

## WELLNESS SHOE AND METHOD

### CROSS-REFERENCE TO RELATED APPLICATION(S)

- [0001] This application claims priority to U.S. Provisional Patent Application No. 61/217,708, filed on June 2, 2009, entitled "WELLNESS SHOE," the disclosure of which is hereby incorporated herein by reference in its entirety.

### BACKGROUND OF THE INVENTION

- [0002] The present invention generally relates to a shoe that assists a user through a gait cycle, and more specifically, assists a user to maintain even foot pressure and proper alignment through the gait cycle.

### SUMMARY OF THE PRESENT INVENTION

- [0003] One aspect of the present invention includes an article of footwear having a shoe body including an upper operably connected with an outsole. The shoe body has a front portion and a back portion. An insole is disposed inside the shoe upper and has a substantially inelastic heel portion and a substantially elastic toe portion. A substantially rigid pressure plate is adjacent to the substantially elastic toe portion.
- [0004] Another aspect of the present invention includes an insert for an article of footwear having an insole including a substantially inelastic heel portion and a substantially elastic toe portion. An elastic absorption pad is disposed below the inelastic heel portion. A substantially rigid pressure plate is adjacent to the substantially elastic toe portion.
- [0005] Yet another aspect of the present invention includes a method of modifying the gait of an individual, including providing a shoe having an upper operably coupled with an outsole. An insole is inserted into the shoe. A substantially elastic toe portion is formed on the insole. A substantially inelastic heel portion is formed on the insole that is elevated above the substantially elastic toe portion. An elastic absorption pad is connected below the substantially inelastic heel portion. The shoe is placed on the foot of a user, thereby promoting a natural gait cycle during walking.
- [0006] These and other aspects, objects, and features of the present invention will be understood and appreciated by those skilled in the art upon studying the following specification, claims, and appended drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

- [0007] FIG. 1A is a side elevational view of one embodiment of a shoe of the present invention;
- [0008] FIG. 1B is a bottom plan view of the shoe of FIG. 1A;
- [0009] FIG. 2 is a side cross-sectional view taken at line II-II of FIG. 1B;

- [0010] FIG. 3A is a right side elevational view of one embodiment of an insole of the present invention;
- [0011] FIG. 3B is a bottom plan view of the insole of FIG. 3A;
- [0012] FIG. 3C is a left side elevational view of the insole of FIG. 3A;
- [0013] FIG. 3D is a top plan view of the insole of FIG. 3A;
- [0014] FIG. 4 is a side elevational cross-sectional view taken at line IV-IV of FIG. 1B;
- [0015] FIG. 5A is a side elevational cross-sectional view of the shoe of FIG. 1A at contact phase at the beginning of a gait cycle;
- [0016] FIG. 5B is a side elevational cross-sectional view of the shoe of FIG. 1A in mid-stance during the gait cycle;
- [0017] FIG. 5C is a side elevational cross-sectional view of the shoe of FIG. 1A at toe-off at the end of the gait cycle;
- [0018] FIG. 6A is a side elevational view of one embodiment of a near side shoe of the present invention at contact phase;
- [0019] FIG. 6B is a side elevational view of one embodiment of a near side shoe of the present invention at mid-stance phase; and
- [0020] FIG. 6C is a side elevational view of one embodiment of a near side shoe of the present invention at toe-off phase.

#### **DETAILED DESCRIPTION OF EMBODIMENTS**

- [0021] For purposes of description herein, the terms “upper,” “lower,” “right,” “left,” “rear,” “front,” “vertical,” “horizontal,” and derivatives thereof shall relate to the invention as oriented in FIG.1. However, it is to be understood that the invention may assume various alternative orientations, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification are simply exemplary embodiments of the inventive concepts defined in the appended claims. Hence, specific dimensions and other physical characteristics relating to the embodiments disclosed herein are not to be considered as limiting, unless the claims expressly state otherwise.
- [0022] Referring to FIG. 1, the reference numeral 10 generally designates a footwear system including a shoe 11 having an upper 12 operably connected with an outsole 14. The shoe 11 has a front portion 16 and a back portion 18. An insole 20 is disposed inside the shoe 11 and has a substantially inelastic heel portion 22 and a substantially elastic toe portion 24. A substantially rigid pressure plate 26 is adjacent to the substantially elastic toe portion 24.

- [0023] Referring again to FIGS. 1A and 1B, the shoe upper 12 of the shoe 11 is designed to generally conform to the foot of a user. It is contemplated that any of a variety of styles and designs may be used on the upper to provide an aesthetic appearance to the shoe 11. The substantially rigid pressure plate 26 or pressure displacement rotation plate, as it is also called, is positioned in a forward portion of the shoe 11 proximate an elastic toe portion 24, as will be described in further detail below. The substantially inelastic heel portion in conjunction with the substantially elastic toe portion 24 forms the insole 20, such that the insole 20 has metatarsal acceleration compression qualities. The juncture of the substantially inelastic heel portion 22 and the substantially elastic toe portion 24 defines a lever that assists the wearer in walking with a more natural gait than is typical in traditional footwear. This construction of the insole 20 provides a natural shoe-less type gait to the shoe wearer that causes the knee to bend quickly while the center of gravity of body mass of the shoe wearer transitions over the shoe 11.
- [0024] Referring again to FIGS. 1A and 1B, the shoe 11 is generally designed to support the weight of the shoe wearer and assist in repositioning the body of the shoe wearer into an angle that promotes a natural gait cycle, which consequently engages the muscular system of a user and reduces the pressure on the skeletal system.
- [0025] Referring again to FIGS. 1A and 1B, the shoe upper 12 includes side portions 40 that come together at the back portion 18 and that operably couple with the front portion 16. A top portion 44 is integrally formed with a tongue 46. The side portions 40, back 42, top portion 44, and the tongue 46 keep the shoe 11 on the foot of a wearer. A transition portion 50 between the shoe upper 12 and the outsole 14 connects the outsole 14 with the shoe upper 12 and provides an aesthetic transition between the shoe upper 12 and the outsole 14. The outsole 14 includes a base 52 that is made from a non-slip material, such as rubber, which interfaces with the ground when the shoe 11 is in use. The substantially rigid pressure plate 26 is located between the outsole 14 and the substantially elastic toe portion 24.
- [0026] The shoe 11 of the footwear system 10 of the present invention is specifically designed to reduce pressure on the forefoot and limit the strain on toes by promoting the natural motion of a foot through toe-off. The shoe 11 also modifies and improves the gait of the wearer, such that the wearer puts less strain on the skeletal system. The footwear system 10 enables the wearer to engage more of the human muscular system than provided by traditional footwear. More specifically, the footwear system 10 controls more movement and absorbs less impact during walking. The pressure displacement rotation

plate 26 and metatarsal acceleration compression insole 20 may be integrally or separately formed. In either instance, the pressure displacement rotation plate 26 and metatarsal acceleration compression insole 20 work together to provide support through the foot arch, absorb shock, and ease rotation of the foot through toe-off.

[0027] Referring now to FIGS. 1B and 2, the insole 20 has a perimeter smaller than that of the outsole 14 and is disposed above and generally inside the perimeter of the outsole 14. The interface of the insole 20 to the outsole 14 is illustrated in FIG. 2, which illustrates that the insole 20 rests over the rigid pressure plate 26, which is supported by the outsole 14. The rigid pressure plate 26 may be exposed through an underside of the outsole 14, as shown in FIG. 2, or may be covered to prevent damage to the rigid pressure plate 26 and to keep the rigid pressure plate 26 clean. A midsole (not shown) may be disposed anywhere between the insole and the outsole to add further comfort to the shoe generally.

[0028] Referring again to FIGS. 1B and 2, the rigid pressure plate 26, or pressure displacement rotation plate, begins no less than 40 percent forward from a distal heel end 60 of the shoe 11 and could extend rearward under the entire surface of the substantially inelastic heel portion 22. The rigid pressure plate 26 extends forward, stopping no less than 15 percent rearward from a distal toe end 62 of the shoe 11. In one embodiment, it is contemplated that the rigid pressure plate 26 extends all the way to the distal toe end 62 of the shoe 11. The rigid pressure plate 26 may be integrated into the insole 20, or separate from the insole 20. However, the rigid pressure plate 26 is generally located between the outsole 14 and the substantially elastic toe portion 24 of the insole 20. The rigid pressure plate 26 may be constructed of a variety of materials, including carbon fiber or other composite material, such as fiberglass, steel, or injection plastics, such as nylons or TPUs, either with or without additional glass fiber reinforcement.

[0029] Referring now to FIGS. 3A-3D, the insole 20 supports the foot of the wearer from an initial contact phase through a mid-stance phase of a gait cycle through use of a multi-density foam. The inelastic heel portion 22 extends at least 20 percent and no more than 60 percent forward from the distal heel end 60. The inelastic heel portion 22 is made of a foam with a density ranging from 35 degrees Shore C and up. It is contemplated that materials, such as PORON®, polyurethane, EVA, or other foam-based materials may be used. The elastic toe portion 24 is forward of the inelastic heel portion 22, and extends no more than 80 percent rearward from the distal toe end 62 of the shoe 11. The elastic toe portion 24 is formed from a less dense foam having a density of at least eight degrees Shore C less than the substantially inelastic heel portion 22. Materials, such as PORON®,

polyurethane, EVA, or other foam-based materials are contemplated for use in the substantially elastic toe portion 24. Because the foam density decreases from the substantially inelastic heel portion 22 to the substantially elastic toe portion 24, during the gait cycle, heads of the metatarsals in the wearer's foot sink into the substantially elastic toe portion 24 at a forefoot drop zone 66 when the foot moves from a contact phase 68 to a mid-stance phase 70 (FIG. 5B) of the gait cycle. When the heads of the metatarsals of the foot of a user sink in this manner, the walking muscles of the user are activated and prepare the foot to rotate forward into a toe-off phase 72, as will be discussed in greater detail below with respect to FIGS. 5A-5C.

[0030] Referring now to FIG. 2 and 3D, the insole 20 includes a dual material top cover 80 or moderating layer. The dual material top cover 80 allows for control of the direction of impact absorption during a gait cycle and movement of the foot in relation to the surface of the insole 20. More specifically, the dual material top cover 80 assists in transferring downward forces from the substantially inelastic heel portion 22 to the substantially elastic toe portion 24. As illustrated, an elastic absorption pad 86 is disposed below the outsole 14 and wraps up the distal heel portion of the shoe 11. The dual material top cover 80 includes an inelastic top cover 82 and an elastic top cover 84. Additionally, it is also contemplated that a thin layer 90 of soft foam may extend over the entire insole 20 covering both the substantially inelastic heel portion 22 and substantially elastic toe portion 24. The thin foam layer 90 is disposed below the dual material top cover 80 and helps transition the foot of a wearer from the substantially inelastic heel portion 22 to the substantially elastic toe portion 24. The thin foam layer 90 may be of any thickness, and in one embodiment, is 3 mm thick.

[0031] Referring to FIG. 4, the rigid pressure plate 26 has a convex lateral cross-section that projects downward from a plantar surface of the insole 20 no less than two millimeters and up to 20 millimeters. The degree of toe spring is affected by the amount and degree the rigid pressure plate 26 protrudes downward from the plantar surface of the insole 20. It is anticipated that the toe spring will range in degree from 15 degrees to 40 degrees.

[0032] Referring to FIGS. 5A-5C, during use, when impact forces are applied to the substantially inelastic heel portion 22 during a contact phase 68 (FIG. 5A) of the gait cycle, the inelastic top cover 82 of the inelastic heel portion 22 forces the elastic absorption pad 86 to compress upward from the plantar surface. Consequently, impact forces are absorbed from the plantar or bottom surface. This construction stabilizes the calcaneus and prevents the heel of a user from sinking into the heel portion of the insole

20. While the insole 20 compresses at the plantar surface at the substantially inelastic heel portion 22, the opposite effect is achieved in the substantially elastic toe portion 24. Specifically, the substantially elastic toe portion 24 allows for an elastic two or four-way stretch material to compress. During the gait cycle, the elastic top cover 84 adjacent the substantially elastic toe portion 24 allows for impact forces to be absorbed from the dorsal or top surface downward through the insole 20. Consequently, pressure is reduced on sensitive areas of the foot, including the metatarsals. The substantially elastic toe portion 24 and the elastic top cover 84 flex as the wearer roles from the substantially inelastic heel portion 22 to the substantially elastic toe portion 24 from the mid-stance phase 70 (FIG. 5B) through the toe-off phase 72 (FIG. 5C) of the gait cycle. Accordingly, there is an increased acceleration of the substantially elastic toe portion 24 into the forefoot drop zone 66 compared to the drop rate of the calcaneus, at which point the foot will plantar shift in a smooth and comfortable manner.

[0033] Referring now to FIGS. 6A-6C, the shoe 11 of the present invention, and specifically the insole 20 disposed in the shoe 11, work to reposition the body's angle into a natural gait cycle to promote further engagement of the muscular system. The forefoot is accelerated downward into the soft and easily compressible substantially elastic toe portion 24 area, which causes the body to decelerate. The rigid pressure plate 26 and the substantially inelastic heel portion 22 then cause the knee to bend quickly, while the body mass transitions over the center of gravity. This transition engages the muscular system, allowing it to absorb any additional forces that are incurred while walking. Consequently, the amount of effort to walk is increased as a result of increased core muscle activity, but greatly reduces the impact of the skeletal system and joints. The convex design of the rigid pressure plate 26 allows the forefoot pressure to spread across the entire surface of the rigid pressure plate 26, thereby translating impact forces over the entire surface of the rigid pressure plate 26 and improving the natural gait cycle. This construction gives cushioning and support under the foot, while assisting the body to move naturally, as if the user was not wearing shoes at all. Consequently, the rigid pressure plate 26 works in combination with the insole 20 to assist the foot in rotating properly through toe-off to achieve a proper gait cycle. Consequently, pressure is redistributed and muscle use has increased.

[0034] It is to be understood that variations and modifications can be made on the aforementioned structure without departing from the concepts of the present invention, and further it is to be understood that such concepts are intended to be covered by the following claims unless these claims by their language expressly state otherwise.

## CLAIMS

What is claimed is:

1. An article of footwear comprising:  
a shoe body including an upper operably connected with an outsole, the shoe body including a front portion and a back portion;  
an insole disposed inside the shoe upper and having a substantially inelastic heel portion and a substantially elastic toe portion; and  
a substantially rigid pressure plate adjacent the substantially elastic toe portion.
2. The article of footwear of claim 1, further comprising:  
an elastic absorption pad disposed between the inelastic heel portion and the outsole.
3. The article of footwear of claim 1, further comprising:  
a midsole disposed between the insole and the outsole.
4. The article of footwear of claim 1, wherein the thickness of the substantially inelastic heel is approximately twice that of the substantially elastic toe portion.
5. The article of footwear of claim 1, wherein the pressure plate includes a convex portion substantially aligned with the metatarsals of a user.
6. The article of footwear of claim 1, further comprising:  
a moderating layer disposed over the insole.
7. The article of footwear of claim 6, wherein the moderating layer includes a rear portion constructed from a substantially inelastic material and a forward portion constructed of a substantially elastic material.
8. The article of footwear of claim 1, further comprising:

a lever defined between the substantially inelastic heel portion and the substantially elastic toe portion that translates downward energy from the back portion forward to the front portion.

9. An insert for an article of footwear comprising:  
an insole having a substantially inelastic heel portion and a substantially elastic toe portion;  
an elastic absorption pad disposed below the inelastic heel portion; and  
a substantially rigid pressure plate adjacent to the substantially elastic toe portion.
10. The insert of claim 9, further comprising:  
a midsole disposed between the insole and the outsole.
11. The insert of claim 9, wherein the thickness of the substantially inelastic heel is approximately twice that of the substantially elastic toe portion.
12. The insert of claim 9, wherein the substantially rigid pressure plate includes a convex portion substantially aligned with the metatarsals of a user.
13. The insert of claim 9, further comprising:  
a moderating layer disposed over the insole.
14. The insert of claim 14, wherein the moderating layer includes a rear portion constructed from a substantially inelastic material and a forward portion constructed of a substantially elastic material.
15. The insert of claim 9, further comprising:  
a lever defined between the substantially inelastic heel portion and the substantially elastic toe portion that translates downward energy from the back portion forward to the front portion.
16. A method of modifying the gait of an individual, the method comprising:  
providing a shoe having an upper operably coupled with an outsole;  
inserting an insole into the shoe;

forming a substantially elastic toe portion on the insole;  
forming a substantially inelastic heel portion on the insole that is elevated above the substantially elastic toe portion;  
connecting an elastic absorption pad below the substantially inelastic heel portion;  
placing the shoe on the foot of a user, thereby promoting a natural gait cycle during walking.

17. The method of claim 16, further comprising:

providing a substantially rigid pressure plate adjacent the substantially elastic toe portion of the insole.

18. The method of claim 17, wherein the step of providing a substantially rigid pressure plate further comprises:

integrally forming the insole with the substantially rigid pressure plate

19. The method of claim 16, further comprising:

positioning a dual material top cover over the insole.

20. The method of claim 16, further comprising:

positioning a midsole between the insole and the outsole.