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(54) **ARTICLE OF FOOTWEAR WITH DEFORMING INSERT**

Publication Classification

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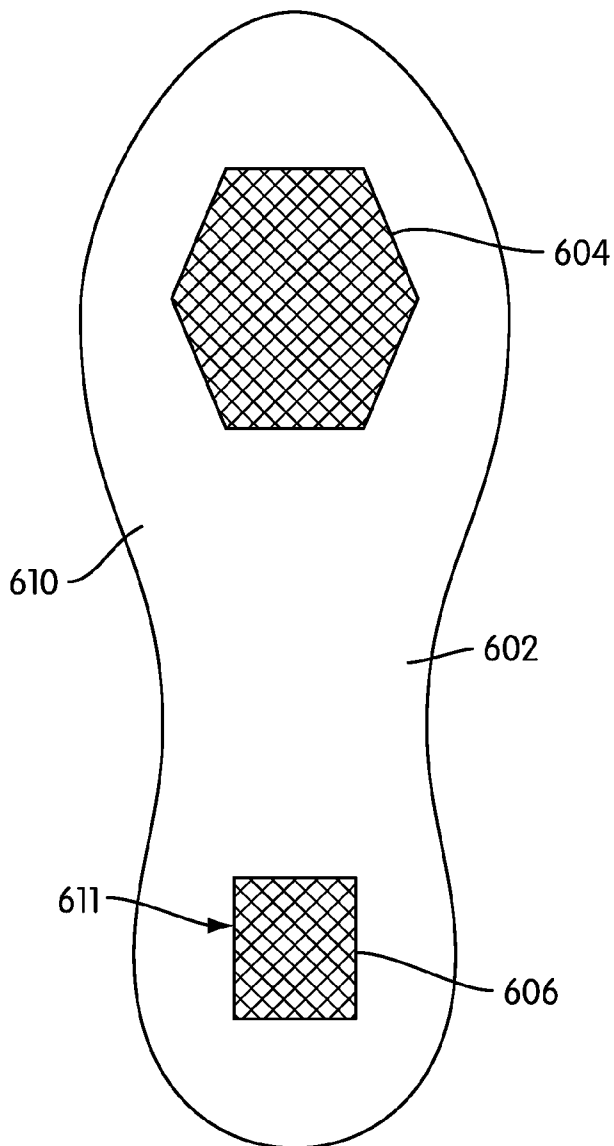
(57) **ABSTRACT**

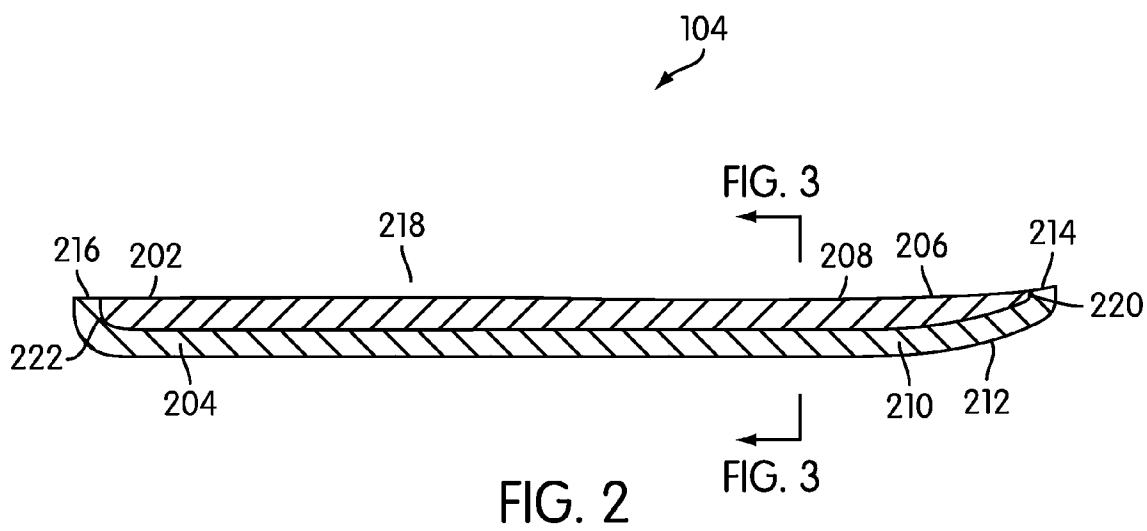
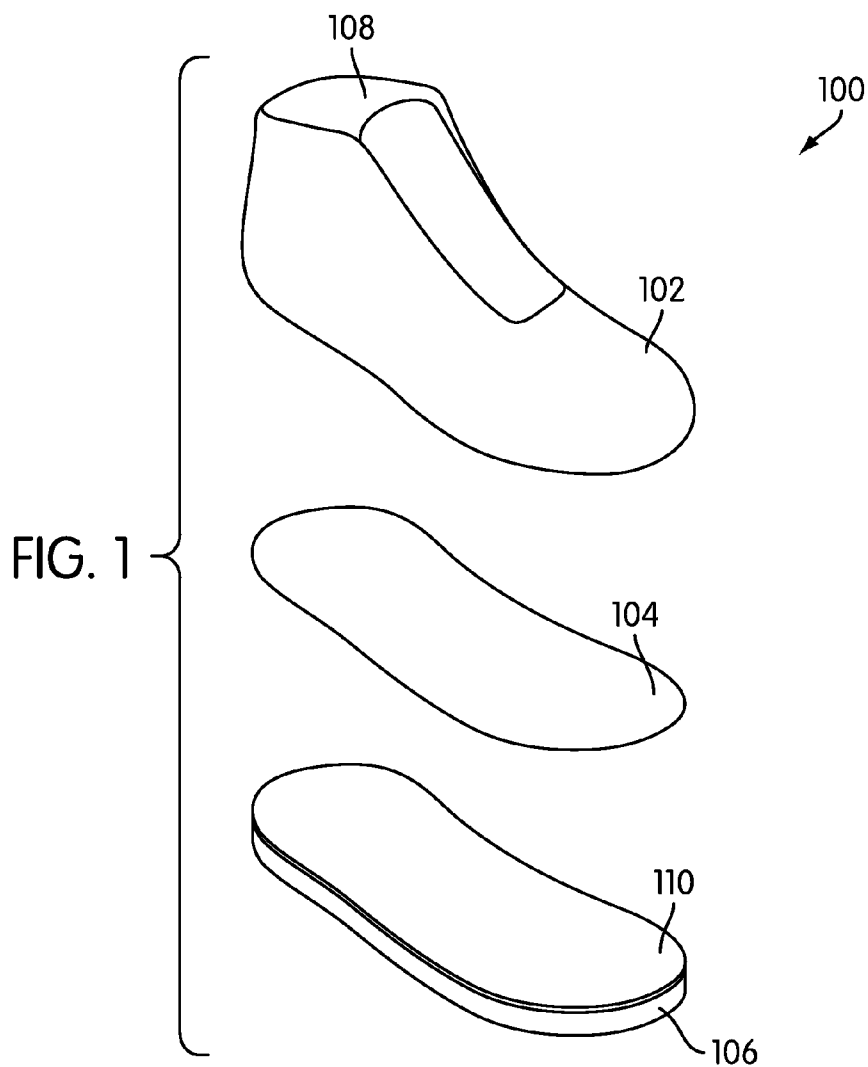
A substantially permanently deforming insert including a soft foam layer configured to substantially permanently deform and conform to a wearer's foot. This deformation preferably takes place quickly, eliminating the typical break in period. The insert can also include a roughened region configured to engage an outer member, eliminating the need for an adhesive between the outer member and the insert.

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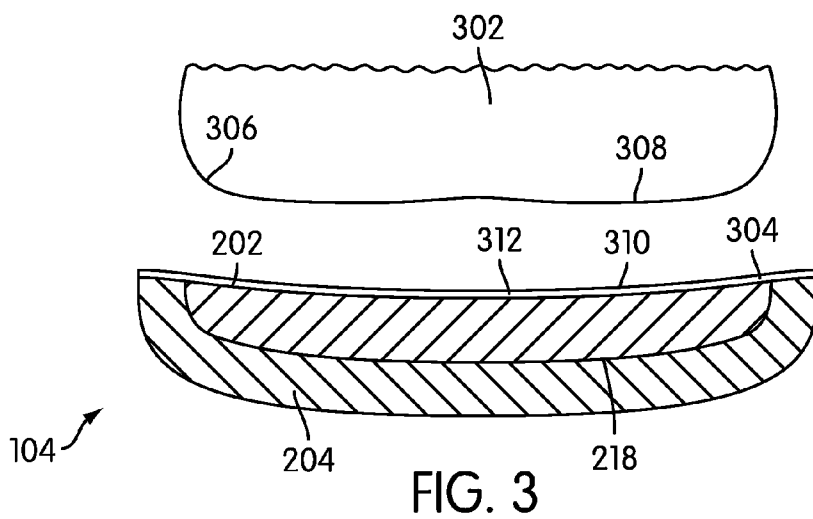


FIG. 3

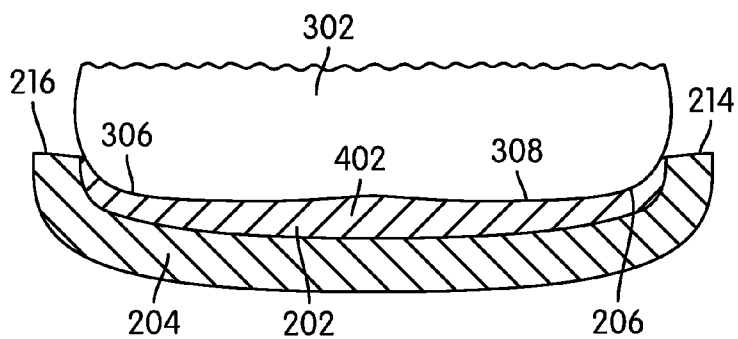


FIG. 4

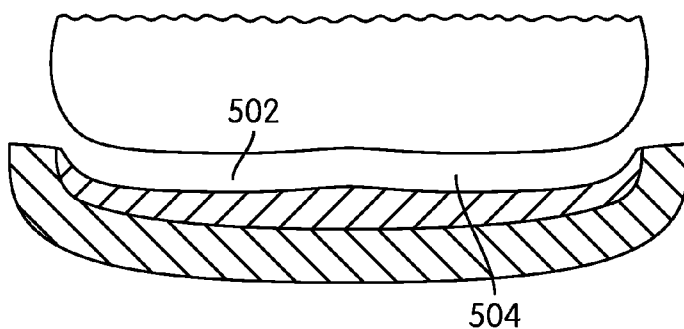


FIG. 5

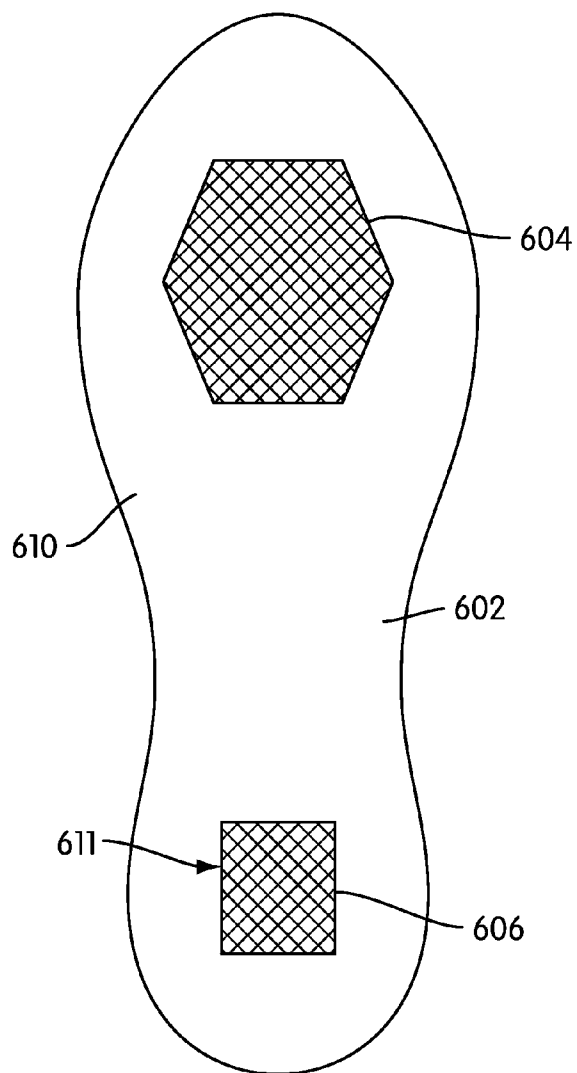


FIG. 6

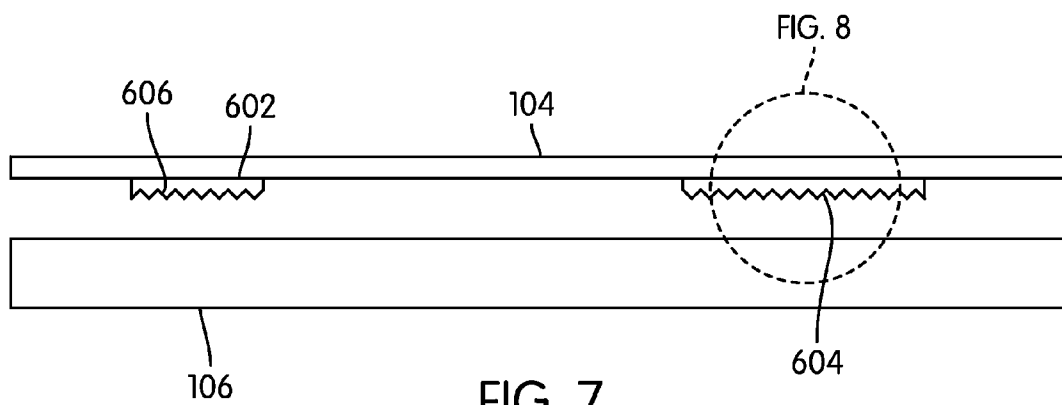


FIG. 7

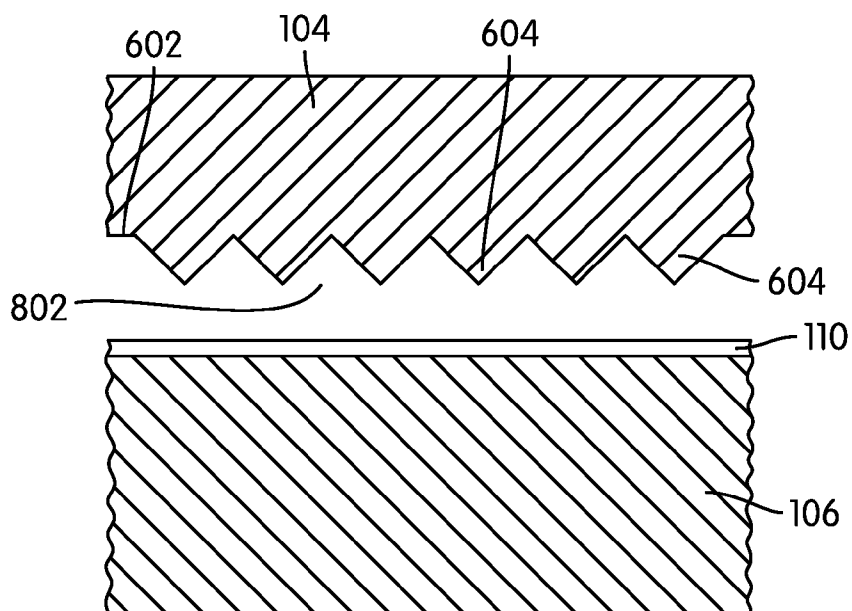


FIG. 8

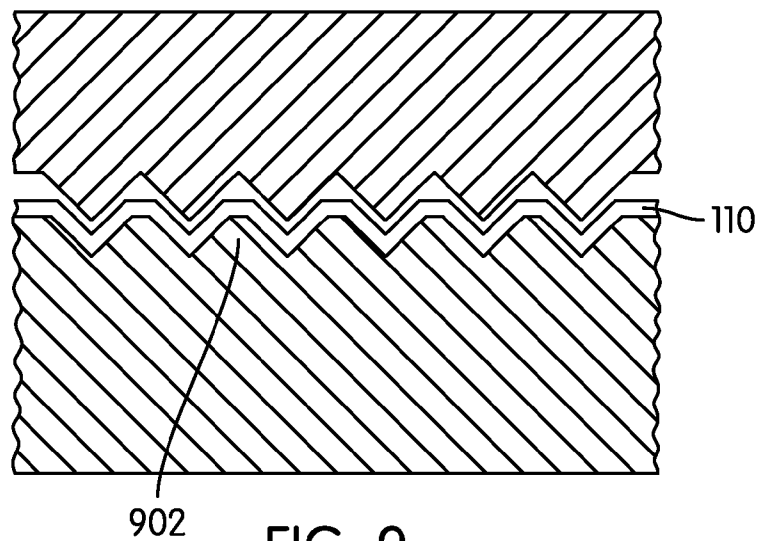


FIG. 9

ARTICLE OF FOOTWEAR WITH DEFORMING INSERT

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to footwear, and in particular an insert that is substantially permanently deformable.

[0003] 2. Description of Related Art

[0004] In order to achieve maximum comfort and support for the foot when using an article of footwear, it is preferable to include an insole which may conform to the contours of the foot.

[0005] Some manufacturers include insoles that are deformable and provide cushioning to the user's foot. Often these insoles comprise a thin foam material. These cushioning insoles are usually too thin to provide sufficient support to the foot. Some inserts have preformed contours.

[0006] Gudas (U.S. Pat. No. 4,677,766) discloses an insert for an article of footwear constructed of resilient material having a depression for the first metatarsal head, a raised portion for the second, third, and fourth metatarsal heads, a full arch support, and an eccentric heel seat. Inserts, like those disclosed in Gudas, are configured generally to fit all or most individuals. Articles of footwear that are configured to fit the particular contours of a particular individual foot may fit a single person or a very narrow group of people, but at the same time, they may cause a great deal of discomfort to other people. In other words, the more targeted an insole design is, the more likely it will be very comfortable to a small select group of individuals, but be more uncomfortable to a larger group of other individuals.

[0007] Inserts that include materials capable of conforming to the contours of a foot after they have been initially manufactured have been proposed. Wolps (U.S. Pat. No. 4,167,824) discloses an insole insert which comprises an open cell foam base capable of conforming to and substantially retaining the shape of compressive forces applied thereto, an elastic closed cell foam layer having a maximum compression set of less than 50% and a stretch fabric bonded to one face of the closed cell foam layer. The drawback of this design is that the open cell foam may only mold to the foot of the wearer after repeated use. There is still a need for a substantial "break in" period for the Wolps design.

[0008] Johnson (US patent application publication 2005/0138844) discloses a multi-layered insole that supports the foot, provides impact resistance, and conforms to the shape of the foot. It comprises a pliable yet supporting heel-cup layer, a high impact foam later that sets very little, and an image foam later that sets to the wearer's foot shape thereby forming a cushion fit to the foot bed. A drawback of this invention is that a heel cup is necessary to provide structure to the insole and other layers so that the insole holds its shape. However the heel cup does not extend over the full length of the insert. There is a need in the art for a foam based insert that molds to the foot and does not require the use of an additional heel cup for structural support.

[0009] In general there is a need in the art for an insert that can be molded substantially permanently to the contours of a wearer's foot, eliminating the usually long break in period, and that may be constructed from the fewest possible materials to provide a light weight insole. Additionally, there

is a need for such an insert that can be easily inserted into an article of footwear and can reduce in-shoe motion of the foot.

SUMMARY OF THE INVENTION

[0010] An article of footwear including a substantially permanently deforming insert is disclosed. In one aspect, the present invention provides an article of footwear comprising: an outsole and an insert; an outer member being configured to contact the ground; an insert including an outer layer configured to contact the outer member, and an inner layer configured to contact the wearer's foot; and where the inner layer is substantially permanently deformable.

[0011] In another aspect, the outer member includes an outsole.

[0012] In another aspect, the outer member includes a midsole and an outsole.

[0013] In another aspect, the outer member includes an intermediate layer, a midsole and an outsole.

[0014] In another aspect, the inner layer substantially permanently deforms after being worn for the first time.

[0015] In another aspect, the inner layer substantially permanently deforms after being worn for about a couple of hours.

[0016] In another aspect, the invention provides an article of footwear comprising: an outer member and an insert; the outer member being configured to contact the ground; an insert including an outer layer configured to contact the outer member, and an inner layer; and where the inner layer is made of any material capable of taking a quick compression set.

[0017] In another aspect, the outer member includes an outsole.

[0018] In another aspect, the outer member includes a midsole and an outsole.

[0019] In another aspect, the outer member includes an intermediate layer, a midsole and an outsole.

[0020] In another aspect, the inner layer is made of polyethylene foam having a specific gravity of about 0.05.

[0021] In another aspect, the inner layer is made of a soft polyethylene foam, being a blend of ethyl vinyl acetate and rubber.

[0022] In another aspect, the intermediate layer comprises ethyl vinyl acetate.

[0023] In another aspect, the outer layer comprises a polyethylene foam.

[0024] In another aspect, the invention provides an article of footwear comprising: an outer member and an insert; the outer member being configured to contact the ground; an insert including an outer layer configured to contact the outsole, and an inner layer configured to contact the outer layer; where the outer layer includes at least one surface feature disposed on the outer layer; and where the surface feature increases friction between the outer member and the outer layer.

[0025] In another aspect, the outer member includes an outsole.

[0026] In another aspect, the outer member includes a midsole and an outsole.

[0027] In another aspect, the outer member includes an intermediate layer, a midsole and an outsole.

[0028] In another aspect, the surface feature comprises diamond-shaped extensions.

[0029] In another aspect, the present invention provides an article of footwear comprising: an outsole and an insert; the outsole being configured to contact the ground; an insert including an outer layer configured to contact the outsole, and an inner layer configured to contact the outsole; where the outer layer includes a first region having a first coefficient of friction and a second region having a second coefficient of friction; and where the second coefficient of friction is greater than the first coefficient of friction.

[0030] In another aspect, the outer member includes an outsole.

[0031] In another aspect, the outer member includes a midsole and an outsole.

[0032] In another aspect, the outer member includes an intermediate layer, a midsole and an outsole.

[0033] In another aspect, the second region replaces an adhesive.

[0034] In another aspect, the present invention provides an article of footwear comprising: an outsole and an insert; the outsole being configured to contact the ground; an insert including an outer layer configured to contact the outsole, and an inner layer configured to contact the outsole; where the outer layer includes a first region having a first roughness and a second region having a second roughness; and where the second roughness is greater than the first roughness.

[0035] In another aspect, the outer member includes an outsole.

[0036] In another aspect, the outer member includes a midsole and an outsole.

[0037] In another aspect, the outer member includes an intermediate layer, a midsole and an outsole.

[0038] In another aspect, the second region replaces an adhesive.

[0039] Other systems, methods, features and advantages of the invention will be, or will become apparent to one with skill in the art upon examination of the following figures and detailed description. It is intended that all such additional systems, methods, features and advantages be included within this description, be within the scope of the invention, and be protected by the following claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0040] The invention can be better understood with reference to the following drawings and description. The components in the figures are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention. Moreover, in the figures, like reference numerals designate corresponding parts throughout the different views.

[0041] FIG. 1 is an exploded isometric view of a preferred embodiment of article of footwear 100;

[0042] FIG. 2 is a side cross-sectional view of a preferred embodiment of an insert;

[0043] FIG. 3 is a front cross-sectional view of a preferred embodiment of an insert prior to contact with a wearer's foot;

[0044] FIG. 4 is a front cross-sectional view of a preferred embodiment of an insert during contact with a wearer's foot;

[0045] FIG. 5 is a front cross-sectional view of a preferred embodiment of an insert after contact with a wearer's foot;

[0046] FIG. 6 is a plan view of the bottom of a preferred embodiment of an insert;

[0047] FIG. 7 is a side cross-sectional view of a preferred embodiment of an insert and an outer member;

[0048] FIG. 8 is a side cross-sectional close-up of a preferred embodiment of an insert and an outer member; and [0049] FIG. 9 is a side cross-sectional close-up of a preferred embodiment of an insert and an outer member.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0050] Generally, embodiments of the present invention include an article of footwear with an insert intended to provide cushioning and support. An insert that includes two foam layers, including a layer that substantially permanently deforms and conforms to the shape of the foot is disclosed. In particular, such deformation preferably takes place over a relatively short interval of time. Preferably, the deformation occurs during the first use of the article of footwear.

[0051] FIG. 1 is an exploded isometric view of a preferred embodiment of article of footwear 100. Article of footwear 100 preferably includes upper 102. Article of footwear 100 also preferably includes insert 104 as well as outer member 106. Insert 104 is preferably disposed between upper 102 and outer member 106. Insert 104 may be added or removed from article of footwear 100, by insertion or removal through opening 108. Opening 108 of upper 102 is also preferably configured to receive a wearer's foot. Outer member 106 is preferably configured to contact the ground during use of article of footwear 100.

[0052] Generally, outer member 106 may include any member configured to contact insert 104. In some embodiments, outer member 106 may include a midsole and an outsole. In other embodiments, outer member 106 may include just an outsole. In some embodiments, outer member 106 may optionally include intermediate layer 110. Intermediate layer 110 may be any layer disposed between outer member 106 and insert 104. In some embodiments, intermediate layer 110 may be a strobil sock.

[0053] FIG. 2 is a side cross-sectional view of a preferred embodiment of insert 104. Insert 104 preferably includes inner layer 202 and outer layer 204. Inner layer 202 preferably includes first side 206 and second side 208. Likewise, outer layer 204 preferably includes first side 210 and second side 212. Second side 208 of inner layer 202 is preferably configured to contact first side 210 of outer layer 204. Inner layer 202 and outer layer 204 are preferably attached. In some embodiments, inner layer 202 and outer layer 204 are attached by an adhesive. In other embodiments, inner layer 202 and outer layer 204 are attached by some other means.

[0054] Regarding the relative location of insert 104, outer layer 204 is preferably configured to contact outer member 106 and inner layer 202 is preferably configured to contact a wearer's foot.

[0055] Some embodiments include provisions to improve the structural integrity of insert 104. In a preferred embodiment, insert 104 includes first edge 214 and second edge 216. First edge 214 is a portion of outer layer 204 that wraps around first end 220 of inner layer 202. Likewise, second edge 216 is a portion of outer layer 204 that wraps around second end 222 of inner layer 202. Generally, the lateral and medial sides of outer layer 204 wrap around the lateral and medial edges of inner layer 202 in a manner similar to the way that first edge 214 and second edge 216 wrap around ends 220 and 222 of inner layer 202. In other words, only first side 206 of inner layer 202 may be exposed in some embodiments. In some embodiments, the top of first edge 214 and the top of second edge 216 are flush with first side

206 of inner layer 202, forming first surface 218. First surface 218 is generally the upper surface of insert 104.

[0056] In some embodiments, outer layer 204 comprises a first material and inner layer 202 comprises a second material. In some embodiments, inner layer 202 comprises a material that is substantially permanently deformable. In some embodiments, inner layer 202 comprises any material capable of taking a quick compression set. In some embodiments, inner layer 202 comprises a polyethylene foam having a specific gravity of about 0.05. In a preferred embodiment, inner layer 202 comprises a soft polyethylene foam.

[0057] In some embodiments, outer layer 204 comprises a material that is more rigid than inner layer 202. In a preferred embodiment, outer layer 204 comprises a type of polyethylene foam that is more rigid than the soft polyethylene foam that is used in some embodiments to form inner layer 202. In general, the shape of insert 104 is defined by outer layer 204, as it preferably does not change shape during use. In this way, first edge 214 and second edge 216 provide structural support to insert 104 at the forward and rearward ends of insert 104.

[0058] FIG. 3 is a schematic diagram of a front cross-sectional view of a preferred embodiment of insert 104 prior to receiving a wearer's foot 302. At this point, inner layer 202 has not been deformed, and instead has a smooth shape that is generally coincident with the shape of outer layer 204. Wearer's foot 302 includes first region 306 and second region 308. First region 306 and second region 308 represent possible contours that may be found on the bottom of a foot. First region 306 and second region 308 are only meant to represent a portion of a wearer's foot. A wearer's foot will generally include many other regions, including other contours.

[0059] In some embodiments, insert 104 includes insert liner 304 that helps to provide extra cushioning for a wearer's foot. In some embodiments, insert liner 304 may include additional properties that may be desirable for a footwear insert. Insert liner 304 may comprise a cloth material in some embodiments. Insert liner 304 includes first side 310 and second side 312. Second side 312 of insert liner 304 is disposed along first surface 218 of insert 104. First side 310 of insert liner 304 is disposed closest to wearer's foot 302.

[0060] FIG. 4 is a front cross-sectional view of a preferred embodiment of insert 104 upon receiving wearer's foot 302. Wearer's foot 302 contacts first side 206 of inner layer 202. In a preferred embodiment, inner layer 202 has both deformed and conformed to wearer's foot 302. That is, inner layer 202 has deformed to receive first region 306 and second region 308 of wearer's foot 302. Inner layer 202 has deformed less in central region 402, which fills a natural gap between first region 306 and second region 308. In this way, inner layer 202 has molded to wearer's foot 302. Outer layer 204 has generally deformed less than inner layer 202, in some cases, much less or not at all, when compared to inner layer 202. Preferably, inner layer 202 has deformed and conformed to other regions of a wearer's foot, which are located in a direction perpendicular to this cross-sectional view.

[0061] FIG. 5 is a front cross-sectional view of a preferred embodiment of insert 104, once wearer's foot 302 has been removed, being worn for enough time to permanently

deform inner layer 202. Note that inner layer 202 of insert 104 is substantially permanently deformed.

[0062] In some embodiments, inner layer 202 has been substantially permanently deformed after the insert has been used for the first time. In some embodiments, inner layer 202 has been substantially permanently deformed after one to several hours, for example, one to three hours. In some embodiments, inner layer 202 can be substantially permanently deformed after about two hours of continuous or combined intermittent use. After inner layer 202 has been deformed, inner layer 202 includes first deformed region 502, corresponding to first region 306 of wearer's foot 302. Inner layer 202 also includes second deformed region 504, corresponding to second region 308 of wearer's foot 308.

[0063] Preferably, the contours of first side 206 disposed along first deformed region 502 are substantially similar to the contours of region 306 of wearer's foot 302. Likewise, it is preferable that the contours of first side 206 disposed along second deformed region 504 are substantially similar to the contours of region 308 of wearer's foot 302. Outer layer 204 has preferably kept its original shape, maintaining the overall shape of insert 104.

[0064] Inner layer 202 is configured to remain permanently substantially deformed for the remainder of the period during which insert 104 is used with article of footwear 100. Because of this, the wearer now has a custom fit insert that is substantially permanently contoured to the shape of their foot. As previously mentioned, this contouring provides comfort and additional support to the wearer's foot during use of article of footwear 100. Generally, insert 104 will retain this custom fit shape in the future. For example, referring to the embodiment shown in the figures, first deformed region 502 and second deformed region 504 will generally retain their shape and will generally not further deform by any substantial amount during future use of insert 104 provided the same person wears article of footwear 100. Instead, first inner layer 104 will set, so that first side 206 of inner layer 202 provides support to wearer's foot 302 along first deformed region 502 and second deformed region 504.

[0065] Typically, a removable insert is designed to be inserted directly into an article of footwear after the article of footwear has been assembled. In order to reduce the tendency of the insert to slip during use of the article of footwear, some fastening mechanism may be provided to increase friction between the insert and the outer member. By using an insert that includes roughened regions in simultaneous use with an outer member that includes a deforming foam, the insert may adhere to the outsole member in a manner that reduces movement of the insert within the upper. This friction mechanism eliminates the need for an adhesive, or other cumbersome features, that may prove time consuming or inefficient in fixing insert 104 to outer member 106.

[0066] FIG. 6 is a schematic diagram of a preferred embodiment of bottom surface 602 of insert 104. Bottom surface 602 is an embodiment of second side 212 of outer layer 204. Bottom surface 602 preferably includes a portion that increases friction between bottom surface 602 and outer member 106. Bottom surface 602 of insert 104 preferably includes a first region 610 and a second region 611. Second region 611 includes a first roughened region 604 and second roughened region 606. First roughened region 604 and second roughened region 606 preferably include surface

features. In some embodiments, these surface features may increase friction between outer layer **204** and outer member **106**.

[0067] In some embodiments, first region **610** has a first coefficient of friction, and second region **611**, including first roughened region **604** and second roughened region **606**, has a second coefficient of friction. In a preferred embodiment, the second coefficient of friction of second region **611** is greater than the first coefficient of friction of first region **610**.

[0068] FIG. 7 is a side cross-sectional view of a preferred embodiment of insert **104** and outer member **106**, just before insert **104** has been moved to contact outer member **106**. From this cross-sectional view, it can be seen that first roughened region **604** and second roughened region **606** extend slightly from bottom surface **602** of insert **104**. The extension of these regions is not necessarily to scale in FIG. 7 or in the following figures, but is shown schematically exaggerated for clarity.

[0069] FIG. 8 is a close up cross-sectional view of a preferred embodiment of insert **104**, including first roughened region **604**, before it has contacted outer member **106**. In some embodiments, first roughened region **604** includes extended portions **802**, which extend from bottom surface **602** of insert **104**. In some embodiments, outer member **106** includes optional intermediate layer **110**. Intermediate layer **110** of outer member **106** is seen to be smooth, relative to first roughened region **604**.

[0070] In some embodiments, first roughened region **604** comprises the same material as outer layer **204** of insert **104**. That is, first roughened region **604** may comprise a rigid polyethylene foam. In a preferred embodiment, the shape of extended portions **802** may be diamond-like. In some embodiments, intermediate layer **110** or outer member **106** may be comprised of ethyl vinyl acetate. Intermediate layer **110** and outer member **106** are preferably constructed of a softer foam than the foam of first roughened region **604**.

[0071] FIG. 9 is a close up cross-sectional view of a preferred embodiment of insert **104**, including first roughened region **604**, during contact with outer member **106**. Here, intermediate layer **110** and outer member **106** have deformed via contact with multiple extended portions **802**. The deformation of outer member **106** in this region creates dented region **902**, which prevents first roughened region **604**, and thus insert **104**, from slipping.

[0072] Although FIGS. 8 and 9 refer to first roughened region **604**, preferably second roughened region **606** is configured to associate with outer member **106** in a similar fashion. That is, second roughened region **606** also preferably includes extended portions that cause intermediate layer **110** of outer member **106** to deform, creating a grooved fit that helps prevent insert **104** from slipping with respect to outer member **106**.

[0073] Additionally, other roughened regions may also be provided on insert **104**. These additional roughened regions may provide extra friction between insert **104** and outer member **106**. By using principles of the present invention, it is possible to provide an article of footwear with a unique custom tailored fit that can reduce in shoe movement of the wearer's foot, and at the same time, does not constrict or pinch the foot and cause pain or impair circulation.

[0074] While various embodiments of the invention have been described, the description is intended to be exemplary, rather than limiting and it will be apparent to those of ordinary skill in the art that many more embodiments and

implementations are possible that are within the scope of the invention. Accordingly, the invention is not to be restricted except in light of the attached claims and their equivalents. Also, various modifications and changes may be made within the scope of the attached claims.

What is claimed is:

1. An article of footwear comprising:
 - an outsole and an insert;
 - an outer member being configured to contact the ground;
 - an insert including an outer layer configured to contact the outer member, and an inner layer configured to contact the wearer's foot; and
 - wherein the inner layer is substantially permanently deformable.
2. The article of footwear according to claim 1, wherein the outer member includes an outsole.
3. The article of footwear according to claim 1, wherein the outer member includes a midsole and an outsole.
4. The article of footwear according to claim 1, wherein the outer member includes an intermediate layer, a midsole and an outsole.
5. The article of footwear according to claim 1, wherein the inner layer substantially permanently deforms after being worn for the first time.
6. The article of footwear according to claim 1, wherein the inner layer substantially permanently deforms after being worn for about one to three hours.
7. An article of footwear comprising:
 - an outer member and an insert;
 - the outer member being configured to contact the ground;
 - an insert including an outer layer configured to contact the outer member, and an inner layer; and
 - wherein the inner layer is made of any material capable of taking a quick compression set.
8. The article of footwear according to claim 7, wherein the outer member includes an outsole.
9. The article of footwear according to claim 7, wherein the outer member includes a midsole and an outsole.
10. The article of footwear according to claim 7, wherein the outer member includes an intermediate layer, a midsole and an outsole.
11. The article of footwear according to claim 7, wherein the inner layer is made of polyethylene foam having a specific gravity of about 0.05.
12. The article of footwear according to claim 7, wherein the inner layer is made of a soft polyethylene foam, being a blend of ethyl vinyl acetate and rubber.
13. The article of footwear according to claim 10, wherein the intermediate layer comprises ethyl vinyl acetate.
14. The article of footwear according to claim 7, wherein the outer layer comprises a polyethylene foam.
15. An article of footwear comprising:
 - an outer member and an insert;
 - the outer member being configured to contact the ground;
 - an insert including an outer layer configured to contact the outsole, and an inner layer configured to contact the outer layer;
 - wherein the outer layer includes at least one surface feature disposed on the outer layer; and
 - wherein the surface feature increases friction between the outer member and the outer layer.
16. The article of footwear according to claim 15, wherein the outer member includes an outsole.

17. The article of footwear according to claim 15, wherein the outer member includes a midsole and an outsole.

18. The article of footwear according to claim 15, wherein the outer member includes an intermediate layer, a midsole and an outsole.

19. The article of footwear according to claim 15, wherein the surface feature comprises diamond-shaped extensions.

20. An article of footwear comprising:

an outsole and an insert;

the outsole being configured to contact the ground;

an insert including an outer layer configured to contact the outsole, and an inner layer configured to contact the outsole;

wherein the outer layer includes a first region having a first coefficient of friction and a second region having a second coefficient of friction; and

wherein the second coefficient of friction is greater than the first coefficient of friction.

21. The article of footwear according to claim 20, wherein the outer member includes an outsole.

22. The article of footwear according to claim 20, wherein the outer member includes a midsole and an outsole.

23. The article of footwear according to claim 20, wherein the outer member includes an intermediate layer, a midsole and an outsole.

24. The article of footwear according to claim 20, wherein the second region replaces an adhesive.

25. An article of footwear comprising:

an outsole and an insert;

the outsole being configured to contact the ground;

an insert including an outer layer configured to contact the outsole, and an inner layer configured to contact the outsole;

wherein the outer layer includes a first region having a first roughness and a second region having a second roughness; and

wherein the second roughness is greater than the first roughness.

26. The article of footwear according to claim 25, wherein the outer member includes an outsole.

27. The article of footwear according to claim 25, wherein the outer member includes a midsole and an outsole.

28. The article of footwear according to claim 25, wherein the outer member includes an intermediate layer, a midsole and an outsole.

29. The article of footwear according to claim 25, wherein the second region replaces an adhesive.

* * * * *