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(54) FOOTWEAR VENTILATION STRUCTURES AND METHODS

SCHUHWERKBELÜFTUNGSSTRUKTUREN UND -VERFAHREN

STRUCTURES ET PROCÉDÉS DE VENTILATION DE CHAUSSURE

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to articles of footwear, in particular articles of footwear having improved ventilation characteristics.

[0002] Certain types of safety footwear must satisfy particular requirements in order for the footwear to be designated as "protective footwear." For instance, the American Society for Testing and Materials (ASTM) sets standards for protecting consumer's toes and metatarsal areas in "protective footwear" (*e.g.*, as set forth in ASTM F2413-11). If a safety toe cap is used, it must meet certain impact resistance and compression resistance tests, indicating the toe cap can sufficiently protect a user's foot from injury. The same is true for metatarsal guards utilized in such footwear.

[0003] Document US 2012/0167418 discloses an article of footwear with a toe cap, which is provided with an aperture on its top surface.

[0004] While safety is a significant concern in these types of footwear, often the footwear lacks proper or efficient ventilation, making the footwear hot and uncomfortable during use. A need therefore exists for providing protective footwear with proper and effective ventilation.

BRIEF SUMMARY OF THE INVENTION

[0005] A first aspect of the present invention includes an article of footwear as disclosed in claim 1.

[0006] A second aspect of the invention includes a protective toe cap for an article of footwear as disclosed in claim 12.

[0007] In another embodiment, the toe cap is rigid and has strength characteristics sufficient to satisfy ASTM F2413-11.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] A more complete appreciation of the subject matter of the present invention and the various advantages thereof can be realized by reference to the following detailed description in which reference is made to the accompanying drawings:

Figs. 1-5 are perspective, back, front, left, and right views of a protective toe cap, in accordance with an embodiment of the invention.

Fig. 6 is a perspective view of a shoe incorporating the toe cap of Figs. 1-5 and having certain ventilation structures, in accordance with an embodiment of the invention.

Figs. 7-8 are perspective views of different variations of the shoe of Fig. 6 with additional ventilation characteristics.

Fig. 9 is an exemplary cross-sectional view of the shoes of Figs. 6-8 and 10.

Fig. 10 is a perspective view of a different variation of the shoe of Fig. 6 with additional ventilation characteristics.

Fig. 11 is an exploded perspective view of a shoe incorporating the toe cap of Figs. 1-5 and having a rubber housing therefor, in accordance with another embodiment of the invention.

Fig. 12 is an assembled perspective view of the shoe of Fig. 11.

Fig. 13 is a top view of the shoe of Fig. 11.

Fig. 14 is a perspective view of a variation of the shoe of Figs. 11-13.

Fig. 15 is a perspective view of a shoe incorporating the toe cap of Figs. 1-5, in which the shoe also utilizes a metatarsal guard with additional ventilation structures, in accordance with yet another embodiment of the invention.

Fig. 16 is a perspective view of a metatarsal guard with vents, according to an embodiment of the invention.

DETAILED DESCRIPTION

[0009] In describing embodiments of the invention discussed herein, specific terminology will be used for the sake of clarity. However, the invention is not intended to be limited to any specific terms used herein, and it is to be understood that each specific term includes all technical equivalents, which operate in a similar manner to accomplish a similar purpose.

[0010] The inventions disclosed herein include, in general, various types of protective footwear that utilize ventilation and/or safety structures to provide improved breathability and safety for a user of the footwear. As an example, the footwear disclosed herein utilizes an improved protective toe cap 20, as shown in Figs. 1-5, along with various vents and/or heat channels to provide footwear 10 with effective protection for a user's toe area, as well as improved ventilation. Such footwear 10 may also use other protective structures, such as a metatarsal guard 70 that itself has vents or other mechanisms, for providing ventilation.

[0011] Figs. 1-5 are various views of a toe cap 20, in accordance with an embodiment of the invention. Toe cap 20 is shaped to fully cover a user's toes and provide protection therefor. Thus, toe cap 20 is shaped as a hemidome in some embodiments. Toe cap 20 includes an open underside 24 sized to accommodate a user's toes, and has a protrusion 22 forming a ventilation channel 23 along underside 24. Although a single protrusion 22 is shown, multiple protrusions forming multiple ventilation channels are equally possible and contemplated by the present invention. Such protrusions may be arranged directly adjacent one another (*e.g.*, in the center of toe cap 20), or may be spaced apart from each other (*e.g.*, a protrusion substantially centered on toe cap 20, as shown in Fig. 1, and one or more protrusions along the sides of toe cap 20).

[0012] Protrusion 22 of Figs. 1-5 extends from a mid-foot side 27 of toe cap 20 towards a forefoot side 28 of toe cap 20 and tapers in the direction of forefoot side 28. As such, a height of channel 23 is at a maximum at mid-foot side 27 of toe cap 20 and progressively decreases in the direction of forefoot side 28 until protrusion 22 and channel 23 disappear along underside 24 of toe cap 20. In an embodiment, protrusion 22 is shaped as a quadrangle, although it could be semi-circular, triangular, hexagonal, pentagonal, polygonal, or any other shape that adequately provides a ventilation channel 23.

[0013] Toe cap 20 also includes a lower lip 26 that extends around the perimeter of underside 24. Lip 26 may be positioned in footwear under a user's foot and be utilized for attaching toe cap 20 to such footwear, as described in more detail below. Toe cap 20 is, in an embodiment, composed of a metal or metal alloy material (*e.g.*, titanium) or any other material of a sufficient strength to satisfy safety standards for protective footwear, such as ASTM F2413-11.

[0014] Toe cap 20 can be incorporated into a variety of different types of footwear, with or without additional ventilation characteristics, to allow for improved ventilation and breathability in the footwear. Various embodiments of such footwear are shown throughout in Figs. 6-16 (with certain components of such footwear shown in isolation in those figures).

[0015] Referring to Figs. 6-10, different variations of footwear having ventilation structures in the tongue portion of the footwear are shown. For example, a first variant of footwear 110 is shown in Fig. 6. Footwear 110 includes all standard aspects of normal footwear, including but not limited to an outsole 117, an upper 119 attached to outsole 117, forefoot 112, arch 114, and heel 116 regions, and a tongue 118 forming part of upper 119. Although other common footwear components are not described in detail herein, footwear 110 includes such components as is apparent in the figures (*e.g.*, laces, etc.)

[0016] Although not shown, footwear 110 also includes a toe cap 20 embedded within its forefoot region 112. Toe cap 20 is incorporated into the toe region of footwear 110 and is arranged with its lip 26 adjacent outsole 117 and its protrusion 22 positioned above the user's toes. Toe cap 20 may therefore provide protection for a user's toes against, for example, a falling object and also allow for improved ventilation via its protrusion 22 and ventilation channel 23. Further, tongue 118 of footwear 110 may also include an air vent channel 30 that, in an embodiment, forms a continuation of channel 23 of protrusion 22 of toe cap 20. Stated differently, tongue 118 may include an air vent channel 30 that extends longitudinally along tongue 118, and protrusion 22 may be shaped and sized to be positioned within vent channel 30 of tongue 118 so that a continuous air vent channel is formed along forefoot region 112 and arch region 114 of footwear 110. An example of a cross section showing such a continuous channel, and heat escaping from a user's foot through the channel, is shown in Fig. 9.

[0017] Referring again to Fig. 6, air vent channel 30 of tongue 118 terminates in a heat egress port 32 having a series of perforations 36 for allowing heat, moisture, etc. to escape channel 30. In this way, heat and/or moisture trapped in forefoot region 112 of footwear 110 may be allowed to escape through channel 23 of toe cap 20, into channel 30 of tongue 118 (which in an embodiment form a substantially continuous channel), and out of heat egress port 32. In some embodiments, although not shown, air vent channel 30 of tongue 118 may be open in the direction of a user's foot *(e.g.,* like channel 23 of toe cap 20), or in other embodiments it may be closed by way of a mesh or other fabric covering vent channel 30. Meshes or other breathable fabrics may increase the comfort level of footwear 110 in the area of channel 30 of tongue 118 and channel 23 of toe cap 20. Indeed, to be clear, such meshes and fabrics as described above may extend over both channel 30 of tongue 118 and channel 23 of toe cap 20, in certain embodiments.

[0018] In another embodiment, air vent channel 30 may be formed on a leather overlay component 40 that is engaged with a leather underlay 38 attached under the eyestay quarter of footwear 110.

[0019] In use, footwear 110 may provide improved ventilation for safety/protective footwear by allowing heat to escape footwear 110 through channel 23 of toe cap 20, into air vent channel 30 of tongue 118, and out of heat egress port 32. In addition, toe cap 20 provides adequate safety for a user's toes and protects the toes from injury.

[0020] A second variant of footwear 110' is shown in Fig. 7. Due to the similarities between footwear 110 of Fig. 6 and footwear 110' of Fig. 7, like reference numerals refer to like elements in this embodiment (although a prime designation is added to the reference numerals of Fig. 7), and predominantly the differences between footwear 110, 110' are discussed below.

[0021] Footwear 110' is different from footwear 110 in that footwear 110', in addition to having a heat egress port 32', also includes an air ingress port 34'. Air ingress port 34' is composed of a series of perforations 36', in an embodiment, and it allows air to flow into channel 30' of tongue 118', through channel 30', and subsequently out of heat egress port 32'. During this process, heat from the user's toes may also circulate or travel through channel 23 of toe cap 20 and into channel 30' of tongue 118'. Thus, heat from the user's toes may combine with cooler air from the environment, which accesses channel 30' through air ingress port 34', and ultimately the combined cooler air from the environment and hotter air from the user's toes may exit through heat egress port 32'. In this way, footwear 110' provides additional ventilation characteristics as compared to footwear 110. Further, although not described above, it is contemplated that footwear 110' may include any of the features of footwear 110 (*e.g.*, meshes or fabric over channel 30', an open channel 30' facing the user's foot, toe cap 20 within footwear 110', etc.)

[0022] Third and fourth variants of footwear 110", 110'"

are shown in Figs. 8 and 10. Due to the similarities between the previous variants and footwear 110", 110"', like reference numerals refer to like elements in this embodiment (although additional prime designations are added to the reference numerals of Figs. 8 and 10), and predominantly the differences between each variant is discussed below.

[0023] Footwear 110", 110'" each include an air ingress port 34", 34"', but such ports are constructed differently than ingress port 34' of the previous embodiment. As an example, air ingress port 34" of footwear 110" of Fig. 8 includes a series of openings 42" that define air ingress port 34". In addition, besides openings 42", channel 30" of tongue 118" is closed in an outward direction along tongue 118" until heat egress port 32" is reached. As to air ingress port 34'" of footwear 110"', it includes a single opening 42'" as well as perforations 36'" along part of the length of tongue 118"'. Although not described above, here as well footwear 110", 110'" may include any of the features of footwear 110, 110' described previously such as, for example, an open channel 30", 30'" in the direction of the user's foot, a channel 30", 30'" covered by a mesh or breathable fabric, toe cap 20 within footwear 110", 110"', and/or other features not explicitly detailed here.

[0024] Fig. 11 depicts footwear 210, according to another embodiment of the invention. Due to the similarities between the previous variants of footwear and footwear 210, like reference numerals refer to like elements in this embodiment (although in the 200-series of numbers), and predominantly the differences between each footwear embodiment is discussed below.

[0025] Footwear 210 includes toe cap 20, as with each of the previous embodiments. Toe cap 20 is shown in detail in the exploded view of Fig. 11. Positioned over toe cap 20, however, is a housing 250, optionally composed of a rubber material for waterproofing purposes. Housing 250 has a protrusion forming an air vent channel 230 that matches the shape of protrusion 22 of toe cap 20 and is sized to receive protrusion 22 of toe cap 20. Additionally, protrusion 230 has an extension part 254 that leads to a heat egress port 232. Heat egress port 232 is clearly shown in the top view of Fig. 13. As illustrated, heat egress port 232 may comprise an opening that is covered by a mesh or other breathable fabric to allow heat to escape port 232. Further, as with the previous embodiments, air vent channel 230 may be open in the direction of the user's foot or it may be covered by a mesh or other breathable fabric to allow heat to enter channel 230 and exit footwear 210 via heat egress port 232.

[0026] Footwear 210 may also include a heel counter 260 that has its own heat egress port 262 for allowing heat to escape from heel region 216 of footwear 210. As shown in Figs. 12-13, heat egress port 262 may extend circumferentially around a majority of heel region 216 of footwear 210 to provide adequate ventilation.

[0027] Toe cap 20 of footwear 210 provides sufficient safety protection during use, along with ventilation via its channel 23, rubber housing 250 provides additional safety protection in addition to waterproofing characteristics, and heat egress port 262 of heel counter 260 allows for ventilation in heel region 216 of footwear 210. Such ventilation and safety structures provide for improved safety footwear 210 with efficient ventilation to keep a user's foot comfortable during use.

[0028] A variant of the previous embodiment, footwear 210', is shown in Fig. 14. Footwear 210' includes one or more side or lateral vents 258' positioned on one or both sides of air vent channel 230' of housing 250' *(e.g.,* to provide for lateral air ventilation out of channel 230'). Footwear 210' may also include a heat egress port 232' or it optionally may be closed and not include such a port, as shown in Fig. 14. Apart from these modifications, footwear 210' is the same as footwear 210, and thus, like reference numerals refer to like elements in this embodiment (although a prime designation is added to the reference numerals of Fig. 14). Of course, footwear 210' may include all of the features of footwear 210 of the previous embodiment, although not specifically discussed herein.

[0029] Fig. 15 depicts footwear 310, according to yet another embodiment of the invention. Due to the similarities between the previous variants of footwear and footwear 310, like reference numerals refer to like elements in this embodiment (although in the 300-series of numbers), and predominantly the differences between each footwear embodiment are discussed below.

[0030] Footwear 310 is different from previous embodiments in that, although toe cap 20 is used as in all embodiments, the ventilation structure of footwear 310 is incorporated into a metatarsal guard 370 component. A particular embodiment of a metatarsal guard 370 is shown in Fig. 16. As illustrated, metatarsal guard 370 may include an enclosed ventilation channel 372 with an opening 374 on a forefoot side of channel 372 and one or more lateral vents 376 in channel 372. Lateral vents 376 may extend along one or both sides of channel 372. For instance, in the embodiment shown in Fig. 15, lateral vents 376 extend along only a single side of channel 372, while in the embodiment of Fig. 16 lateral vents 376 extend along both sides. Ventilation channel 372 may also be closed at a midfoot side of channel 372, as shown in Fig. 16. Further, an inside surface 371 of metatarsal guard 370 is shaped to overlie and protect the metatarsal region of a user's foot during use (*e.g.*, from injury due to a falling object). Thus, metatarsal guard 370 has a saddle-shaped inside surface 371 that is convex in a longitudinal direction and concave in a lateral direction.

[0031] Metatarsal guard 370 may be incorporated into a flap or pocket 380 of footwear 310, as shown in Fig. 15. As noted above, however, Fig. 15 depicts an embodiment of metatarsal guard 370 where ventilation channel 372 has vents 376 along only one side of channel 372. Metatarsal guard 370 is positioned within pocket 380, and acts to provide ventilation for the foot as well as pro-

tect the metatarsal area of the foot from injury. Although only referenced obliquely in Fig. 15 (and not shown), footwear 310 may also have a heat egress port 332 in pocket 380 that allows for further ventilation.

[0032] Metatarsal guard 370 may also include any of the protective features and/or patterns disclosed in Applicant's U.S. Patent No. 8,635,789, directed to various metatarsal 2. guards.

Claims

1. An article of footwear comprising:

an upper (119) defining a cavity sized and shaped to receive a foot of a user, wherein the upper is attached to an outsole (117); and
a protective toe cap (20) positioned adjacent a toe region of the footwear, the toe cap being effective to protect a forefoot portion of the user's foot from injury and having an arcuate shape with a section arranged to overlie toes of the user's foot during use, wherein the toe cap has a forefoot side (28) and a midfoot side (27) and includes a ventilation channel (23) for providing ventilation in the toe region, **characterized in that** the ventilation channel (23) is defined in a protrusion (22) extending from the midfoot side (27) to the forefoot side (28), the protrusion (22) having a height at a maximum at the midfoot side (27) and decreasing in a direction of the forefoot side (28).

2. An article of footwear as claimed in claim 1, wherein the toe cap (20) is hemi-domed in shape and the ventilation channel (23) extends along a longitudinal axis of the toe cap.

3. An article of footwear as claimed in claim 1, wherein the toe cap (20) includes either:

inner and outer surfaces and the ventilation channel (23) is open along the inner surface (24) of the toe cap, or
multiple ventilation channels.

4. An article of footwear as claimed in claim 1, wherein the upper (119) includes a tongue (118) and a ventilation channel (30) is positioned along the tongue.

5. An article of footwear as claimed in claim 4, wherein the ventilation channel (30) of the tongue (118) is in communication with a heat egress port (32) effective to allow heat to escape the ventilation channel (30).

6. An article of footwear as claimed in claim 5, wherein the ventilation channel (30) of the tongue (118) is either:

open along a first side of the ventilation channel facing the user's foot and is closed along a second side of the ventilation channel facing away from the user's foot, or
in communication with an air intake port (34) positioned adjacent a forefoot region of the footwear.

7. An article of footwear as claimed in claim 4, wherein the ventilation channel (30) of the tongue (118) either:

extends along a majority of the length of the tongue, or
is aligned with the ventilation channel (23) of the toe cap (20) to provide a continuous ventilation channel extending from a forefoot region of the footwear to an arch region of the footwear.

8. An article of footwear as claimed in claim 1, wherein a waterproof housing (250) is positioned over the protective toe cap (20), the waterproof housing providing waterproofing in a forefoot region of the footwear.

9. An article of footwear as claimed in claim 8, wherein the waterproof housing (250) includes either:

a ventilation channel (230) having a heat egress port (232) for providing ventilation in the forefoot region, or
a lateral vent (258') along a side of its ventilation channel (230') to provide further ventilation in the forefoot region.

10. An article of footwear as claimed in claim 1, further comprising a metatarsal guard (370) having a ventilation channel (372) extending along a longitudinal axis of the footwear, wherein the ventilation channel of the metatarsal guard has a lateral vent (376) to allow heat to escape the ventilation channel.

11. An article of footwear as claimed in claim 10, wherein the ventilation channel (372) of the metatarsal guard (370) is defined by first and second sides, and multiple lateral vents (376) are formed in the ventilation channel along the first and second sides.

12. A protective toe cap (20) for an article of footwear comprising:

a hemi-dome shaped body sized and shaped to cover a user's toes once incorporated into footwear, the body having inner and outer surfaces and a ventilation channel (23) extending in a longitudinal direction between a forefoot side (28) and a midfoot side (27) of the body, the ventilation channel (23) being open along the inner sur-

face (24) to allow air to travel along the ventilation channel,
characterized in that the ventilation channel (23) is defined in a protrusion (22) extending from the midfoot side (27) to the forefoot side (28), the protrusion (22) having a height at a maximum at the midfoot side (27) and decreasing in a direction of the forefoot side (28).

13. A protective toe cap as claimed in claim 12, wherein the ventilation channel (23) either:

defines an opening at the forefoot side (28) of the body, or
includes an inner surface that is offset from the inner surface (24) of the body of the toe cap, and the inner surfaces of the ventilation channel and the toe cap converge in the direction of the forefoot side (28) of the body.

14. A protective toe cap as claimed in claim 12, wherein the toe cap is rigid and has strength characteristics sufficient to satisfy ASTM F2413-11.

15. A protective toe cap as claimed in claim 12, wherein the toe cap includes multiple ventilation channels (23).

Patentansprüche

1. Fußbekleidungsartikel, Folgendes umfassend:

einen Schaft (119), der einen Hohlraum definiert, der dazu dimensioniert und geformt ist, einen Fuß eines Trägers aufzunehmen, wobei der Schaft an einer Laufsohle (117) befestigt ist; und eine Zehenschutzkappe (20), die an einen Zehenbereich des Fußbekleidungsartikels angrenzend positioniert ist, wobei die Zehenkappe dazu funktionsfähig ist, einen Vorderfußabschnitt des Trägerfußes vor Verletzungen zu schützen, und eine Bogenform mit einem Teil, der dazu angeordnet ist, beim Tragen über den Zehen des Trägers zu liegen, aufweist, wobei die Zehenkappe eine Vorderfußseite (28) und eine Mittelfußseite (27) aufweist und einen Lüftungskanal (23) enthält, um den Zehenbereich zu lüften, **dadurch gekennzeichnet, dass** der Lüftungskanal (23) in einem Vorsprung (22) definiert ist, der sich von der Mittelfußseite (27) zur Vorderfußseite (28) erstreckt, wobei der Vorsprung (22) an der Mittelfußseite (27) eine maximale Höhe aufweist, die in Richtung der Vorderfußseite (28) abnimmt.

2. Fußbekleidungsartikel nach Anspruch 1, wobei die Zehenkappe (20) halbkuppelförmig ist und sich der Lüftungskanal (23) entlang einer Längsachse der Zehenkappe erstreckt.

3. Fußbekleidungsartikel nach Anspruch 1, wobei die Zehenkappe (20) eines der folgenden Elemente enthält:

eine Innen- und Außenfläche und wobei der Lüftungskanal (23) entlang der Innenfläche (24) der Zehenkappe offen ist, oder
mehrere Lüftungskanäle.

4. Fußbekleidungsartikel nach Anspruch 1, wobei der Schaft (119) eine Zunge (118) enthält und der Lüftungskanal (30) entlang der Zunge angeordnet ist.

5. Fußbekleidungsartikel nach Anspruch 4, wobei der Lüftungskanal (30) der Zunge (118) mit einem Wärmeausgangsanschluss (32) verbunden ist, der dazu funktionsfähig ist, zuzulassen, dass Wärme aus dem Lüftungskanal (30) austritt.

6. Fußbekleidungsartikel nach Anspruch 5, wobei der Lüftungskanal (30) der Zunge (118) entweder:

entlang einer ersten Seite des Lüftungskanals, die dem Trägerfuß zugewandt ist, offen ist und entlang einer zweiten Seite des Lüftungskanals, die vom Trägerfuß abgewandt ist, geschlossen ist, oder
mit einem Lufteinlassanschluss (34) verbunden ist, der an einen Vorderfußbereich des Fußbekleidungsartikels angrenzend positioniert ist.

7. Fußbekleidungsartikel nach Anspruch 4, wobei der Lüftungskanal (30) der Zunge (118) entweder:

sich entlang des größten Teils der Länge der Zunge erstreckt, oder
am Lüftungskanal (23) der Zehenkappe (20) ausgerichtet ist, um einen durchgehenden Lüftungskanal vorzusehen, der sich von einem Vorderfußbereich des Fußbekleidungsartikels zu einem Gewölbebereich des Fußbekleidungsartikels erstreckt.

8. Fußbekleidungsartikel nach Anspruch 1, wobei ein wasserdichtes Gehäuse (250) über der Zehenschutzkappe (20) positioniert ist, wobei das wasserdichte Gehäuse eine Wasserabdichtung im Vorderfußbereich des Fußbekleidungsartikels vorsieht.

9. Fußbekleidungsartikel nach Anspruch 8, wobei das wasserdichte Gehäuse (250) eines der folgenden Elemente enthält:

einen Lüftungskanal (230), der einen Wärmeausgangsanschluss (232) aufweist, um eine

Lüftung im Vorderfußbereich vorzusehen, oder einen seitlichen Lüftungsschlitz (258') entlang einer Seite des Lüftungskanals (230'), um eine weitere Lüftung im Vorderfußbereich vorzusehen.

10. Fußbekleidungsartikel nach Anspruch 1, ferner einen Mittelfußschutz (370) umfassend, der einen Lüftungskanal (372) aufweist, der sich entlang einer Längsachse der des Fußbekleidungsartikels erstreckt, wobei der Lüftungskanal des Mittelfußschutzes einen seitlichen Lüftungsschlitz (376) aufweist, um zuzulassen, dass Wärme aus dem Lüftungskanal entweichen kann.

11. Fußbekleidungsartikel nach Anspruch 10, wobei der Lüftungskanal (372) des Mittelfußschutzes (370) durch eine erste und zweite Seite definiert wird und mehrere seitliche Lüftungsschlitze (376) entlang der ersten und zweiten Seite im Lüftungskanal ausgebildet sind.

12. Zehenschutzkappe (20) für einen Fußbekleidungsartikel, Folgendes umfassend:

einen halbkuppelförmigen Körper, der dazu dimensioniert und geformt ist, die Zehen eines Trägers abzudecken, wenn er in einen Fußbekleidungsartikel integriert ist, wobei der Körper eine Innen- und Außenfläche aufweist und sich ein Lüftungskanal (23) in Längsrichtung zwischen einer Vorderfußseite (28) und einer Mittelfußseite (27) des Körpers erstreckt, wobei der Lüftungskanal (23) entlang der Innenfläche (24) offen ist, um zuzulassen, dass Luft entlang des Lüftungskanals strömt,
dadurch gekennzeichnet, dass
der Lüftungskanal (23) in einem Vorsprung (22) definiert ist, der sich von der Mittelfußseite (27) zur Vorderfußseite (28) erstreckt, wobei der Vorsprung (22) an der Mittelfußseite (27) eine maximale Höhe aufweist, die in Richtung der Vorderfußseite (28) abnimmt.

13. Zehenschutzkappe nach Anspruch 12, wobei der Lüftungskanal (23) entweder: eine Öffnung an der Vorderfußseite (28) des Körpers definiert, oder
eine Innenfläche enthält, die von der Innenfläche (24) des Körpers der Zehenkappe versetzt ist, und die Innenflächen des Lüftungskanals und der Zehenkappe in Richtung der Vorderfußseite (28) des Körpers zusammenlaufen.

14. Zehenschutzkappe nach Anspruch 12, wobei die Zehenkappe steif ist und Festigkeitseigenschaften aufweist, die ausreichen, um ASTM F2413-11 zu erfüllen.

15. Zehenschutzkappe nach Anspruch 12, wobei die Zehenkappe mehrere Lüftungskanäle (23) enthält.

Revendications

1. Article pour chaussure comprenant :

une tige (119) définissant une cavité dimensionnée et formée pour recevoir un pied d'un utilisateur, dans lequel la tige est fixée à une semelle (117) ; et
un embout protecteur (20) positionné adjacent à une région au bout de la chaussure, l'embout fonctionnant pour protéger une partie d'avant-pied du pied de l'utilisateur des blessures et présentant une forme arquée comportant une section disposée de façon à recouvrir les orteils du pied de l'utilisateur en utilisation, dans lequel l'embout comporte un côté d'avant-pied (28) et un côté de milieu de pied (27) et inclut un canal de ventilation (23) servant à fournir une ventilation dans la région des orteils, **caractérisé en ce que** le canal de ventilation (23) est défini dans une protubérance (22) s'étendant du côté de milieu de pied (27) au côté d'avant-pied (28), la protubérance (22) présentant une hauteur maximale sur le côté de milieu de pied (27) et diminuant dans la direction du côté d'avant-pied (28).

2. Article pour chaussure selon la revendication 1, dans lequel l'embout (20) présente une forme de semi-dôme et le canal de ventilation (23) s'étend le long d'un axe longitudinal de l'embout.

3. Article pour chaussure selon la revendication 1, dans lequel l'embout (20) inclut soit :

des surfaces intérieure et extérieure et le canal de ventilation (23) est ouvert le long de la surface intérieure (24) de l'embout, soit
de multiples canaux de ventilation.

4. Article pour chaussure selon la revendication 1, dans lequel la tige (119) inclut une languette (118) et un canal de ventilation (30) est positionné le long de la languette.

5. Article pour chaussure selon la revendication 4, dans lequel le canal de ventilation (30) de la languette (118) est en communication avec un port de sortie de chaleur (32) fonctionnant pour permettre à la chaleur de sortir du canal de ventilation (30).

6. Article pour chaussure selon la revendication 5, dans lequel le canal de ventilation (30) de la languette (118) est soit :

ouvert le long d'un premier côté du canal de ventilation faisant face au pied de l'utilisateur et fermé le long d'un second côté du canal de ventilation orienté à l'opposé du pied de l'utilisateur, soit
en communication avec le port d'entrée d'air (34) positionné adjacent à une région d'avant-pied de la chaussure.

7. Article pour chaussure selon la revendication 4, dans lequel le canal de ventilation (30) de la languette (118), soit :

s'étend le long de la plus grande partie de la longueur de la languette, soit
est aligné avec le canal de ventilation (23) de l'embout (20) pour constituer un canal de ventilation continu s'étendant d'une région d'avant-pied de la chaussure à une région de cambrure de la chaussure.

8. Article pour chaussure selon la revendication 1, dans lequel un logement étanche à l'eau (250) est positionné par-dessus l'embout protecteur (20), le logement étanche à l'eau fournissant une étanchéité à l'eau dans une région d'avant-pied de la chaussure.

9. Article pour chaussure selon la revendication 8, dans lequel le logement étanche à l'eau (250) inclut soit :

un canal de ventilation (230) comportant un port de sortie de chaleur (232) servant à fournir une ventilation dans la région d'avant-pied, soit
une aération latérale (258') le long d'un côté de son canal de ventilation (230') pour fournir une ventilation supplémentaire dans la région d'avant-pied.

10. Article pour chaussure selon la revendication 1, comprenant en outre un protège-pied (370) comportant un canal de ventilation (372) s'étendant le long d'un axe longitudinal de la chaussure, dans lequel le canal de ventilation du protège-pied comporte une aération latérale (376) pour permettre à la chaleur de sortir du canal de ventilation.

11. Article pour chaussure selon la revendication 10, dans lequel le canal de ventilation (372) du protège-pied (370) est défini par des premier et second côtés, et de multiples aérations latérales (376) sont formées dans le canal de ventilation le long des premier et second côtés.

12. Embout protecteur (20) pour un article pour chaussure comprenant :
un corps en forme de semi-dôme dimensionné et formé pour recouvrir les orteils d'un utilisateur une fois incorporé dans la chaussure, le corps comportant des surfaces intérieure et extérieure et un canal de ventilation (23) s'étendant dans une direction longitudinale entre un côté d'avant-pied (28) et un côté de milieu de pied (27) sur le corps, le canal de ventilation (23) étant ouvert le long de la surface intérieure (24) pour permettre à l'air de se déplacer le long du canal de ventilation, **caractérisé en ce que** le canal de ventilation (23) est défini dans une protubérance (22) s'étendant du côté de milieu de pied (27) au côté d'avant-pied (28), la protubérance (22) présentant une hauteur maximale sur le côté de milieu de pied (27) et diminuant dans la direction du côté d'avant-pied (28).

13. Embout protecteur selon la revendication 12, dans lequel le canal de ventilation (23), soit :

définit une ouverture sur le côté d'avant-pied (28) du corps, soit
inclut une surface intérieure qui est décalée par rapport à la surface intérieure (24) du corps de l'embout, et les surfaces intérieures du canal de ventilation et de l'embout convergent dans la direction du côté d'avant-pied (28) du corps.

14. Embout protecteur selon la revendication 12, dans lequel l'embout est rigide et présente des caractéristiques de résistance suffisantes pour satisfaire à la norme ASTM F2413-11.

15. Embout protecteur selon la revendication 12, dans lequel l'embout inclut de multiples canaux de ventilation (23).

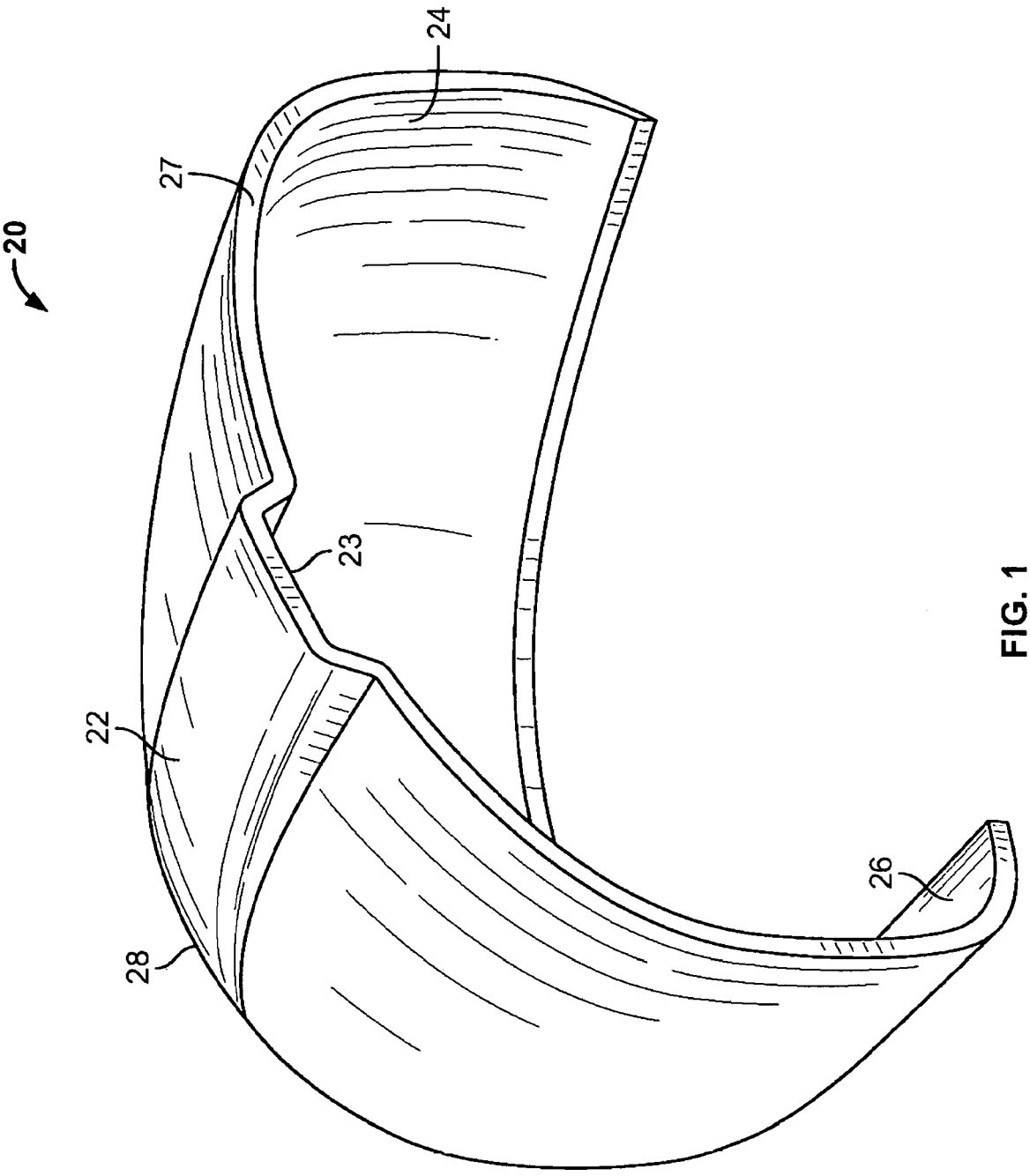

FIG. 1

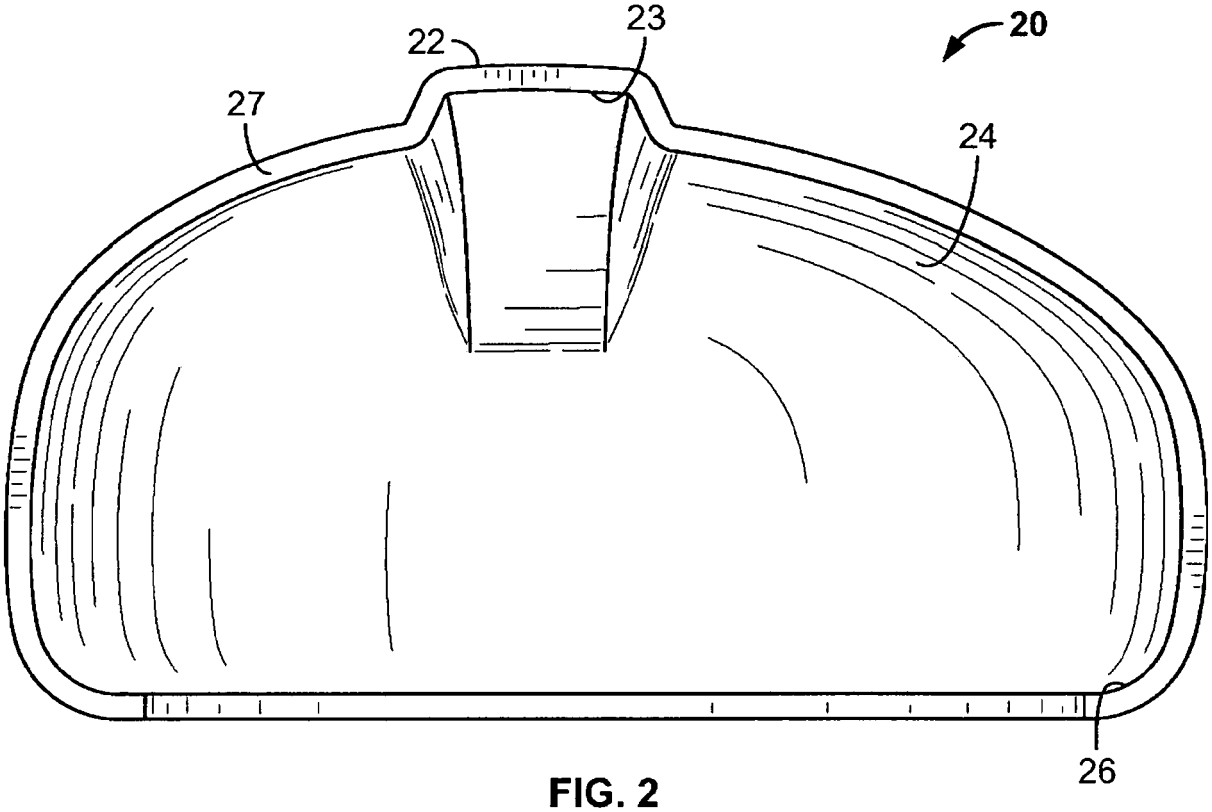

FIG. 2

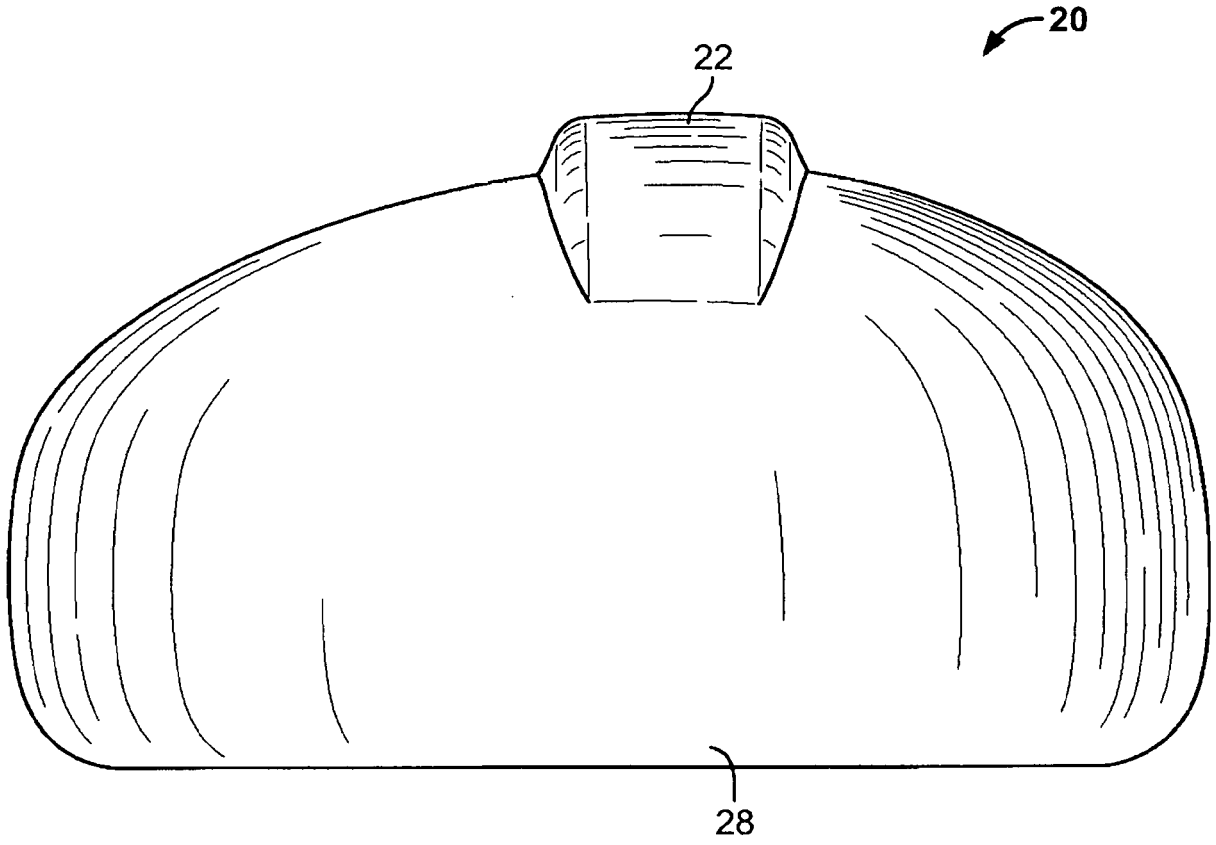

FIG. 3

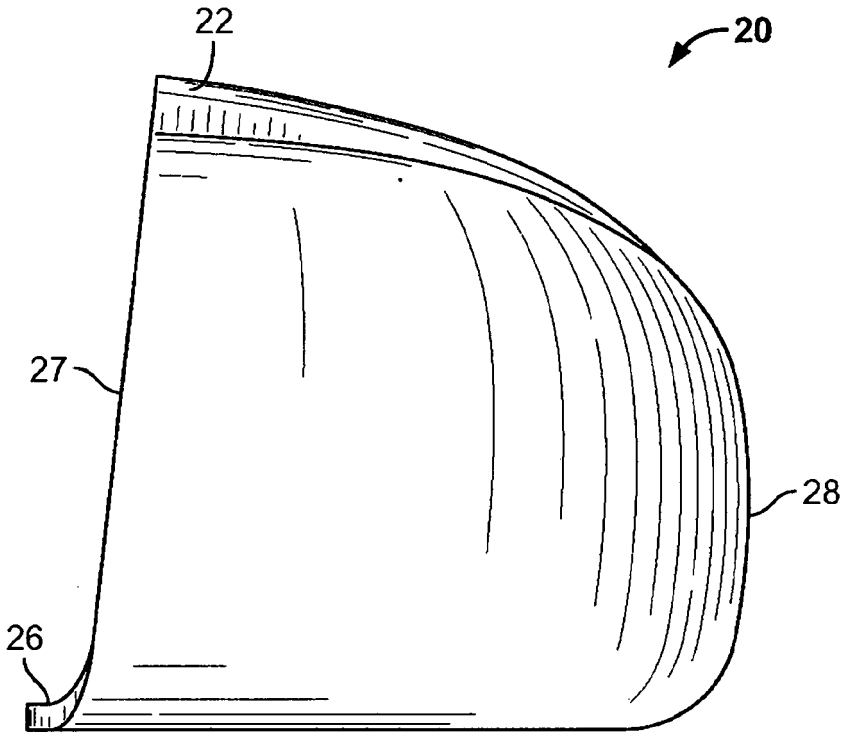

FIG. 4

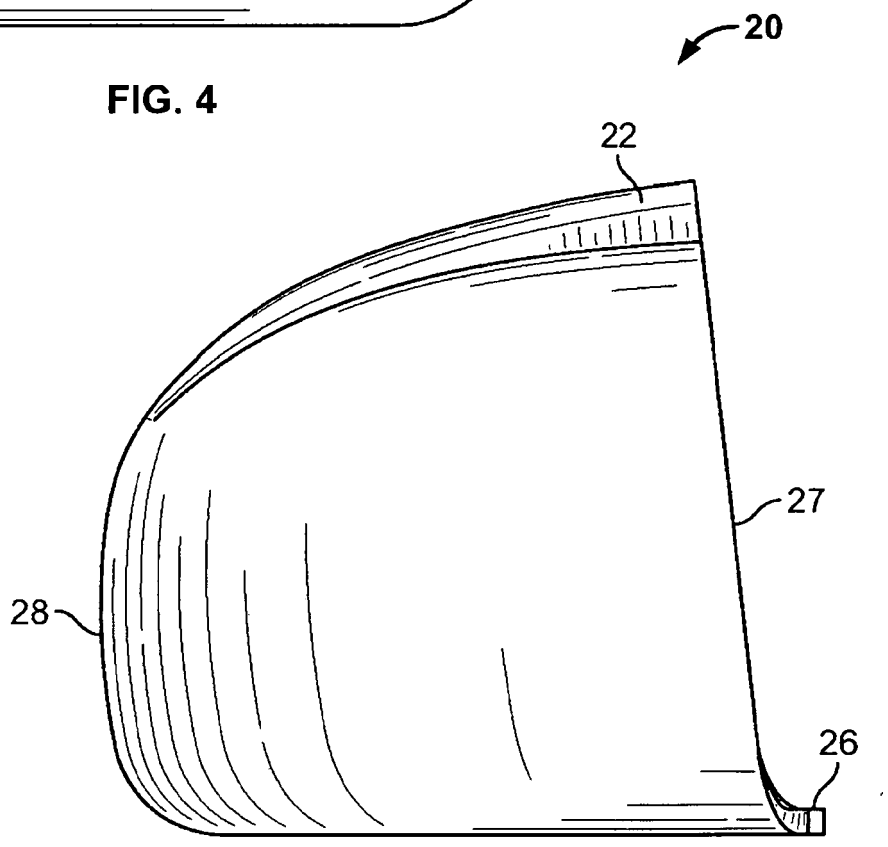

FIG. 5

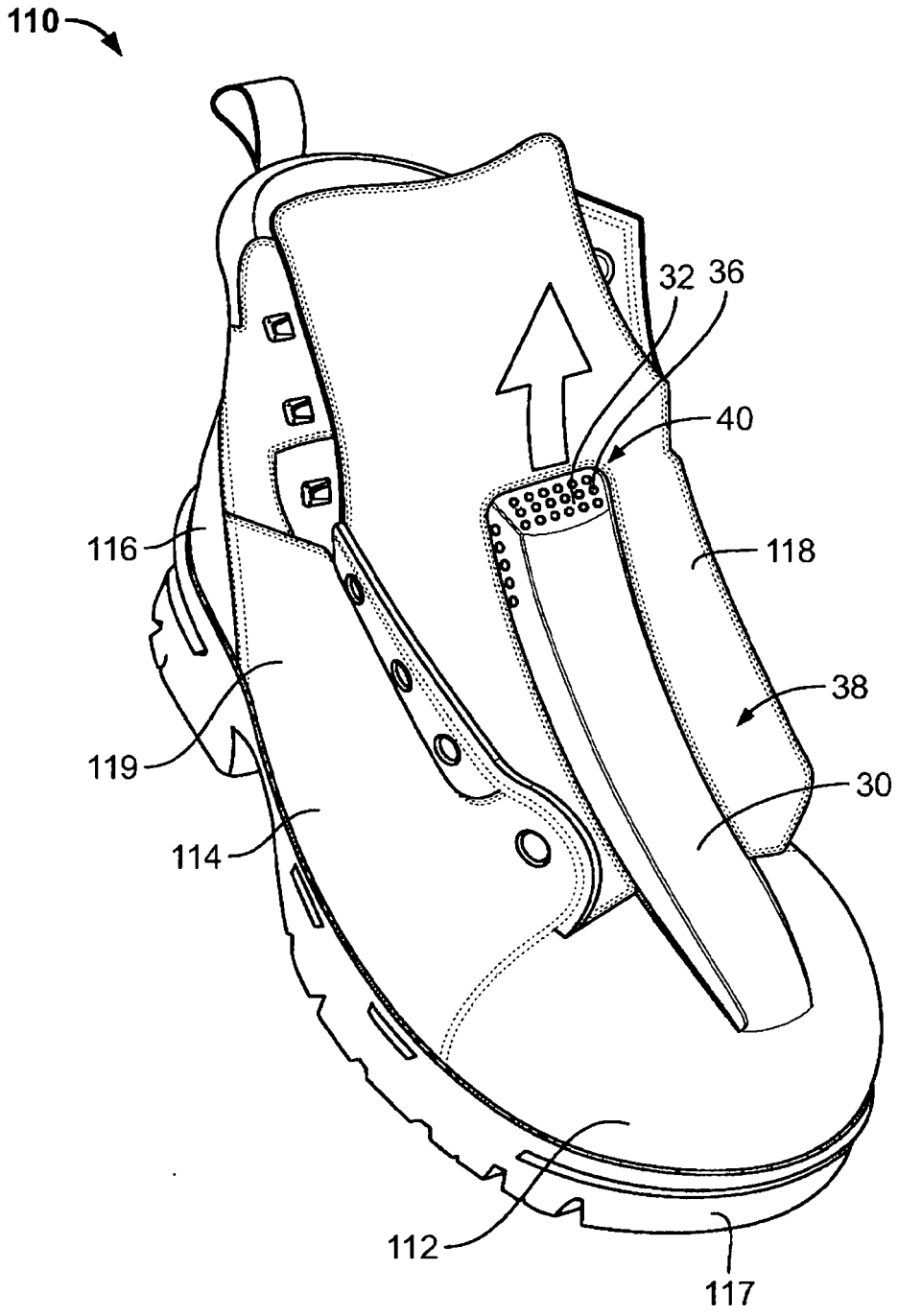

FIG. 6

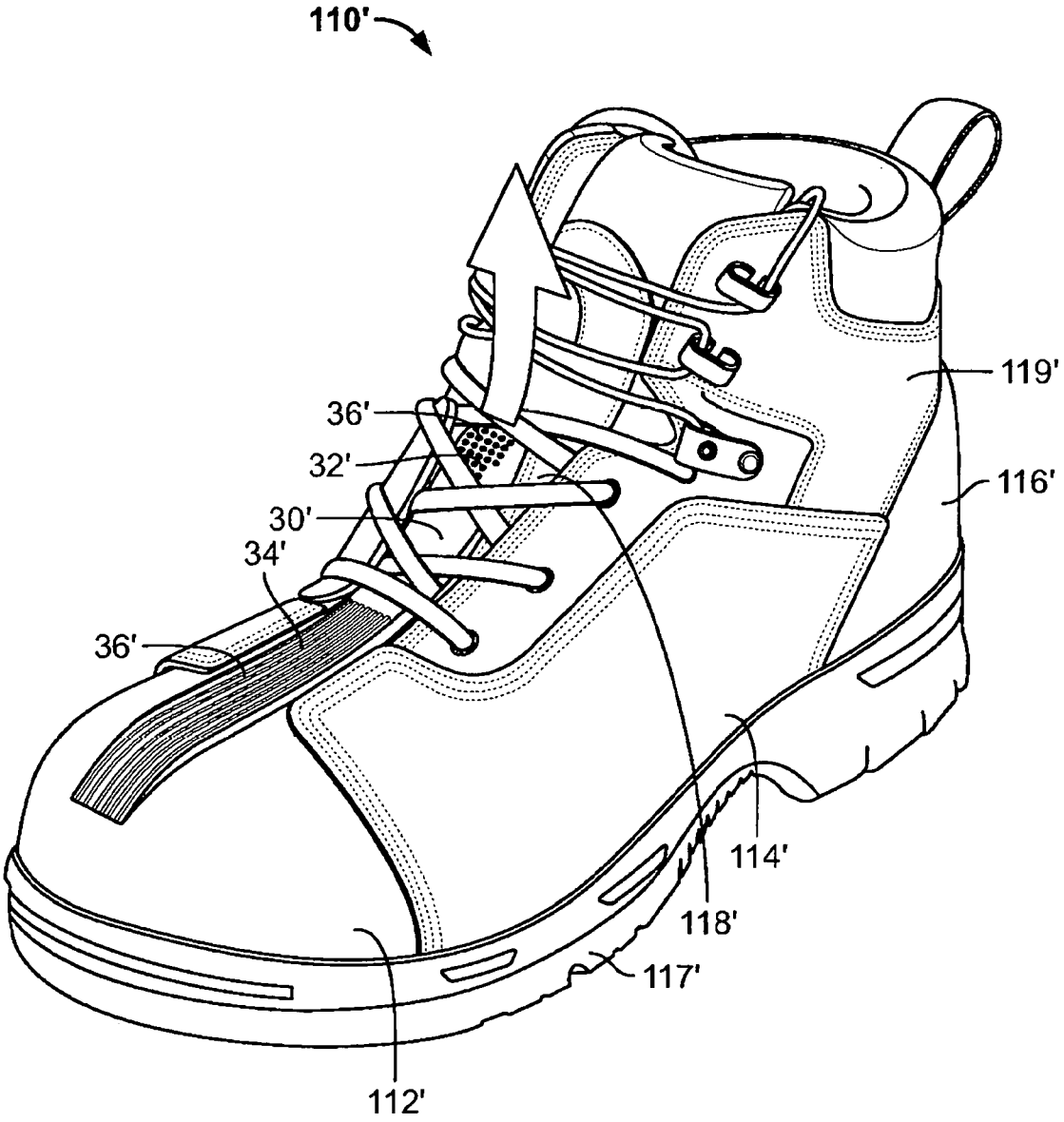

FIG. 7

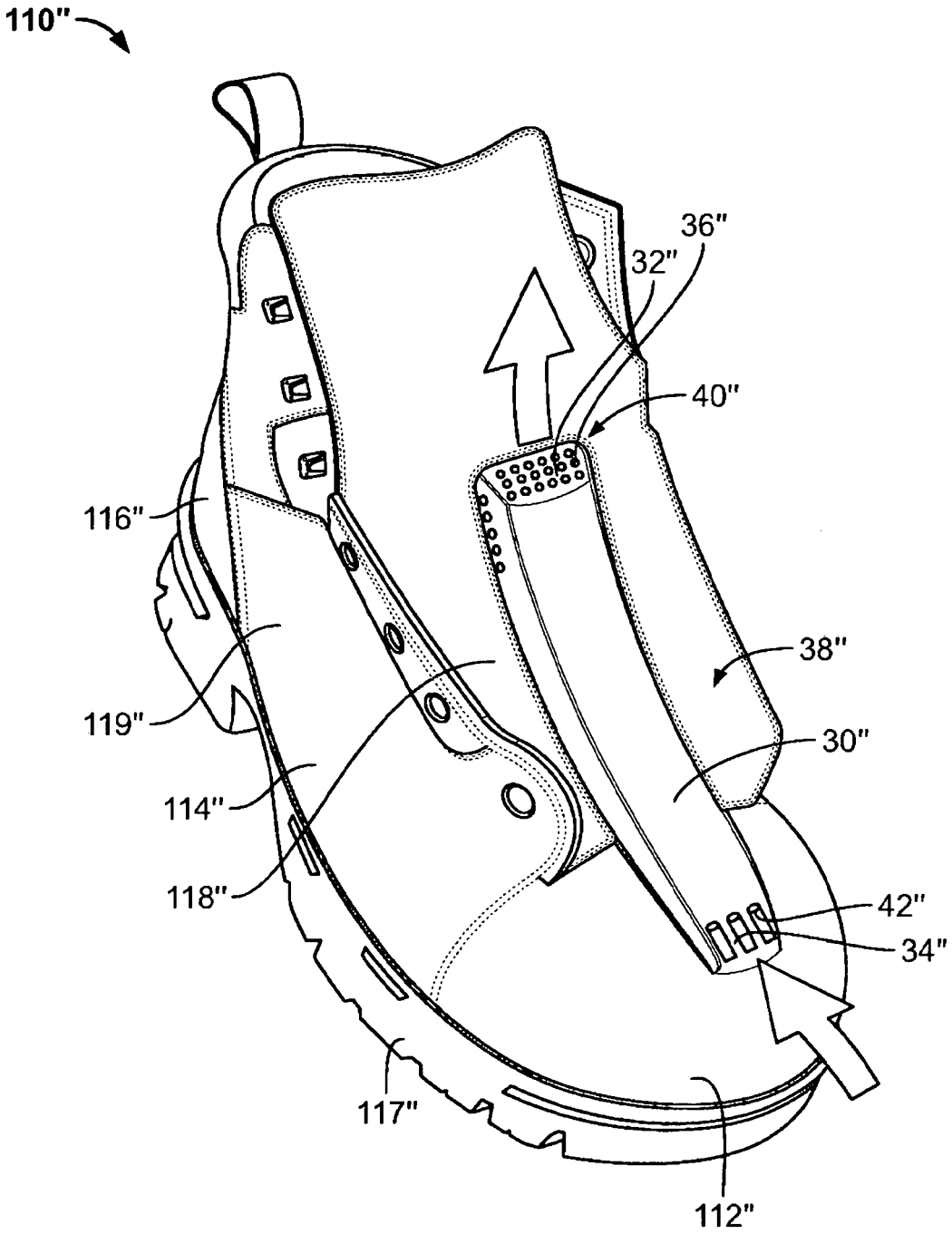

FIG. 8

FIG. 9

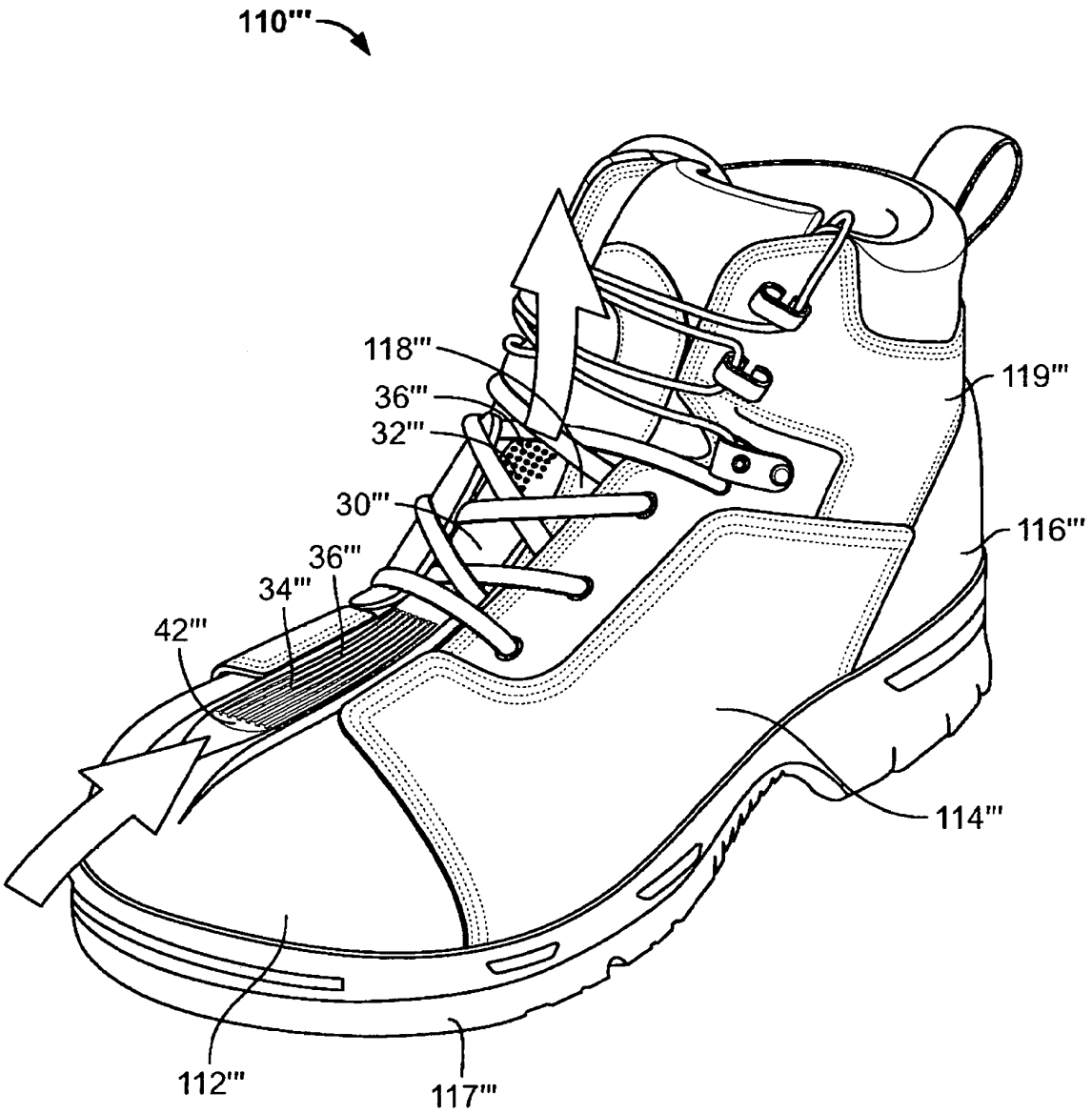

FIG. 10

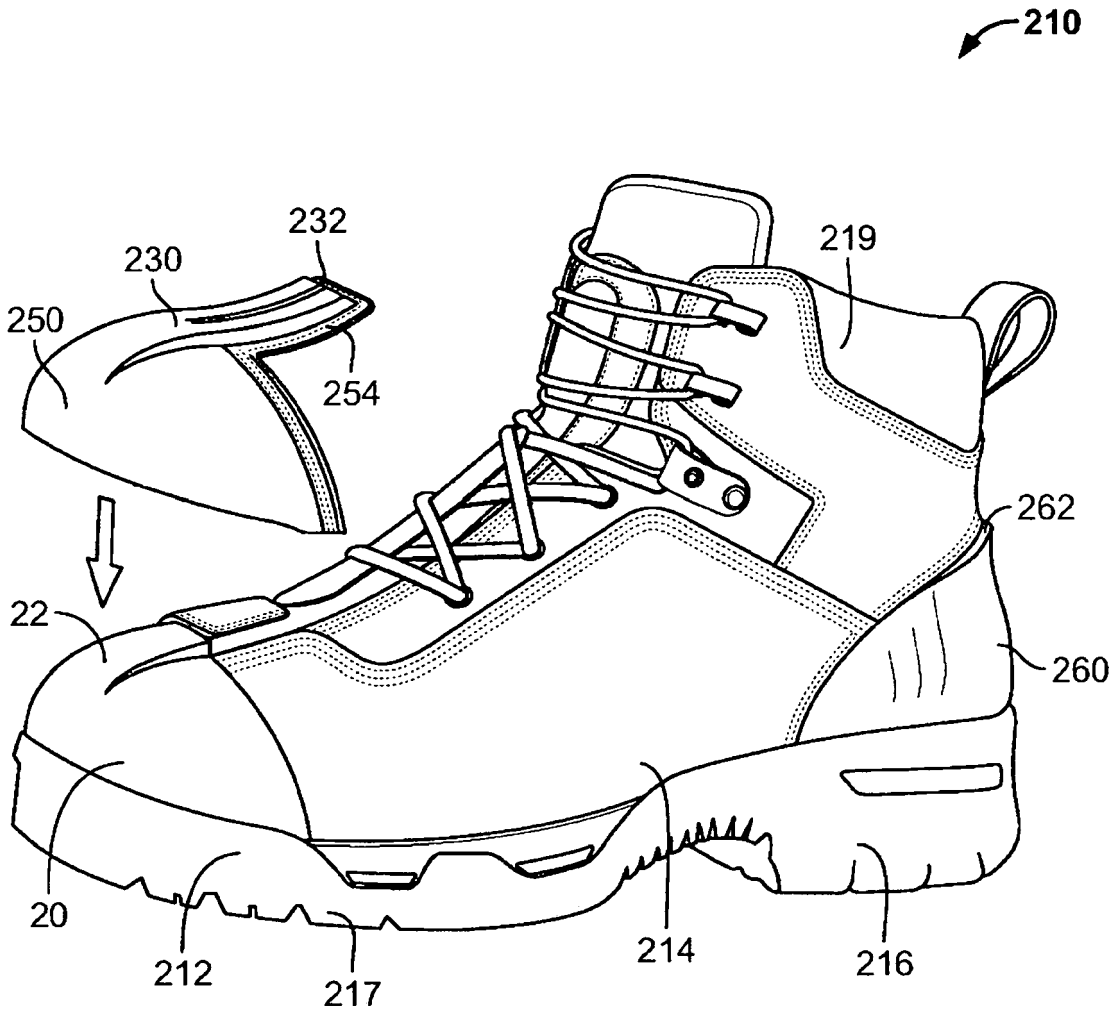

FIG. 11

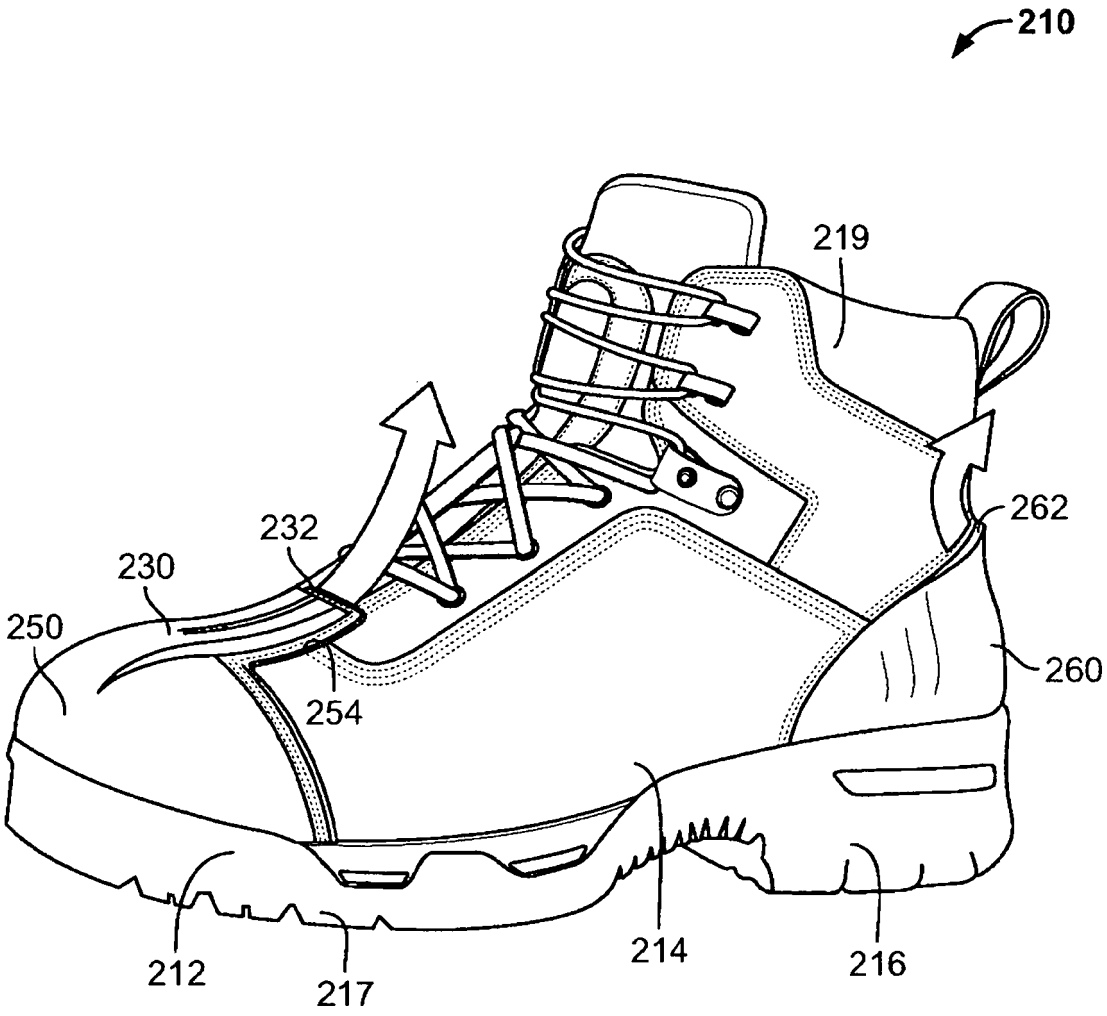

FIG. 12

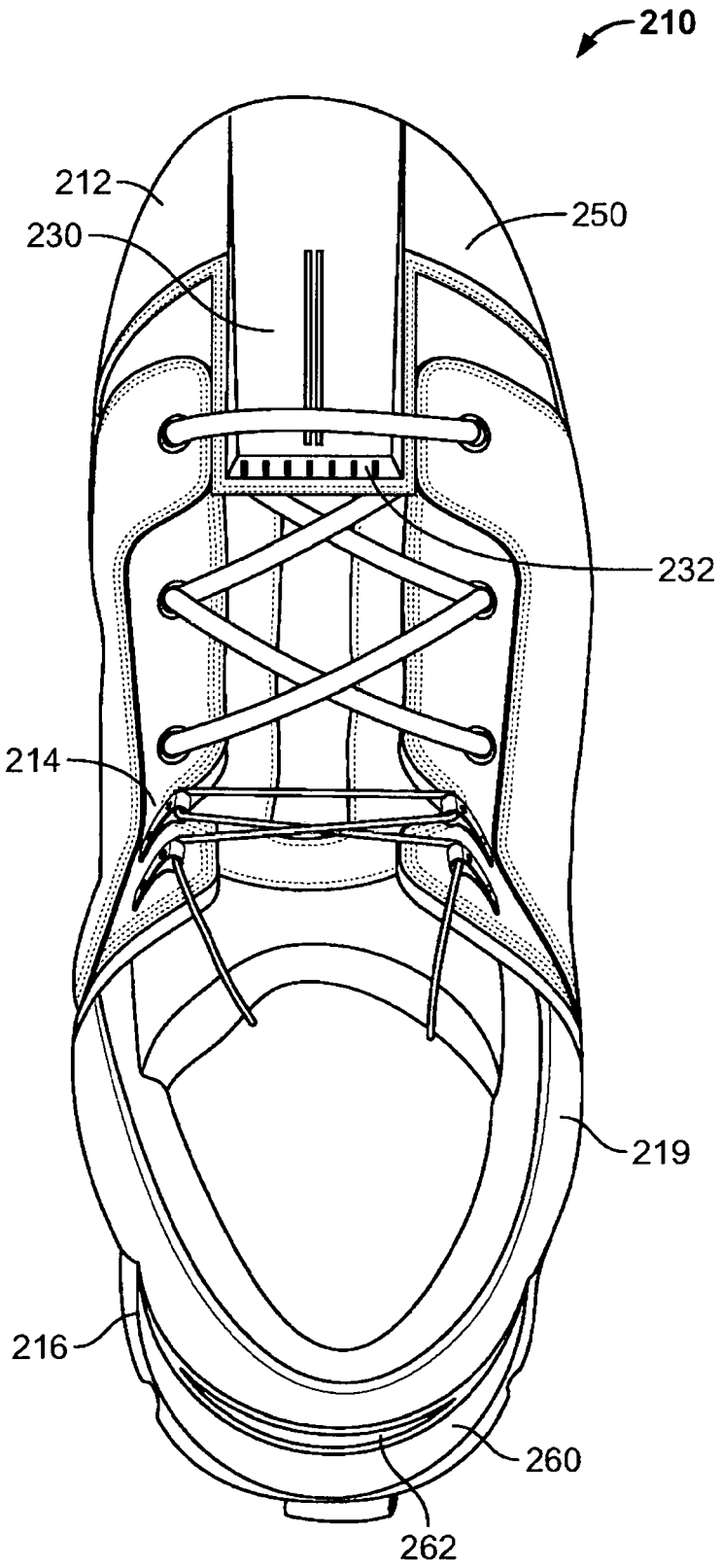

FIG. 13

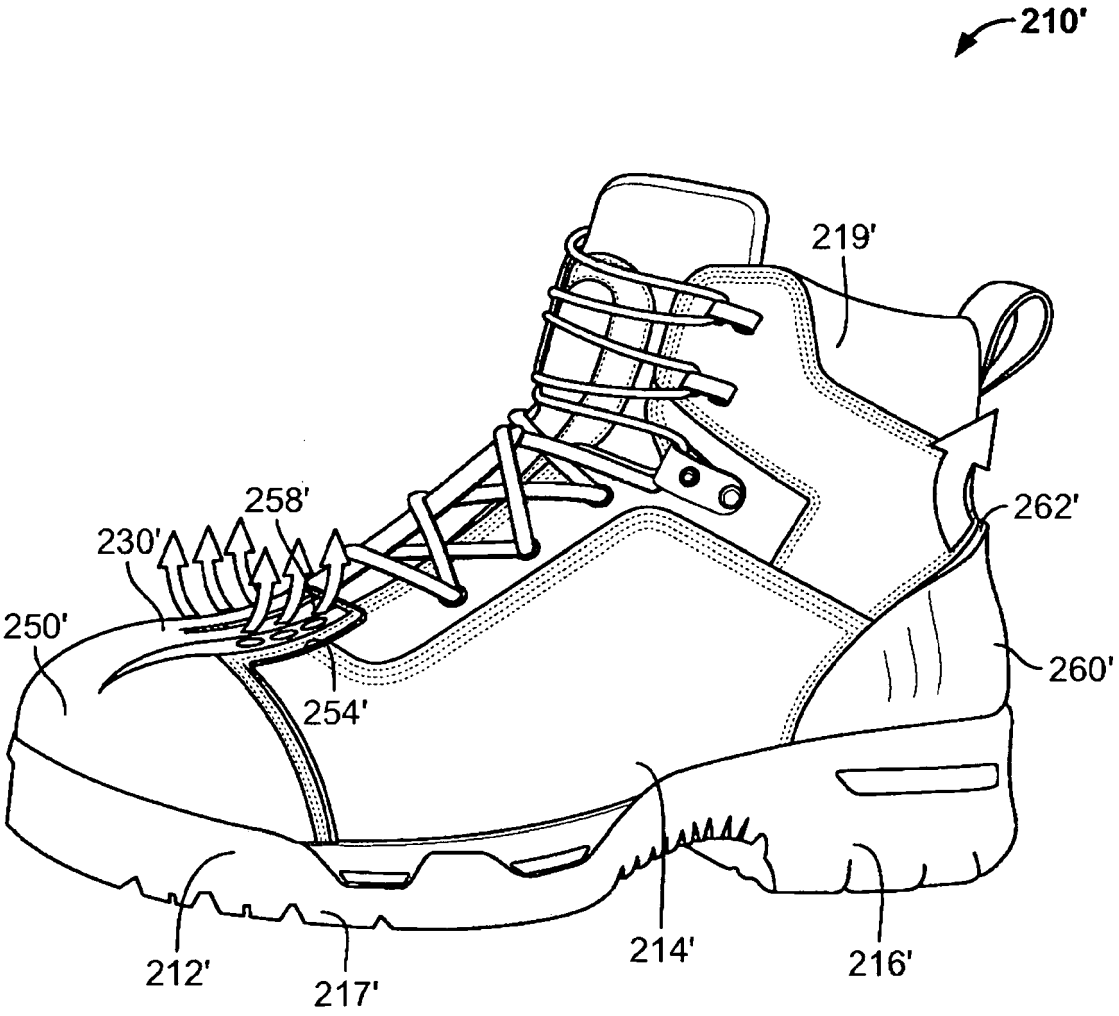

FIG. 14

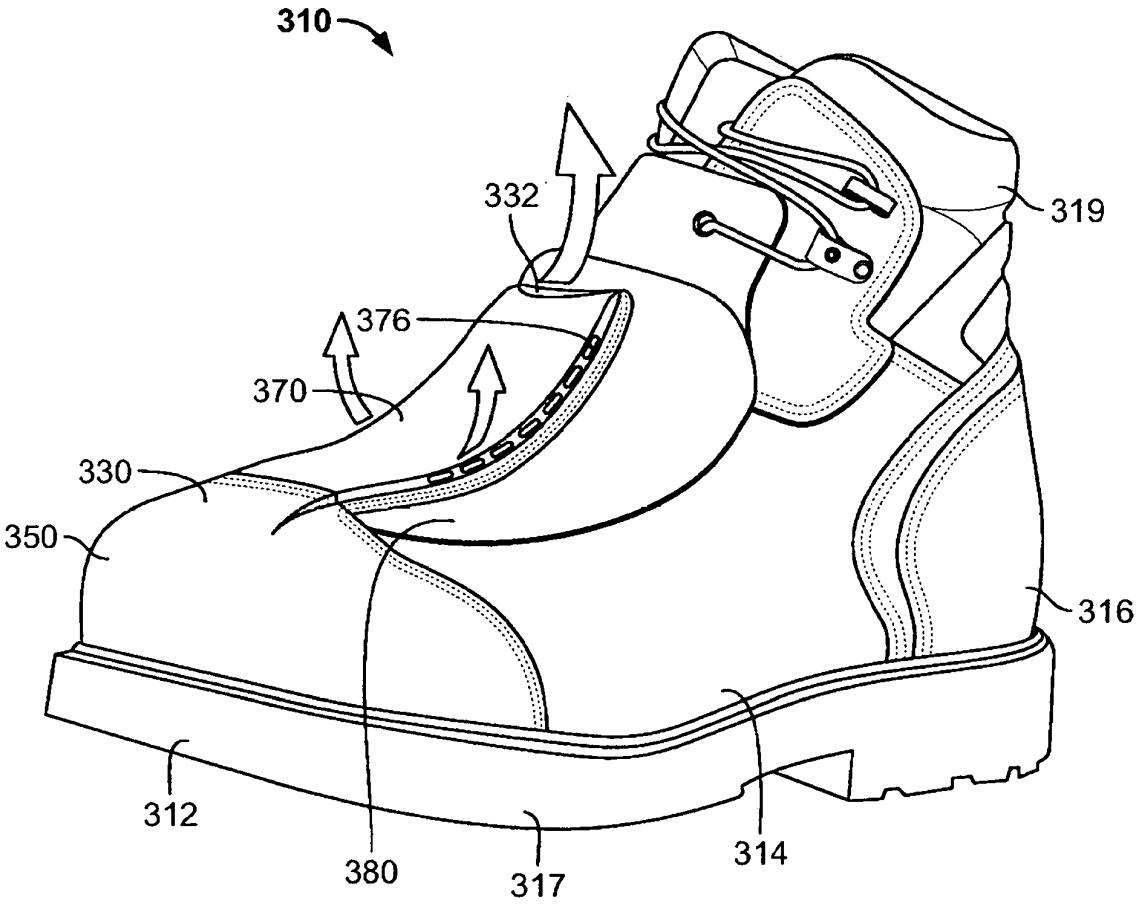

FIG. 15

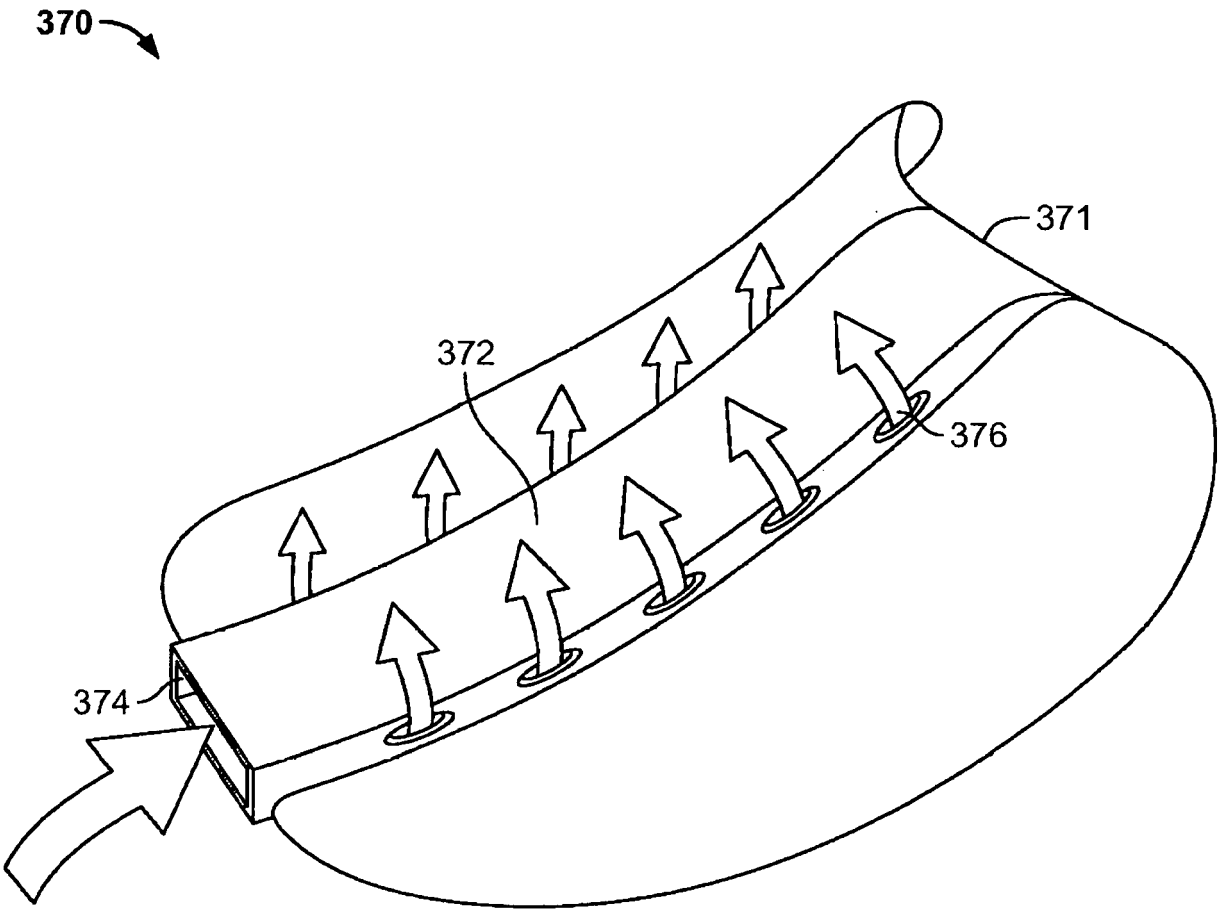

FIG. 16

REFERENCES CITED IN THE DESCRIPTION

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