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Shane

(54) **FOOTWEAR WITH ADJUSTABLE SIZE**

(75) Inventor: **S. Kohatsu Shane**, Portland, OR (US)

Correspondence Address:
BANNER & WITCOFF, LTD.
1100 13th STREET, N.W., SUITE 1200
WASHINGTON, DC 20005-4051 (US)

(73) Assignee: **NIKE, INC.**, Beaverton, OR (US)

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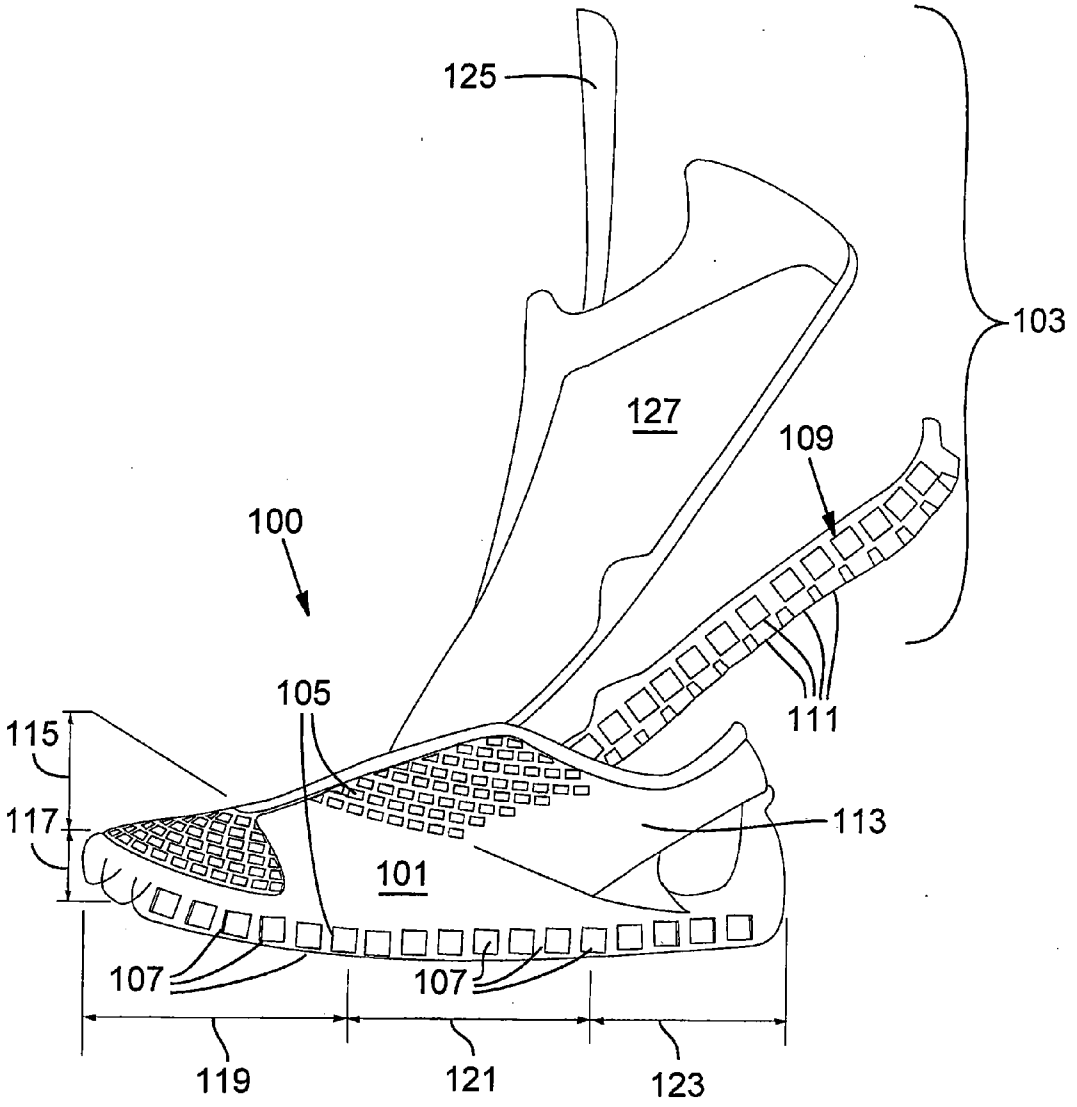
(57) **ABSTRACT**

An article of manufacture may be adjustable and may include a cage having a plurality of apertures and an insert having a frame with a plurality of projections that extend from the frame. The insert may be inserted into the cage and may cause the cage to expand to the shape of the insert. The projections on the frame may extend through the apertures of the cage when the insert is inserted into the cage. The cage may be capable of expanding to a plurality of sizes and shapes of various inserts. The article of manufacture may be an article of footwear, a container, an article of apparel, a textile, and any other object of manufacture.



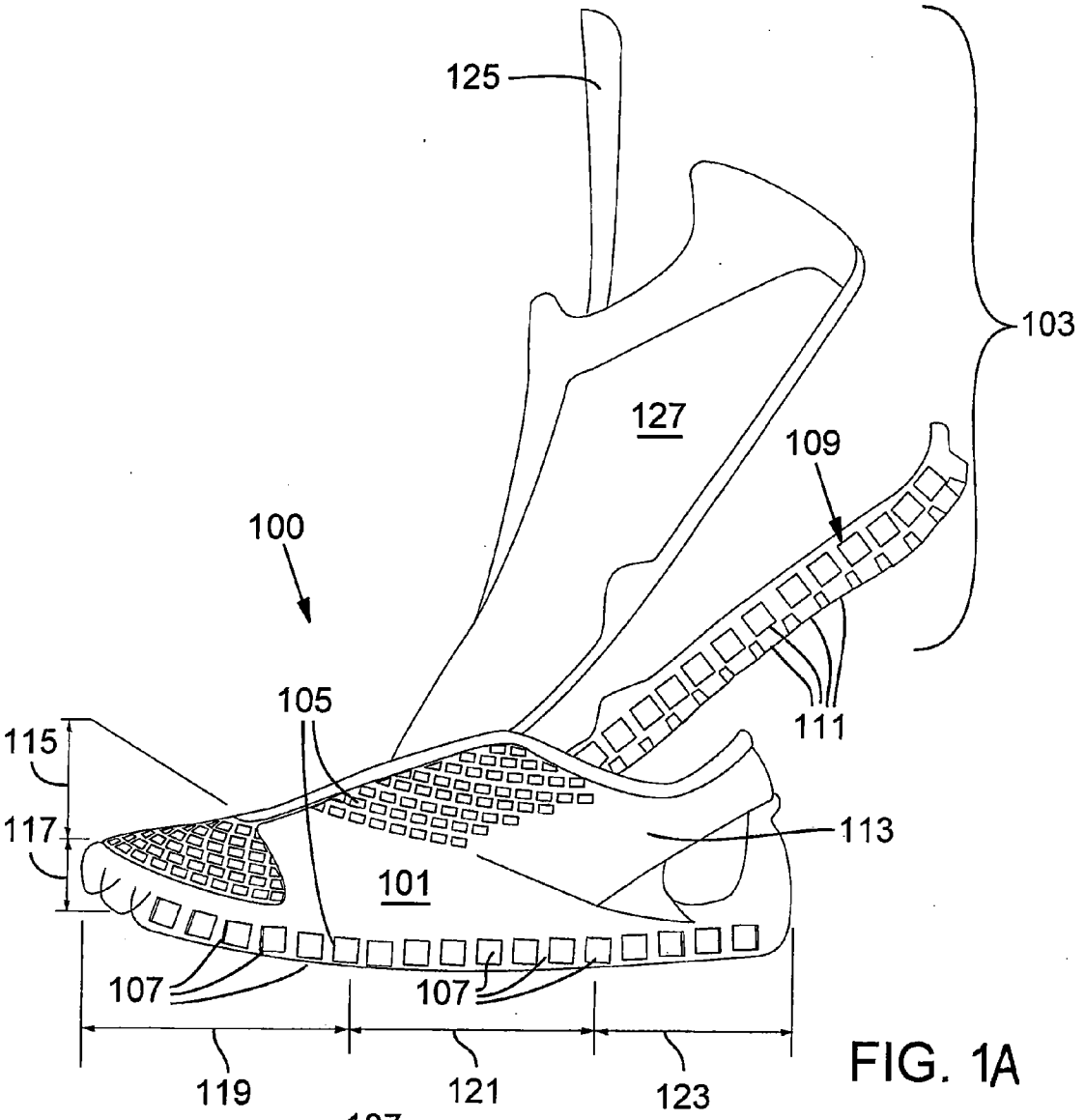

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FIG. 1A

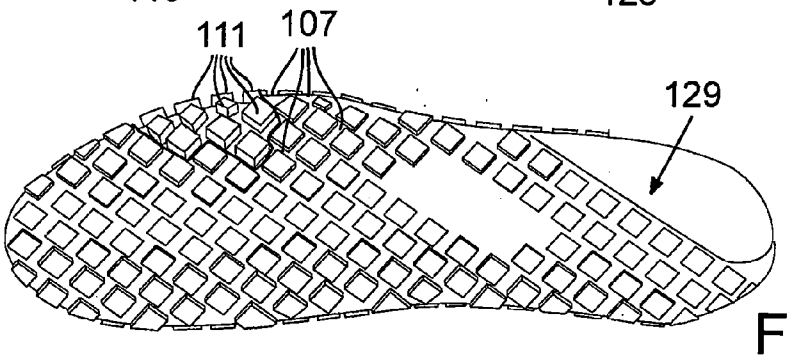
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FIG. 1B

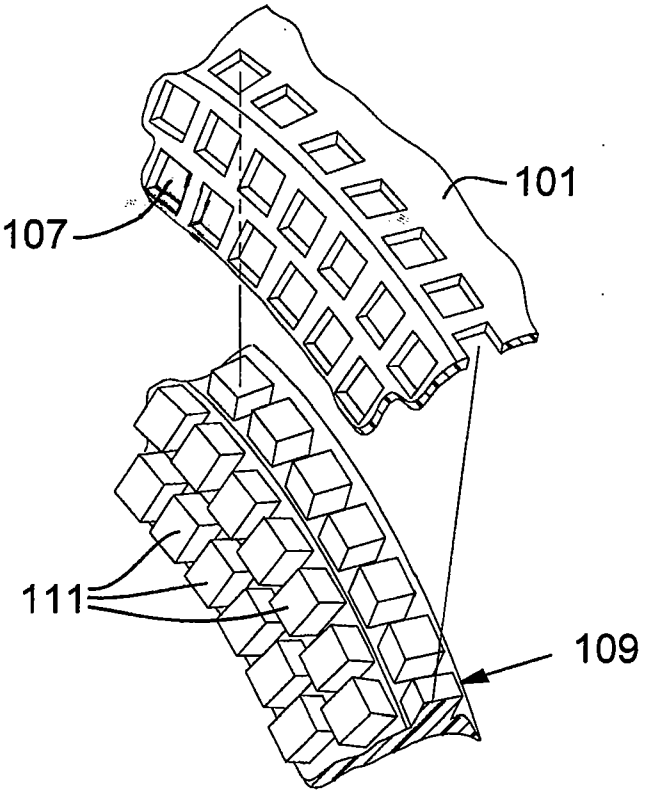

FIG. 2A

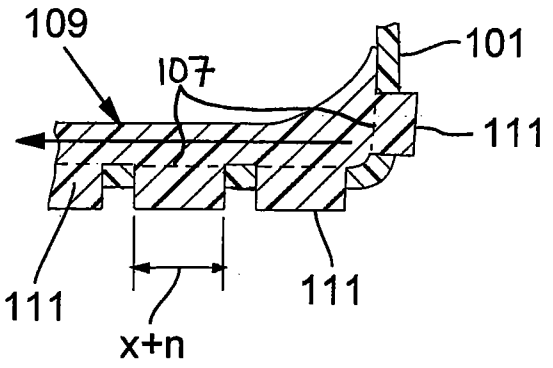

FIG. 2B

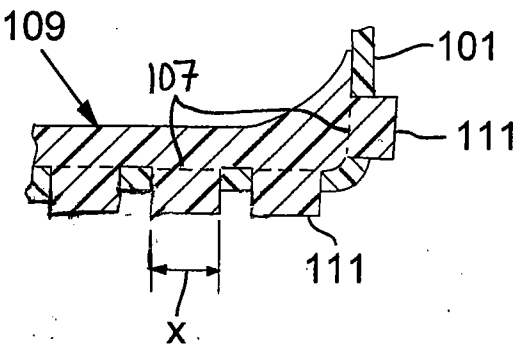

FIG. 2C

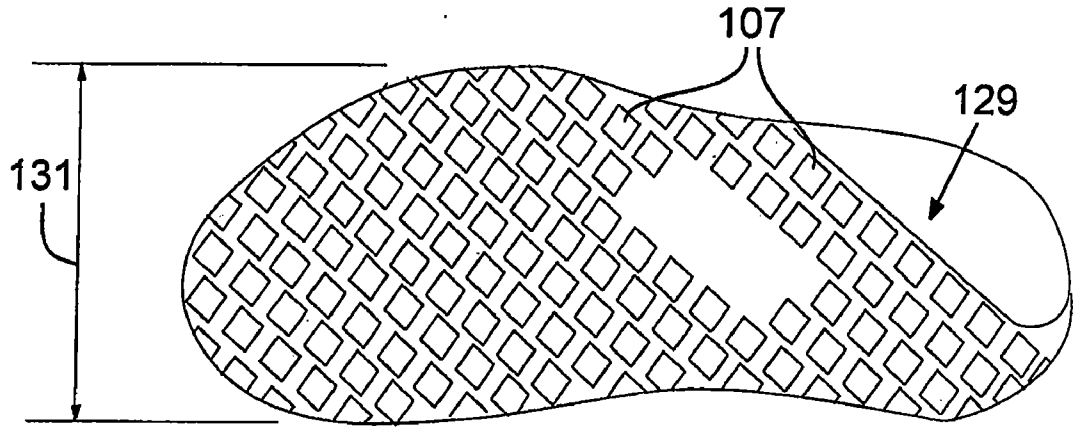

FIG. 3A

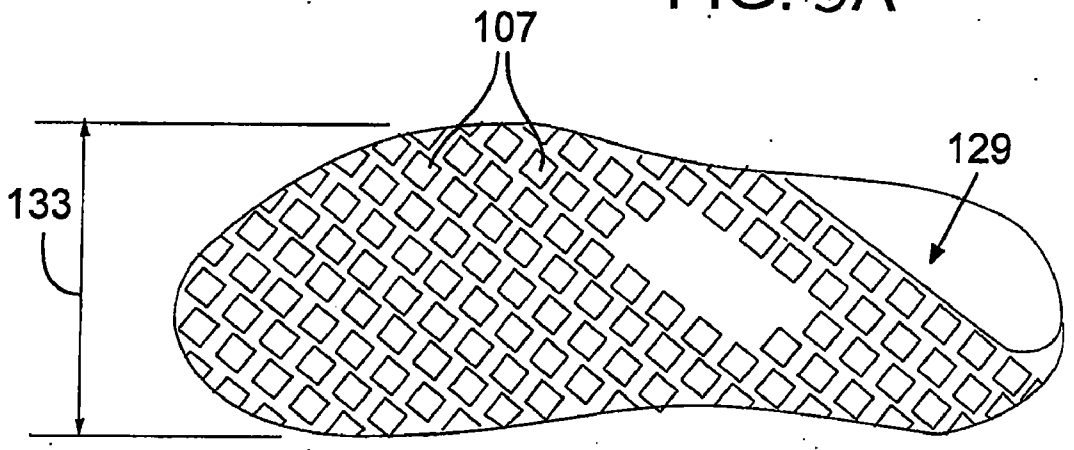

FIG. 3B

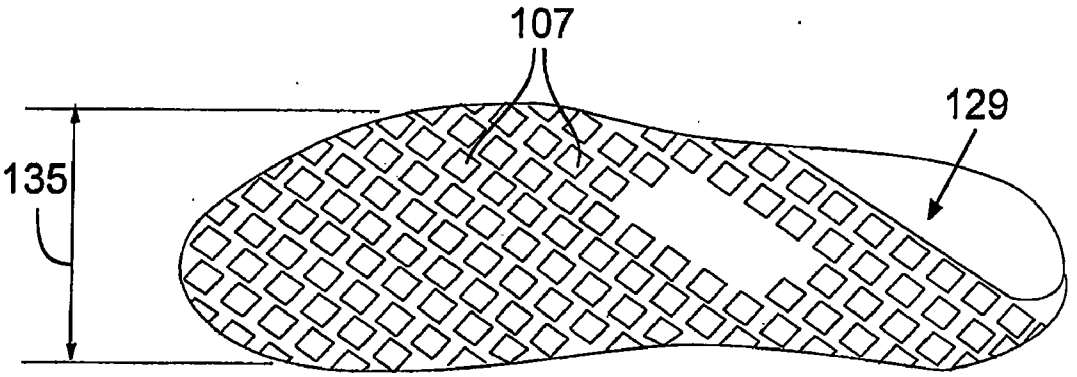

FIG. 3C

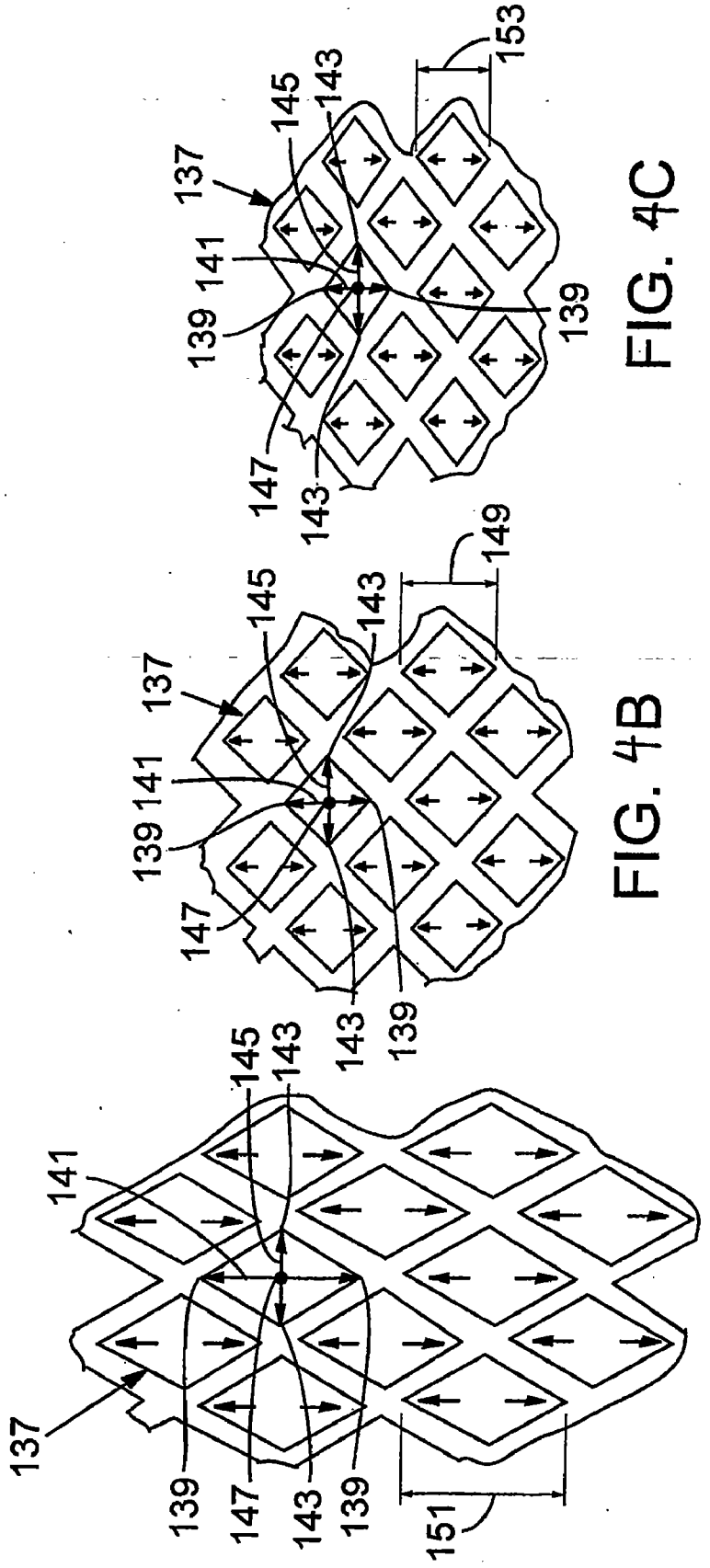

FIG. 4A

FIG. 4B

FIG. 4C

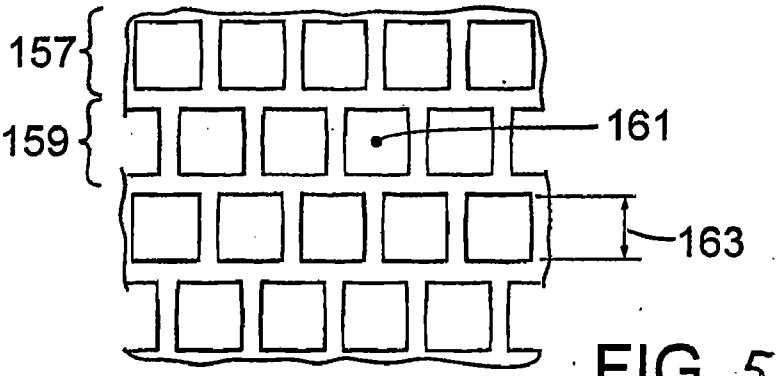

FIG. 5A

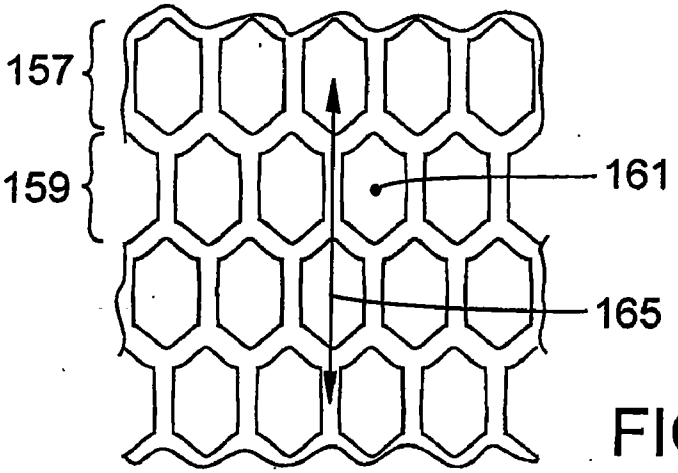

FIG. 5C

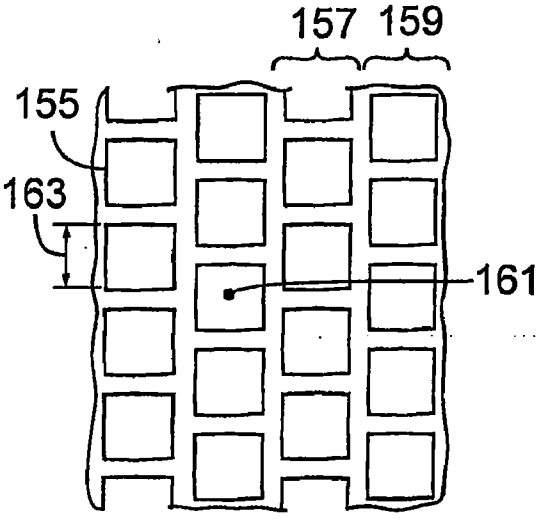

FIG. 5B

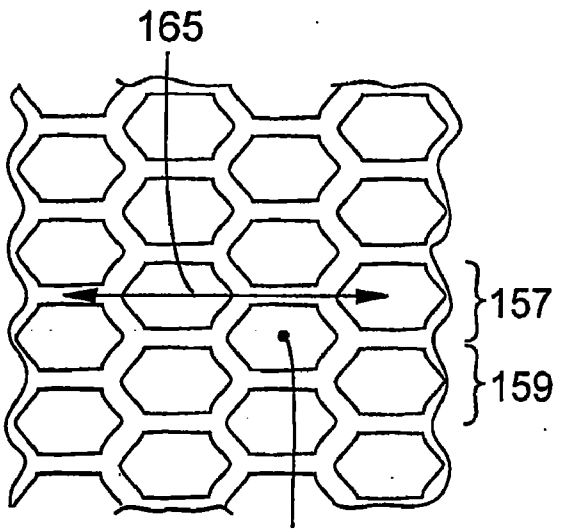

FIG. 5D

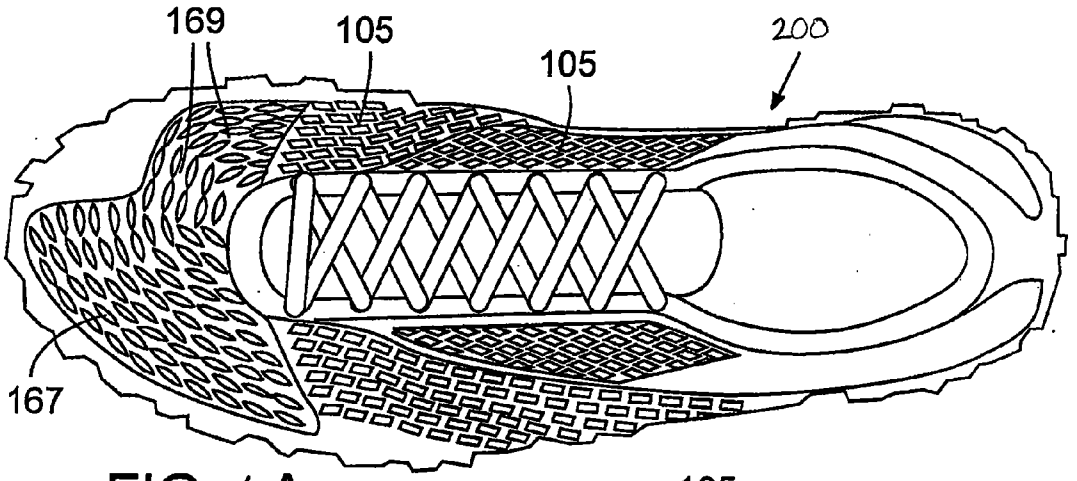

FIG. 6A

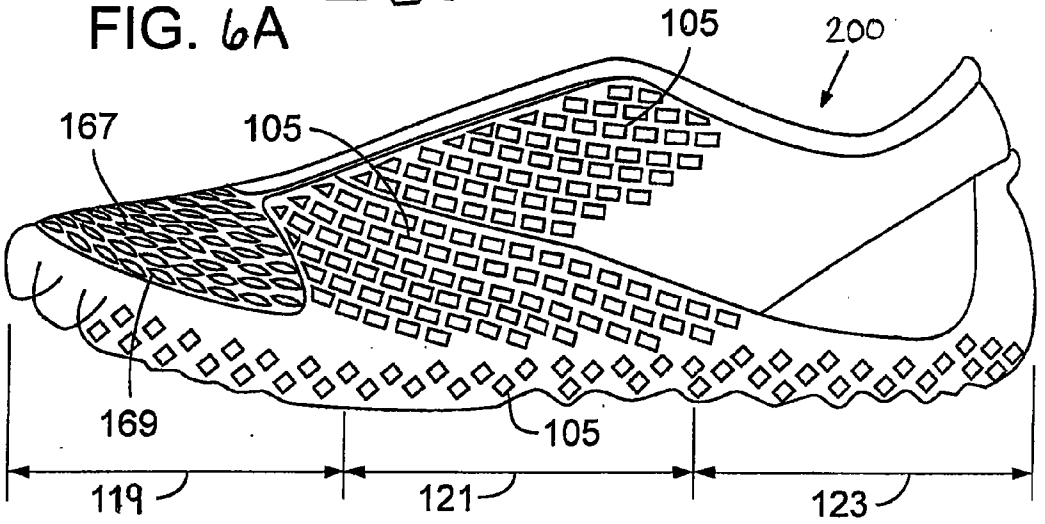

FIG. 6B

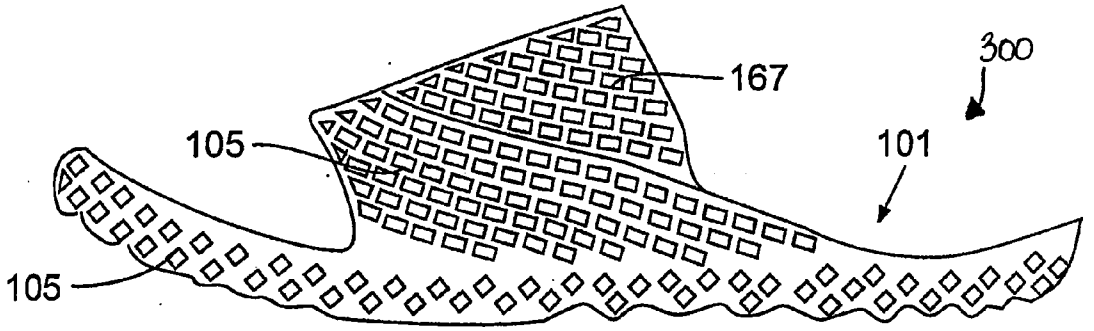

FIG. 7

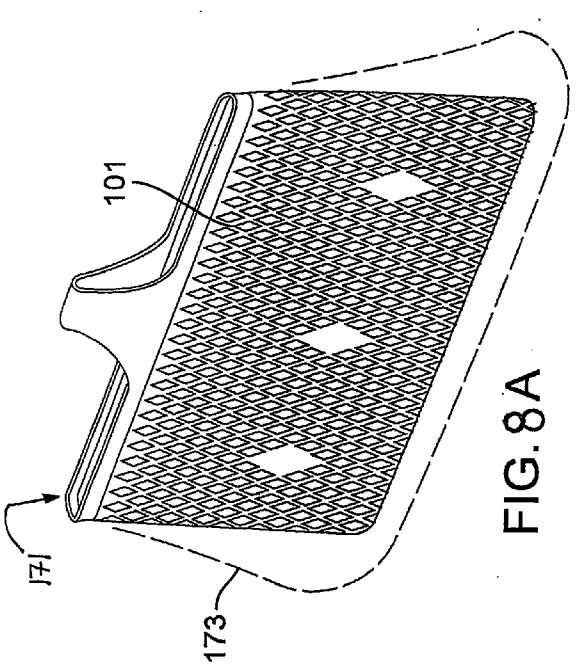

FIG. 8A

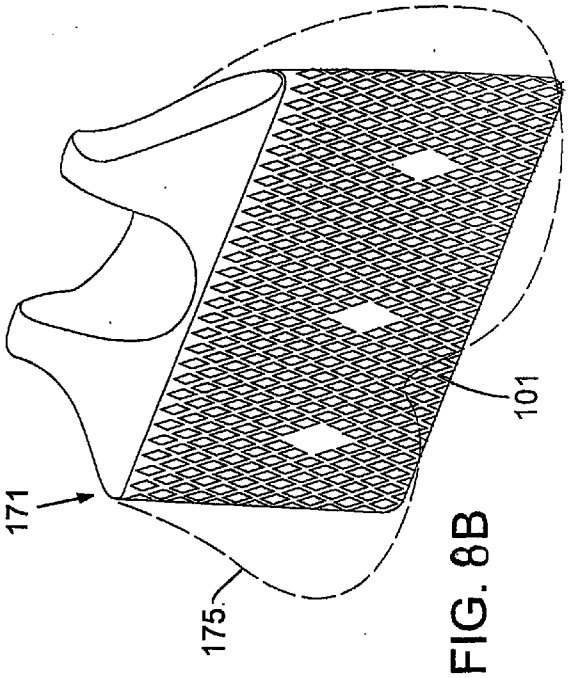

FIG. 8B

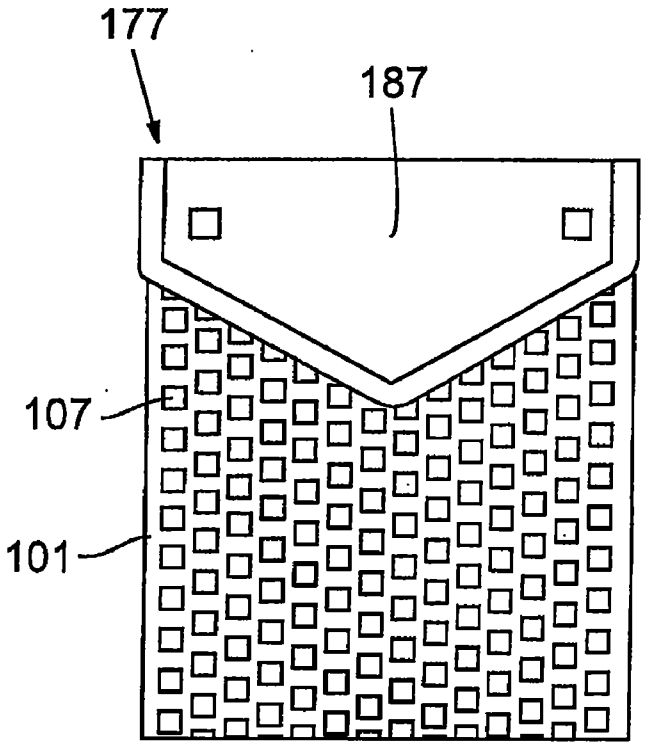

FIG. 9A

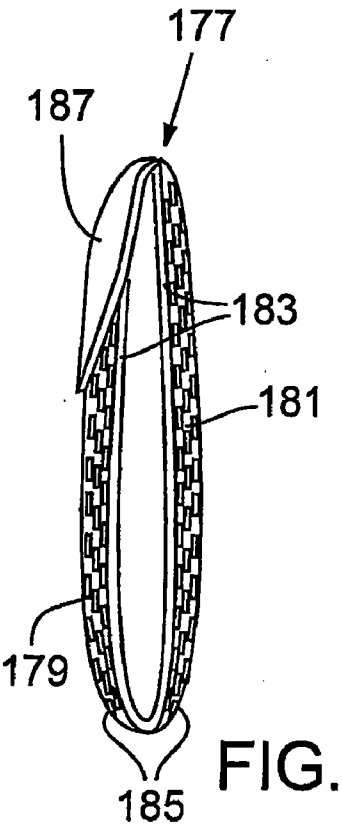

FIG. 9B

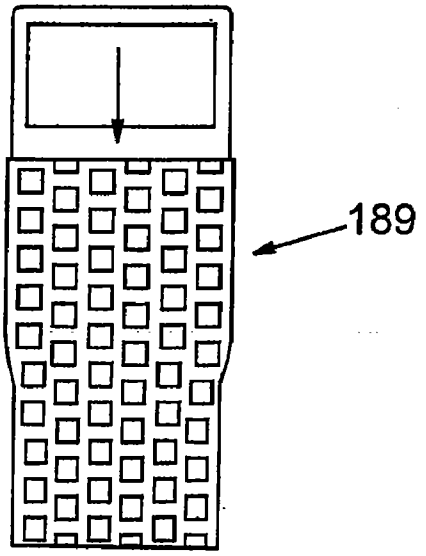

FIG. 10

FOOTWEAR WITH ADJUSTABLE SIZE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This U.S. patent application claims priority to U.S. Provisional Patent Application Ser. No. 61/022,223, which was filed in the U.S. Patent and Trademark Office on Jan. 18, 2008 and entitled "Footwear with Adjustable Size." This prior U.S. Provisional Patent Application is entirely incorporated herein by reference.

FIELD OF THE INVENTION

[0002] Aspects of this invention relate to articles of manufacture having an adjustable size and shape. More specifically, aspects of the invention relate to an article of manufacture that is capable of receiving a plurality of inserts that may be various sizes and shapes.

BACKGROUND

[0003] Many articles of footwear contain an upper and a sole structure that are manufactured in a range of standard sizes. The standard sizes are typically two-dimensional, in that they are defined by a length and a width. The length and width are measured for the foot of an average wearer. These standard sizes do not account for differences in the overall shape and contour of a wearer's foot. Wearers often find that footwear by one manufacturer varies significantly in fit from footwear by another manufacturer. Different styles of footwear vary significantly in fit because each article of footwear has different shape and flexibility qualities. Moreover, wearers may also wish to customize their footwear by varying the appearance of elements of the footwear, such as its color, shape, and material.

[0004] To meet the needs of the wearers, manufacturers have attempted to customize an article of footwear's fit and appearance. For example, a last shaped to an individual wearer's foot may be used to mold a customized article of footwear, but this process is time-consuming and expensive. Further, manufacturers have sold footwear having interchangeable inserts of different sizes. These inserts may be placed within the sole structure to customize the length and width of the sole to suit a wearer's individual needs. Still further, some footwear may be customized to fit a variety of lengths and widths by providing an upper to which may be attached a plurality of removable sole structures of different lengths and widths, as taught in U.S. Pat. No. 6,915,596 to Grove, et al. Although these manufacturing techniques may permit a wearer to customize the length and width of an article of footwear, none of them allow for the overall shape of the article of footwear to be customized to the unique shape and contour of the wearer's foot.

[0005] Additionally, manufacturers face high costs to produce a wide variety of sizes and appearances for articles of footwear that fit various foot shapes and fashion needs. The manufacturer must assume a high risk of maintaining an inventory of articles of footwear that are customized to the shape and appearance needs of a small portion of wearers, which runs a significant risk of a poor profit margin. However, manufacturers also do not realize a large profit from the sale of articles of footwear that do not provide the wearer with a comfortable fit having a desirable fashion and a reasonable price.

[0006] Many manufacturers have attempted to reduce inventory risk and decrease production costs for articles of footwear. Other manufacturers simply pass along the increased inventory risks and costs of production to wearers of the articles of footwear. For example, a wearer wanting an article of footwear that has a custom size or style is likely to pay a high price, which does not appeal to many consumers.

[0007] Some manufacturers have attempted to decrease production costs for articles of footwear by making an element, such as an upper, that may be interchangeable between sizes. Rather than customizing an upper for every wearer, some manufacturers have proposed footwear with a versatile upper that may be attached to soles having different lengths and widths. The removable sole structure described in the Grove, et al. patent discussed above, for example, may reduce a manufacturer's inventory risk because several sole structures of different sizes may be fitted to a single upper to provide a wide range of wearers with a sole having a customized length and width. This construction reduces the number of uppers that would need to be manufactured to provide customized lengths and widths, and thus decreases the production costs for the manufacturer.

[0008] Moreover, an upper and removable sole structure decreases the inventory risk for a manufacturer. Such a modular construction permits the manufacturer to mix and match many different combinations of colors, materials, and other custom characteristics to create customized products for customers without incurring excessive inventory costs that are associated with maintaining large quantities of customized articles.

[0009] Therefore, it is desirable to manufacture an article of footwear that may be customized to the shape of the wearer's foot and to each wearer's fashion needs. It is also desirable to reduce inventory risk and production costs for providing the wearer with a customizable article of footwear.

SUMMARY

[0010] The following presents a general summary of aspects of the invention and is not an extensive overview of the invention. It is not intended to identify key or critical elements of the invention and/or to delineate the scope of the invention. The following summary merely presents some concepts of the invention in a general form as a prelude to the more detailed description provided below.

[0011] This invention relates to articles of manufacture that may be stretched to expand to dimensions of an insert, wherein the insert includes a frame and a plurality of projections. A cage, including a plurality of apertures and a stretchable portion, may be expanded so that the plurality of projections extends through the plurality of apertures when the insert is inserted into the cage. In some embodiments, the stretchable portion of the cage may maintain its general shape when it is expanded. One embodiment may include a first insert having a first frame that defines a first dimension and a second insert having a second frame that defines a second dimension. In this embodiment, the stretchable portion may be expanded to the first dimension that corresponds to the size of a first wearer or a first object, and it may also be expanded to the second dimension that corresponds to the size of a second wearer or a second object.

[0012] The insert may cause the stretchable portion to expand to various shapes, such as an article of footwear or a container. The stretchable portion may be shaped to be a portion of an upper of an article of footwear, wherein the

upper may receive inserts of various dimension. For example, a first dimension may correspond to the foot size of a first wearer and a second dimension may correspond to the foot size of a second wearer. When the sole portion is inserted into the upper, the first dimension and the second dimension may expand the stretchable portion to the contour and shape of a first wearer's foot and a second wearer's foot, respectively. The insert may also configure the stretchable portion to be the shape of a container, such as a bag, backpack, wallet, or case for electronics, which may be expanded to different sizes.

[0013] The sole portion may contain projections that extend through the plurality of apertures defined by the upper when the sole portion is inserted into the upper. In at least some embodiments, the apertures are in the shape of a regular polygon, such as a diamond, or any other polygon with any number of sides (e.g., a hexagon, an octagon, etc.). Additionally, some embodiments may include a plurality of slits that are positioned within the stretchable portion and are configured to expand when an object, such as a foot, is placed into the upper. The slits may have a length and a width, wherein the slits expand a greater distance in the direction of the length than in the direction of the width when the stretchable portion is expanded by an object.

[0014] This invention also relates to methods of modular construction, wherein an insert may be inserted into a cage, the insert including a frame and a plurality of projections and the cage including a stretchable portion that defines a plurality of apertures that allow the stretchable portion to expand to the shape of the frame. The plurality of projections are coordinated to extend through the plurality of apertures when the cage is expanded to the dimensions of the frame. The insert may be one of several inserts, wherein each insert is defined by a size that corresponds to the fit of one of a plurality of wearers or each insert defines a differently sized object.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] A more complete understanding of the present invention and certain advantages thereof may be acquired by referring to the following description along with the accompanying drawings, in which like reference numbers indicate like features, and wherein:

[0016] FIG. **1**A illustrates an article of footwear and an insert for defining a size and shape, according to an aspect of the invention.

[0017] FIG. **1**B illustrates a bottom plan view of a cage and a plurality of projections extending through openings in the cage that form a ground contact surface of an article of footwear, according to aspects of the invention.

[0018] FIG. **2**A illustrates a portion of a cage and an insert having a plurality of projections, according to aspects of the invention.

[0019] FIGS. **2**B and **2**C illustrate a cross sectional view of a cage with a plurality of openings and an insert having a plurality of projections extending through the openings, according to aspects of the invention.

[0020] FIGS. **3**A-**3**C illustrate a bottom plan view of an article of footwear capable of receiving a plurality of inserts, in accordance with aspects of the invention.

[0021] FIGS. **4**A-**4**C show an embodiment of a cage that expands to fit various inserts for an article of footwear, according to aspects of the invention.

[0022] FIGS. **5**A-**5**D show cages defining a plurality of apertures having various shapes, according to aspects of the invention.

[0023] FIGS. **6**A and **6**B illustrate an embodiment of an article of footwear having expandable slits, according to aspects of the invention.

[0024] FIG. **7** illustrates yet another embodiment of an article of footwear in accordance with an aspect of the invention.

[0025] FIGS. **8**A and **8**B illustrate exemplary bags having an adjustable size and shape, according to aspects of the invention.

[0026] FIGS. **9**A and **9**B illustrate a wallet having an adjustable size and shape, in accordance with aspects of the invention.

[0027] FIG. **10** illustrates a case for housing electronics having an adjustable size and shape, according to an aspect of the invention.

[0028] The reader is advised that the attached drawings are not necessarily drawn to scale.

DETAILED DESCRIPTION

[0029] In the following description of various example embodiments of the invention, reference is made to the accompanying drawings, which form a part hereof, and in which are shown by way of illustration various example devices, systems, and environments in which aspects of the invention may be practiced. It is to be understood that other specific arrangements of parts, example devices, systems, and environments may be utilized and structural and functional modifications may be made without departing from the scope of the present invention.

A. General Description of an Article of Manufacture According to Exemplary Embodiments

[0030] In general, as described above, aspects of the invention relate to articles of wear having an adjustable size. In accordance with at least some aspects of the invention, an article of manufacture may comprise: (a) a cage that includes at least one stretchable portion, where the stretchable portion defines a plurality of apertures that allow the stretchable portion to expand in at least one direction; and (b) an insert having a frame and a plurality of projections that extend therefrom such that when the insert is inserted into the cage, the projections extend through at least some of the apertures to cause the stretchable portion to expand to dimensions defined by the frame and projections.

[0031] An article of manufacture may be any article that may be manufactured, such as an article of footwear, an article of apparel, a container or bag, and the like. The article of manufacture may be any shape and size and may be designed to contain any desired items such as a wearer's foot or other portion of a wearer's body, objects such as money, electronics, writing instruments, food, beverage containers, clothing, etc. The article of manufacture may contain or define features such as a pocket or enclosed space for containing items.

[0032] The article of manufacture may also include a securing mechanism that is capable of enclosing at least a portion of the article of manufacture. For example, the article of manufacture may be an article of footwear and the article of footwear may include a securing mechanism. The securing mechanism may be shoelaces, hook and loop fastener, buttons, buckles, snaps, elastic, or any other material or mechanism that may be capable of securing the article of footwear to the foot of a user. Oftentimes, the securing mechanism may be

adjusted to a plurality of different sizes. For example, shoe laces may be loosened to increase the opening through which a foot of a user may be inserted. Once the user's foot is inserted into the article of footwear, the shoelaces may be tightened to fittingly engage the article of footwear with the user's foot and provide the support and comfort that the user desires.

[0033] In another example, an article of manufacture may be a wallet and may have a securing means that includes a hook and loop fastener, buckle, snap, magnet, button, or the like. The wallet may include two storage portions, each containing an attached and a free end, where the attached end of each portion may be folded so that the attached ends and the free ends of each portion are generally aligned adjacent to each other. A securing mechanism may be attached to any portion of the wallet to cause the free ends of each portion of the wallet to remain aligned adjacent to one another or in a "closed" position.

[0034] The article of manufacture may also define an opening through which objects may be inserted and removed into an interior space of the article of manufacture. The opening may be expandable and may include elastic or other features to selectively expand to the size and shape of the object that is being inserted through the opening. The article of manufacture may also include features such as pockets, hoods, collars, scarves, key chains, zippers, decorative items or designs, handles, tags, or any other feature that a user may wish to employ in the use of the article of manufacture.

[0035] The article of manufacture may be an article of footwear and may comprise an outsole, an insole, and an upper. The outsole may be a ground-contacting surface of the article of footwear and may be selectively or fixedly attached to the article of footwear. The outsole may include traction enhancing features in the form of traction elements and/or traction surfaces to create friction and provide the user with "grip" and "stability" when the outsole contacts the ground or other contact surfaces. Oftentimes, the outsole protects the other portions of the article of footwear against wear and damage.

[0036] The outsole may be sized to meet the lengths and widths that may be associated with the European and/or the United Kingdom and American standard units or may be customized to the dimensions of a wearer's foot. Articles of footwear for men may be sized and shaped differently than articles of footwear for women to meet the unique physiological and structural needs of each gender.

[0037] Some articles of footwear also may contain an insole that may be engaged with the outsole and/or the upper. The insole may be engaged with the outsole and/or the upper in any manner including, but not limited to, a layered fashion via sewing or stitching, via adhesives, via mechanical connectors, etc. The insole may be removable from the outsole and/or the upper, or it may be permanently affixed to the outsole and/or the upper.

[0038] The upper may be attached to the outsole and/or the insole and may define a space for receiving a foot of a wearer. In many conventional articles of footwear, the upper may be constructed to fittingly engage with the foot of a wearer. In some examples, the upper may include an aperture or a plurality of apertures for receiving phalanges of a wearer's foot and through which phalanges of a wearer's foot may extend and fittingly engage with the upper (e.g., a "flip-flop" or "thong" style article of footwear). In some examples, the upper may extend over at least a portion of the top of the wearer's foot across the top surface of the wearer's foot in the forefoot region of the article of footwear.

[0039] Generally, an article of footwear may include three regions: (a) a forefoot region; (b) a midfoot region; and (c) a heel region. The forefoot region may include the portion of the article of footwear that extends beneath and around the toes and/or the forefoot regions of the wearer's foot. The midfoot region may include the portion of the article of footwear that extends beneath and around the arch and/or the midfoot regions of the wearer's foot, and the heel region may include the portion of the article of footwear that extends beneath and around the heel and ankle areas of the wearer's foot. An article of footwear is not necessarily confined to be described by only these regions and may include additional regions, such as a lateral side (outside) and a medial side (inside). Each of the regions is a reference to a region or portion of the article of footwear and may include each or any of an outsole, an insole, and an upper.

[0040] The article of manufacture may include a cage and an insert, as described above. The cage may extend along a portion or the whole of the article of manufacture. More than one portion of the article of manufacture may contain a cage, and the cage in each portion may have different properties. The cage may include a stretchable portion that may define a plurality of apertures, wherein expansion of the apertures may cause the stretchable portion to expand in one or more directions. The stretchable portion may be a first portion and the cage may include a second portion that is discrete from the first or stretchable portion. The second portion may or may not be stretchable and the second portion may contain stretchability and/or other characteristics that are different from the stretchable portion.

[0041] As described above, the stretchable portion of the cage may define a plurality of apertures that may cause the stretchable portion to expand in one or more directions. The apertures may be a plurality of shapes and may or may not be uniform in shape and size. One or a group of apertures may have different characteristics such as different elasticity and breathability properties. In some examples, the each of the plurality of apertures is a uniform shape and size. Each of the apertures may also have the same elasticity and breathability properties.

[0042] Each of the apertures may be configured to expand in at least one direction. The apertures may expand in one, two, or three dimensions. The expansion of the apertures may cause the cage to be adjusted or customized to the size and shape of an insert, object, wearer's foot, or any other item that may be inserted into the cage. For example, an article of footwear may have a cage and an insert. The insert may be sized to fit a wearer having a foot with a narrow forefoot region. The insert may be inserted into the cage and may expand the cage to the dimensions of the insert along the ground contacting surface. The insert may be sized to extend along the bottom surface of a wearer's foot and may be configured to fittingly engage with the bottom surface of a wearer's foot. The cage and the insert may define a space configured to receive the wearer's foot. The cage may comprise a portion that extends over the top of the wearer's foot. The portion of the cage that extends over the top of the wearer's foot may expand to the shape of the wearer's foot when the wearer's foot is inserted within the space defined by the cage and the insert.

[0043] In another example, the insert may be sized to define a container such as a bag, wallet, or a case for electronics. The

insert may be sized and shaped to the dimensions of any object. The insert may surround a portion of or the entire object when the object is positioned within the cage and insert. For example, the insert may be shaped to be a handbag having at least two side walls, a bottom wall, and a top opening. In one example, the insert may be shaped to extend along the bottom wall and cause the cage to expand to be shaped to the structure of the insert along the bottom wall. Oftentimes, handbags may include a flat panel along the bottom wall of the handbag. In other examples, the insert may be shaped to extend along both of the side walls and the bottom wall and may cause the cage to expand to be shaped to the insert along the bottom wall and the side walls. Portions of the cage in the handbag may not be engaged with the insert and may or may not be expandable. The portions of the cage that are not engaged with the insert may be any shape and size and may include any characteristics such as elasticity and breathability.

[0044] The insert may have a frame and a plurality of projections that extend from the frame. The projections may be positioned to extend through the apertures of the cage when the insert is positioned within the cage. The projections may cause the apertures to expand to the dimensions that may be defined by the frame. The projections that extend from the frame of the insert may extend through the apertures of the cage to cause the cage to expand to the dimensions of the insert. The projections may be similarly shaped (e.g., in a complimentary shape) to the shape of the apertures so that they may fittingly engage with the perimeter of the aperture. One or more projections may extend through the aperture and cause the aperture to expand to the shape of the one or more projections.

[0045] Specific examples of the invention are described in more detail below. The reader should understand that these specific examples are set forth merely to illustrate examples of the invention, and they should not be construed as limiting the invention.

B. Specific Examples of the Invention

[0046] The various figures in this application illustrate examples of articles of manufacture according to this invention. When the same reference number appears in more than one drawing, that reference number is used consistently in this specification and the drawings to refer to the same or similar parts throughout.

[0047] FIG. **1**A illustrates an example of an article of manufacture embodied in an article of footwear **100** comprising a cage **101** and an insert **103**. The cage **101** may include at least one stretchable portion **105** that may define a plurality of apertures **107**. The apertures **107** may cause the stretchable portion **105** to expand in at least one direction. The insert **103** may have a frame **109** and a plurality of projections **111** that extend from the frame **109**. When the insert **103** is inserted into the cage **101**, the projections **111** cause the stretchable portion **105** to expand at the apertures **107** to dimensions that may be defined by the frame **109**.

[0048] As illustrated in FIG. **1**A, the cage **101** may include a stretchable portion **105** and a non-stretchable portion **113**. The stretchable portion may be expandable, as described above. The non-stretchable portion **113** may be generally inelastic and may not generally be expanded to an alternate shape. The non-stretchable portion **113** may be positioned along portions of a wearer's foot that may not benefit from being expandable, such as along the arch of the wearer's foot or at areas that may require greater support or stability. For example, the cage **101** illustrated in FIG. **1**A includes at least three discrete stretchable portions **105** that extend over the top surface of the foot of a wearer in both the forefoot and midfoot regions of the wearer's foot and extending along the bottom surface along the length of the wearer's foot.

[0049] For reference purposes, the article of footwear **100** illustrated in FIG. **1**A is divided into three general regions: a forefoot region **119**, a midfoot region **121**, and a heel region **123**. Each of the forefoot region **119**, the midfoot region **121**, and the heel region **123** are intended to illustrate general portions of the article of footwear **100** and are not intended to demarcate precise areas of the article of footwear **100**. The forefoot region **119**, the midfoot region **121**, and the heel region **123** may be used in this specification to refer to more specific portions of an upper **115**, an insole **125**, an outsole **117**, and any other layer or feature of the article of footwear **100** that may be positioned within the respective region.

[0050] The article of footwear **100** may include a cage **101** that is configured in the general shape of a wearer's foot. The cage **101** may include upper **115** and an exterior sole portion **117** of the article of footwear **100**, as illustrated in FIG. **1**A. The cage **101** may form the portion of the upper **115** that extends over the top surface of the wearer's foot, as illustrated in FIG. **1**A. The cage **101** that provides the upper **115** and the exterior sole portion **117** may be a unitary structure or may be a plurality of structures (or cages) that may be fixedly or selectively attached to one another.

[0051] The cage **101** may comprise one or more suitable materials, including materials that may be conventionally used in manufacturing articles of footwear **100**. The cage **101** may include one or a combination of leather, synthetic leather, natural or synthetic textiles, polymer sheets, polymer foams, mesh textiles, felts, non-woven polymers, or any other suitable material. The material making up the cage **101** may have varying degrees of elasticity, breathability and other materials characteristics. The cage **101** may comprise a first region or upper region and a second region or sole region. The first region or upper region may have a first set of materials properties and the second region or sole region may have a second set of materials properties that is different from the first set of materials properties.

[0052] In some examples, the cage **101** may form all or a portion of the upper **115** of an article of footwear. When the cage **101** forms the entire upper **115**, the cage **101** may be fittingly engaged with and positioned adjacent to the foot of a wearer. In this case, the cage **101** may wrap around the foot of a wearer to secure the outsole or ground contacting surface of the article of footwear **100** to the bottom surface of the foot of a wearer. FIG. **1**B illustrates a bottom surface of the cage **101** and insert **103** combination in which the cage extends along most of the length and width of a bottom surface of the wearer's foot.

[0053] In another example, a sock **127** or bootie member may be inserted within the cage and may be configured to receive the foot of a wearer. The sock **127** may be selectively removable from the cage **101** and may be fitted to compliment the shape of a wearer's foot. The interchangeable nature of the sock **127** permits the wearer to selectively wear protective knitted hosiery, as oftentimes may be worn to prevent chafing between the wearer's foot and the article of footwear **100** and to absorb moisture and odor.

[0054] The sock **127** may include an elastic material that is capable of expanding to the size and shape of the wearer's

foot. The sock **127** may be made of a variety of suitable materials including, but not limited to, cotton, wool, nylon, acrylic, polyester, and spandex. The sock **127** may be removed from the cage **101** to permit the wearer to replace a worn sock **127** with a new sock **127**, to wash the sock **127**, or the change the color or appearance of the sock **127**.

[0055] The sock **127** may be comprised of a rigid, semi-rigid, or flexible material. For example, a sock **127** may include a rigid polymer material that encases the heel region **123** of the wearer's foot to secure the heel of a wearer's foot with respect to the upper **115** and outsole **117**. In another example, the forefoot region **119** of the upper **115** may include a flexible and elastic sock **127** that is capable of being configured to the size and shape of the wearer's foot when the foot is inserted within the sock **127**. In yet another example, the midfoot region **121** may include a sock **127** containing a semi-rigid material extending along the instep (not shown) of a wearer's foot to provide the wearer with support for the arch and to provide the wearer with flexibility during the pronation, supination, flexion, extension, and any other motions that occur during normal activity of the wearer's foot.

[0056] The sock **127** may comprise a plurality of regions, where each region may have different characteristics. For example, a first region of the sock **127** may be positioned within the forefoot region of the wearer's foot and may be highly absorbent of moisture. A second region of the sock **127** may be positioned within a midfoot region of the wearer's foot and may be moderately absorbent of moisture, but somewhat more supportive.

[0057] In this example, the sock **127** may be inserted within the cage **101** and may be fittingly engaged with the insert **103**, as illustrated in FIGS. **1**A and **1**B. If desired, an insole **125** may be fitted along the bottom surface of the sock **127** and may be configured to receive the bottom surface of a wearer's foot.

[0058] Referring again to FIG. **1**A, the cage **101** may include one or more stretchable portions **105**. Each stretchable portion **105** may define a plurality of apertures **107**. The apertures **107** may be openings that extend through a width of the cage **101**. The apertures **107** may be any shape, including a polygon, a circle or oval, or any other suitable shape, as described in greater detail below. In FIG. **1**A, each of the plurality of apertures **107** is shaped in a similar or uniform shape of a four-sided polygon. The shape of the apertures **107** may have straight, angled, and/or curved edges and may be expandable in one or more directions, as described below.

[0059] The insert **103** may have a frame **109** and a plurality of projections **111** that extend from the frame **109**. The frame **109** may include any suitable material including, but not limited to, rubber, polyurethane, nylon, leather, and polyvinyl chloride (PVC). The frame **109** may include at least portions of the shoe sole **117** that are configured to be the ground contacting surface of the article of footwear **100**. The frame **109** may include any portion of the article of footwear **100** that may have projections **111** that may extend through the apertures **107** in the cage **101**. The frame **109** may be inserted into the cage **101** and fittingly engage with the cage **101** to form the ground contacting surface of the article of footwear **100**.

[0060] Projections **111** may be selectively or fixedly attached to the frame **109**. The projections **111** may be shaped in a complimentary fashion to the shape of the apertures **107** of the cage **101**. For example, if the apertures **107** are shaped to define a square or rectangular opening, then the projections **111** may be square or rectangular shaped so that they may extend through the apertures **107** in a complimentary fit. The projections **111** may be any desired size or shape. The projections **111** may form the ground contacting surface for the article of footwear **100** as shown in FIG. **1**B.

[0061] The projections **111** may be spaced apart in any suitable configuration on the frame **109**. For example, the projections **111** may be evenly spaced apart over the surface of the frame **109**. In another configuration, a plurality of projections **111** may be grouped together in a particular section of the frame's **109** surface. The spacing between each of the projections **111** may or may not be uniform. In yet another configuration, the projections may be spaced at varying distances along the surface of the frame **109**. The size and/or shape of the projections **111** may vary over a single frame **109**. The spacing apart of the projections **111** may be determined by various considerations such as, but not limited to, appearance, additional traction, contour and/or shape of the wearer's foot, and the like.

[0062] The projections **111** may comprise traction elements that form at least a portion of the ground contacting surface of the sole **117**. Traction elements may create friction between the article of footwear **100** and the ground and may help prevent the article of footwear **100** from slipping, sliding, or the like. Such traction elements may also increase the wearer's stability while wearing the article of footwear **100**. Tractions elements may include a traction surface (not shown) attached to the projections **111** or integrally formed as part of the projections **111** to form at least a portion of the ground contact surface of the outsole.

[0063] FIG. **2**A illustrates a portion of a cage **101** having a plurality of openings **107** and an insert **103** having a frame **109** with a plurality of projections **111** that may be caused to extend through the openings **107**. As described above, the each projection **111** may extend through and fittingly engage with an opening **107**. In some examples, the openings **107** may expand to accommodate projections **111** of various sizes and shapes.

[0064] FIGS. **2**B and **2**C illustrate a cross sectional view of a plurality of projections **111** that are extending through and are fittingly engaged with openings **107** of a cage **101**. FIG. **2**C illustrates projections **111** having a width of "x" and the openings **107** expanding to a width of "x" to permit the projections **111** to extend through and fittingly engage with the openings **107**. In FIG. **2**B, the projections **111** have a width of "x+n" and cause the openings **107** to expand to the width of "x+n." The openings **107** in a single cage **101** may be expandable to accommodate any suitably sized and shaped projection **111**.

[0065] FIGS. **3**A-**3**C illustrate a bottom surface **129** of a cage **101** of an article of footwear **100**. The cage **101** may be expanded to a plurality of widths. For example, FIG. **3**A illustrates a cage **101** that may be expanded to the width and/or size of a typical article of footwear **100** having a wide width **131**. FIG. **3**B illustrates the same cage **101**, but the cage **101** is expanded only to the width and/or size of an article of footwear **100** having an average width **133**. FIG. **3**C illustrates the same cage **101**, but in this instance the cage **101** is expanded only to the width and/or size of an article of footwear **100** having a narrow width **135**. The wide width **131** may be greater than both the average width **133** and the narrow width **135**. The average width **133** may be greater than the narrow width **135** and may be less than the wide width

131. The narrow width 135 may be less than both the wide width 131 and the average width 133.

[0066] The width of the article of footwear 100 may be uniformly wide, average, or narrow through each of the forefoot region 119, the midfoot region 121, and the heel region 123 of the article of footwear 100. The width of the article of footwear 100 may also comprise an average width 133 for the heel region 123 and a wide width 131 in the forefoot region 119. In another example, the heel region 123 of an article of footwear 100 may include a narrow width 135 and the forefoot region 119 may be sized for an average width 133. The width may also be customized to the width of a wearer's foot in each of the forefoot region 119, the midfoot region 121, and the heel region 123. The width may be any suitable width for a wearer. The width of any region of the article of footwear 100 may include a stretchable or expandable portion to permit the corresponding element (e.g., upper, etc.) to expand to the suitable width. A single cage member 101 may be used to accommodate this widely varying combination of sizes, e.g., by using the cage member 101 with different frame members 109 having the desired width and/or other sizing characteristics.

[0067] FIG. 4A-4C illustrate a portion of the stretchable portion of the cage having apertures that may be shaped to expand and/or contract in one or more directions. For example, the apertures may be shaped to be a diamond 137 having a pair of first opposing vertices 139 that are expandable in a first direction 141 and a pair of second opposing vertices 143 that are expandable in a second direction 145, depending on the sizes and shapes of the projections that extend therethrough. The first direction 141 may be a direction generally opposing the center point 147 of the diamond 137 and may be generally in 180° directionally opposed forces away from the center point 147 of the diamond 137 (e.g., directing a force away from the center point), as illustrated in FIG. 4A. The first vertices 139 may extend to a position that is a greater distance from the center point 147 of the diamond 137 along the first direction 141. The second opposing vertices 143 may extend in the second direction 145, which is different than the first direction 141. In the examples illustrated in FIGS. 4A-4C, the first direction 141 is substantially perpendicular to the second direction 145. Any suitable orientation of the angle between the first direction and the second direction 145 may be implemented.

[0068] FIG. 4B illustrates a cage 101 having a first pair of vertices 143 that are positioned in a resting position. The first pair of vertices 139 may be at a first distance 149 apart. The first distance 149 is less than an expanded distance 151 (e.g., a distance of the first pair of vertices 139 in the expanded position 151 of FIG. 4A). In contrast, the first pair of vertices 139 may be retracted to a retracted distance 153 that is illustrated in FIG. 4C (e.g., by expanding in the direction 145). The retracted distance 153 may be less than the expanded distance 151 and the first distance 149.

[0069] When the first pair of vertices 139 of the cage 101 expand to the expanded position 151 of FIG. 4A, the second pair of vertices 139 may be retracted to a position that is closer to the center point 147 of the diamond 137. Moreover, the first pair of vertices 139 and the second pair of vertices 143 may act in opposing motion and force, e.g., when the first pair of vertices 143 expands to a position farther away from the center point of the diamond 137, the second pair of vertices 143 retracts to a position closer to the center point 147 of the diamond 137. In contrast, when the first pair of vertices 139 retracts to a position closer to the center point 147 of the diamond 137, the second pair of vertices 143 expands to a position that is farther away from the center point 147 of the diamond 137.

[0070] The frame 109 size and projections 111 extending through the first pair of vertices 139 and the second pair of vertices 143 may cause both sets of vertices 139 to expand. The first pair of vertices 139 may also expand in unison with the second pair of vertices 143, e.g., both the first pair and the second pair expand at the same time. The general shape of the cage 101 may be maintained during the expansion and retraction of the cage 101. The shape of the cage 101 at a resting position may be similar to the shape of the cage 101 at an expanded position; however, the expanded position may define a larger interior space for the wearer's foot as compared to the interior space defined by the cage 101 while it is in a resting position. The shape of the case 101 may be altered when it expands and contracts.

[0071] For example, both the first pair of vertices 139 and the second pair of vertices 143 may expand in a direction away from the center point 147 of the diamond 137 (e.g., if the projection 111 is larger in two dimensions that the aperture 107). Likewise, both the first pair of vertices 139 and the second pair of vertices 143 may retract in a direction toward the center point 147 of the diamond 137 (e.g., when a large projection 111 is removed from the aperture 107). The first pair of vertices 139 may also expand in an independent motion from the second pair of vertices 143 (and vice versa). FIGS. 4A-4C illustrate one pair of vertices (in this example, the first pair of vertices) of the diamond shape of the apertures 137 that are in various levels of expansion.

[0072] The apertures 107 may be shaped in any suitable or desired shape. FIGS. 5A-5D illustrates various shapes that may be suitable for the cage 101. The apertures 107 may be expandable in any direction. In many examples, the apertures 107 may be expandable in various directions that provide comfort for the wearer's foot.

[0073] FIGS. 5A and 5B illustrate apertures that may be shaped in a regular polygon 155 having four sides, such as a square or rectangular shape 155. FIGS. 5A and 5B illustrate 4-sided polygon apertures 155 that are positioned in the cage so that they extend along the length of an upper 115 and/or along the exterior of the sole 117 of an article of footwear 100. For example, the bottom surface 129 of the cage 101 may extend along the entire length of the sole 117 (and hence the entire length of the article of footwear 100, along a longitudinal axis of the wearer's foot).

[0074] For example, in FIGS. 5A and 5B, the cage comprises a plurality of rows of apertures. Any configuration of apertures 107 may be included in cage, e.g., a plurality of rows and/or columns of apertures. The orientation of the apertures 107 also may be a custom design such as a crescent shape or hemispherical shape.

[0075] In the example illustrated in FIGS. 5A and 5B, the first row of apertures 157 and the second row of apertures 159 may be positioned adjacent one another so that each side of the apertures 107 may be shifted the distance of approximately 0.5 length of an aperture so that the center point 161 of the apertures is a first row of apertures 157 is approximately aligned with the side 163 of each aperture in the second row of apertures 159.

[0076] The plurality of apertures 107 may be oriented to cause the cage 101 to expand in any suitable direction. Further, the plurality of apertures 107 may be oriented to encour-

age the cage **101** to extend along a line of force that may be comfortable for the wearer's foot. The material(s) of the various portions of the cage **101** also may be selected so as to, at least in part, control the extent of stretchability.

[0077] FIGS. **5**C and **5**D illustrate cages having a plurality of apertures **107** that are each configured to be a shape having two substantially straight sides and two generally curved sides. In FIGS. **5**C and **5**D, the apertures **107** may be oriented to expand along the line defined by the arrow **165**. Any combination of shapes may comprise the plurality of apertures. In some example, a plurality of apertures may have a first aperture configured in a first shape and a second aperture configured in a second shape that is different from the first shape.

[0078] FIGS. **6**A and **6**B illustrate another example of an article of manufacture according to this invention embodied in an article of footwear **200**. The cage **101** may extend around one or more of the forefoot region **119**, the midfoot region **121**, and the heel region **123** of the wearer's foot. For example, FIGS. **6**A and **6**B illustrate a cage that is positioned to extend through the upper in the midfoot region **121** of the wearer. A textile portion **167** of the upper **115** may be attached to the cage **101** or may be attached to the upper **115**, outsole **117**, or any other suitable element of the article of footwear **200**. The textile portion **167** may be positioned to extend over the forefoot region **119** of the upper **115**. The textile portion **167** may comprise a breathable material and/or an expandable material. The textile portion **167** may be capable of expanding to the shape of the forefoot region **119** of the upper **115**. The textile portion **167** may be unitary with the cage **101** and may be fitted to be positioned adjacent to the wearer's foot.

[0079] The textile portion **167** may include a plurality of slits **169**. The slits **169** may be a longitudinal cut or slice through at least a portion of the textile portion **167** to permit the textile portion **167** to expand. The slits **169** may be a cut that extends through the entire width of the textile portion **169** and may provide for the exchange of moisture and air between a space defined by the interior of the article of footwear **200** and the exterior of the article of footwear **200**. The slits **169** may be caused to expand when an object, such as a wearer's foot may be inserted into the cage or when the wearer's foot moves when the article of footwear **200** is engage therewith.

[0080] FIG. **7** illustrates another example an article of manufacture according to this invention that is shaped to be an article of footwear **300**. FIG. **7** illustrates a sandal having a cage **101** that extends over the top portion of the midfoot region **121** of the wearer's foot and that extends along the longitudinal length of the sole. The cage **101** of the article of footwear **300** illustrated in FIG. **7** may be capable of receiving a first insert and a second insert, where the first and the second insert are different sizes and/or widths. The cage **101** may expand to the size and shape of the insert **103** in the same fashion as described above in greater detail. The sandal configuration may also comprise a cage **101** that extends along the longitudinal length of the bottom surface of the article of footwear **300** and a textile portion (or other material) that extends across the top surface of the wearer's forefoot and/or midfoot region (across the top of the wearer's foot to secure the article of footwear to the wearer's foot).

[0081] The article of manufacture may also be configured to be in the shape of a container. The container may define a space for receiving an object. The space may fittingly engage with the objects or may permit the objects to be contained in any suitable fashion. The insert **103** may be shaped to cause the cage **101** to expand to the shape of a container. The insert **103** may be shaped to be a bag or other container that is capable of containing or storing objects. For example, FIGS. **8**A and **8**B illustrate a handbag **171** that includes a cage **101** made of stretchable material and an insert that is capable of expanding the handbag cage **101** to a suitable shape that is shown by the dashed lines **173** and **175** in FIGS. **8**A and **8**B, respectively. The handbag **171** may include any desired decorative or functional features such as pockets, key chains, and the like. The handbag **171** may be capable of containing objects and may be used for any purpose such as for storing and containing personal items.

[0082] FIGS. **9**A and **9**B illustrate an article of manufacture that includes an insert that is shaped to be a wallet **177**. The wallet **177** may include a cage **101** having a first wall **179** and a second wall **181**, each of the first wall **179** and the second wall **181** having a free end **183** and an attached end **185**. The attached ends **185** of each of the first wall **179** and the second wall **181** may be affixed together and aligned so that their edges are positioned adjacent to one another. In some examples, the wallet is a single, unitary element that is folded over at a midpoint, the midpoint defining the "two attached ends." The free ends **183** of the first wall **179** and the second wall **181** of the wallet **177** may also be aligned or may define opposing ends of an open wallet in a similar fashion to a free end of opening a book. A securing mechanism **187** may be attached to the wallet **177** for securing the free end **183** of the first wall **179** to the free end **183** of the second wall **181**. The securing mechanism **187** may be attached to the wallet **177** at or near the free end **183** of either or both of the first wall **179** or the second wall **181**.

[0083] FIG. **10** illustrates yet another embodiment of an article of manufacture according to this invention that is configured to be a case for electronics **189**. The article of manufacture may include a cage **101** and an insert shaped to cause the cage to expand to the shape of a case for electronics **189** when the insert **103** is inserted into the cage **101**. In this manner, a single cage may be used to create electronics cases for electronics elements of a variety of different sizes (e.g., depending on the insert size placed within the case).

[0084] The article of manufacture may include any object or article that may comprise a cage having a plurality of apertures and an insert having a frame that may be inserted into the cage, where the frame may have a plurality of projections that may extend through the apertures to expand the cage to the shape of the insert. The case and/or inserts each may be one piece or multi-piece construction.

[0085] A method of modular construction according to examples of this invention may comprise: (a) inserting an insert into a cage, the insert having a frame and a plurality of projections and the cage including at least one stretchable portion to expand to the shape of the frame and/or the projections; and (b) coordinating the plurality of projections to extend through the plurality of apertures when the cage is expanded to the dimensions of the frame. The method of modular construction may be used to form articles of manufacture, such as articles of footwear, containers, articles of apparel, or any other suitable object.

[0086] The modular nature of the method of modular construction permits articles of manufacture to be customized, i.e. to be fitted to a various sizes and shapes of the user/wearer or other contained item. The cage may be capable of expanding to various sizes and shapes when different inserts are

placed into the cage. As described in detail above, the cage may have a stretchable portion including a plurality of apertures and the insert may have a frame and a plurality of projections. The cage may be manufactured in many different sizes, shapes, and colors. The inserts may be manufactured in many different sizes, shapes, and colors. The cage and inserts may be interchangeable to customize or "mix and match" the size, shape, and appearance of the article of manufacture to meet the anatomical and fashion needs of the wearer or user.

[0087] An article may be customized by: (a) inserting a first insert into a cage, the first insert having a first frame and defining a first plurality of projections that may extend from the first frame, the cage including at least one stretchable portion that may define a plurality of apertures, wherein the first plurality of projections extend through the plurality of apertures when the cage expands to the shape of the first frame; (b) removing the first insert from the cage; and (c) inserting a second insert into the cage, the second insert having a second frame that may be different (e.g., in size, shape, color, etc.) from the first frame and defining a second plurality of projections that may extend from the second frame, wherein the second plurality of projections extend through the plurality of apertures when the cage expands to the shape of the second frame.

[0088] The article may be any textile, plastic, or other article that may be manufacturable. The article may be an article of footwear, a container, an article of apparel, or the like. The article may be modular in nature and may have interchangeable elements such as one or more of the cage, the first insert, the second insert, the stretchable portion, or any other element. The first insert may be sized differently than the second insert. The first insert may be sized to fit a first wearer or user and a second insert may be sized to fit a second wearer or user, wherein the first and the second inserts may be placed into the same cage. The various inserts also may be sized and/or shaped to create containers having different sizes and/or shapes.

[0089] For example, the article may be an article of footwear and may have a first insert that is sized for a first wearer and a second insert that may be sized for a second wearer. The first insert may be a wearer with a small foot and the second insert may be a wearer having a somewhat larger foot. The first insert may also be shaped and sized for a woman's foot whereas the second insert may be shaped and sized for a man's foot.

[0090] When the first insert is removed from the cage and replaced with the second insert, the article of manufacture may be customized and adjustable. The first and the second inserts may also be the same size and shape for a single user, but may have different features, decorations, or colors. The first insert may also replace the second insert when the first insert is worn. The cage is capable of receiving any number of inserts having different sizes and shapes.

C. Conclusion

[0091] While the invention has been described with respect to specific examples including presently preferred modes of carrying out the invention, those skilled in the art will appreciate that there are numerous variations and permutations of the above described systems and methods. Thus, the spirit and scope of the invention should be construed broadly as set forth in the appended claims.

1. An article of manufacture, comprising:

a cage including at least one stretchable portion, wherein the stretchable portion defines a plurality of apertures that allow the stretchable portion to expand in at least one direction; and

an insert having a frame and a plurality of projections extending therefrom such that when the insert is placed into the cage, the projections extend through the apertures to cause the stretchable portion to expand to dimensions defined by the frame.

2. The article of manufacture recited in claim **1**, wherein the stretchable portion is configured to be expanded without deviating from a general shape of the stretchable portion prior to being expanded.

3. The article of manufacture recited in claim **1**, wherein the insert is a first insert having a first frame defining a first dimension, and wherein the article of manufacture further comprises a second insert having a second frame defining a second dimension different from the first dimension such that when the second insert is placed into the cage, projections included with the second frame extend through the apertures to cause the stretchable portion to expand to the second dimension.

4. The article of manufacture recited in claim **1**, wherein at least a portion of the apertures are in the shape of a regular polygon.

5. The article of manufacture recited in claim **4**, wherein the regular polygon is four-sided.

6. The article of manufacture recited in claim **1**, wherein the cage further includes a textile portion that contains one or more slits that are configured to expand when an object is placed within the insert.

7. The article of manufacture recited in claim **1**, wherein the insert is shaped to configure the cage to be a container.

8. The article of manufacture recited in claim **7**, wherein the container is at least one of a handbag, a backpack, a wallet, and a case for electronics.

9. An article of footwear, comprising:

a cage including at least one stretchable portion, wherein the stretchable portion defines a plurality of apertures that allow the stretchable portion to expand in at least one direction without deviating from a general shape of the stretchable portion; and

an insert shaped to configure the cage to be an article of footwear, wherein the insert includes a frame and a plurality of projections extending therefrom, the insert causing the stretchable portion to expand to dimensions defined by the frame.

10. The article of footwear recited in claim **9**, wherein the insert is a first insert having a first frame defining a first dimension, wherein the article of footwear further comprises a second insert having a second frame defining a second dimension that is different from the first dimension such that when the second insert is placed into the cage, projections included with the second extend through the apertures to cause the stretchable portion to expand to the second dimension.

11. The article of footwear recited in claim **9**, wherein at least a portion of the apertures are in the shape of a regular polygon.

12. The article of footwear recited in claim **11**, wherein the regular polygon is four-sided.

13. The article of footwear recited in claim **9**, wherein the cage further includes a textile portion that contains one or more slits that are configured to expand when an object is placed into the article of footwear.

14. The article of footwear recited in claim **9**, wherein the cage forms at least a portion of an upper of the article of footwear and at least some of the projections of the insert form at least a portion of a sole structure of the article of footwear.

15. A method of modular construction, comprising:

placing an insert into a cage,

the insert having a frame and a plurality of projections; and

the cage including at least one stretchable portion that defines a plurality of apertures that allow the stretchable portion to expand to the shape of the frame; and

coordinating the plurality of projections to extend through the plurality of apertures when the cage is expanded to the dimensions of the frame.

16. The method recited in claim **15**, wherein the stretchable portion is expanded without deviating from a general shape of the stretchable portion.

17. The method recited in claim **15**, wherein the insert is a first insert having a first frame defining a first dimension and a first plurality of projections, the method further comprising:

removing the first insert; and

placing a second insert into the cage,

the second insert having a second frame defining a second dimension different from the first dimension and a second plurality of projections; and

coordinating the second plurality of projections to extend through the plurality of apertures when the cage is expanded to the dimensions of the second frame.

18. The method recited in claim **15**, wherein at least a portion of the apertures are in the shape of a regular polygon.

19. The method recited in claim **18**, wherein the regular polygon is four-sided.

20. The method recited in claim **15**, wherein the cage includes a plurality of slits that are capable of expanding when an object is placed within the article of footwear.

21. The method recited in claim **15**, wherein the insert is shaped to configure the cage to be an article of footwear.

22. The method recited in claim **15**, wherein the insert is shaped to configure the cage to be a container for defining a space for receiving an object.

23. The method recited in claim **22**, wherein the container is at least one of a handbag, a backpack, a wallet, and a case for electronics.

24. A method for customizing a an article of manufacture, comprising:

placing a first insert into a cage,

the first insert having a first frame and defining a first plurality of projections extending from the first frame,

the cage including at least one stretchable portion that defines a plurality of apertures, wherein the first plurality of projections extend through the plurality of apertures when the cage expands to the shape of the first frame;

removing the first insert from the cage; and

placing a second insert into the cage, the second insert having a second frame different from the first frame and defining a second plurality of projections extending from the second frame, wherein the second plurality of projections extend through the plurality of apertures when the cage expands to the shape of the second frame.

25. The method recited in claim **24**, wherein the first frame has at least one of a different size, a different shape, or a different color from the second frame.

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