area 182. As shown in FIG. 23A, monofilament area 182 is bounded by welt 185 as well as welt 188. Monofilament area 182 may be located at an edge of medial monofilament group 160. That is, monofilament area 182 may not interrupt or augment the shape of other monofilament areas in a group. In other embodiments, the boundaries of monofilament area 182 may share some boundaries of elongated monofilament area 189. As shown in FIG. 23A, monofilament area 182 is located near sole border portion 187. Additionally, monofilament area 182 is located adjacent to monofilament area 189. As such, the border of monofilament area 182 may share a boundary 190 with monofilament area 189. In such a case, the length of monofilament area 189 is influenced by the boundary of monofilament area 182, as opposed to sole border portion 187.

[0077] Boundary 190 may be constructed in a similar manner as welts 170. That is, boundary 190 may be a multifilament area that includes an exterior portion and an interior portion. As such, boundary 190 may protrude or extend beyond the plane of monofilament area 189 and/or monofilament area 182. Alternatively, boundary

190 may be constructed in a different manner than welts 170. For example, boundary 190 may be formed along the same approximate plane along which monofilament area 189 and monofilament area 182 are constructed.

[0078] As FIGS. 15-17 show, monofilament areas may be variously located on knitted component 130, including being located in forefoot region 10 of article 100. As shown there, the monofilament areas may be surrounded by multifilament portions where the shape of the monofilament areas may be defined by a border of multifilament yarn. The multifilament areas between and surrounding monofilament areas may be constructed similarly to welts as discussed above. That is, the multifilament areas may include an interior layer or portion and an exterior layer or portion where the exterior portion extends radially outwardly beyond the monofilament areas. In other examples, the multifilament areas may be constructed along the same plane as monofilament areas.

[0079] As shown in FIG. 24 and 24A, a forefoot monofilament group 162 of forefoot region 10 includes multiple monofilament areas 200. In an exemplary embodiment, each of the monofilament areas 200 may have an approximately triangular shape, including a wider base that narrows to a tip at one end. Referring specifically to one monofilament area 202, it may be triangular in appearance. Additionally, monofilament areas 200 may be oriented in a similar manner. For example, base 204 of monofilament area 202 may be oriented along the lateral direction. Additionally, base 204 may be located facing heel region 14. In some embodiments, tip 206 of monofilament area 202 may be oriented opposing base 204. As such, monofilament area 202 be generally triangular and may resemble the shape of a shark tooth. Various other monofilament areas 200 may be similarly shaped. However, other geometric or non-geometric shapes of monofilament areas 200 may be utilized. Monofilament areas 200 may be arranged such that strength and stability are imparted into the forefoot region 10. In comparison to medial monofilament group 160 of midfoot region 12 (see FIG. 23), the forefoot monofilament group 162 of forefoot region 10 includes smaller areas of monofilament strands.

[0080] In some embodiments, multifilament yarn may assist in supporting article 100 in order to maintain its shape while also providing abrasion resistance. For example, forefoot region 10 may include a greater percentage of multifilament yarn because in some instances forefoot region 10 may experience a greater likelihood of abrasion and increased force upon knitted component 130. For example, a user may move or "cut" laterally which may cause the foot to press against forefoot region 10 of article. Additionally, a user may encounter greater obstacles or objects in forefoot region 10 as compared to other regions of article 100.

[0081] Furthermore, the location(s), orientation, design and/or shape of the monofilament areas may assist in force distribution throughout the article 100. For example, referring to FIG. 24A, the triangular or shark-tooth

design of monofilament areas 200 may allow for force to be distributed through forefoot region 10 at many different angles. The offset nature of monofilament areas 200 allows for multifilament yarn to be oriented between monofilament areas 200. The orientation of multifilament yarn allows for force to be transferred through multifilament yarn along multiple different angles. The specific design of the multifilament yarn area allows any force to be split or distributed through different channels of multifilament yarn. For example, a lateral force may be distributed through the multifilament yarn in an indirect manner. That is, a purely lateral force may be distributed into lateral and longitudinal components, thereby reducing stress along any one direction in forefoot region 10. In other embodiments, the shark-tooth shaped monofilament areas 200 may be combined with differently shaped monofilament areas. For example, in some embodiments, the shark-tooth-shaped monofilament areas 200 may be used in conjunction with oval-shaped monofilament areas or rectangular or elongated monofilament areas as discussed above. The shark-tooth design of monofilament areas 200 may provide strength to the forefoot region 10 while also adding to the design of article 100.

[0082] Referring to FIGS. 25 and 26, one example of a heel portion 126 for article 100 is shown. Heel monofilament group 166 includes elongated monofilament areas 300 that are located between lateral side 16 and medial side 18 of heel portion 126. As shown, elongated monofilament areas 300 extend toward spine 302. The spine 302 may be located in a central location between lateral side 16 and medial side 18 or it may be offset such that the spine 302 is closer to either lateral side 16 or medial side 18. The spine 302 may act as a barrier or separation area between lateral side 16 and medial side 18 of heel portion 126. As FIG. 25A shows, oval-shaped monofilament areas 304 may be located along the length of spine 302. As such, oval-shaped monofilament areas 304 may be located adjacent to elongated monofilament areas 300. In other embodiments, oval-shaped monofilament areas 304 may be located at different locations within heel portion 126. For example, oval shaped monofilament areas 304 may be located adjacent to collar 306.

[0083] The shape, orientation and layout of oval-shaped monofilament areas 304 and elongated monofilament areas 300 may assist in stretch prevention or restriction of the article 100. For example, heel portion 126 is shown being subjected to a tensile force in FIG. 26. As heel portion 126 is stretched, spine 302 may absorb a substantial portion of the force. That is, force may be directed to pass along spine 302, thus minimizing the amount of force experienced by the monofilament areas. As shown, force may be oriented along spine 302 as well as along multifilament areas 308 that encircle or surround the oval shaped monofilament areas 304. By creating multifilament areas or paths for a force to travel along, stress and other force experienced by the adjacent monofilament areas may thereby be diminished. Additionally, this design may allow for a large area of heel

portion 126 to be a monofilament structure while providing a durable, stylish, and stretch-resistant heel portion 126.

[0084] As shown in FIG. 26, monofilament areas 300 may be oriented in a horizontal or lateral direction. In other embodiments, monofilament areas 300 may be oriented in a vertical direction or they may be oriented in other directions. The multifilament areas 308 located between and/or surrounding monofilament areas 300 may be constructed similarly to welts 170 (see FIG. 27) as discussed above. That is, in some embodiments the multifilament areas 308 may include an interior layer or portion and an exterior layer or portion. The interior portion and exterior portion of the multifilament areas 308 may lie in different planes (with the interior portion in a plane closer to the user's foot and the exterior portion in a plane located radially outwardly away from the user's foot) and

there may space between the interior portion and exterior portion of the multifilament areas 308. Alternatively, the interior and exterior portions of the multifilament areas 308 may be at least partially secured and/or adhered together such that there is little to no space there between. In another example, the multifilament areas 308 may be of

similar construction to monofilament areas 300 and monofilament areas 304. That is, the multifilament areas 308 may be located in the same plane as the monofilament areas 300. For example, the multifilament area 308 may not include an exterior portion and the lack of an exterior portion may result in a uniform continuous surface in the same plane between a monofilament area and an adjacent area formed with multifilament yarn.

[0085] Multifilament areas 308 may include a tensile element which extends through the multifilament area(s) 308 in a manner similar to the way that a tensile element 804 and a tensile element 806 extend through respective welts 820, 822 in FIG. 8A or in a manner similar to the way that a tensile element 1402 extends through welt 1400 shown in FIG. 27A. Alternatively the multifilament areas 308 may be hollow or unfilled with no tensile element extending there through.

[0086] Referring to FIGS. 8 and 27, welt 700 and 170 are shown in cross section as welt 700 and welt 1400 in FIGS. 8A and 27A respectively. As discussed above, welts 700, 1400 are generally hollow structures formed by two overlapping and at least partially coextensive layers of knitted material. Although the sides or edges of one layer of the knitted material forming the welts 700, 1400 may be secured to the other layer, a central area is generally unsecured such that another element may be located between the two layers of knitted material and extend through welts. As FIG. 8A shows, welt 700 may include two adjacent welts, 820 and 822. Another example of knitted components for footwear uppers that

have overlapping or at least partially coextensive layers may be found in U.S. Patent Application Publication 2008/0110048 to Dua et al..

[0087] As mentioned above, a welt may include a tensile element that extends there through. For example, tensile elements 804 and 806 extend through welts 820 and 822, respectively, while tensile element 1402 extends through welt 1400. In some embodiments the tensile element may extend between one welt and another welt. For

example, referring to welt 700, a tensile element 804 passes through welt 820, and tensile element 806 passes through welt 822. Although the tensile element(s) 804 and 806 may be a single continuous piece, each section of the tensile element is labeled as a separate section or portion, (section 804 and section 806, respectively) for ease of reference. Tensile element section 804 and tensile element section 806 may connect to form loop 158. More specifically, tensile element section 804 extends through welt 820 and outward from an upper end of the welt, forms a loop 158 then extends back down through welt 822. The loop 158 is exposed, while the remainder of the tensile element sections 804 and 806 may be at least partially enclosed by welt 700, with welt 700 generally defined by exterior portion 800, exterior portion 801 and interior portion 802. Individual welt 820 may be defined by exterior portion 801, intermediate portion 830 as well as interior portion 802, while individual welt 822 may be defined by exterior portion 800, intermediate portion 830 as well as interior portion 802. In other embodiments, the tensile element may extend along the length of a single welt twice. For example, tensile element section 804 may extend outward from an upper end of welt 700, form a loop 158 on the exterior of upper 120, with tensile element section 806 extending back through welt 700.

[0088] In a further example, a tensile element may extend from one welt to another welt. More specifically, as shown in FIG. 27, tensile element 1402 may extend upwards through welt 1400, form a loop, and then extend back down into an upper end of a second welt 1404. Tensile element 1402 may extend through second welt 1404 and exit second welt 1404 through a lower end. In some embodiments, tensile element 1402 may exit and enter the same welt multiple times. In some embodiments, tensile element 1402 may extend to and through the other welts. In other embodiments, separate strands or tensile elements may extend through additional welts.

[0089] As mentioned above, the welts may be constructed of natural or synthetic twisted fiber multifilament yarn. For example, welt 820 shown in FIG. 8A comprises a multifilament strand 810, while welt 1400 shown in FIG. 27A comprises a multifilament strand 1406. In one example shown generally in FIG. 8A, welt 700 may be void of monofilament strands, including, for example, the monofilament strands 808 that are used to form adjacent monofilament areas 703 and 705. Likewise, welt 1400 may be void of monofilament strands including those monofilament strands that are used to form adjacent

monofilament areas 1408 and 1410 and any other monofilament areas. In some embodiments, a tensile element may extend through a welt without contacting the monofilament strand(s) used to construct adjacent monofilament areas. Specifically, tensile element 806 may extend through welt 822 without contacting monofilament area 703. Similarly, tensile element 804 may extend through welt 820 without contacting monofilament area 705. Tensile element 1402 may extend through welt 1400 without contacting the monofilament strands used to construct monofilament areas 1408 and 1410. That is, in some embodiments, tensile elements, including but not limited to exemplary tensile elements 804, 806 and 1402 may be set apart or otherwise isolated from adjacent monofilament areas.

[0090] As shown in exemplary FIG. 8A, tensile element portion 806 contacts interior portion 802, intermediate portion 830 and exterior portion 800 of welt 822, while welt 822 is constructed completely of multifilament yarn 810 that is represented by a solid sinusoidal line, while tensile element portion 804 contacts interior portion 802, intermediate portion 830 and exterior portion 801, while welt 820 is also constructed completely of multifilament yarn 810. Monofilament strand 808 is represented by a dashed sinusoidal line and is not present in interior portion 802, intermediate portion 830 and/or exterior portions 800, 801 of welts 820 and 822.

[0091] Similarly, as shown in exemplary FIG. 27A, tensile element 1402 contacts interior portion 172 and exterior portion 173 of welt 1400, with welt 1400 being constructed completely of multifilament yarn 1406 that is represented by a solid sinusoidal line. Additionally, monofilament strand 1408, represented by a dashed sinusoidal line, is not present in interior portion 172 or exterior portion 173 of welt 1400. As such, tensile elements 804, 806 and/or 1402 may not come into contact with monofilament strands used to construct the monofilament area(s) adjacent the respective welts 820, 822, 1400. Therefore, as tensile element 804, 806 and/or 1402 is tightened or moved, the tensile element(s) may contact only multifilament yarn 810, 1406, thereby reducing the amount of wear that monofilament strands may experience.

[0092] Referring to FIGS. 9A and 28A, exemplary looping diagrams 900 and 1500 depicting a portion of knitted component 130 of article 100 shown in FIGS. 9 and 28, respectively, is shown. Looping diagrams 900 and 1500 illustrate the sequence of stitches and movements performed by a knitting machine, for example, a flat-knitting machine, to form a portion of monofilament area 705 and welt 700 (see FIG. 8) and monofilament area 1410 and welt 1400 (see FIG. 27). As shown in FIGS. 9A and 28A, the spaced apart dots represent the needles of a knitting machine and the illustrated steps represent the direction of movement of yarn or strands between the needles of each of a front bed and a back bed of a knitting machine.

[0093] Needles located on the front bed may be referred to as "front needles" while needles located in the back bed may be referred to as "back needles." Addition-

ally, the term "pass" may be used to refer to the operation of a feeder of a knitting machine moving across needle beds so that a strand or yarn interacts with and/or is manipulated by the needles of a needle bed. The term "course" may refer to yarn or strand after the yarn or strand has interlooped with another yarn or strand. A pass across a needle bed may be associated with a course of interlooped strands or yarns. Alternatively, multiple passes, such as two passes, may be used to form one course of a knit material. A method of manufacturing an article utilizing a knitting machine with a combination feeder is disclosed in previously referenced U.S. Patent Application Publication 2012/0233882 to Huffa, et al..

[0094] As shown in FIG. 9A, monofilament strand 808 may be used to knit a portion of a monofilament area 705. The looping diagram is not meant to be a specific layout or orientation of strands, but as an exemplary diagram. As shown, a first pass forms monofilament element 902 on alternating needles on the front bed and back bed of a knitting machine. That is, the first pass may form portions of two courses, one on each of the front needles and the back needles. Monofilament element 904 is also formed on alternating needles on the front bed and back bed and similarly portions of two courses, one on each of the front needles and the back needles, during a single pass.

[0095] Additionally, monofilament element 906 and monofilament element 908 are formed in a similar manner. As shown, each of the monofilament courses of the elements skips a needle position between each loop on the front needle bed and the back needle bed.

[0096] The configuration may allow for increased strength and stability in the monofilament area. Additionally, each monofilament course may not interloop with the adjacent course. For example, the loops on the front needle bed of monofilament element 902 align with an open needle in the corresponding position of monofilament element 904. The loops of monofilament element 902 on the front needle bed may interact, however, with the courses of monofilament element 906 on the front bed. A similar interaction between the courses of monofilament element 908 and monofilament element 904 may occur. Additionally, a similar interaction may occur between loops located on the back needles. Multifilament element 910 is knit using multifilament yarn 810 on back needles and front needles creating two courses in one pass. In contrast to the monofilament elements, the courses of multifilament element 910 do not skip needles on the front bed or the back bed. As such, the front needle bed portion of multifilament element 910 interacts and interloops with the front bed needle portion of monofilament element 908 and monofilament element 906. Likewise, the back needle bed portion of multifilament element 910 interacts and interloops with the back bed needle portion of monofilament element 908 and monofilament element 906. In some embodiments, the back needle portion of multifilament element 910 may be considered the beginning of interior portion 802 of welt

700. The front bed needle portion of multifilament element 910 may be considered the beginning of exterior portion 801 of welt 700. Multifilament element 912 is formed on the back needle bed, creating a single course during a single pass, and interloops with the back needle portion of multifilament element 910.

[0097] In some embodiments, multiple multifilament courses may be formed on the back needle bed after the formation of multifilament element 912. Additional passes by the feeder on the back needle bed may be made to form similar additional courses in order to adjust the shape and size of interior portion 802 of welt 700. For example, an embodiment which includes four additional courses on the back needle bed after multifilament element 912 may produce a larger interior portion than the interior portion 802 shown in FIG. 8A.

[0098] In some embodiments, a tensile element portion 804 may be placed within the partially completed welt 700. Tensile element portion 804 may be inlaid between the back bed and the front bed. In some embodiments, multifilament element 914 may be formed during one pass of the feeder using a multifilament yarn interacting with needles on the front bed and the back bed. Multifilament element 914 and multifilament element 916 may skip alternating needles as discussed in reference to the monofilament elements, above. Similarly to the monofilament elements, multifilament element 914 and multifilament element 916 may interact with corresponding loops on front needle beds and back needle bed. For example, the back needle bed portion of multifilament element 914 and multifilament element 916 may interact with multifilament element 912. In some embodiments, the front bed portions of multifilament element 914 and multifilament element 916 may be considered a portion of intermediate portion 830. In some embodiments, a second tensile element 806 portion may be inlaid between the front bed and the back bed.

[0099] In some embodiments, tensile element portion 804 may contact multifilament element 912 and tensile element portion 806 may contact multifilament element 916. In some embodiments, a feeder may make an additional pass to knit a multifilament course 918 on the front bed. Additional courses may be formed on the front bed that interact and interloop with multifilament course 918. By increasing the number of courses formed on the front bed after multifilament course 918, the size of exterior portion 800 may increase. Additionally, by increasing the number of courses formed on the front bed after multifilament element 910 the size of exterior portion 801 may increase.

[0100] Similarly, as shown in FIG. 28A, monofilament strand 1408 may be used to knit a portion of a monofilament area 1410. The looping diagram of FIG. 28A is not meant to be a specific layout or orientation of strands, but as an exemplary diagram. As shown, a first pass of the feeder may form monofilament course 1502 knit using monofilament strand 1408 on back needles of a knitting machine. As shown, monofilament course 1502 does not

interact with every needle on the back needle bed. Rather, monofilament course 1502 interacts with every other needle on the back needle bed. In some embodiments, such a configuration may increase the strength of monofilament areas as opposed to monofilament areas that utilize a plain jersey stitch that interacts with each needle. Additionally, a second pass of the feeder forms monofilament course 1504 which is also knit using monofilament strand 1408 on back needles. Monofilament course 1504 may also utilize a knit stitch that interacts with every other needle on the back needle beds. In an exemplary embodiment, each of monofilament course 1502 and monofilament course 1504 may interact with alternating every other needles. As such, monofilament course 1502 and monofilament course 1504 may not interloop with one another. Rather, monofilament course 1502 may interact with other courses that were previously formed. In some embodiments, monofilament strand 1408 may be used for knitting on back needles of a knitting machine. By knitting on the back needles, the knit structure formed may extend toward interior surface 122 of article 100. Additionally, portions of the knitted component 130 that are knit on the back needles may generally extend away from portions of the knitted component that are knit on the front needles.

[0101] A third pass of a feeder may be used to form both multifilament course 1506 on the back needle bed as well as multifilament course 1508 on the front needle bed. Therefore, two courses may be formed from one pass of a feeder. Multifilament course 1506 is knit using multifilament yarn 1406 on back needles and multifilament course 1508 is knit using multifilament yarn 1406 on front needles. In some embodiments, multifilament course 1508 may be considered the beginning of exterior portion 173 of welt 1400. As shown, multifilament course 1506 and multifilament course 1508 are formed using the same multifilament yarn 1406, but are not interlooped with one another; rather each is formed on a different set of needle beds. Because multifilament course 1506 is formed on the back needle bed, multifilament course 1506 may interact and interloop with monofilament course 1504. Multifilament course 1506 may be considered the beginning of interior portion 172 of welt 1400. A fifth pass of a feeder may form multifilament course 1512 on the back needle bed which interloops with multifilament course 1506.

[0102] In some embodiments, multiple multifilament courses may be formed on the front needle bed after the formation of multifilament course 1510. Additional courses on the front needle bed may be formed in order to adjust the shape and size of exterior portion 173 of welt 1400. For example, an embodiment which includes four additional courses on the front needle bed after multifilament course 1510 may produce a larger exterior portion than the exterior portion 173 shown in FIG. 27A.

[0103] As shown in FIG. 28A, tensile element 1402 may be placed within the partially completed welt 1400. Tensile element 1402 may be inlaid between the back

bed and the front bed. In one example, tensile element 1402 may be inlaid with a separate feeder. In some embodiments, tensile element 1402 may contact multifilament course 1508 as well as multifilament course 1510. In some embodiments, an additional course, such as multifilament course 1512 may be formed on the back bed. In some embodiments additional passes of the feeder may be made on the back bed with multifilament yarn 1406 to form courses that interact and interloop with multifilament course 1512. By increasing the number of courses formed on the back bed after multifilament course 1512, the size of interior portion 172 of welt 1400 may increase.

[0104] In some embodiments, the course remaining on the front bed (in the case of FIG. 9A, multifilament course 918, and in the case of FIG. 28A, multifilament course 1510) may be transferred to the back bed after the preferred number of courses are formed on the back bed and the front bed. After such an action, the final course on the front bed may interact and interloop with the course formed on the back bed. This action may complete the formation of a welt such as welt 700 and welt 1400. Welt 700 may therefore surround or enclose a substantial portion of tensile element portion 804 and tensile element portion 806 and welt 1400 may therefore surround or enclose a substantial portion of tensile element 1402.

[0105] Referring now to FIG. 29B, a looping diagram of a portion of heel portion 126 of article 100 shown in FIGS. 29 and 29A is shown. In some embodiments, the monofilament strands from monofilament area 1602 may not extend into seam border portion 1600 or they may have a limited presence. Seam border portion 1600 may be an area of heel portion 126 that, when assembled, is located adjacent to body portion 124 of article 100. Seam border portion 1600 may be adjacent to edge 128 of heel portion 126. Additionally, in some embodiments, seam border portion 1600 may be adjacent to edge 127 when heel portion 126 is assembled to body portion 124 (See FIGS. 15 and 19).

[0106] Referring to enlarged area 1604 of FIG. 29A, monofilament area 1602 is shown along with seam border portion 1600. As illustrated, a portion of monofilament area 1602 is substantially located to the left of seam border line 1606. Seam border line 1606 is not meant to be a precise demarcation of an area, rather seam border line 1606 is used to show a general boundary between monofilament area 1602 and seam border portion 1600. Although as shown in enlarged area 1604, monofilament area 1602 does not extend into seam border portion 1600, in some embodiments, monofilament strands may extend into seam border portion 1600. That is, although not visible in Figure 29A, some loops of monofilament strands 1610, 1612, 1614, 1616, may be present in a portion of seam border portion 1600 as discussed in detail below.

[0107] Additionally, edge 127 of body portion 124 may also include limited monofilament strands, or may be devoid of monofilament strands. As such, the seam area

between heel portion 126 and body portion 124 (see FIG. 15 and FIG. 19) may largely be devoid of monofilament strands. Therefore, as heel portion 126 and body portion 124 are sewn or joined together, monofilament strands may be absent from the sewing or joining portion. As such, stress or force imparted onto monofilament strands may be reduced.

[0108] Referring to the looping diagram 1608 of FIG. 29B, monofilament courses formed from monofilament strand 1408 may be skip every other needle within a needle bed, in a similar manner as discussed in reference to looping diagram 1500 of FIG. 28A. A first pass may be used to form monofilament course 1610 which may extend beyond seam border line 1606 of monofilament area 1602. As discussed with reference to looping diagram 1608, each course may be created from a single pass. As shown, monofilament course 1610 may include two loops formed beyond seam border line 1606. In other embodiments, monofilament course 1610 may extend a greater number of loops into seam border portion 1600, or a fewer number of loops into seam border portion 1600. In some embodiments, monofilament course 1610 may extend to edge 128 of heel portion 126, however, in an exemplary embodiment, there may be no monofilament strands that extend to edge 128 of heel portion 126. As shown, monofilament course 1612 may extend a single loop beyond seam border line 1606. Monofilament course 1614 may extend beyond seam border line 1606. In some embodiments, monofilament course 1614 may form a tuck stitch between monofilament course 1614 and monofilament course 1616.

[0109] As shown in FIG. 29B, monofilament course 1610 may interact and interloop with monofilament course 1612, monofilament course 1612 may interact and interloop with monofilament course 1614 and monofilament course 1614 may interact and interloop with monofilament course 1616. That is, the monofilament courses may interact with one another to form monofilament area 1602 shown in FIG. 29 and in an enlarged view FIG. 29A. As shown, a tuck stitch is used to transition from monofilament course 1614 to monofilament course 1616 during the next pass of the feeder.

[0110] Due to the lack of courses throughout edge 128 of heel portion 126, additional courses may be introduced to form the edge or finish heel portion 126. Multifilament course 1618 and multifilament course 1620 formed on front needle beds by multifilament yarn 1406 may be introduced and interact with the monofilament courses. In this sense, multifilament courses may form a cohesive and continuous edge of heel portion 126. The placement of multifilament yarn 1406 with monofilament courses may allow for the edge of heel portion 126 to include multifilament yarn, while removing monofilament strands from the edge. As such, when combined, joined or sewn together with edge 128 of body portion 124, the connection yarn may not interact with a monofilament strand. It may be advantageous to set apart the monofilament strands from the joining mechanism in order to avoid

stress or other forces being exerted on the monofilament strands through the joining mechanism.

[0111] The monofilament strands may also be limited in other areas of article 100 that may experience higher stress or force. For example, instep border portion 186 may be constructed in a similar manner as heel edge 128. Because instep border portion 186 may include lace apertures 156 which may include lace 154, instep border portion 186 may experience increased stress or force in certain areas. Thus, to avoid or limit the exposure of monofilament strands to increased stress, instep border portion 186 may include limited or no monofilament strands in a similar manner as discussed above.

[0112] Referring to FIG. 30A, a cross section of a welt 1700 located in heel portion 126 of FIG. 30 is shown. Welt 1700 is located between monofilament area 1706 and monofilament area 1708. In the embodiment shown, welt 1700 is largely composed of multifilament yarn whereas the monofilament areas are largely composed of monofilament strands. Welt 1700 may enclose a tensile element, however, as shown in FIG. 30A, welt 1700 does not include a tensile element extending there through, in contrast to welt 1400 of FIG. 27A. Although welt 1700 does not include a tensile element, welt 1700 may still form a bulge or bump along exterior surface 121 of heel portion 126 as shown in FIG. 30A. As discussed above, a bump or bulge in exterior surface 121 of multifilament yarn may be able to protect monofilament areas from contact or abrasion. For example, exterior portion 1702 of welt 1700 may extend radially outwardly away from interior portion 1704 of welt 1700. Exterior portion 1702 and interior portion 1704 may form a cavity or tunnel-like structure.

[0113] In some embodiments, the geometry of interior portion 1704 and exterior portion 1702 may assist in retaining the shape of exterior portion 1702. For example, interior portion 1704 may be of a shorter or smaller overall length than exterior portion 1702, while the edges or ends of interior portion 1704 and exterior portion 1702 may be joined or held in a relatively fixed relationship to one another. Due to this geometry and configuration, exterior portion 1702 may extend outwards from interior portion 1704. Additionally, as exterior portion 1702 is pressed or force is placed upon exterior portion 1702, the exterior portion 1702 may resist the force and largely return to a shape when force is released. Similarly, other multifilament areas and/or welts located throughout other portions of article 100 may be utilized throughout upper 120 to further protect monofilament areas from outside forces that may damage monofilament areas.

[0114] Referring to FIG. 31A, a looping diagram 1800 is shown depicting an embodiment of welt 1700 of FIG. 31 that does not include a tensile element extending through the welt. As shown, monofilament course 1802 and monofilament course 1804 are knit using monofilament strand 1408 on a back needle bed in a configuration utilizing every other needle of the back needle bed. In an exemplary embodiment, each of monofilament course

1802 and monofilament course 1804 may interact with alternating every other needle. Monofilament course 1802 may be formed from a single pass, and monofilament course 1804 may be formed during another pass. Monofilament course 1804 is also knit using monofilament strand. As such, monofilament course 1802 and monofilament course 1804 may not interloop with one another. Rather, monofilament course 1802 may interact with other passes that were previously formed.

[0115] Multiple multifilament courses may be formed during a single pass. For example, multifilament course 1806 as well as multifilament course 1808 are both formed during the same single pass of a feeder. Multifilament course 1806 is knit using multifilament yarn 1406 on back needles and multifilament course 1808 is knit using multifilament yarn 1406 on front needles. Multifilament course 1806 may be considered the beginning of interior portion 1704 of welt 1700 (see FIG. 30A). As shown, multifilament course 1806 and multifilament course 1808 are formed using the same multifilament yarn 1406 but are not interlooped with one another; rather each is formed on a different set of needle beds. Because multifilament course 1806 is formed on the back needle bed, multifilament course 1806 may interact and interloop with monofilament course 1804. Multifilament course 1806 may therefore clear the monofilament strand away such that monofilament course 1804 interloops with a multifilament course.

[0116] Multifilament course 1808 may be considered the beginning of exterior portion 1702 of welt 1700 (see FIG. 30A). Multifilament course 1810 is knit using multifilament yarn 1406 on the front needle bed and interloops with multifilament course 1808. In some embodiments, multiple multifilament courses may be formed on the front needle bed after the formation of multifilament pass 1810. Additional courses on the front needle bed may be formed in order to adjust the shape and size of exterior portion 1702 of welt 1700. For example, an embodiment which includes four additional courses on the front needle bed after multifilament course 1810 may produce a larger exterior portion than exterior portion 1702 in FIG. 30A.

[0117] In some embodiments, an additional multifilament course 1812 may be knit using multifilament yarn 1406 on the back bed. Additional courses may be formed on the back bed that interact and interloop with multifilament course 1812. By increasing the number of courses formed on the back bed after multifilament course 1812, the size of interior portion 1704 may increase. The course remaining on the back bed may be transferred the front bed after the preferred number of courses are formed on the back bed and the front bed. After such an action, the final course on the back bed may interact and interloop with the course on the front bed. This action may complete the formation of a welt such as welt 1700 of FIGS. 30-31A. Welt 1700 may therefore be largely constructed of multifilament yarn while thereby diminishing the likelihood that monofilament strands may experience abrasion or other forces.

Further Knitted Component Configurations

[0118] Referring now to FIGS. 10 through 14A, various additional embodiments of an article incorporating monofilament areas are depicted. Referring in particular to FIG. 10, an embodiment of article 1004 is shown with relatively large monofilament areas. In this embodiment, monofilament area 1000 and monofilament area 1002 are relatively large with respect to the surface area of the lateral side 16 of the article 1004 in comparison to the embodiment of article 100 depicted in FIG. 1. Multifilament area 1006 may surround monofilament area 1000 and monofilament area 1002. In some embodiments, multifilament area 1006 may include one or more welts, such as welt 1008, as described above. Tensile elements 1010 may extend through at least a portion of welt 1008.

[0119] In one example, the multifilament area 1006 adjacent to the monofilament areas 1000, 1002 may be similarly aligned to the plane in which the multifilament area 1006 is located. For example, the multifilament area between welt 1008 and monofilament area 1002 may extend along a similarly aligned plane of monofilament area 1002. Alternatively, other portions of the monofilament areas 1000, 1002 of article 1004 may be bordered by a portion of multifilament area 1006 which extends along a different plane.

[0120] Referring to FIG. 11, an embodiment of article 1108 is shown which includes multiple and relatively smaller monofilament areas of triangular shape. The monofilament areas of article 1108 may be largely formed in the same manner as discussed with reference to the embodiment shown in FIG. 1. In the embodiment shown in FIG. 11, monofilament area 1104 and monofilament area 1102 may be located adjacent to welt 1106. Welt 1106 may be formed from multifilament yarns 1100 as discussed with reference to previous welt configurations.

[0121] Multifilament yarn 1100 may surround or border monofilament areas of article 1108 or alternatively, the monofilament areas of article 1108 may be bordered by welts or bordered by a combination of multifilament areas and welts. The monofilament areas of article 1108, including but not limited to monofilament areas 1102 and 1104, may be bordered by multifilament yarn 1100 that is oriented along a similarly aligned plane as the monofilament areas. That is, in some embodiments, there may be a relatively even transition between monofilament areas and adjacent multifilament areas. For example, there may not be a bump or bulge formed by the multifilament areas when the multifilament areas and the monofilament areas are generally located in the same plane.

[0122] Referring to FIG. 12, an embodiment of article 1212 is shown which includes multiple monofilament areas 1200, 1202, 1204 and 1206. In this embodiment, each monofilament area may be partially bounded by a welt and with a tensile element at least partially enclosed within the welt. The shape of monofilament area 1200, monofilament area 1202, monofilament area 1204, and monofilament area 1206 are each defined in part by a

welt and a tensile element extending through the welt. In one non-limiting example, monofilament area 1202 is defined at least in part by welt 1208 and welt 1210. Each of the welts may include a tensile element extending there through as discussed in previous embodiments. In some embodiments, tensile element 1214 may be a continuous strand that extends between each welt. In other embodiments, multiple tensile elements may be utilized within each welt. In still further embodiments, some welts may not include a tensile element. As shown in FIG. 12, the wider portion of the monofilament areas 1200, 1202, 1204 and 1206 are located adjacent to instep border portion 186. In other embodiments, such as those shown in FIGS. 10 and 11, the wider portion or base of the monofilament areas may be located adjacent to sole border portion 187.

[0123] Referring to FIGS. 13 and 14 a still further alternative embodiment of article 100 is depicted, identified as article 1306. As in previous embodiments, monofilament areas such as 1300, 1302, 1304 are at least partially defined by welts. In this particular embodiment, the monofilament areas are also generally triangularly shaped. The monofilament areas 1300, 1302, 1304 may be variously arranged on the article 1306. In particular, monofilament area 1300 extends such that the base of the triangle is located adjacent sole structure 110 of article 1306. Conversely, monofilament area 1302 is oriented such that the base of the triangle is located adjacent instep border portion 186. Additionally, monofilament area 1304 and monofilament area 1300 are oriented largely in the same manner, with the base of the triangle oriented adjacent the sole structure 110. As such the sides of adjacent monofilament areas of this embodiment generally align with one another.

[0124] In some embodiments, tensile element 1308 may act as a division between monofilament areas. For example, in the embodiment shown, tensile element 1308 is largely V-shaped in alternate directions. Monofilament area 1300 is partially bound by an upside-down V-shaped portion of tensile element 1308. That is, the base portion of monofilament area 1300 is located adjacent to sole structure 100. In contrast, monofilament area 1302 is partially bound by an upright V-shaped portion of tensile element 1308. As such, monofilament area 1302 is oriented in the opposite direction than the direction that monofilament area 1300 is oriented.

[0125] Additionally, tensile element 1308 separates the monofilament areas into sections. In some embodiments, the sections may be oriented in a similar manner. For example, all of the monofilament areas located above tensile element 1308 (that is, located toward instep border portion 186), are oriented in a similar manner. Likewise, the monofilament areas located below tensile element 1308 (that is, located toward sole structure 110) are oriented in a similar manner to one another. Although article 1306 depicts similarly-shaped monofilament areas, it should be recognized that variously-shaped monofilament areas may be utilized in conjunction with a tensile

element oriented in a different manner.

[0126] In some embodiments, the layout of and path of tensile element 1308 may allow for a large portion of article 1306 to include monofilament areas. For example, adjacent to welt 1303 toward forefoot region 10 is monofilament area 1304. Additionally, adjacent to welt 1303 toward heel region 14 is monofilament area 1302. Monofilament area 1304 and monofilament area 1302 are oriented in opposite directions but may both be adjacent to a single welt. This orientation and layout may allow for a greater area of article 1306 to be encompassed by monofilament areas while maintaining the integrity and structural support that tensile element 1308 may provide.

[0127] Welts that separate monofilament areas may include tensile elements. For example, as FIG. 13 shows, welt 1301 and welt 1303 may include tensile element 1308. In some embodiments the tensile element that extends through welt 1301 and welt 1303 may be the same tensile element, for example tensile element 1308. Therefore in this embodiment, tensile element 1308 may extend through each of the welts surrounding each monofilament area. In addition, each monofilament area is at least partially bordered or by a welt.

[0128] Referring to FIG. 14 and 14A, a cross-section of a portion of the embodiment of article 1306 is depicted. As shown there, welt 1301 and welt 1303 are located adjacent to multiple monofilament areas. As discussed above, welts are generally hollow structures formed by two overlapping and at least partially coextensive layers of knit material. Although the sides or edges of one layer of the knitted material forming the welts may be secured to the other layer, a central area is generally unsecured to form a tunnel-like structure such that another element may be located or extended between the two layers of knitted material through the welts. In some embodiments, a portion 1408 of tensile element 1308 extends through welt 1301. Tensile element portion 1408 may extend through welt 1301 and enter adjacent welt 1303. For convenience, the portion of tensile element 1308 that enters into welt 1303 may be referred to as tensile element portion 1410. Tensile element 1308 may extend into other welts that are located within the article of footwear, while in other welts may remain hollow and devoid of a tensile element as discussed above.

[0129] As shown in FIG 14A, welt 1301 may include an exterior portion 400 as well as an interior portion 402. Likewise, welt 1303 may include an exterior portion 404 and an interior portion 406. As discussed with regard to previous embodiments, portions of welt 1301 and welt 1303 may be composed substantially entirely of multifilament yarn 810. Additionally, monofilament areas may be composed substantially entirely of monofilament strand 808. As discussed with relation to other embodiments discussed previously, however, tensile element portion 408 and tensile element portion 410 may largely contact multifilament yarn 810. That is, tensile element portion 408 and tensile element portion 410 may be substantially separated from the monofilament strand 808

which is used to form monofilament areas 1300 and 1304. As such, as tensile element portion 408 and tensile element portion 410 translate or move within the welts 1301 and 1303, tensile element portion 408 and tensile element portion 410 may contact multifilament yarn 810 without contacting monofilament strand 808, thereby reducing abrasion and wear of monofilament strands.

Claims

1. An article of footwear (100) comprising: a knitted component (130) comprising

at least one monofilament area (703) comprising a monofilament strand (808), the at least one monofilament area having a shape;
a first multifilament area (822) adjacent to the at least one monofilament area, the first multifilament area comprising at least two overlapping knit layers of multifilament yarn (810), wherein the at least two overlapping knit layers form a first unsecured area there between;
a second multifilament area (820) adjacent to the at least one monofilament area, wherein the first multifilament area and the second multifilament area define at least a portion of the shape of the at least one monofilament area; and
a first tensile element (806) extending through at least a portion of the first unsecured area.

2. The article (100) of claim 1 wherein the second multifilament area (820) comprises at least two overlapping knit layers of multifilament yarn (810), wherein the at least two overlapping knit layers form a second unsecured area there between.

3. The article (100) of claim 2 wherein a second tensile element (804) extends through at least a portion of the second unsecured area.

4. The article (100) of claim 1 further comprising an instep border portion (186) and a sole border portion (187) and wherein the instep border portion and the sole border portion further define at least a portion of the shape of the at least one monofilament area (703).

5. The article (100) according to claim 1, wherein the at least two overlapping layers of the first multifilament area (822) comprise an interior layer (802) and an exterior layer (800) and wherein the interior layer and the exterior layer are at least partially connected to each other to form the first unsecured area.

6. The article (100) according to claim 5 wherein the first unsecured area comprises a tubular structure through which the first tensile element (806) extends.

7. The article (100) according to claim 5 wherein the interior layer (802) and the exterior layer (800) of the first unsecured area provide a barrier between the first tensile element (806) and the at least one monofilament area (703).

8. The article (100) according to claim 1 wherein the first multifilament area (822) is disposed on at least a portion of an outer surface (121) of the at least one monofilament area (703).

9. The article (100) according to claim 2, wherein the first tensile element (806) extends from the first unsecured area to the second unsecured area to form a loop (158).

10. The article (100) according to claim 1 wherein the at least one monofilament area (703) defines a width and wherein the first multifilament area (822) defines a width, and wherein the width of the at least one monofilament area is less than or equal to the width of the first multifilament area.

11. The article (100) according to claim 1 wherein the at least one monofilament area (703) defines a width and wherein the first multifilament area (822) defines a width, and wherein the width of the at least one monofilament area is greater than the width of the first multifilament area.

12. The article (100) according to claim 1, wherein the knitted component further comprises

at least one additional monofilament area (705) comprising a monofilament strand (808), the at least one additional monofilament area comprising a shape;
the second multifilament area (820) comprising at least two overlapping knit layers of multifilament yarn (810), wherein the at least two overlapping knit layers of the first multifilament area (822) and the second multifilament area comprise an interior layer (802) and an exterior layer (800) and wherein the first multifilament area and the second multifilament area define at least a portion of the shape of the at least one monofilament area and the at least one additional monofilament area;
wherein the at least one monofilament area and the at least one additional monofilament area are located in a first plane and wherein at least the exterior layer of the first multifilament area and the second multifilament area is located in a second plane.

13. The article (100) of claim 12 wherein the second plane is located radially outwardly of the first plane.

14. The article (100) according to claim 12, wherein the knitted component (130) further comprises a forefoot region (10), a midfoot region (12) and a heel region (14) and wherein a plurality of monofilament areas (703, 705) are located in each of the forefoot, midfoot and heel regions.
15. The article (100) according to claim 14 wherein the shape and orientation of the plurality of monofilament areas (703, 705) located within the forefoot region (10) differ from the shape and orientation of the plurality of monofilament areas located within the midfoot region (12) and the heel region (14).

Patentansprüche

1. Fußbekleidungsartikel (100) mit: einer Strickkomponente (130) mit wenigstens einem Monofilamentbereich (703), der einen Monofilamentstrang (808) umfasst, wobei der wenigstens eine Monofilamentbereich eine Form hat,

einem ersten Multifilamentbereich (822), der an den wenigstens einen Monofilamentbereich angrenzt, wobei der erste Multifilamentbereich wenigstens zwei sich überlappende gestrickte Lagen aus Multifilamentgarn (810) umfasst, wobei die wenigstens zwei sich überlappenden gestrickten Lagen einen ersten unbefestigten Bereich dazwischen bilden, einem zweiten Multifilamentbereich (820), der an den wenigstens einen Monofilamentbereich angrenzt, wobei der erste Multifilamentbereich und der zweite Multifilamentbereich wenigstens einen Abschnitt von der Form des wenigstens einen Monofilamentbereichs definieren, und einem ersten dehnbaren Element (806), das sich durch wenigstens einen Abschnitt des ersten unbefestigten Bereichs erstreckt.

2. Artikel (100) nach Anspruch 1, wobei der zweite Multifilamentbereich (820) wenigstens zwei sich überlappende gestrickte Lagen aus Multifilamentgarn (810) umfasst, wobei die wenigstens zwei sich überlappenden gestrickten Lagen einen zweiten unbefestigten Bereich dazwischen bilden.
3. Artikel (100) nach Anspruch 2, wobei sich ein zweites dehnbare Element (804) durch wenigstens einen Abschnitt des zweiten unbefestigten Bereichs erstreckt.
4. Artikel (100) nach Anspruch 1, ferner mit einem Blatumrandungsabschnitt (186) und einem Sohlenumrandungsabschnitt (187), und wobei der Blatumrandungsabschnitt und der Sohlenumrandungsab-

schnitt ferner wenigstens einen Teil der Form des wenigstens einen Monofilamentbereichs (703) definieren.

5. Artikel (100) nach Anspruch 1, wobei die wenigstens zwei sich überlappenden Lagen des ersten Multifilamentbereichs (822) eine innere Lage (802) und eine äußere Lage (800) umfassen und wobei die innere Lage und die äußere Lage zur Bildung des ersten unbefestigten Bereichs wenigstens teilweise miteinander verbunden sind.
6. Artikel (100) nach Anspruch 5, wobei der erste unbefestigte Bereich eine schlauchförmige Struktur umfasst, durch die sich das erste dehnbare Element (806) erstreckt.

7. Artikel (100) nach Anspruch 5, wobei die innere Lage (802) und die äußere Lage (800) des ersten unbefestigten Bereichs eine Sperre zwischen dem ersten dehnbaren Element (806) und dem wenigstens einen Monofilamentbereich (703) schaffen.

8. Artikel (100) nach Anspruch 1, wobei der erste Multifilamentbereich (822) an wenigstens einem Abschnitt einer Außenfläche (121) des wenigstens einen Monofilamentbereichs (703) angeordnet ist.

9. Artikel (100) nach Anspruch 2, wobei sich das erste dehnbare Element (806) zur Bildung einer Schlaufe (158) vom ersten unbefestigten Bereich zum zweiten unbefestigten Bereich erstreckt.

10. Artikel (100) nach Anspruch 1, wobei der wenigstens eine Monofilamentbereich (703) eine Breite definiert und wobei der erste Multifilamentbereich (822) eine Breite definiert, und wobei die Breite des wenigstens einen Monofilamentbereichs kleiner als die oder gleich der Breite des ersten Multifilamentbereichs ist.

11. Artikel (100) nach Anspruch 1, wobei der wenigstens eine Monofilamentbereich (703) eine Breite definiert und wobei der erste Multifilamentbereich (822) eine Breite definiert, und wobei die Breite des wenigstens einen Monofilamentbereichs größer als die Breite des ersten Multifilamentbereichs ist.

12. Artikel (100) nach Anspruch 1, wobei die Strickkomponente ferner Folgendes umfasst:

wenigstens einen zusätzlichen Monofilamentbereich (705) mit einem Monofilamentstrang (808), wobei der wenigstens eine zusätzliche Monofilamentbereich eine Form umfasst, wobei der zweite Multifilamentbereich (820) wenigstens zwei sich überlappende gestrickte Lagen aus Multifilamentgarn (810) umfasst, wobei

- die wenigstens zwei sich überlappenden gestrickten Lagen des ersten Multifilamentbereichs (822) und des zweiten Multifilamentbereichs eine innere Lage (802) und eine äußere Lage (800) umfassen und wobei der erste Multifilamentbereich und der zweite Multifilamentbereich wenigstens einen Abschnitt der Form des wenigstens einen Monofilamentbereichs und des wenigstens einen zusätzlichen Monofilamentbereichs definieren, wobei der wenigstens eine Monofilamentbereich und der wenigstens eine zusätzliche Monofilamentbereich in einer ersten Ebene liegen und wobei wenigstens die äußere Lage des ersten Multifilamentbereichs und des zweiten Multifilamentbereichs in einer zweiten Ebene liegt.
13. Artikel (100) nach Anspruch 12, wobei die zweite Ebene radial außerhalb der ersten Ebene liegt.
14. Artikel (100) nach Anspruch 12, wobei die Strickkomponente (130) ferner eine Vorderfußregion (10), eine Mittelfußregion (12) und eine Fersenregion (14) umfasst und wobei mehrere Monofilamentbereiche (703, 705) jeweils in der Vorderfuß-, der Mittelfuß- und der Fersenregion gelegen sind.
15. Artikel (100) nach Anspruch 14, wobei die Form und die Ausrichtung der mehreren Monofilamentbereiche (703, 705), die in der Vorderfußregion (10) gelegen sind, von der Form und der Ausrichtung der mehreren Monofilamentbereiche verschieden sind, die in der Mittelfußregion (12) und der Fersenregion (14) gelegen sind.
- Revendications**
1. Article chaussant (100), comprenant: un composant tricoté (130) comprenant
- au moins une zone en monofilament (703) comprenant un cordon monofilament (808), ladite au moins une zone en monofilament présentant une forme ;
- une première zone en multifilament (822) adjacente à ladite au moins une zone en monofilament, la première zone en multifilament comprenant au moins deux couches tricotées de fil multifilament (810) qui se chevauchent, une première zone non fixée étant formée entre lesdites au moins deux couches tricotées qui se chevauchent ;
- une deuxième zone en multifilament (820) adjacente à ladite au moins une zone en monofilament,
- la première zone en multifilament et la deuxième zone en multifilament définissant au moins une
- partie de la forme de ladite au moins une zone en monofilament ; et
- un premier élément extensible (806) qui s'étend à travers au moins une partie de la première zone non fixée.
2. Article (100) selon la revendication 1, la deuxième zone en multifilament (820) comprenant au moins deux couches tricotées de fil multifilament (810) qui se chevauchent, une deuxième zone non fixée étant formée entre lesdites au moins deux couches tricotées qui se chevauchent.
3. Article (100) selon la revendication 2, un deuxième élément extensible (804) s'étendant à travers au moins une partie de la deuxième zone non fixée.
4. Article (100) selon la revendication 1, comprenant en outre une partie de bord de cou-de-pied (186) et une partie de bord de semelle (187), et la partie de bord de cou-de-pied et la partie de bord de semelle définissant en outre au moins une partie de la forme de ladite au moins une zone en monofilament (703).
5. Article (100) selon la revendication 1, lesdites au moins deux couches de la première zone en multifilament (822) qui se chevauchent comprenant une couche intérieure (802) et une couche extérieure (800), et la couche intérieure et la couche extérieure étant au moins partiellement reliées l'une à l'autre de manière à former la première zone non fixée.
6. Article (100) selon la revendication 5, la première zone non fixée comprenant une structure tubulaire à travers laquelle s'étend le premier élément extensible (806).
7. Article (100) selon la revendication 5, la couche intérieure (802) et la couche extérieure (800) de la première zone non fixée fournissant une barrière entre le premier élément extensible (806) et ladite au moins une zone en monofilament (703).
8. Article (100) selon la revendication 1, la première zone en multifilament (822) étant agencée sur au moins une partie d'une surface extérieure (121) de ladite au moins une zone en monofilament (703).
9. Article (100) selon la revendication 2, le premier élément extensible (806) s'étendant de la première zone non fixée à la deuxième zone non fixée de manière à former une boucle (158).
10. Article (100) selon la revendication 1, ladite au moins une zone en monofilament (703) définissant une largeur, et la première zone en multifilament (822) définissant une largeur, et la largeur de ladite au moins une zone en monofilament étant inférieure ou égale

à la largeur de la première zone en multifilament.

11. Article (100) selon la revendication 1, ladite au moins une zone en monofilament (703) définissant une largeur, et la première zone en multifilament (822) définissant une largeur, et la largeur de ladite au moins une zone en monofilament étant supérieure à la largeur de la première zone en multifilament. 5

12. Article (100) selon la revendication 1, le composant tricoté comprenant en outre 10
 - au moins une zone en monofilament supplémentaire (705) comprenant un cordon monofilament (808), ladite au moins une zone en monofilament supplémentaire présentant une forme ; 15
 - la deuxième zone en multifilament (820) comprenant au moins deux couches tricotées en fil multifilament (810) qui se chevauchent, lesdites au moins deux couches tricotées de la première zone en multifilament (822) et de la deuxième zone en multifilament qui se chevauchent comprenant une couche intérieure (802) et une couche extérieure (800), et la première zone en multifilament et la deuxième zone en multifilament définissant au moins une partie de la forme de ladite au moins une zone en monofilament et de ladite au moins une zone en monofilament supplémentaire ; 20 25 30
 - ladite au moins une zone en monofilament et ladite au moins une zone en monofilament supplémentaire étant agencées dans un premier plan, et au moins la couche extérieure de la première zone en multifilament et de la deuxième zone en multifilament étant agencée dans un deuxième plan. 35

13. Article (100) selon la revendication 12, le deuxième plan étant agencé radialement à l'extérieur du premier plan. 40

14. Article (100) selon la revendication 12, le composant tricoté (130) comprenant en outre une zone d'avant-pied (10), une zone de métatarse (12) et une zone de talon (14), et une pluralité de zones en monofilament (703, 705) étant agencées dans les zones d'avant-pied, de métatarse et de talon. 45

15. Article (100) selon la revendication 14, la forme et l'orientation de la pluralité de zones en monofilament (703, 705) agencées dans la zone d'avant-pied (10) étant différentes de la forme et de l'orientation de la pluralité de zones en monofilament agencées dans la zone de métatarse (12) et la zone de talon (14). 50 55

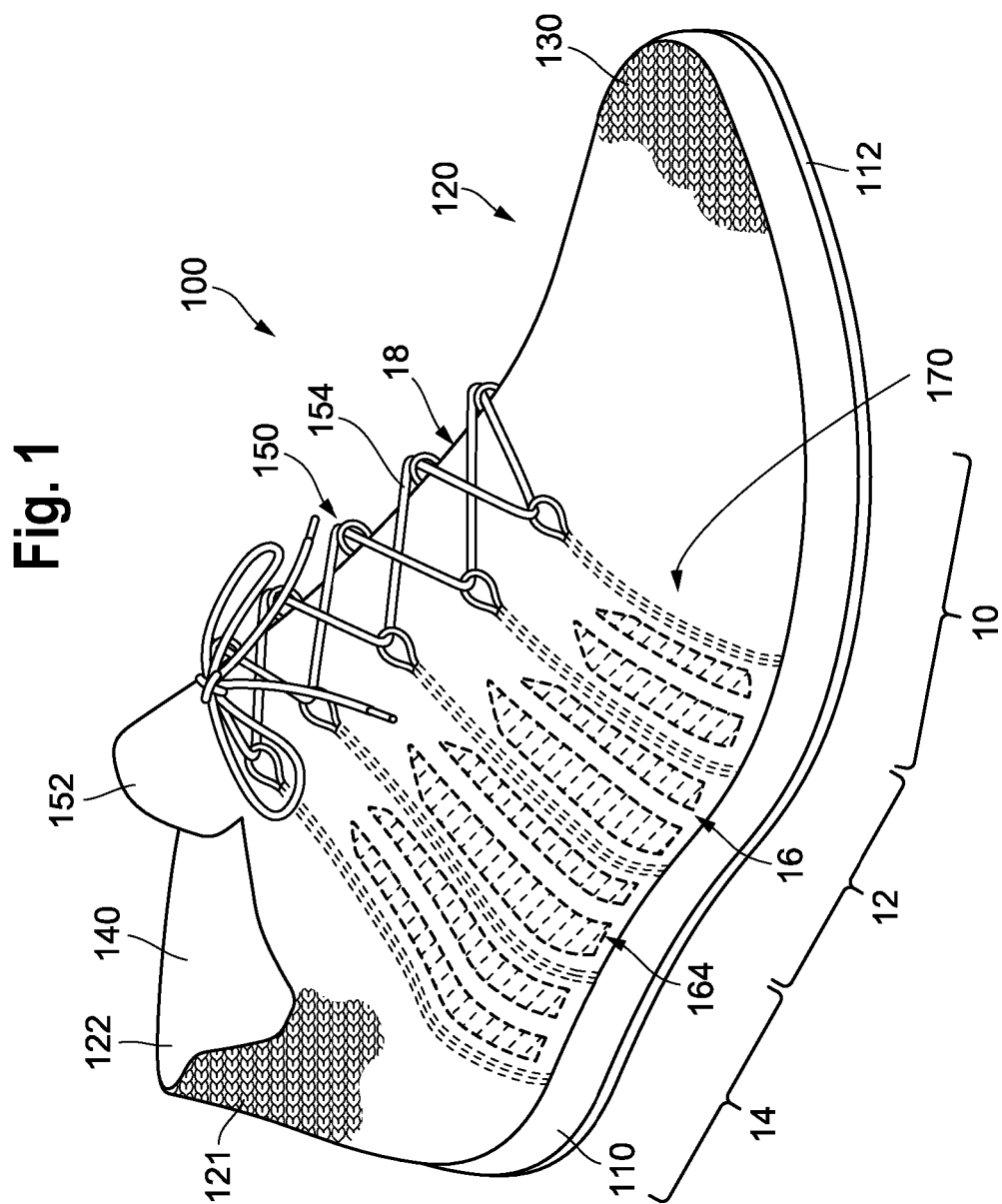


Fig. 2

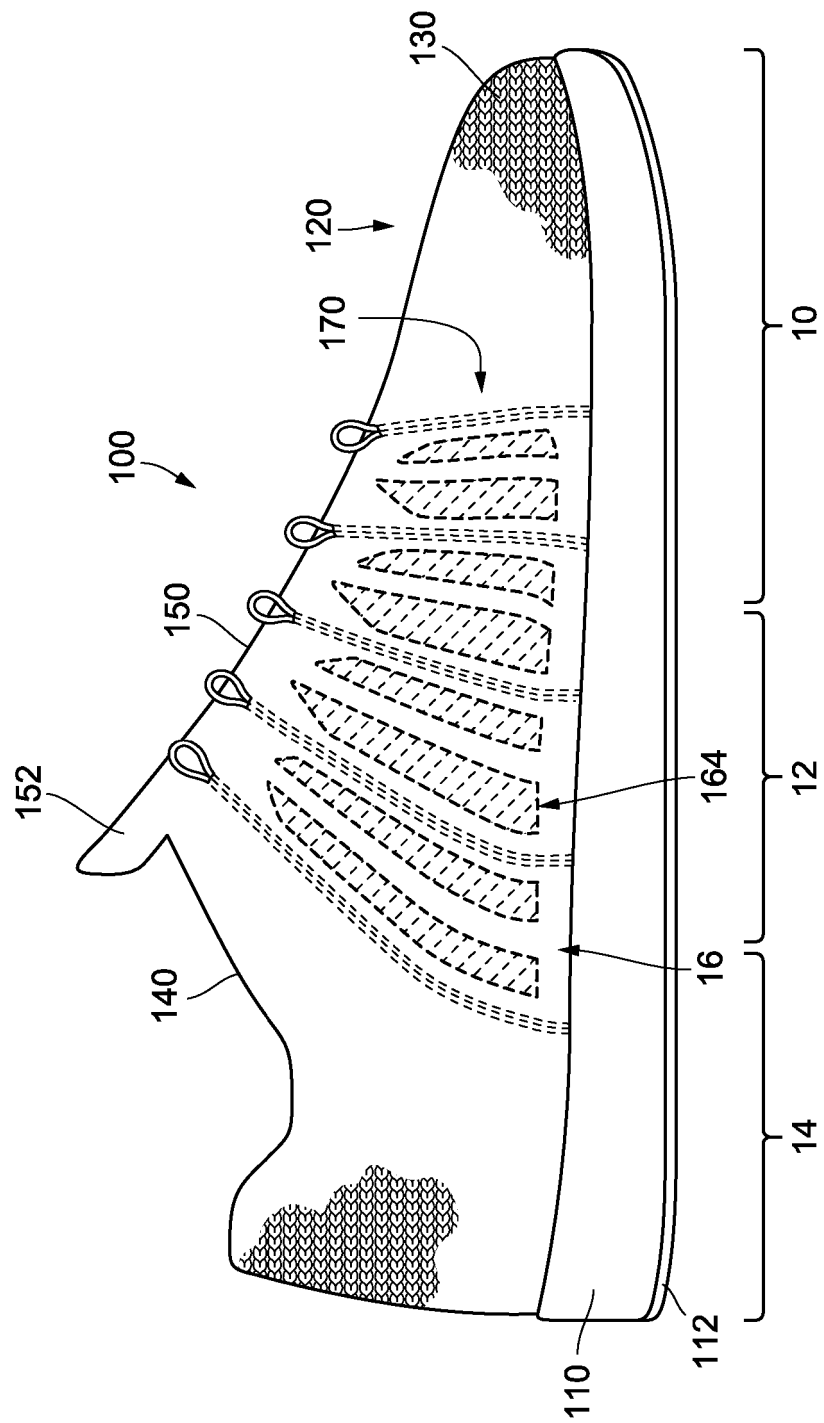


Fig. 3

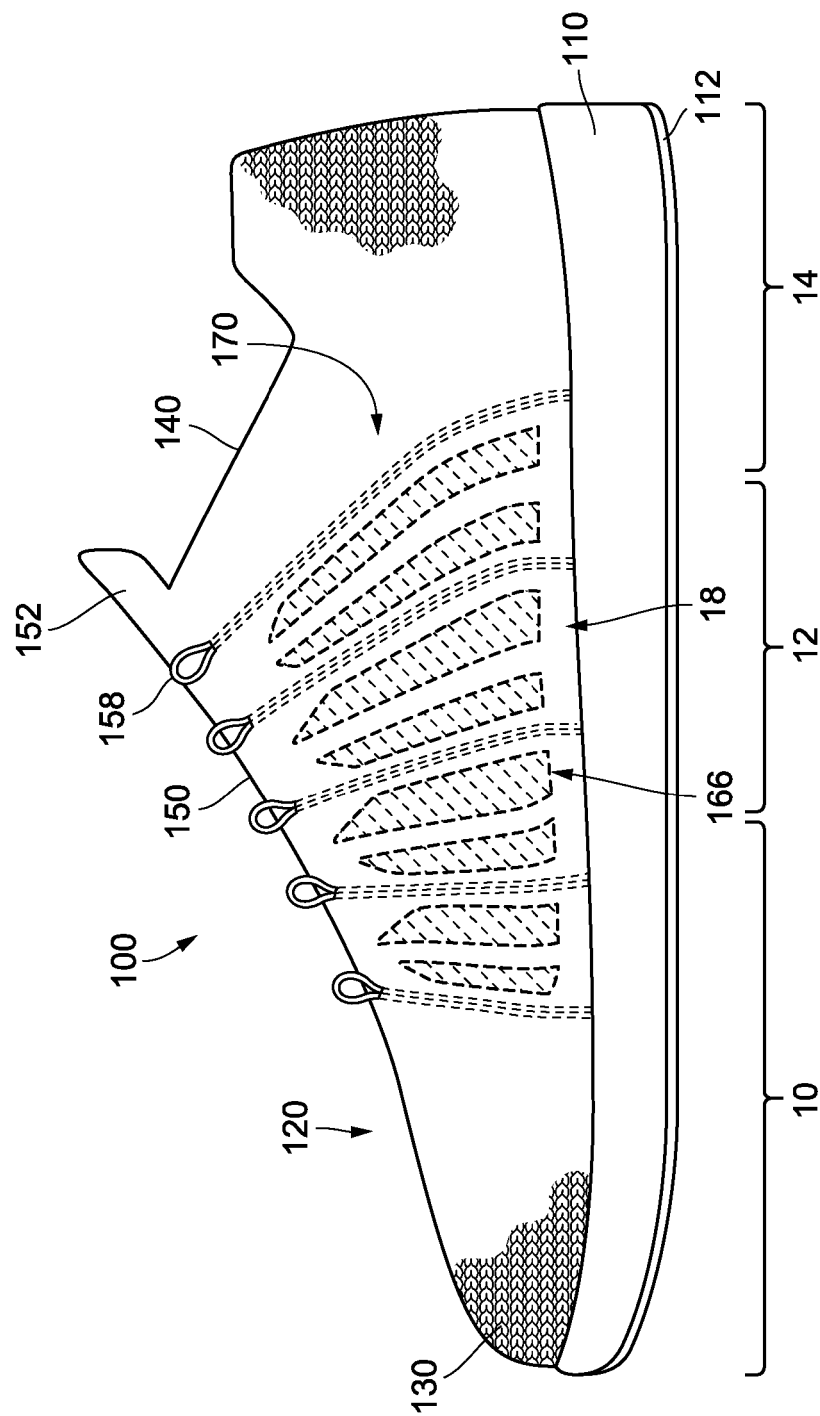
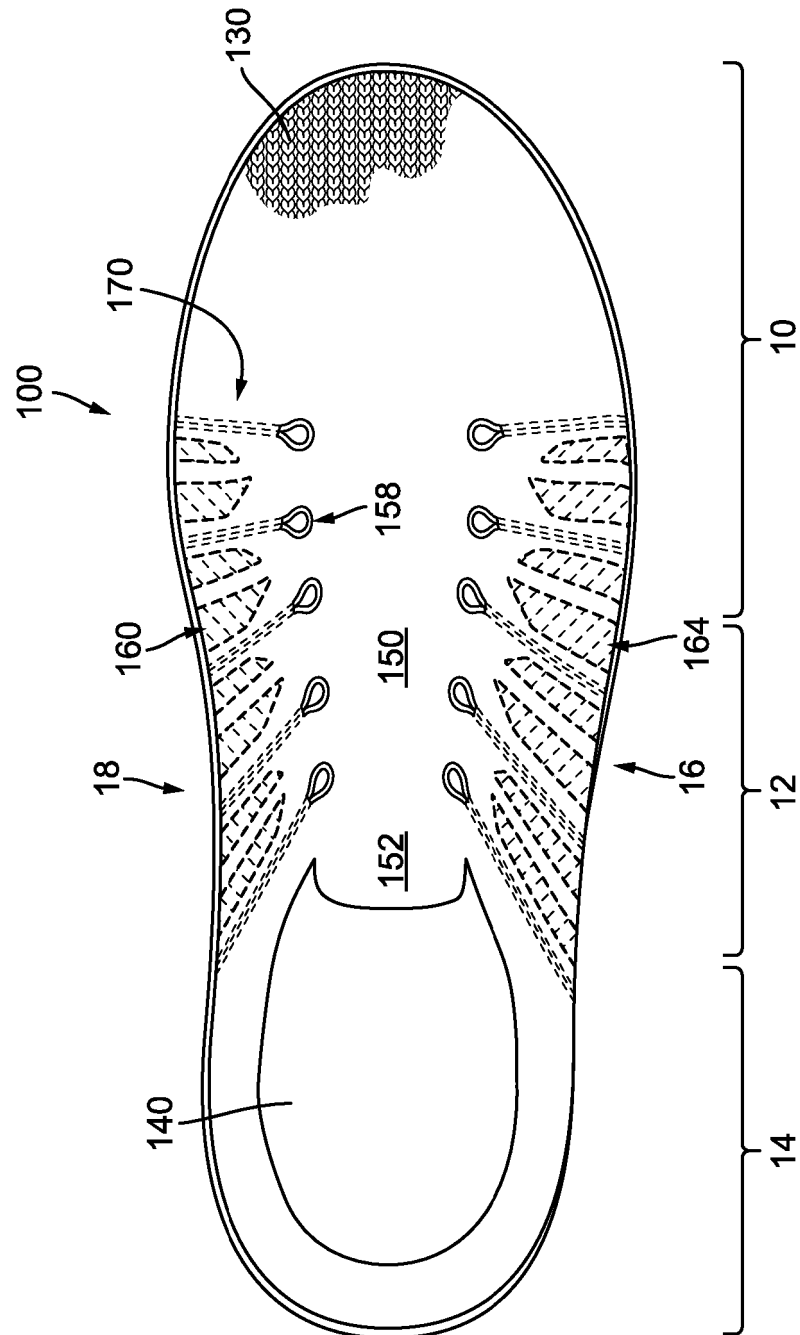


Fig. 4



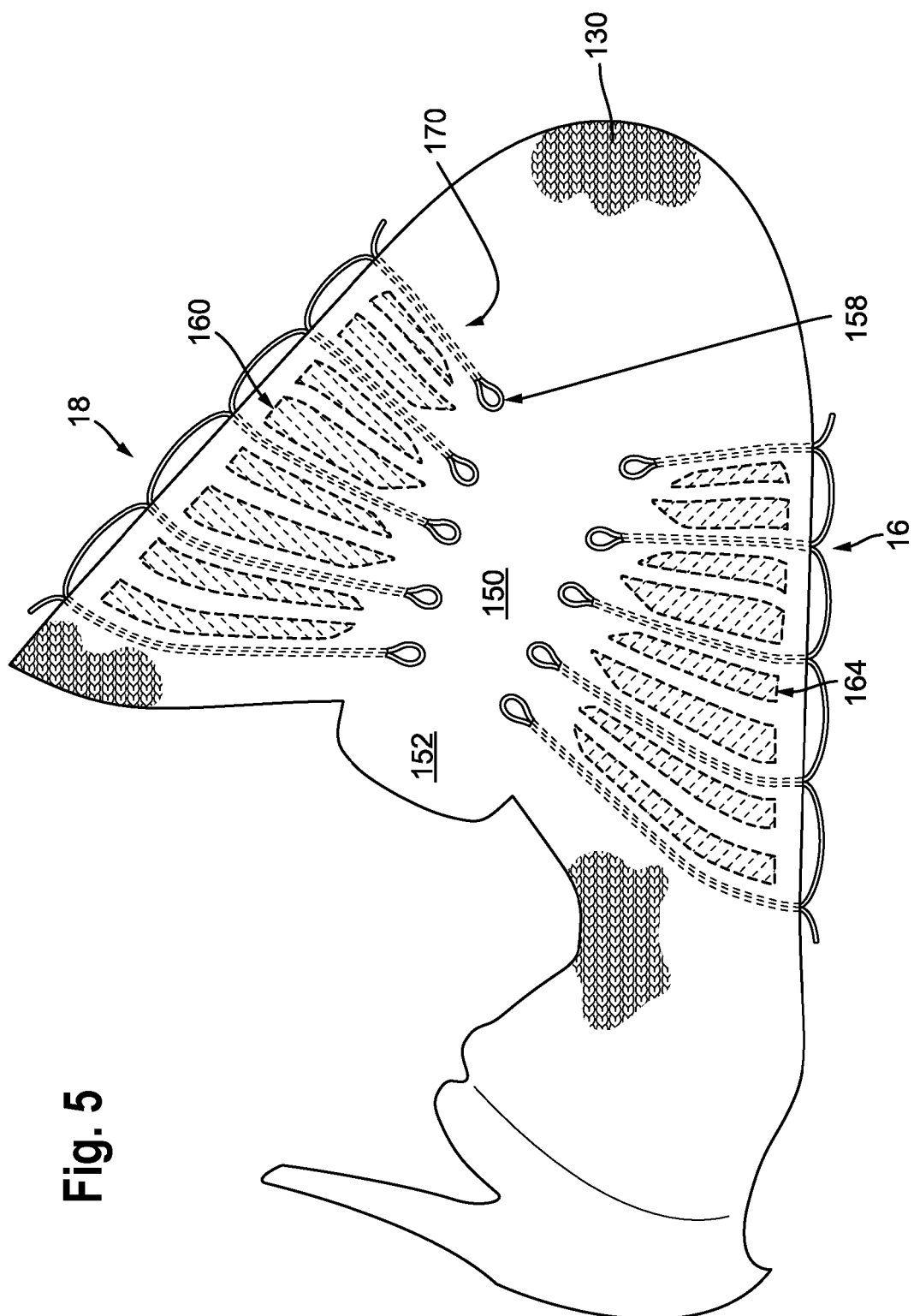


Fig. 5

Fig. 6

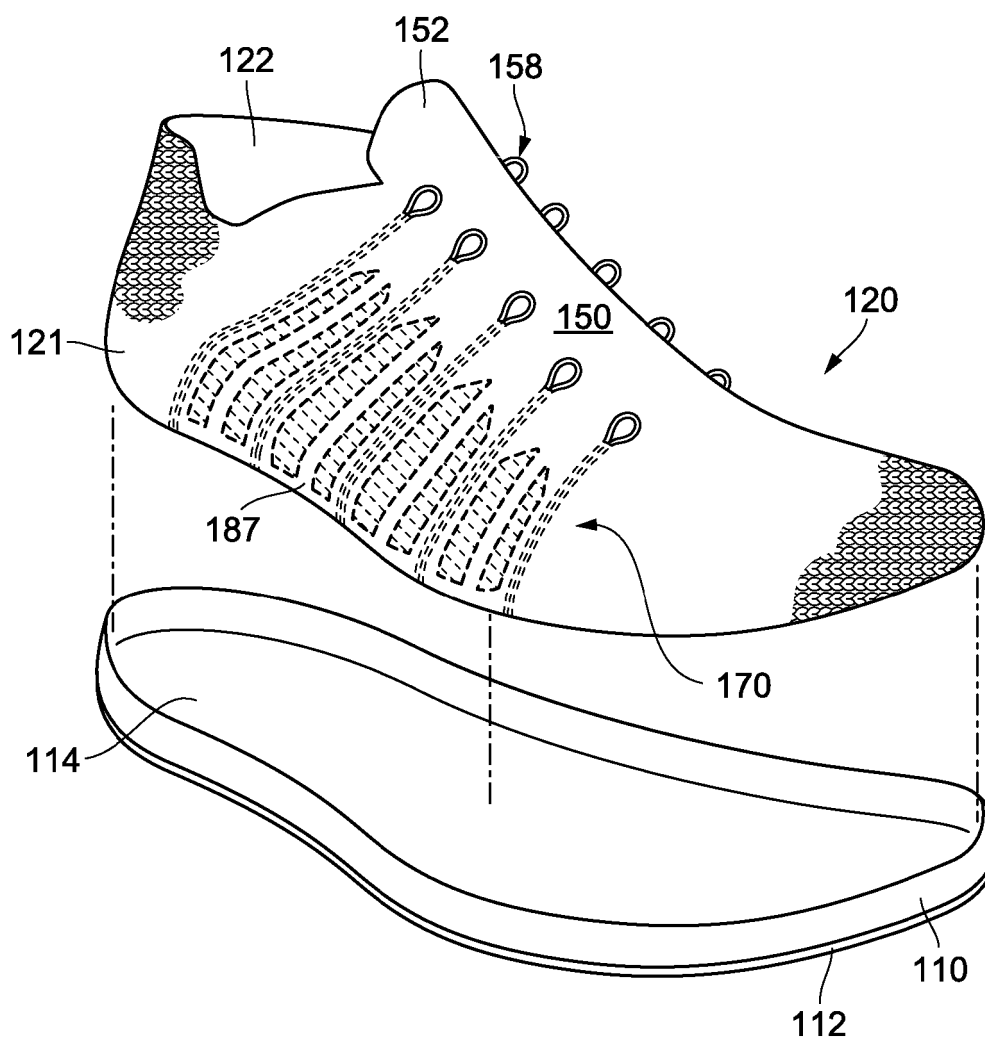


Fig. 7

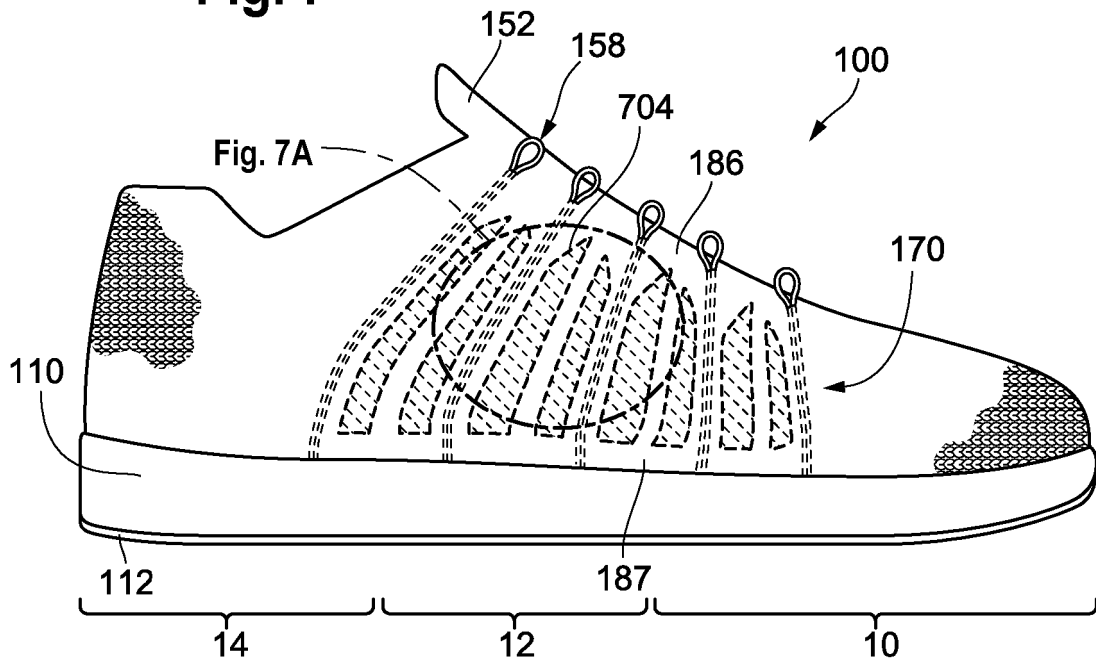


Fig. 7A

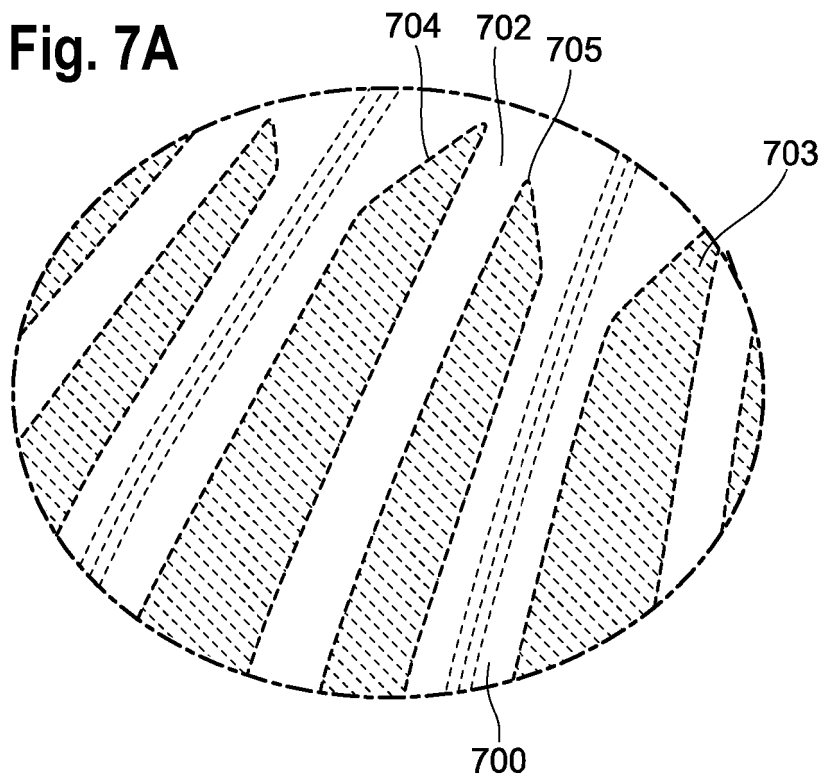


Fig. 8

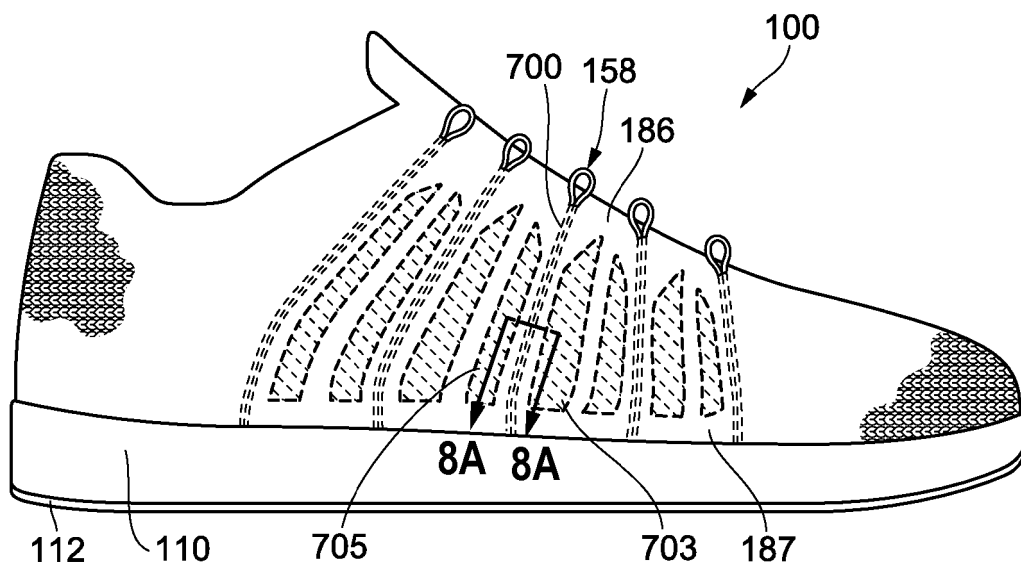


Fig. 8A

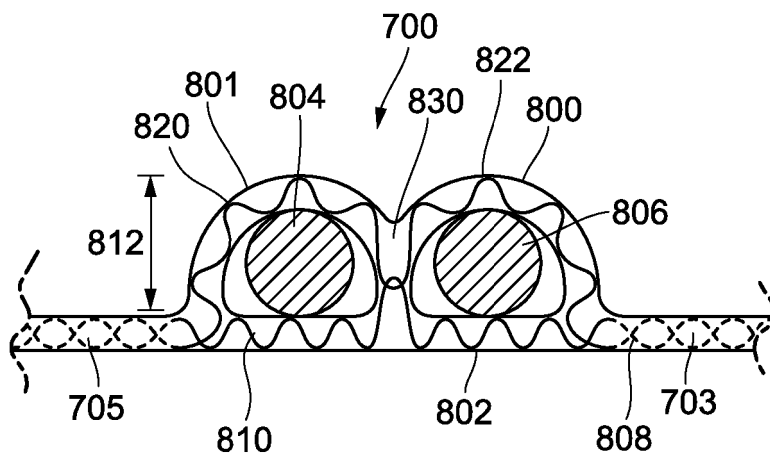


Fig. 9

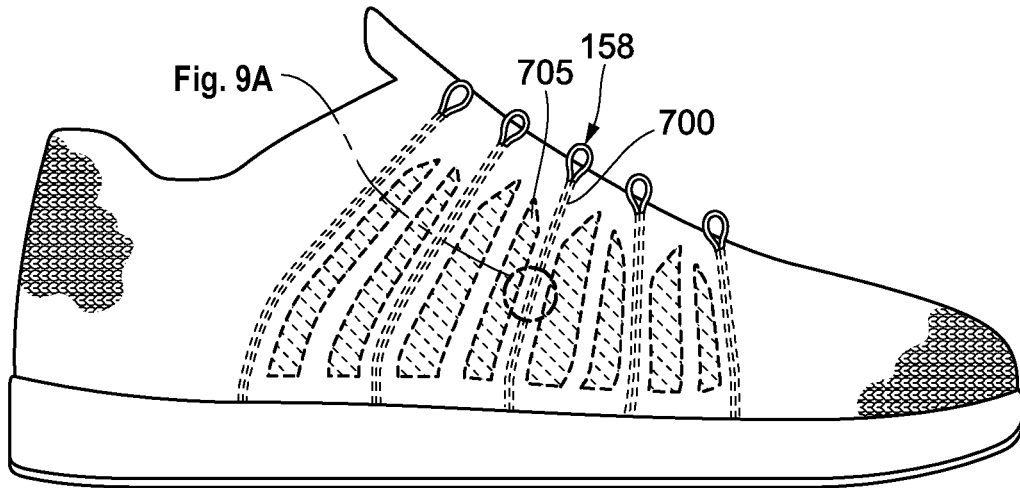


Fig. 9A

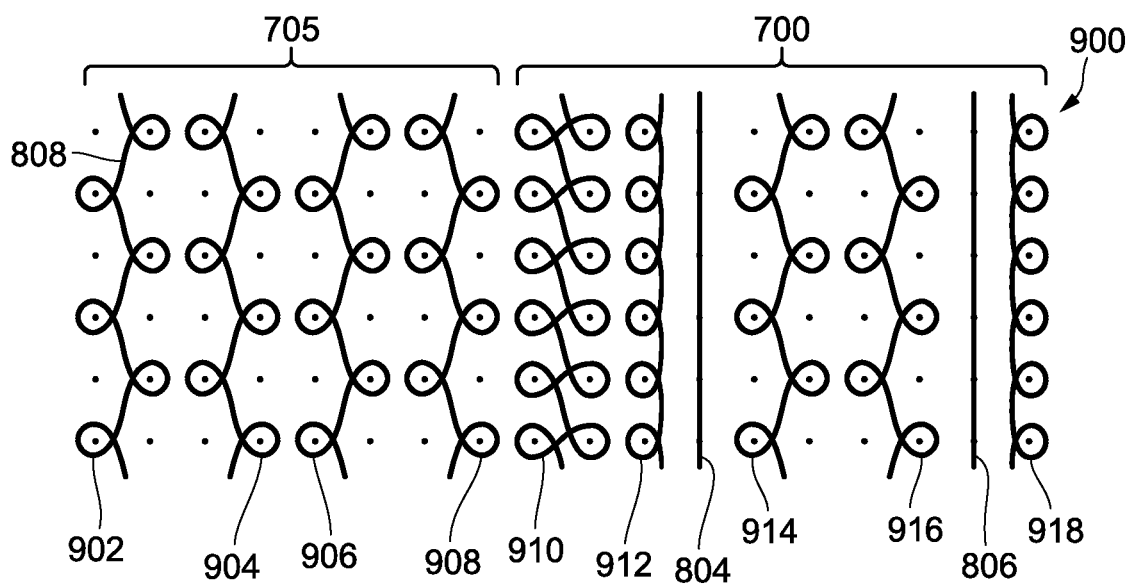


Fig. 10

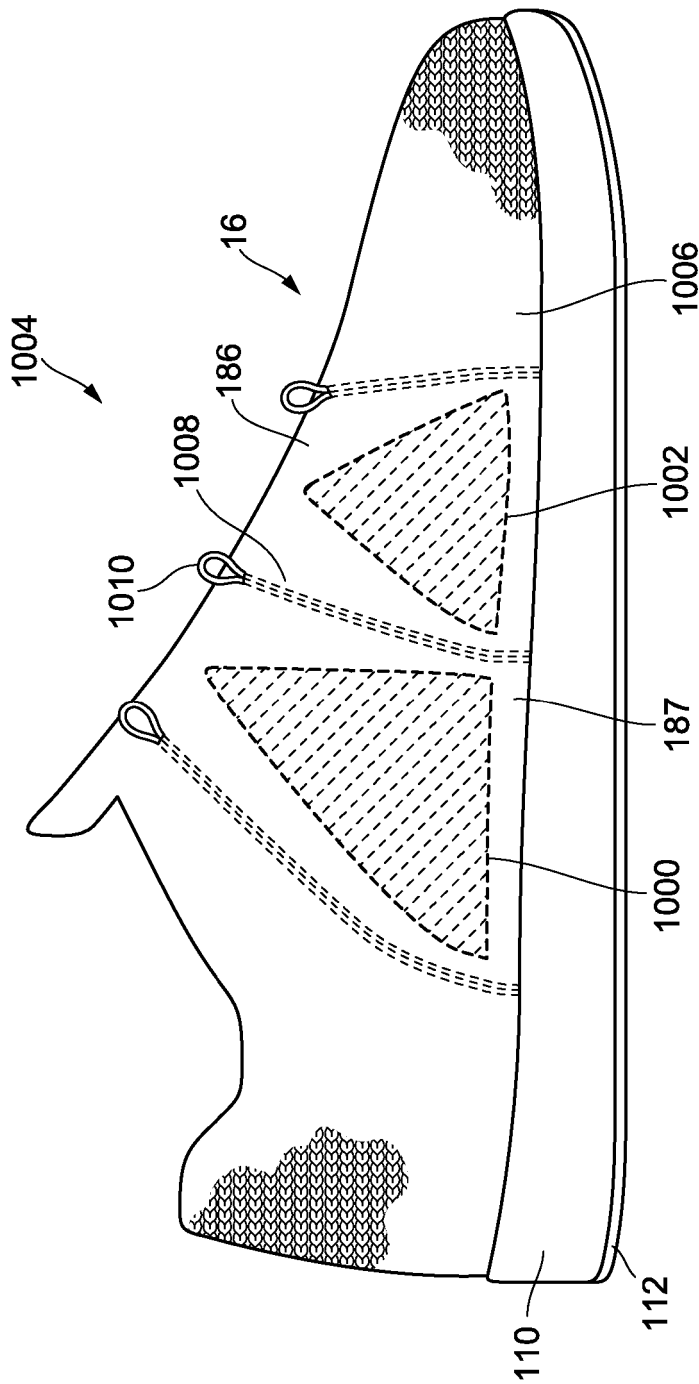


Fig. 11

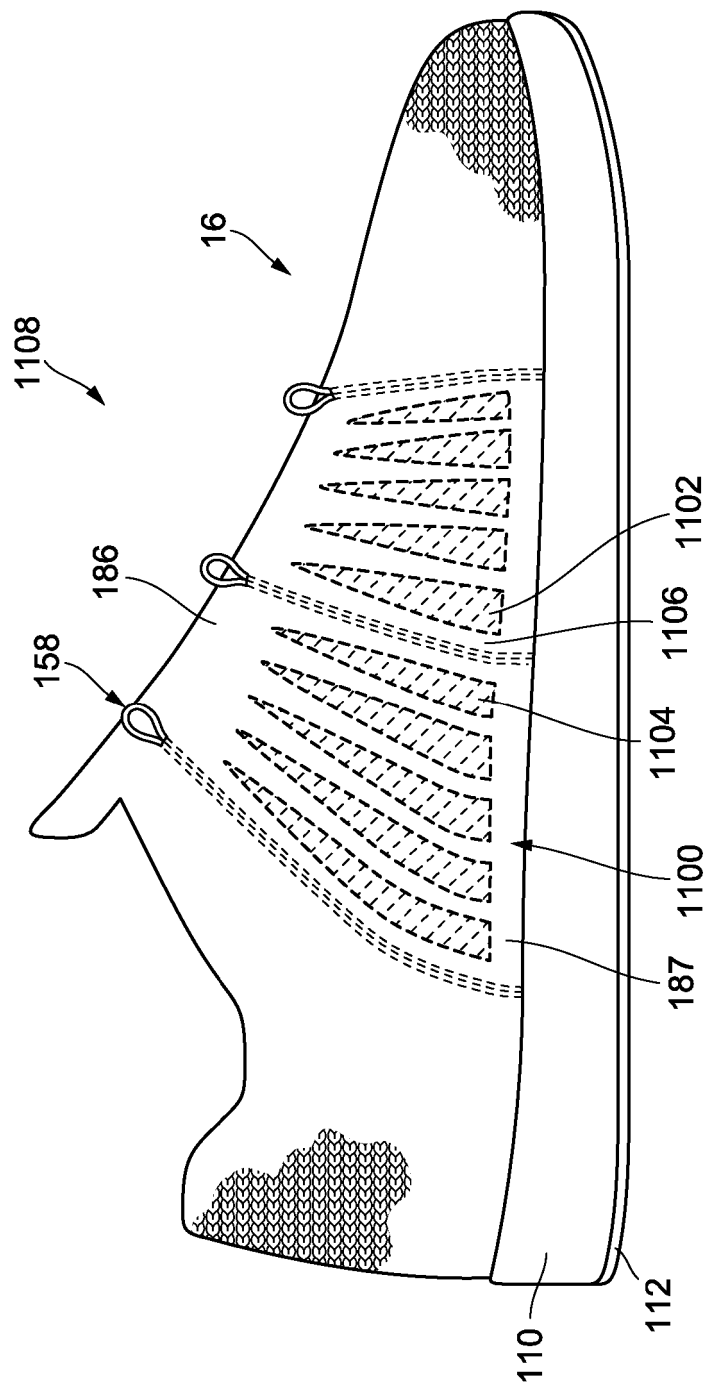


Fig. 12

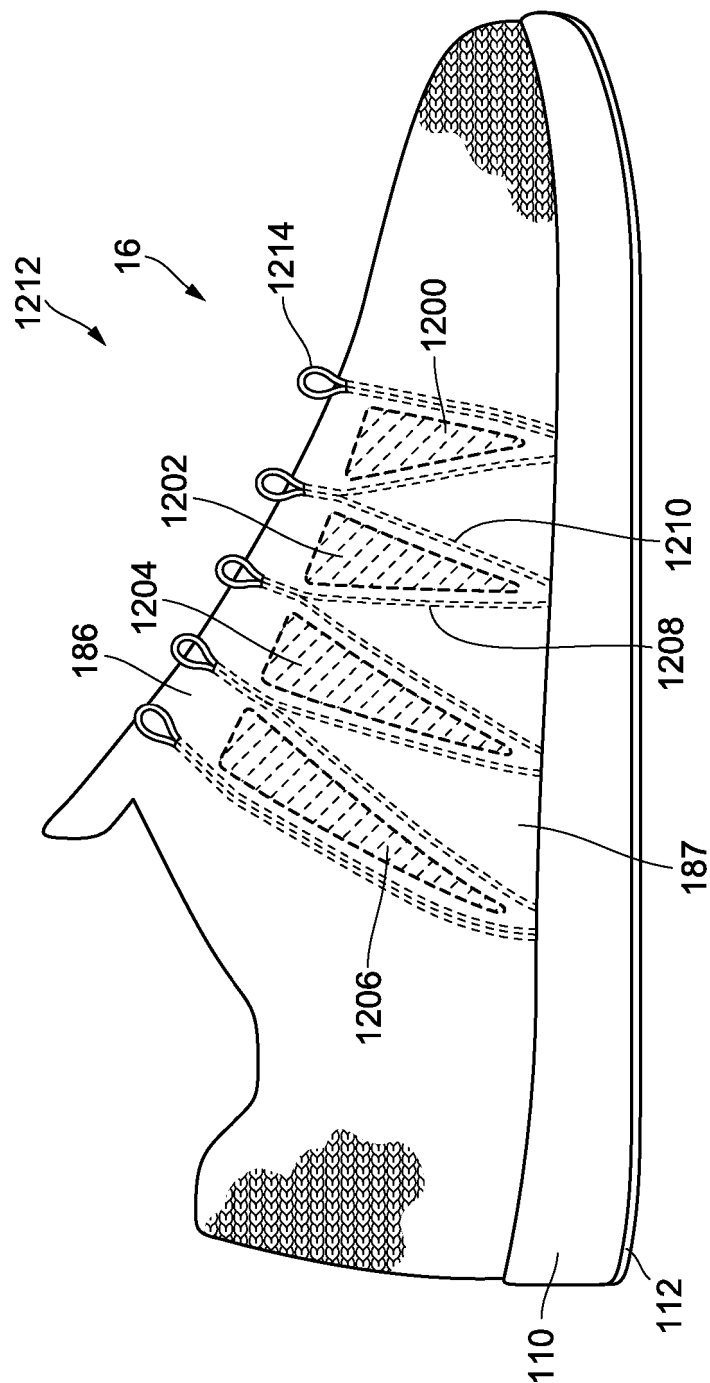


Fig. 13

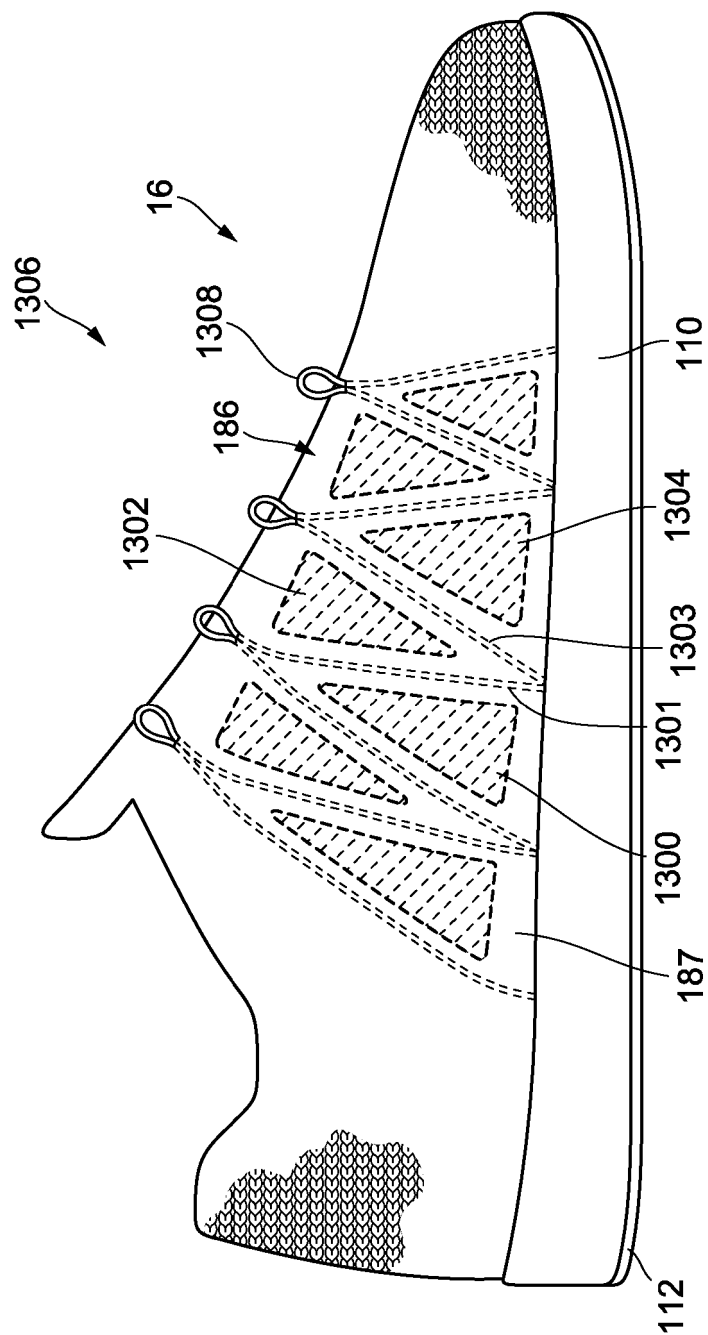


Fig. 14

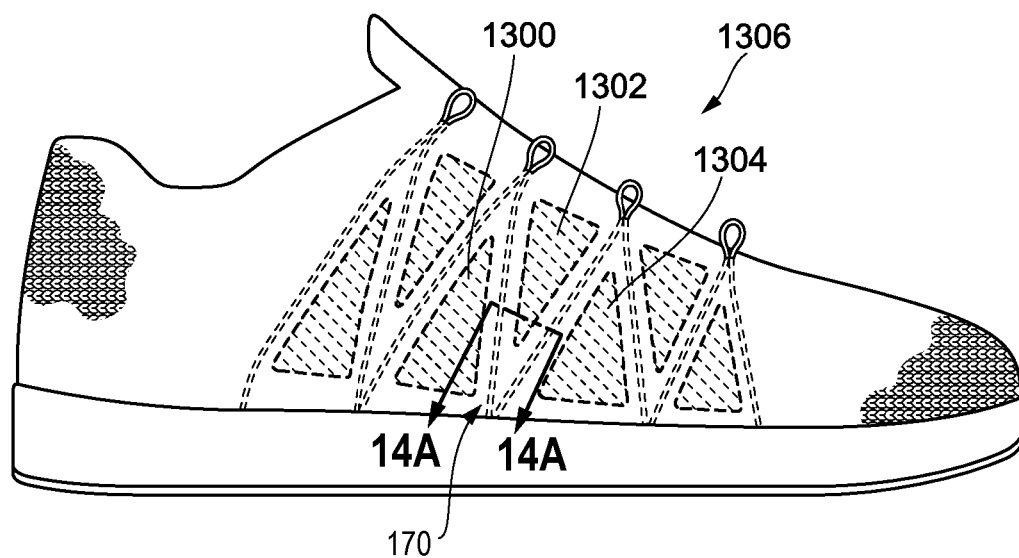


Fig. 14A

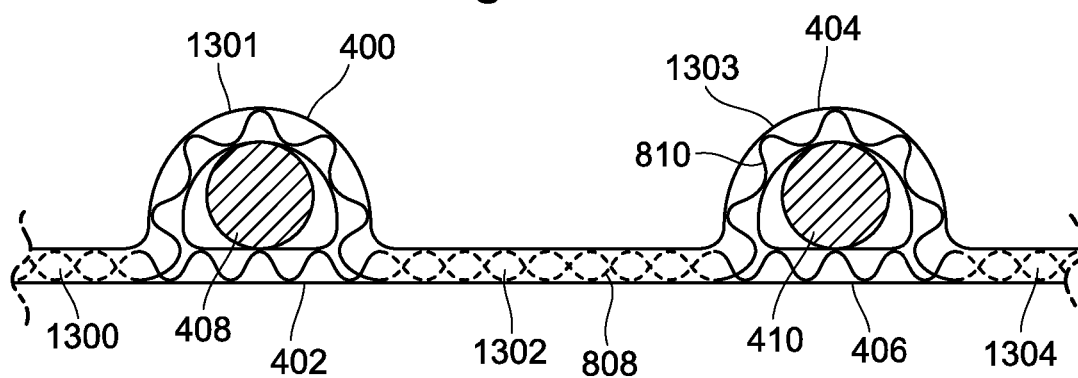


Fig. 15

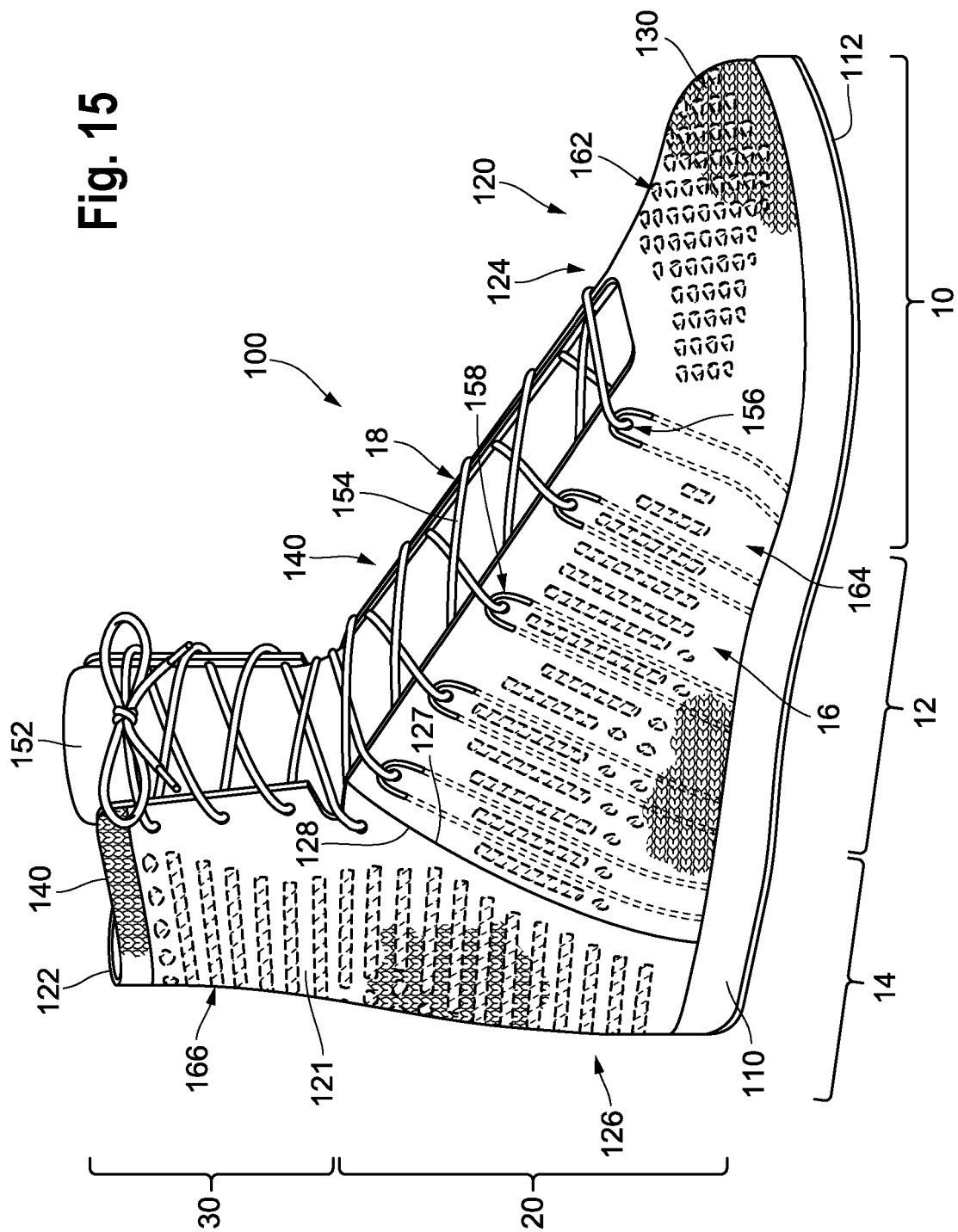


Fig. 16

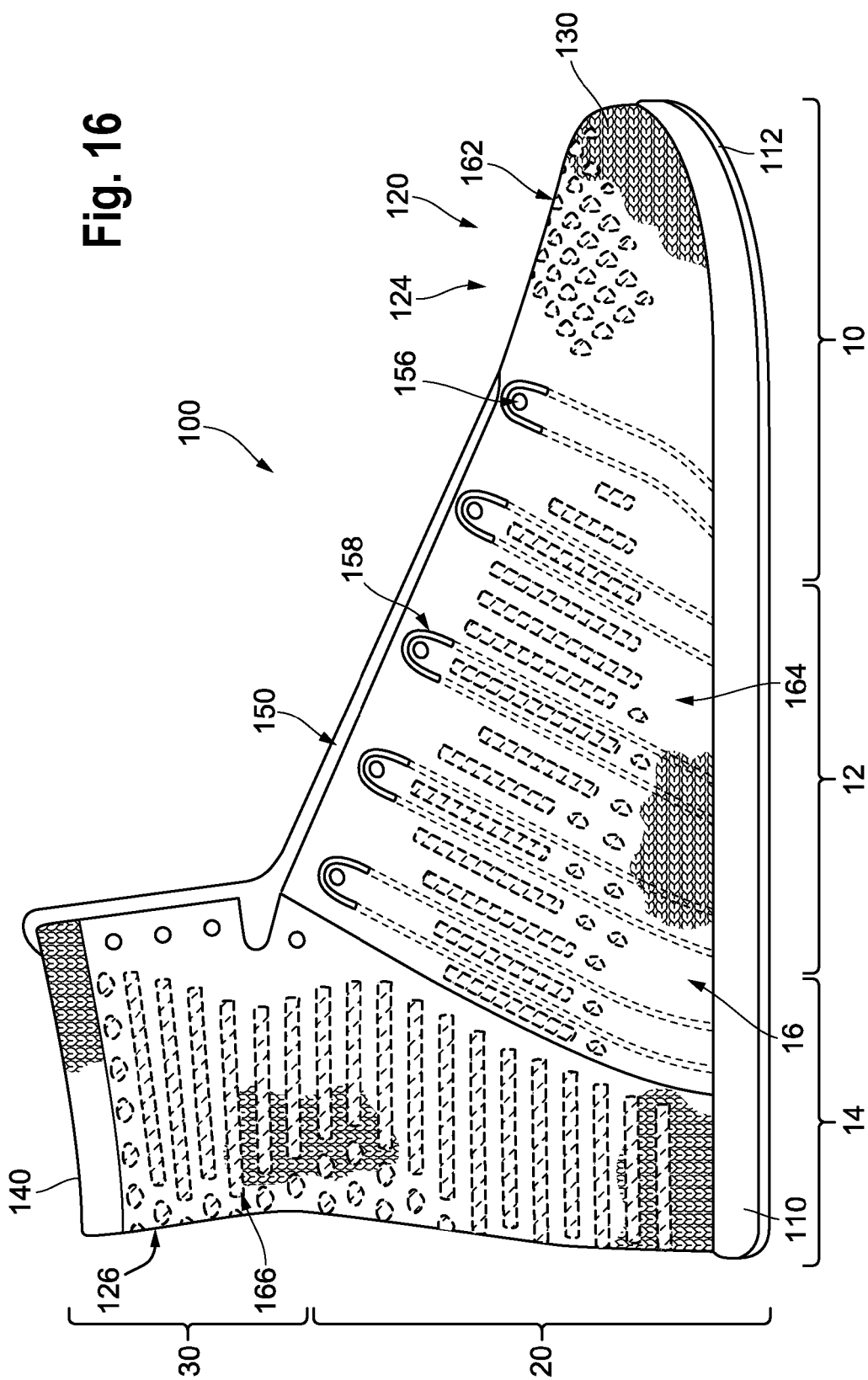


Fig. 17

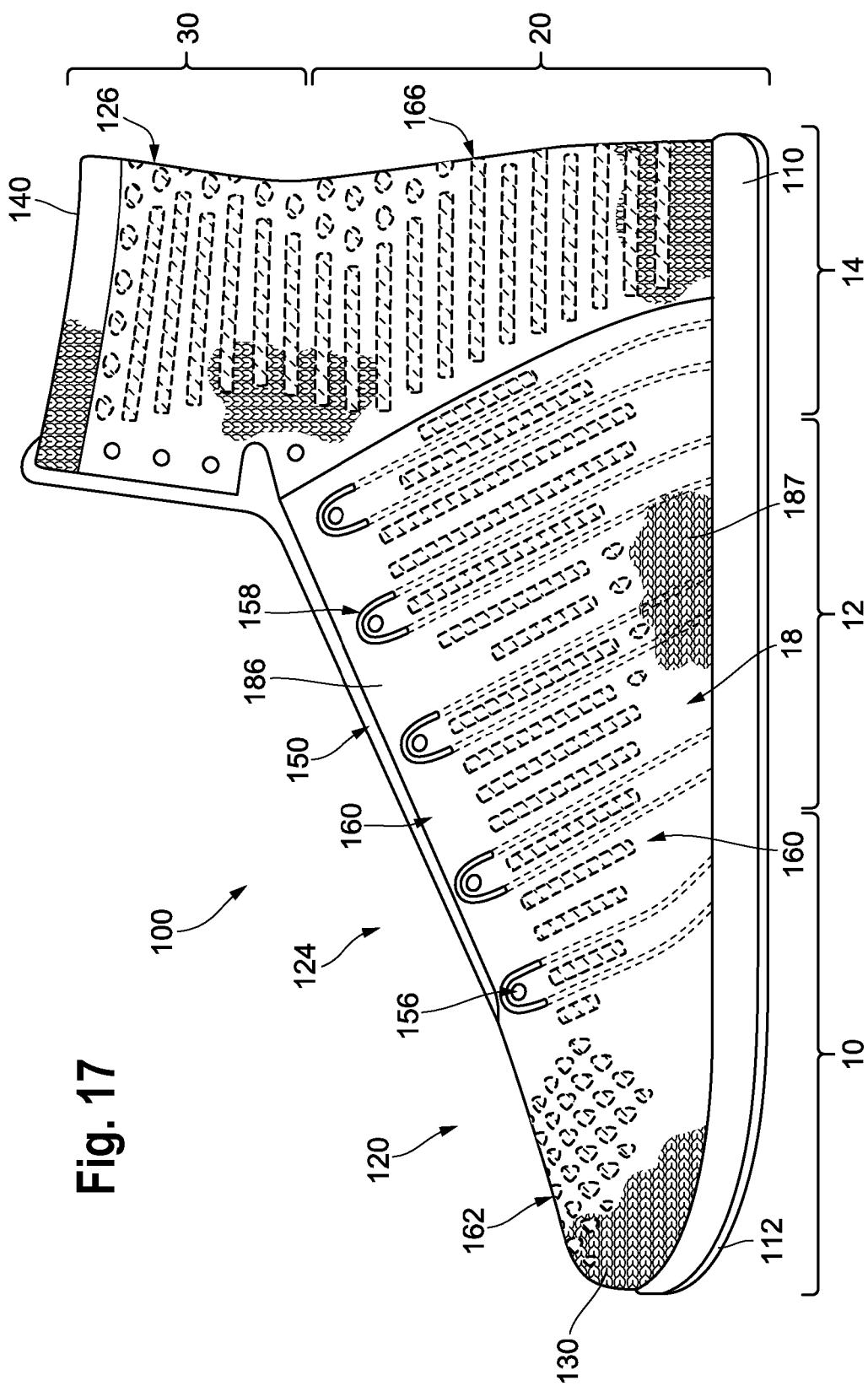


Fig. 18

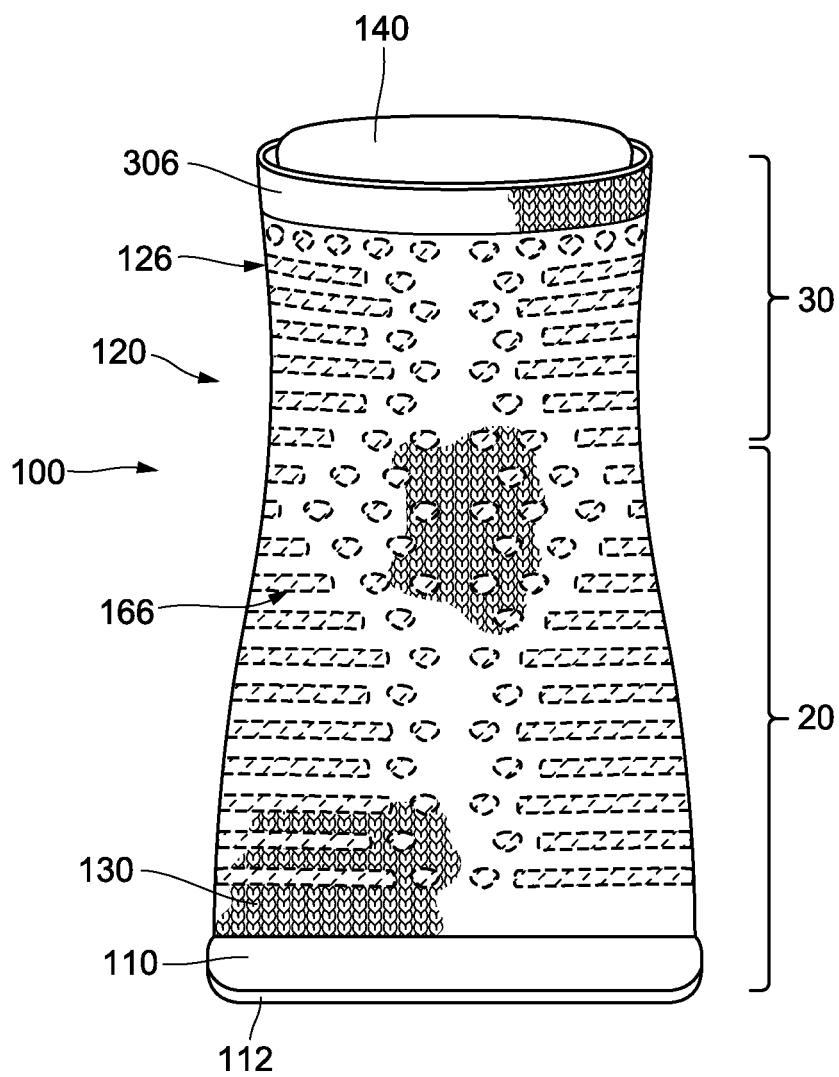


Fig. 19

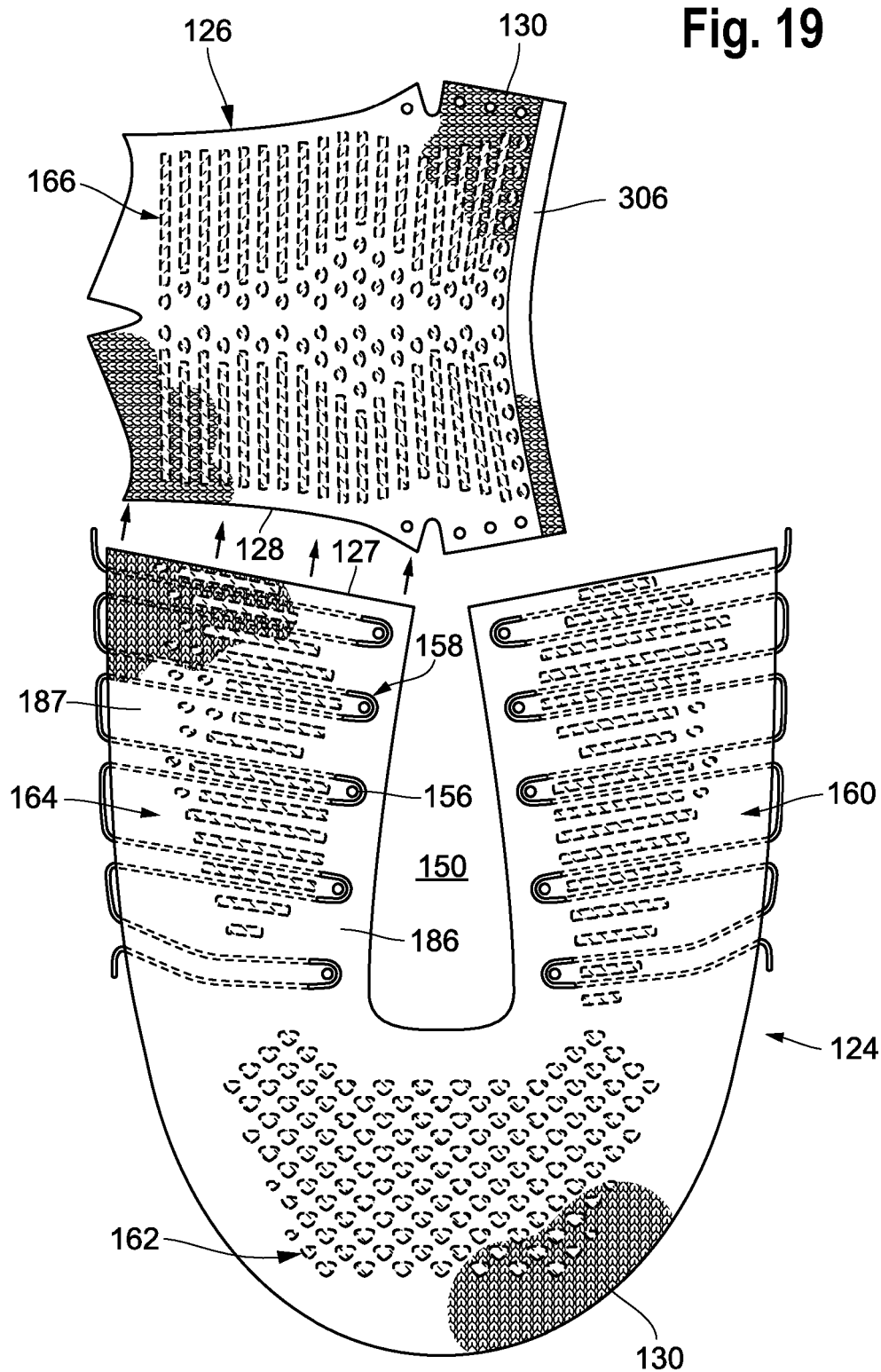


Fig. 20

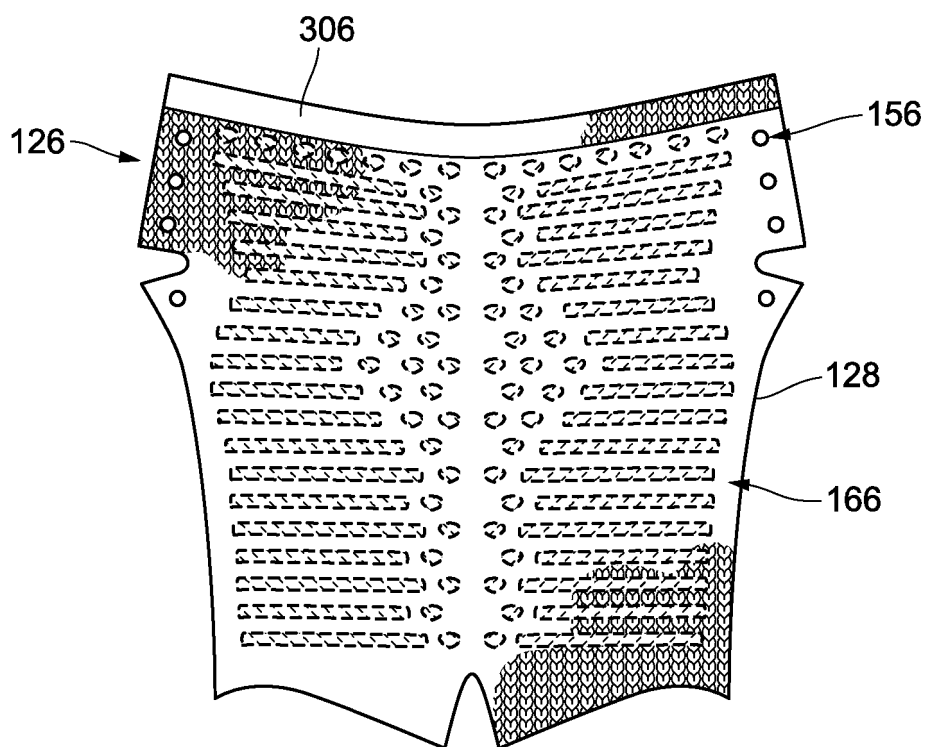


Fig. 21

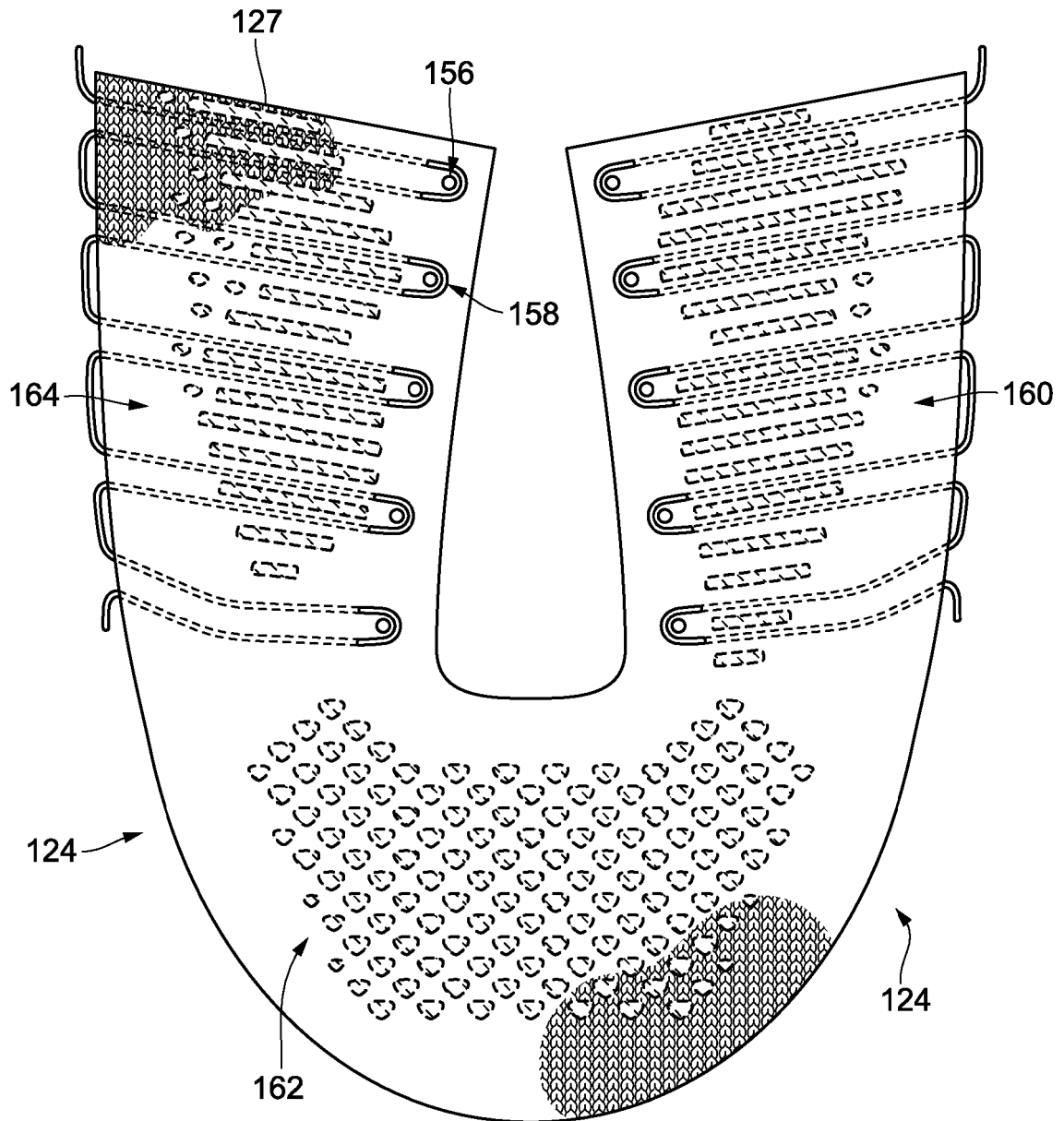


Fig. 22

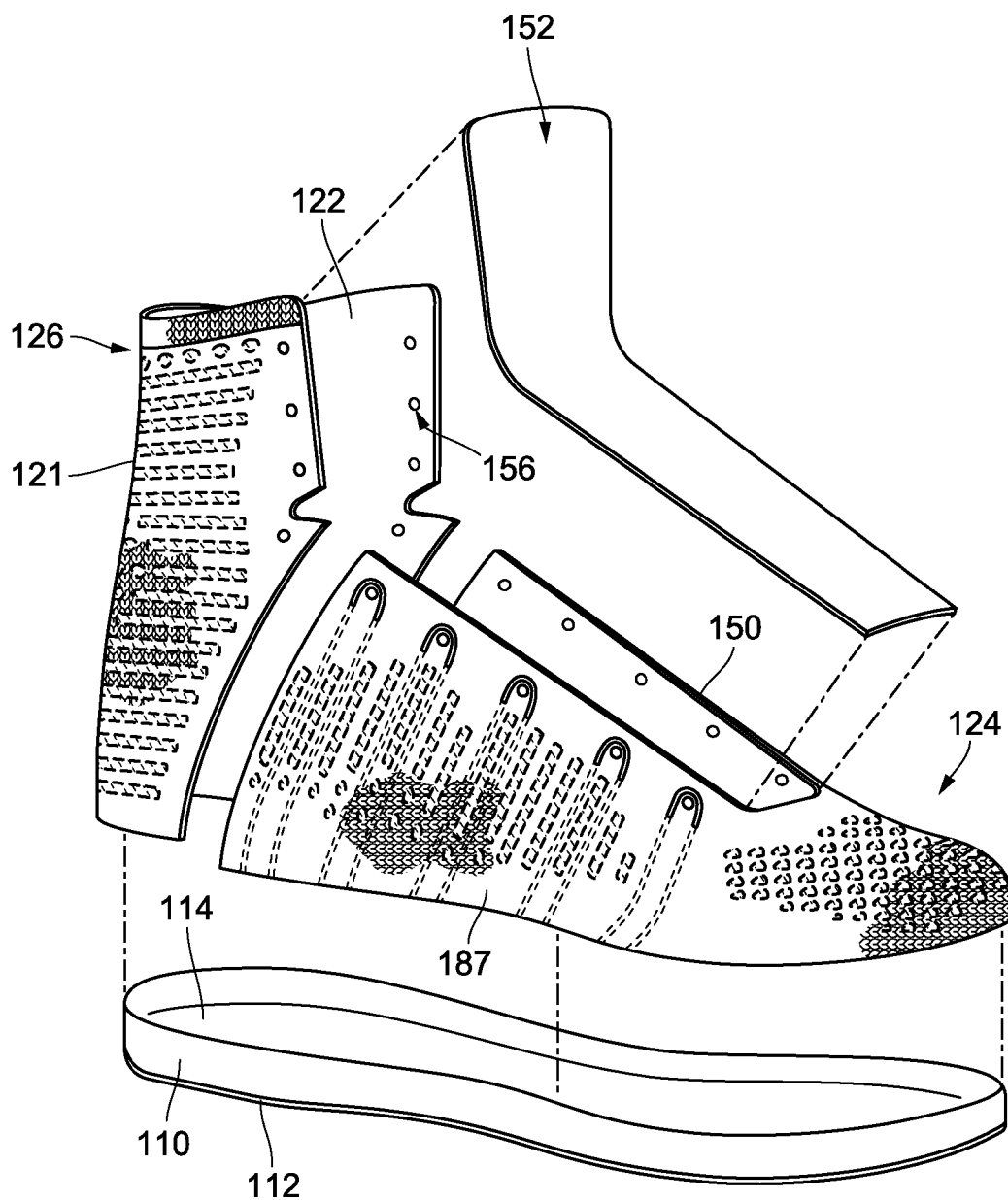


Fig. 23

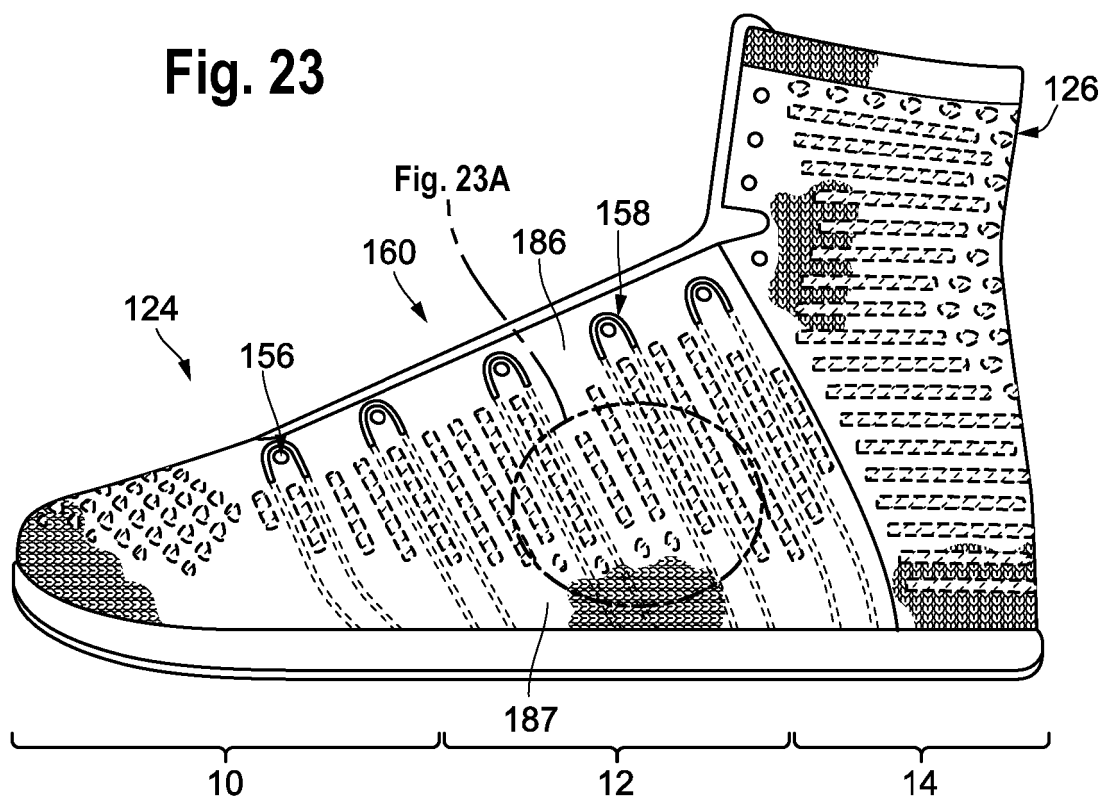


Fig. 23A

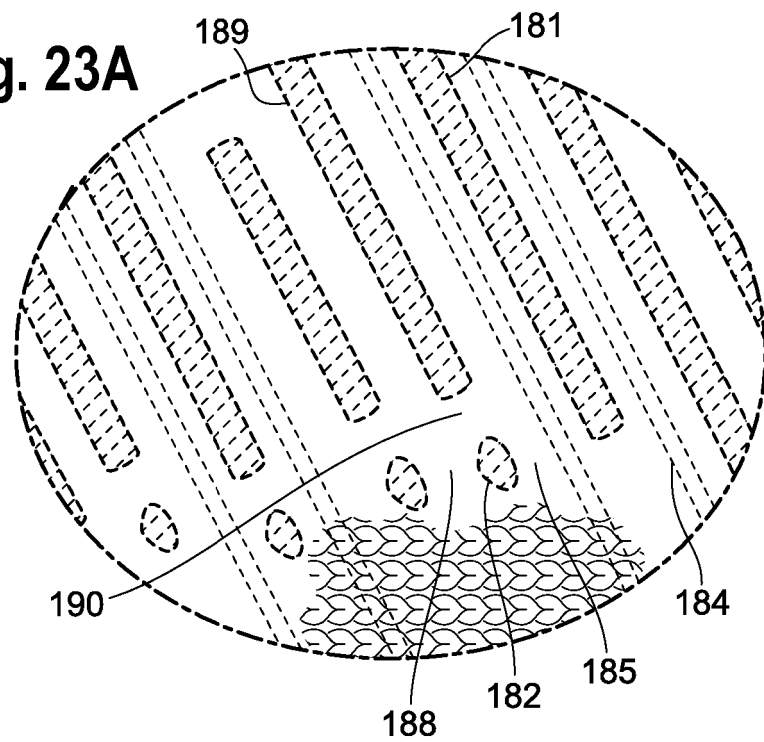


Fig. 24

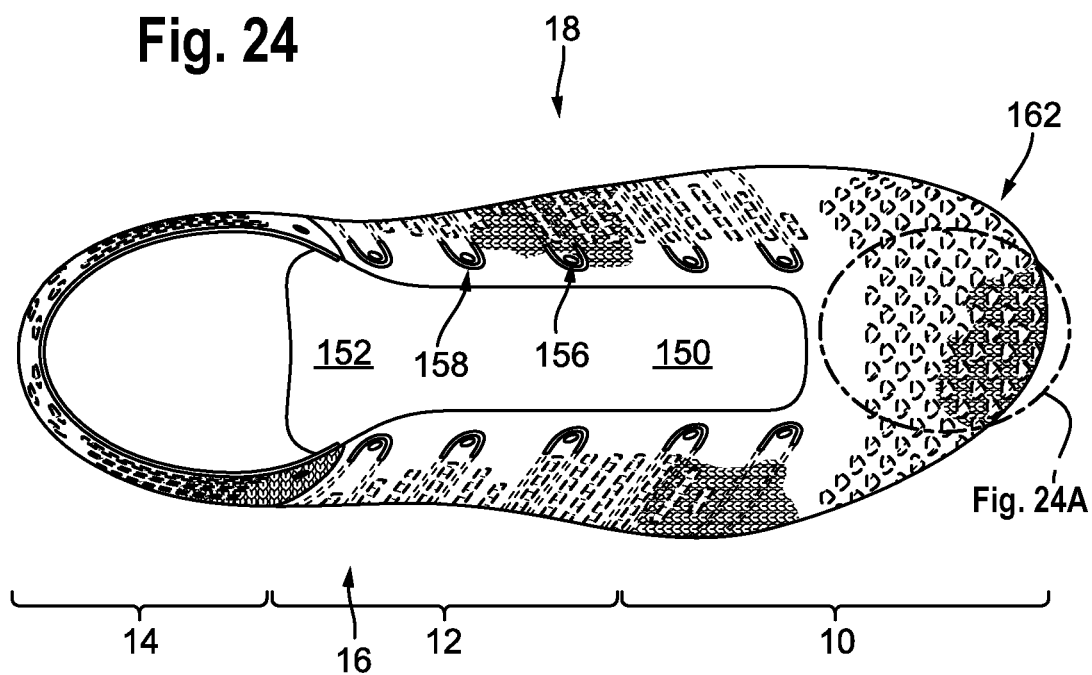


Fig. 24A

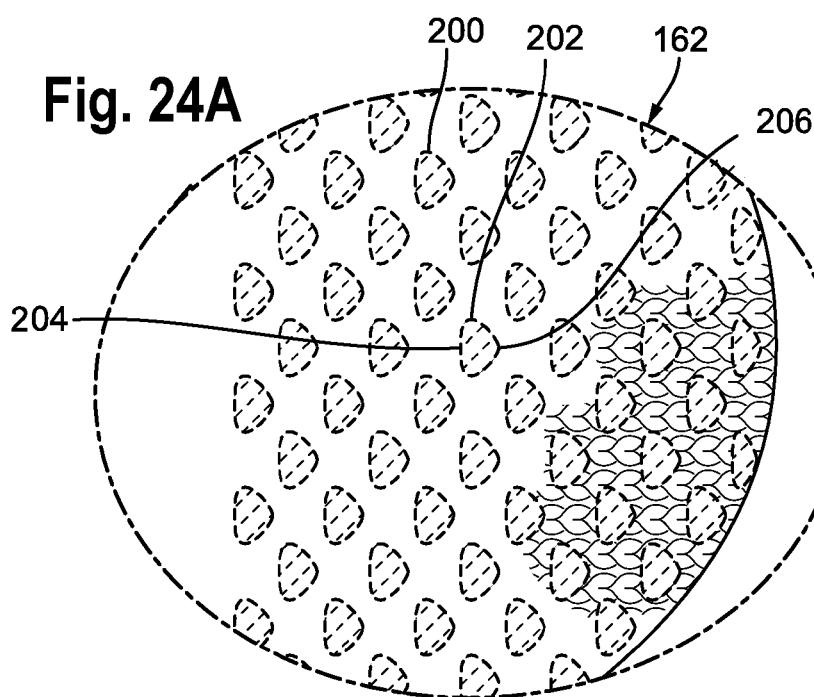


Fig. 25

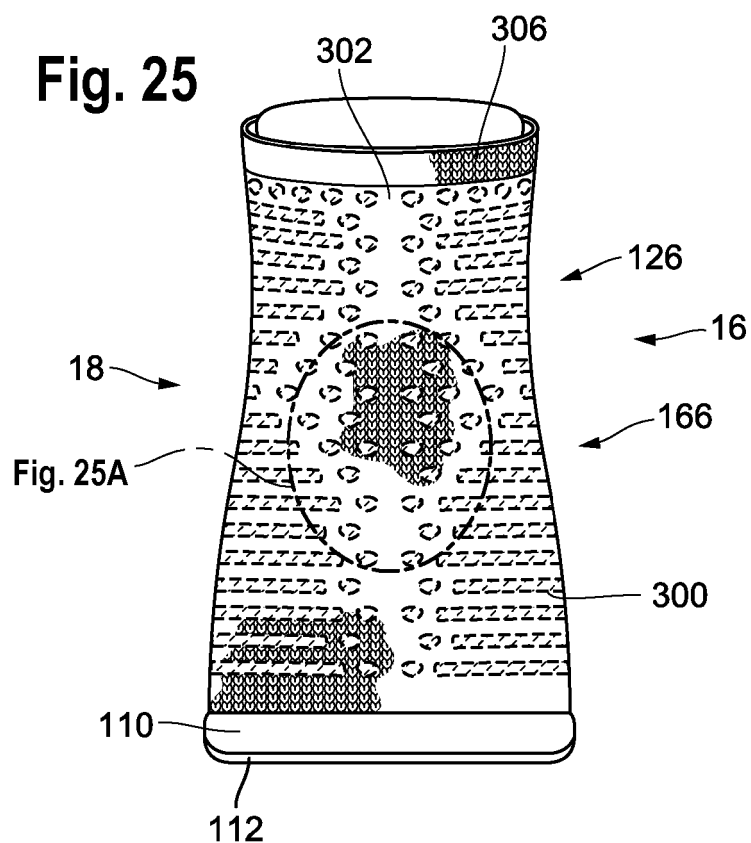


Fig. 25A

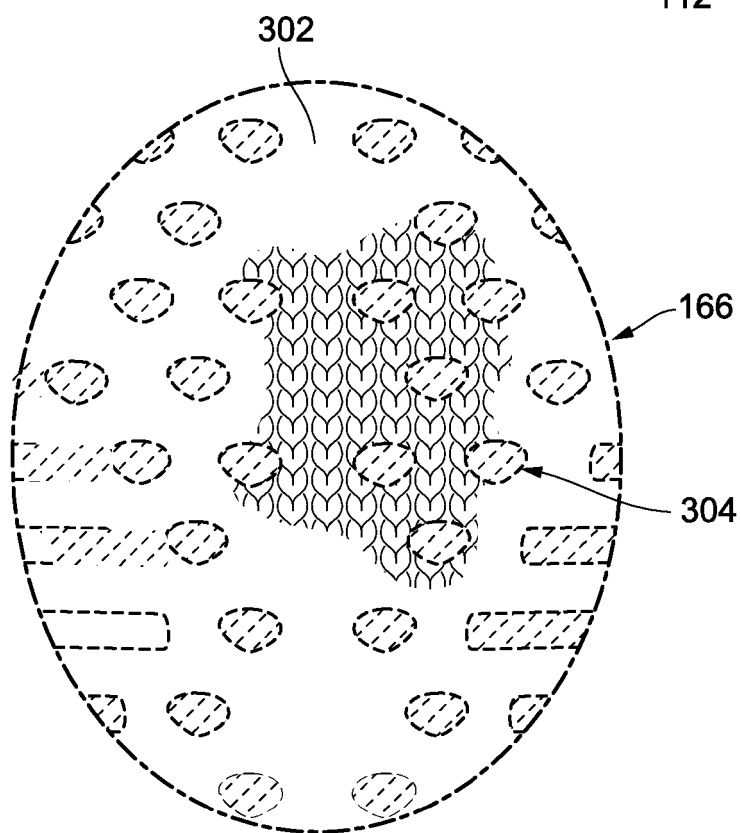


Fig. 26

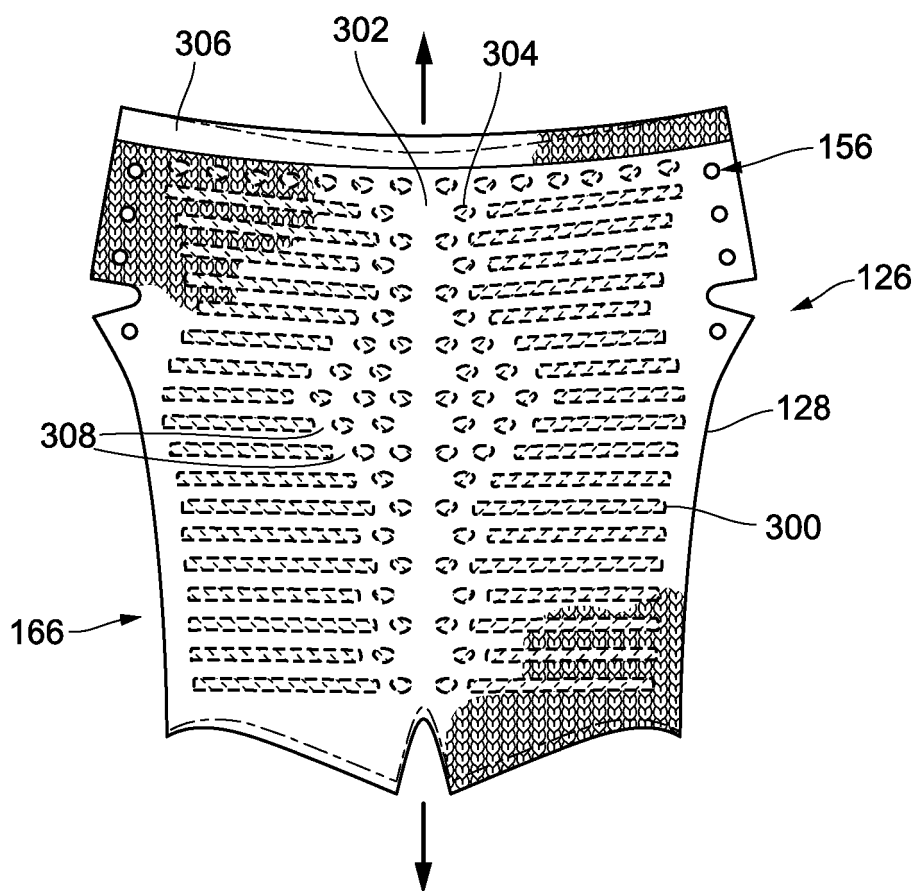


Fig. 27

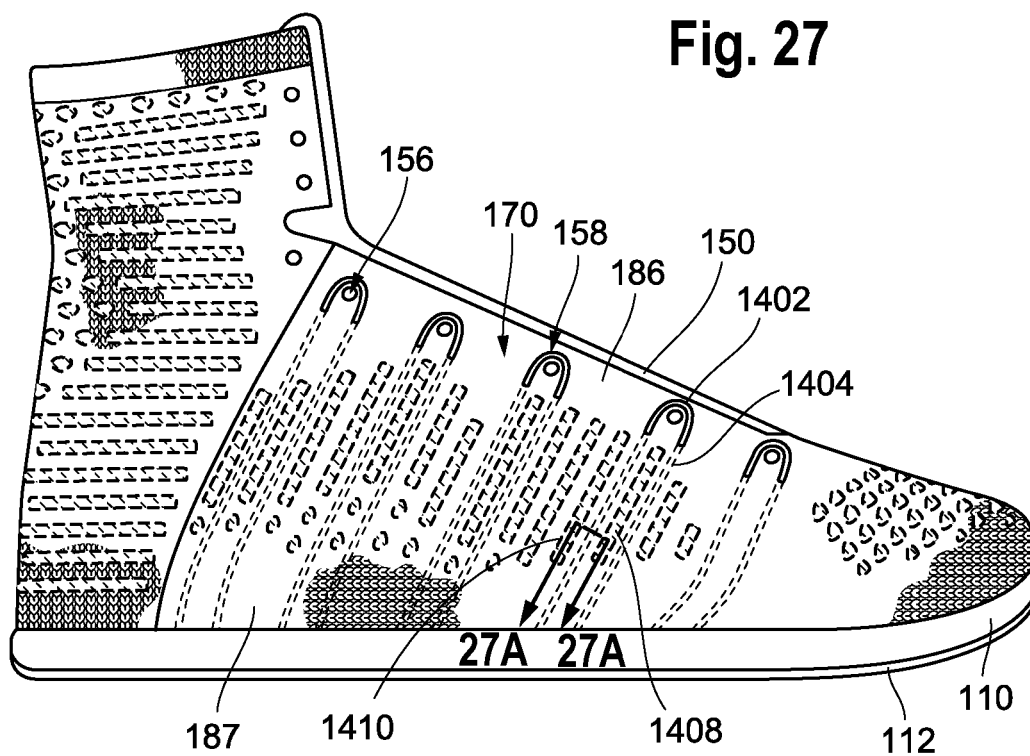
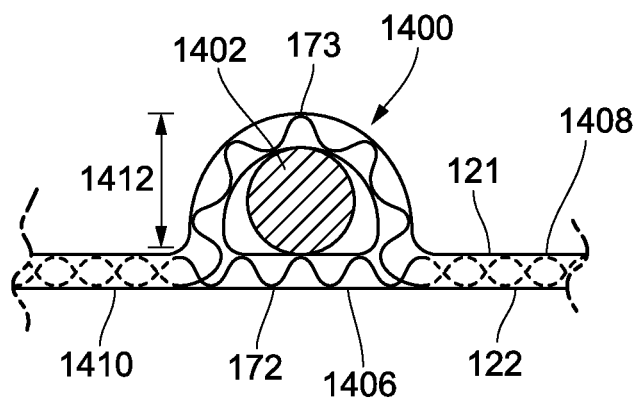


Fig. 27A



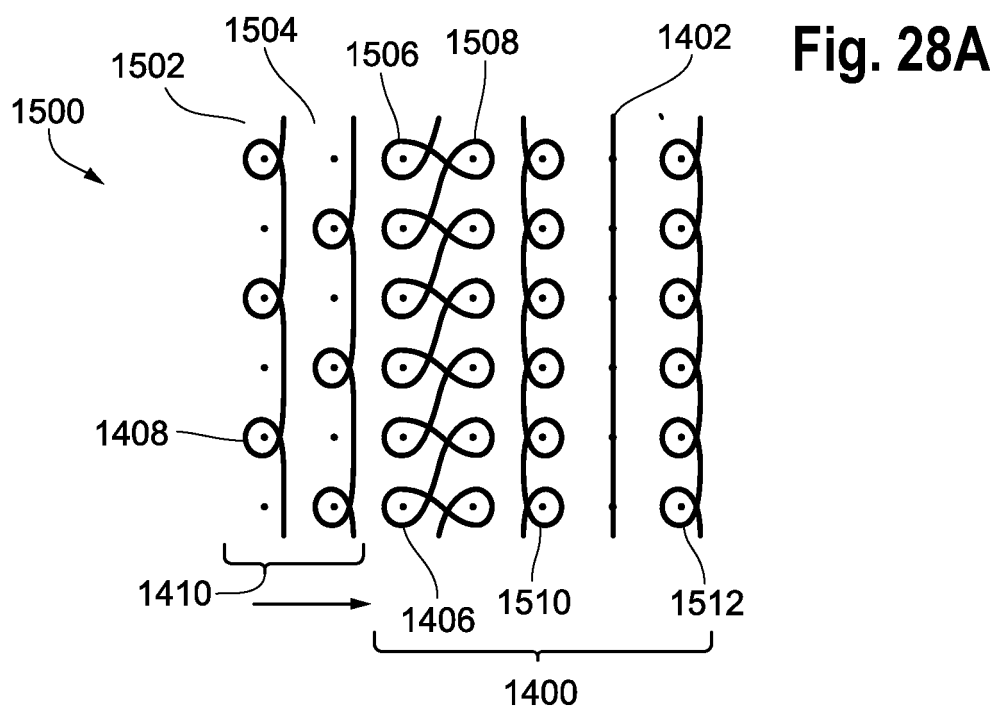
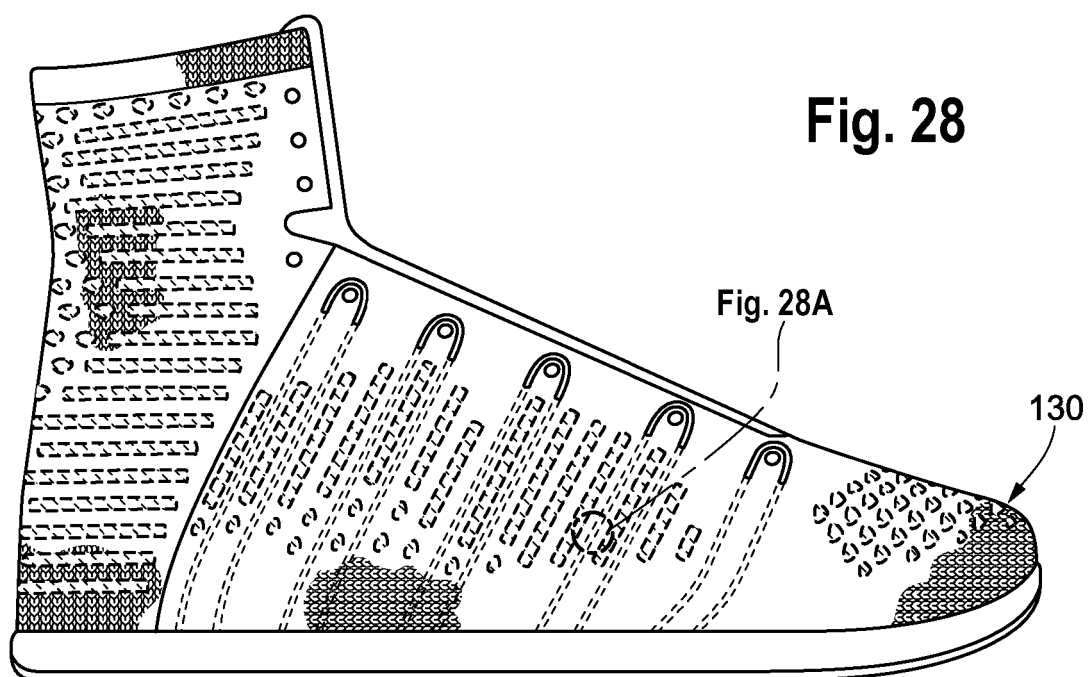


Fig. 29

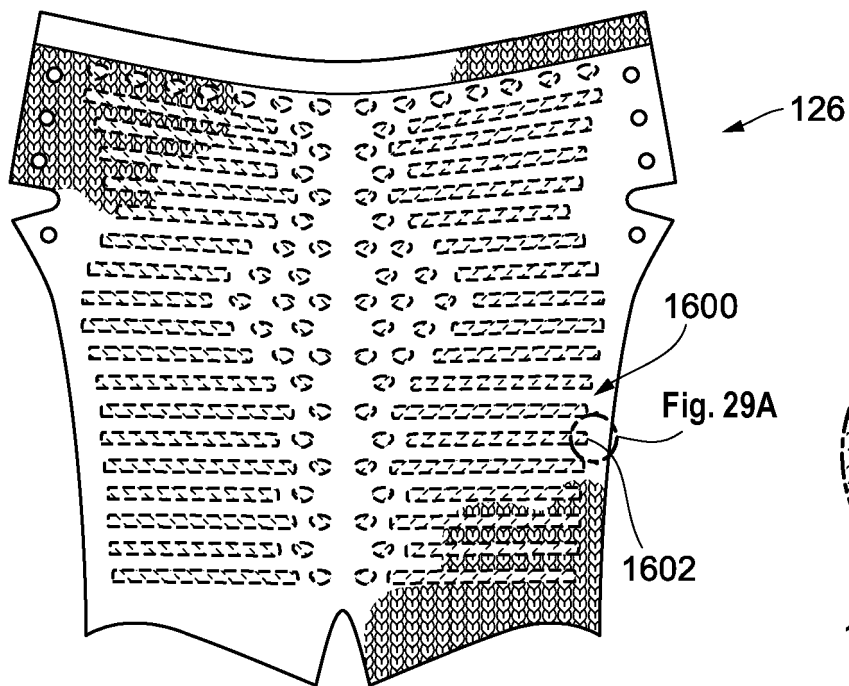


Fig. 29A

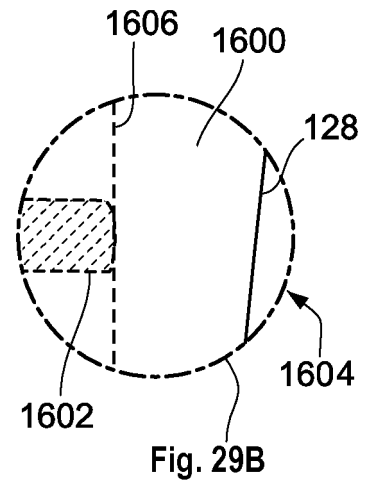


Fig. 29B

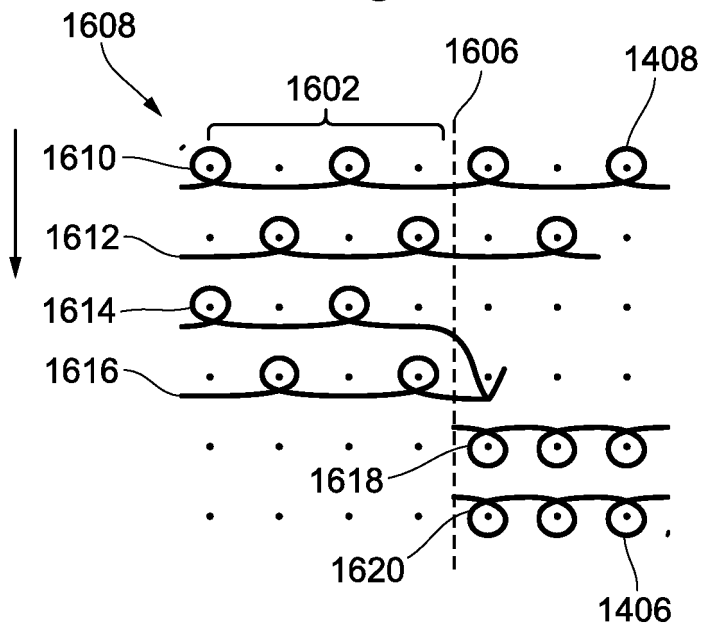


Fig. 30

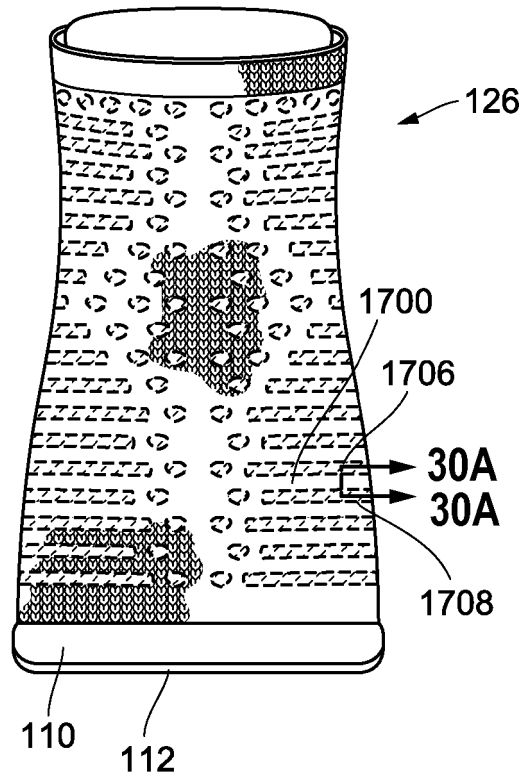


Fig. 30A

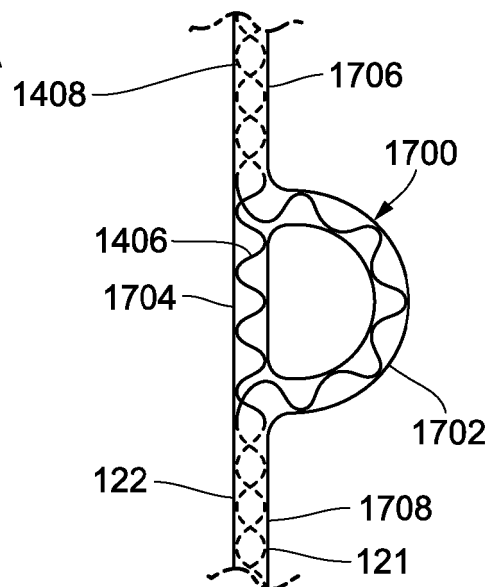


Fig. 31

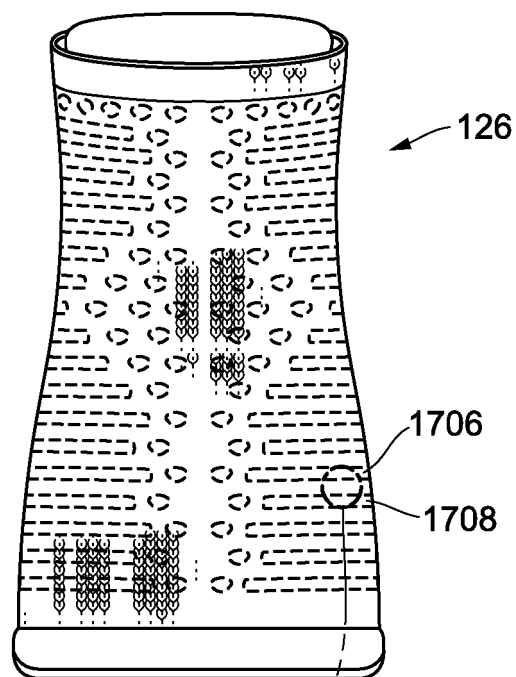
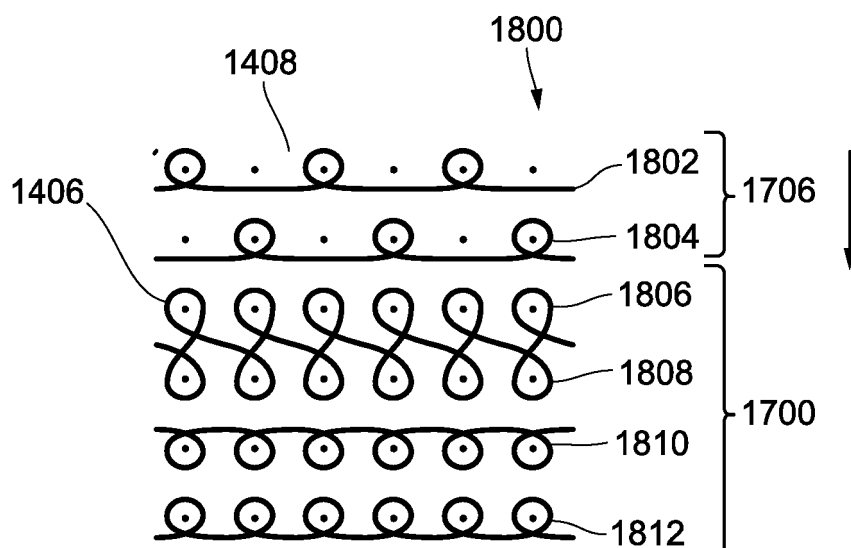


Fig. 31A

Fig. 31A



REFERENCES CITED IN THE DESCRIPTION

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