



(11) **EP 3 481 982 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:

20.04.2022 Bulletin 2022/16

(21) Application number: **17739806.2**

(22) Date of filing: **29.06.2017**

(51) International Patent Classification (IPC):
D04B 1/24 (2006.01)

(52) Cooperative Patent Classification (CPC):
D04B 1/24; D10B 2501/043

(86) International application number:
PCT/US2017/040078

(87) International publication number:
WO 2018/009414 (11.01.2018 Gazette 2018/02)

(54) **ARTICLE WITH MULTIPLE LAYERS**

GEGENSTAND MIT MEHREREN SCHICHTEN

ARTICLE À COUCHES MULTIPLES

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(30) Priority: **06.07.2016 US 201662359108 P**
09.05.2017 US 201762503704 P

(43) Date of publication of application:
15.05.2019 Bulletin 2019/20

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

5 **[0001]** This application claims the benefit of U.S. Provisional Application No. 62/359,108, filed July 6, 2016. This application also claims the benefit of U.S. Provisional Application No. 62/503,704, filed May 9, 2017.

BACKGROUND

10 **[0002]** A variety of articles are formed from textiles. As examples, articles of apparel (e.g., shirts, pants, socks, footwear, jackets and other outerwear, briefs and other undergarments, hats and other headwear), containers (e.g., backpacks, bags), and upholstery for furniture (e.g., chairs, couches, car seats) are often at least partially formed from textiles. These textiles are often formed by weaving or interlooping (e.g., knitting) a yarn or a plurality of yarns, usually through a mechanical process involving looms or knitting machines. One particular object that may be formed from a textile is

15 an upper for an article of footwear.

[0003] Conventional articles of footwear generally include two primary elements: an upper and a sole structure. The upper is secured to the sole structure and forms a void within the article of footwear for comfortably and securely receiving a foot. The sole structure is secured to a lower surface of the upper so as to be positioned between the upper and the ground. In some articles of athletic footwear, for example, the sole structure may include a midsole and an outsole. The

20 midsole may be formed from a polymer foam material that attenuates ground reaction forces to lessen stresses upon the foot and leg during walking, running, and other ambulatory activities. The outsole may be secured to a lower surface of the midsole and forms a ground-engaging portion of the sole structure that is formed from a durable and wear-resistant material.

[0004] The upper 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 void on the interior of the upper 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 void within the upper. In addition, the upper may include a tongue that extends under the lacing system to enhance adjustability of the footwear, and the upper may incorporate a heel counter to limit movement of the heel.

30 **[0005]** US 2013/269209 A1 discloses a shoe upper for a shoe having a first portion and a second portion that are jointly manufactured as a knitted fabric, wherein only one of the first portion and the second portion of the knitted fabric is reinforced by a coating of a polymer material applied to the shoe upper such that the stretchability of the portions is different. Further, a multi-layer structure is disclosed.

35 **[0006]** Knitted fabrics having regions with different properties are also known from US 2015/128652 A1, US 2012/284902 A1, US 2015/181979 A1, and US 2014/237856 A1.

SUMMARY

40 **[0007]** The objective technical problem to be solved can be considered to consist in overcoming or at least reducing the disadvantages according to the prior art. The problem is solved according to the subject matter of the independent claim. The present disclosure provides an article of footwear according to the subject matter of claim 1.

[0008] The present disclosure also provides an article of footwear according to the subject matter of claim 10.

45 **[0009]** Background art useful for understanding the present disclosure includes a method, where the method may include the knitting a pass of a base layer with a first yarn on a knitting machine, the knitting machine having a first needle bed and a second needle bed, where the base layer is at least partially formed on the second needle bed. The method may further include knitting at least one pass of a second layer with a second yarn at least partially on the first needle bed of the knitting machine, and transferring the second yarn from the first needle bed to the second needle bed.

BRIEF DESCRIPTION OF THE DRAWINGS

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[0010]

FIG. 1 shows an article of footwear in accordance with certain aspects of the present disclosure.

FIG. 2 shows an upper for the article of footwear of FIG 1.

55 FIG. 3 shows an embodiment of an article with a base layer and a second layer.

FIG. 4 shows an embodiment of an article with a base layer and a second layer having multiple structures.

FIG. 5 shows an embodiment of an article with a base layer and a second layer having multiple regions.

FIG. 6 shows an article with a base layer and a second layer having tie-down yarns.

FIG. 7 shows a diagram illustrating a method of manufacturing an article with a base layer and a second layer.

FIG. 8 shows a diagram illustrating a method of manufacturing an article with a base layer and a second layer with multiple structures.

FIG. 9 shows an article with multiple zones, where a base layer has multiple regions having different elasticities in accordance with the present disclosure.

FIG. 10 shows an upper for an article of footwear incorporating certain aspect associated with the article as described with reference to FIG. 9.

DETAILED DESCRIPTION

[0011] Various aspects are described below with reference to the drawings in which like elements generally are identified by like numerals. The relationship and functioning of the various elements of the aspects may better be understood by reference to the following detailed description. However, aspects are not limited to those illustrated in the drawings or explicitly described below. It also should be understood that the drawings are not necessarily to scale, and in certain instances details may have been omitted that are not necessary for an understanding of aspects disclosed herein, such as conventional fabrication and assembly.

[0012] Certain aspects of the present disclosure relate to articles at least partially formed from textiles. One example of an article is an article of apparel (e.g., shirts, pants, socks, footwear, jackets and other outerwear, briefs and other undergarments, hats and other headwear, or the like). The article may be an upper configured for use in an article of footwear. The upper may be used in connection with any type of footwear. Illustrative, non-limiting examples of articles of footwear include a 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. The upper may also be incorporated into a non-athletic shoe, such as a dress shoe, a loafer, and a sandal.

[0013] Referring to FIG. 1, an article of footwear 100 is generally depicted as including a sole 110 and an upper 120. The upper 120 includes a lateral side 104 and a medial side 105. The area of the shoe where the sole 110 joins the upper 120 may be referred to as the biteline 116. The upper 120 may be joined to the sole 110 in a fixed manner using any suitable technique, such as through the use of an adhesive, by sewing, etc. It is contemplated that the upper 120 may extend partially or completely around the foot of a wearer and/or may be integral with the sole, and a sockliner may or may not be used.

[0014] In some embodiments, the sole 110 includes a midsole (not shown) and an outsole. The article of footwear 100 may additionally comprise a throat 126 and an ankle opening 128, which may be surrounded by a collar 130 and may lead to a void 132. The void 132 of the article of footwear 100 may be configured to accommodate a foot of a person. The throat 126 is generally disposed in the mid-foot area 102 of the upper 120. The mid-foot area 102 is generally an area of the upper 120 located between a heel area 101 and a toe area 103.

[0015] In some embodiments, a tongue may be disposed in the throat 126 of the shoe, but a tongue is an optional component. The tongue may be any type of tongue, such as a gusseted tongue or a burrito tongue. If a tongue is not included, the lateral and medial sides of the throat 126 may be joined together. Although not shown, in some embodiments, the article of footwear 100 may include an optional fastening element, such as a lace (which may be associated with the lace apertures 136). Any suitable type of fastening element may be used.

[0016] As depicted in FIG. 1, the upper 120 includes a base layer 140, which is depicted herein as a textile layer, but the base layer is not necessarily limited to textile materials. The base layer 140 is formed of a knitted material. The base layer 140 may comprise one or more strands, threads, yarns, mesh components, or the like (herein referred to as a "yarn"). The base layer 140 may have a first side forming an inner surface of the upper 120 (e.g., facing the void 132 of the article of footwear 100) and a second side forming an outer surface of the upper 120. In some embodiments, another object or layer, such as a cushioning layer, may be included between the void and the base layer 140. The base layer 140 may be formed as an integral one-piece element. For example, the base layer 140 may be formed during a single weft knitting process (e.g., with a flat knitting machine or circular knitting machine), a warp knitting process, or any other suitable knitting process such that the knitting process substantially forms the knit structure of the base layer 140 without the need for significant post-knitting processes or steps. While not shown, in some embodiments, the base layer 140 of the upper 120 may be configured to substantially surround the foot of a wearer such that it extends beneath the plantar aspect (also known as the sole or bottom of the foot).

[0017] According to the invention, the upper 120 includes a second knitted layer 150. While not limited to including a net, the second layer 150 is depicted as a net layer. Herein, a "net layer" may include, but is not limited to, an open-meshed fabric or layer formed of yarns that are interlooped, twisted, knotted, or woven together at certain intervals, and may have a relatively low stitch density (i.e., the number of loops per measured area) with respect to typical knitted fabric and/or the base layer 140. In some exemplary embodiments, the second layer 150 is formed on a knitting machine. As depicted, the second layer 150 has at least two regions (e.g., a first region 152, a second region 154, a third region

156, and a fourth region 158, shown in FIG. 2) that exhibit different functional and visual characteristics. Each "region" of the second layer 150 is associated with a "zone" of the upper 120 (i.e., herein, a "region" refers to a layer alone, while a "zone" refers to the upper or other article). The second layer 150 may be formed as an integral one-piece element. In some embodiments, the second layer 150 and the base layer 140 are formed together as an integral one-piece element (which may be referred to as a "knitted component") and may be formed by a single knitting process on a knitting machine. For example, the base layer 140 and the second layer 150 may be formed simultaneously and/or integrally on a multi-bed flat knitting machine.

[0018] The second layer 150 is depicted as being located on an outer surface of the upper 120, but it is contemplated that the second layer 150 could be at least partially located on another surface (e.g., the inner surface). Further, the second layer 150 may have substantially the same boundary dimensions as the base layer 140 such that substantially all of at least one surface of the base layer 140 is covered by the second layer 150. Alternatively, and as depicted by FIG. 1, the second layer 150 may be absent from an isolated region (the fifth region 142) of the base layer 140. Although not shown, it is also contemplated that the article of footwear 100 may have one or more locations where the second layer 150 is present but the base layer 140 is absent.

[0019] FIG. 2 shows the upper 120 of article of footwear 100 (of FIG. 1) in isolation, and potentially as the upper 120 would appear after its formation (e.g., on a knitting machine) and before being combined with other elements of the article of footwear 100, like the sole 110. The upper 120 may be formed as an integral one-piece element substantially during a single manufacturing process (e.g., a single knitting process).

[0020] The upper 120 is shown having four zones including the second layer 150, where, in an example not forming part of the present invention, each zone is associated with one of the four regions 152, 154, 156, and 158 of the second layer 150. The first region 152 of the second layer 150 may include a relatively large structure (e.g., relatively large cells 160 as described in more detail below). This structure may provide the upper 120 with a desirable level of support and elasticity, for example. The second region 154 of the second layer 150 may have a relatively dense structure (e.g., relatively small cells 160). This structure may be relatively rigid and/or inelastic (at least with respect to the first region 152), which may be advantageous in areas of the upper 120 where support, strength, durability, and/or other particular properties associated with a dense structure are desired. In some embodiments, the first region 152 may have a first elasticity, and the second region 154 may have a second elasticity, such that when the same tensile load is applied to both regions, a zone with the first region 152 elongates at least 5% more, at least 10% more, at least 20% more, at least 50% more, or even at least 100% more (or greater) than a zone with the second region 154. As shown, it may be advantageous for the second region 154 of the second layer 150 to extend from the biteline 116 to the throat 126 and/or to a throat area 127 adjacent to the throat 126, which may provide durability and structural integrity to an area that commonly experiences a high degree and frequency of stress during typical use of an article of footwear. Further, the second region 154 may interact with a fastening element, such as a lace, to ensure a snug and comfortable fit of the upper 120. For example, tightening the lace may tighten the second region 154 (and its associated zone) around the foot. Similarly, the third region 156, which is depicted as including an area of the second layer 150 with two structures (described in more detail below), may exhibit increased strength and durability and a decreased amount of elasticity with respect to other areas and/or may provide a desirable visual effect. The fourth region 158 may have another structure (or a structure substantially the same a structure from another region) to achieve characteristics desired in that zone of the upper 120. While four regions of the second layer 150 have been illustrated for purposes of this explanation, the second layer 150 may have more or less than four regions.

[0021] A fifth region 142 of the base layer 140 may include a portion of the base layer 140 that is isolated from and uncovered by the second layer 150. In this embodiment, the second layer 150 terminates at the edge of the fifth region 142, but it is contemplated that the structure of the second layer 150 could fade or otherwise slowly transition from the fourth region 158 into the fifth region 142 in a transition zone. The fifth region 142 may elongate at least 20% more, at least 50% more, at least 100% more, at least 200% more, or even at least 300% more (or greater) than at least one of the zones incorporating a region of the second layer 150. It may be advantageous to include the fifth region 142 and/or other uncovered, isolated regions of the base layer 140 where flexibility, elasticity, and certain other characteristics that may be primarily associated with the base layer 140 in isolation are desired.

[0022] FIG. 3 shows an article 300 with an embodiment of a region of a second layer 350 and an underlying base layer 340. The second layer 350 may have a first yarn portion 352, a second yarn portion 354, and a third yarn portion 356, which are each depicted as extending in a serpentine pattern in a substantially parallel direction. These yarn portions may be formed of different materials or the same material, and it is contemplated that they may be formed of the same continuous yarn or separate yarns. As shown in FIG. 3, the first yarn portion 352 of the second layer 350 may be intertwined with at least one other yarn portion, such as the second yarn portion 354. In this embodiment, the second yarn portion 354 is intertwined with two other yarn portions: the first yarn portion 352 and the third yarn portion 356. It is contemplated that one yarn may be intertwined with more than two yarn portions of the second layer 350. As shown, the structure of the second layer 350 defines cells 360, which may have corners defined at points where the yarn portions of the second layer 350 are intertwined and/or overlap.

[0023] The structure of the second layer 350 may form any suitable number of cells 360. The cells 360 are depicted in FIG. 3 as substantially being in the shape of a quadrilateral (i.e., a four-sided polygon, such as a square or rectangle), but it is contemplated that the second layer 350 may include cells having different shapes with a different number of sides. For example, the second layer 350 could be formed to have triangular cells, pentagonal cells, hexagonal cells, etc. Further, according to the invention, the second layer 350 has different regions that have a different property (e.g., different cell sizes or shapes), and it is contemplated that the second layer 350 may have a pattern that forms cells of different shapes adjacent to one-another. The shape of the cells 360 may be selected for certain characteristics. For example, cells having a triangular shape may have a different elasticity than quadrilateral cells at least in one direction. The size of the cells 360 may also be selected for certain properties. For example, small cells may form a tighter, more rigid, and less elastic structure with respect to a structure formed by larger cells. The cells 360 may change in size in response to motion and/or stretching of the article 300 when the article 300 is in use.

[0024] The base layer 340 and the second layer 350 may have different functional and/or visual characteristics. For example, the base layer 340 may be more elastic than the second layer 350. The difference in elasticity may be achieved by using yarns formed of different materials and/or having different dimensions, by varying the way the yarns interact (for example, by selecting a particular knit structure that exhibits a particular degree of elasticity), or a combination thereof. In some embodiments, the base layer 340 and the second layer 350 may additionally or alternatively have different degrees of strength, durability, thermal resistance, fluid (e.g., water or air) permeability, weight, flexibility, or the like. Further, the second layer 350 may have different visual properties (e.g., a different color) than the base layer 340 such that the combination of the second layer 350 and the base layer 340 is aesthetically pleasing. It is contemplated that when the article 300 is in use (for example as an upper of an article of footwear), its movement may cause the second layer 350 to visibly move with respect to the underlying base layer 340, which may create a desirable visual effect.

[0025] The yarns of the second layer 350 and the base layer 340 may be formed of any suitable material. For example, in some embodiments, the yarns forming the second layer 350 may be formed of a material that is relatively inelastic when compared to the yarns that form the underlying base layer 340. To illustrate, the yarns forming the base layer 340 may elongate at least 5% more, at least 50% more, at least 100% more, or even at least 500% more (and potentially greater than 500% more) than the yarns forming the second layer 350 when subjected to the same tensile load. The combination of the base layer 340 and the second layer 350 may be advantageous for achieving a desirable combination of characteristics of the article 300. For example, the base layer 340 may be relatively soft and anti-abrasive, which are characteristics that may be desirable for an inner surface of an upper or other article configured to contact a wearer. The base layer 340 may also be relatively elastic, which when used in an upper, for example, may facilitate a snug and comfortable fit around the foot of the wearer. The second layer 350, which may be located on an outer surface of the base layer 340, may be relatively inelastic to provide the upper with structural integrity and durability either throughout the entirety of the upper or at select locations.

[0026] FIG 4 shows an embodiment of an article 400 where a region of a second layer 450 includes two structures, depicted as a first structure 452 and a second structure 454. As depicted, the first structure 452 and the second structure 454 each form their own cells. It is contemplated that more than two structures may be included. The first structure 452 and the second structure 454 are depicted as being substantially identical, but this is not required. In some embodiments, the first structure 452 may have different characteristics (either visual or functional) than the second structure 454. The yarns forming the first structure 452 may or may not be interlooped with the yarns forming the second structure 454. Both of the structures may be attached to the base layer 440, but alternatively one or both of the structures may have portions that are free from (e.g., loose with respect to) the base layer 440. The first structure 452 may be interlocked with the second structure 454. In other words, when viewing the first structure 452 and the second structure 454 from the viewpoint shown in FIG. 4, the first structure 452 may be in front of (e.g., closer to the viewer) the second structure 454 in some locations, and the first structure 452 may be behind (e.g., closer to the base layer 440) the second structure 454 in other locations. As depicted, the cells of the first structure 452 may be offset from the cells of the second structure 454.

[0027] FIG. 5 shows an article 500 with a second layer 550 having three different regions: a first region 552, a second region 554, and a third region 556. A base layer 540 may include a fourth region 542, where the fourth region 542 of the base layer 540 may be in isolation with respect to the second layer 550. Two or more of the regions of the second layer 550 have at least one different property. For example, in the first region 552, the second layer 550 has two structures (similar to as shown in FIG. 4). In the second region 554, the second layer 550 has a single structure with relatively large cells. In the third region 556, the second layer 550 has relatively small cells when compared to the cells of the second region 554. The second layer 550 terminates adjacent to the fourth region 542 of the base layer 540 such that the fourth region 542 includes an uncovered and isolated portion of the base layer 540. The fourth region 542 may exhibit properties associated with the base layer 540 alone. FIG. 5 illustrates that the article 500 has a different structure, and hence different functional and/or visual properties, in different zones. While all of the regions of the second layer 550 are depicted as being on the same side of the base layer 540, it is contemplated that at least one region of the second layer 550 may be on the opposite side of the base layer 540. Further, according to the invention, two or more regions of the

second layer 550 are spaced apart on the base layer such that an isolated region of the base layer 540 is disposed therebetween.

[0028] As shown in FIG. 6, an article 600 may have a second layer 650 with a region that is attached to a base layer 640 with a series of tie-down yarns 642 at the corners of the cells and/or a series of tie-down yarns 644 between the corners of the cells. In some embodiments (not shown), a tie-down yarn 642 may be included at substantially every corner of every cell 660, but this is not required. The tie-down yarns 642 may be selectively placed to achieve a certain level of securement between the second layer 650 and the base layer 640. It may be advantageous in some instances to provide attachment at every corner when it is desirable for the second layer 650 to remain substantially in the same position with respect to the base layer 640. In other instances, it may be advantageous to allow some cells of the second layer 650 to remain free with respect to the base layer 640, which may allow for varying characteristics depending on the action of the article 600 and/or may allow for respective movement between the layers that produces desirable visual and/or functional effects. It is further contemplated that some or all of the tie-down yarns could be located at another location, such as between the corners of the cells of the second layer 650 as shown by the tie-down yarns 644 of FIG. 6.

[0029] The tie-down yarns 642 and/or 644 may be yarns that form the base layer 640. For example, as described in more detail below with reference to FIGS. 7-8, the yarns (of FIG. 6) that form the second layer 650 may be integrated with (e.g., intertwined with) the yarns that form the base layer 640 during a knitting process. It is contemplated, however, that the tie-down yarns 642 and/or 644 may be separate from the second layer 650 and the base layer 640, and/or may be embroidered or otherwise installed after the formation of the second layer 650 and the base layer 640. Other forms of attachment may be additionally or alternatively used. For example, the second layer 650 may be attached to the base layer 640 by way of an adhesive, with a tack or mechanical clamp, by sewing, or the like.

[0030] FIG. 7 shows a diagram illustrating one method of forming an article having a base layer and a second layer on a knitting machine, where the knitting machine has a first needle bed 762 and a second needle bed 764. The first needle bed 762 may be what is commonly referred to as a "front bed" on a flat-knitting machine, and the second needle bed 764 may be what is commonly referred to as a "back bed" (or vice versa). The diagram of FIG. 7 is not intended to represent the entirety of an article, but is shown only to illustrate one particular sequence that may be substantially repeated. Each repetition of the depicted sequence does not need to be identical. Further, FIG. 7 shows only one series of six (6) consecutive needles of each needle bed, and it will be recognized that the described steps may be repeated (potentially with some alterations between repetitions) across additional needles of each needle bed.

[0031] Referring to FIG. 7, a first yarn 742 may be primarily associated with a base layer, and a second yarn 752 may be primarily associated with a second layer. Step A (which is not necessarily the first step of the sequence) shows the second yarn 752 being knitted on one needle of the first needle bed 762 and then on a needle of the second needle bed 764 being spaced about two needles apart. This spacing is not limited to two (2) needles, and it may correlate to the size of the cells of the second layer. Steps B-E depict knitting the first yarn 742 repeatedly on each of the needles of the second needle bed 764. This may form the base layer with a single jersey knit structure. In the depicted embodiment, the first yarn 742 completes four (4) passes before again knitting the second yarn 752. The number of consecutive passes of the base layer may also be associated with the cell size of the second layer. After knitting a portion of the base layer, the loop of the second yarn 752 located on a needle of the first needle bed 762 may be transferred to a needle of the second needle bed 764 at Step F. This may provide a point of attachment between the second layer and the base layer (e.g., a point where a tie-down yarn is located) once the knitting process is continued. The four depicted loops of the second yarn 752 in FIG. 7 may each be associated with a corner of cells of the second layer.

[0032] This sequence may be substantially repeated in Steps G-K of FIG. 7, but as depicted, the sequence of the second yarn 752 at Step G may be offset with respect to Step A. Here, this offset is shown as being equivalent to the distance between six (6) needles of the first needle bed 762. This offset may correspond to one dimension of the cells when the knitting process is complete. The sequence described in FIG. 7 may form an article with a structure similar to that of the article 300 of FIG. 3, for example.

[0033] FIG. 8 shows a diagram illustrating one method of forming an article having a base layer and a second layer with multiple structures (e.g., as shown in FIG. 4) on a knitting machine with a first needle bed 862 and a second needle bed 864. A first yarn 842 may be primarily associated with a base layer, and a second yarn 852 and a third yarn 854 may be primarily associated with a second layer. The second yarn 852 may be primarily associated with a first structure of the second layer, and the third yarn 854 may be associated with a second structure of the second layer. In some embodiments, the second yarn 852 and the third yarn 854 may be substantially identical yarns, and it is contemplated that they may be the same continuous yarn. In the depicted Step A, the second yarn 852 is knitted on one needle of the first needle bed 862 and then on a needle of the second needle bed 864 being spaced about two needles apart. Similarly, in Step B, the third yarn 854 is depicted as going through the same sequence as the second yarn 852 but being offset by one needle. This offset may create two structures with cells that are offset from one another (as best illustrated by FIG. 4). This offset is not limited to one needle, and it does not necessarily need to be constant throughout the entirety of the article.

[0034] In FIG. 8, steps C-F depict knitting the first yarn 842 repeatedly on each of the needles of the second needle

bed 864. This may form the described base layer with a single jersey knit structure. After knitting a portion of the base layer, the loop of the second yarn 852 located on a needle of the first needle bed 862 may be transferred to a needle of the second needle bed 864 at Step G. This may form a point of attachment between the base layer and the second layer. Similarly, in Step H, the loop of the third yarn 854 located on the first needle bed 862 may be transferred to the second needle bed 864.

[0035] Referring to Step I, the second yarn 852 may again be knitted on one needle of each of the first needle bed 862 and the second needle bed 864. However, the second yarn 852 may be offset with respect to its previous pass. For example, it may be offset by six (6) needles with respect to its previous pass, which may correspond with one dimension of the cells of the second layer. The cell size of the second layer may also correlate with the number of passes of the base layer alone (e.g., the single jersey passes from Steps C-F and Steps K-N) between knitting the second yarn 852 and/or the third yarn 854. Step J similarly involves knitting the third yarn 854 in a manner offset from its previous pass in Step B. Steps K-N involve again knitting the first yarn 842 of the base layer to form a single jersey structure. This knitting process may be substantially repeated to form a multi-structure (e.g., a two structure) region.

[0036] The inventors have found that varying the structure of the second layer as described herein can achieve particular advantageous characteristics. For example, in one test, an article with five zones was formed. In this example, which does not form part of the present invention, each zone of the article may be associated with a region of a second layer. One zone (e.g., the Control Zone) included only a knitted base layer without (i.e., isolated from) a second layer. The 1st Zone included the base layer and a second layer with relatively large cells. The 2nd, 3rd, and 4th Zones included a base layer with second layers having decreasing cell size such that the 4th Zone included the smallest cells. Each of the zones was formed into an approximately 25,4mm (1 inch) by 152,4mm (6 inch) strip. The zones were then separately tested with a testing machine (i.e., an Instron 5965 Testing System) that applied a particular load and then measured the elongation of each of the zones at a loading speed of 50 millimeters per minute and at a gage length of 75 millimeters. Table 1 includes the data recovered from these tests.

Table 1

		Elongation at Applied Load (%)			
		25 N	50 N	75 N	100 N
Control	1	143.10	183.39	207.48	230.34
	2	124.76	163.06	186.02	206.20
	3	113.09	150.09	170.17	185.82
	Mean	126.99	165.51	187.89	207.45
	SD	15.13	16.79	18.73	22.29
1st Zone	1	69.17	82.21	92.55	104.36
	2	72.90	85.14	94.51	103.87
	3	66.78	78.95	89.66	99.91
	Mean	69.62	82.10	92.24	102.71
	SD	3.09	3.09	2.44	2.44
2nd Zone	1	54.44	66.67	75.18	82.06
	2	51.63	62.52	70.98	77.76
	3	51.44	62.56	70.25	76.47
	Mean	52.50	63.91	72.14	78.77
	SD	1.68	2.38	2.66	2.93
3rd Zone	1	35.34	49.48	59.65	66.92
	2	33.50	47.00	55.91	63.59
	3	33.59	47.77	56.61	64.13
	Mean	34.15	48.08	57.39	64.88
	SD	1.04	1.27	1.99	1.79
4th Zone	2	16.81	24.90	30.98	36.10
	3	19.18	28.56	34.76	40.20
	4	18.63	27.97	35.05	41.22
	Mean	18.21	27.14	33.60	39.17
	SD	1.24	1.96	2.27	2.71

[0037] As shown in Table 1, the elongation correlates with cell size, where a smaller cell size reduces the elongation. Advantageously, the cell size of a second layer as described herein can be selected to achieve particular elongation properties.

[0038] In a second test, the zones were tested to determine their recovery characteristics. In this test, a testing machine (i.e., the Instron 5965 Testing System) pulled each of the zones with a 100 Newton load for 100 cycles. The gauge length was set at 100 millimeters. Displacement measurements were taken initially at approximately 9.8 Newtons (Po) and then again after the 100 cycles (Pi). Table 2 includes the data recovered from this test. The Stretch-Recovery Index was determined by dividing the difference between the initial measured length (Po) and the final measured length (Pi) by the difference between the gauge length and the initial length.

Table 2

Sample	Trial	P0 (mm)	P1 (mm)	Stretch-Recovery Index (%)
Control	1	53.40	122.10	44.78%
	2	33.45	111.00	58.11%
	Mean	43.43	116.55	50.98%
1 st Zone	1	34.85	62.14	20.24%
	2	23.45	49.72	21.28%
	Mean	29.15	55.93	20.74%
2 nd Zone	1	13.78	34.48	18.19%
	2	17.42	31.59	12.07%
	3	16.17	36.27	17.30%
	Mean	15.79	34.11	15.83%
3 rd Zone	1	7.61	18.01	9.66%
	2	5.70	17.81	11.46%
	3	6.32	18.21	11.19%
	Mean	6.54	18.01	10.77%
4 th Zone	1	3.16	13.68	10.20%
	2	3.66	12.07	8.12%
	3	4.05	11.91	7.56%
	Mean	3.62	12.55	8.62%

[0039] As indicated by the data, the cell size of the second layer is correlated with a lower Stretch Recovery Index. Advantageously, the structure of the second layer as described herein can therefore be configured to achieve particular recovery properties. For example, the second layer may provide a particular zone with a desirable lock-out effect in certain regions of an article of footwear, for example, while other zones may be configured to have a relatively high elasticity where a high degree of freedom of movement is desirable.

[0040] In the examples above, zones with a second layer (e.g., a net layer) are generally described as having a relatively low elasticity and high stretch resistance when compared to zones without the second layer. However, it is also contemplated that zones with the net layer may be relatively elastic when compared to other zones.

[0041] According to the invention, referring to FIG. 9, an article 900 includes a first zone 952 and a second zone 954. The first zone 952 having a first region 942 of a base layer 940 and a second layer 950, which may be similar to embodiments described above. The first region of the base layer 940 may include a first yarn, and the second layer 950 may include a second yarn. The second yarn(s) of the second layer 950 may be relatively inelastic when compared to the first yarn(s) that forms the underlying first region 942 of the base layer 940. The second layer 950 may be formed using the methods described above (e.g., by knitting the base layer on a first needle bed while holding the second yarn on a second needle bed, and then transferring the second yarn to the first needle bed), and may include any of the characteristics or other aspects described above with respect to a second layer.

[0042] The second zone 954 of the article 900 includes a second region 944 of the base layer 940. The second layer 950 may terminate adjacent to the second region 944 of the base layer 940 such that it does not cover a surface of the second region 944. The second region of the base layer 940 shares at least one common yarn (e.g., the first yarn) or at least one common yarn and at least one common course with the first region of the base layer 940, and it is contemplated that the knit structure forming the first region 942 and the second region 944 may be different. The second region 944 of the base layer 940 also shares at least one common yarn (e.g., the second yarn) or at least one common yarn and at least one common course with the second layer 950 located in the first region 942. In other words, the second region 944 of the base layer 940 is may at least partially formed by the yarns forming the first region 942 of the base layer 940 and the yarns forming the second layer 950. This may, in some embodiments, result in the second region 944 of the base layer 940 having a higher stitch density (i.e., the total number of knit loops in a measured area of fabric) with respect to the first region 942 of the base layer 940. Additionally, or alternatively, the second region 944 of the base layer 940 may incorporate the second yarn (e.g., the yarn at least partially forming the second layer 950), which may result in the second region 944 of the base layer 940 having a different elasticity than the first region 942 of the base layer 940.

[0043] As a result, the first zone 952 of the article 900 includes a relatively high elasticity when compared to the second zone 954 of the article in some embodiments. In other words, the first zone 952 has a first degree of elasticity such that it has a first elongation when subjected to a tensile load, and the second zone 954 may have a second degree of elasticity such that it has a second elongation when subjected to the tensile load. The first elongation is at least 5% more, at least 10% more, at least 20% more, at least 50% more, or even at least 100% more (or greater) than the second elongation, for example.

[0044] The yarns of the second region 944 of the base layer 940 may be distributed such that the first yarns forming the first region 942 of the base layer 940 are primarily associated with an outer surface of the second region 944 and/or such that the second yarns forming the second region 944 of the base layer 940 are primarily associated with an inner surface of the second region 944 of the base layer 940 (or vice versa). Advantageously, from an external visual perspective, the second yarns may be hidden such that the first region 942 and the second region 944 of the base layer 940 may have a uniform appearance, which may be desirable aesthetically, while still exhibiting the functional characteristics described above. Alternatively, the second yarns may be exposed (when associated with the outer surface) to produce a contrast in appearance between the first region 942 and the second region 944 of the base layer 940. Alternatively, both the first and second yarns may be associated with both surfaces.

[0045] While not required, the article 900 may also include a third zone 956 with a third region 946 of the base layer that is similar in knit structure and/or yarn composition to the first region 942 of the base layer 940. The second layer 950 may terminate adjacent to the third region 946 of the base layer 940 such that the third region 946 of the base layer 940 is isolated from other layers in the third zone 956. As a result, the third zone 956 may have a relatively high elasticity when compared to the first zone 952 and the second zone 954, and accordingly may elongate at least 5% more, at least 10% more, at least 20% more, at least 50% more, or even at least 100% more (or greater) than the elongation of the first zone 952 and second zone 954 when subjected to a certain tensile load. Also according to the invention, while not shown, the second layer 950 has multiple regions (similar to as described with reference to the article 500 of FIG. 5).

[0046] Referring to FIG. 10, a knitted upper 1020 for an article of footwear may have a first zone 1052, a second zone 1054, and a third zone 1056, which may have relative characteristics similar to those of the first zone 952, the second zone 954, and the third zone 956 of FIG. 9. The three zones may be located in any suitable location of the upper 1020. As shown, for example, the first zone 1052 may extend from a biteline 1016 to a throat area 1027, and may provide suitable rigidity, durability, and structural support in that particular area. The second zone 1054 may be located in a heel area 1001, as shown, thereby providing desirable characteristics to that area. Additionally, or alternatively, the second zone 1054 may be located in the throat area 1027, which may be advantageous for providing adequate rigidity, strength, and durability where the upper 1020 is configured to couple to a fastening element (such as a lace). The third zone 1056 may be located in a toe region 1003 where a relatively high elasticity is desirable for providing comfort and desirable performance of the article of footwear. The respective zones are shown in certain areas of the upper 1020 for non-limiting illustrative purposes only, and it is contemplated that the three zones (or more or less than three zones) could be arranged in any particular manner with respect to the upper 1020.

[0047] In the present disclosure, the ranges given either in absolute terms or in approximate terms are intended to encompass both, and any definitions used herein are intended to be clarifying and not limiting. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of the present embodiments are approximations, the numerical values set forth in the specific examples are reported as precisely as possible. Any numerical value, however, inherently contains certain errors necessarily resulting from the standard deviation found in their respective testing measurements. Moreover, all ranges disclosed herein are to be understood to encompass any and all subranges (including all fractional and whole values) subsumed therein.

Claims

1. An article (100, 300, 400, 500, 900) the article comprising:

a first zone (952), the first zone including a first region (942) of a knitted base layer (340, 440, 540, 940) and a knitted second layer Z (350, 450, 550, 950), wherein the second layer (350, 450, 550, 950) is disposed primarily on one side of the base layer (340, 440, 540, 940), the base layer (340, 440, 540, 940) and the second layer (350, 450, 550, 950) being at least partially coextensive to each other; and
a second zone (954) including a second region (944) of the base layer (340, 440, 540, 940),
wherein the second region of the base layer (340, 440, 540, 940) and the first region of the base layer (340, 440, 540, 940) have a common yarn, and wherein the second region of the base layer (340, 440, 540, 940) and the second layer (350, 450, 550, 950) have a common yarn,
wherein the first zone has a first degree of elasticity such that it has a first elongation when subjected to a tensile load,

characterized in that the second zone has a second degree of elasticity such that it has a second elongation when subjected to the tensile load, the first elongation being at least 5% greater than the second elongation, wherein the second layer (350, 450, 550, 950) includes a first region in a first portion of the first zone (952) and a second region in a second portion of the first zone, wherein the first region has at least one property being different than the second region, and wherein the first and second regions of the second layer (350, 450, 550, 950) are spaced apart on the base layer (940).

2. The article (100, 300, 400, 500, 900) of claim 1, wherein the first elongation is at least 20% greater than the second elongation.

3. The article (100, 300, 400, 500, 900) of claim 1,

wherein the first region (942) of the base layer (940) is at least partially formed with a first yarn and the second layer (350, 450, 550, 950) is at least partially formed with a second yarn, the first yarn having a characteristic different than that characteristic of the second yarn, wherein the first yarn is the common yarn of the first and second region (942, 944) of the base layer (340, 440, 540, 940) and wherein the second yarn is the common yarn of the second layer (350, 450, 550, 950) and the second region (944) of the base (340, 440, 540, 940).

4. The article (100, 300, 400, 500, 900) of claim 3, wherein the first yarn is primarily disposed on a first side of the base layer (340, 440, 550, 940) in the second zone (954), and wherein the second yarn is primarily disposed on an opposite second side of the base layer (340, 440, 550, 940) in the second zone.

5. The article (100, 300, 400, 500, 900) of claim 1, further comprising a third zone (956) including a third portion of the base layer (340, 440, 540, 940), wherein the second layer (350, 450, 550, 950) terminates adjacent to the third portion of the base layer (340, 440, 540, 940), and wherein the third zone includes a third elongation when subjected to the tensile load, the third elongation being at least 5% greater than both the first elongation and the second elongation.

6. The article (100, 300, 400, 500, 900) of claim 1, wherein the first region of the first zone (952) has an elongation being at least 5% greater than an elongation of the second region of the first zone when subjected to a tensile load; and/or wherein the first and second regions of the second layer (350, 450, 550, 950) are each disposed primarily on the same side of the base layer (340, 440, 540, 940).

7. The article (100, 400, 500, 900) of claim 1, wherein the first region of the second layer (450, 550, 950) includes a first structure (452) and a second structure (454) each forming their own respective cells, and wherein the cells of the first structure are offset with respect to the cells of the second structure.

8. The article (100, 300, 500, 900) of claim 1, wherein the at least one property of the first region includes a first cell size, and wherein the at least one property of the second region of the second layer (350, 550, 950) includes a second cell size, and wherein at least one dimension of the first cell size is larger than the same at least one dimension of the second cell size.

9. The article (100, 900) of claim 1, wherein the article is an upper (120, 1020) for an article of footwear, and wherein the second layer (550, 950) extends from a biteline (116, 1016) of the upper to a throat area (127, 1027) of the upper.

10. An article (100, 300, 400, 500, 900) comprising:

a first zone (952), the first zone including a knitted base layer (340, 440, 540, 940) and a first region of a knitted second layer (350, 450, 550, 950) disposed primarily on one side of the base layer (340, 440, 540, 940), the base layer and the second layer (350, 450, 550, 950) being at least partially coextensive to each other; and a second zone (954), the second zone including the base layer (340, 440, 540, 940) and a second region of the second layer (350, 450, 550, 950) disposed primarily on one side of the base layer (340, 440, 540, 940), wherein the first zone has a first degree of elasticity such that it has a first elongation when subjected to a tensile load,

characterized in that the second zone has a second degree of elasticity such that it has a second elongation

when subjected to the tensile load, the first elongation being at least 5% greater than the second elongation, wherein the second layer (350, 450, 550, 950) includes a first region in a first portion of the first zone (952) and a second region in a second portion of the first zone, wherein the first region has at least one property being different than the second region, and
 wherein the first and second regions of the second layer (350, 450, 550, 950) are spaced apart on the base layer (340, 440, 540, 940).

11. The article (100, 300, 400, 500, 900) of claim 10, wherein the first and second regions of the second layer (350, 450, 550, 950) are each disposed primarily on the same side of the base layer (340, 440, 540, 940).
12. The article (100, 300, 400, 500, 900) of claim 10, further comprising a third zone (956), wherein the base layer (340, 440, 540, 940) is isolated with respect to the second layer (350, 450, 550, 950) in the third zone.
13. The article (100, 300, 400, 500, 900) of claim 12, wherein the third zone (956) has a third degree of elasticity such that it has a third elongation when subjected to the tensile load, the third elongation being at least 20% greater than the second elongation.
14. The article (100, 400, 500, 900) of claim 13, wherein the first region includes a first cell size, and wherein the second region of the second layer (450, 550, 950) includes a second cell size, and wherein at least one dimension of the first cell size is larger than the same at least one dimension of the second cell size.

Patentansprüche

1. Artikel (100, 300, 400, 500, 900), wobei der Artikel Folgendes umfasst:

eine erste Zone (952), wobei die erste Zone einen ersten Bereich (942) einer gestrickten Basislage (340, 440, 540, 940) und eine gestrickte zweite Lage (350, 450, 550, 950) aufweist, wobei die zweite Lage (350, 450, 550, 950) hauptsächlich auf einer Seite der Basislage (340, 440, 540, 940) angeordnet ist, wobei die Basislage (340, 440, 540, 940) und die zweite Lage (350, 450, 550, 950) zumindest teilweise miteinander deckungsgleich sind, und

eine zweite Zone (954), die einen zweiten Bereich (944) der Basislage (340, 440, 550, 940) aufweist, wobei der zweite Bereich der Basislage (340, 440, 540, 940) und der erste Bereich der Basislage (340, 440, 540, 940) ein gemeinsames Garn haben, und wobei der zweite Bereich der Basislage (340, 440, 540, 940) und die zweite Lage (350, 450, 550, 950) ein gemeinsames Garn haben, wobei die erste Zone einen ersten Elastizitätsgrad aufweist, derart, dass sie bei Zugbeanspruchung eine erste Dehnung aufweist,

dadurch gekennzeichnet, dass

die zweite Zone einen zweiten Elastizitätsgrad aufweist, derart, dass sie bei der Zugbeanspruchung eine zweite Dehnung aufweist, wobei die erste Dehnung mindestens 5% größer als die zweite Dehnung ist, wobei die zweite Lage (350, 450, 550, 950) einen ersten Bereich in einem ersten Abschnitt der ersten Zone (952) und einen zweiten Bereich in einem zweiten Abschnitt der ersten Zone aufweist, wobei der erste Bereich wenigstens eine Eigenschaft hat, die vom zweiten Bereich verschieden ist, und wobei der erste und der zweite Bereich der zweiten Lage (350, 450, 550, 950) auf der Basislage (940) voneinander beabstandet sind.

2. Artikel (100, 300, 400, 500, 900) nach Anspruch 1, wobei die erste Dehnung mindestens 20% größer als die zweite Dehnung ist.

3. Artikel (100, 300, 400, 500, 900) nach Anspruch 1,

wobei der erste Bereich (942) der Basislage (940) wenigstens teilweise mit einem ersten Garn gebildet ist und die zweite Lage (350, 450, 550, 950) wenigstens teilweise mit einem zweiten Garn gebildet ist, wobei das erste Garn ein Merkmal hat, das von jenem Merkmal des zweiten Garns verschieden ist, wobei das erste Garn das gemeinsame Garn des ersten und des zweiten Bereichs (942, 944) der Basislage (340, 440, 540, 940) ist und wobei das zweite Garn das gemeinsame Garn der zweiten Lage (350, 450, 550, 950) und des zweiten Bereichs (944) der Basis (340, 440, 540, 940) ist.

4. Artikel (100, 300, 400, 500, 900) nach Anspruch 3, wobei das erste Garn hauptsächlich auf einer ersten Seite der Basislage (340, 440, 550, 940) in der zweiten Zone (954) angeordnet ist und wobei das zweite Garn hauptsächlich auf einer entgegengesetzten, zweiten Seite der Basislage (340, 440, 550, 940) in der zweiten Zone angeordnet ist.
5. Artikel (100, 300, 400, 500, 900) nach Anspruch 1, ferner mit einer dritten Zone (956), die einen dritten Abschnitt der Basislage (340, 440, 540, 940) aufweist, wobei die zweite Lage (350, 450, 550, 950) angrenzend an den dritten Abschnitt der Basislage (340, 440, 540, 940) endet und wobei die dritte Zone bei Zugbeanspruchung eine dritte Dehnung aufweist, wobei die dritte Dehnung mindestens 5% größer als sowohl die erste Dehnung als auch die zweite Dehnung ist.
6. Artikel (100, 300, 400, 500, 900) nach Anspruch 1, wobei der erste Bereich der ersten Zone (952) eine Dehnung aufweist, die mindestens 5% größer als eine Dehnung des zweiten Bereichs der ersten Zone ist, wenn er auf Zug beansprucht wird, und/oder wobei der erste und der zweite Bereich der zweiten Lage (350, 450, 550, 950) jeweils hauptsächlich auf der gleichen Seite der Basislage (340, 440, 540, 940) angeordnet sind.
7. Artikel (100, 400, 500, 900) nach Anspruch 1, wobei der erste Bereich der zweiten Lage (450, 550, 950) eine erste Struktur (452) und eine zweite Struktur (454) aufweist, die jeweils ihre eigenen entsprechenden Zellen bilden, und wobei die Zellen der ersten Struktur gegenüber den Zellen der zweiten Struktur versetzt sind.
8. Artikel (100, 300, 500, 900) nach Anspruch 1, wobei die mindestens eine Eigenschaft des ersten Bereichs eine erste Zellgröße aufweist und wobei die mindestens eine Eigenschaft des zweiten Bereichs der zweiten Lage (350, 550, 950) eine zweite Zellgröße aufweist und wobei mindestens eine Abmessung der ersten Zellgröße größer als die gleiche mindestens eine Abmessung der zweiten Zellgröße ist.
9. Artikel (100, 900) nach Anspruch 1, wobei der Artikel ein Obermaterial (120, 1020) für einen Fußbekleidungsartikel ist und wobei sich die zweite Lage (550, 950) von einer Bisslinie (116, 1016) des Obermaterials zu einem Halsbereich (127, 1027) des Obermaterials erstreckt.
10. Artikel (100, 300, 400, 500, 900) mit:

einer ersten Zone (952), wobei die erste Zone eine gestrickte Basislage (340, 440, 540, 940) und einen ersten Bereich einer gestrickten zweiten Lage (350, 450, 550, 950) aufweist, der hauptsächlich auf einer Seite der Basislage (340, 440, 540, 940) angeordnet ist, wobei die Basislage und die zweite Lage (350, 450, 550, 950) zumindest teilweise deckungsgleich miteinander sind, und

einer zweiten Zone (954), wobei die zweite Zone die Basislage (340, 440, 540, 940) und einen zweiten Bereich der zweiten Lage (350, 450, 550, 950) aufweist, der hauptsächlich auf einer Seite der Basislage (340, 440, 540, 940) angeordnet ist,

wobei die erste Zone einen ersten Elastizitätsgrad aufweist, derart, dass sie bei Zugbeanspruchung eine erste Dehnung aufweist,

dadurch gekennzeichnet, dass

die zweite Zone einen zweiten Elastizitätsgrad aufweist, derart, dass sie bei der Zugbeanspruchung eine zweite Dehnung aufweist, wobei die erste Dehnung mindestens 5% größer als die zweite Dehnung ist,

wobei die zweite Lage (350, 450, 550, 950) einen ersten Bereich in einem ersten Abschnitt der ersten Zone (952) und einen zweiten Bereich in einem zweiten Abschnitt der ersten Zone aufweist, wobei der erste Bereich wenigstens eine Eigenschaft hat, die vom zweiten Bereich verschieden ist, und

wobei der erste und der zweite Bereich der zweiten Lage (350, 450, 550, 950) auf der Basislage (340, 440, 540, 940) voneinander beabstandet sind.
11. Artikel (100, 300, 400, 500, 900) nach Anspruch 10, wobei der erste und der zweite Bereich der zweiten Lage (350, 450, 550, 950) jeweils hauptsächlich auf der gleichen Seite der Basislage (340, 440, 540, 940) angeordnet sind.
12. Artikel (100, 300, 400, 500, 900) nach Anspruch 10, ferner mit einer dritten Zone (956), wobei die Basislage (340, 440, 540, 940) bezüglich der zweiten Lage (350, 450, 550, 950) in der dritten Zone isoliert ist.
13. Artikel (100, 300, 400, 500, 900) nach Anspruch 12, wobei die dritte Zone (956) einen dritten Elastizitätsgrad aufweist, derart, dass sie bei der Zugbeanspruchung eine dritte Dehnung aufweist, wobei die dritte Dehnung mindestens 20% größer als die zweite Dehnung ist.

14. Artikel (100, 400, 500, 900) nach Anspruch 13, wobei der erste Bereich eine erste Zellgröße aufweist und wobei der zweite Bereich der zweiten Lage (450, 550, 950) eine zweite Zellgröße aufweist und wobei mindestens eine Abmessung der ersten Zellgröße größer als die gleiche mindestens eine Abmessung der zweiten Zellgröße ist.

5

Revendications

1. Article (100, 300, 400, 500, 900), l'article comprenant :

10 une première zone (952), la première zone comprenant une première région (942) d'une couche de base tricotée (340, 440, 540, 940) et une deuxième couche tricotée (350, 450, 550, 950), la deuxième couche (350, 450, 550, 950) étant agencée principalement d'un côté de la couche de base (340, 440, 540, 940), la couche de base (340, 440, 540, 940) et la deuxième couche (350, 450, 550, 950) étant au moins partiellement coextensives l'une par rapport à l'autre ; et

15 une deuxième zone (954) comprenant une deuxième région (944) de la couche de base (340, 440, 550, 940), la deuxième région de la couche de base (340, 440, 550, 940) et la première région de la couche de base (340, 440, 540, 940) comprenant un fil commun, et la deuxième région de la couche de base (340, 440, 540, 940) et la deuxième couche (350, 450, 550, 950) comprenant un fil commun,

20 la première zone présentant un premier degré d'élasticité de manière à présenter un premier allongement lorsqu'elle est soumise à une contrainte de traction,

caractérisé en ce que la deuxième zone présente un deuxième degré d'élasticité de manière à présenter un deuxième allongement lorsqu'elle est soumise à la contrainte de traction, le premier allongement étant supérieur d'au moins 5% au deuxième allongement,

25 la deuxième couche (350, 450, 550, 950) présentant une première région dans un premier tronçon de la première zone (952) et une deuxième région dans un deuxième tronçon de la première zone, la première région présentant au moins une propriété qui est différente de la deuxième région, et la première et la deuxième région de la deuxième couche (350, 450, 550, 950) étant espacées de la couche de base (940).

- 30 2. Article (100, 300, 400, 500, 900) selon la revendication 1, le premier allongement étant supérieur d'au moins 20% au deuxième allongement.

- 35 3. Article (100, 300, 400, 500, 900) selon la revendication 1, la première région (942) de la couche de base (940) étant au moins partiellement réalisée avec un premier fil, et la deuxième couche (350, 450, 550, 950) étant au moins partiellement réalisée avec un deuxième fil, le premier fil présentant une caractéristique qui est différente de cette caractéristique du deuxième fil,

le premier fil étant le fil commun de la première et de la deuxième région (942, 944) de la couche de base (340, 440, 540, 940), et

40 le deuxième fil étant le fil commun de la deuxième couche (350, 450, 550, 950), et de la deuxième région (944) de la base (340, 440, 540, 940).

- 45 4. Article (100, 300, 400, 500, 900) selon la revendication 3, le premier fil étant agencé principalement d'un premier côté de la couche de base (340, 440, 550, 940) dans la deuxième zone (954), et le deuxième fil étant agencé principalement d'un deuxième côté opposé de la couche de base (340, 440, 550, 940) dans la deuxième zone.

- 50 5. Article (100, 300, 400, 500, 900) selon la revendication 1, comprenant en outre une troisième zone (956) qui comprend un troisième tronçon de la couche de base (340, 440, 540, 940), la deuxième couche (350, 450, 550, 950) se terminant de manière adjacente au troisième tronçon de la couche de base (340, 440, 540, 940), et la troisième zone présentant un troisième allongement lorsqu'elle est soumise à une contrainte de traction, le troisième allongement étant supérieur d'au moins 5% au premier allongement et au deuxième allongement.

- 55 6. Article (100, 300, 400, 500, 900) selon la revendication 1, la première région de la première zone (952) présentant un allongement qui est supérieur d'au moins 5% à un allongement de la deuxième région de la première zone lorsqu'elle est soumise à une contrainte de traction ; et/ou la première et la deuxième région de la deuxième couche (350, 450, 550, 950) étant respectivement agencées principalement du même côté de la couche de base (340, 440, 540, 940).

7. Article (100, 400, 500, 900) selon la revendication 1, la première région de la deuxième couche (450, 550, 950) comprenant une première structure (452) et une deuxième structure (454) formant chacune leurs propres cellules respectives, et les cellules de la première structure étant décalées par rapport aux cellules de la deuxième structure.

8. Article (100, 300, 500, 900) selon la revendication 1, ladite au moins une propriété de la première région présentant une première taille de cellule, et ladite au moins une propriété de la deuxième région de la deuxième couche (350, 550, 950) présentant une deuxième taille de cellule, et au moins une dimension de la première taille de cellule étant supérieure à la même au moins une dimension de la deuxième taille de cellule.

9. Article (100, 900) selon la revendication 1, l'article étant une tige (120, 1020) pour un article chaussant, et la deuxième couche (550, 950) s'étendant à partir d'une ligne d'attaque (116, 1016) de la tige sur une partie d'étranglement (127, 1027) de la tige.

10. Article (100, 300, 400, 500, 900) comprenant :

une première zone (952), la première zone comprenant une couche de base tricotée (340, 440, 540, 940) et une première région d'une deuxième couche tricotée (350, 450, 550, 950) agencée principalement d'un côté de la couche de base (340, 440, 540, 940), la couche de base et la deuxième couche (350, 450, 550, 950) étant au moins partiellement coextensives l'une par rapport à l'autre ; et une deuxième zone (954), la deuxième zone comprenant la couche de base (340, 440, 540, 940) et une deuxième région de la deuxième couche (350, 450, 550, 950) agencée principalement d'un côté de la couche de base (340, 440, 540, 940),

la première zone présentant un premier degré d'élasticité de manière à présenter un premier allongement lorsqu'elle est soumise à une contrainte de traction,

caractérisé en ce que la deuxième zone présente un deuxième degré d'élasticité de manière à présenter un deuxième allongement lorsqu'elle est soumise à la contrainte de traction, le premier allongement étant supérieur d'au moins 5% au deuxième allongement,

la deuxième couche (350, 450, 550, 950) présentant une première région dans un premier tronçon de la première zone (952) et une deuxième région dans un deuxième tronçon de la première zone, la première région présentant au moins une propriété qui est différente de la deuxième région, et

la première et la deuxième région de la deuxième couche (350, 450, 550, 950) étant espacées de la couche de base (340, 440, 540, 940).

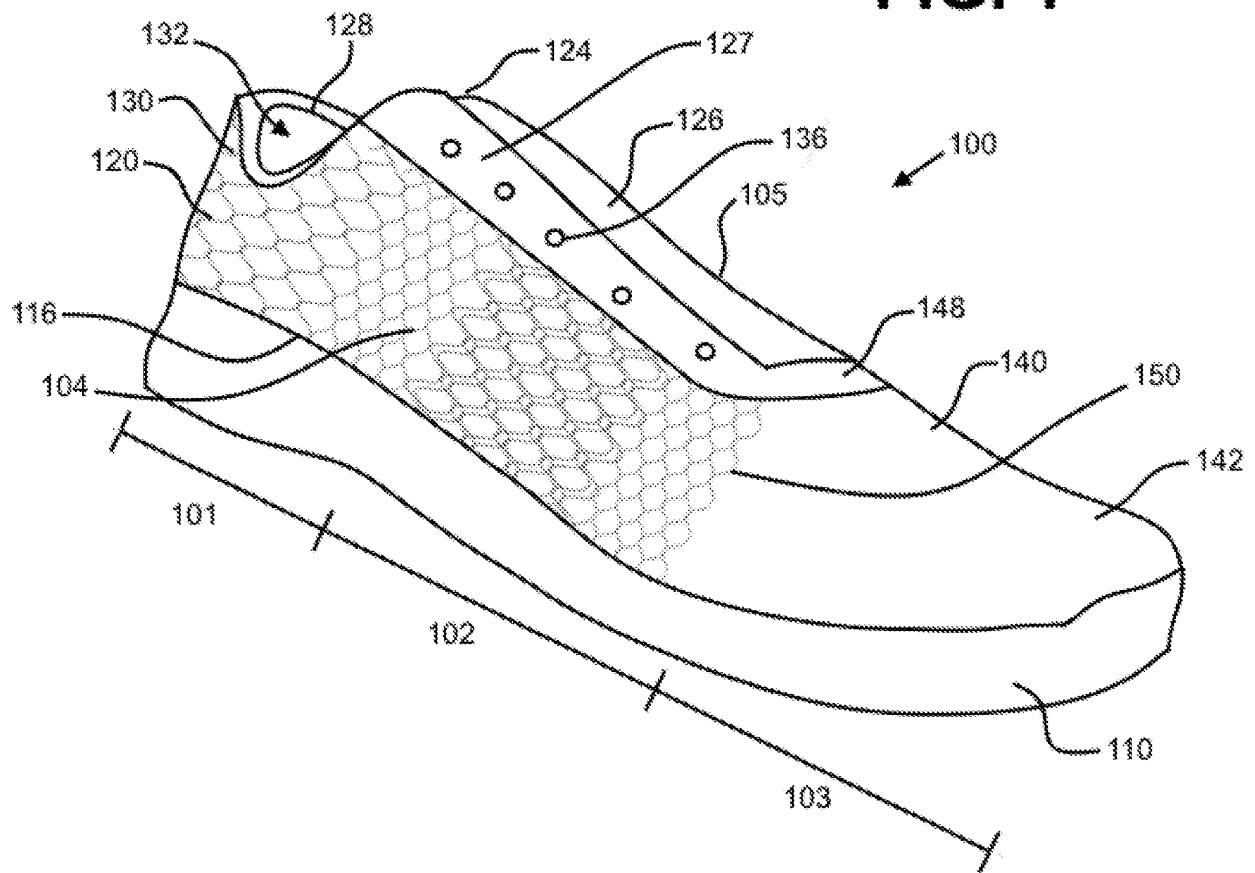
11. Article (100, 300, 400, 500, 900) selon la revendication 10, la première et la deuxième région de la deuxième couche (350, 450, 550, 950) étant chacune agencées principalement du même côté de la couche de base (340, 440, 540, 940).

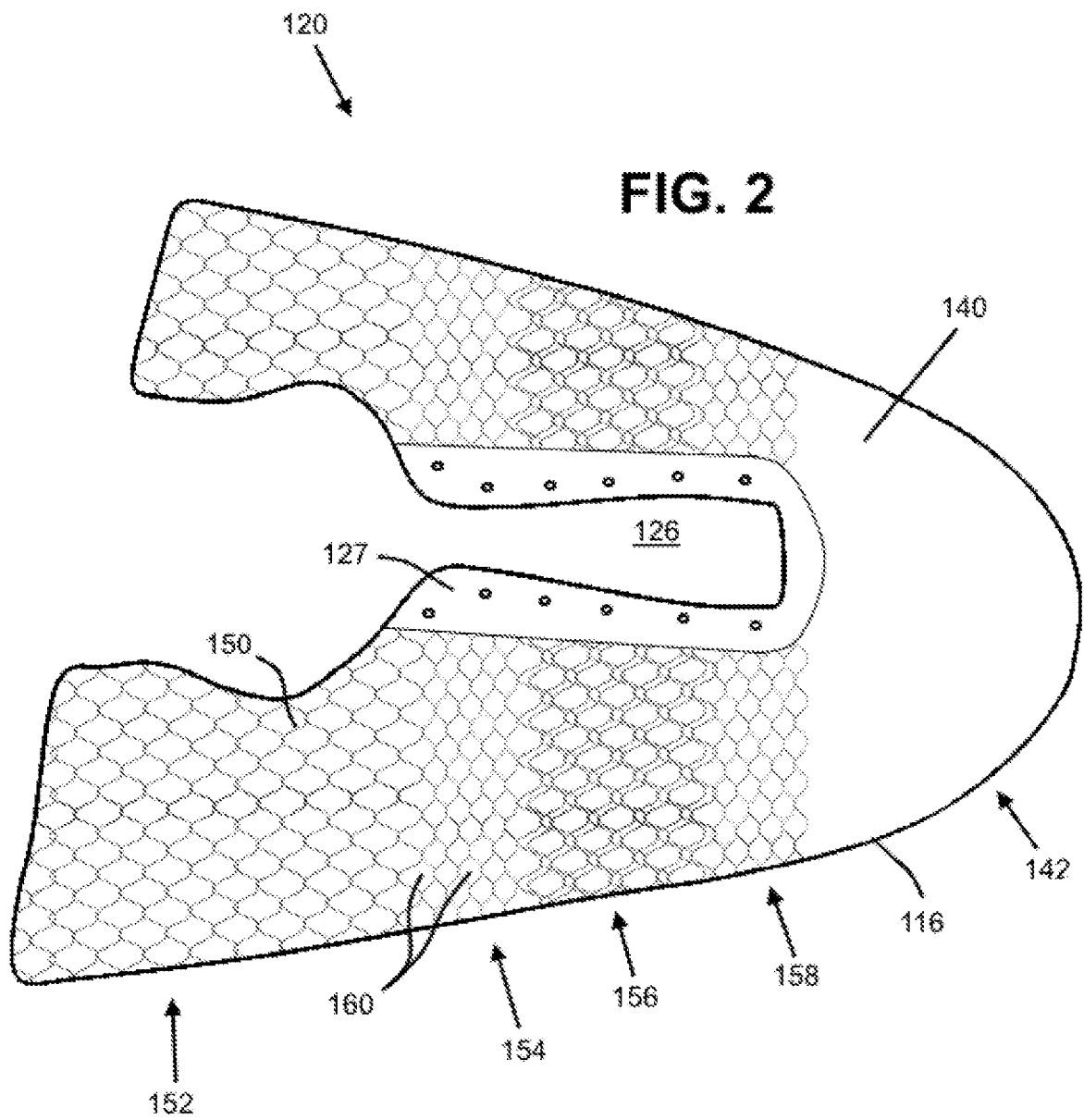
12. Article (100, 300, 400, 500, 900) selon la revendication 10, comprenant en outre une troisième zone (956), la couche de base (340, 440, 540, 940) étant isolée par rapport à la deuxième couche (350, 450, 550, 950) dans la troisième zone.

13. Article (100, 300, 400, 500, 900) selon la revendication 12, la troisième zone (956) présentant un troisième degré d'élasticité de manière à présenter un troisième allongement lorsqu'elle est soumise à la contrainte de traction, le troisième allongement étant supérieur d'au moins 20% au deuxième allongement.

14. Article (100, 400, 500, 900) selon la revendication 13, la première région présentant une première taille de cellule, et la deuxième région de la deuxième couche (450, 550, 950) présentant une deuxième taille de cellule, et au moins une dimension de la première taille de cellule étant supérieure à la même au moins une dimension de la deuxième taille de cellule.

FIG. 1





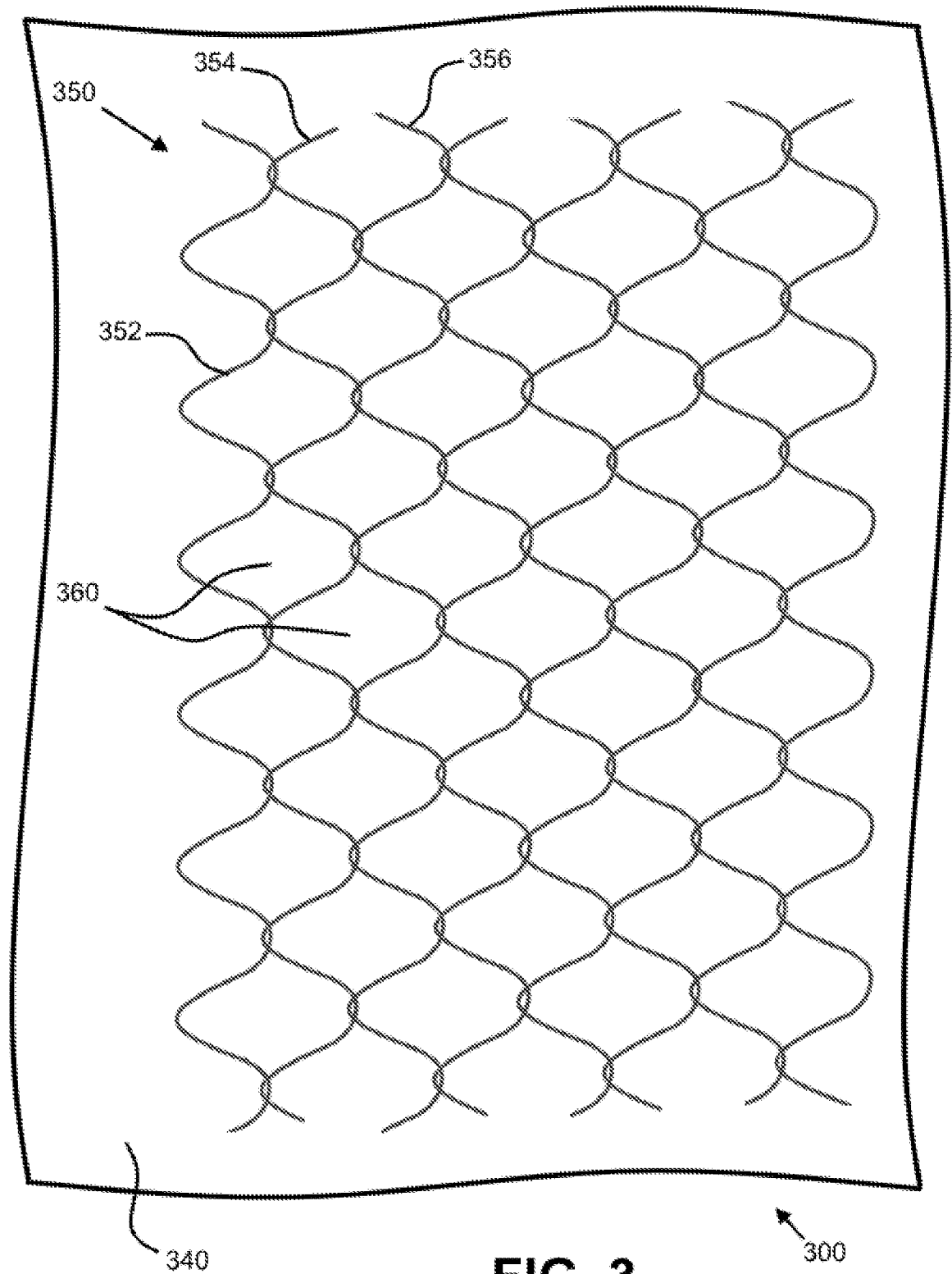
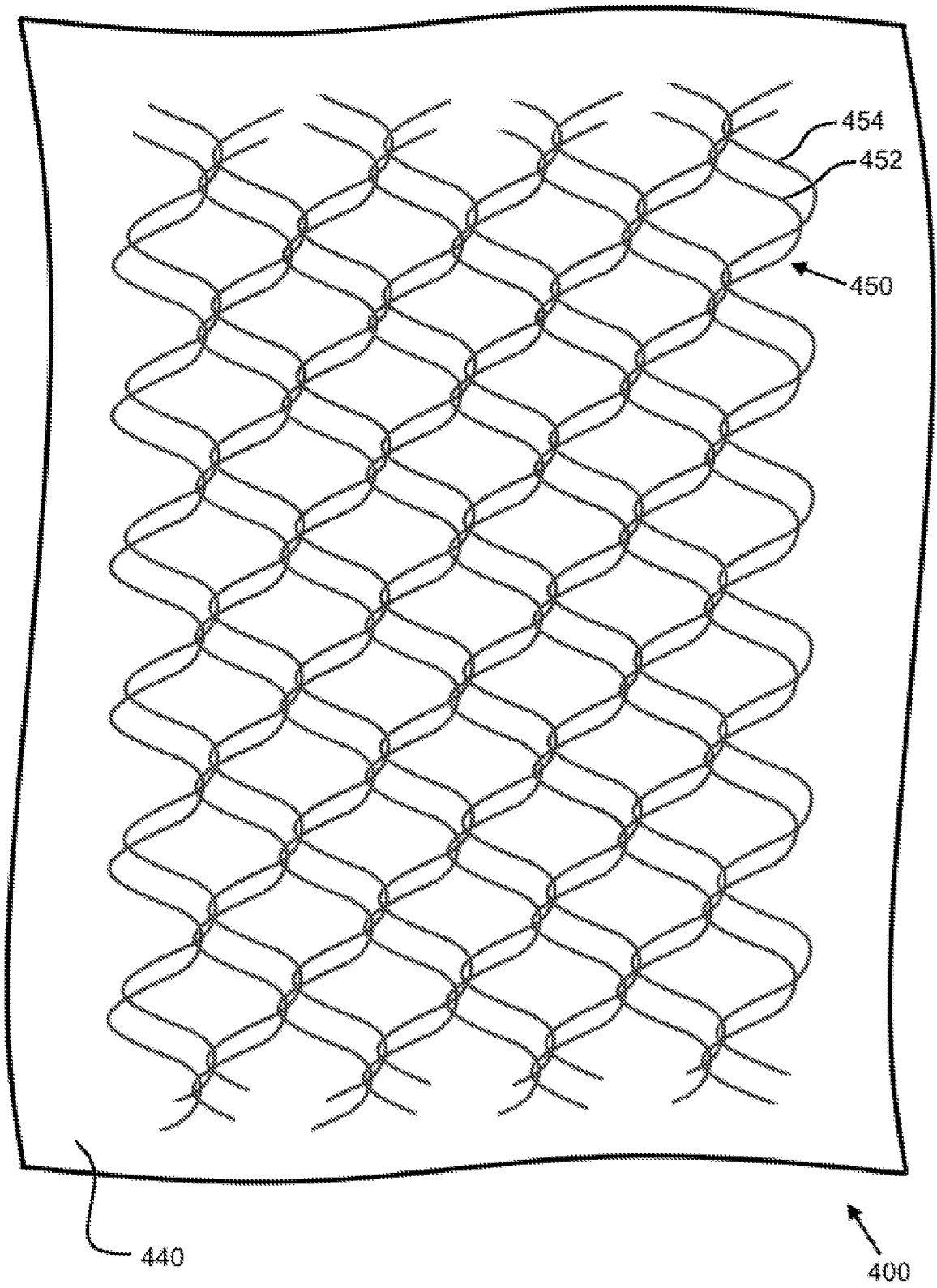
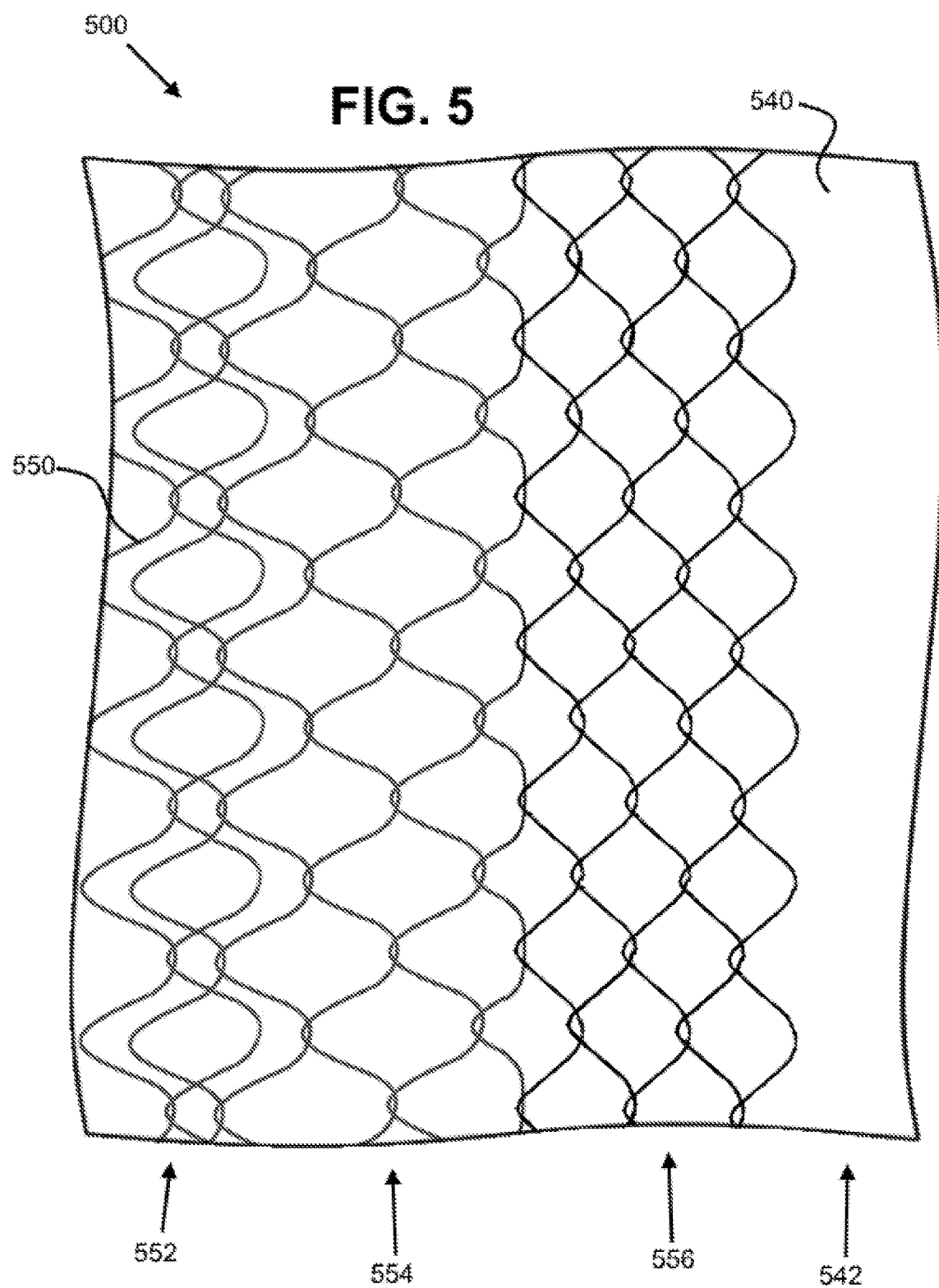


FIG. 3

FIG. 4





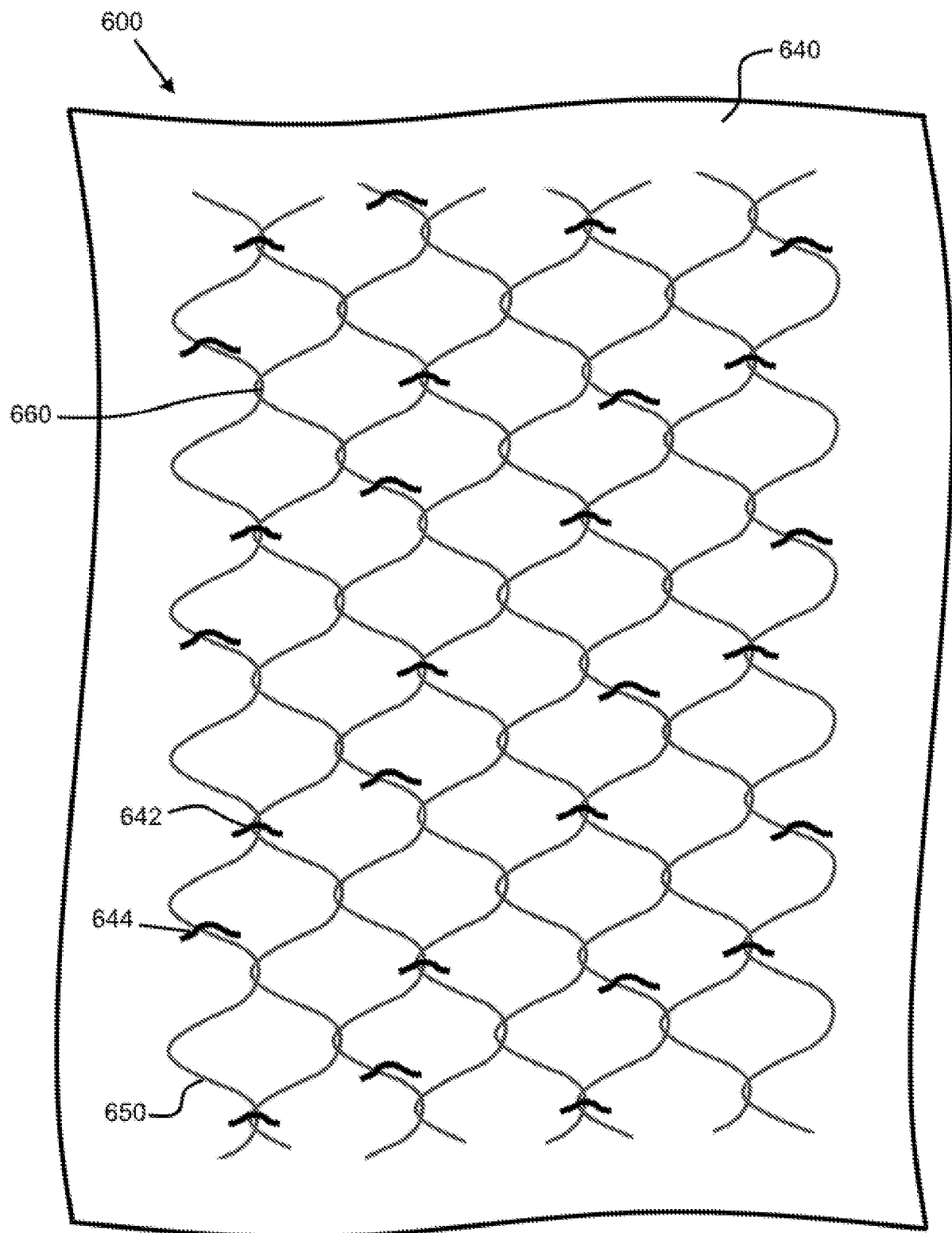


FIG. 6



FIG. 7

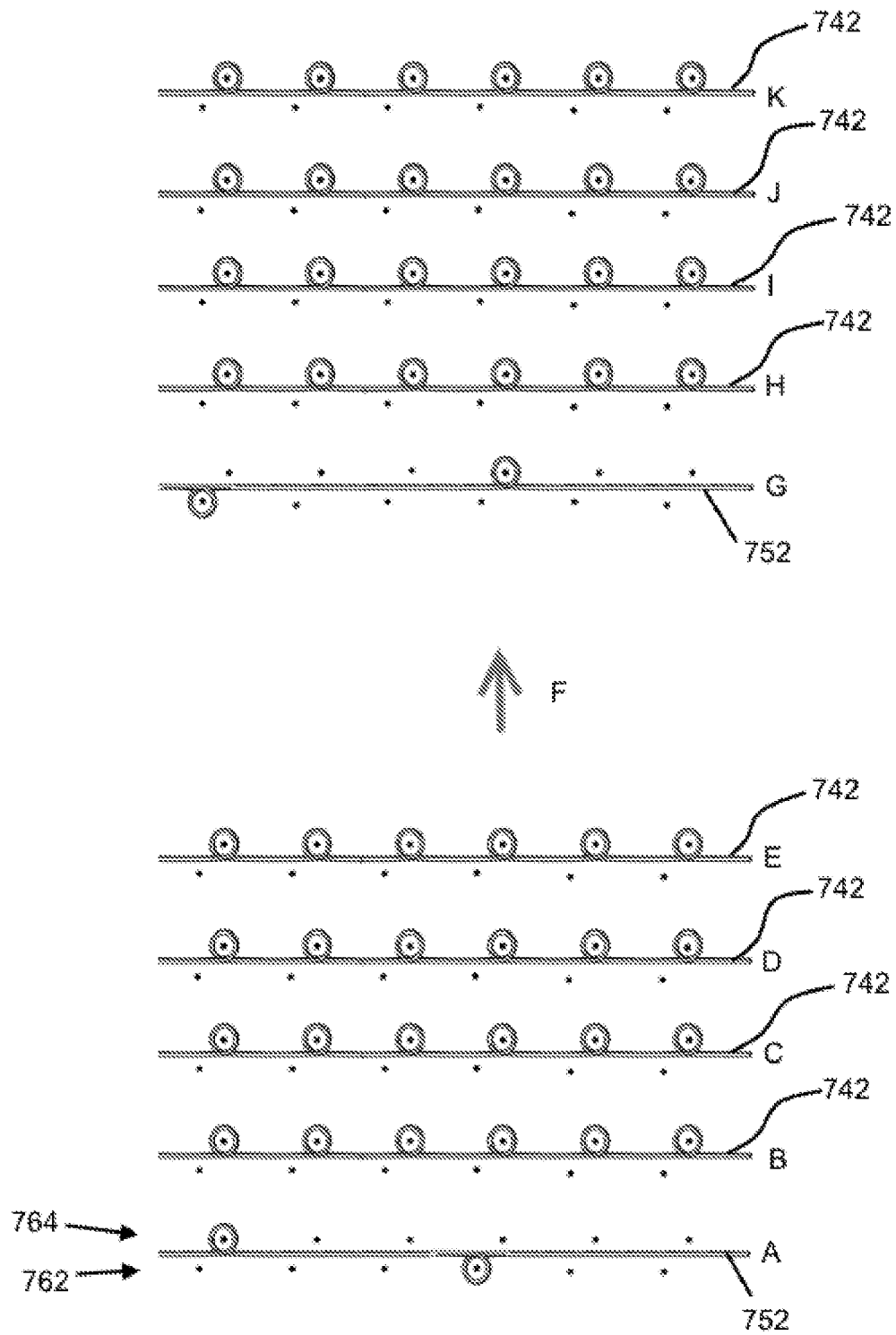
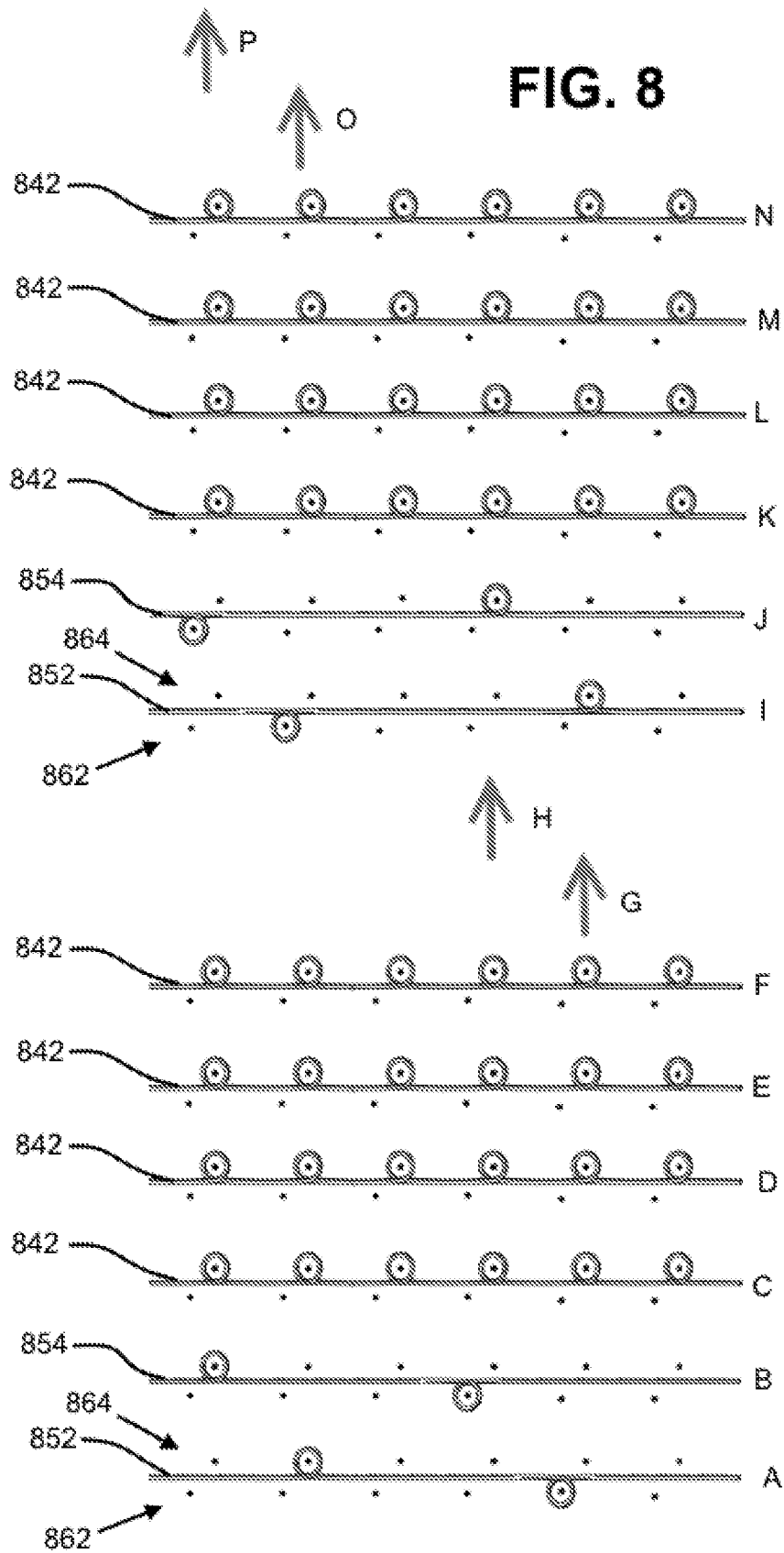


FIG. 8



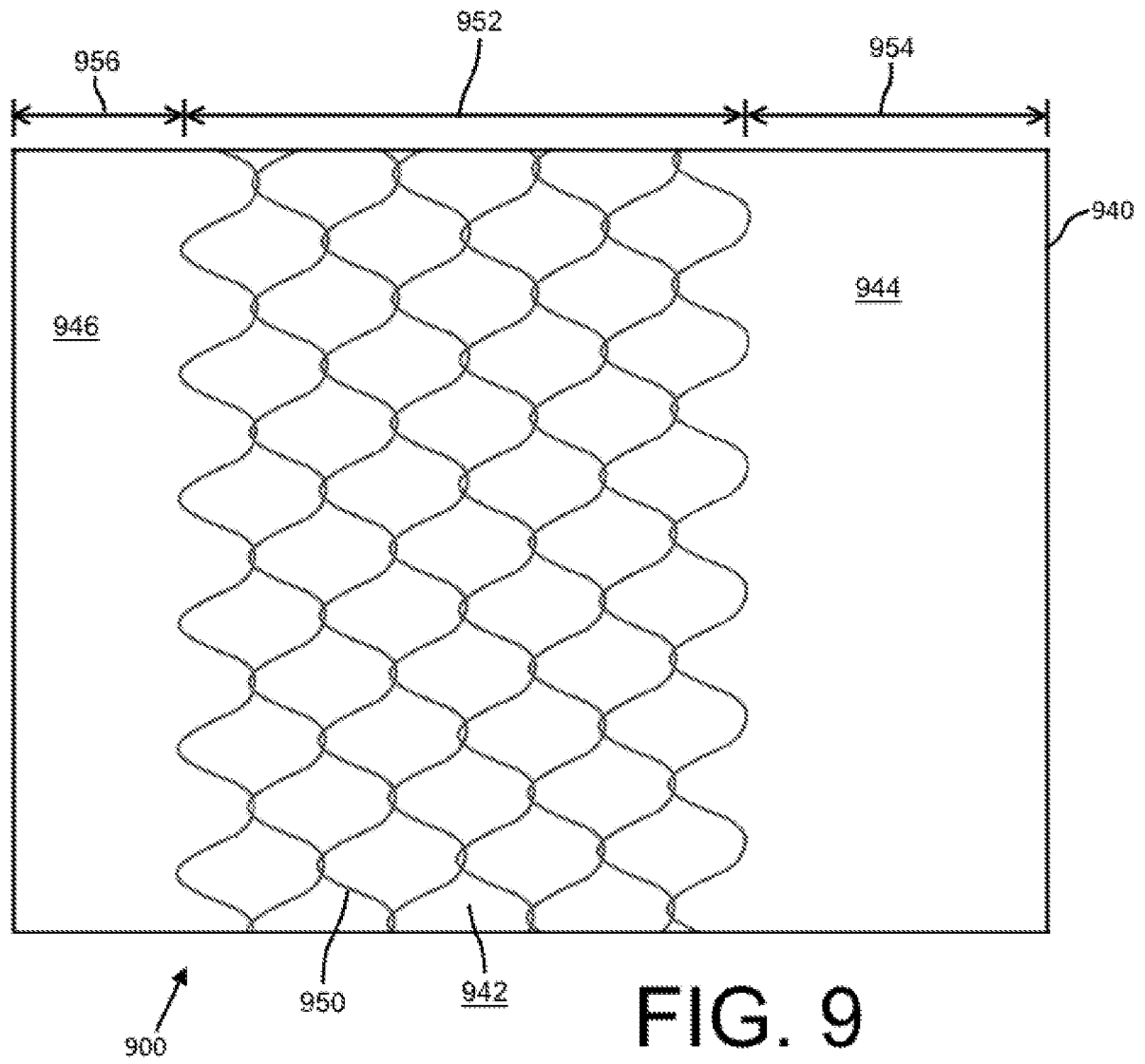
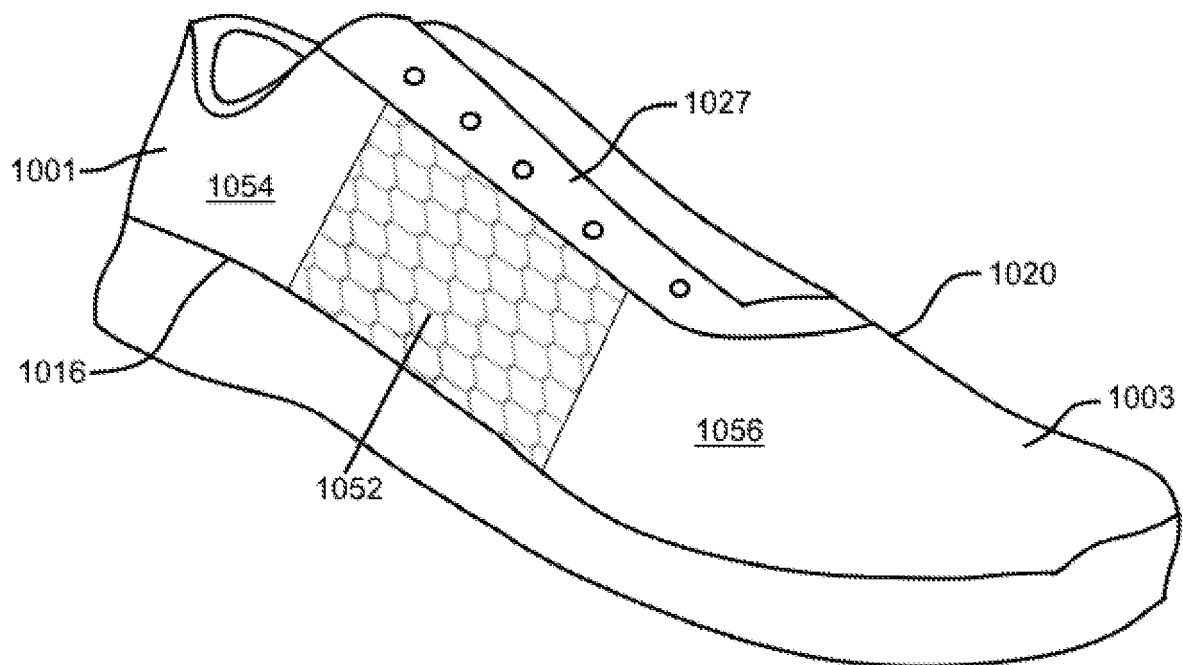


FIG. 10



REFERENCES CITED IN THE DESCRIPTION

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