FOOTWEAR SOLE STRUCTURE

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ABSTRACT

A shoe structure for athletic use includes an upper adapted and constructed to at least partially cover an upper surface of the foot of a wearer of the shoe. A sole element is secured to the upper, and is fabricated from a relatively flexible and cushioned material. A plurality of multi-island platforms are secured to the sole element. The multi-island platforms have varying degrees of stiffness. Stiffer multi-island platforms are located in areas of the foot requiring stiffness to enhance footwear performance, and more flexible multi-island platforms are located in areas of the foot requiring flexibility to enhance footwear performance.
FOOTWEAR SOLE STRUCTURE
CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] None.

BACKGROUND OF THE INVENTION

[0002] The development of footwear-related technology is a relatively recent phenomenon. With rare exceptions, until the middle of the 19th century, shoes were made on a single straight last and there was no differentiation between left and right shoes. As footraces and other sports began to grow in popularity during the Industrial revolution, the concept of specialized footwear for athletic activities began. In 1832, Wait Webster patented a process whereby rubber soles could be attached to the shoes and boots. A croquet shoe marketed in the 1860's had a rubber sole with a canvas upper fastened with laces. The bicycle boom of the 1860's and 70's sparked the introduction of heel less shoes for cyclists.

[0003] Spiked shoes for running were developed in 1852. By 1894 the Spalding Catalogue featured three grades of spiked shoes made from lightweight kangaroo leather. Joseph William Foster founded the first sports shoe company in Boulton (United Kingdom) in the 1890's, a company that would in 1958 become Reebok. The Boulton based company made shoes for Lord Burgess in the 1924 Olympics.

[0004] In 1907 one company began stitching a leather strip round the top of the shoe to form a collar to reduce stretching. This was the beginning of the use of ornamental appliqués which now form standard design for modern sports shoes.

[0005] The first popular sneaker introduced in the United States was in 1917, under the name of Keds. Also in 1917, a higher boot for basketball was introduced by Converse and the shoe was known as the Converse All Stars. In 1923, the signature of basketball star and Converse employee Chuck Taylor appeared on the ankle patch, and “Chuck Taylor All Stars” became one of the most ubiquitous shoes for several decades.

[0006] The father of the modern running shoe was Adolf Dassler who began making shoes in 1920. By 1936 his shoes were internationally acclaimed as the best and were worn by athletes of the calibre of Jesse Owens. Dassler specialized in shoes designed for sport. After WWII, Dassler developed a training shoe made from surplus tent canvas and rubber from fuel tanks. In 1948 he founded Adidas but the company was soon to split into Adidas (later known as Adidas) and Puma. To give support to the running shoe Dassler added three side strips to the shoe which first appeared in 1949.

[0007] Throughout this post war period the demand for leisure footwear grew. The fitness craze of the 30's meant sneakers became associated with sports and leisure activities. In 1936 the U.S. basketball team adopted the Converse Chucks as the official shoe. In the same year Dassler's running shoes were worn at the Berlin Olympics. By the 1950's famous runners were supplied shoes.

[0008] As with spiked running shoes, footwear has been developed to enhance the performance of athletes in a variety of sports. For example, in the early days of football, shoes were provided with leather cleats. If inclement weather was expected, the equipment manager would take the team's cleats to a cobbler to have metal "mud cleats" installed. In the 1920's, John Riddell invented a removable cleat. With few variations, Riddell's cleats were standard footwear for football players until the late 20th Century. Since that time, football cleats are typically molded with the sole of the shoe in different patterns.

[0009] Athletic footwear has been the subject of a high degree of inventive activity, and is represented in the patent literature. For example, U.S. Pat. No. 7,219,449 to Hoffberg discloses a method for controlling footwear, comprising cushioning a transient force during use of the footwear at a first period of a gait cycle, storing energy from said cushioning, and releasing the stored energy during use of the footwear at a second period of the gait cycle, and after said transient force has subsided. The control can be electronic, mechanical or hydraulic, and is preferably dependent on a sensed gait cycle phase. The control may be adaptive to the user or the use of the footwear. The stored energy can be used to assist in locomotion, to generate electrical energy, to drive a heat pump, or simply dissipated.

[0010] U.S. Pat. No. 6,701,643 to Greer discloses a footwear structure including an upper and a separate midsole having interlocking shank portions. The upper has an upward extending arc in the shank area which defines a shank interlock portion therein. The midsole has a corresponding arc which defines a shank interlock portion on a bottom surface thereof which mates with the arc in the upper for resisting motion of the midsole relative to the outsole in the case where the midsole is unsecured within the structure to allow for removal of the midsole. The structure may include an outsole having a shank interlock area that mates with the shank interlock of the midsole, with or without an upper disposed between the midsole and the outsole. The shank interlock areas may include a continuous arc or all abruptly changing arc, and the midsole may be removable or non-removable from the structure. A rigid shank insert may be provided between the midsole and outsole, and the midsole may include a variety of layers. The upper may include stretch zones and non-stretch zones to allow a single upper to be used with differently sized midsoles.

[0011] U.S. Pat. No. 6,205,683 to Clark, showing a combination insole board includes a shock diffusion plate for diffusing the shock of a heel strike and for providing torsional stiffness in the heel and midfoot areas and includes a flexible material in the forepart of the insole board. The semi-rigid shock diffusion shock diffusion plate is engineered with a contour which loosely correlates to the foot morphology. At least two alternative shoe construction methodologies may be used for incorporating a combination insole board into a shoe according to the present invention. In a first embodiment, the shock diffusion plate is attached to the flexible forepart to form the combination insole board. In this embodiment, the combination insole board is tacked to a shoeemaker’s last either mechanically or adhesively, an upper having a sufficient lasting margin extending beyond the feather edge is pulled over the last and the lasting margin is attached to the combination insole board with a suitable adhesive. In a second embodiment, an upper having a lasting margin only in the heel and midfoot areas is Strobel stitched to the flexible material along the feather edge, the shock diffusion plate is adhered to the last, the last is inserted into the upper, and the lasting margin is attached to the shock diffusion plate with adhesive. After attaching the upper to the insole board, a midsole and outsole are added, and an orthotic which conforms anatomically to the shape of the bottom of the foot and which is preferably more closely contoured to the morphol-
ogy of the foot than the shock diffusion plate may be added. A shoe made according to either of these methods disperses the force of a heel strike to significantly reduce cumulative underfoot pressures.

[0012] U.S. Pat. No. 6,065,230 to James teaches a shoe having improved sole component composed of a closed cell foam mid-sole which is adhered to at least a portion of the shoe’s upper component. The mid-sole component has multiple thickened zones which are separated by multiple flex grooves between the zones. The thickened zones are provided in a forefoot and rear foot portions and underlie only the high impact regions of a wearer’s foot during a wearer’s gait cycle. An outer sole is attached to the outer bottom surface of the thickened zones of the mid-sole with the thickened zones being between the out sole and a portion of the upper component.

[0013] U.S. Pat. No. 6,119,373 Gebhard is directed to an athletic shoe including a upper, a support member or “chassis” attached to the underside of the upper, and sole elements attached to the bottom of the support member. The support member provides support for the foot, and thereby permits use of spaced apart sole elements rather than a full midsole and a full outsole. In addition, the support member can be tailored to provide the optimum stiffness for a particular activity or user.

[0014] U.S. Pat. No. 7,191,550 to Back discusses a skateboard shoe having a sole with four sole pads; each sole pad having differing durometer values: a lateral pad and a toe pad comprised of a low durometer value (Shore A) material, a medial pad comprised of a moderate durometer value (Shore A) material, and a heel pad comprised of a hard durometer value (Shore A) material.

[0015] U.S. Pat. No. 6,076,283 to Boie deals with an outsole having excellent gripping and traction properties on wet surfaces. These properties are achieved by equipping the bottom surface of the outsole with a combination of gripping regions having different gripping characteristics. The gripping regions include (a) regions of siping, oriented in different directions to provide multidirectional traction, and (b) regions of stippling (spaced protuberances).

[0016] Although the shoe structure described in these patents provide certain advantages, they present certain deficiencies as well. For example, known shoe structures provide very limited, if any, flexibility to allow desirable foot flexion. Further, many known shoe structures are relatively complicated and expensive to manufacture, and cannot be customized to meet the demands of specific positions within a sport. It can thus be seen that the need exists for a simple, flexible, and easily manufactured athletic shoe structure.

SUMMARY OF THE INVENTION

[0017] A shoe structure for athletic use includes an upper adapted and constructed to at least partially cover an upper surface of the foot of a wearer of the shoe. A sole element is secured to the upper, and is fabricated from a relatively flexible and cushioned material. A plurality of multi-island platforms are provided on the sole element. The multi-island platforms have varying degrees of stiffness. Stiffer multi-island platforms are located in areas of the foot requiring stiffness to enhance footwear performance, and more flexible multi-island platforms are located in areas of the foot requiring flexibility to enhance footwear performance.

BRIEF DESCRIPTION OF THE INVENTION

[0018] Embodiments of the invention are illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

[0019] FIG. 1 illustrates a perspective view of a shoe structure in accordance with the principles of the present invention.

[0020] FIG. 2 illustrates an exploded schematic side view of sole structure.

[0021] FIG. 3 illustrates a detailed view of an embodiment of multi-island platform.

[0022] FIG. 4 illustrates a detailed view of another embodiment of a multi-island platform.

[0023] FIG. 5 illustrates a bottom plan view of an embodiment of a shoe structure.

[0024] FIG. 6 illustrates a bottom plan view of another embodiment of a shoe structure.

DETAILED DESCRIPTION OF THE INVENTION

[0025] In the following description, specific details are set forth in order to provide a thorough understanding of the invention. However, it will be apparent that the invention may be practiced without these specific details. Without departing from the generality of the invention disclosed herein and without limiting the scope of the invention, the discussion that follows, will refer to the invention as depicted in the drawings.

[0026] The first embodiment of a shoe structure 10 in accordance with the principles of the present invention is shown in FIG. 1. The shoe structure 10 includes an upper 12 adapted and constructed to at least partially cover an upper surface of the foot of a wearer of the shoe, as is known in the art. The shoe structure 10 also includes a sole assembly 14 that contacts the sole of the wearer on one side, and the playing or walking surface on the other.

[0027] As seen in FIG. 2, the sole assembly 14 includes a form-fitting insert 16 adapted and constructed for contact with the sole of a foot of a wearer. The insert 16 can be constructed of any suitable material that conforms to the contours of the sole of the foot of a wearer. Examples of such materials include foam rubber, gel pacs, and the like. A durable casing is secured beneath the insert, and provides protection for the foot as well as an overall cross-sectional form for the shoe structure 10.

[0028] A sole element 20 is provided beneath the insert 18. The sole element 20 is fabricated from a highly flexible and cushioned material, such as air-cushioned synthetic rubber and the like.

[0029] The sole element provides maximum flexibility for the specific application, and is moderated and controlled by means of a plurality of multi-island platforms 22 provided on the sole element 20. The multi-island platforms 22 are secured to the sole element in a suitable manner. It is contemplated that the multi-island platforms 22 can be adhered to the sole element, molded with the sole element, or etched out of a laminated, multi-layered blank encompassing the sole element and multi-island platform material. The multi-island platforms 22 are fabricated to have varying widths and degrees of stiffness. Stiffer and/or wider multi-island plat-
forms 22 are located in areas of the foot requiring stiffness to enhance footwear performance, and narrower and/or more flexible multi-island platforms 22 are located in areas of the foot requiring flexibility to enhance footwear performance, as will be shown in detail.

[0030] As shown in FIGS. 3 and 4, each of the multi-island platforms 22 has a base 24 having a desired width and degree of stiffness, and a contact element 26 secured to the base. The base 24 can be fabricated from a thermoplastic polyurethane material such as TPU, in which varying the formula used for the plastic varies the stiffness of the base. Attached to the base 24 is a traction-enhancing device, shown in FIG. 3 as a cleat 26. As shown in FIG. 4, the traction device can be provided as a patterned rubber element 26' secured to a base 24'. It is contemplated that the specific properties of the traction device will be chosen to optimize performance in a specific footwear application. Such traction device 26 are known as the previously mentioned cleat 26 providing traction to over-all shoe structure. Cleats are typically strategically located in predetermined locations on the various multi-island platforms 22 in varying predetermined numbers to maximize the athletes traction with the shoe.

[0031] As shown in FIGS. 5 and 6, the shoe structure of the present invention allows customization of shoe flexibility not only for different sports, but for the requirements of different positions of tasks within a sport. For example, FIG. 5 illustrates a pattern 28 of multi-island platforms 30 specifically adapted for use by a running back in football. Placement of wider and stiffer multi-island at the periphery of the front sole and rear of the heel facilitates increased first-step traction, while large areas of exposed flexible sole element and narrower and more flexible multi-island platforms 32, 34 at the sole center permit optimal flexibility for quick cuts and changes of direction.

[0032] By contrast, the pattern 36 shown in FIG. 6 is suitable for a defensive lineman. The larger and more numerous stiff multi-island platforms 38, along with additional stiffness provided by multi-island platforms 40 and placement of multi-island platforms at the inner toe provide enhanced lateral stability and first-step quickness.

[0033] It can readily be appreciated by those skilled in the art that the present invention can be adapted for the varied demands of any specialized position in any sport, and can be adapted to footwear from track shoes to goalie skates. It is well within the capabilities of kinesiology, for example, through the use of techniques such as an F-scan, to determine which loci demand stiffness, and which demand flexibility, thus defining known sets of parameters for the desired properties of the sole of the shoe structure. The present invention allows a footwear designer to provide those attributes as needed by the application of multi-island platforms having varying width and stiffness.

[0034] While this invention has been described in connection with the best mode presently contemplated by the inventor for carrying out his invention, the preferred embodiments described and shown are for purposes of illustration only, and are not to be construed as constituting any limitations of the invention. Modifications will be obvious to those skilled in the art, and all modifications that do not depart from the spirit of the invention are intended to be included within the scope of the appended claims. Those skilled in the art will appreciate that the conception upon which this disclosure is based, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

[0035] The invention resides not in any one of these features per se, but rather in the particular combinations of some or all of them herein disclosed and claimed and it is distinguished from the prior art in these particular combinations of some or all of its structures for the functions specified.

[0036] With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the invention, including variations in size, materials, shape, form, function and manner of operation, assembly and use, and all equivalent relationships to those illustrated in the drawings and described in the specification, that would be deemed readily apparent and obvious to one skilled in the art, are intended to be encompassed by the present invention.

[0037] Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

I claim as my invention:

1. A shoe structure for athletic use comprising the following:

an upper 12 adapted and constructed to at least partially cover an upper surface of the foot of a wearer of the shoe; a sole element 17 secured to the upper, the sole element 17 being fabricated from a relatively flexible and cushioned material;

a plurality of multi-island platforms 22 on the sole element, the multi-island platforms 22 having varying degrees of width and stiffness; and

whereby wider and stiffer multi-island platforms are located in areas of the foot requiring stiffness to enhance footwear performance, and narrower and more flexible multi-island platforms are located in areas of the foot requiring flexibility to enhance footwear performance.

2. A shoe structure in accordance with claim 1, further comprising an insert assembly including the following:

a form-fitting insert 16, 18 adapted and constructed for contact with the sole of a foot of a wearer; and a durable casing 20 secured between the insert 16, 18 and the sole element 14.

3. A shoe structure in accordance with claim 1, wherein each of the multi-island platforms comprises the following:

a base 24 having a desired degree of stiffness; and a contact element 26 secured to the base 24.

4. A shoe structure in accordance with claim 3, wherein the base is fabricated from a thermoplastic material.

5. A shoe structure in accordance with claim 4, wherein the base 24 is fabricated from TPU.

6. A shoe structure in accordance with claim 3, wherein the contact element 26 comprises a traction-enhancing device 26.

7. A shoe structure in accordance with claim 6, wherein the contact element comprises a cleat.

8. A shoe structure in accordance with claim 3, wherein the contact element comprises a patterned rubber element.

9. A shoe structure in accordance with claim 1, wherein the plurality of multi-island platforms comprises at least three multi-island platforms.