US 20110138657A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2011/0138657 A1**

(43) **Pub. Date: Jun. 16, 2011**

CHRISTENSEN

(54) **SOLE FOR FOOTWEAR FOR UNSTABLE SURFACES**

(76) Inventor: **JILL CHRISTENSEN**, Los Angeles, CA (US)

(21) Appl. No.: **12/638,321**

(22) Filed: **Dec. 15, 2009**

Publication Classification

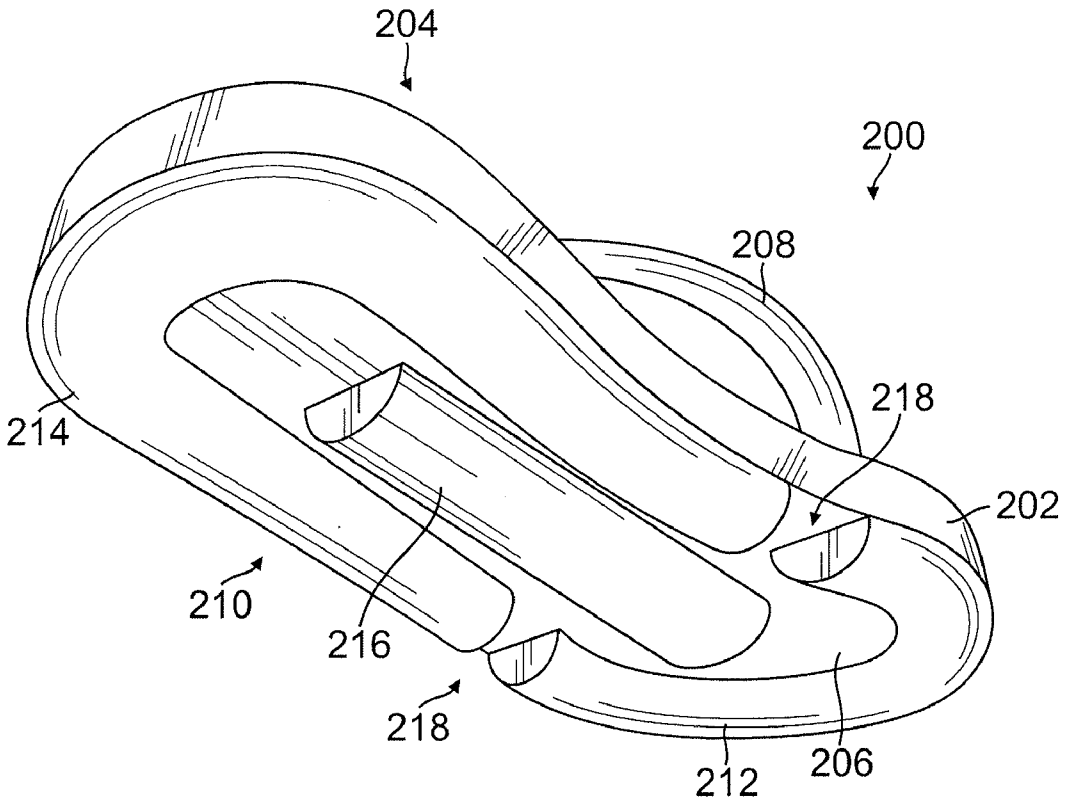
(51) **Int. Cl.**

A43B 13/00	(2006.01)
A43B 3/12	(2006.01)
A43B 5/00	(2006.01)
A43C 15/00	(2006.01)
A43B 13/14	(2006.01)

(52) **U.S. Cl.** ..... **36/103**; 36/11.5; 36/114; 36/59 R; 36/25 R

(57) **ABSTRACT**

A sole for footwear that is suited for sandy or non-rigid environments, as well as various footwear that includes the sole, are disclosed. The sole includes a first arc structure extending along a forefoot portion of the sole, and a second arc structure extending along a rear foot portion of the sole. The second arc structure has an open end that faces an open end of the first arc structure, and the second arc structure is separated from the first arc structure by a gap. The stability and traction structure further includes a linear structure extending from within the first arc structure to within the second arc structure.



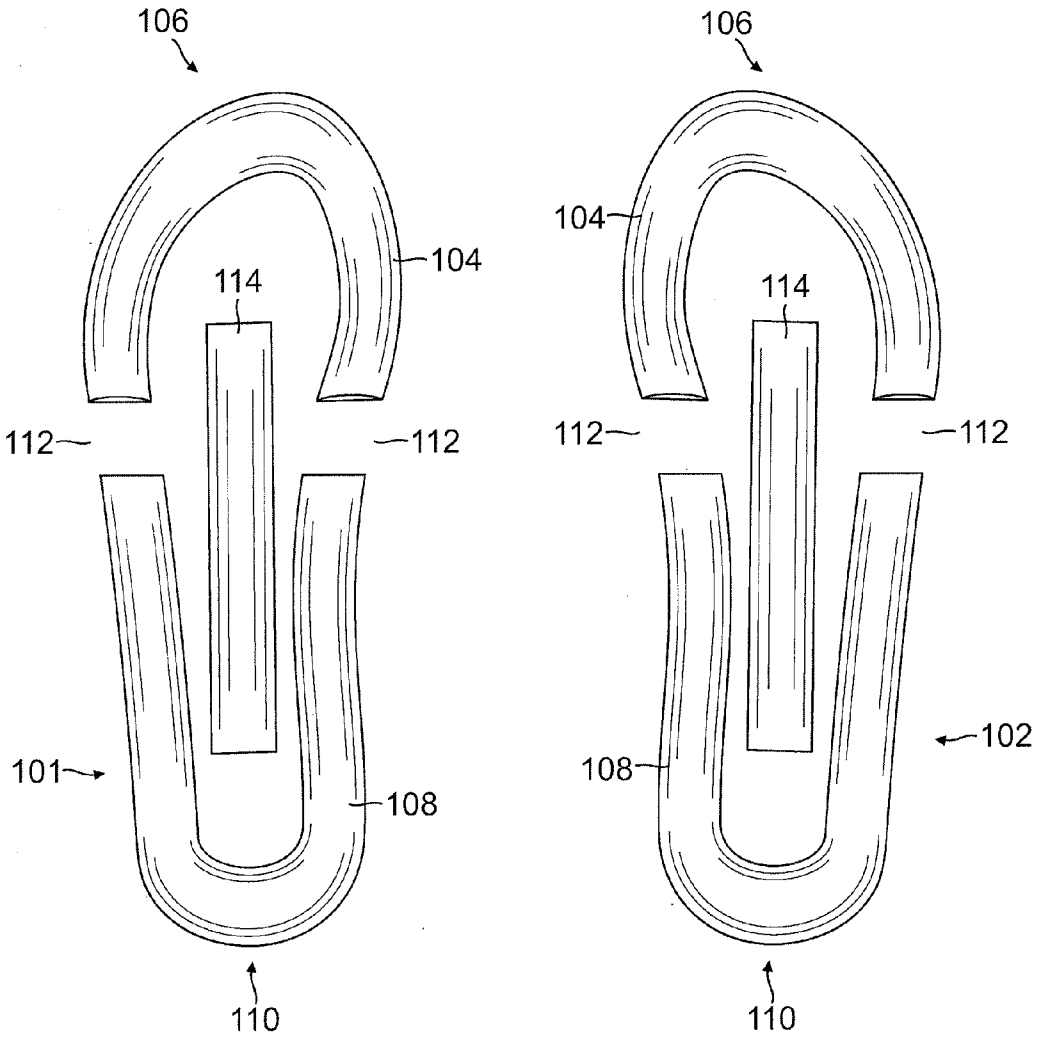


FIG. 1

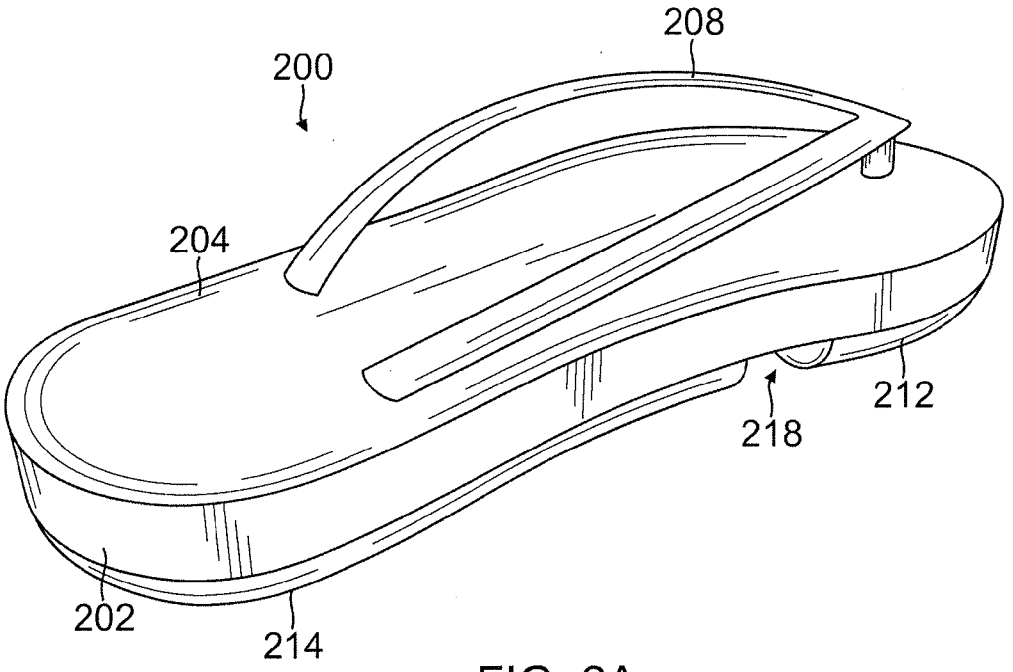

208
200
204
212
218
202
214

FIG. 2A

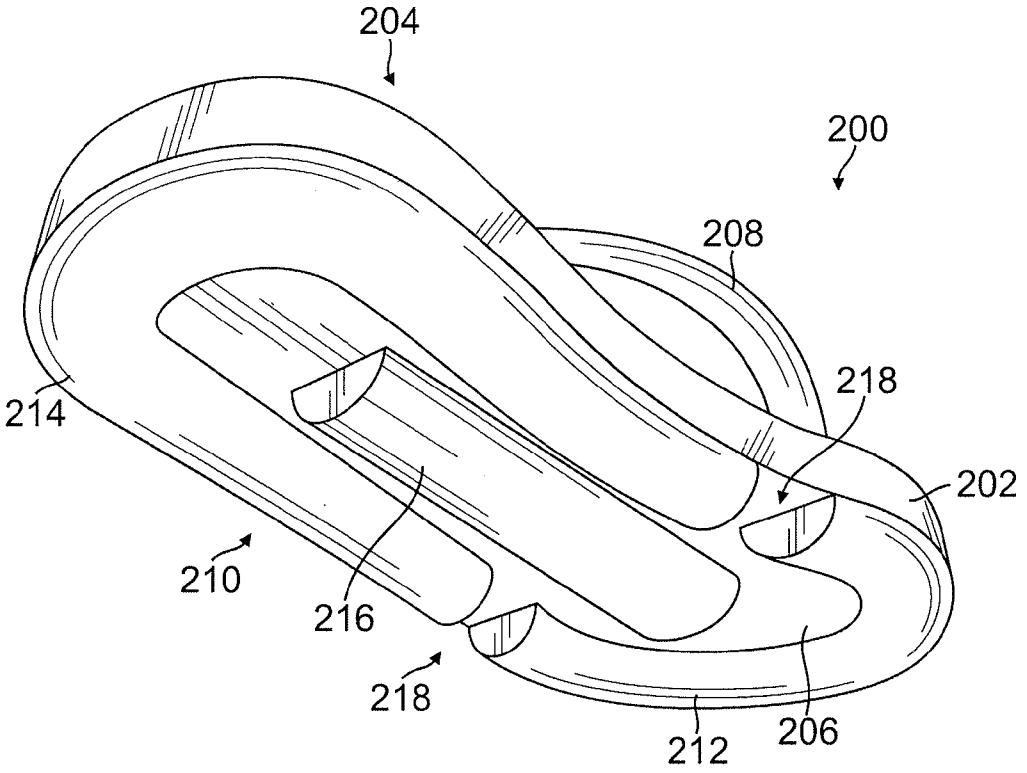

204
200
208
218
214
202
210
216
218
206
212

FIG. 2B

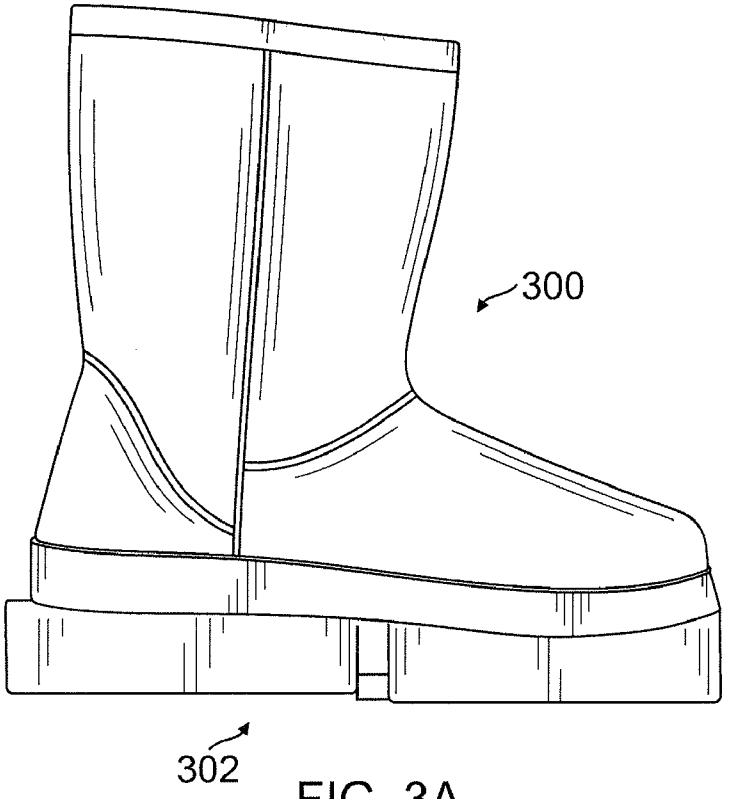


FIG. 3A

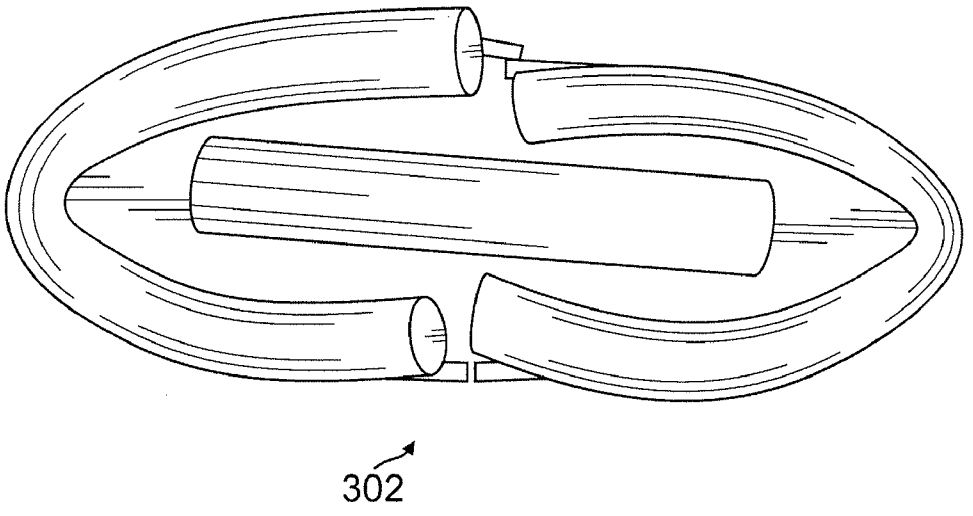


FIG. 3B

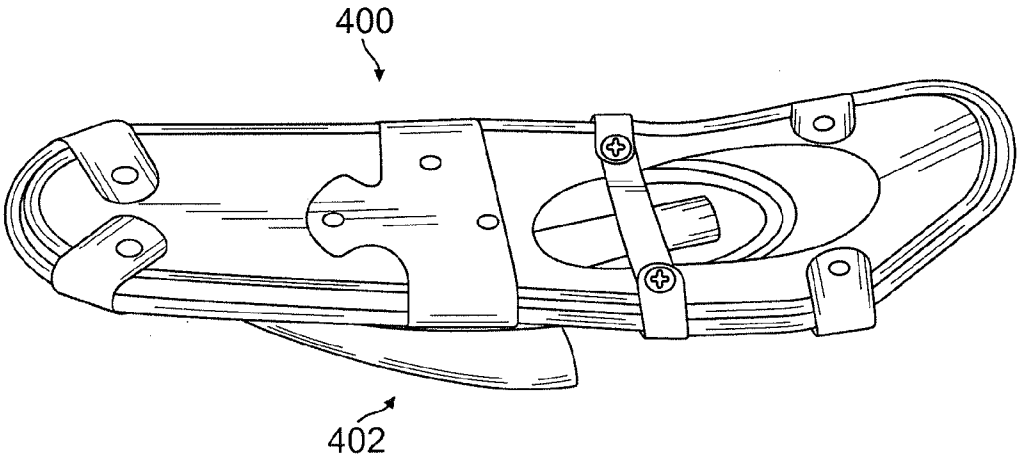


FIG. 4A

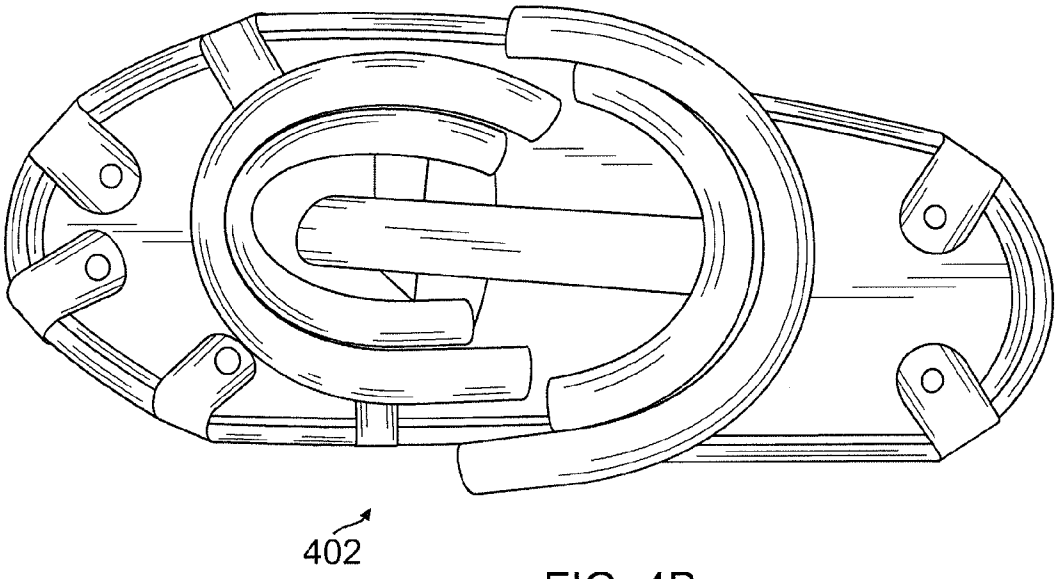


FIG. 4B

SOLE FOR FOOTWEAR FOR UNSTABLE SURFACES

BACKGROUND

[0001] This present invention is related to footwear, and more particularly to a sole for footwear that is adapted for unstable surfaces.

[0002] Walking, jogging, and running are forms of human activity that are thought to be natural and beneficial to health and well-being. These activities are often performed on stable, supportive surfaces. However, there are a lot of areas where walking, jogging and running are difficult due to unstable terrain. These areas include sandy or gravel-filled beaches of oceans, lakes or rivers, muddy or wet areas, desert terrain, and other areas with unstable pedestrian surfaces. What is needed is footwear that can adapt to, and overcome, the instability and inefficiency of unstable terrain to enable a wearer to better walk, jog and run on such terrain.

SUMMARY

[0003] This document describes a sole for footwear that is suited for sandy or non-rigid environments, as well as various footwear that includes the sole.

[0004] In one aspect, a stability and traction structure for a footwear sole is disclosed. The stability and traction structure includes a first arc structure extending along a forefoot portion of the sole, and a second arc structure extending along a rear foot portion of the sole. The second arc structure has an open end that faces an open end of the first arc structure, and the second arc structure is separated from the first arc structure by a gap. The stability and traction structure further includes a linear structure extending from within the first arc structure to within the second arc structure.

[0005] In another aspect, a sole for footwear for unstable environments is presented. The sole includes a planar bottom side, and a peripheral elongated protrusion extending down from the planar bottom side along a periphery of the sole and having a gap between a forefoot portion and a rear foot portion of the sole. The sole further includes a linear elongated protrusion extending down from the planar bottom side substantially in the middle of the peripheral elongated protrusion.

[0006] In yet another aspect, a sandal is described. The sandal includes a sole having a top side and bottom side, and a strap connected to the top side of the sole for fastening to a foot of a wearer of the sandal. The sandal further includes a first elongated protrusion extending down from the bottom side along a periphery of a forefoot portion of the sole and a second protrusion extending down from the bottom side along a periphery of a rear foot portion of the sole. The sandal further includes a third elongated protrusion extending down from a medial portion of the bottom side and bridging the forefoot and the rear foot of the sole.

[0007] The sole and the stability and traction members that it provides can be implemented with other types of footwear, including but not limited to, boots, shoes and sand shoes. The details of one or more embodiments are set forth in the accompanying drawings and the description below. Other features and advantages will be apparent from the description and drawings, and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] These and other aspects will now be described in detail with reference to the following drawings.

[0009] FIG. **1** illustrates a stability and traction arrangement for a sole for footwear.

[0010] FIG. **2**A is a top perspective view and FIG. **2**B is a bottom perspective view of a sandal that incorporates a sole in accordance with implementations described herein.

[0011] FIG. **3**A is a side view and FIG. **3**B is a bottom view of a boot that incorporates a sole in accordance with implementations described herein.

[0012] FIG. **4**A is a top perspective view and FIG. **4**B is a bottom view of a sand show that incorporates a sole in accordance with implementations described herein.

[0013] Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION

[0014] This document describes a sole for footwear that is suited for sandy or non-rigid environments, as well as various footwear that includes the sole. The sole combines equine biomechanics and horseshoe technology with human biomechanics and gait to produce a structure that provides stability for a human walker, jogger or runner on unstable surfaces.

[0015] A sole in preferred implementations utilizes a stability and traction mechanism that incorporates a "double horseshoe" arrangement, i.e. two U-shaped structures with open ends facing toward each other, implemented by first and second arc structures facing each other by their open ends and separated by a gap. The sole further includes a linear structure extending from within the first arc structure to within the second arc structure, to provide, in addition to added stability, balance and control like a frog of a horse's hoof. The first arc extends along a periphery of a forefoot portion of the sole, and the second arc extends along a periphery of a rear foot portion of the sole. In addition, the sole is formed and made of a resilient material for attenuating shock and vibration associated with use and to provide maximum traction to a wearer on unstable surfaces or non-rigid environments.

[0016] The preferred, exemplary implementations are illustrated in FIG. **1**, showing left and right soles **101** and **102**, respectively. Each sole **101**, **102** includes a first arc structure **104** extending along a periphery of a forefoot portion **106** of the soles **101**, **102**, and a second arc structure **108** extending along a periphery of a rear foot portion **110** of the soles **101**, **102**. Each sole **101**, **102** further includes a linear structure **114** that extends from within the first arc structure **104** to within the second arc structure **108**.

[0017] Each of the first and second arc structures **104**, **108** are preferably "horseshoe" shaped, arranged with open ends facing each other, and separated by a gap **112**. The gap **112** enables the first and second arc structures **104**, **108** to operate independently. In preferred implementations, the gap **112** is aligned and coextensive with a line of flexion of a foot of the wearer, such as a medial metatarsal-phalanges joint line, for instance.

[0018] The first and second arc structures **104** and **108** and linear structure **114** can be formed of a protrusion, such as approximately half of a cylindrical tube, for example. The first and second arc structures **104** and **108** and linear structure **114** can be solid or hollow, but are at least slightly compressible and flexible. Suitable materials for the first and second arc structures **104** and **108** and linear structure **114** of the soles **101**, **102** include rubber, polyvinyl carbonate (PVC), nylon, other plastics, metal, or other materials. The soles **101**, **102** provide a larger surface area than typical soles, and provide a wider and more even surface area to an unstable

surface than the foot, to disperse the weight and force of impact on the unstable surface.

[0019] In operation, the foot of a wearer of the soles **101**, **102** comes down onto an unstable surface in two parts: the back of the foot comes down, plants and is stabilized by the second arc structure **108**. The forward-facing U-shape of the second arc structure **108** further attenuates shock and vibration, while inhibiting too much sliding forward of the sole (or footwear to which it is attached) as the back of the foot comes down. The linear structure **114** then provides more surface area connection with the unstable surface, keeps the foot level, and inhibits or counteracts over arching of the foot. Finally, the front of the foot comes down, where the first arc structure **104** adds further stability, grabs or scoops the unstable surface, and provides leverage against it. Accordingly, the use of the presently described soles **101**, **102** and the traction structure provided thereby for various types of footwear, can significantly decrease instances of ankle injury due to surface instability, and unstable surfaces can now be available as a suitable or even desired place for walking, jogging or running.

[0020] FIGS. **2**A and **2**B show a sandal **200** using a sole and traction structure as described above. The sandal **200** includes a sole **202** having a top side **204** and a bottom side **206**. The top side **204** can be substantially planar, or may be contoured to accommodate a foot of a wearer of the sandal **200**. For example, the top side **204** can include indentations for receiving a heal, forefoot, and/or toes of a foot. The top side **204** may also include a ridge or arch support structure. The sandal **200** also includes a strap **208** connected to the top side **204** of the sole **202** for fastening to the foot of the wearer of the sandal **200**.

[0021] The bottom side **206** is preferably planar or substantially planar, at least in part. In some implementations, the bottom side **206** is smooth and water-impermeable, to inhibit collection of sand, dirt or other particulate, or inhibit absorption of water or other fluids. In other implementations, the bottom side **206** may include small ridges or a pattern for providing traction or grip to a surface or environment, such as a sandy beach, on which the wearer walks.

[0022] The sandal **200** further includes traction members **210** extending down from the bottom side **206**. In some implementations, the traction members **210** include a peripheral elongated protrusion **212**, **214**, similar to the first and second arc structures **104**, **108** of FIG. **1**, extending down from the bottom side along a periphery of the sole **202** and having a gap **218** between a forefoot portion and a rear foot portion of the sole. In exemplary implementations, the gap **218** is aligned and coextensive with a line of flexion, such as a medial metatarsal-phalanges joint line of a foot of the wearer. The gap **218** can be formed as a cut-out or tapering of the peripheral elongated protrusions.

[0023] The traction members **210** may also be formed of a first elongated protrusion **212** extending down from the bottom side **206** of the sole **202** along a periphery of a forefoot portion of the sole **202**, and a second protrusion **214** extending down from the bottom side **206** of the sole **202** along a periphery of a rear foot portion of the sole **202**. The sandal **200** may include a third, or medial, elongated protrusion **216** extending down from a medial portion of the bottom side **206** and bridging the forefoot and the rear foot of the sole **202**, for extra support and resistance against too much bending of the sole **202** at the gap **218**.

[0024] In preferred implementations, the traction members **210** of the first, second and third elongated protrusions **212**, **214**, and **216**, respectively, are formed as curved (peripheral) or straight (medial) in the shape of a half-cylinder or part-cylinder. In other implementations, the traction members **210** are squared or angular. The traction members **210** can be solid, cellular, or may include one or more larger air pockets or channels, or may be formed of a number of small, serial protrusions. The traction members **210** may also be formed with an inner material that is denser or lighter than an outer material. More than two layers are possible.

[0025] The sandal **200** can be made of rubber, foam, polyurethane, leather, plastic, or any other rigid or flexible material, such as alloys or composite materials. Alternatively, the materials used for the sandals **202** can be soft and compressible, or a combination of hard, resilient materials with soft, compressible materials. In some implementations, the sole **202** can be formed of layers of different materials, and in still other implementations, the traction members and/or bottom side **206** of the sole **202** can be formed of a softer material than the top side **204** of the sole **202**. Sandals **200** can be injection molded, thermally bonded, etc, in a manufacturing process. The protrusion may have an interior cavity made using a blow molding process.

[0026] FIG. **3**A is a side view and FIG. **3**B is a bottom view of a boot **300** that incorporates a sole **302** in accordance with implementations described herein. FIG. **4**A is a top perspective view and FIG. **4**B is a bottom view of a sand shoe **400** that incorporates a sole **402** in accordance with implementations described herein.

[0027] Although a few embodiments have been described in detail above, other modifications are possible. For example, the stability and traction mechanism and sole can be applied to other types of footwear, including tennis-style shoes or sneakers, other types of athletic shoes or boots, and other footwear. Further, the linear elongated protrusion may be tapered to a forward-facing point on the sole or footwear to which the sole is attached. In still yet other modifications, the linear elongated protrusion may extend from the bottom surface of the sole up through the top surface of the sole to make slight contact with the wearer's foot, or with a thin layer underneath the wearer's foot. Other embodiments may be within the scope of the following claims.

1. A sole for footwear for unstable environments, the sole comprising:
- a planar bottom side;
- a peripheral elongated protrusion extending down from the planar bottom side along a periphery of the sole and having a gap between a forefoot portion and a rear foot portion of the sole; and
- a linear elongated protrusion extending down from the planar bottom side substantially in the middle of the peripheral elongated protrusion.

2. The sole in accordance with claim **1**, wherein the peripheral elongated protrusion and linear elongated protrusion have a semicircular cross section.

3. The sole in accordance with claim **1**, wherein the peripheral elongated protrusion and linear elongated protrusion are flexible.

4. A stability and traction structure for a footwear sole, the stability and traction structure comprising:
- a first arc structure extending along a forefoot portion of the sole;

a second arc structure extending along a rear foot portion of the sole and having an open end that faces an open end of the first arc structure, the second arc structure being separated from the first arc structure by a gap; and

a linear structure extending from within the first arc structure to within the second arc structure.

5. The stability and traction structure in accordance with claim **4**, wherein the first arc structure and second arc structure includes at least one semicircular U-shaped tube.

6. The stability and traction structure in accordance with claim **4**, wherein the first and second arc structures and the linear structure are flexible.

7. A sandal comprising:

a sole having a top side and bottom side;

a strap connected to the top side of the sole for fastening to a foot of a wearer of the sandal; and

a first elongated protrusion extending down from the bottom side along a periphery of a forefoot portion of the sole and a second protrusion extending down from the bottom side along a periphery of a rear foot portion of the sole.

8. A sandal in accordance with claim **7**, further comprising a third elongated protrusion extending down from a medial portion of the bottom side and bridging the forefoot and the rear foot of the sole.

9. A sandal comprising:

a sole having a top side and bottom side;

a strap connected to the top side of the sole for fastening to a foot of a wearer of the sandal; and

a peripheral elongated protrusion extending down from the bottom side along a periphery of the sole and having a gap between a forefoot portion and a rear foot portion of the sole.

10. A sandal comprising:

a sole having a top side and a substantially planar bottom side;

a strap connected to the top side of the sole for fastening to a foot of a wearer of the sandal; and

traction members extending down from the substantially planar bottom side, the traction members comprising a peripheral elongated protrusion extending down from the bottom side along a periphery of the sole and having a gap between a forefoot portion and a rear foot portion of the sole, the traction members further including a central linear protrusion within the peripheral elongated protrusion.

11. An article comprising:

footwear; and

a sole connected to an underside of the footwear, the sole having a stability and traction mechanism comprising:

a first arc structure extending along a forefoot portion of the sole;

a second arc structure extending along a rear foot portion of the sole and having an open end that faces an open end of the first arc structure, the second arc structure being separated from the first arc structure by a gap; and

a linear structure extending from within the first arc structure to within the second arc structure.

12. The article in accordance with claim **11**, wherein the footwear is a sandal.

13. The article in accordance with claim **11**, wherein the footwear is a boot.

14. The article in accordance with claim **11**, wherein the footwear is a sand shoe.

15. The article in accordance with claim **11**, wherein the footwear is a tennis shoe.

* * * * *