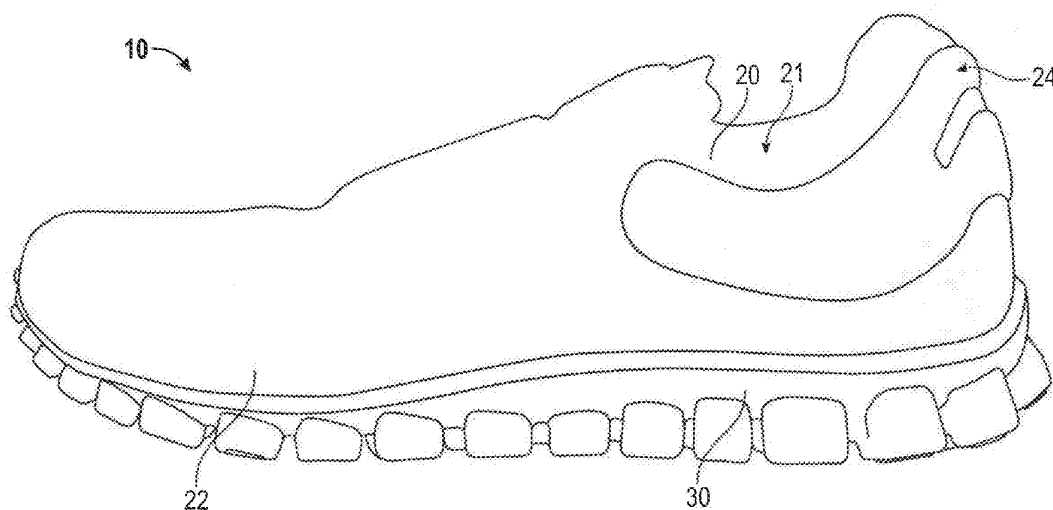


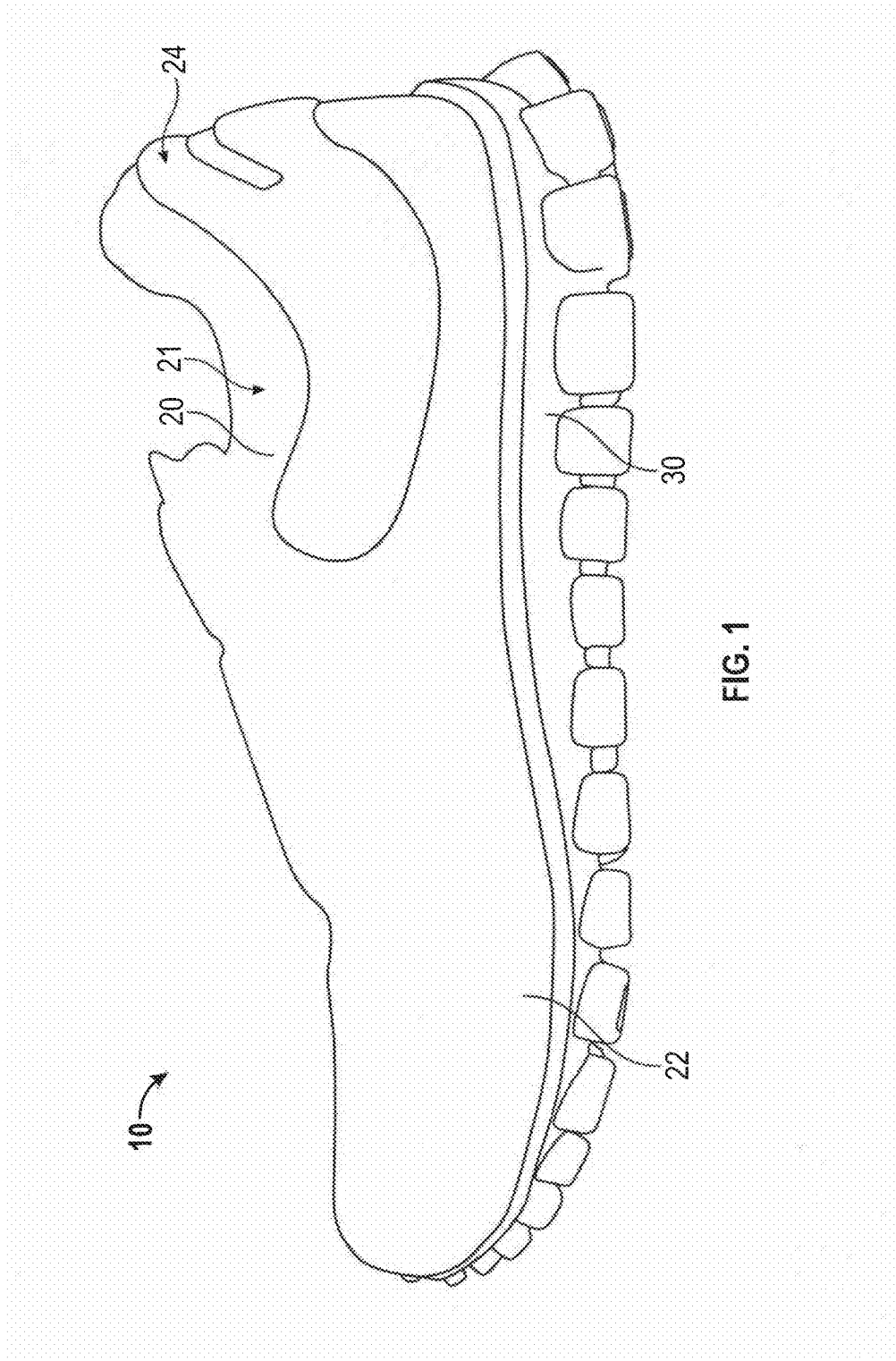


US 20140283410A1

(19) **United States**(12) **Patent Application Publication**
MARVIN et al.(10) **Pub. No.: US 2014/0283410 A1**
(43) **Pub. Date: Sep. 25, 2014**(54) **MOLDED FOOTWEAR UPPER AND
METHOD OF MAKING SAME****Publication Classification**(71) Applicant: **Reebok International Limited**, London
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Thomas Piacentini, Waltham, MA (US)(21) Appl. No.: **13/849,386**(22) Filed: **Mar. 22, 2013**(51) **Int. Cl.**
A43B 23/02 (2006.01)
(52) **U.S. Cl.**
CPC **A43B 23/02** (2013.01)
USPC **36/45; 12/146 C; 12/142 R**(57) **ABSTRACT**

A method for manufacturing an upper for an article of footwear includes: forming a foam layer; forming a preliminary upper by laminating an outer layer, an inner layer, and the foam layer intermediate to the outer layer and the inner layer; and molding the preliminary upper to a shape having: a contour to substantially fit at least a portion of a foot to provide at least a portion of an upper for an article of footwear.





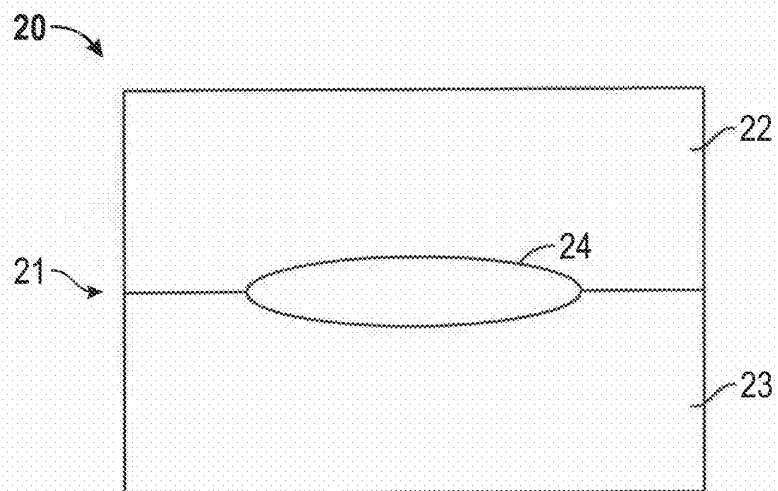


FIG. 2

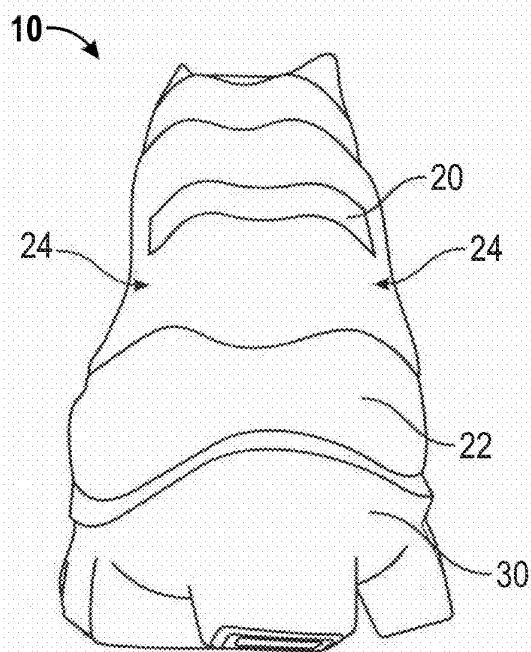
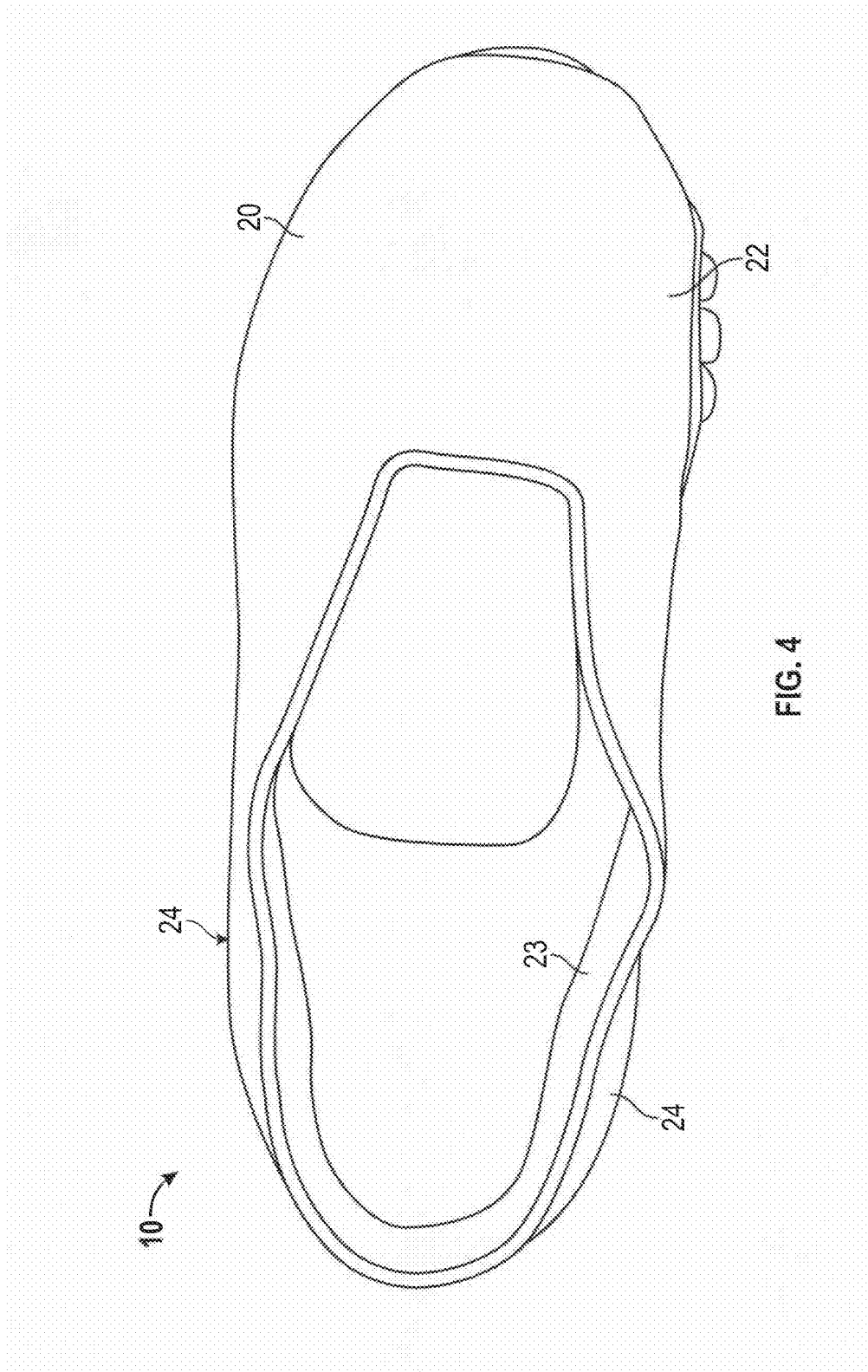
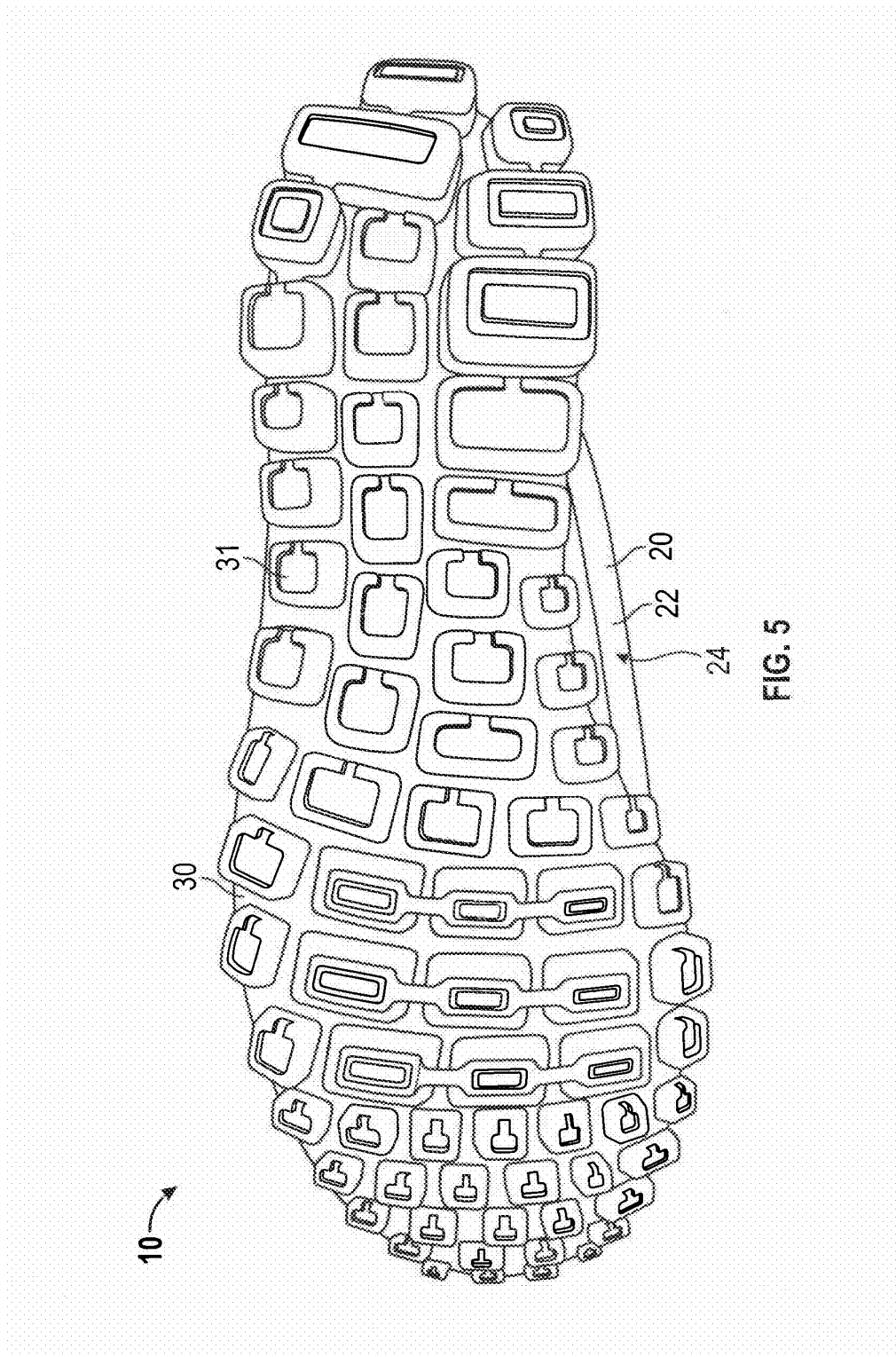


FIG. 3





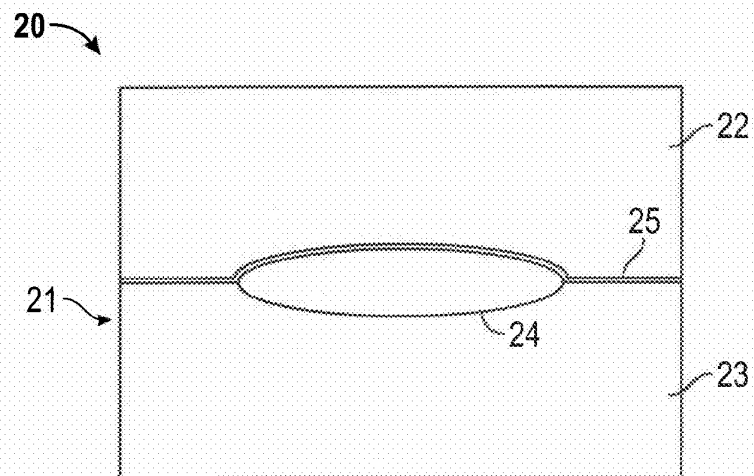


FIG. 6

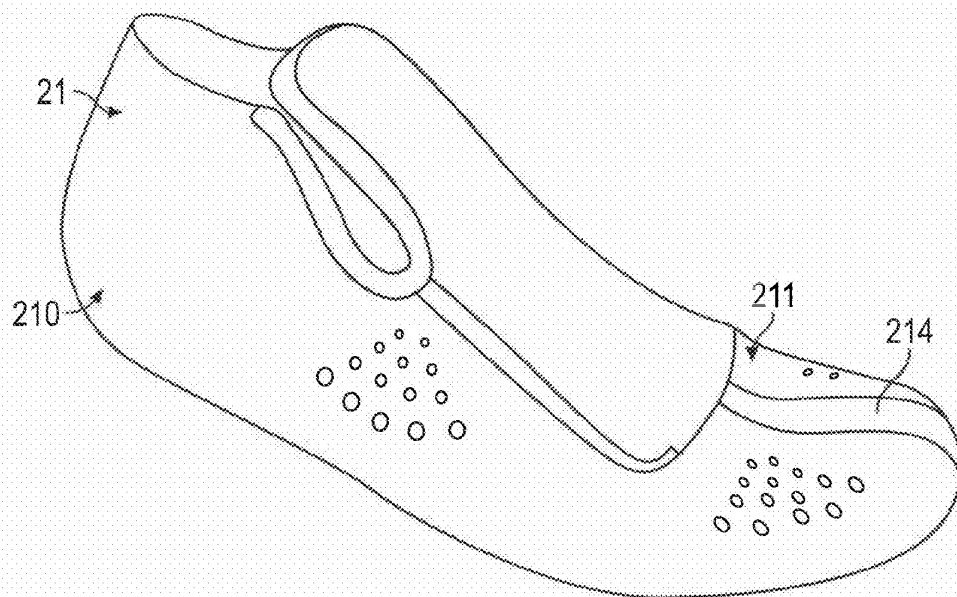


FIG. 7

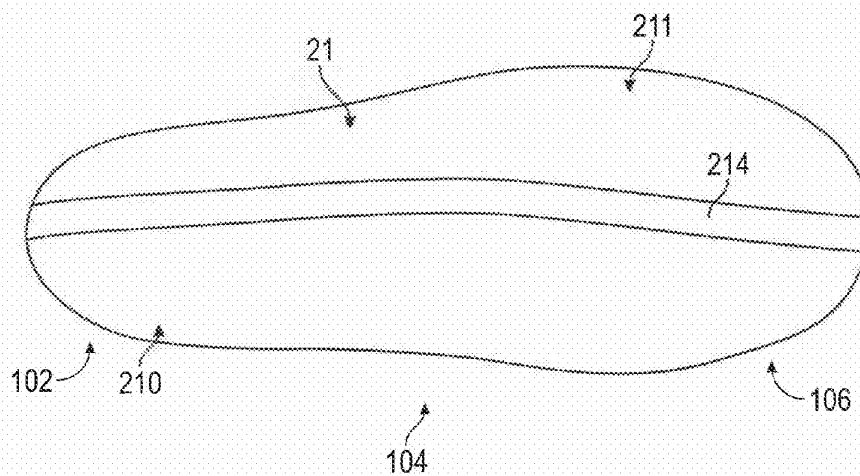


FIG. 8

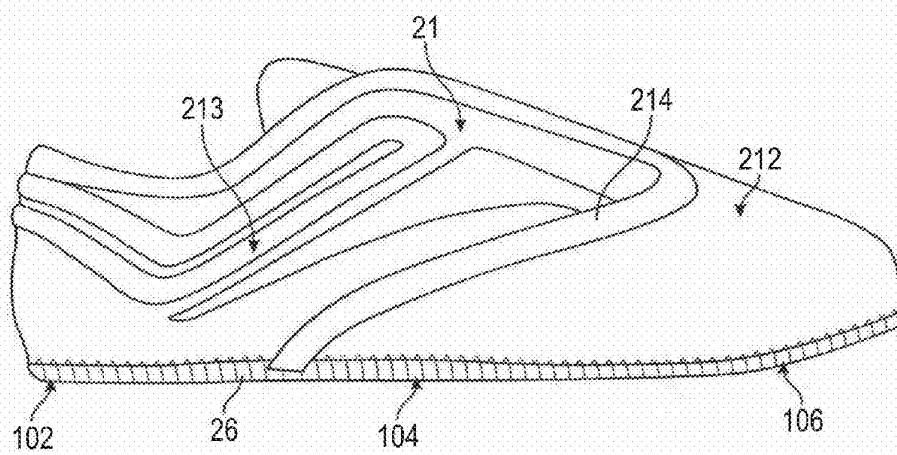


FIG. 9

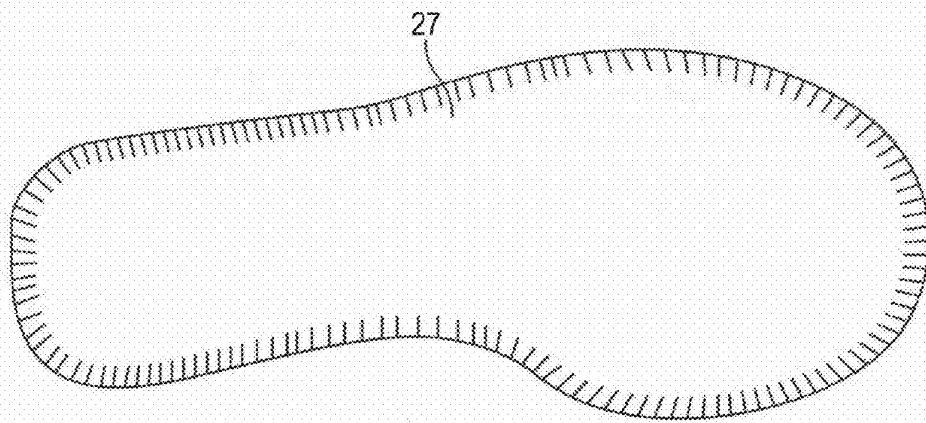


FIG. 10

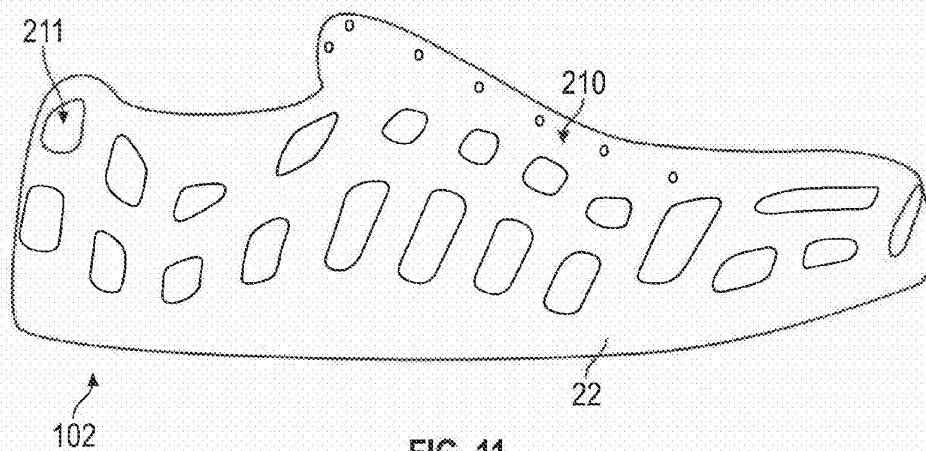


FIG. 11

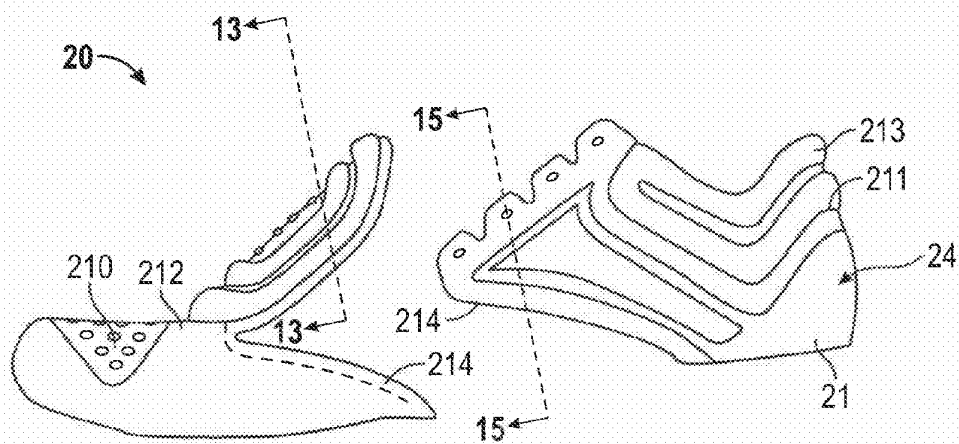


FIG. 12

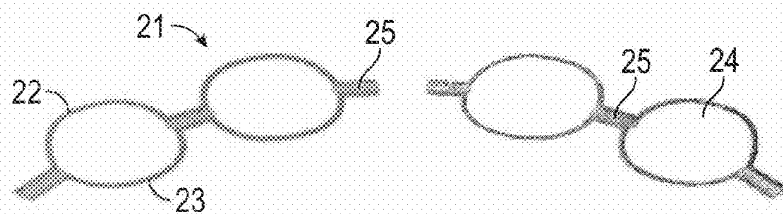


FIG. 13

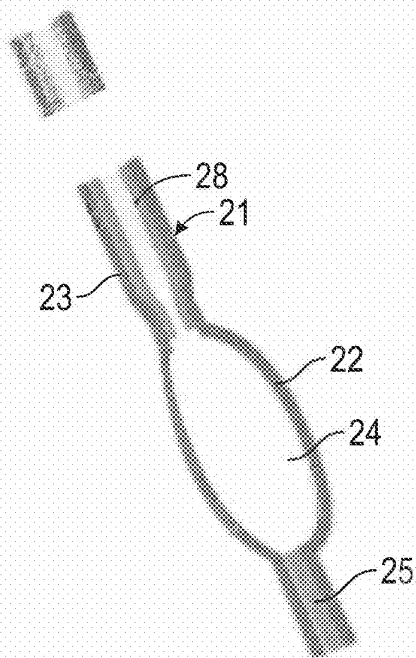


FIG. 15

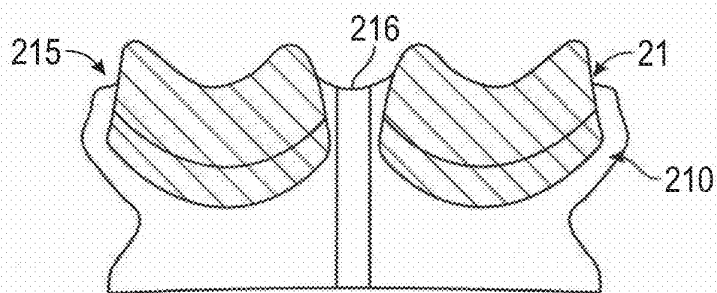
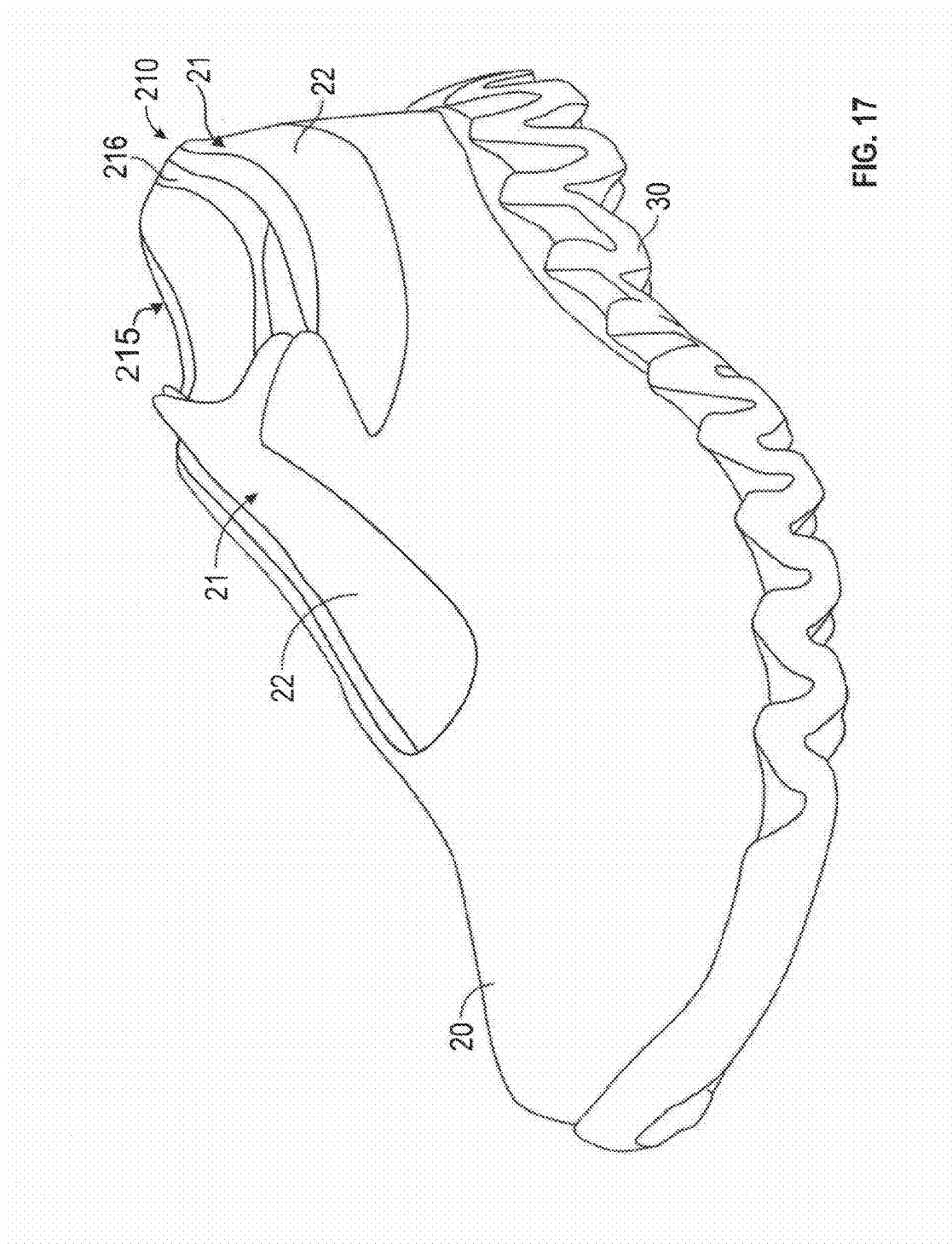


FIG. 16



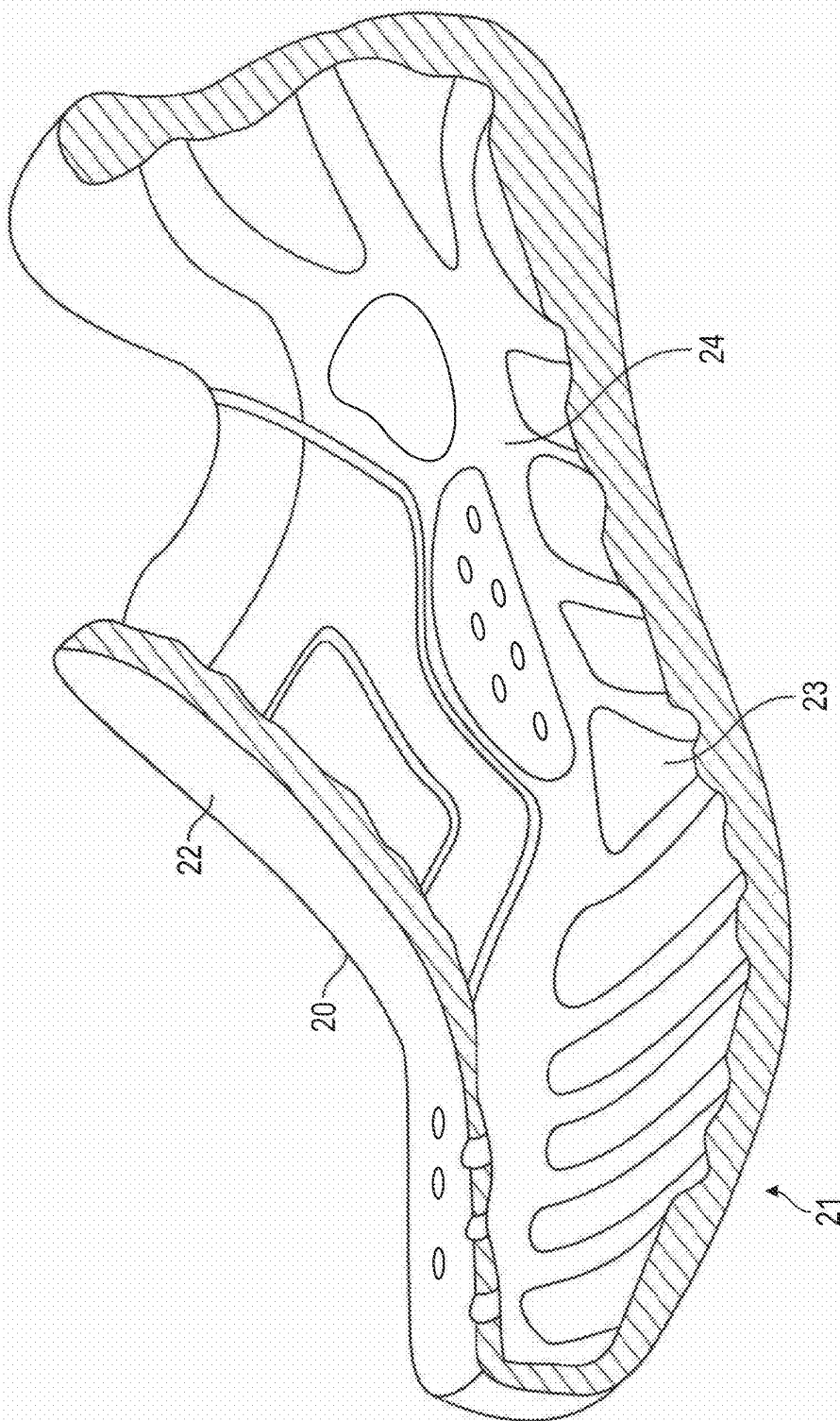


FIG. 18

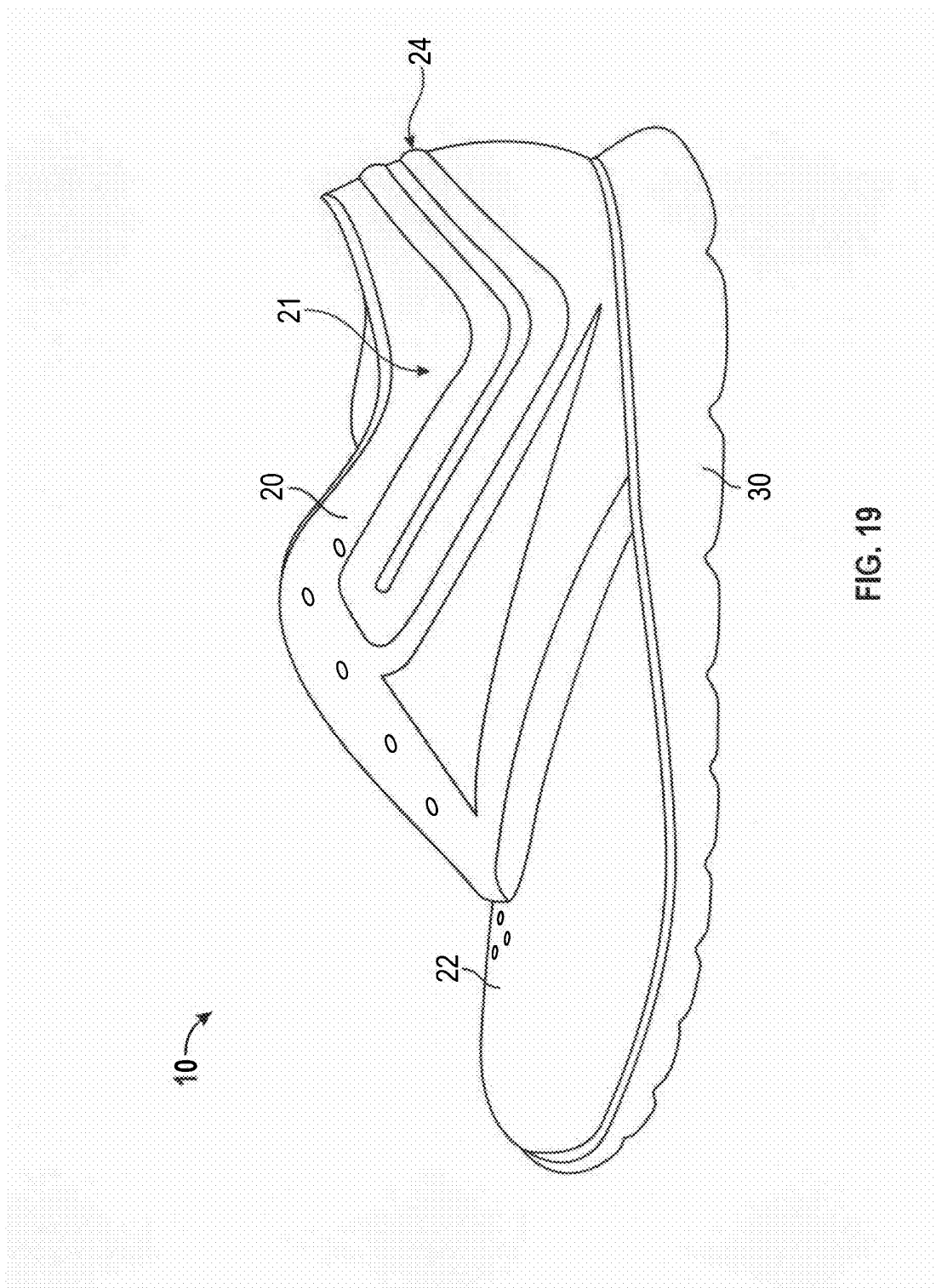
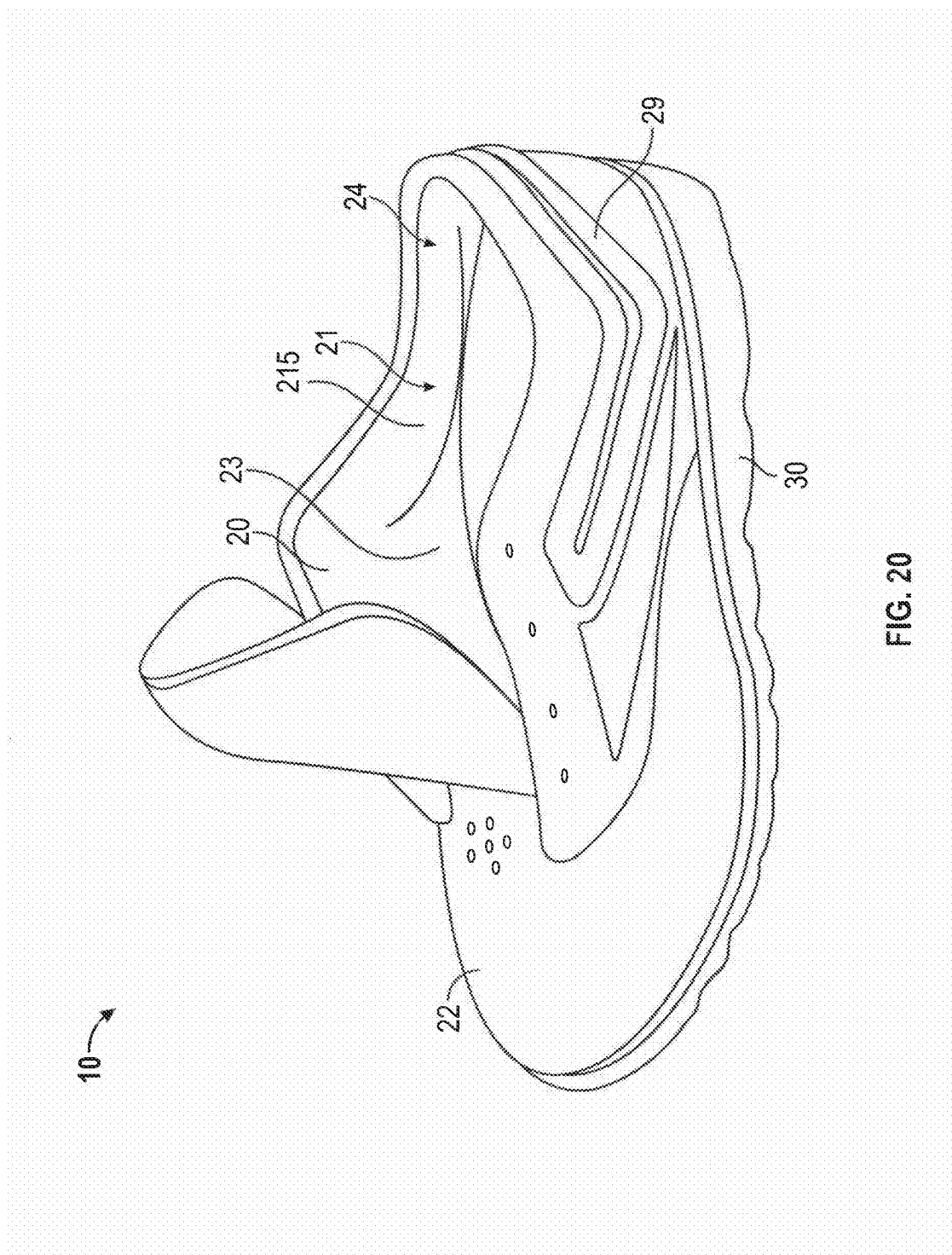


FIG. 19



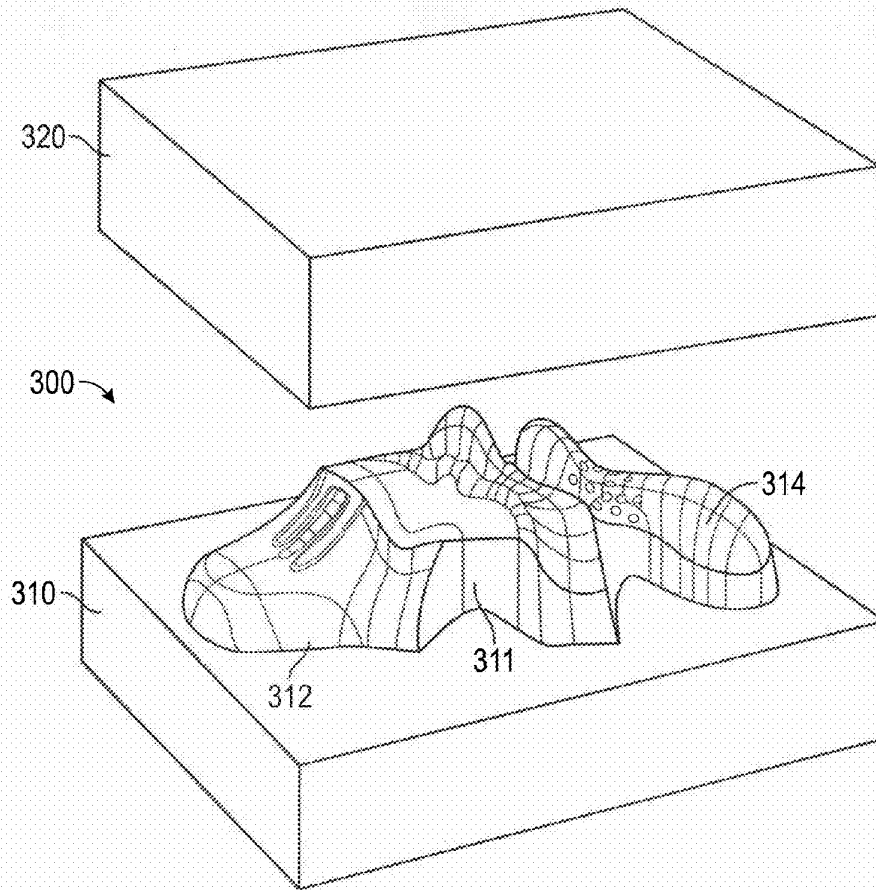


FIG. 21

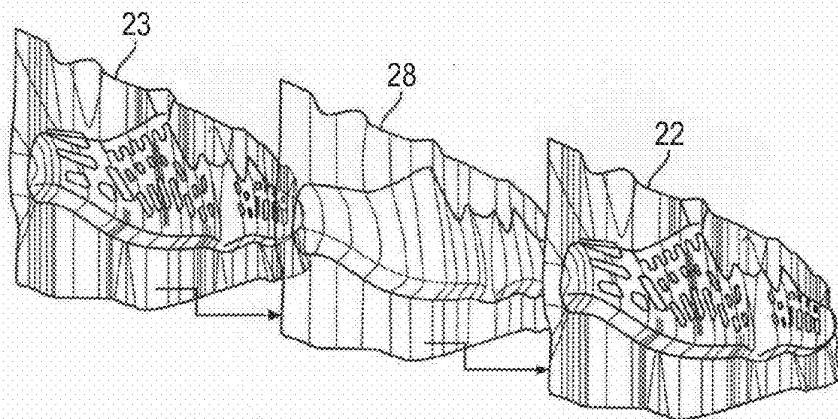


FIG. 22

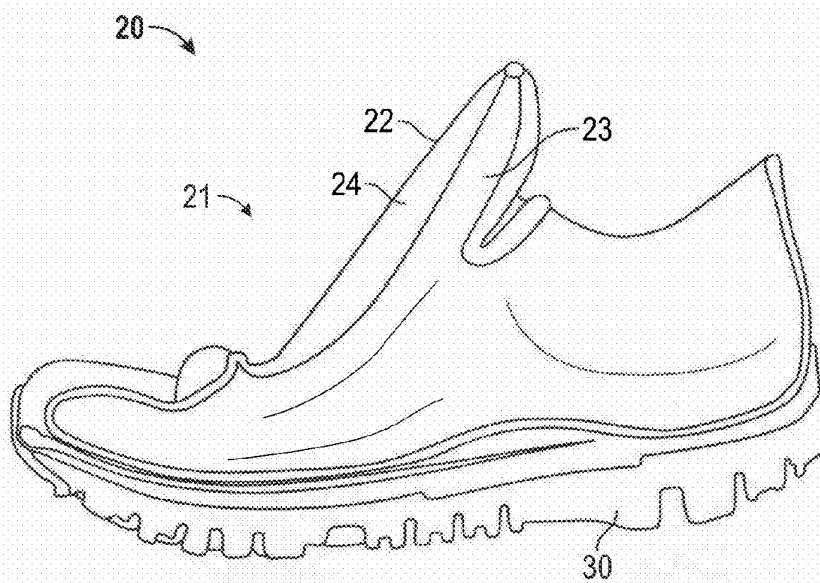


FIG. 23

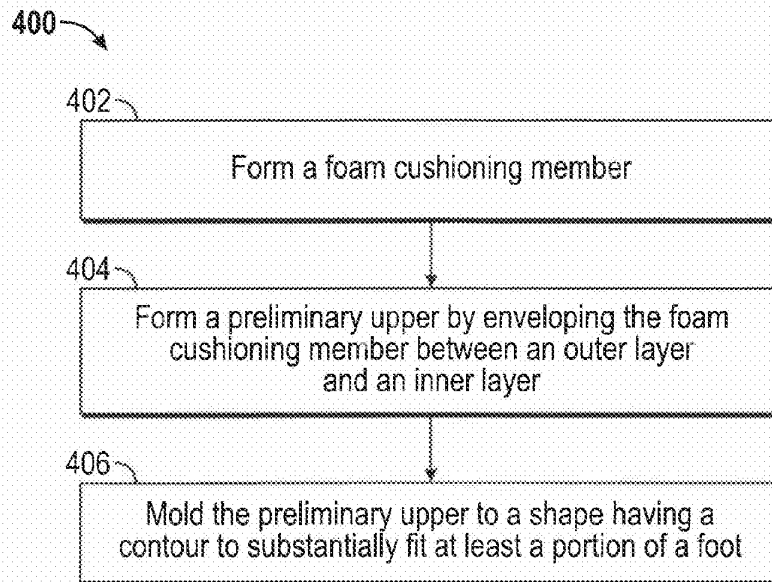


FIG. 24

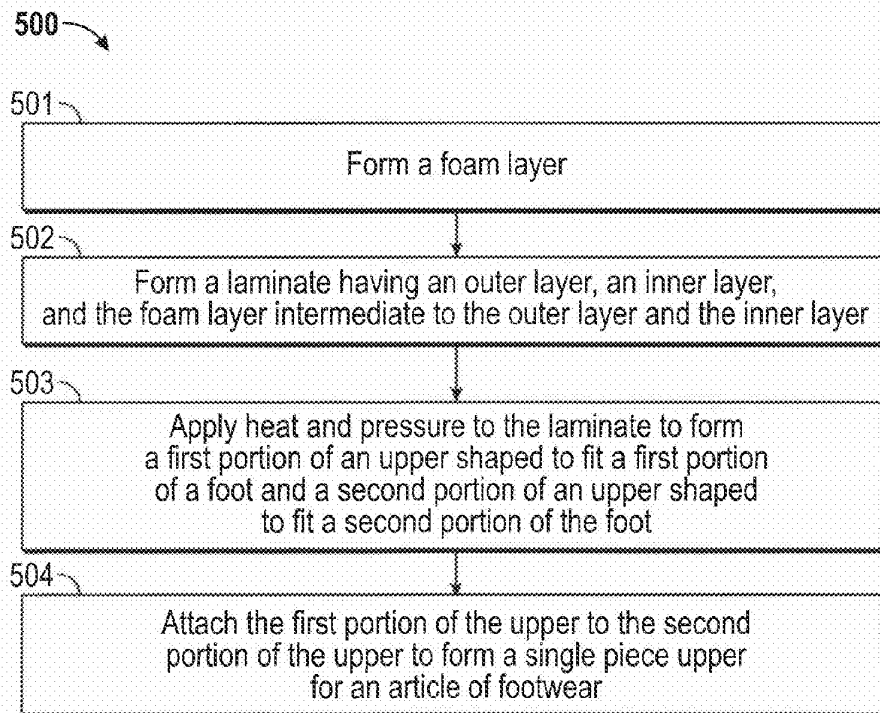


FIG. 25

MOLDED FOOTWEAR UPPER AND METHOD OF MAKING SAME

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] Embodiments of the present invention generally relate to footwear, and more particularly relate to a molded upper for an article of footwear and related methods of making the same.

[0003] 2. Background Art

[0004] Shoe manufacture is a labor intensive process. The typical shoe manufacturing process encompasses the steps of cutting the upper material, reducing the thickness of the joining edges ("skiving"), reducing the thickness of the upper pieces ("splitting"), cementing the interlining to the upper pieces ("interlining"), forming the eyelets, stitching the upper pieces together, shaping the upper over a last ("lasting") and cementing, molding or sewing the bottom or sole of the shoes to the upper ("bottoming"). Modern footwear designs, particularly athletic shoe designs, require numerous upper pieces and complicated manufacturing steps, leading to high labor costs. Additionally, a new pattern is required and the manufacturing process must be retooled for every new design and style and for each desired shoe size. Even manufacturing processes that include molding techniques often involve other complicated manufacturing steps.

[0005] Proper footwear should complement the natural functionality of the foot, in part, by incorporating an upper that provides necessary comfort, stability, and other desired characteristics. The desired upper characteristics are often different for each footwear design, and may often be unique to the wearer. What is needed, therefore, is an improved labor-saving and time-saving method of manufacturing footwear that may require reduced costs. Further, improved and effective manufacturing techniques may provide for improved footwear customization capability.

BRIEF SUMMARY OF THE INVENTION

[0006] In one embodiment, a method for manufacturing an upper for an article of footwear includes: forming a contoured foam layer; forming a preliminary upper by laminating an outer layer, an inner layer, and the foam layer intermediate to the outer layer and the inner layer; and molding the preliminary upper to a shape having a contour to substantially fit at least a portion of a foot to provide at least a portion of an upper for an article of footwear.

[0007] In another embodiment, a method for manufacturing an upper for an article of footwear includes: forming a foam layer; forming a laminate having an outer layer, an inner layer, and the foam layer intermediate to the outer layer and the inner layer; applying heat and pressure to the laminate to form a medial portion of an upper shaped to fit a medial portion of a foot and a lateral portion of an upper shaped to fit a lateral portion of the foot; and attaching the medial portion to the lateral portion to form a single piece upper for an article of footwear.

[0008] In yet another embodiment, a method for manufacturing an article of footwear includes: forming a single piece preliminary upper having an outer layer comprising an elastic polyurethane fiber, an inner layer, and a foam layer disposed between the outer layer and the inner layer; molding the preliminary upper to form a medial portion of an upper shaped to fit a medial portion of a foot and a lateral portion of

an upper shaped to fit a lateral portion of the foot; attaching the lateral portion to the medial portion to form a single piece upper for an article of footwear; and attaching a sole to the upper.

[0009] In another embodiment, a method for manufacturing an article of footwear includes: forming a contoured foam cushioning member; forming a preliminary upper by enveloping the foam cushioning member between an outer layer and an inner layer; and molding the preliminary upper to a shape having a contour to substantially fit at least a portion of a foot.

[0010] In still another embodiment, an upper for an article of footwear includes a single piece laminate including a contoured foam cushioning member, an inner layer, and an outer layer, wherein the foam cushioning member is enveloped between the inner layer and the outer layer. A first region of the single piece laminate corresponds to a portion of a lateral side of the foot and a second region of the single piece laminate corresponds to a portion of a medial side of the foot. The outer layer comprises an elastic material.

BRIEF DESCRIPTION OF THE DRAWINGS/FIGURES

[0011] The accompanying drawings, which are incorporated herein and form a part of the specification, illustrate the present invention and, together with the description, further serve to explain the principles of the invention and to enable a person skilled in the pertinent art to make and use the invention.

[0012] FIG. 1 is a lateral side view of an article of footwear having a molded upper according to an embodiment of the present invention.

[0013] FIG. 2 is a partial cross-sectional view of a molded upper according to an embodiment of the present invention.

[0014] FIG. 3 is a rear view of an article of footwear having a molded upper according to an embodiment of the present invention.

[0015] FIG. 4 is a top plan view of an article of footwear having a molded upper according to an embodiment of the present invention.

[0016] FIG. 5 is a bottom plan view of a sole for an article of footwear having a molded upper according to an embodiment of the present invention.

[0017] FIG. 6 is a partial cross-sectional view of a molded upper having a continuous foam layer according to another embodiment of the present invention.

[0018] FIG. 7 is a perspective view of a molded upper for an article of footwear according to an embodiment of the present invention.

[0019] FIG. 8 is a bottom view of the molded upper of FIG. 7 according to an embodiment of the present invention.

[0020] FIG. 9 is a lateral side view of a molded upper for an article of footwear having a forefoot portion and a heel portion according to an embodiment of the present invention.

[0021] FIG. 10 is a bottom view of the molded upper of FIG. 9 according to an embodiment of the present invention.

[0022] FIG. 11 is a lateral side view of a molded upper for an article of footwear having a lateral side portion and a medial side portion according to an embodiment of the present invention.

[0023] FIG. 12 is a side view of a molded upper for an article of footwear having a forefoot portion and a heel portion according to an embodiment of the present invention.

[0024] FIG. 13 is a cross sectional view of a portion of the molded upper shown in FIG. 12 along the line 13-13 according to an embodiment of the present invention.

[0025] FIG. 14A is a cross sectional view of a portion of the molded upper shown in FIG. 12 according to an embodiment of the present invention.

[0026] FIG. 14B is a cross sectional view of a portion of the molded upper shown in FIG. 12 according to another embodiment of the present invention.

[0027] FIG. 14C is a cross sectional view of a portion of the molded upper shown in FIG. 12 according to another embodiment of the present invention.

[0028] FIG. 15 is a cross sectional view of a portion of the molded upper shown in FIG. 12 along the line 15-15 according to an embodiment of the present invention.

[0029] FIG. 16 is a laminate package of a portion of a molded upper for an article of footwear according to an embodiment of the present invention.

[0030] FIG. 17 is a perspective view of an article of footwear having a molded upper portion of FIG. 14 according to an embodiment of the present invention.

[0031] FIG. 18 is a cross-sectional side view of an article of footwear having a molded upper according to an embodiment of the present invention.

[0032] FIG. 19 is a lateral side view of an article of footwear having a molded upper according to an embodiment of the present invention.

[0033] FIG. 20 is a partial interior view of the article of footwear of FIG. 19 having a molded upper according to an embodiment of the present invention.

[0034] FIG. 21 is a schematic view of a mold for use in a method for manufacturing an upper for an article of footwear according to an embodiment of the present invention.

[0035] FIG. 22 is a partial schematic diagram of a molded upper according to an embodiment of the present invention.

[0036] FIG. 23 is a cross sectional view of a molded upper according to an embodiment of the present invention.

[0037] FIG. 24 is an exemplary flow diagram of a method for manufacturing an upper for an article of footwear according to an embodiment of the present invention.

[0038] FIG. 25 is an exemplary flow diagram of a method for manufacturing an upper for an article of footwear according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0039] The present invention will now be described in detail with reference to embodiments thereof as illustrated in the accompanying drawings, in which like reference numerals are used to indicate identical or functionally similar elements. References to “one embodiment”, “an embodiment”, “an example embodiment”, etc., indicate that the embodiment described may include a particular feature, structure, or characteristic, but every embodiment may not necessarily include the particular feature, structure, or characteristic. Moreover, such phrases are not necessarily referring to the same embodiment. Further, when a particular feature, structure, or characteristic is described in connection with an embodiment, it is submitted that it is within the knowledge of one skilled in the art to affect such feature, structure, or characteristic in connection with other embodiments whether or not explicitly described.

[0040] The following examples are illustrative, but not limiting, of the present invention. Other suitable modifications and adaptations of the variety of conditions and parameters

normally encountered in the field, and which would be apparent to those skilled in the art, are within the spirit and scope of the invention.

[0041] Embodiments of the present invention include an upper 20 for an article of footwear 10, and methods of making same. In some embodiments, the article of footwear 10 includes a sole 30 coupled to the upper 20. With reference to FIGS. 1-5, for example, in one embodiment, the upper 20 includes an outer layer 22 and an inner layer 23 enveloping a cushioning member 24 to form a single piece laminate 21. Before the laminate 21 undergoes molding according to embodiments of the present invention, the single piece laminate 21 may comprise a preliminary upper structure to be molded to form all or a portion of the upper 20. During manufacture, the laminate 21 may be cut and molded to a shape having a contour to substantially fit at least a portion of a foot. In this manner, the footwear 10 is provided using an improved labor-saving and customizable method of manufacturing footwear that may reduce costs.

[0042] In one embodiment, the laminate 21 may be molded by applying heat and pressure to the laminate 21 to form the upper 20 or one or more portions of the upper 20. In one embodiment, the mold may be heated in order to heat and mold the laminate 21. In one embodiment, the laminate 21 may be heated (e.g., in a suitable oven) and then put into a mold for application of pressure to mold the laminate 21. Other molding techniques, also may be used to mold the single piece laminate 21 into the upper 20 or one or more portions of the upper 20. For example, all or components of the laminate 21 may be provided as a liquid formulation that foams into shape inside of a mold. According to some embodiments of the present invention, the laminate 21 may be molded using aspects of contour shape pressing techniques used in molding brassieres, such as those described, for example in U.S. Pat. No. 6,805,610, the disclosure of which is incorporated herein by reference thereto.

[0043] In one embodiment, the outer layer 22 and/or the inner layer 23 comprise an elastic material such as, for example, Lycra®. In one embodiment, in particular, one or both of the outer layer 22 and the inner layer 23 may comprise a 4-way stretch Lycra®. In one embodiment, the outer layer 22 and/or the inner layer 23 comprise about 40% Lycra content with another material, such as, for example nylon. In this manner, the outer layer 22 and the inner layer 23 provide a single piece laminate 21 structure that is lightweight and flexible. Other suitable materials, including, but not limited to, elastic polyurethane fiber, elastane, a 2-way stretch material, a 4-way stretch material, and polyamide nylon, may be used. In one embodiment, the material used for the inner layer 23 and/or outer layer 22 may comprise material similar to that used for intimate apparel, such as, for example, brassieres, and the like. In one embodiment, the outer layer 22 and the inner layer 23 are made of the same material. In another embodiment, the outer layer 22 and the inner layer 23 are made of different materials. In one embodiment, one or more layers of the laminate 21, including one or more of the outer layer 22 and the inner layer 23, comprise materials having suitable breathability, wicking characteristics, waterproof characteristics, and/or non-abrasive characteristics. In one embodiment, one or both of the outer layer 22 and the inner layer 23 may comprise a well knitting fabric having moisture management supplied by Best Pacific Textile Ltd. having an article no. PL-995MFX1. In one embodiment, the outer layer 22 and/or the inner layer 23 may comprise a material having

high elongation characteristics (e.g., about 500%-about 700%), low elastic modulus (e.g., about 200% elongation, about 0.04 to about 0.12 g/denier), and/or high elastic recovery rate (e.g., about 200% elongation, 95%-99%).

[0044] In one embodiment, the cushioning member **24** comprises a contoured foam. The cushioning member **24** may be contoured to provide desired cushioning characteristics. In this manner, the cushioning member **24** may be contoured to a shape that substantially fits at least a portion of the foot of the wearer. For example, as shown in FIG. 3, the cushioning member **24** may be contoured to a shape that cushions a heel portion of the foot. In other embodiments, the cushioning member **24** may be contoured to a shape that cushions an upper portion of the foot corresponding to a vamp or tongue portion of the footwear **10**, a quarter panel, a collar, or any other desired portion of the upper. In some embodiments, cushioning member **24** may be contoured to a shape for aesthetic purposes.

[0045] With reference to FIG. 23, in one embodiment, the cushioning member **24** may be precisely contoured such that it has varying thickness to fit the desired area between outer layer **22** and inner layer **23**. In some embodiments, cushioning member **24** may have asymmetrical cross-sections. The cushioning member **24** may be contoured using skiving, molding, heat molding, pressure molding, blow molding, or other suitable techniques. However, unlike conventional foam pieces used in footwear to provide cushioning or contour, including die-cut foam pieces, the cushioning member **24** is pre-shaped before inclusion in the laminate **21** for molding and is provided to have a uniform presence within the laminate **21**. For example, the upper **20** having a cushioning member **24** according to embodiments of the present invention may be provided without any gaps between the cushioning member **24** and the outer layer **22** and/or inner layer **23**. For example, as shown in FIG. 23, the cushioning member **24** tapers to the point of intersection between the outer layer **22** and inner layer **23** such that there are no gaps between the cushioning member and the layers. In contrast, in conventional uppers a die-cut block of foam may be placed in a similar area, causing gaps between the foam and the inner and outer layers at the point of intersection. In addition, in some embodiments, unlike conventional foam pieces which may be compressed or “wedged” to fit into an area between an inner layer and outer layer of the conventional shoe, the cushioning member **24** is not compressed to fit within an area of the upper but rather is precisely contoured to fit the area. Because the cushioning member **24** is not compressed, the laminate **21** may be provided with a cushioning member **24** having a substantially uniform density throughout. In this manner, the cushioning member **24** may more comfortably fit to a portion of the wearer’s foot, and may provide the desired cushioning, feel, and aesthetic characteristics.

[0046] Suitable material for cushioning member **24** may include, but is not limited to, foam, thermoplastic polyurethane (TPU), and thermoplastic rubber (TPR). In one embodiment, cushioning member **24** may comprise a high grade memory foam. When cushioning member **24** is a foam, the foam may be, for example, ethyl vinyl acetate (EVA) based or polyurethane (PU) based and the foam may be an open-cell foam or a closed-cell foam. In other embodiments, cushioning member **24** may comprise elastomers, thermoplastic elastomers (TPE), polyethylene (PE), foam-like plastic (e.g., Pebax® foam or Hytrel® foam) and gel-like plastics.

[0047] Upper **20** may be used in conjunction with a variety of soles **30**, in one embodiment, the sole **30** may include a plurality of projections **31** to provide the desired cushioning and ride characteristics for the footwear **10**, as shown, for example, in FIG. 5, and as described, for example, in U.S. Patent Application Publication No. 2012/0073160, entitled “Sole With Projections and Article of Footwear” and published on Mar. 29, 2012, the disclosure of which is incorporated herein in its entirety by reference thereto. In one embodiment, the sole **30** may undulate to define gaps in its top and bottom surface so as to be substantially sinusoidal, as described, for example, in U.S. Patent Application Publication No. 2011/0016749, entitled “Article of Footwear and Methods of Making Same” and published on Jan. 27, 2011, the disclosure of which is incorporated herein in its entirety by reference thereto.

[0048] In one embodiment, the sole **30** may comprise a resilient material such that the sole provides a flexible ride and desired cushioning to the wearer. In one embodiment, the sole **30** comprises foam, such as, for example, ethyl vinyl acetate (EVA) foam or polyurethane (PU) foam, and the foam may be an open-cell foam or a closed-cell foam. In other embodiments, sole **30** may comprise elastomers, thermoplastic elastomers (TPE), foam-like plastic (e.g., Pebax® foam or Hytrel® foam), gel-like plastics, thermoplastic rubber (TPR), and combinations thereof in one embodiment, the sole **30** may include a molded thermoplastic component such as, for example, an injection molded TPU component. In one embodiment of the present invention, an insole and/or sock-liner may also be included within the footwear **10**. In some embodiments, the sole **30** may include an insole and/or sock-liner. In some embodiments, a plate may be disposed between the sole **30** and the wearer’s foot. The plate may comprise, for example, compressed cellulose, plastic, TPU, and the like. Sole **30** may be attached to the upper **20** using adhesive bonding, stitching, welding, or other suitable techniques.

[0049] In one embodiment of the present invention, an outsole (not shown) may be disposed on all or a portion of the bottom surface of the sole **30**. The outsole may comprise a wear-resistant material. For example, the outsole can include synthetic or natural rubber, polyurethane (e.g., thermoplastic polyurethane (TPU)), foam (e.g., a wear-resistant foam), or a combination thereof. In some embodiments, the sole **30** and the outsole may be formed of the same or different material. In one embodiment, they may be molded together as a unitary structure.

[0050] As shown, for example, in FIGS. 2 and 6, in one embodiment laminate **21** includes the outer layer **22** and the inner layer **23** enveloping a first foam layer, the cushioning member **24**. In one embodiment, the laminate **21** may further include a foam sheet **25**. In one embodiment, the foam sheet **25** is disposed intermediate to the cushioning member **24** and the outer layer **22**. In another embodiment, the foam sheet **25** may be disposed intermediate to the cushioning member **24** and the inner layer **23**. The foam sheet **25** may be a continuous layer that extends over all or a portion of the surface of the laminate **21**. In one embodiment, the cushioning member **24** may have a thickness in the range of about 0.5 mm to about 20 mm. The foam sheet **25** may have a thickness in the range of about 0.5 mm to about 1.5 mm. The foam sheet **25** may provide a smoothing effect to the upper **20** so as to smooth the transition between an area of the upper **20** having the cushioning member **24** to an area of the upper having no cushioning member. In some embodiments, this may provide a

desired shape, smoothness, softness, and cushioning property to the upper 20. In one embodiment, the foam sheet may provide support to the wearer during use. In one embodiment, the foam sheet 25 may comprise a permeable membrane such that vapor may be released from the interior of the upper 20 while reducing or preventing moisture from entering the interior of the upper 20. In one embodiment, the foam sheet 25 may comprise an anti-microbial material.

[0051] In one embodiment, the foam sheet 25 may be attached to an adjacent layer of the laminate 21 using a urethane spray or other suitable adhesive. The adhesive preferably does not create stiffness differences between areas of the upper 20. The depiction of the laminate structure in FIG. 6 is intended to be illustrative only and not limiting. The size and shape of the outer layer 22, the inner layer 23, the cushioning member 24, and the foam sheet 25 may vary to provide the desired characteristics of the upper 20. In some embodiments, one or more of these elements may not be provided in the laminate 21. Suitable material for the foam sheet 25 may include, but is not limited to, foam and thermoplastic polyurethane. The foam may be, for example, ethyl vinyl acetate (EVA) based or polyurethane (PU) based and the foam may be an open-cell foam or a closed-cell foam.

[0052] In one embodiment, the laminate 21 is molded to a shape having a contour to substantially fit at least a portion of a foot. In one embodiment, the laminate 21 may include a first portion 210 to be molded to a shape having a contour to substantially fit a first portion of a foot and a second portion 211 to be molded to a shape having a contour to substantially fit a second portion of a foot. For example, with reference to FIGS. 7 and 8, the laminate 21 may include a lateral portion 210 to be molded to a shape having a contour to substantially fit a lateral portion of a foot and a medial portion 211 to be molded to a shape having a contour to substantially fit a medial portion of a foot. As shown in FIG. 7, in one embodiment the lateral portion 210 may substantially cover the lateral side of the foot from the heel region 102 to the toe region 106, and the medial portion 211 may substantially cover the medial side of the foot from the heel region 102 to the toe region 106. In other embodiments, the lateral portion 210 and/or the medial portion 211 may cover only a portion of the respective side of the foot. For example, the lateral portion 210 may cover only the heel region 102 of the lateral side of the foot, or the medial portion 211 may cover only from the heel region 102 to the midfoot region 104 of the medial side of the foot.

[0053] In another embodiment, with reference to FIG. 9, for example, the laminate 21 may include a forward portion 212 and a rearward portion 213. For example, the forward portion 212 of the laminate 21 may be molded to a shape having a contour to substantially fit a forward portion of the foot extending from the midfoot region 104 to the toe region 106 on both the medial and lateral sides of the foot, and the rearward portion 213 may be molded to a shape having a contour to substantially fit a rearward portion of the foot extending from the midfoot region 104 to the heel region 102 on both the medial and lateral sides of the foot. The size, shape, and location of the first portion 210 and the second portion 211 may vary as needed.

[0054] In one embodiment, the first portion 210 and the second portion 211 may be molded from the same laminate 21 such that both portions share at least one continuous layer of the laminate 21 in common (e.g., the outer layer 22, the inner layer 23, the cushioning member 24, and/or the foam sheet

25, where included). For example, with reference to FIG. 11, the laminate 21 may include a lateral portion 210 to be molded to a shape having a contour to substantially fit a lateral portion of a foot and a medial portion 211 to be molded to a shape having a contour to substantially fit a medial portion of a foot, wherein both portions share a continuous outer layer 22 (shown), inner layer 23, and cushioning member 24 in common. In this manner, the lateral portion 210 and the medial portion 211 share a common border in the heel region 102 of the upper 20, as shown, in some embodiments, a first portion 210 and a second portion 211 molded from the same laminate 21 may share a common border along another portion of the upper 20, such as, for example, along the length of the bottom of the upper. In other embodiments, a single portion 210 may be molded from a laminate 21. In one embodiment, a first portion 210 may be molded from a first laminate 21, and a second portion 211 may be molded from a second laminate 21 such that the first portion 210 and the second portion 211 do not share at least one continuous layer of laminate and do not share a common border.

[0055] In embodiments in which one or more laminates 21 are molded to form a first portion 210 and a second portion 211, the first portion 210 and the second portion 211 may be attached, after the one or more laminates 21 are molded, to form a single piece upper 20 for an article of footwear. The first portion 210 and the second portion 211 may be attached by one or more of adhesive, stitching, adhesive seam tape, RF welding, ultrasonic bonding, and other suitable attachment means. In one embodiment, adhesive seam tape used may comprise thermoplastic seam tape comprising a material selected from, the group consisting of polyurethane, polyamide, polyester, nylon, polyolefin, vinyl, polypropylene, thermoplastic urethane, tricot, acrylic, and PVC. An example of suitable seam tape for use in embodiments of the present invention is produced by Bemis Associates, Inc. of Shirley Mass.

[0056] As shown in FIGS. 7 and 8, for example, the first portion 210 and the second portion 211 may be attached along a longitudinal seam 214 along the length of the bottom of the upper 20 from the heel region 102 to the toe region 106. In one embodiment, as shown, for example, in FIG. 9, the seam 214 may extend from a bottom edge 26 of the upper 20 along a portion of midfoot region 104 of the upper 20. In one embodiment, the seam 214 may extend along only a portion of the Upper 20 so as to create an opening (not shown) to allow venting of air into or out of the interior of the upper 20.

[0057] In one embodiment, the first portion 210 and the second portion 211 may not comprise an entire upper 20 When attached. As shown for example, in FIG. 10, the forward portion 212 and the rearward portion 213, when attached, may not include an upper bottom 27. A bottom 27 may be attached, by strobil stitching or other suitable means, to the first portion 210 and the second portion 211 so as to provide the upper 20.

[0058] With reference to FIGS. 12-15, an upper 20 having a forward portion 212 and a rearward portion 213 adapted to be attached along a seam 214 will now be described. In one embodiment, as shown, for example, in FIG. 14A, the forward portion 212 may be formed with a perimeter tab 217 extending from the laminate 21 and the rearward portion 213 may be formed with an opening 218 between the outer layer 22 and the inner layer 23 for receiving the perimeter tab 217. The perimeter tab 217 may be attached to the rearward portion 213 with adhesive (as shown), stitching, adhesive seam

tape, RF welding, ultrasonic bonding, and/or other suitable attachment techniques. In one embodiment, as shown, for example, in FIG. 14C, the perimeter tab 217 may be formed by the rearward portion 212 and the opening 218 between the outer layer 22 and the inner layer 23 may be formed by the forward portion 212. In one embodiment, as shown, for example, in FIG. 14B, both the forward portion 212 and the rearward portion 213 may be formed with a perimeter tab 217 extending from the laminate 21. The forward and rearward perimeter tabs 217 may be overlapped and then attached. In one embodiment, the forward portion 212, and the rearward portion 213 may be attached by a butt seam.

[0059] In one embodiment, as shown, for example, in FIGS. 15 and 22, the laminate 21 may further include one or more reinforcing layers 28. The reinforcing layer 28 may provide desired stiffness to the upper 20 at a desired location. For example, the reinforcing layer 28 may be used in rearward portion 213 approximate the lacing eyelets to provide desired stiffness to this area to facilitate lacing of the upper 20. The reinforcing layer 28 may include a series of holes (not shown) to coincide with the eyelets. In one embodiment, the reinforcing layer 28 may comprise a stretchable material, including, but not limited to, elasticated banding material (e.g., Gore®), elasticated webbing; knitted material (e.g., circular knitted material), and other suitable stretchable material. In another embodiment, the reinforcing layer 28 may comprise a non-stretchable material, including, but not limited to, non-woven or woven textile material. In one embodiment, the reinforcing layer 28 may comprise a mesh layer. In some embodiments, both a stretchable reinforcing layer 28 and a non-stretchable reinforcing layer 28 may be used. For example, from outermost layer to innermost layer the laminate 21 may include an outer layer 22 (comprising, for example, Lycra®), a non-stretchable reinforcing layer 28, a foam sheet 25, a foam cushioning member 24, a stretchable reinforcing layer 28, and an inner layer 23 (comprising, for example, Lycra®).

[0060] As discussed, the laminate 21 is molded to a shape having a contour to substantially fit at least a portion of a foot. In one embodiment, as shown, for example, in FIGS. 16 and 17, the laminate 21 may include a first portion 210 to be molded to a shape having a contour to substantially fit a heel collar portion 215 of the upper 20. The laminate 21 may be molded to include a hinge 216. The hinge 216 may comprise a portion of the laminate 21 without a cushioning member 24 that is adjacent to areas of the laminate having a cushioning member 24. The hinge 216 may substantially align with a vertical segment at the heel of the foot. In this manner, the heel collar portion 215 may have a clamshell-like structure that may facilitate the portion substantially fitting the contours of the heel of the foot. In one embodiment, as shown, for example, in FIG. 17, the heel collar portion 215 may include a thick cushioning member 24 (relative to cushioning members 24 provided in other areas of the upper 20) so as to provide an enlarged heel collar portion 215.

[0061] FIG. 18 is a partial cross-sectional view of a molded upper 20 according to an embodiment of the present invention. As discussed above, the size and shape of the cushioning layer 24 may vary depending on the desired characteristics of the upper 20. In one embodiment, the cushioning layer 24 may be contoured for anatomical purposes. In one embodiment, the cushioning layer 24 may be contoured to create a massaging effect on the wearer. In one embodiment, all or a portion of the cushioning layer may be contoured for extra comfort. In one embodiment, the upper 20 may be molded to

include an integral a lining or footbed, as shown. In this embodiment, the shoe 10 may be provided without a sock liner. In this manner, the molded upper 20 may comprise a “bootie” with comfort and feel of the laminate 21 around the entire foot.

[0062] In one embodiment, the laminate 21 may initially comprise the inner layer 23 and the cushioning member 24 (with or without the foam sheet 25) and the outer layer 22 may be added after the preliminary upper structure has been molded. The outer layer 22 may be added using similar a molding process. In some embodiments, this may provide an efficient manufacturing process whereby the outer layer 22 may be customizable. For example, different color or pattern outer layers 22 may be used with the same underlying inner layer 23 and cushioning member laminate. In this manner, in one embodiment a modular upper 20 may be provided with a standard interior of the upper 20 (e.g., inner layer 23) and flexibility in styling the exterior of the upper 20 (e.g., outer layer 22).

[0063] With reference to FIGS. 19 and 20, a molded upper 20 according to an embodiment of the present invention includes a laminate 21 having an inner layer 23, an outer layer 22, and a cushioning member 24 disposed between the inner 23 and outer 22 layers. As discussed above, the size and shape of the cushioning layer 24 may vary depending on the desired characteristics of the upper 20. In one embodiment, as shown for example in FIGS. 19 and 20, the cushioning layer 24 may include a plurality of ribs 29 that extend from a midfoot portion of the upper on the lateral side around the heel portion of the upper to the medial side of the upper. The cushioning layer 24 may further include a heel collar portion 215 that extends about the interior collar of the heel portion of the upper.

[0064] With reference to FIG. 21, in one embodiment a mold 300 for molding an upper 20 according to embodiments of the present invention includes a lower plate 310 and an upper plate 320. The lower plate may include a three-dimensional profile of an upper 20 having a first portion 312 and a second portion 314, and the upper plate includes a corresponding relief or cavity (not shown) for receiving the profile 311 during the molding process.

[0065] With reference to FIG. 24, a method 400 for manufacturing an upper for an article of footwear according to embodiments of the present invention will now be described. In one embodiment, the method includes steps 402, 404, and 406, and may include additional or fewer steps. In step 402, a foam cushioning member 24 is formed. In step 404, a preliminary upper 21 is formed by enveloping the foam cushioning member 24 between an outer layer 22 and an inner layer 22. In step 406, the preliminary upper 21 is molded to a shape having a contour to substantially fit at least a portion of the foot.

[0066] With reference to FIG. 25, a method 500 for manufacturing an upper for an article of footwear according to embodiments of the present invention will now be described. The method includes steps 501, 502, 503, and 504, and may include additional or fewer steps. In step 501, a foam layer 24 is formed. In step 502, a laminate 21 is formed having the foam layer 24 in between an outer layer 22 and an inner layer 23. In step 503, heat and pressure is applied to the laminate 21 to form a first portion of an upper shaped to fit a first portion of a foot and a second portion of an upper shaped to fit a second portion of the foot. In step 504, the first portion of the

upper is attached to the second portion of the upper to form a single piece upper for an article of footwear.

[0067] The foregoing description of the specific embodiments will so fully reveal the general nature of the invention that others can, by applying knowledge within the skill of the art, readily modify and/or adapt for various applications such specific embodiments, without undue experimentation, without departing from the general concept of the present invention. Therefore, such adaptations and modifications are intended to be within the meaning and range of equivalents of the disclosed embodiments, based on the teaching and guidance presented herein. It is to be understood that the phraseology or terminology herein is for the purpose of description and not of limitation, such that the terminology or phraseology of the present specification is to be interpreted by the skilled artisan in light of the teachings and guidance.

[0068] The breadth and scope of the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

1. A method for manufacturing an upper for an article of footwear, comprising:

forming a contoured foam layer;

forming a preliminary upper by laminating an outer layer, an inner layer, and the foam layer intermediate to the outer layer and the inner layer; and

molding the preliminary upper to a shape having a contour to substantially fit at least a portion of a foot to provide at least a portion of an upper for an article of footwear.

2. The method of claim 1, wherein the preliminary upper is molded to a shape having a contour to fit a heel portion of the foot.

3. The method of claim 1, wherein the preliminary upper is molded to a shape having a contour to fit a forefoot portion of the foot and a heel portion of the foot.

4. The method of claim 1, wherein the preliminary upper is molded to a shape having a contour to fit a forefoot portion of the foot, a heel portion of the foot, and an intermediate portion of the foot between the forefoot portion and the heel portion.

5. The method of claim 1, wherein the preliminary upper is molded to form a single piece upper having a medial portion, a lateral portion, and a footbed portion.

6. The method of claim 1, wherein the outer layer comprises an elastic material.

7. The method of claim 1, wherein outer layer comprises an elastic polyurethane fiber.

8. The method of claim 1, wherein the outer layer comprises elastane.

9. The method of claim 1, wherein the outer layer and the inner layer comprise an elastic material.

10. The method of claim 1, wherein the outer layer and the inner layer comprise the same material.

11. The method of claim 1, wherein the step of molding the preliminary upper includes applying heat and pressure to the preliminary upper.

12. The method of claim 1, wherein the foam layer is formed to a shape having a contour to fit a heel portion of a foot.

13. The method of claim 1, wherein the preliminary upper is substantially flat before molding.

14. The method of claim 1, wherein the foam layer has a variable thickness.

15. A method for manufacturing an upper for an article of footwear, comprising:

forming a foam layer;

forming a laminate having an outer layer, an inner layer, and the foam layer intermediate to the outer layer and the inner layer;

applying heat and pressure to the laminate to form a medial portion of an upper shaped to fit a medial portion of a foot and a lateral portion of an upper shaped to fit a lateral portion of the foot; and

attaching the medial portion to the lateral portion to form a single piece upper for an article of footwear.

16. The method of claim 15, wherein the outer layer and the inner layer comprise an elastic polyurethane fiber.

17. The method of claim 15, further comprising attaching the medial portion to the lateral portion along a seam extending along the length of the upper.

18. The method of claim 15, wherein the laminate is a single piece laminate and the medial portion and the lateral portion are integral portions of the single piece laminate.

19. The method of claim 15, wherein the laminate is substantially flat before applying heat and pressure during molding.

20. The method of claim 15, wherein the foam layer has a variable thickness.

21. The method of claim 15, wherein the step of applying heat and pressure includes heating the laminate and placing the heated laminate into a mold.

22. A method for manufacturing an article of footwear, comprising:

forming a single piece preliminary upper having an outer layer comprising an elastic polyurethane fiber, an inner layer, and a foam layer disposed between the outer layer and the inner layer;

molding the preliminary upper to form a medial portion of an upper shaped to fit a medial portion of a foot and a lateral portion of an upper shaped to fit a lateral portion of the foot;

attaching the lateral portion to the medial portion to form a single piece upper for an article of footwear; and

attaching a sole to the upper.

23. A method for manufacturing an article of footwear, comprising the steps of:

forming a contoured foam cushioning member;

forming a preliminary upper by enveloping the foam cushioning member between an outer layer and an inner layer; and

molding the preliminary upper to a shape having a contour to substantially fit at least a portion of a foot.

24. The method of claim 23 wherein the molding step includes placing the preliminary upper on a mold and applying heat and pressure, wherein a first region of the mold corresponds to a portion of a medial side of a foot and a second region of the mold corresponds to a portion of a lateral side of the foot.

25. The method of claim 23 wherein the molding step includes placing the preliminary Upper on a mold having a shape corresponding to a medial side of a foot and applying heat and pressure to the preliminary upper.

26. The method of claim 23 wherein the molding step includes placing the preliminary upper on a mold having a shape corresponding to a lateral side of a foot and applying heat and pressure to the preliminary upper.

27. The method of claim 23 wherein the foam cushioning member is formed by molding.

28. An upper for an article of footwear, comprising:
a single piece laminate including a contoured foam cushioning member, an inner layer, and an outer layer, wherein the foam cushioning member is enveloped between the inner layer and the outer layer, wherein a first region of the single piece laminate corresponds to a portion of a lateral side of the foot and a second region of the single piece laminate corresponds to a portion of a medial side of the foot, and wherein the outer layer comprises an elastic material.

29. An article of footwear comprising:
a footwear upper formed of one or more pieces, each piece comprising one or more layers;
a footwear lower attached to the footwear upper to provide a sole supporting member to the article of footwear; wherein the one or more pieces used to form the footwear upper are molded into a three dimensional configuration.

30. An article of footwear according to claim 29, wherein at least one of the pieces forming the footwear upper is multilayered.

31. An article of footwear according to claim 30, wherein the multilayered piece comprises:
an outer layer;
a middle layer; and
an inner layer.

32. An article of footwear according to claim 29, wherein the footwear upper comprises a single layer.

33. An article of footwear according to claim 29, wherein the one or more pieces forming the footwear upper are joined so as to provide a substantially seamless inner surface.

34. An article of footwear according to claim 29, wherein the footwear upper is formed from a single piece.

35. An article of footwear according to claim 34, wherein the footwear upper is formed from a single piece comprising an outer fabric layer, a middle foam layer and an inner fabric layer.

36. An article of footwear according to claim 30, wherein the footwear upper includes padding positioned at one or more anatomically determined positions to provide enhanced cushioning, reinforcement or support.

37. An article of footwear according to claim 29, wherein the footwear upper includes an upper opening to receive a wearer's foot, the upper opening having an upper edge, and a lower opening having a lower edge to which the footwear lower is attached to provide a sole supporting member, wherein the upper edge is finished to provide a seamless edge.

38. An article of footwear according to claim 29, wherein one or more decorative and/or structural features are added to an outer surface of the footwear upper by use of a heat sealable film along at least an outer periphery of the decorative feature.

39. An article of footwear according to claim 38, wherein structural features in the form of eyes for receiving shoe laces are attached to the footwear upper using a heat sealable film.

40. An article of footwear according to claim 29, wherein the molding involves the application of heat and pressure.

41. A method for forming an article of footwear, the method comprising the following steps:

molding one or more pieces for forming a footwear upper into a suitable three dimensional configuration;

forming the footwear upper from the one or more pieces, each piece comprising one or more layers; and
attaching a footwear lower to the footwear upper to provide a sole supporting member to the article of footwear.

42. A method for forming an article of footwear according to claim 41, wherein the step of molding one or more pieces for forming a footwear upper into a suitable three dimensional configuration includes placing the piece into a heat press molding apparatus including complementary shaped first and second molding portions, wherein the first molding portion is configured to receive a complementary shaped second molding portion so that the piece is formed into a three dimensional configuration there between.

43. A method for forming an article of footwear according to claim 41, wherein the footwear upper is formed from more than one piece and each piece is joined to its adjacent piece by ultrasonic welding.

44. (canceled)

45. (canceled)

46. A method for forming an article of footwear according to claim 41, wherein the molding involves the application of heat and pressure.

47. A method for forming an article of footwear according to claim 41, wherein the molding of each of the one or more pieces for forming a footwear upper into a suitable three dimensional configuration comprises the steps of:

providing a first sheet of material which is to be an outer layer of the footwear upper,

providing a second sheet of material which is to be an inner layer of the footwear upper,

providing between the first and second sheets of material a sheet of foam which is to be a middle layer of the footwear upper, and

molding together the first and second sheets of material and the sheet of foam to laminate the sheets.

48. A method for forming an article of footwear according to claim 47, wherein the first and second sheets of material each comprises a layer of fabric.

49. An inner lining for an article of footwear, comprising:
a footwear liner formed of one or more pieces, each piece comprising one or more layers, the footwear liner configured to receive a wearer's foot;

wherein the one or more pieces used to form the footwear liner are molded into a three dimensional configuration.

50. An inner lining for an article of footwear according to claim 49, wherein the inner lining is placed within and fastened to a footwear upper to form an article of footwear.

51. An inner lining for an article of footwear according to claim 50, wherein the inner lining is removably fastened to the footwear upper.

52. An inner lining for an article of footwear according to claim 49, wherein the footwear liner is formed from one piece, the one piece being molded into a three dimensional configuration using a heat press molding apparatus,

53. An inner lining for an article of footwear according to claim 52, wherein the heat press molding apparatus includes complementary shaped first and second molding portions, wherein the first molding portion is configured to receive a complementary shaped second molding portion so that the footwear liner is formed into a three dimensional configuration there between.

54. An inner lining for an article of footwear according to claim 49, wherein the footwear liner is formed from two

pieces, each piece being molded into a three dimensional configuration using a heat press molding apparatus.

55. An inner lining for an article of footwear according to claim **54**, wherein one of the two pieces is independently molded into a left side piece and the other one of the two pieces is independently molded into a right side piece, such that the molded left side piece and the molded right side piece can be joined together to form the footwear liner configured to receive a wearer's foot.

56. An inner lining for an article of footwear according to claim **55**, wherein the molded left side piece and the molded right side piece are joined together using non stitching means.

57. An inner lining for an article of footwear according to claim **55**, wherein the molded left side piece and the molded right side piece are joined together by ultrasonic welding.

58. An article of footwear including an inner lining, comprising:

a footwear upper;

a footwear liner formed of one or more pieces, each piece comprising one or more layers, the footwear liner configured to receive a wearer's foot; and

a footwear lower attached to the footwear upper to provide a sole supporting member to the article of footwear; wherein the one or more pieces used to form the footwear liner are molded into a three dimensional configuration.

59. An article of footwear comprising:

a footwear upper formed of one or more pieces, each piece comprising one or more layers;

a footwear lower attached to the footwear upper to provide a sole supporting member to the article of footwear;

wherein the one or more pieces used to form the footwear upper are molded into a three dimensional configuration, each of the one or more pieces used to form the footwear upper having no seams away from the edges of the piece.

60. An inner lining for an article of footwear, comprising: a footwear liner formed of one or more pieces, each piece comprising one or more layers, the footwear liner configured to receive a wearer's foot;

wherein the one or more pieces used to form the footwear liner are molded into a three dimensional configuration, each of the one or more pieces used to form an upper part of the footwear liner having no seams away from the edges of the piece.

61. An article of footwear including an inner lining, comprising:

a footwear upper;

a footwear liner formed of one or more pieces, each piece comprising one or more layers, the footwear liner configured to receive a wearer's foot; and

a footwear lower attached to the footwear upper to provide a sole supporting member to the article of footwear;

wherein the one or more pieces used to form the footwear liner are molded into a three dimensional configuration, the one or more pieces used to form the footwear liner including two pieces used to form an upper part of the footwear liner.

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