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Aceves Tinajero et al.

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(54) **SUSTAINABLE FOOTWEAR ARTICLE**

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CPC **A43B 23/0215** (2013.01); **A43B 1/0063** (2013.01); **A43B 1/04** (2013.01); **A43B 3/24** (2013.01); **A43B 23/0205** (2013.01)

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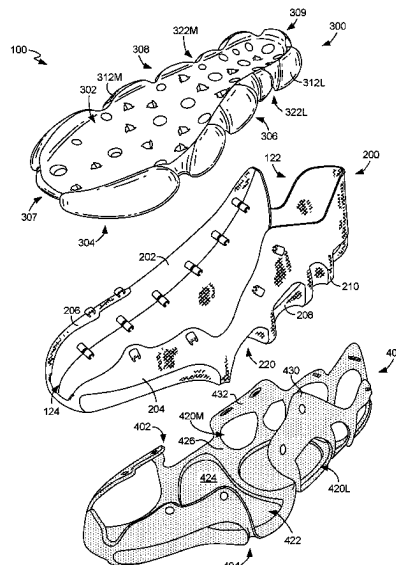
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(57) **ABSTRACT**

Articles of footwear for sustainable systems are disclosed herein. A modular article of footwear includes a knitted upper component and a midsole component that are removably secured together. Some aspects further includes an exterior sole component that is removably secured to the midsole component and the knitted upper component.

24 Claims, 25 Drawing Sheets



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USPC 36/45, 50.1, 100
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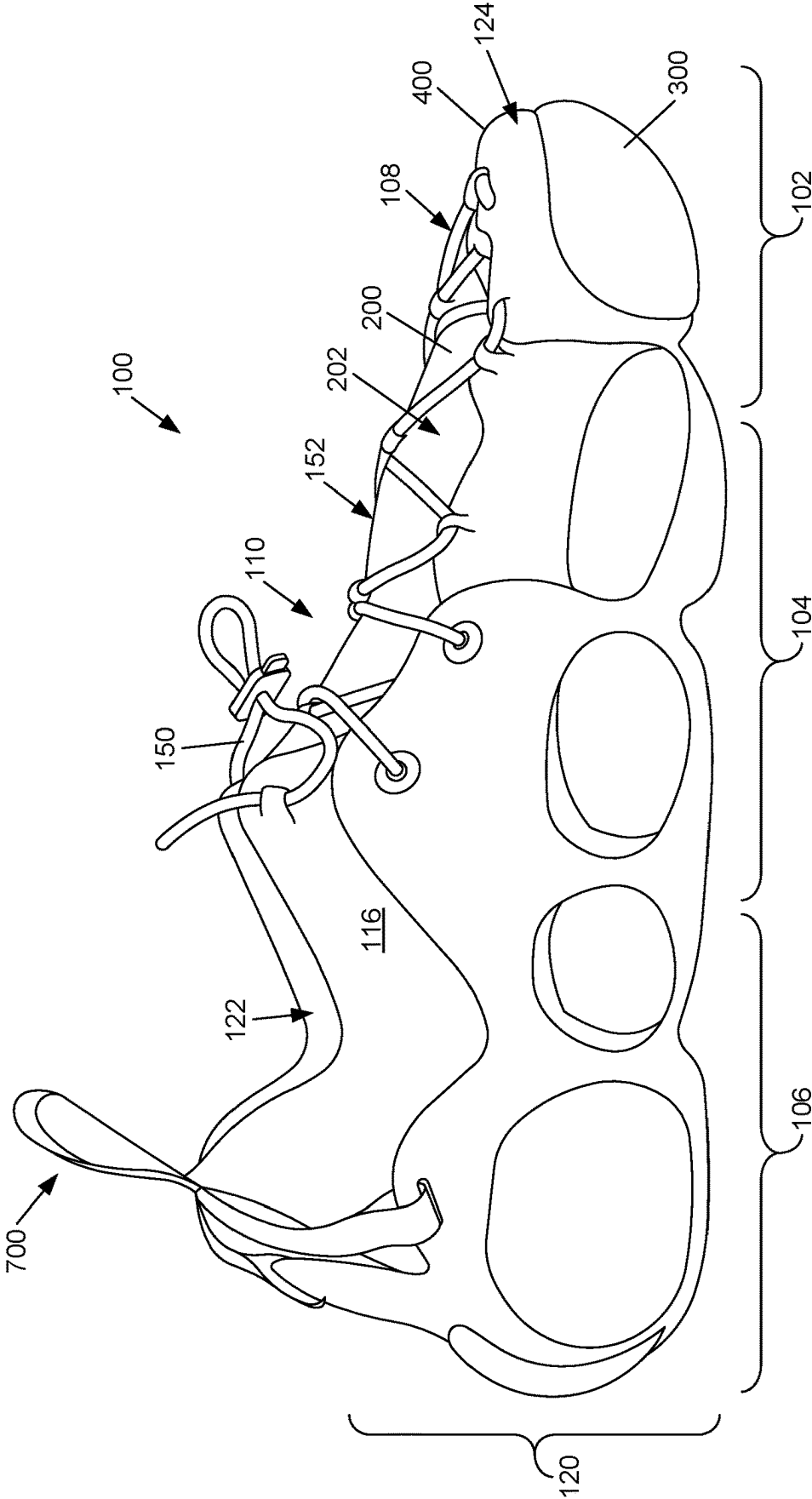


FIG. 1A

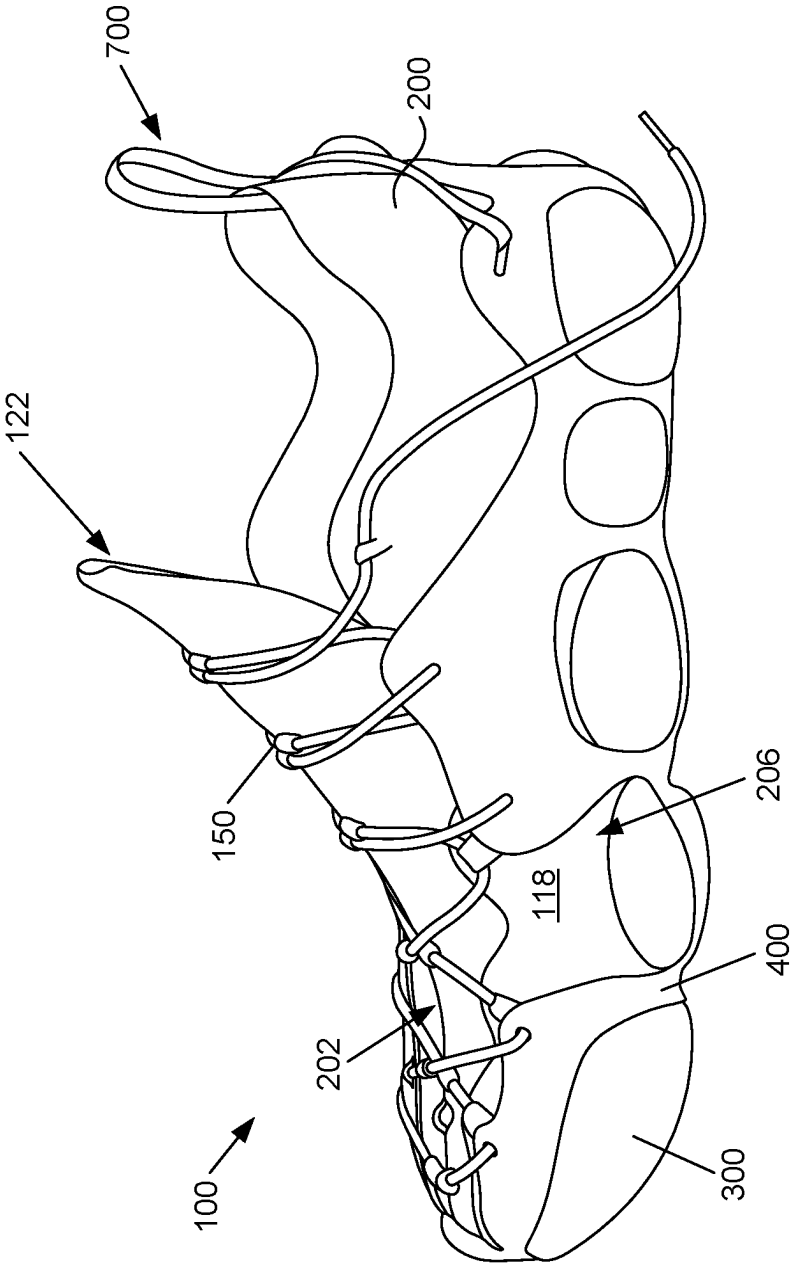
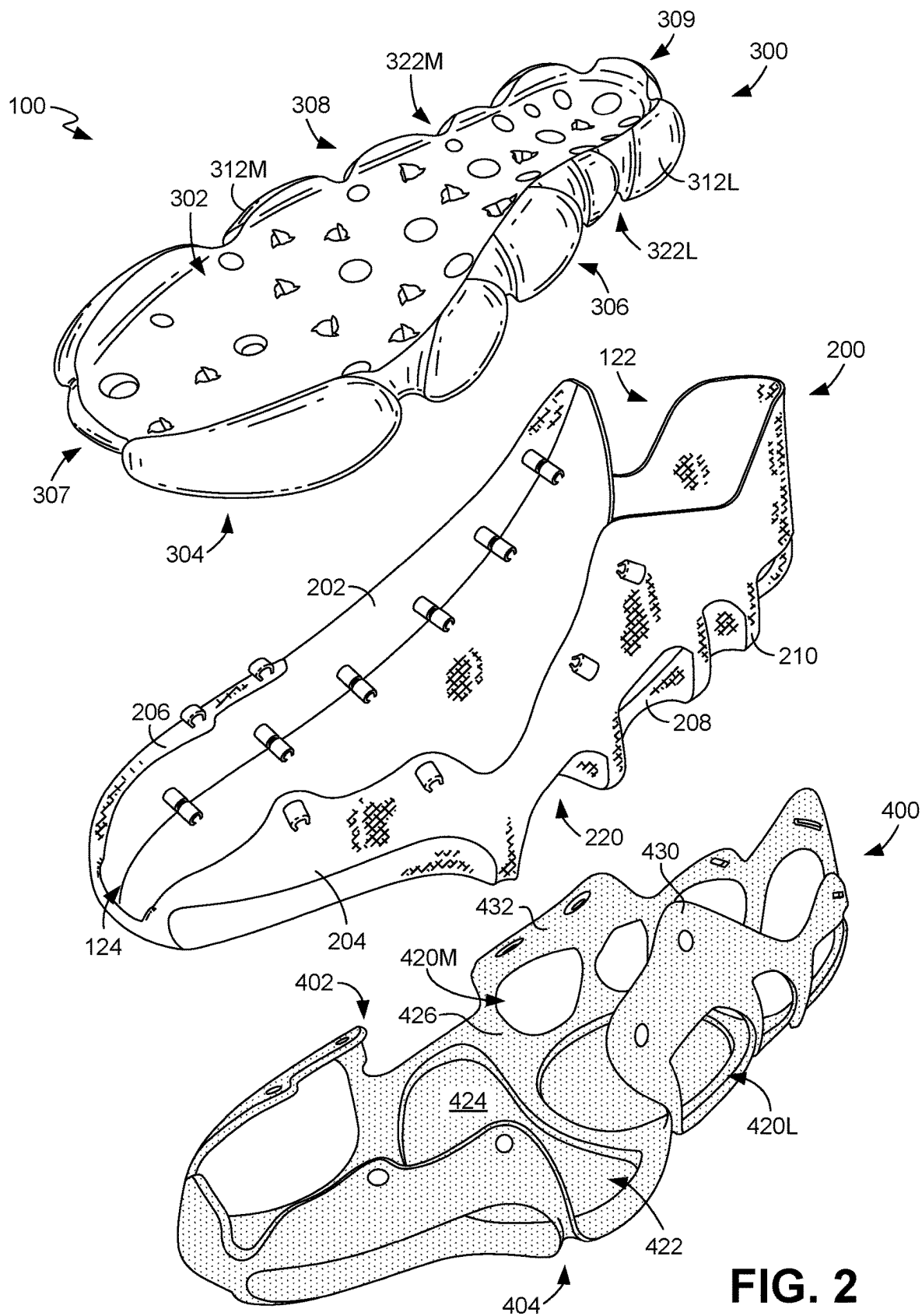


FIG. 1B



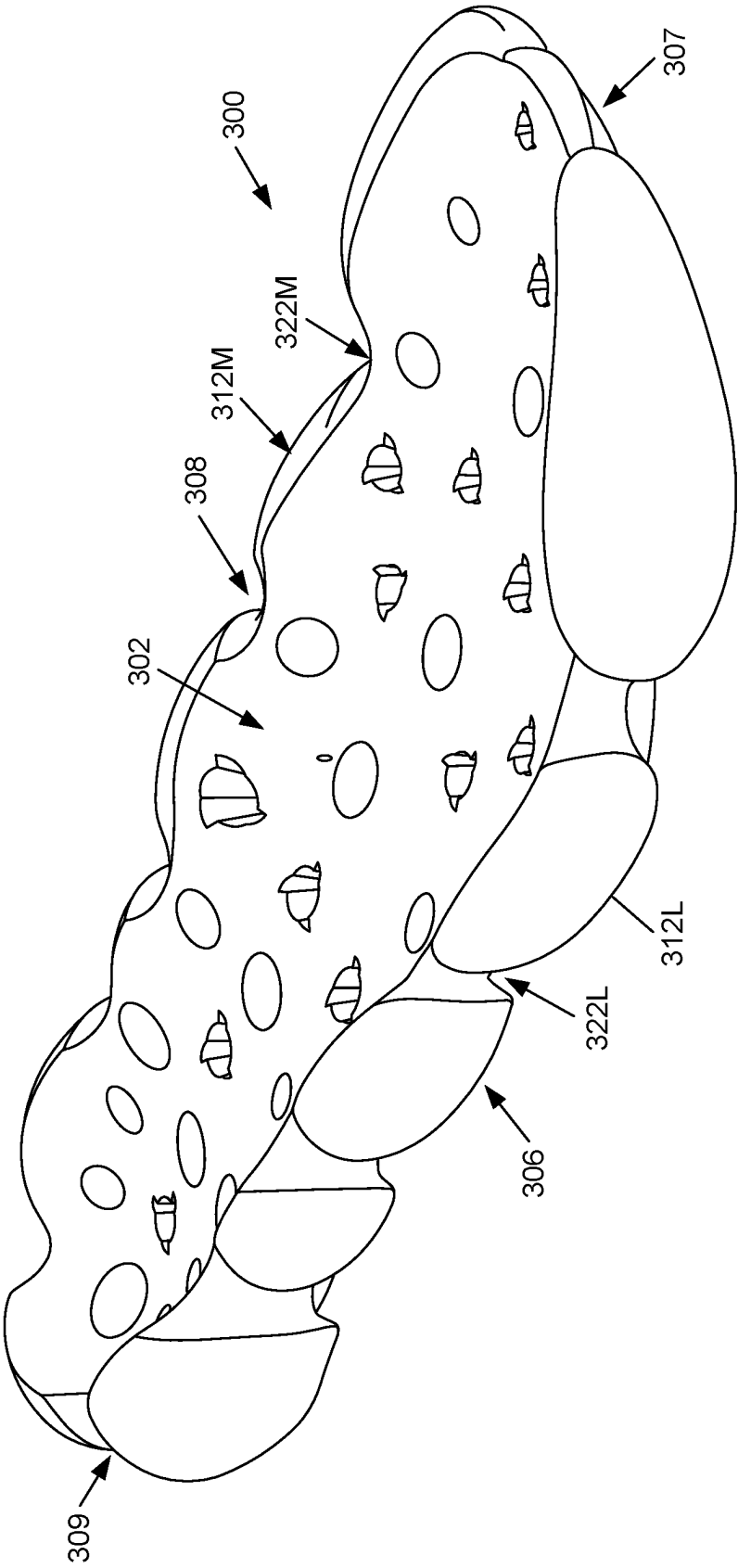


FIG. 3A

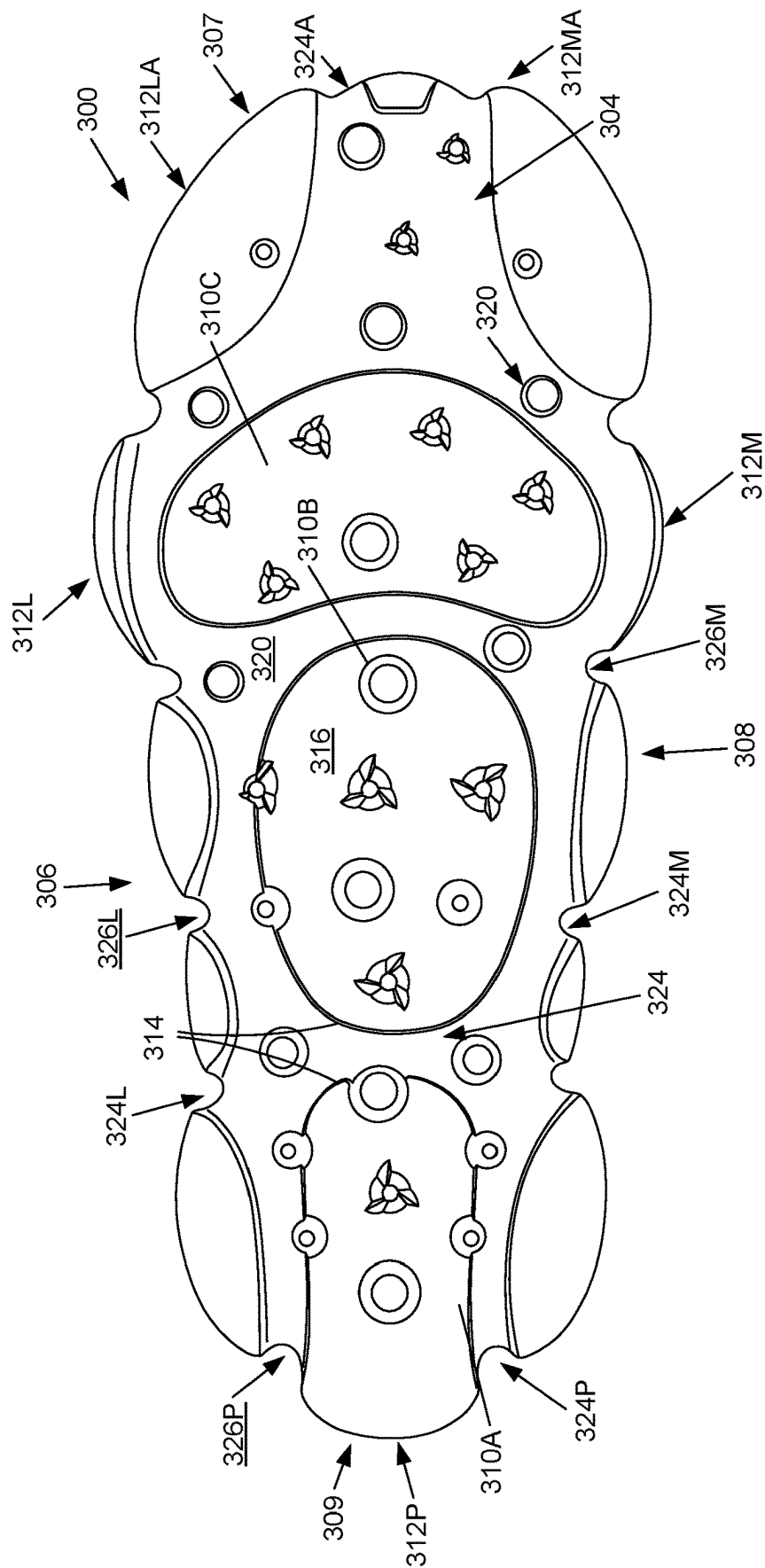


FIG. 3B



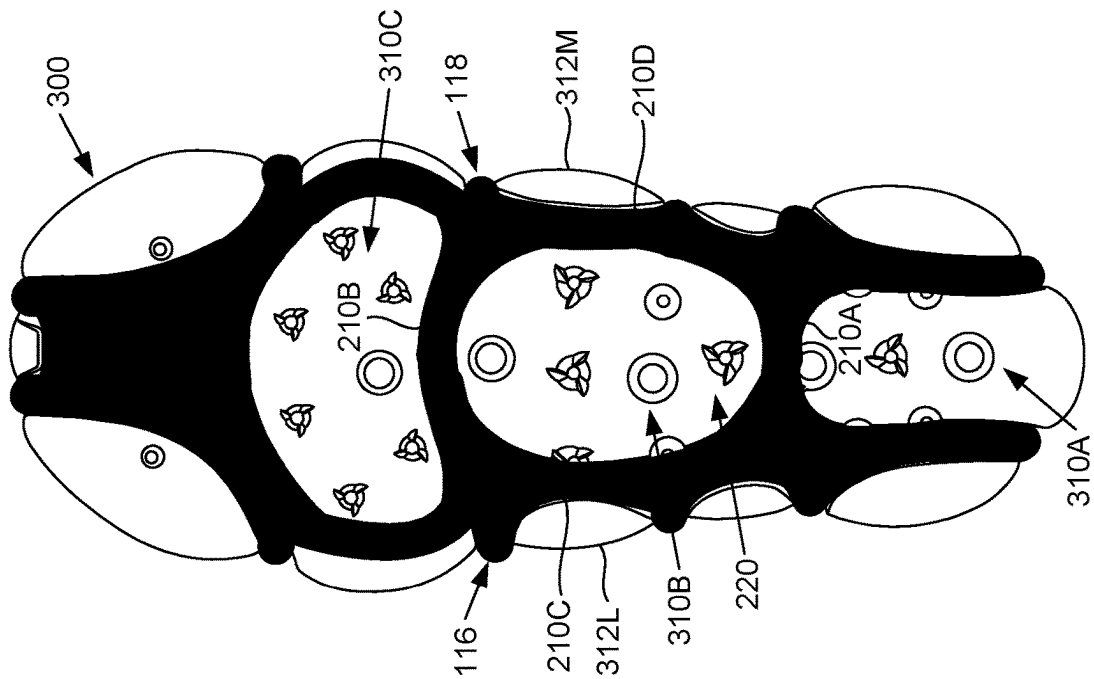


FIG. 5B

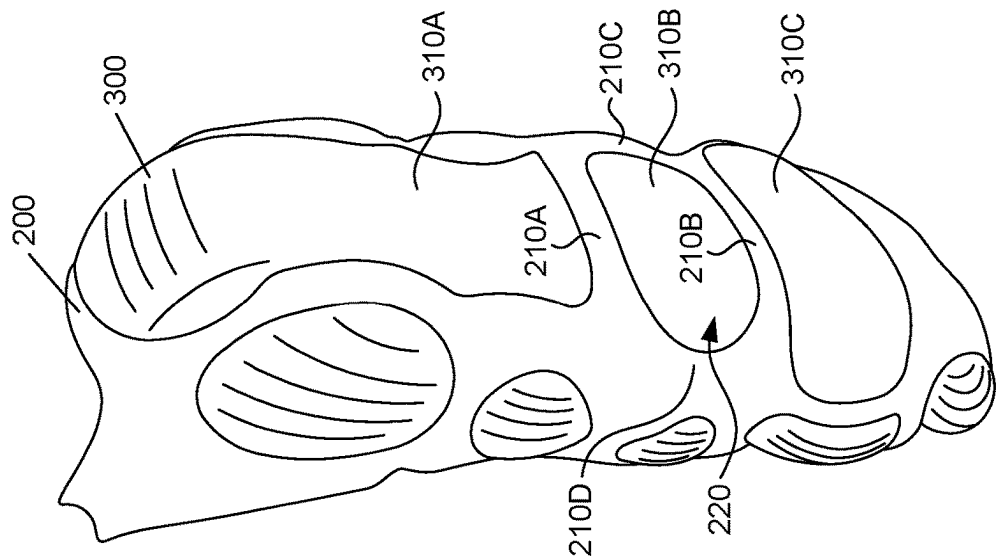


FIG. 5A

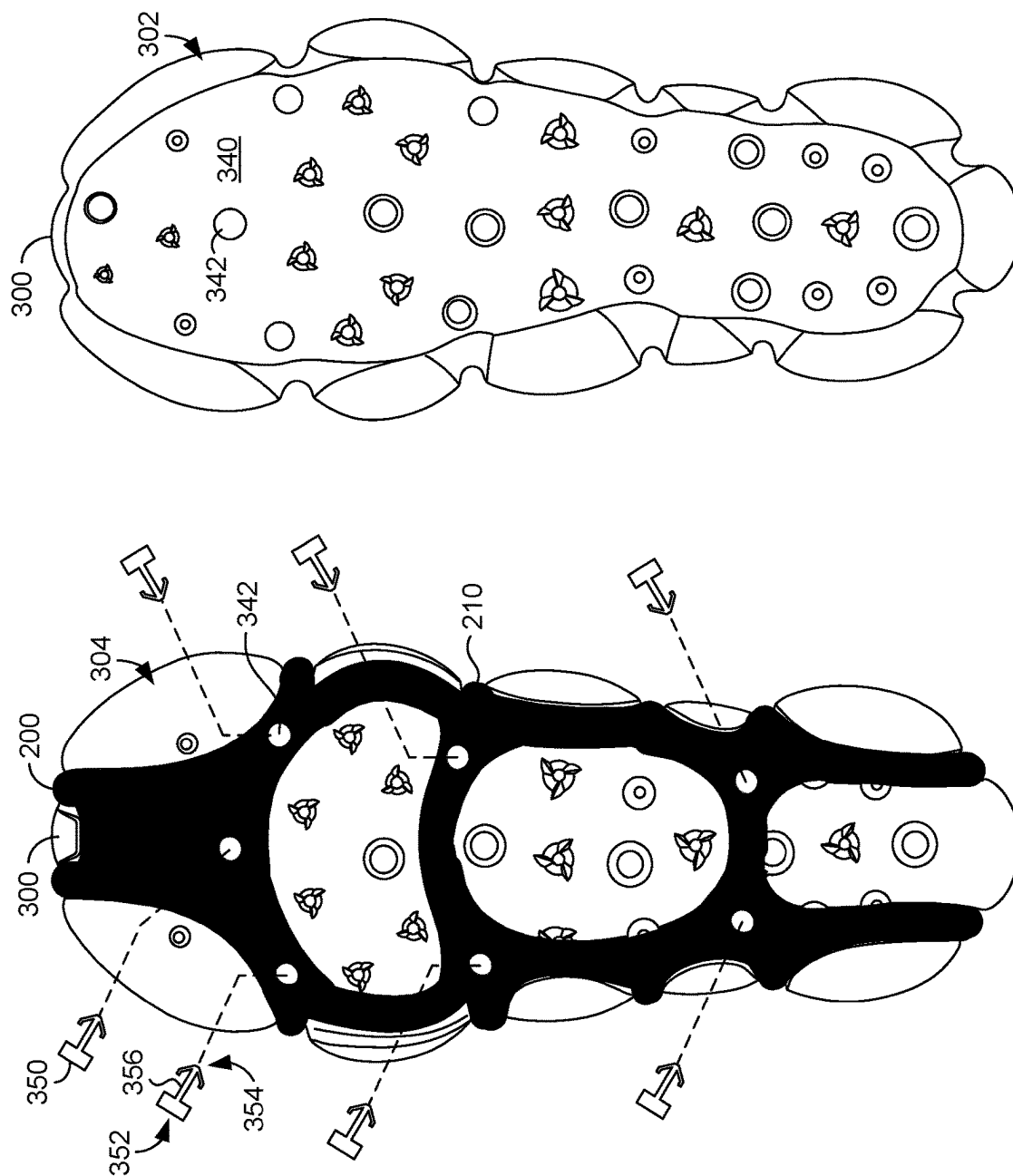


FIG. 6

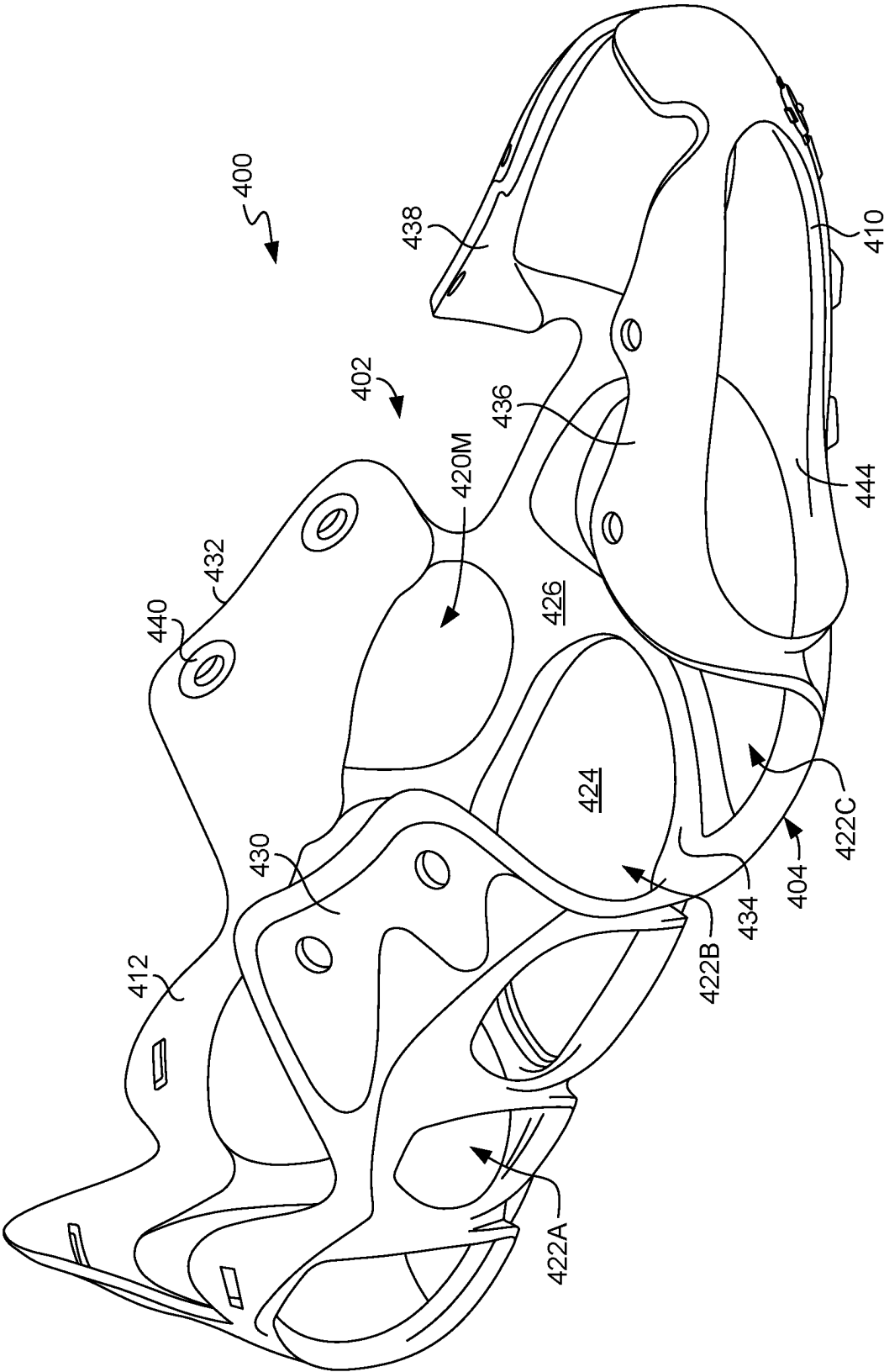


FIG. 7A

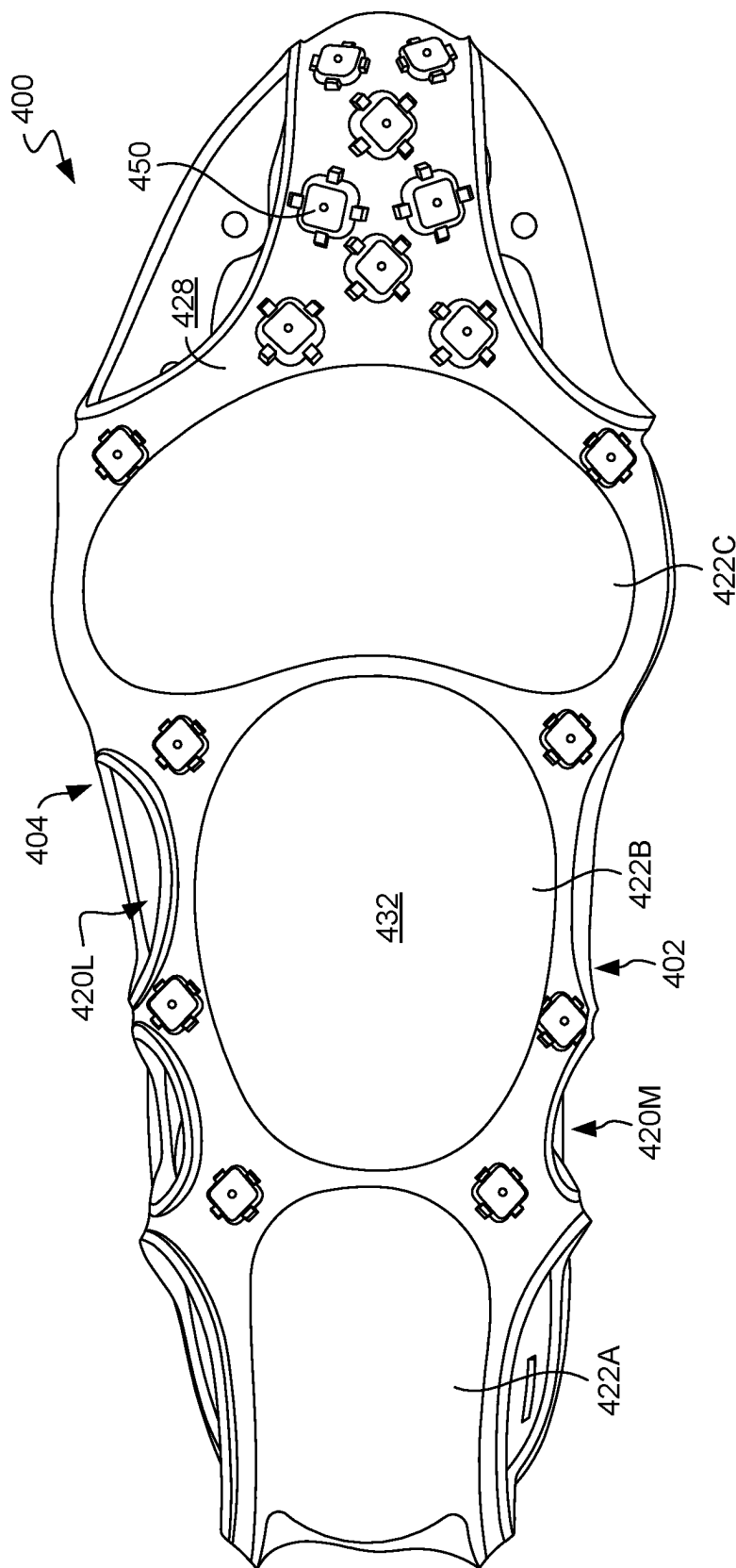


FIG. 7B

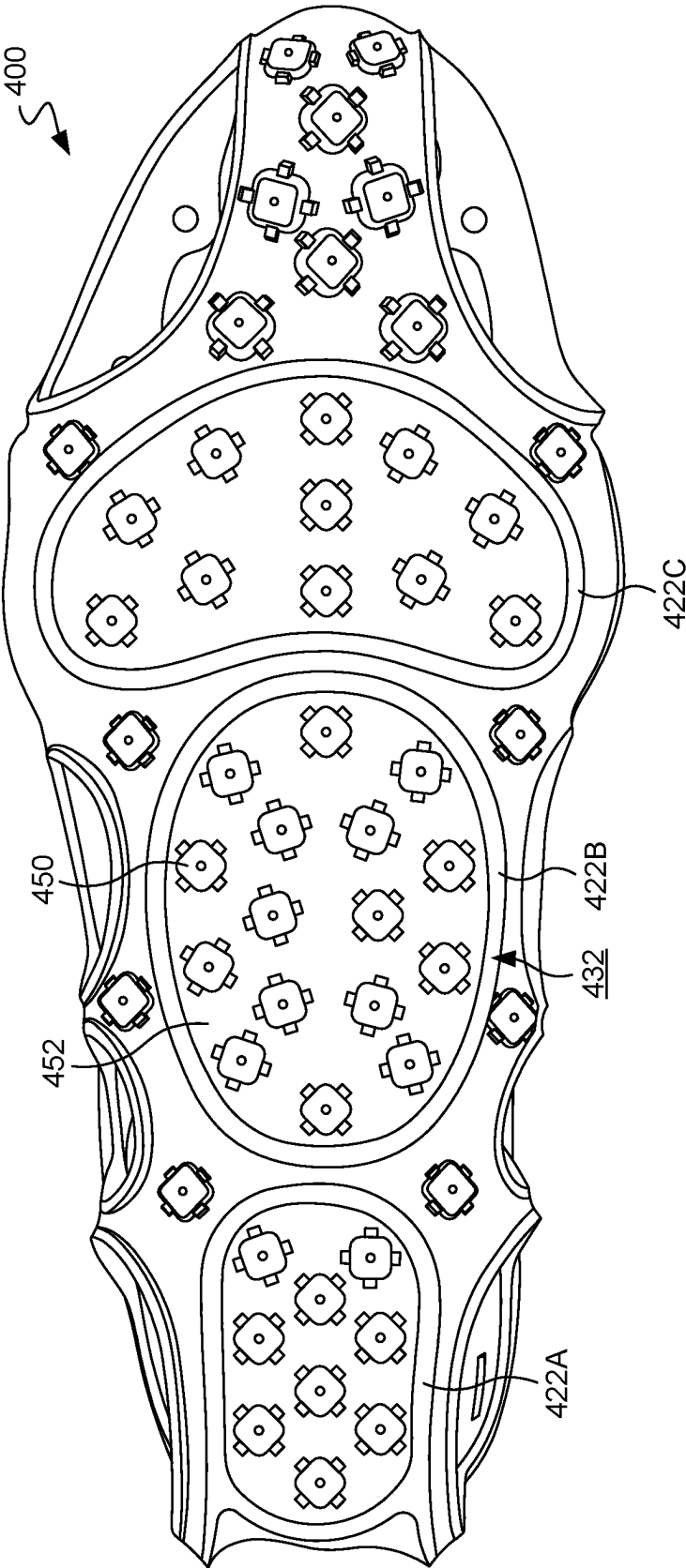


FIG. 7C

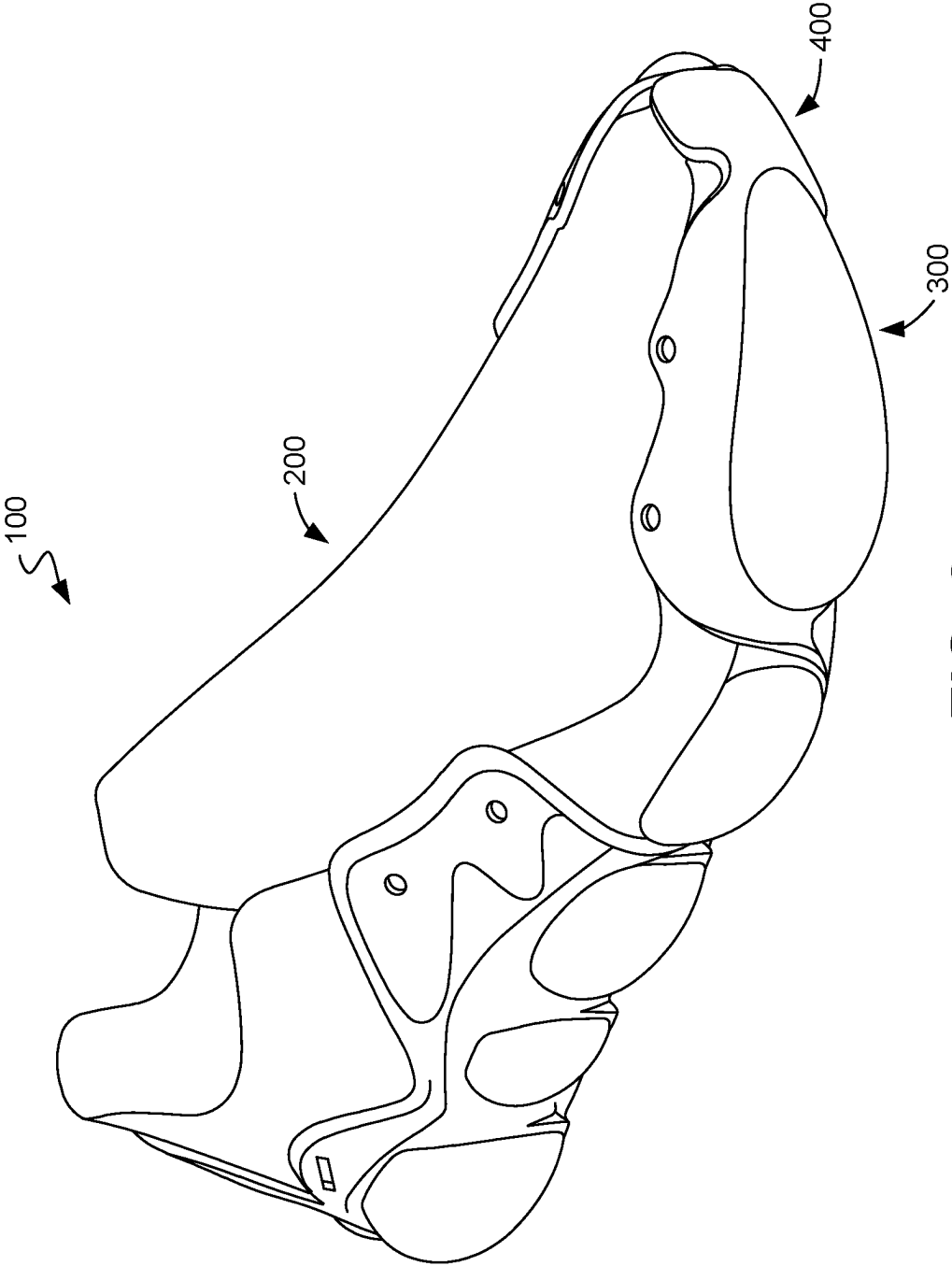


FIG. 8

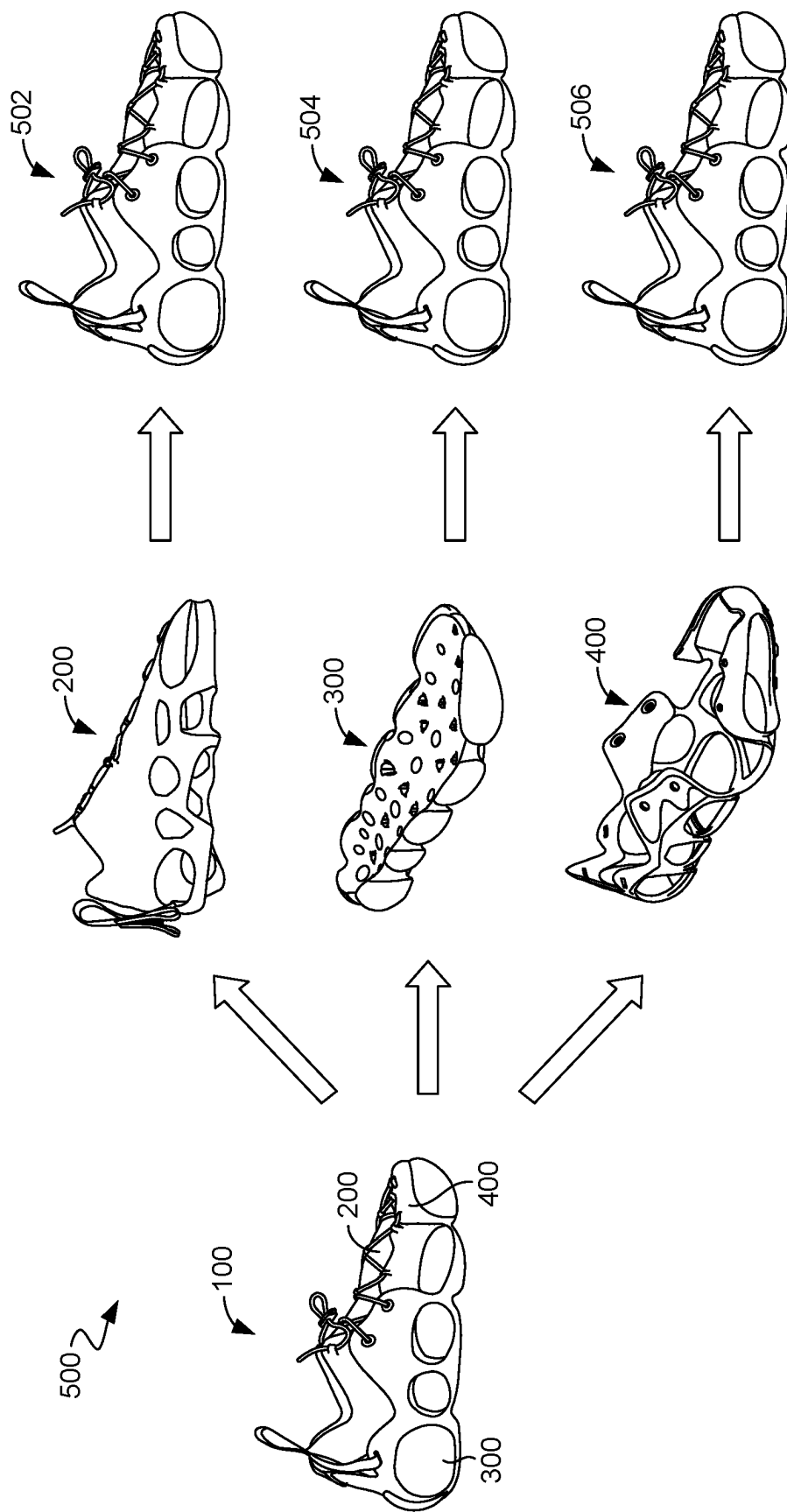


FIG. 9

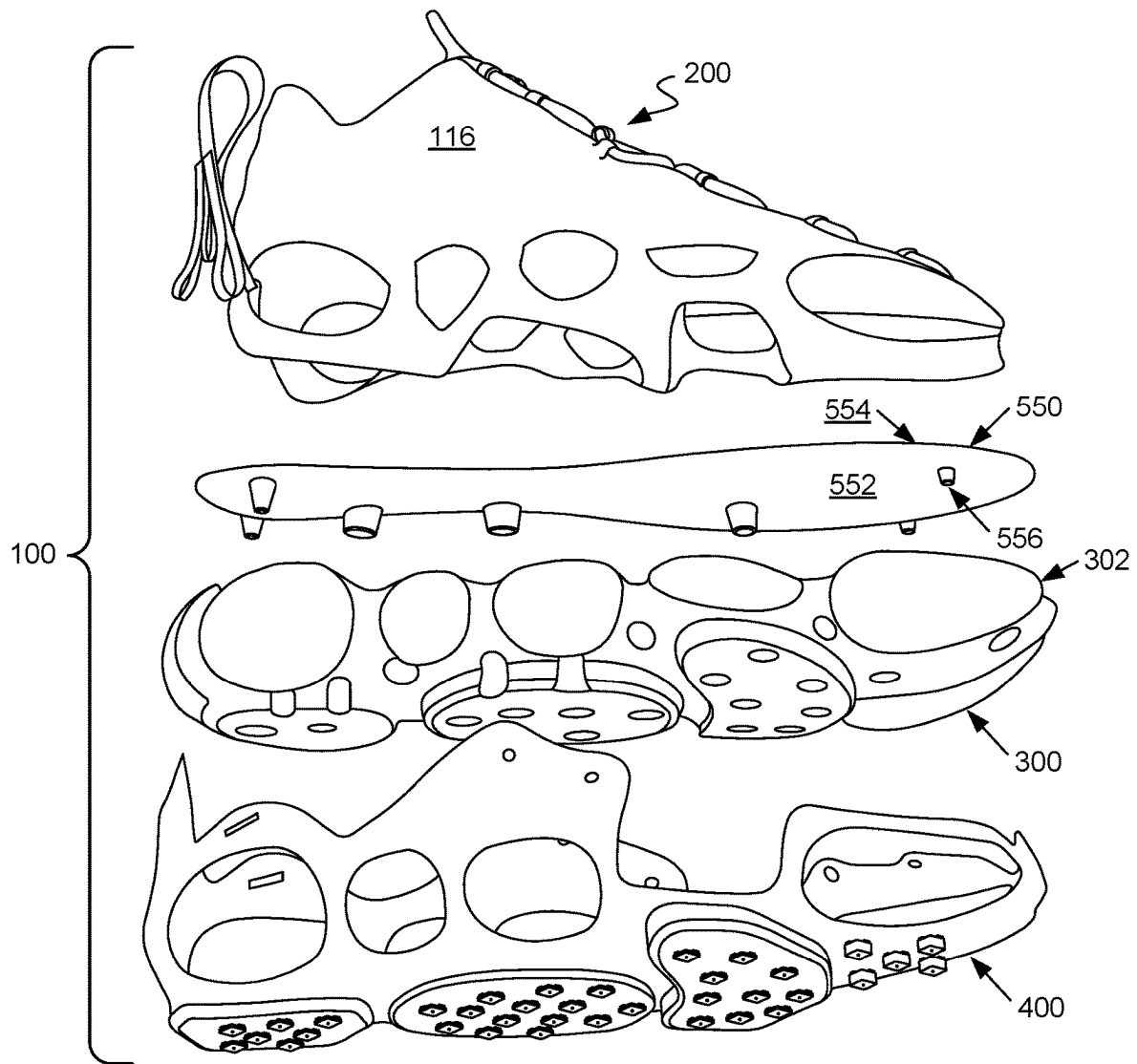
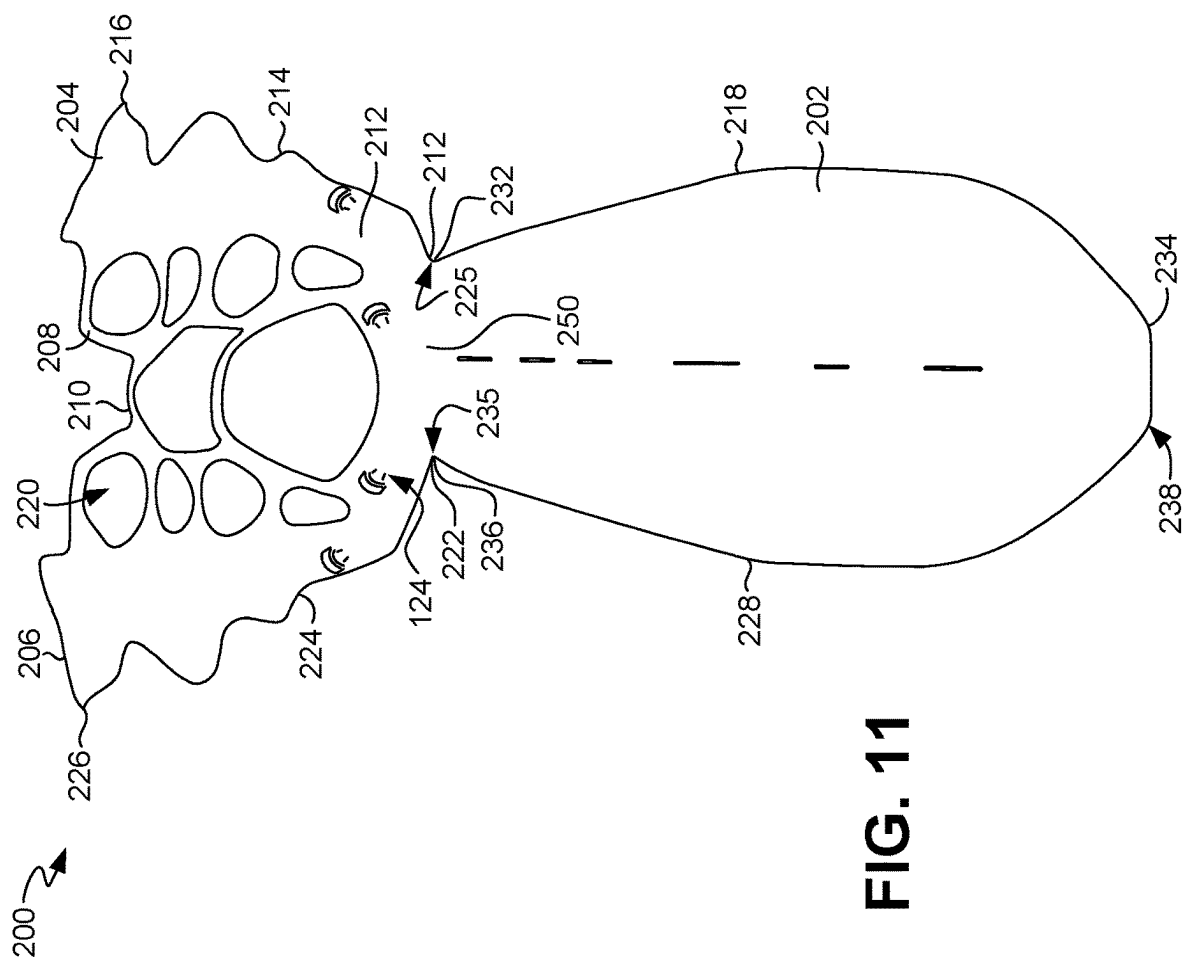


FIG. 10



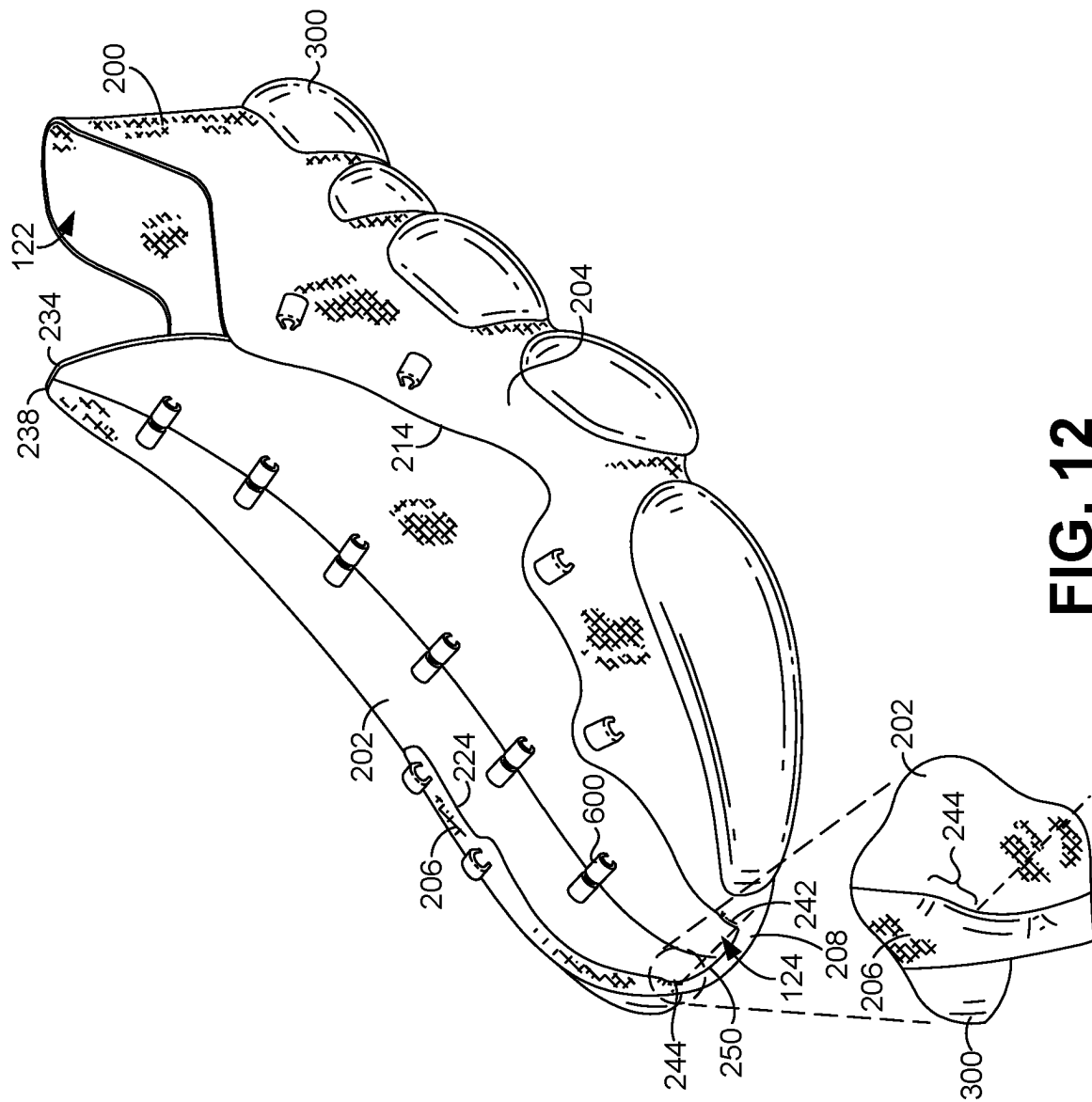
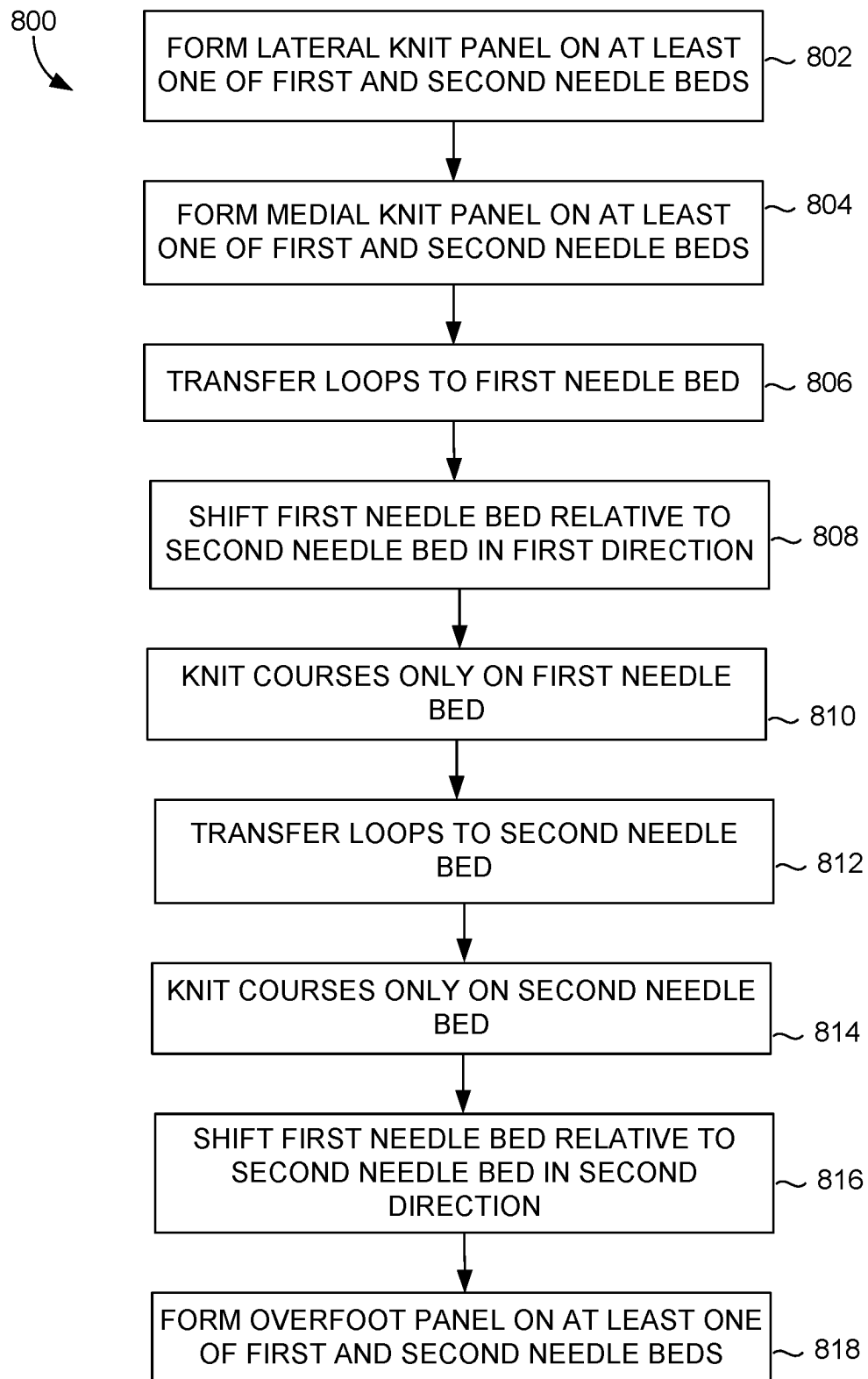


FIG. 12

**FIG. 13**

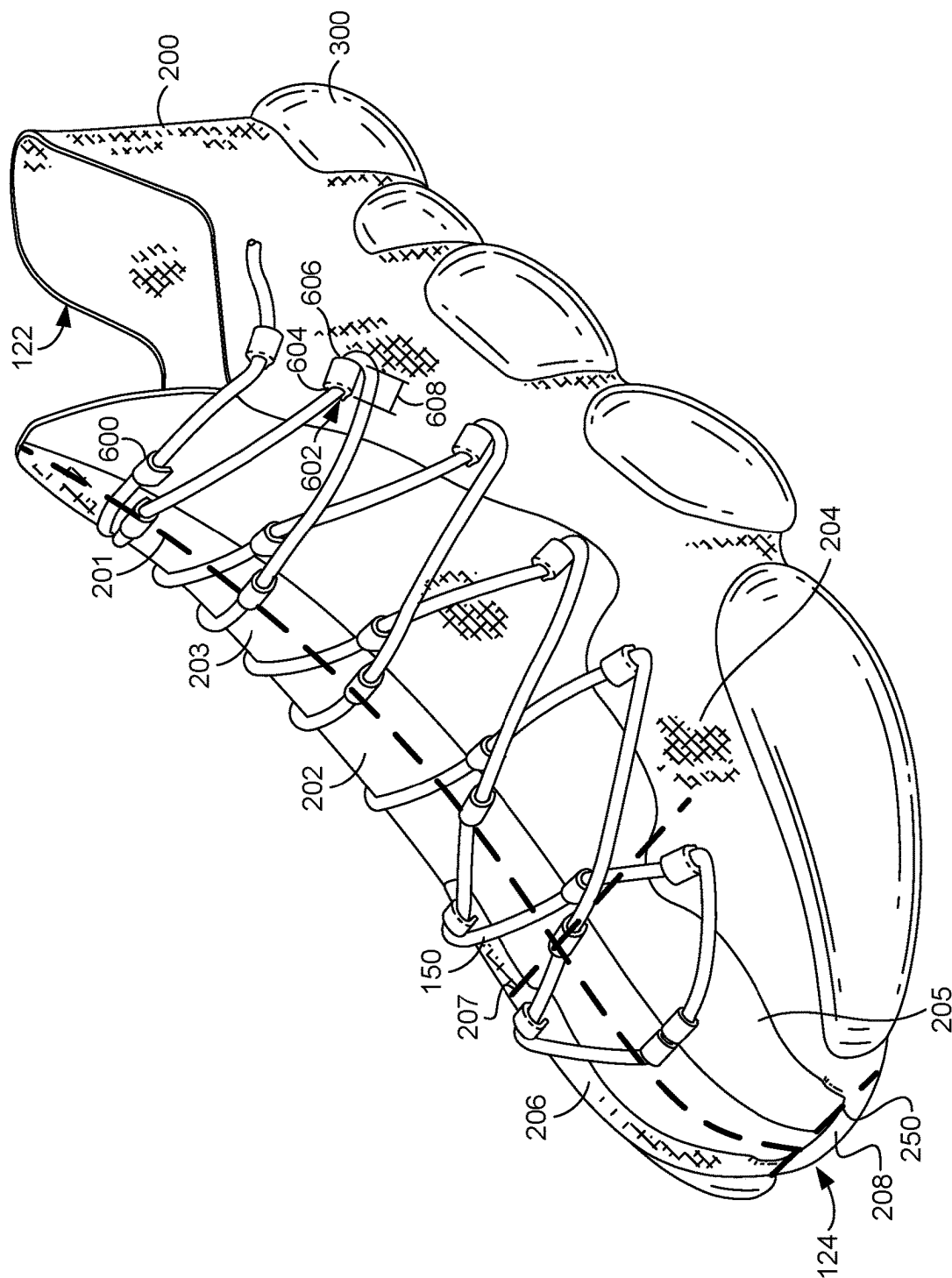


FIG. 14

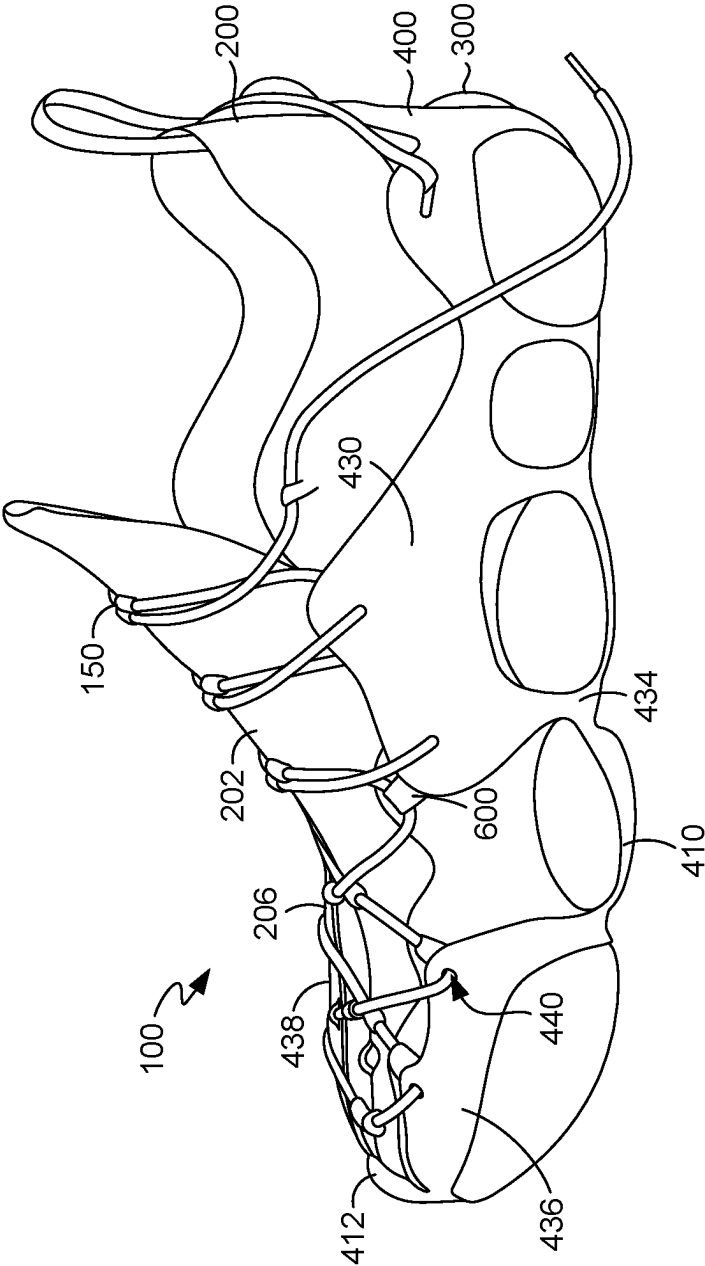


FIG. 15

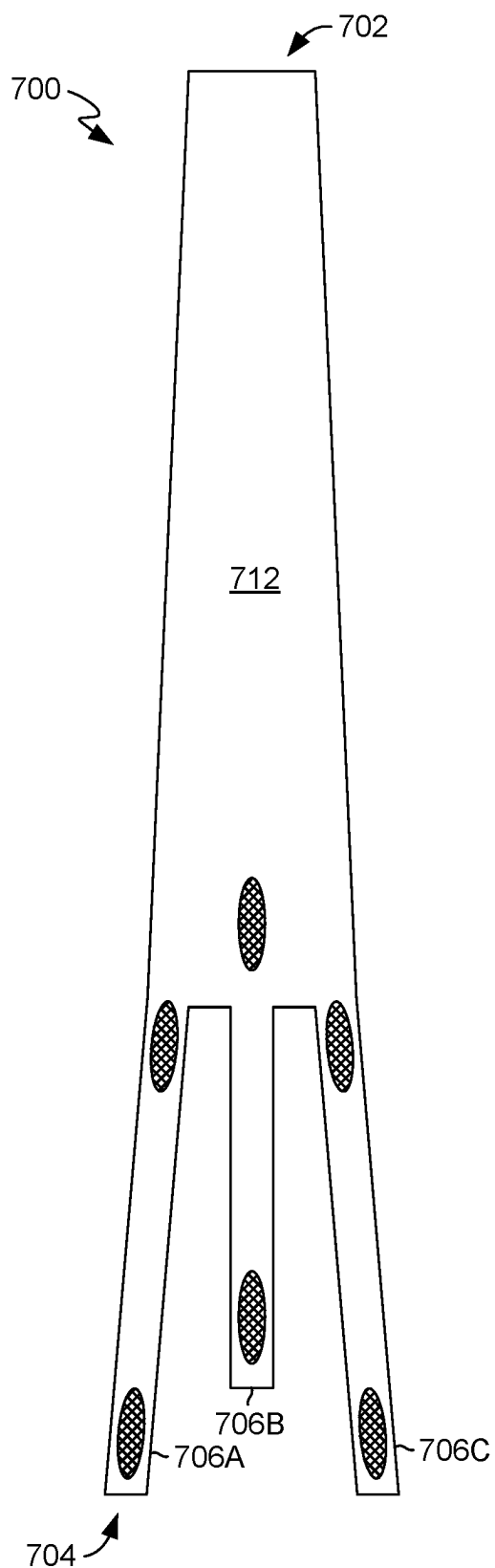


FIG. 16A

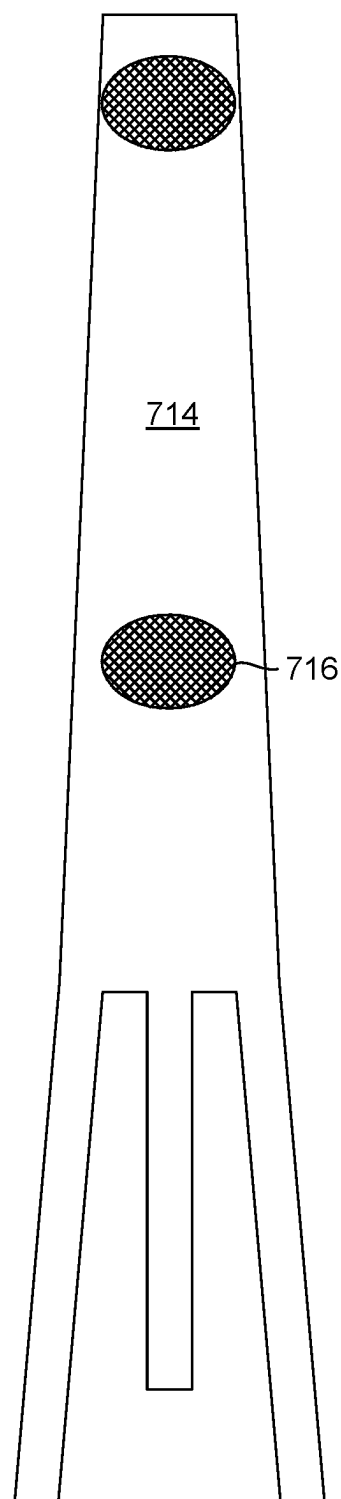


FIG. 16B

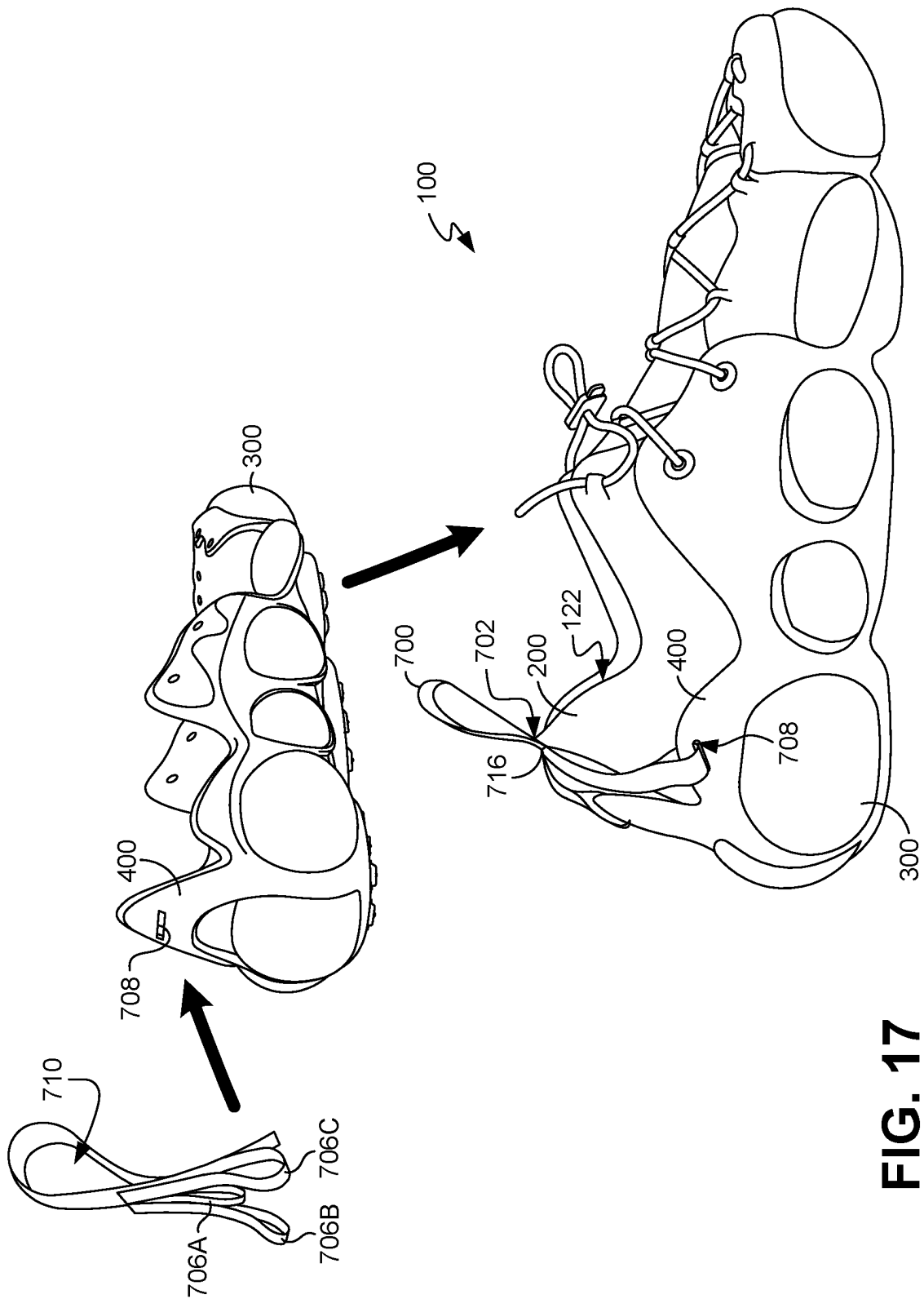
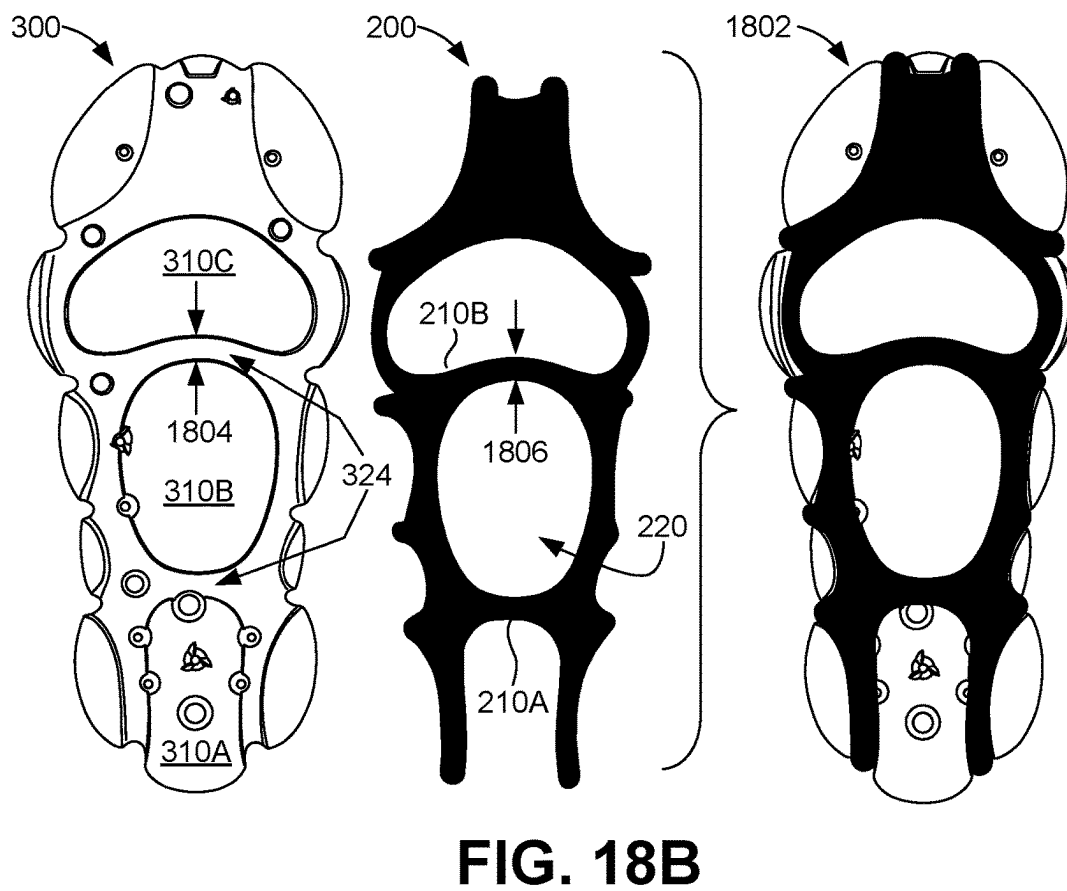
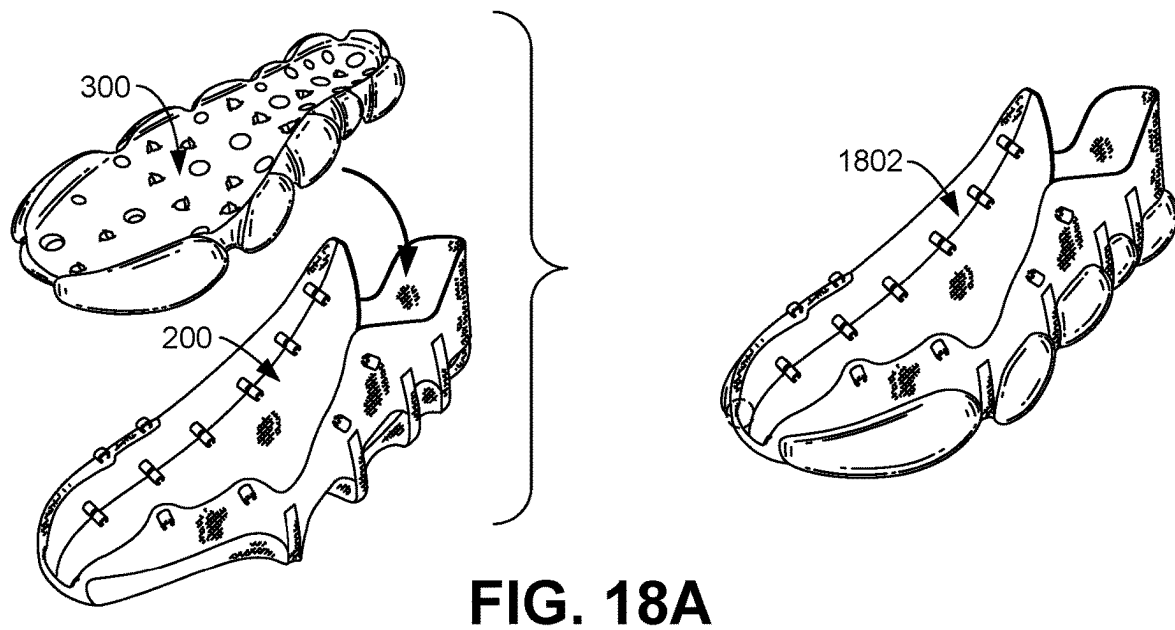


FIG. 17



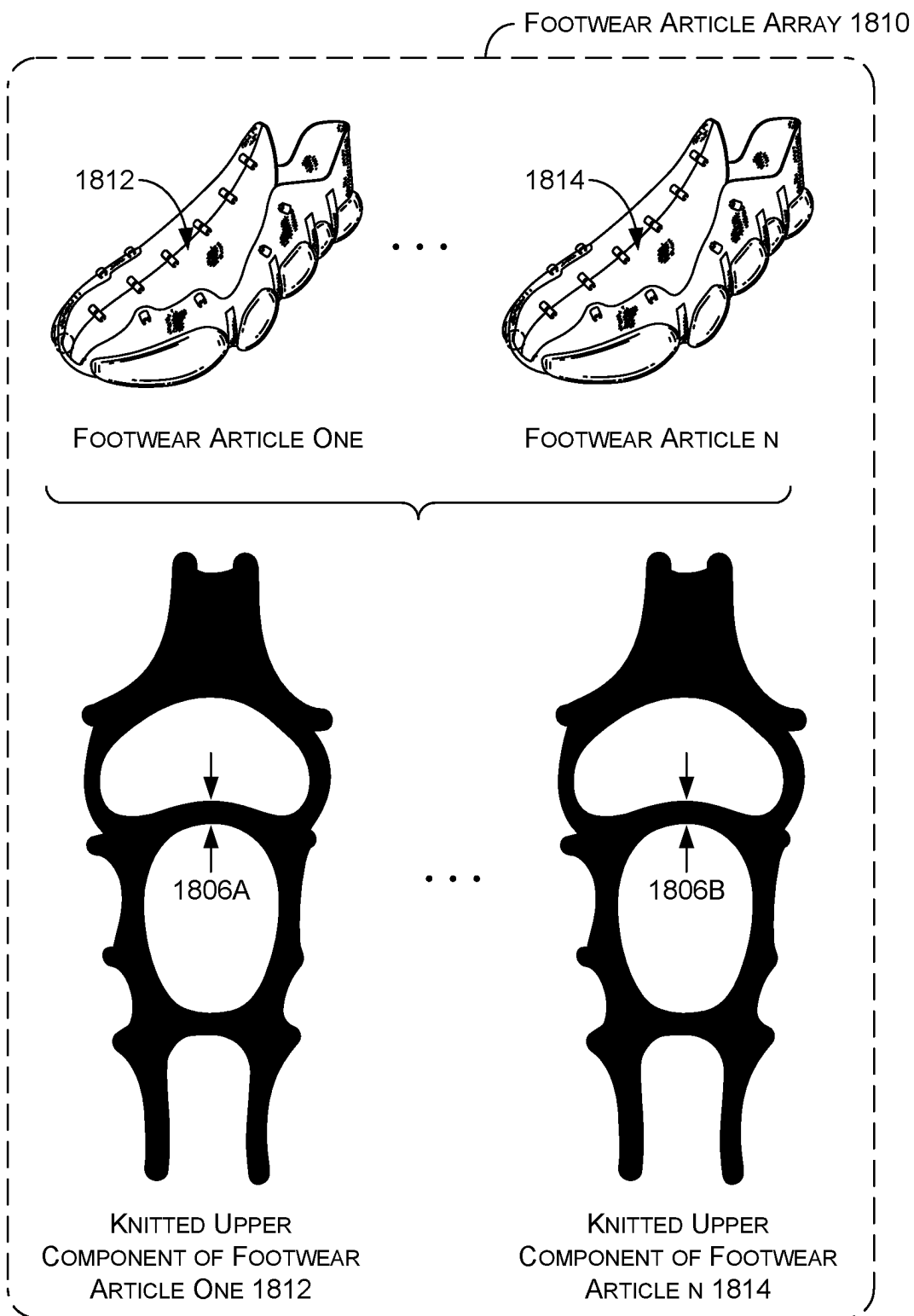


FIG. 18C

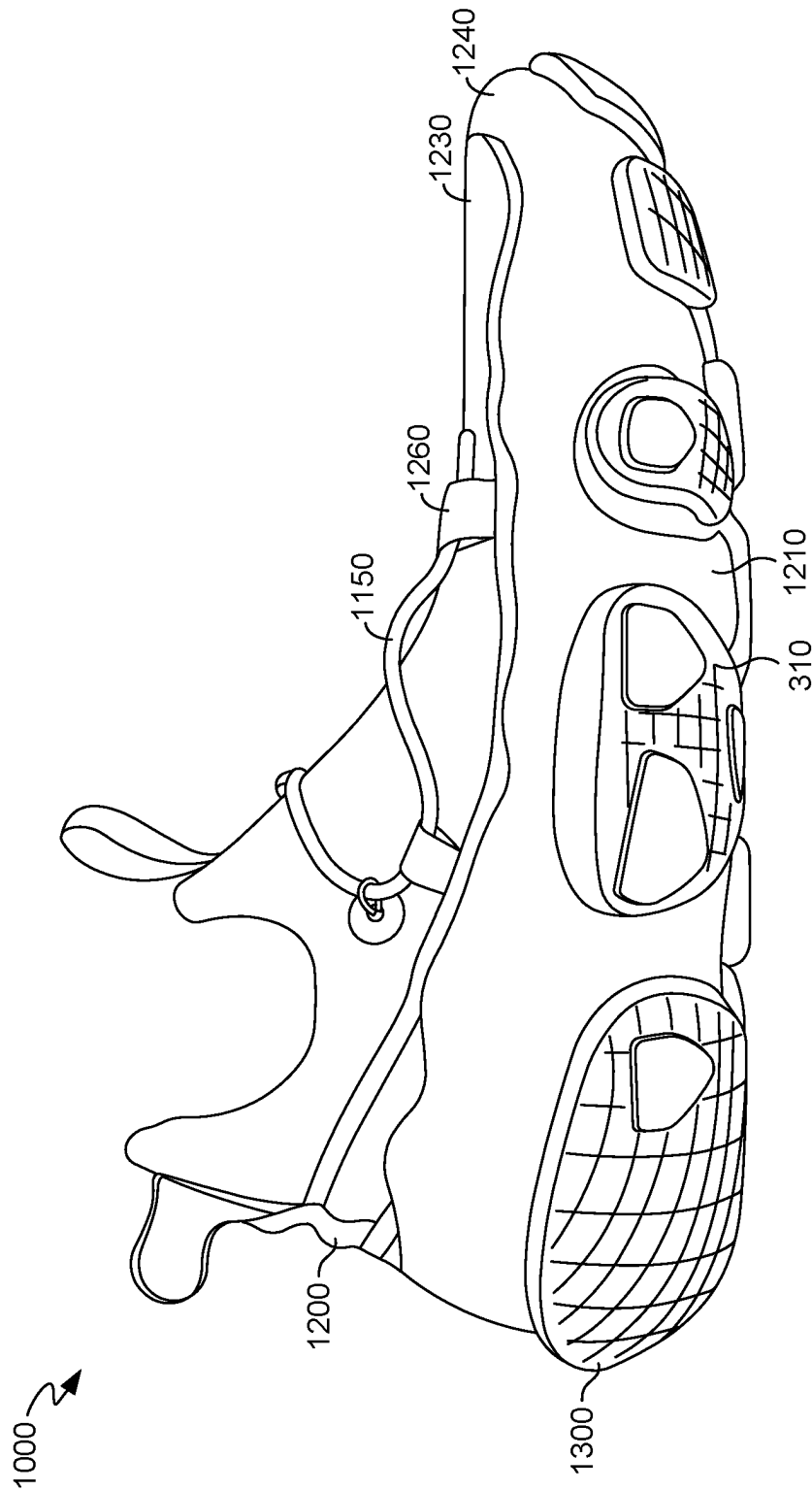


FIG. 19A

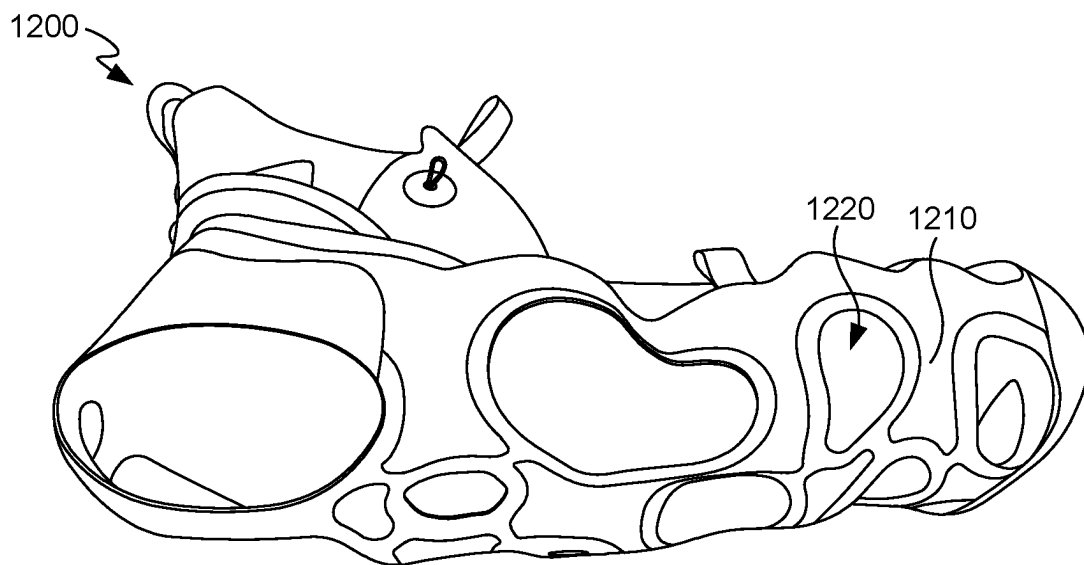


FIG. 19B

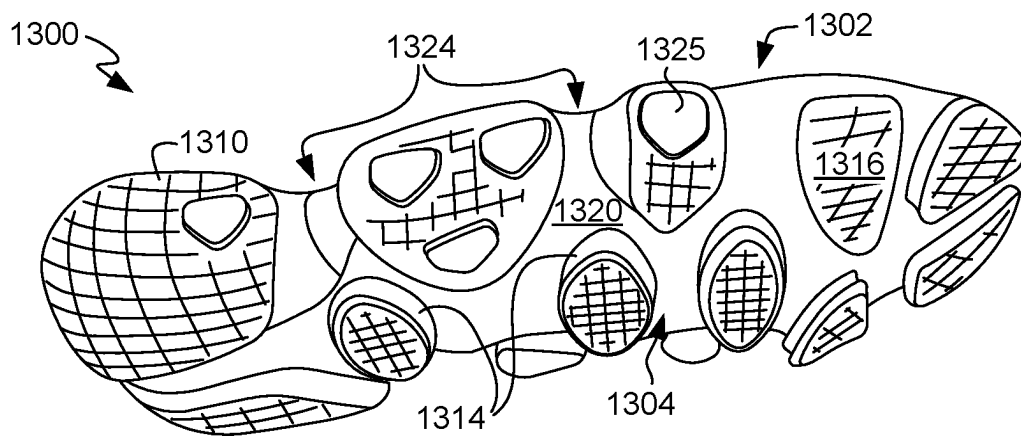


FIG. 19C

SUSTAINABLE FOOTWEAR ARTICLE**CROSS-REFERENCE TO RELATED APPLICATIONS**

This Nonprovisional Application claims priority to U.S. Provisional Application No. 63/320,078, filed Mar. 15, 2022, and titled “Sustainable Footwear Article”, which is related to U.S. Provisional Application No. 63/320,125, filed Mar. 15, 2022, and titled “Articles of Footwear Having Modular, Replaceable, and/or Recyclable Parts”, the entire contents of both of which are incorporated by reference herein in their entireties.

TECHNICAL FIELD

Aspects herein relate to a sustainable article of footwear with an upper component formed of a knitted component and one or more sole components.

BACKGROUND

Conventional articles of footwear generally include an upper component and a sole component. The upper component is secured to the sole component and forms an interior chamber within the article of footwear for comfortably and securely receiving a foot. The upper component of the article of footwear generally extends over the instep and toe areas of the foot, along the medial and lateral sides of the foot, and around the heel area of the foot. Access to the interior chamber of the upper component is generally provided by an ankle opening in a heel area of the footwear. A lacing system is often incorporated into the upper to adjust the fit of the upper, thereby facilitating entry and removal of the foot from the chamber within the upper.

Upper and sole components of conventional articles of footwear are often secured together using adhesive, stitching, or a combination thereof. In this way, they cannot easily be deconstructed into separate parts or easily recycled. In other words, when one component of the article of footwear becomes worn down, the entire article is replaced instead of a single component. Additionally, even where a use of an entire article of footwear is no longer desired, materials traditionally used to secure the upper and sole components together often impede easy recycling of the article of footwear. This impediment may be due to the materials themselves not being recyclable or due to the additional effort to separate the components, which are often made of different types of materials and are recycled according to different processes.

BRIEF DESCRIPTION OF THE DRAWINGS

This technology is described in detail herein with reference to the attached drawing figures, which are incorporated herein by reference, wherein:

FIGS. 1A and 1B depict side views of an article of footwear in accordance with aspects herein;

FIG. 2 depicts an exploded view of the article of footwear of FIGS. 1A and 1B in accordance with aspects herein;

FIGS. 3A and 3B depict a lateral perspective view and a bottom-side view, respectively, of an example midsole component in accordance with aspects herein;

FIG. 4 depicts a side view of an example knitted upper component in accordance with aspects herein;

FIGS. 5A and 5B depicts views of the knitted upper component of FIG. 4 positioned around the midsole component of FIGS. 3A and 3B in accordance with aspects herein;

FIG. 6 depicts example removable securement devices for additional coupling of the knitted upper component of FIG. 4 and the midsole component of FIGS. 3A and 3B in accordance with aspects herein;

FIGS. 7A-7C depict views of an example exterior sole component in accordance with aspects herein;

FIG. 8 depicts the knitted upper component, the midsole component, and the exterior sole component coupled together in accordance with aspects herein;

FIG. 9 depicts a schematic diagram representing an example system for sustainable footwear articles in accordance with aspects herein;

FIG. 10 depicts an exploded view of the article of footwear of FIGS. 1A and 1B with an example insole component in accordance with aspects herein;

FIG. 11 depicts the knitted upper component of FIG. 4 in an unfolded configuration in accordance with aspects herein;

FIG. 12 depicts a lateral side perspective view of the knitted upper component of FIG. 11 folded and coupled to a midsole component in accordance with aspects herein;

FIG. 13 depicts a representation of a method of manufacturing the knitted upper component of FIG. 11 in accordance with aspects herein;

FIG. 14 depicts a lateral side perspective view of the knitted upper component of FIG. 12 with a lacing system in accordance with aspects herein;

FIG. 15 depicts a lateral side view of the exterior sole component laced to the knitted upper component in accordance with aspects herein;

FIGS. 16A and 16B depict an example textile piece for a heel strap for the article of footwear in accordance with aspects herein;

FIG. 17 depicts a schematic diagram representing how the heel strap of FIGS. 16A and 16B is integrated into the article of footwear in accordance with aspects herein;

FIGS. 18A-18C depict knit-component tolerances across an array, in accordance with aspects herein; and

FIGS. 19A-19C depict alternative embodiments of an article of footwear in accordance with aspects herein.

DETAILED DESCRIPTION

The subject matter of the present invention is described with specificity herein to meet statutory requirements. However, the description itself is not intended to limit the scope of this disclosure. Rather, the inventors have contemplated that the claimed or disclosed subject matter might also be embodied in other ways, to include different steps or combinations of steps similar to the ones described in this document, in conjunction with other present or future technologies. Moreover, although the terms “step” and/or “block” might be used herein to identify different elements of methods employed, the terms should not be interpreted as implying any particular order among or between various steps herein disclosed unless and except when the order of individual steps is explicitly stated.

As described, certain aspects of the present disclosure relate to articles of footwear or aspects thereof. The term “article of footwear” or “footwear article” or “footwear” refers to any type of wearable apparel for the feet, including any shoe or boot. Illustrative, non-limiting examples of footwear includes athletic or sport-specific shoes, such as basketball shoe, a biking shoe, a cross-training shoe, a global

football (soccer) shoe, an American football shoe, a bowling shoe, a golf shoe, a hiking shoe, a ski or snowboarding boot, a tennis shoe, a running shoe, and a walking shoe. Example footwear may also include various types of non-athletic shoes, such as a dress shoe, a loafer, and a sandal. Accordingly, the concepts disclosed with respect to articles of footwear apply to a wide variety of footwear types.

Positional terms used when describing the article of footwear and components thereof, such as top, bottom, front, sides, back, superior, inferior, anterior, posterior, lateral, medial, right, left, interior, exterior, and the like, are used with respect to the article of footwear being worn as intended with the wearer standing upright such that the wearer's foot is in the foot-receiving chamber and the wearer's ankle or leg extends through the ankle opening. It should be understood, however, that use of positional terms do not depend on the actual presence of a human being for interpretative purposes.

The term "knitted upper component," as used herein, refers to a textile piece used for an upper that 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 courses and wales. The term "course," as used herein, refers to a predominantly horizontal row of knit loops (in an upright textile as knit) that are produced by adjacent needles during the same knitting cycle. The course may comprise one or more stitch types, such as a knit stitch, a held stitch, a float stitch, a tuck stitch, a transfer stitch, a rib stitch, and the like as these terms are known in the art of knitting. The term "knit stitch," as used herein, refers to the basic stitch type where the yarn is cleared from the needle after pulling a loop of the yarn from the back to the front of the textile through a previous stitch. The term "wale," as used herein, refers to a predominantly vertical column of intermeshed or interlooped knit loops, generally produced by the same needle at successive (but not necessarily all) courses or knitting cycles. The terms "horizontal" and "vertical" as used herein are relative to an upright textile as knit in which the heads of knit loops face toward the top of the textile and the course knit first is oriented towards the bottom of the textile.

The term "integrally knit," as used herein, refers to a knit textile (such as a knitted upper component) having a yarn from one or more knitted courses in a first area being interlooped with one or more knitted courses of another area. The interlooping may be through a simple knit stitch, a tuck stitch, a held stitch, a float or miss stitch, and the like. In this way, areas that are integrally knit together have a seamless transition.

There are various numerical measurements provided herein. Unless indicated otherwise, the term "about" or "substantially" with respect to a measurement means within $\pm 10\%$ of the indicated value.

FIGS. 1A and B depict a lateral side view and a medial side view, respectively, of an example article of footwear **100**. The footwear **100** includes an upper **110** secured to a sole structure **120**. The upper **110** may extend partially or completely around the foot of a wearer and may extend under the foot of a wearer. The footwear **100** may be divided into three general regions: a toe region **102**, a midfoot region **104**, and a heel region **106**. The toe region **102** generally includes portions of the footwear **100** corresponding to the toes and joints connecting the metatarsals with the phalanges when the footwear **100** is worn. As described further herein, the toe region **102** may include an anterior portion **124** and a posterior portion **126**. The midfoot region **104** generally includes portions of the footwear **100** corresponding with an

arch of the foot when the footwear **100** is worn. The heel region **106** generally corresponds with rear portions of the foot, including the heel and calcaneus bone when the footwear **100** is worn. The footwear **100** also includes a lateral side **116** and a medial side **118**, which may be defined by a longitudinal midline reference plane of the footwear **100**. Each of the lateral side **116** and the medial side **118** extend through regions **102**, **104**, and **106**, and correspond to opposite sides of the footwear **100**. More particularly, the lateral side **116** corresponds with an outside area of the foot (i.e., the side that faces away from the other foot) when the footwear **100** is worn, while the medial side **118** corresponds with an inside area of the foot (i.e., the side that faces towards the other foot) when the footwear **100** is worn. These regions **102**, **104**, and **106** and sides **116** and **118** are not intended to demarcate precise areas of the footwear **100** but, rather, are intended to represent general areas of the footwear **100** to aid in understanding the various descriptions provided herein.

The sole structure **120** generally extends between the foot and the ground when the footwear **100** is worn. The sole structure **120** may be configured to attenuate forces, enhance stability and/or provide traction to the footwear **100**. In exemplary aspects, the sole structure **120** includes a midsole component **300**. Further, aspects may include an exterior sole component **400** that forms a ground-contacting surface. It should be understood that aspects of footwear **100** may exclude the exterior sole component **400** such that the midsole component **300** forms a ground-contacting surface. As such, any discussion of footwear **100** and components thereof that is not expressly limited to the exterior sole component **400** may be present in an aspect in which the exterior sole component is absent.

Additional sole components, such as an insole component (which also may be referred to as a sock liner), may be used. Various materials may be used to form the sole structure **120**, such as rubber, ethylene vinyl acetate (EVA), thermoplastic polyurethane (TPU), thermoplastic elastomer (e.g., polyether block amide), and the like. In example aspects, the midsole component **300** and exterior sole component **400** provide sufficient protection, stability, and support without the need for a separate heel counter or toe cap. But it is contemplated that, in other aspects, additional features for attenuating forces, enhancing stability, and/or providing traction, like a heel counter or toe cap may be used without departing from the scope of this disclosure.

The upper **110** defines a chamber within the footwear **100** for receiving and securing a foot relative to the sole structure **120**. Access to the chamber is provided by an ankle opening **122** located in at least the heel region **106**. The size of the ankle opening **122** and fit of the upper **110** around a wearer's foot may be adjusted by a fastening system. The example fastening system depicted in FIGS. 1A and 1B include a lace **150** extending across a throat area **152**.

At least a portion of the upper **110** may be formed of at least one knitted upper component **200**. In some aspects, the entire upper **110** or substantially the entire upper **110** is formed of the knitted upper component **200**. The knitted upper component **200** may be formed as a single integral one-piece element during a knitting process, such as weft knitting, warp knitting, or any other suitable knitting process. Forming the upper **110** with the knitted upper component **200** may provide the upper **110** with advantageous characteristics including, but not limited to, a particular degree of elasticity, breathability, bendability, strength, moisture absorption, weight, abrasion resistance, and/or a combination thereof. Further, forming the upper **110** from an

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integrally knit knitted upper component **200** may enable formation of various features and structures of the upper **110** without the need for significant additional manufacturing steps or processes, thereby increasing production efficiency. Forming the upper **110** with the knitted upper component **200** may further increase the recyclability of the upper **110**. The knitted upper component **200** may be formed entirely from material that is easily recyclable, such as a polyester yarn and because of the ability of the knitted upper component **200** to provide desired characteristics within the knitted component itself, the need to use additional components that may not be recyclable or as easily recyclable is removed.

In exemplary aspects, the upper **110** and sole structure **120** are coupled together without the use of adhesive or stitching to allow for easy deconstruction as well as construction of the footwear **100**. Traditional footwear is typically made without the intention that a consumer would deconstruct the footwear and, as such, the upper and sole structure(s) of traditional footwear are typically secured together in a manner that inhibits deconstruction and reuse, such as through adhesives and/or stitching. In contrast, aspects of the footwear **100** are constructed in a way that allows for easy deconstruction for recycling and/or reusing components of the footwear **100**, including the knitted upper component **200**, the midsole component **300**, and the exterior sole component **400**. As such, the footwear **100** includes a mechanical engagement mechanism by which the knitted upper component **200**, the midsole component **300**, and the exterior sole component **400** are secured to one another through a mechanical interaction without the use of adhesives or stitching.

In exemplary aspects and as described further with respect to FIGS. 2-8 below, protrusions in the midsole component **300** extend through openings in the knitted upper component **200** such that the knitted upper component **200** can lock around the midsole component **300**, and the exterior sole component **400** may similarly engage with protrusions in the midsole component **300**. For example, FIG. 2 depicts an exploded view of a the footwear **100** having the knitted upper component **200**, the midsole component **300**, the exterior sole component **400**. The midsole component **300** may fit within a chamber of the knitted upper component **200** access through the ankle opening **122**, which may be enlarged by pulling back on an overfoot knit panel **202** as described further herein. When the midsole component **300** is positioned inside the knitted upper component **200**, protrusions (such as lateral-side protrusions **312L** and medial-side protrusions **312M**) on the midsole component **300** extend through openings **220** on the knitted upper component **200**. The exterior sole component **400** may wrap around the combined knitted upper component **200** and midsole component **300**. The lateral-side protrusions **312L** and medial-side protrusions **312M** of the midsole component **300** may extend through openings, such as lateral-side openings **420L** and medial-side openings **420M** of the exterior sole component **400**.

FIG. 3A depicts a top perspective view of the midsole component **300**, and FIG. 3B depicts a bottom view of the midsole component **300**. The midsole component **300** includes a top side **302**, a bottom side **304**, a lateral side **306**, and a medial side **308**. The top side **302** generally corresponds with a superior portion of the midsole component **300** that is oriented towards a person's foot when the footwear **100** is being worn. The bottom side **304** is opposite the top side **302** and generally corresponds with a bottom portion oriented away from the wearer's foot and towards the ground, floor, or other surface when the footwear **100** is

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being worn. The lateral side **306** extends between the top side **302** and the bottom side **304** on the lateral side **116** of the footwear **100**, and the medial side **308**, which is opposite the lateral side **306**, extends between the top side **302** and the bottom side **304** on the medial side **118** of the footwear.

The bottom side **304** of the midsole component **300** includes a plurality of protrusions, including a first protrusion **310A**, a second protrusion **310B**, and a third protrusion **310C**, which may be collectively referred to herein as the protrusions **310**. The protrusions **310** extend outward from a recessed bottom surface **320** of the bottom side **304** and toward a ground, floor or other external surface when the footwear **100** is worn. Each protrusion **310** includes a protruding bottom surface **316** that forms the surface of the protrusion **310** that is farthest from the top side **302**, and also includes side walls **314** that extend between the surface **316** and the recessed bottom surface **320**. In some aspects, these side walls **314** may be continuous surfaces without ridges or recesses.

Recesses **324** (or grooves) are formed between side walls **314** of adjacent protrusions **310**. The first protrusion **310A** may generally be located within a heel region **106** of the footwear **100**; the second protrusion **310B** may generally be located within the midfoot region **104** of the footwear **100**, and the third protrusion **310C** may generally be located within the toe region **102** of the footwear **100**.

The midsole component **300** may also include a protrusions along the lateral side **306**, medial side **308**, anterior side **307**, and/or posterior side **309**, where these protrusions extend outward from the midsole component **300** in a direction generally perpendicular to the direction in which the protrusions **310** on the bottom side **304** extend. For example, lateral-side protrusions **312L** extend outward from recessed lateral surfaces **326L** along the lateral side **306** of the midsole component **300**. Lateral-side recesses **324L** are created between adjacent lateral-side protrusions **312L**. Medial-side protrusions **312M** extend outward from recessed medial surfaces **326M** along the medial side **308** of the midsole component **300**, and medial-side recesses **324M** are created between adjacent medial-side protrusions **312M**. Further, a posterior-side protrusion **312P** extends outward from recessed posterior surfaces **326P** on the posterior side **309** and is positioned between two posterior-side recesses **324P**. As shown in the example implementation shown in FIGS. 3A and 4B, a lateral anterior-side protrusion **312LA** and a medial anterior-side protrusion **312MA** may be adjacent anterior-side recesses **324A**. The lateral anterior-side protrusion **312LA** may be positioned to extend long both the lateral side **306** and the anterior side **307** of the midsole component **300**, and the medial anterior-side protrusion **312MA** may be positioned to extend long both the medial side **308** and the anterior side **307** of the midsole component **300**.

The protrusions **312** may have distal surfaces (i.e., bottom surfaces **316**) facing away from the midsole component **300** that have ribs or raised structures, which may provide traction and/or increased durability. An example of such raised structure is illustrated in FIG. 5A but removed from other views to not obstruct the view of other features. The distal surfaces of the protrusions **310** on the bottom side **304** of the midsole component **300** may have holes or cavities, which may aid in flexion and/or ground-force attenuation of the midsole component **300**.

The locations of the protrusions **310**, **312L**, **312M**, **312P**, **312MA**, and **312LA** on the midsole component **300** may correspond to openings in the knitted upper component **200**

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and/or opening in the exterior sole component **400** that receive one or more of the protrusions.

FIG. 4 depicts a lateral side view of the upper **110** with the knitted upper component **200** folded into the shape of an upper and fastened with a fastening system, such as the lace **150**. The knitted upper component **200** forms an overfoot portion **130** and a lower portion **140** of the upper **110**. The overfoot portion **130** forms a superior aspect of the upper **110** in that it extends over the top and at least partway down the lateral and medial sides of a wearer's foot when the footwear **100** is being worn. The overfoot portion **130** extends at least through the toe region **102** and the midfoot region **104**. The lower portion **140** of the upper is configured to extend underneath a wearer's foot (either directly or separated by one or more sole components). The lower portion **140** extends through the toe region **102**, the midfoot region **104**, and the heel region **106**. The transition between the overfoot portion **130** and the lower portion **140** is represented by the dashed line **135** in FIG. 4. Together, the overfoot portion **130** and the lower portion **140** define an interior chamber that may be accessed at least through the ankle opening **122**.

The overfoot portion **130** of the upper **110** is formed by a main body portion **230** of the knitted upper component **200** that generally includes a continuous knit structure extending from within the toe region **102**, through the midfoot region **104**, and to the heel region **106**. In contrast, a midsole containment portion **240** of the knitted upper component **200** includes a plurality of knit strips **210** that define openings **220** in the knitted upper component **200**.

The midsole containment portion **240** is generally configured to engage with protrusions and recesses of the midsole component **300** to help keep the midsole component **300** contained when in the interior chamber defined by the knitted upper component **200** as shown in FIGS. 5A and 5B, which depict a bottom perspective view and a bottom view, respectively, of the knitted upper component **200** coupled to the midsole component **300**. The knitted upper component **200** is depicted as solid black in FIG. 5A (as well as in FIG. 6 and FIG. 18B) only for purposes of distinguishing the knitted upper component from the midsole component **300** in those views.

The lower portion **140** of the knitted upper component **200** includes strips **210** that are integrally knitted together and define a plurality of openings **220** in the lower portion **140**. Openings **220** at least partially defined by strips **210** that extend between the lower portion **140** and the overfoot portion **130** are located partially in the lower portion **140** and partially in the overfoot portion **130**.

The knit strips **210** of the knitted upper component **200** include a first lower knit strip **210A** and a second lower knit strip **210B** each extending continuously from the lateral side **116** to the medial side **118** on the lower portion **140**. Each of the first lower knit strip **210A** and the second lower knit strip **210B** are positioned within a recess **324** defined by adjacent protrusions of the midsole component **300**. For example, the first lower knit strip **210A** of the knitted upper component **200** is positioned within a recess between the first protrusion **310A** and the second protrusion **310B** on the bottom side **304** of the midsole component **300**, while the second lower knit strip **210B** of the knitted upper component **200** is positioned within a recess between the second protrusion **310B** and the third protrusion **310C** on the bottom side **304** of the midsole component **300**.

The knit strips **210** also include strips extending in a longitudinal direction, such as a third lower knit strip **210C** and a fourth lower knit strip **210D**. The third lower knit strip

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210C of the knitted upper component **200** is positioned between the second protrusion **310B** on the bottom side **304** and one or more protrusions **312** on the lateral side **306** of the midsole component **300**, while the fourth lower knit strip **210D** is positioned between the second protrusion **310B** and one or more protrusions on the medial side **308** of the midsole component **300**. Each of the third and fourth lower knit strips **210C** and **210D** continuously extend between the first and second lower knit strips **210A** and **210B**, and lower knit strips **210A-D** collectively define an opening **220** through which a protrusion of the midsole component **300** (the second protrusion **310B**) extends.

Similarly, knit strips **210** extending up the sides of the knitted upper component **200** may be positioned within recesses **324L**, **324M**, **324P**, **324A** between protrusions **312L**, **312M**, **312P**, **312LA**, and **312MA**. There may be some frictional engagement between the knit strips **210** of the knitted upper component **200** and the protrusions **310**, **312L**, **312M**, **312P**, **312LA**, and **312M** that help keep the knit strips **210** in place around the midsole component **300**. In some aspects, there may be an additional mechanism to keep the knit strips **210** in place around the midsole component. For example, there may be removable securement devices that secure at least some of the knit strips **210** to the midsole component **300** as shown in FIG. 6.

FIG. 6 depicts an example aspect in which removable securement devices **350** help secure the knit strips **210** around the midsole component **300**. FIG. 6 shows the bottom side **304** and the top side **302** of the midsole component. While the view of the bottom side **304** includes the knitted upper component **200**, the knitted upper component **200** has been removed from the top side **302** view so as to not obstruct the top side **302**. The midsole component **300** includes securement openings **342** extending from the top side **302** to the bottom side **304** of the midsole component **300**. These openings **342** extend from a top-side surface **340** on the top side **302** to the recessed bottom surface **320** on the bottom side **304** (which is visible in FIG. 3B). Each removable securement device **350** extends through a knit strip **210** that lays adjacent the recessed bottom surface **320**, through a securement opening **342**. After extending at least partially through a securement opening **342**, the securement devices mechanically engages with the midsole component **300** in the inside of the opening **342** or on the top-side surface **340**, to keep the securement device **350** in place.

In this example, the removable securement devices **350** may be referred to as pins or snaps. Each removable securement device **350** includes a first end **354**, a second end **352**, and a middle section **356** between the first end **354** and the second end **352**. The first end **354** may include flanges made of a pliable material. When the first end **354** extends through the securement opening **342**, the flanges may flex inward toward the middle section **356** so that the width or diameter of first end **354** is at least partially reduced so that it is less than the width or diameter of the securement opening **342**. In some aspects, the first end **354** extends completely through the securement opening **342** so that the flanges on the first end **354** may return to their extended position and lock to the top-side surface **340** around the securement opening **342**. In other aspects, the first end **354** does not exit the securement opening **342** on the top side **302** but, rather, engages with a structure within the securement opening **342** so that the removable securement device **350** does not fall out of the securement opening **342** on the bottom side **304**. The middle section **356** of the removable securement device **350** may be configured to extend through and be positioned within the securement opening **342** when

the first end 354 is engaged. The second end 352 of the removable securement device 350 may be wider than the middle section 356. In some aspects, the securement opening 342 is tapered or otherwise has a varied width, and the second end 352 extends partway through the opening 342 but is unable to extend further when the width of the securement opening 342 narrows, which may help prevent the removable securement device 350 from falling out through the securement opening 342 on the top side 302.

The removable securement devices 350 may be removable in that a user may be able to remove them upon applying sufficient force, such as by pulling on the second ends 352. In this way, the removable securement devices 350 may help keep the knitted upper component 200 secured around the midsole component 300 without the use of adhesives, stitching or other mechanisms that would impede the ability to easily deconstruct the footwear 100. In exemplary aspects, the removable securement devices 350 are made from recyclable material.

FIGS. 7A and 7B depict a lateral side perspective view and a bottom side view of the exterior sole component 400. The exterior sole component 400 includes a medial side 402 and a lateral side 404. The exterior sole component 400 further includes an underfoot portion 410 and an upper portion 412. The underfoot portion 410 is configured to extend underfoot when the footwear 100 is worn, such that the underfoot portion 410 may form a ground-contacting surface for the footwear 100. The upper portion 412 is configured to extend along and over portions of the knitted upper component 200 when the footwear 100 is assembled.

The exterior sole component 400 includes openings on at least the medial side 402 and the lateral side 404 configured to receive protrusions of the midsole component 300. For example, lateral-side openings 420L on the exterior sole component 400 are configured to receive lateral-side protrusions 312L on the midsole component 300, and medial side openings 420M are configured to receive medial-side protrusions 312M when the midsole component 300 is received within the exterior sole component 400.

The underfoot portion 410 of the exterior sole component 400 may include recesses for receiving protrusions of the midsole component 300. Particularly, the recesses 422A, 422B, and 422C (which may be collectively referred to as recesses 422) of the exterior sole component 400 may receive the protrusions 310A, 310B, and 310C, respectively, on the bottom side 304 of the midsole component 300. The recesses 422 each include a recessed surface 424 that is positioned below the top-side surface 426 of the underfoot portion 410 that extends between recesses 422. When the footwear 100 is assembled, the recessed surface 424 of the exterior sole component 400 is positioned adjacent to and contacts the bottom protruding surface 316 on the bottom side 304 of the midsole component 300. The top-side surface 426 of the underfoot portion 410 of the exterior sole component 400 may be positioned to be adjacent to and contact at least a portion of the knit strips 210 of the knitted upper component 200 when the footwear 100 is assembled.

In the example exterior sole component 400 depicted in FIGS. 7A and 7B, the recesses 422 in the underfoot portion 410 receive protrusions 310 of the midsole component 300 while preventing the protrusions 310 from extending all the way through the underfoot portion 410 of the exterior sole component 400. In this way, the exterior sole component 400 may provide the ground contacting surface when the footwear 100 is assembled. For example, protruding bottom surface 432 of the exterior sole component 400 that forms the surface opposite the recessed surface 424 may form the

ground contacting surface. It is contemplated that, in other aspects, recesses 422 on the underfoot portion 410 of the exterior sole component 400 may be openings (similar to openings 220 of the knitted upper component 200) such that the protrusions 310 of the midsole component 300 may extend completely through the underfoot portion 410 of the exterior sole component 400 to form ground-contacting surfaces.

The protruding bottom surface 432 of the recesses 422 on the opposite side of the underfoot portion 410 may include traction elements 450. FIG. 7C depicts a bottom side view of an aspect of the exterior sole component 400 in which traction elements 450 are applied to the protruding bottom surface 432. Particularly, traction components 452 each having a plurality of traction elements 450 (such as protrusions or cleats) may be applied to the protruding bottom surface 432 of the recesses 422A, 422B, and 422C (which may form protrusions when viewed from the bottom side of the exterior sole component 400). These traction components 452 may have substantially the same size and shape as the protruding bottom surfaces 432 of these recesses 422A, 422B, and 422C. Further, traction components 452 may be made from a thermoplastic polymer material like the rest of the exterior sole component 400. For example, the traction components 452 and the exterior sole component 400 may be made from a thermoplastic polyurethane material. The traction components 452 and the exterior sole component 400 may be co-molded together such that they may effectively form a unitary structure. In this way, the traction components 452 may be recycled along with the exterior sole component 400.

FIG. 8 depicts the exterior sole component 400 wrapped around the midsole component 300 and the knitted upper component 200. While some details of the knitted upper component 200 may be removed in FIG. 8 for clarity, it should be understood that the knitted upper component 200 in FIG. 8 should be the same or similar to the knitted upper component of FIGS. 1A-1B, 2, and 4.

FIG. 9 provides a schematic representation of a sustainable system 500 for articles of footwear in accordance with aspects of the disclosure. The article of footwear 100 of FIGS. 1A-8 may be constructed so that the components 200, 300, and 400, may be separated without substantial burden such that a user may separate the components 200, 300, or 400 without ripping, tearing or otherwise destroying the integrity of the individual components 200, 300, and 400. In this way, the footwear 100 may be easily deconstructed from recycling the raw materials of the individual components 200, 300, or 400 or for re-using components in another article of footwear with different combinations of components.

As shown in FIG. 9, footwear 100 may be deconstructed so that the exterior sole component 400 is removed from around the midsole component 300 and the knitted upper component 200, and the midsole component 300 is removed from the interior chamber of the knitted upper component 200. One or more of these components may be recycled for the creation of additional articles of footwear 502, 504, and 506.

In some aspects, the materials from the components 200, 300, and 400 are recyclable materials such that they may be used to form new components for footwear articles 502, 504, and 506. For example, the footwear 502 may have a knitted upper component with yarns derived from the knitted upper component 200 where the knitted upper component 200 no longer exists in its original form. The footwear 504 may have a midsole component comprising a thermoplastic poly-

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mer material component recycled from the midsole component **300** of footwear **100** where the midsole component **300** no longer exists in its original form. The footwear **506** may have an exterior sole component comprising a thermoplastic polymer material component recycled the exterior sole component **400** where the exterior sole component **400** no longer exists in its original form. Further, it should be understood that any of footwear articles **502**, **504**, and **506** may have multiple components made from recycled materials from a no-longer existing footwear. For example, footwear **502** may have a knitted upper component with yarns derived from a no-longer existing knitted upper, a midsole component comprising a thermoplastic polymer material component recycled a no-longer existing midsole component, and an exterior sole component comprising a thermoplastic polymer material component recycled a no-longer existing exterior sole component.

In other aspects, any of the components **200**, **300**, and **400** may be recycled in their entirety into a new footwear, rather than their materials being recycled to form new components. For example, new footwear **502** may include the knitted upper component **200**. New footwear **504** may include the midsole component **300**. New footwear **506** may include the exterior sole component **400**. In this way, components that are being worn down may be replaced while other component(s) may still be used. This provides a more sustainable option than replacing an entire footwear when one of the components **200**, **300**, or **400** is worn or broken. Additionally, it allows for greater options for a wearer's footwear. For example, a wearer may own multiple knitted upper components of different colors or styles that each fit with the midsole component **300** and the exterior sole component **400** and may switch out the knitted upper components for different uses of the footwear **100**. Different midsole components and/or different exterior sole components may be similarly swapped out for different uses. Further, customized footwear may be easier in different colors and/or styles of the individual components may be manufactured ahead of time, and a user may select the desired colors and/or styles for each of the knitted upper component **200**, midsole component **300**, and exterior sole component **400**. The user may even be able to assemble the footwear **100** from the selected components.

As previously described, in some aspects of system **500**, the knitted upper component **200**, the midsole component **300**, and the exterior sole component **400** may each be recycled and incorporated into separate articles of footwear **502**, **504**, and **506**. But it is contemplated that multiple components from footwear in the system **500** may be recycled into the same new footwear. For example, the knitted upper component **200** and the midsole component **300** from footwear **100** may be used in a new footwear having a new exterior sole component. The knitted upper component **200** and the exterior sole component **400** from footwear **100** may be used together in a new footwear having a new midsole component. Similarly, the midsole component **300** and the exterior sole component **400** from footwear **100** may be used together in a new footwear having a new knitted upper component.

FIG. **10** depicts an exploded view of another embodiment of footwear **100**. Footwear **100** may have the same features as previously described with respect to FIGS. **1A-9**, but may include an insole component **550** that is configured to be positioned on top of the midsole component **300** inside the interior chamber of the knitted upper component **200**. The insole component **550** includes a top surface **554** generally configured to face the wearer's foot when the footwear **100**

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is worn, and a bottom surface **552** opposite the top surface and generally configured to face toward the midsole component **300**. The insole component **550** may have insole engagement protrusions **556** extending downward from the bottom surface **552** of the insole component **550** and engage with openings on the top side **302** of the midsole component **300**. In exemplary aspects, no adhesives or stitching is used to couple the midsole component **300** and the insole component **550**. The insole component **550** may provide a smoother and more comfortable surface for a wearer to place his or her foot when the footwear **100** is worn. The insole component **550** may be constructed from recyclable material, such as a thermoplastic polyurethane or other recyclable thermoplastic polymer material. The insole component **550** may also be easily removed from the midsole component **300** through the use of some force.

FIG. **11** depicts a planar view of the knitted upper component **200** in an unfolded configuration, and FIG. **12** depicts a lateral side perspective view when the knitted upper component **200** is folded and contains the midsole component **300**. As previously discussed, the knitted upper component **200** may be formed from recyclable materials, such as polyester yarn. Further, in some aspects, yarn forming the knitted upper component **200** may be recycled from a no-longer existing item, such as a no-longer existing knitted upper component. As such, the yarns forming the knitted upper component **200** may be recycled and further recyclable.

The constructions of the knitted upper component **200** may further aid in the use of the knitted upper component **200** in a modular footwear system as described above with respect to FIGS. **1A-10** that enable easy recycling and/or customization of the footwear **100**. For example, the knitted upper component **200** may be knitted in a shape that allows for creation of a large opening through the ankle opening **122** so that the midsole component **300** may be inserted into and removed from the interior chamber of the knitted upper component **200**.

The knitted upper component **200** includes an overfoot knit panel **202**, a lateral knit panel **204**, a medial knit panel **206**, and a lower knit panel **208**. The overfoot knit panel **202**, the lateral knit panel **204**, and the medial knit panel **206** may generally form the main body portion **230** of the knitted upper component **200**, while the lower knit panel **208** may generally form the midsole containment portion **240**. Although referred to as panels, it should be understood that these components of the knitted upper component **200** may have a unitary knit construction such that they are integrally formed as a single textile piece on a knitting machine. As such, panels **202**, **204**, **206**, and **208** may be seamlessly connected to one another through knitted stitches in one or more regions. In other aspects, one or more of these panels may be knit separately and stitched together. Even where knit panels are stitched together, the article of footwear **100** may otherwise not include stitching between the knitted upper component **200** and the midsole component **300** or the exterior sole component **400**.

The lateral knit panel **204** may form a lateral aspect of the overfoot portion **130** of the upper **110**. Particularly, the lateral knit panel **204** extends along the lateral side **116**, from within the anterior portion **124** of the toe region **102** at least towards the heel region **106**. The lateral knit panel **204** includes a lateral-panel top edge **214** having a first end **212** and a second end **216** opposite the first end **212**. The first end **212** of the lateral-panel top edge **214** terminates in the anterior portion **124** of the toe region **102**.

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Similarly, the medial knit panel **206** may form a medial aspect of the overfoot portion **130** of the upper **110**. Particularly, the medial knit panel **206** extends along the medial side **118**, from within the anterior portion **124** of the toe region **102** at least towards the heel region **106**. In some aspects, the medial knit panel **206** is shaped as a mirror image of the lateral knit panel **204**. The medial knit panel **206** also includes a medial-panel top edge **224** having a first end **222** and a second end **226** opposite the first end **222**. The first end **222** of the medial-panel top edge **224** terminates in the anterior portion **124** of the toe region **102**.

In example aspects, the lateral knit panel **204** and the medial knit panel **206** each extend through the heel region **106** such that the lateral knit panel **204** and medial knit panel **206** each extend all or substantially all the entire length of the upper **110**. As such, the second ends of the lateral-panel top edge **214** and the medial-panel top edge **224** may each terminate in the heel region **106**. In some aspects, the lateral knit panel **204** and the medial knit panel **206** are secured together to form a seam in the heel region **106** such that second ends **216** and **226** of the lateral-panel top edge **214** and the medial-panel top edge **224** terminate in the heel region **106**.

At least part of the overfoot knit panel **202** is positioned between the lateral knit panel **204** and the medial knit panel **206** such that the overfoot knit panel **202** may be configured to form a central or superior aspect of the overfoot portion **130** of the upper **110**. When the knitted upper component **200** is folded into the shape of the upper **110**, the overfoot knit panel **202** extends from within the anterior portion **124** of the toe region **102** to the ankle opening **122**. In some aspects, the overfoot knit panel **202** extends the entire lengths of the toe region **102** and midfoot region **104** of the upper **110**. The overfoot knit panel **202** is extends in a continuous and seamless manner between the medial side **118** and the lateral side **116** of the upper **110**. As such, the line extending down the center of the overfoot knit panel **202** in the views depicted in some of the figures should not be construed as a seam.

The overfoot knit panel **202** includes an overfoot-panel lateral edge **218** and an overfoot-panel medial edge **228**. The overfoot-panel lateral edge **218** includes a first end **232** and a second end **234** opposite the first end **232**, while the overfoot-panel medial edge **228** includes a first end **236** and a second end **238** opposite the first end **236**. The first ends **232** and **236** of the overfoot-panel lateral edge **218** and the overfoot-panel medial edge **228** terminates in the anterior portion **124** of the toe region **102**, and the second ends **234** and **238** of the overfoot-panel lateral edge **218** and the overfoot-panel medial edge **228** terminates at the ankle opening **122**. The term "edge" as used herein with respect to a panel of the knitted upper component **200** refers to an outer perimeter edge of the knitted upper component **200** such that an edge of a panel is a free edge and not an integrally knit transition between two portion of the knitted upper component **200**.

Further, the overfoot-panel lateral edge **218** intersects the lateral-panel top edge **214** at a first edge intersection **225**, and the overfoot-panel medial edge **228** intersects the lateral-panel top edge **224** at a second edge intersection **235**. The first edge intersection **225** and the second edge intersection **235** may be located in the anterior portion **124** of the toe region **102**. Immediately adjacent the first edge intersection **225** and the second edge intersection **235** is a joined area **250** where the overfoot knit panel **202**, lateral knit panel **204**, and medial knit panel **206** are integrally knitted to one another in the anterior portion **124** of the toe region **102**. The

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joined area **250** is the only knitted connection between the overfoot knit panel **202** and either of the lateral knit panel **204** and the medial knit panel **206**. Further, the joined area **250** may be the only direct securement of the overfoot knit panel **202** and either of the lateral knit panel **204** and the medial knit panel **206**. In other words, in some aspects, the overfoot knit panel **202** is directly coupled to the lateral knit panel **204** and the medial knit panel **206** only through knitting in the joined area **250** and is not otherwise directly coupled to the lateral knit panel **204** or the medial knit panel **206** through stitching or bonding. In this way, a wearer may manipulate the overfoot knit panel **202** to move it independently over the lateral knit panel **204** and the medial knit panel **206** outside of the joined area **250**.

The joined area **250** is in the anterior portion **124** of the toe region **102**. In example aspects, the anterior portion **124** is the anterior-most quarter of the toe region **102** such that, if the toe region **102** were divided into four sections by evenly spaced apart cuts each extending from the lateral side **116** to the medial side **118**, the anterior portion **124** of the toe region **102** may be considered to refer to the quarter-section immediately adjacent the transition between the overfoot portion **130** and the lower portion **140**. In this way, the overfoot knit panel **202** may be at least not directly secured to the lateral knit panel **204** and the medial knit panel **206** through most of (such as approximately three-quarters of) the length of the toe region **102**. Consequently, the overfoot knit panel **202** may be lifted and separated from the lateral knit panel **204** and the medial knit panel **206** through most of the toe region **102** to create an opening for inserting and/or removing the midsole component **300** from the interior of the knitted upper component **200** once the knitted upper component **200** is folded into the shape of the upper **110**. In some aspects, the anterior portion **124** of the toe region **102** where the first edge intersection **225** and the second edge intersection **235** are located is at least partially covered by a sole structure, such as the exterior sole component **400**, when the footwear **100** is assembled.

When the knitted upper component **200** is folded into the shape of the upper **110**, the lateral knit panel **204** and the medial knit panel **206** may each partially overlap the overfoot knit panel **202**. As such, at least part of the overfoot-panel lateral edge **218** may be positioned underneath the lateral knit panel **204**, and at least part of the overfoot-panel medial edge **228** may be positioned underneath the medial knit panel **206** when the knitted upper component **220** is folded into the shape of the upper **110**.

As illustrated in FIG. 12, integrally knit pleats are formed where the lateral knit panel **204** and the medial knit panel **206** are folded to partially overlap with the overfoot knit panel **202**. An integrally knit lateral pleat **242** is formed near the first edge intersection **225** of the overfoot knit panel **202** and the lateral knit panel **204**, and an integrally knit medial pleat **244** is formed near the second edge intersection **235** between the overfoot knit panel **202** and the medial knit panel **206**. The lateral pleat **242** is a fold of the lateral knit panel **204** that partially overlaps the overfoot knit panel **202** and is formed where the lateral knit panel **204** is integrally knit to the overfoot knit panel **202**. The medial pleat **244** is a fold of the medial knit panel **206** that partially overlaps the overfoot knit panel **202** and is formed where the medial knit panel **206** is integrally knit to the overfoot knit panel **202**. In this way, the lateral pleat **242** and the medial pleat **244** may also be referred to herein as a lateral fold and a medial fold, respectively. FIG. 12 provides a close-up view of the medial pleat **244**.

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The lateral pleat **242** and the medial pleat **244** are positioned entirely within the toe region, and they may each have a first end terminating in the anterior portion **124** of the toe region **102**. The first ends of the lateral fold **242** and medial fold **244** may be at or immediately adjacent to a boundary between the lower knit panel **208** and the overfoot knit panel **202**. In some aspects, the entire lengths of the lateral pleat **242** and the medial pleat **244** are located within the anterior portion **124** of the toe region **102**.

The lateral pleat **242** and the medial pleat **244** are integrally knit raised structures such that they extend above the rest of the knitted upper component **200** when the knitted upper component **200** is formed into the shape of the upper **110**. In exemplary aspects, the lateral pleat **242** and the medial pleat **244** are the only pleats within the anterior portion **124** of the toe region **102** and in some aspects, the only pleats within the entire toe region **102**. In some aspects, other types of raised structures, such as lace tunnels **600**, may be located within the anterior portion **124** of the toe region **102**.

FIG. **13** illustrates a flow diagram depicting an example method **800** of manufacturing a knitted upper component with integrally knit pleats or folds, such as the knitted upper component **200**. The steps provided in method **800** are merely illustrative, and method **800** may include additional steps that are not illustrated. At least some of the steps of method **800** are indicated as being performed on a knitting machine, which may be an automated knitting machine. As such, one or more of these steps may be performed and/or controlled using a control unit having a processor or computer communicatively coupled with or integrated into the knitting machine. In example aspects, the knitting machine used to carry out steps of method **800** is a V-bed flat knitting machine having two needle beds—a front needle bed and a back needle bed—that are angled relative to each other to form a V-bed. The front and back needle beds may each include a plurality of individual needles extending across a common plane. A carriage may move feeders, such as standard and/or combination feeders, along the front and back needle beds to supply yarns to needles. Generally, standard feeders and combination feeders both supply yarn for needles to knit, tuck, and/or float, while combination feeders may also supply yarn to inlay through or between knitted structures. Although a flat V-bed knitting machine used for weft-knitting is described herein, it should be understood that this is one example and that other knitting machines may be used to form the knitted upper component or a portion thereof.

At step **802** of method **800**, a lateral knit panel (which may be an example of the lateral knit panel **204**) is knit using one of a first needle bed and a second needle bed, and at step **804**, a medial knit panel (which may be an example of the medial knit panel **206**) is knit on at least one of the first needle bed and the second needle bed. In some aspects, the first needle bed is the front needle bed and the second needle bed is the back needle bed, but it should be understood that the first needle bed may be the back needle bed while the second needle bed may be the front needle bed. In some aspects of method **800**, the lateral knit panel and the medial knit panel are each knit on both the first needle bed and the second needle bed. In one aspect, the lateral and medial knit panels both have double jersey knit structure. Additionally, the lateral knit and medial knit panels may be knit at steps **802** and **804** in a heel-to-toe direction such that the portions that will form part of the heel region of the knitted upper component are knit prior to the portions that will form part of the toe region of the knitted upper component. In some

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aspects, some part of the lateral knit panel and/or medial knit panel may be formed on a single needle bed but another portion, such as a portion in the toe region, is knit on both needle bed.

At step **806**, once the lateral and medial knit panels are knit through a toe portion (e.g., toe region **102**), loops forming the lateral and medial knit panels that are on the needles of the second needle bed are transferred to needles on the first needle bed. After this transfer, the needles on the second needle bed may remain empty.

At step **808**, the first needle bed is shifted horizontally relative to the second needle bed in a first direction by a number of needle positions. This shifting may be also referred to as racking the needle beds. To accomplish step **808**, the first needle bed may be moved while the second needle bed remains stationary, the second needle bed may be moved while the first needle bed remains stationary, or both needle beds may be moved. In some aspects, the number of needle positions over which the first and second needle beds are racked at step **808** is within a range of 4 to 12. In some aspects, the number of needle positions is within a range of 6 to 10, and in one example aspect, the number of needle positions is 8.

After the needle beds are shifted relative to one another, a quantity of courses is knit on only the first needle bed at step **810**. In some aspects, the quantity of courses that is knit on the first needle bed at step **810** is within a range of 1 to 5. In one example, the quantity of courses knit at step **810** is 2.

A step **812**, all loops from the first needle bed are transferred to the second needle bed, and at step **814**, a second quantity of courses are knit on only the second needle bed. The quantity of course knit at step **814** may be the same quantity previously knit at step **810**. In some aspects, the second quantity of courses is within a range of 1 to 5. In one example, the second quantity of courses knit at step **814** is 2.

At step **816**, the needle beds are shifted back such that the first needle bed is shifted relative to the second needle in a second direction by the same number of needle positions the beds were shifted in the first direction at step **808**. For example, at step **816**, the needle beds may be shifted in the second direction by 8 needle positions. The second direction is the opposite the first direction such that the first and second needle beds may be aligned similar to one another as they were prior to step **808**.

At step **818**, an overfoot knit panel, which may be an example aspect of the knit overfoot panel **202**, is knit on at least one of the first needle bed and the second needle bed. In some aspects, the overfoot knit panel is knit using both the first needle bed and the second needle bed. In one aspect, the overfoot knit panel has a double jersey knit structure. In exemplary aspects, the gauge (or density of active needles being used along a needle bed when knitting) is uniform when knitting the lateral knit panel, the medial knit panel, and the overfoot knit panel at steps **802**, **804**, and **818**, respectively. Further, in some aspects, the gauge knit in these steps is a full gauge.

In some aspects, method **800** also includes knitting a lower knit panel that is positioned between the medial knit panel and the lateral knit panel. The lower knit panel (which may be an example of lower knit panel **208**) may be knit so that courses are knit continuously from the medial knit panel, through the lower knit panel, and to the lateral knit panel and vice versa. In this way, the lower knit panel, the medial knit panel, and the lateral knit panel may be formed simultaneously using the same yarn feeder(s). Additionally,

in some aspects, where the lower knit panel does not integrally connect the lateral knit panel and the medial knit panel, the lateral knit panel and the medial knit panel may be formed at the same time with different yarn feeders. In other aspects, the medial knit panel and the lateral knit panel may be formed separately such that one of these panels may be knit first and held on the needles while the other panel is knit.

Steps 806-816 represent where the medial and lateral knit panels are integrally knitted with the overfoot knit panel and how integrally knit pleats (e.g., pleats 242 and 244) may be formed. Shifting the needle beds at steps 808 and 816 result in additional tension or a pull that causes a fold to be created where the medial and lateral knit panels are knit with the overfoot knit panel. Additionally, in aspects in which a lower knit panel is created, switching from a double knit jersey construction in the lower knit panel, to the single jersey knit construction for the pleats (i.e., in a transition between the lower knit panel and overfoot knit panel), and back to a double knit jersey construction for the overfoot knit panel results in the knitted upper component being biased to curl and form a contoured shape at the transition between the lower knit panel and the overfoot panel.

Aspects of the knitted upper component 200 include integrally knit lace tunnels 600 that, along with the lace 150, form a lacing system for securing the upper 110 around a wearer's foot. The overfoot knit panel 202, the lateral knit panel 204, and the medial knit panel 206 each have integrally knit lace tunnels 600. In exemplary aspects, each lace tunnel 600 is a raised tubular structure formed between two coextensive knit layers of the knitted upper component 200. In regions adjacent the lace tunnels 600, the two knit layers may be interconnected such that they are not freely separately, but the two knit layers may be separable from one another in the lace tunnels to form a channel 602 between the two knit layers. The channel 602 may be configured to receive the lace 150.

The channel 602 of each lace tunnel 600 extends from a first end 604 to a second end 606 of the lace tunnel 600. The length 608 of any lace tunnel 600 is between the first end 604 and the second end 606. In some aspects, at least one lace tunnel 600 on each of the overfoot knit panel 202, the lateral knit panel 204, and the medial knit panel 206 has the same length. Further, all of the lace tunnels 600 may have the same length 608. In some aspects, the channels 602 of the lace tunnels 600 extend in a course-wise direction and, as such, may have lengths 608 measured by a quantity of wales between the first end 604 and the second end 606. The lengths 608 of all lace tunnels 600 may be within a range from about 4 wales to about 16 wales, within a range from about 4 wales to about 14 wales, or within a range from about 6 wales to about 10 wales. In one example in which the lace tunnels 600 have uniform lengths, the length 608 may be about 8 wales.

The overfoot knit panel 202 may extend from the ankle opening 122 to the lower knit panel 208 at the anterior portion 124 of the toe region 102. As such, the overfoot knit panel 202 may have a length (shown by dashed line 201 in FIG. 14) extending from the ankle opening 122 to the lower knit panel 208 at the anterior portion 124 of the toe region 102. The overfoot knit panel 202 may have a tongue portion 203 forming approximately the posterior two-thirds of the overfoot knit panel 202, and a vamp portion 205 forming approximately the anterior one-third of the overfoot knit panel 202, where the vamp portion 205 and the tongue portion 203 are separated by dashed line 207 for illustration purposes only in FIG. 14. As such, the tongue portion 203

may extend from the ankle opening 122 to approximately two-thirds of the length 201 of the overfoot knit panel, and the vamp portion 205 may extend from the transition (e.g., joined are 250) with the lower knit panel 208 to approximately one-third the length 201 of the overfoot knit panel 202. As such, the overfoot knit panel 202 may include at least one lace tunnel in the anterior-most third of the overfoot knit panel 202. In some aspects, the boundary between the tongue portion 203 and the vamp portion 205 is configured to align with metatarsophalangeal joints of the wearer when the footwear 100 is worn. As such, the overfoot knit panel 202 may include at least one lace tunnel 600 that is positioned to be over the wearer's toes when the footwear 100 is worn.

The medial knit panel 206 and the lateral knit panel 204 may each include lace tunnels 600 extending from the midfoot region 104 to the toe region 102. In the example in FIG. 14, there are five lace tunnels 600 on each of the medial knit panel 206 and the lateral knit panel 204, but it contemplated that other aspects may include different amounts of lace tunnels 600. Additionally, the overfoot knit panel 202 includes lace tunnels 600 arranged in pairs.

In some aspects, the medial knit panel 206 includes a medial-panel top edge 224, and the lateral knit panel 204 includes a lateral-panel top edge 214, where at least some of the lace tunnels 600 are located adjacent the medial-panel top edge 224 and lateral-panel top edge 214. Positioning the lace tunnels 600 through the knitted upper component 200 adjacent the lateral-panel and medial-panel top edges 214 and 224 and through the disclosed positioned on the overfoot knit panel 202 helps to keep the knitted upper component 200 contained around a wearer's foot. This ability may be particularly advantageous to keep the knitted upper component 200 provide containment around a wearer's foot where the knitted upper component 200 extends at least partially around the midsole component 300.

FIG. 15 depicts a lateral side view of footwear 100 with the knitted upper component 200, the midsole component 300, and the exterior sole component 400. As illustrated, the lace 150 may be used to secure the exterior sole component 400 to the knitted upper component 200. In this way, the lace 150 may provide another means by which the exterior sole component 400 is coupled to the rest of the footwear 100 in addition to having openings (e.g., openings 420) that receive protrusions 312 on the midsole component 300.

With reference to FIG. 15, as well as FIG. 7A, the upper portion 412 of the exterior sole component 400 includes a medial top edge portion 432 that is positioned adjacent the medial side 118 of the knitted upper component 200 within in an instep region and includes a lateral top edge portion 430 that is positioned adjacent the lateral side 116 of the knitted upper component 200 within the instep region. An intermediate portion 434 of the exterior sole component 400 extends between the medial top edge portion 432 and the lateral top edge portion 430. The intermediate portion 434 is at least partially formed of the underfoot portion 410 of the exterior sole component 400 and, therefore, may be part of the ground-contacting surface.

Each of the medial top edge portion 432 and the lateral top edge portion 430 include a lacing engagement portion. In example aspects, the lacing engagement portion is a lace aperture 440 through which the lace 150 extends. The lace aperture 440 may be an opening directly within the exterior sole component 400. In other aspects, the lace apertures are formed by additional components, which as loops formed by

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cables or other materials, that are secured to the medial top edge portion 432 and the lateral top edge portion 430 of the exterior sole component 400.

The upper portion 412 of the exterior sole component 400 may further include a second lateral top edge portion 436 and a second medial top edge portion 438. The second lateral top edge portion 436 may be positioned on the lateral side 404 and positioned along the toe region 102 of the knitted upper component 200. The second medial top edge portion 438 may be positioned on the medial side 402 and positioned along the toe region 102 of the knitted upper component 200. A second intermediate section 444 forms part of the underfoot portion 410 and extends between the second lateral top edge portion 436 and the second medial top edge portion 438. Additionally, the second lateral top edge portion 436 and the second medial top edge portion 438 may also include lace engagement portions (e.g., lace apertures 440) similar to the lateral top edge portion 430 and the second medial top edge portion 440.

The lace 150 that extends through lace apertures (e.g., lace tunnels 600) on the knitted upper component 200 may also extend through lace apertures 440 on the exterior sole component 400 so that the lace 150 provides a means for removably coupling the exterior sole component 400 with the knitted upper component 200. In some aspects, the exterior sole component 400 is aligned with the knitted upper component 200 so that the lace apertures 440 on the exterior sole component 400 (e.g., apertures 440 on at least the lateral top edge portion 430 and the medial top edge portion 432) are positioned immediately adjacent to lace tunnels 600 in the lateral knit panel 204 and the medial knit panel 206, respectively. In some aspects, lace apertures 440 on the second lateral top edge portion 436 and the second medial top edge portion 438 are positioned immediately adjacent to lace tunnels 600 in the lateral knit panel 204 and the medial knit panel 206, respectively.

FIGS. 16A and 16B depict an example heel strap 700 that may be incorporated into the footwear 100. The heel strap 700 may be a textile piece, such as a knitted textile, forming a first surface 712 and a second surface 714. The heel strap 700 has a generally elongate shape having a first end 702 and a second end 704. The second end 704 may split into three branches 706A, 706B, and 706C. These branches 706A, 706B, and 706C fold over themselves so that distal ends of the branches 706A, 706B, and 706C may be secured to proximate ends of the branches (such as for branches 706A and 706C) or secured to a portion of the heel strap 700 adjacent the branched section (such as for branch 706B). Additionally, the first end 702 of the heel strap 700 may fold over itself and be secured to another portion of the heel strap 700 between the first end 702 and the second end 704. Hatched markings in FIGS. 16A and 16B illustrate example locations in which the heel strap 700 may be secure to itself. In some aspects, this securing is done through stitching but it is contemplated that other means of removably or permanently securing the heel strap 700 to itself may be used. For example, hook and loop fasteners, buttons, magnets, ties, and/or snap fasteners may be incorporated as means for removably securing various portions of the heel strap 700 to itself or another component, such as the knitted upper component 200.

FIG. 17 depicts how the heel strap 700 may be integrated into the footwear 100. The exterior sole component 400 includes three slots 708. Each of the three branches 706A, 706B, and 706C may be threaded through a slot 708 and then secure to itself as described above. The first end 702 of the heel strap 700 may be folded over itself to form the strap

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loop 710, which may be used by a wearer to pull up on the heel strap 700 when donning the footwear 100. In some aspects, the heel strap 700 is not directly secured to the knitted upper component 200. In other aspects, the first end 702 of the heel strap 700 is folded over itself to form the strap loop 710 and inserted, through the ankle opening 122, into interior chamber defined by the knitted upper component 200. The first end 702 may be secured to the inside of the knitted upper component 200. In some aspects, an intermediate section 716 of the heel strap 700 may be secured to the exterior surface of the knitted upper component 200 while the first end 702 is secured to the interior surface. Although the heel strap 700 is depicted in several drawings herein, it should be understood that aspects of footwear 100 and its components described herein may not include the heel strap 700. Further, the knitted upper component 200 is removed from the top portion of FIG. 17 only to not distract from the features of the heel strap 700 and the exterior sole component 400 but it should be understood that the heel strap 700 may be integrated with the knitted upper component 200 as illustrated in the bottom portion of FIG. 17.

Referring now to FIGS. 18A, 18B, and 18C, another aspect of the present disclosure is illustrated. FIGS. 18A and 18B depict the knitted upper component 200 and the midsole component 300, and as described in other portions of this disclosure, the midsole component 300 can be combined with the knitted upper component 200 to form at least a footwear assembly 1802. In addition, the midsole component 300 can include the protrusions 310A, 310B, and 310C, and recesses 324 located between the protrusions. Furthermore, in some examples, the knitted upper component 200 can include knit strips 210A and 210B that, in the assembly 1802, nest within the recesses 324 between adjacent protrusions 310 of the midsole component 300.

In some examples, the protrusions 310A, 310B, and 310C and/or the recesses 324 can include size dimensions, such as the recess width 1804. In addition, the knit strips 210A and 210B can include a size dimension, such as the strip width 1806. In examples of the present disclosure, the strip width 1806 can influence the nesting relationship between the knitted upper component 200 and the midsole component 300. For example, if the strip width 1806 is larger than the recess width 1804 by an amount greater than a given tolerance (e.g., more than 20 percent), then the knit strips 210 will not be able to nest within the recesses 324. Further, if the strip width 1806 is smaller than the recess width 1804 by an amount greater than a given tolerance (e.g., more than 20 percent), then the knit strips 210 will be more likely to at least partially dislodge from the recesses 324. Stated differently, because examples of the present disclosure do not include adhesives or other bonding agents to couple the knitted upper component 200 to the midsole component 300, the closeness of the fit (e.g., based on the similarity between the strip width 1806 and the recess width 1804) between the knitted upper component 200 and the midsole component 300 can improve the integrity of the assembly 1802.

In at least some examples, the midsole component 300 includes a recess (e.g., 324) with a recess width (e.g., 1804); the knitted upper component 200 includes a knit strip (e.g., 210B) with a strip width (e.g., 1806); and the strip width 1806 is within a width tolerance of the recess width. In examples, the width tolerance is within about 0.5 millimeter and about 1.5 millimeters, or within about 0.75 millimeter and about 1.25 millimeters, or about 1 millimeter. For

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example, if the recess width is about 10 millimeters, then the strip width can be about 8 millimeters to about 11.5 millimeters.

Referring to FIG. 18C another example is illustrated, including an array 1810 of articles of footwear (e.g., assembly 1802 or combination of assembly 1802 with an outsole component, such as the exterior sole component 400), including footwear article one 1812 and footwear article “n” 1814. The array 1810 can include a batch of articles of footwear, such as a batch provided by a manufacturer, distributor, retailer, etc. The array 1810 can include various quantity of footwear articles, and in some examples, “n” can be more than five, more than ten, or more than twenty. As described with respect to FIGS. 18A and 18B, the similarity of the recess width 1804 and strip width 1806 can affect the integrity of the assembly. As such, among the array 1810, the strip widths between any two knitted component uppers within the array (e.g., strip width 1806A and strip width 1806B) can include a relatively small standard deviation. For example, in some instances, the standard deviation can be in a range of about 0.5 millimeter to about 1 millimeters, or about 1.25 millimeters to about 0.75 millimeter, or about 1.2 millimeters or about 1.0 millimeter.

In some examples, tolerances and deviations among an article of footwear may vary depending on the portion of the upper. For example, as explained above, to improve the nesting relationship and securement between the knitted upper component 200 and the midsole component 300, the strip width 1806 may have relatively smaller tolerances and standard deviations among an array. In some examples, other portions of the upper, such as on the medial and lateral knit panels (e.g., panels 204 and 206) or the overfoot panel (e.g., panel 202), the knit portions may have larger tolerances and standard deviations that are between about 3 millimeters and 6 millimeters (e.g., more than double the tolerance for the strip width 1806).

FIGS. 19A, 19B, and 19C depict views of an alternative footwear embodiment. Footwear 1000 may include a knitted upper component 1200 similar to the knitted upper component 200 described herein and a midsole component 1300 similar to the midsole component 300 described herein. The midsole component 1300 may be positioned within the interior chamber defined by the knitted upper component 1200 and have protrusions extending through the openings in the knitted upper component 1200 as further described below. The coupling of the midsole component 1300 and knitted upper component 1200 may be similar to what is described for the midsole component 300 and the knitted upper component 200. As such, the knitted upper component 1200 (forming an upper of the footwear 1000) and the midsole component 300 (forming a sole structure of the footwear 1000) may be coupled together without the use of adhesive or stitching to allow for easy deconstruction as well as construction of the footwear. Further, materials forming the knitted upper component 1200 and the midsole component 1300 may be recycled materials, such as materials recycled from no longer existing components in footwear as described with respect to FIG. 9. Additionally or alternatively, the knitted upper component 1200 and/or the midsole component 1300 may be re-used from a different footwear assembly as these components may be swapped out between different footwear assemblies. Aspects of footwear 1000 do not include an exterior sole component such that the midsole component 1300 may form the ground-contacting surface. It should be understood that embodiments described with respect to footwear 1000 may also not include an exterior sole component.

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FIG. 19B provides a bottom perspective view of the knitted upper component 1200. The knitted upper component 1200 includes an overfoot portion 1230 and a lower portion 1240. The overfoot portion 1230 forms a superior aspect of the knitted upper component 1200 in that it extends over the top and at least partway down the lateral and medial sides of a wearer's foot when the footwear 1000 is being worn. The lower portion 1240 is configured to extend underneath a wearer's foot (either directly or separated by one or more sole components). The lower portion 1240 extends through a toe region (similar to the toe region 102), a midfoot region (similar to the midfoot region 104), and a heel region (similar to the heel region 106). Together, the overfoot portion 1230 and the lower portion 1240 define an interior chamber that may be accessed at least through the ankle opening 122. The interior chamber may receive the midsole component 1300 as well as the wearer's foot. The overfoot portion 1230 and the lower portion 1240 may be knitted as separate components and secured (e.g., stitched) together. Alternatively, the overfoot portion 1230 and the lower portion 1240 may be integrally knit together such that they form a continuous knit structure as described with respect to the knitted upper component 200.

As seen in the view of the footwear 1000 depicted in FIG. 19A, the knitted upper component 1200 may have a sock-like structure and may not have an overfoot knit panel that is substantially unsecured to the lateral and medial sides. The knitted upper component 1200 may include lace tunnels 1260 for receiving a lace 1150 to help secure the footwear 1000 to a desired fit around the wearer's foot. In some aspects, the lace tunnels 1260 are positioned at a transition between the overfoot portion 1230 and the lower portion 1240.

The lower portion 1240 of the knitted upper component 1200 includes integrally knit strips 1210 forming a bottom side of the knitted upper component 1200. The knit strips 1210 define openings 1220 in the knitted upper component 1200 that receive portions of the midsole component 1300.

FIG. 19A depicts a bottom perspective view of the midsole component 1300. The midsole component 1300 includes a top side 1302, a bottom side 1304 that includes a plurality of protrusions 1310, similar to protrusions 310 described above. The protrusions 1310 extend outward from a recessed bottom surface 1320 of the bottom side 1304 and toward a ground, floor or other external surface when the footwear 1000 is worn. Each protrusion 1310 includes a protruding bottom surface 1316 that forms the surface of the protrusion 1310 that is farthest from the top side 1302, and also includes side walls 1314 that extend between the surface 1316 and the recessed bottom surface 1320. Recesses 1324 (or grooves) are formed between side walls 1314 of adjacent protrusions 1310. The midsole component 1300 includes protrusions 1310 and recesses 1324 in the toe region, the midfoot region, and the heel region. In some aspects, some of the protrusions 1310 have one or more additional protrusions 1325 that have a smaller surface area as the primary protrusions 1310 and extend further away from the recessed surface 1320.

When the midsole component 1300 is inserted within the interior cavity of the knitted upper component 1200, the protrusions 1310 extend through the openings 1220 defined at least partially by the knit strips 1210 of the knitted upper component 1200. When assembled as shown in FIG. 19A, the knit strips 1210 extend within the recesses 1320 between protrusions 1310 to mechanically couple and secure the midsole component 1300 within the knitted upper component 1200.

The following clauses represent example aspects of concepts contemplated herein. Any one of the following clauses may be combined in a multiple dependent manner to depend from one or more other clauses. Further, any combination of dependent clauses (clauses that explicitly depend from a previous clause) may be combined while staying within the scope of aspects contemplated herein. The following clauses are examples and are not limiting.

Clause 1: An article of footwear comprising a knitted upper component, the knitted upper component comprising: a medial side; a lateral side; a medial knit panel forming at least part of the medial side of the knitted upper component and having a medial-panel top edge; a lateral knit panel forming at least part of the lateral side of the knitted upper component having a lateral-panel top edge; an overfoot knit panel positioned between the medial knit panel and the lateral knit panel; and a plurality of lace tunnels comprising: one or more lace tunnels positioned on the overfoot knit panel, one or more lace tunnels adjacent the medial-panel top edge of the medial knit panel, and one or more lace tunnels adjacent the medial-panel top edge of the lateral knit panel.

Clause 2: The article of footwear of clause 1, further comprising a lace extending through each of lace tunnels in the plurality of lace channels.

Clause 3: The article of footwear of any of clauses 1 and 2, wherein a single lace extends through each lace tunnel in the plurality of lace tunnels.

Clause 4: The article of footwear of any of clauses 1-3, further comprising a midsole component positioned within an interior void formed by the knitted upper component.

Clause 5: The article of footwear of clause 4, wherein a lower portion of the knitted upper component includes apertures, wherein protrusions extending from a bottom side the midsole component extend through the apertures in the lower portion of the knitted component.

Clause 6: The article of footwear of any of clauses 4-5, wherein the midsole component and the knitted upper component are joined together without adhesives.

Clause 7: The article of footwear of any of clauses 1-6, wherein the lace tunnels within the plurality of lace tunnels are integrally knit with one or more portions of the knitted upper component.

Clause 8: The article of footwear of any of clauses 1-7, wherein the medial knit panel, the lateral knit panel, and the overfoot knit panel are integrally knit in a unitary construction.

Clause 9: An article of footwear comprising: a first knitted upper component comprising a set of yarns derived from a no-longer existing knitted upper component, the first knitted upper component at least partially defining an interior chamber configured to receive a wearer's foot and having a lower portion with knit strips defining a first plurality of openings; and a first midsole component comprising a first thermoplastic polymer material component recycled from a no-longer existing midsole component, the first midsole component received in the interior chamber of the knitted upper component and having a plurality of protrusions extending through the first plurality of openings in the first knitted upper component.

Clause 10: The article of footwear of clause 9, wherein adjacent protrusions within the plurality of protrusions are separated by recessed surfaces of the first midsole component and, wherein the lower portion of the first knitted upper component are positioned under and contact the recessed surfaces of the first midsole component.

Clause 11: The article of footwear of any of clauses 9-10, wherein the set of yarns of the first knitted upper component comprises polyester yarns.

Clause 12: The article of footwear of any of clauses 9-11, wherein the first thermoplastic polymer material component comprises thermoplastic polyurethane (TPU).

Clause 13: The article of footwear of any of clauses 9-12, wherein the first midsole component and the first knitted upper component are joined together without adhesives.

Clause 14: The article of footwear of any of clauses 9-13 further comprising a first exterior sole component extending under at least part of the first knitted upper component and having one or more openings for receiving a subset of protrusions from the plurality of protrusions of the first midsole component.

Clause 15: The article of footwear of clause 14, wherein the first exterior sole component comprises a thermoplastic polymer material.

Clause 16: The article of footwear of any of clauses 14-15, wherein the first exterior sole component extends from a toe region of the article of footwear to a heel region of the article of footwear.

Clause 17: A sustainable system for an article of footwear comprising: a first article of footwear comprising: a first knitted upper component at least partially defining an interior chamber configured to receive a wearer's foot, the first knitted upper component having a lower portion configured to extend under the wearer's foot and having knit strips defining a plurality of openings; and a first midsole component received in the interior chamber of the first knitted upper component and having a first plurality of protrusions extending through the plurality of openings in the first knitted upper component; and a second article of footwear comprising: the first knitted upper component removed from the first article of footwear; and a second midsole component received in the interior chamber of the first knitted upper component and having a second plurality of protrusions extending through the plurality of openings in the first knitted upper component.

Clause 18: The sustainable system of clause 17, wherein the second midsole component is made from recycled thermoplastic polymer material.

Clause 19: The sustainable system of any of clauses 17-18, wherein the first knitted upper component is formed of yarns recycled from another knitted upper component.

Clause 20: The sustainable system of any of clauses 17-19, wherein the first article of footwear comprises a first exterior sole component configured to extend under at least part of the lower portion of the first knitted upper component and having at least one opening through which one or more protrusions within the plurality of protrusions of the first midsole component extend.

Clause 21: The sustainable system of clause 20, wherein first exterior sole component extends under at least a toe region of the knitted upper component.

Clause 22: The sustainable system of any of clauses 17-21, wherein the first knitted upper component is joined to the first midsole component in a first instance without adhesives and is joined to the second midsole component in a second instance without adhesives.

Clause 23: An array of articles of footwear, each article of footwear in the array comprising: a knitted upper component including an underfoot portion defining a plurality of openings, the plurality of openings including: (i) a first opening and (ii) a second opening separated from the first opening by a knit strip of upper component material, wherein the knitted upper component at least partially defines an interior cham-

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ber configured to receive a wearer's foot; and a midsole component received in the interior chamber of the upper component, the midsole component having a plurality of protrusions including (i) a first protrusion extending through the first opening and (ii) a second protrusion extending through the second opening, wherein the knit strip of the upper component material covers a portion of the midsole component located in a recess between the first protrusion and the second protrusion, wherein among all articles of footwear included in the array, the widths of the knit strips include a standard deviation of less than 1.2 millimeters.

Clause 24: The array of articles of footwear of clause 23, wherein the knitted upper component includes an overfoot knit panel having a length from an ankle opening to an anterior portion of a toe region, wherein among all articles of footwear included in the array, the lengths of the overfoot knit panel include a standard deviation within a range of 3 millimeters and 6 millimeters.

Clause 25: The array of articles of footwear of any of clauses 23-24, wherein the midsole component and the knitted upper component are joined together without adhesives.

Clause 26: The array of articles of footwear of any of the clauses 23-25, wherein the first protrusion and the second protrusion each include a side wall defining the recess, wherein the side wall is a continuous surface.

Clause 27: A knitted upper component for an article of footwear, the knitted upper component comprising: a medial side; a lateral side; a toe region comprising an anterior portion configured to, in the article of footwear, overlap with a sole structure of the article of footwear; a medial knit panel forming at least part of the medial side, the medial knit panel comprising a medial-panel top edge that terminates in the anterior portion of the toe region; a lateral knit panel forming at least part of the lateral side, the lateral knit panel comprising a lateral-panel top edge that terminates in the anterior portion of the toe region; and an overfoot knit panel positioned between the medial knit panel and the lateral knit panel and extending from the toe region to an ankle opening, the overfoot knit panel comprising: an overfoot-panel lateral edge that terminates and intersects the lateral-panel top edge at a first edge intersection in the anterior portion of the toe region; and an overfoot-panel medial edge that terminates and intersects the medial-panel top edge at a second edge intersection in the anterior portion of the toe region.

Clause 28: The knitted upper component of clause 27, wherein a first end of the medial-panel top edge and a first end of the lateral-panel top edge that each overlap with the sole structure in the anterior portion of the toe region.

Clause 29: The knitted upper component of any of clauses 27-28, wherein the lateral knit panel and the medial knit panel each partially overlap the overfoot knit panel portion.

Clause 30: The knitted upper component of any of clauses 27-29, wherein the overfoot knit panel, the lateral knit panel, and the medial knit panel are integrally knitted together.

Clause 31: The knitted upper component of any of clauses 27-30, wherein overfoot knit panel is integrally knit to the lateral knit panel and the medial knit panel along a quantity of courses in the anterior portion of the toe region, the quantity of courses being between 2 and 8.

Clause 32: The knitted upper component of any of the clauses 27-31, wherein courses joining the overfoot knit panel, the lateral knit panel, and the medial knit panel comprise a single jersey knit structure.

Clause 33: The knitted upper component of any of the clauses 27-32, wherein each of the overfoot knit panel, the lateral knit panel, and the medial knit panel comprise a

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double jersey knit structure outside of the courses joining the overfoot knit panel, the lateral knit panel, and the medial knit panel.

Clause 34: The knitted upper component of any of clauses 27-33, wherein the medial knit panel and the lateral knit panel each extend through a midfoot region and a heel region.

Clause 35: The knitted upper component of any of clauses 27-34, wherein the medial knit panel and the lateral knit panel are joined together in the heel region.

Clause 36: The knitted upper component of any of clauses 27-35, further comprising a lower knit panel configured to extend at least partially underfoot.

Clause 37: The knitted upper component of clause 36, wherein the lower knit panel is integrally knit with the medial knit panel and the lateral knit panel in the toe region, the midfoot region, and the heel region.

Clause 38: The knitted upper component of any of clauses 36-37, wherein the lower knit panel is integrally knit with the overfoot knit panel in at least part of the anterior portion of the toe region.

Clause 39: The knitted upper component of any of clauses 27-38, wherein the overfoot knit panel is secured to each of the medial knit panel and the lateral knit panel through one or more laces.

Clause 40: The knitted upper component of any of clauses 27-39, further comprising a first pleat integrally knit near the first edge intersection, and a second pleat integrally knit near the second edge intersection.

Clause 41: An article of footwear comprising the knitted upper component of any of clauses 27-40, and a sole structure coupled to the knitted upper component.

Clause 42: The article of footwear of clause 41, wherein the sole structure comprises a midsole component positioned within a foot-receiving void formed by the knitted upper component.

Clause 43: The article of footwear of clause 42, wherein the sole structure further comprises an exterior sole component that is positioned below the knitted upper component and the midsole component.

Clause 44: The article of footwear of clause 43, wherein the exterior sole component is at least partially wrapped around the medial knit panel and the lateral knit panel of the knitted upper component.

Clause 45: The article of footwear of any of clauses 43-44, wherein the exterior sole component overlaps at least part of the anterior portion of the toe region of the knitted upper component.

Clause 46: The article of footwear of any clauses 43-45, wherein each of the knitted upper component, the midsole component, and exterior sole component are made exclusively of recyclable material.

Clause 47: A knitted upper component for an article of footwear, the knitted upper component comprising: a medial side; a lateral side; a toe region; a medial knit panel forming at least part of the medial side; a lateral knit panel forming at least part of the lateral side; an overfoot knit panel positioned between the medial knit panel and the lateral knit panel and extending from the toe region to an ankle opening; a lateral pleat within the toe region, the lateral pleat being formed by the lateral knit panel being integrally knit with and overlapping the overfoot knit panel; and a medial pleat within the toe region, the medial pleat being formed by the medial knit panel being integrally knit with and overlapping the overfoot knit panel.

Clause 48: The knitted upper component of clause 27 wherein the medial pleat and the lateral pleat are positioned entirely within the toe region.

Clause 49: The knitted upper component of any of clauses 47-48, wherein the medial pleat and the lateral pleat are each at least partially positioned within an anterior portion of the toe region, the anterior portion of the toe region being configured to, in the article of footwear, overlap with a sole structure of the article of footwear.

Clause 50: The knitted upper component of any of clauses 47-49, further comprising a lower knit panel, at least part of the lower knit panel being configured to extend underfoot of a wearer.

Clause 51: The knitted upper component of clause 50, wherein the lateral pleat and the medial pleat each extend from a boundary between the lower knit panel and the overfoot knit panel.

Clause 52: The knitted upper component of any of clauses 50-51, wherein the lower knit panel is integrally knit with the medial knit panel and the lateral knit panel in at least the toe region and the midfoot region.

Clause 53: The knitted upper component of any of clauses 47-52, wherein the overfoot knit panel is integrally knit to the lateral knit panel and to the medial knit panel along a quantity of courses to form the lateral pleat and the medial pleat, the quantity of courses being between 2 and 8.

Clause 54: The knitted upper component of any of clauses 47-53, wherein courses joining the overfoot knit panel, the lateral knit panel, and the medial knit panel comprise a single jersey knit structure.

Clause 55: The knitted upper component of any of clauses 47-54, wherein each of the overfoot knit panel, the lateral knit panel, and the medial knit panel comprise a double jersey knit structure outside of the courses joining the overfoot knit panel, the lateral knit panel, and the medial knit panel.

Clause 56: The knitted upper component of any of clauses 47-55, wherein the lateral pleat and the medial pleat are the only raised structures in an anterior portion of the toe region of the knitted upper component.

Clause 57: The knitted upper component of any of clauses 47-56, wherein the medial knit panel and the lateral knit panel each extend through a midfoot region and a heel region.

Clause 58: An article of footwear comprising the knitted upper component of any of clauses 27-58 and a sole structure coupled to the knitted upper component.

Clause 59: The article of footwear of clause 58, wherein the sole structure comprises a midsole component and an exterior sole component, the midsole component being positioned within a foot-receiving void formed by the knitted upper component, and the exterior sole component positioned below the knitted upper component and the midsole component.

Clause 60: The article of footwear of clause 59, wherein the exterior sole component is at least partially wrapped around the medial knit panel and the lateral knit panel of the knitted upper component.

Clause 61: The article of footwear of any of clauses 59-60, wherein the exterior sole component overlaps at least part of the anterior portion of the toe region of the knitted upper component.

Clause 62: The article of footwear of any of clauses 59-61, wherein each of the knitted upper component, the midsole component, and exterior sole component are made exclusively of recyclable material.

Clause 63: A method of manufacturing a knitted upper component, the method comprising: forming a lateral knit panel on at least one of a first needle bed and a second needle bed; forming a medial knit panel on at least one of the first needle bed and the second needle bed; transferring loops from the second needle bed to the first needle bed; shifting the first needle bed relative to the second needle bed in a first direction by a number of needle positions; knitting a quantity of courses on only the first needle bed; transferring loops from the first needle bed to the second needle bed; knitting a second quantity of courses on only the second needle bed; shifting the first needle bed relative to the second needle in a second direction by the number of needle positions, the second direction being opposite the first direction; and forming an overfoot knit panel on at least one of the first needle bed and the second needle bed.

Clause 64: The method of manufacturing of clause 63, wherein the overfoot knit panel is knit on both the first needle bed and the second needle bed.

Clause 65: The method of manufacturing of any of clauses 63-64, wherein the lateral knit panel and the medial knit panel are each knit on both the first needle bed and the second needle bed.

Clause 66: The method of manufacturing of any of claims clauses 63-65, wherein the first quantity of courses is the same as the second quantity of courses.

Clause 67: The method of manufacturing of any of clauses 63-66, wherein the first quantity of courses and the second quantity of courses are each within a range of 1 to 5.

Clause 68: The method of manufacturing of any of clauses 63-66, wherein the first quantity of courses and the second quantity of courses are each 2.

Clause 69: The method of manufacturing of any of clauses 63-68, wherein portions of the lateral knit panel and the medial knit panel configured to form a heel region of the knitted upper component are formed before portions of the lateral knit panel and the medial knit panel configured to form a toe region of knitted upper component.

Clause 70: The method of manufacturing of any of clauses 63-69, wherein the lateral knit panel and the medial knit panel are knit at the same time.

Clause 71: The method of manufacturing of any of clauses 63-70, further comprising knitting a lower knit panel configured to form an underfoot portion of the knitted upper component.

Clause 72: The method of manufacturing of clause 71, wherein the lower knit panel is knit at the same time as the lateral knit panel and the medial knit panel and is at least partially formed of courses that are continuous with the lateral knit panel and the medial knit panel.

Clause 73: The method of manufacturing of any of clauses 63-72, wherein the quantity of needle positions is within a range of 4 to 12.

Clause 74: The method of manufacturing of any of clauses 63-72, wherein the quantity of needle positions is 8.

Clause 75: An article of footwear, comprising: a knitted upper component forming an instep region and having a plurality of lace apertures; and an exterior sole component coupled to the knitted upper component, the exterior sole component forming a ground-contacting surface of the article of footwear, the exterior sole component comprising: a first top edge portion located along the instep region on a medial side of the knitted upper component, the first top edge portion including a first lace-engaging component, a second top edge portion located along the instep region on a lateral side of the knitted upper component, the second top edge portion including a second lace-engaging component;

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and an intermediate portion forming at least part of the ground contacting surface and extending between the first top edge portion and the second top edge portion.

Clause 76: The article of footwear of clause 75, wherein the plurality of lace apertures comprises a plurality of integrally knitted lace apertures.

Clause 77: The article of footwear of any of clauses 75-76, wherein the plurality of lace apertures comprises a plurality of raised tubular structures each having a channel configured to receive a lace.

Clause 78: The article of footwear of any of clauses 75-77, further comprising a midsole component coupled to the knitted upper component.

Clause 79: The article of footwear of clause 78, wherein the midsole component comprises a plurality of protrusions and wherein the exterior sole component includes a plurality of openings, the plurality of protrusions of the midsole component extending through the plurality of openings of the exterior sole portion.

Clause 80: The article of footwear of clause 79, wherein knitted upper component comprises a bottom portion having strips defining a plurality of openings, the plurality of protrusions of the midsole component extending through the plurality of openings of the knitted upper component.

Aspects of the present disclosure have been described with the intent to be illustrative rather than restrictive. Alternative aspects will become apparent to those skilled in the art that do not depart from its scope. A skilled artisan may develop alternative means of implementing the aforementioned improvements without departing from the scope of the present disclosure.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations and are contemplated within the scope of the claims. Not all steps listed in the various figures need be carried out in the specific order described.

The invention claimed is:

1. An article of footwear, comprising:
a knitted upper component comprising:
a medial side;
a lateral side;
a medial knit panel forming at least part of the medial side of the knitted upper component and having a medial-panel top edge;
a lateral knit panel forming at least part of the lateral side of the knitted upper component having a lateral-panel top edge;
an overfoot knit panel positioned between the medial knit panel and the lateral knit panel; and
a plurality of lace tunnels comprising:
at least a first lace tunnel positioned on the overfoot knit panel,
at least a second lace tunnel positioned adjacent to the medial-panel top edge of the medial knit panel, and
at least a third lace tunnel positioned adjacent to the lateral-panel top edge of the lateral knit panel; and
a sole component that extends onto the medial side and onto the lateral side, and that includes a plurality of lace openings.
2. The article of footwear of claim 1, further comprising a lace extending through each lace tunnel of the plurality of lace tunnels.
3. The article of footwear of claim 2, wherein a single lace extends through the each lace tunnel of the plurality of lace tunnels.

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4. The article of footwear of claim 1, further comprising a midsole component positioned within an interior void formed by the knitted upper component.

5. The article of footwear of claim 4, wherein a lower portion of the knitted upper component includes apertures, wherein protrusions extending from a bottom side the midsole component extend through the apertures in the lower portion of the knitted upper component.

6. The article of footwear of claim 4, wherein the midsole component and the knitted upper component are joined together without adhesives.

7. The article of footwear of claim 1, wherein the plurality of lace tunnels are integrally knit with one or more portions of the knitted upper component.

8. The article of footwear of claim 1, wherein the medial knit panel, the lateral knit panel, and the overfoot knit panel are integrally knit in a unitary construction.

9. A knitted upper component for an article of footwear, the knitted upper component comprising:

- a medial side;
- a lateral side;
- a toe region;
- a medial knit panel forming at least part of the medial side;
- a lateral knit panel forming at least part of the lateral side;
- an overfoot knit panel positioned between the medial knit panel and the lateral knit panel and extending from the toe region to an ankle opening;
- a lateral pleat within the toe region, the lateral pleat being formed by the lateral knit panel being integrally knit with and overlapping the overfoot knit panel; and
- a medial pleat within the toe region, the medial pleat being formed by the medial knit panel being integrally knit with and overlapping the overfoot knit panel.

10. The knitted upper component of claim 9, wherein the medial pleat and the lateral pleat are positioned entirely within the toe region.

11. The knitted upper component of claim 9, wherein the medial pleat and the lateral pleat are each at least partially positioned within an anterior portion of the toe region, the anterior portion of the toe region being configured to, in the article of footwear, overlap with a sole structure of the article of footwear.

12. The knitted upper component of claim 9, further comprising a lower knit panel, at least part of the lower knit panel being configured to extend underfoot of a wearer.

13. The knitted upper component of claim 12, wherein the lateral pleat and the medial pleat each extend from a boundary between the lower knit panel and the overfoot knit panel.

14. The knitted upper component of claim 12, wherein the lower knit panel is integrally knit with the medial knit panel and the lateral knit panel in at least the toe region and a midfoot region.

15. The knitted upper component of claim 9, wherein the overfoot knit panel is integrally knit to the lateral knit panel and to the medial knit panel along a quantity of courses to form the lateral pleat and the medial pleat, the quantity of courses being between 2 and 8.

16. The knitted upper component of claim 9, wherein courses joining the overfoot knit panel, the lateral knit panel, and the medial knit panel comprise a single jersey knit structure.

17. The knitted upper component of claim 16, wherein each of the overfoot knit panel, the lateral knit panel, and the medial knit panel comprise a double jersey knit structure.

outside of the courses joining the overfoot knit panel, the lateral knit panel, and the medial knit panel.

18. The knitted upper component of claim **9**, wherein the lateral pleat and the medial pleat are raised structures in an anterior portion of the toe region of the knitted upper component. 5

19. The knitted upper component of claim **9**, wherein the medial knit panel and the lateral knit panel each extend through a midfoot region and a heel region.

20. An article of footwear comprising the knitted upper component of claim **9** and a sole structure coupled to the knitted upper component. 10

21. The article of footwear of claim **20**, wherein the sole structure comprises a midsole component and an exterior sole component, the midsole component being positioned within a foot-receiving void formed by the knitted upper component, and the exterior sole component positioned below the knitted upper component and the midsole component. 15

22. The article of footwear of claim **21**, wherein the exterior sole component overlaps at least part of an anterior portion of the toe region of the knitted upper component. 20

23. The article of footwear of claim **21**, wherein the exterior sole component is at least partially wrapped around the medial knit panel and the lateral knit panel of the knitted upper component. 25

24. The article of footwear of claim **21**, wherein each of the knitted upper component, the midsole component, and the exterior sole component are made exclusively of recyclable material. 30

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