REPLACEABLE HEEL SYSTEM

Inventor: Alvaro Z. Gallegos, Albuquerque, NM (US)

Correspondence Address:
LAW OFFICE OF RAY R. REGAN, P.A.
P.O. BOX 1442
CORALES, NM 87048 (US)

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ABSTRACT
The specification and drawing figures disclose, describe and claim replaceable heel system for footwear that includes a plurality of heel bodies. The heel bodies are interchangeably and demountably connectable to footwear. A rigid orthotic plate that is positionally insertable in the footwear for distributing forces longitudinally and laterally during use of the footwear. In one aspect, a compressible spring is positionable in the plurality of heel bodies to relieve pain during use of the footwear. In another embodiment opposing pressure connectable and detachable members are provided to demountably connect the heel bodies to the footwear. In an alternative aspect a flared plug and hollow receptacle are provided to demountably connect the heel bodies to the footwear.
FIG. 2A
REPLACEABLE HEEL SYSTEM
CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a continuation-in-part from a co-pending application Ser. No. 11/697,735 filed Apr. 8, 2007 entitled REPLACEABLE HEEL SYSTEM, by the sole inventor named in this document. The specification of the pending application is incorporated by reference into this document.

FIELD OF TECHNOLOGY

[0002] The apparatus and methods disclosed and claimed in this document pertain generally to footwear. More particularly, the new and useful replaceable heel systems disclosed and claimed in this document allows a footwear user to interchangeably replace heels on footwear for aesthetic, functional, pain relief and other reasons as and when desired. The replaceable heels included in the replaceable heel system disclosed, illustrated, and claimed in this document are useful for adjusting the height of footwear, while continuing to provide a range of functionalities such as pain relief during use of the footwear.

BACKGROUND

[0003] The evolution of the structure and design of shoes through the centuries has been and continues to be profound. Sandals were the most common footwear in early civilizations. Although footwear approximating a shoe began emerging in 1600 B.C., as late as 1850 A.D. most shoes were made on straight lasts (meaning that there was no difference between the right and left shoe). A “last” is the shaped block, usually made from wood, around which a shoe traditionally was designed and made. By 1892, the first rubber-soled shoes (called “plimsolls”) were manufactured in the United States. When vulcanization was discovered and patented by Charles Goodyear, rubber soled shoes became even more popular. These were followed by “sneakers” manufactured by U.S. Rubber using brand KEDS® in 1917. Beginning in 1958, an international demand arose for athletic shoes. Inventions related to footwear as a product of continuous research has progressed at an incredible pace.

[0004] For a long time, shoes were merely functional; the primary objective was to protect feet. The idea of reducing or eliminating pain by redesigning footwear was a long time coming. More recently, for many people the appearance of footwear also has become as important as function.

[0005] Studies show, however, that over 90 percent of people have different sized feet. Continual frustration has arisen due to the absence of a standard shoe size system. The problems, therefore, of fitting shoes to feet of a user often are multifactorial. Asymmetry and anatomical variation among feet provides significant challenges for people seeking to provide an ideal fit.

[0006] Until recently, however, few shoes addressed the problem of pain associated with walking, exercising, moving, or hiking, despite the fact that many people are unable to stand, move about, walk, or work in the footwear that is generally available. Shoes were not designed to provide pain relief sufficient to enable users to walk and work. Many limitations that existed in the industry in connection with providing pain relief were overcome for countless people by the present inventor, Alvaro Z. Gallegos, by providing what is referred to generally as footwear that includes at least one compressible spring suspension system, such as the coil spring disclosed and claimed in U.S. Pat. No. 5,435,079 issued on Jul. 25, 1995 to Gallegos, and in U.S. Design Pat. No. 434,548 issued Dec. 5, 2000 to Gallegos, and further protected under the internationally renown trademarks and service marks for the brand Z-COIL®.


[0008] Commercial embodiments of footwear based on the Prior Patents and Applications now contribute to relieving pain by providing in one or more embodiments, among other features disclosed and claimed in the Prior Patents and Applications, at least one spring, such as a coil spring, that provides superior support and high energy return. The spring, or coil spring (collectively, “spring”) disposed adjacent to a human heel and the heel of footwear, prevents bottoming out during compression during movement of a user. Commercial embodiments of footwear based on the Prior Patents and Applications also provide a stable and comparatively inexpensive footwear that incorporate and provides shock absorption and energy return during use of the footwear. Other commercial embodiments of footwear based on the Prior Patents and Applications also provide one or more midsoles, or plates, mounted on a rigid orthotic plate, with or without cushioning extending from the metatarsal area of a user to the rearmost portion of footwear, and extending across the width of the user’s foot, thus supporting the entire foot between the metatarsal area and the rear portion of the foot. The result is strong, comfortable, and stable support for a user’s foot.

[0009] The replaceable heel system disclosed and claimed in this document makes further contributions to the art by providing a variety of useful embodiments of replaceable heels for footwear.

[0010] Problems solved by the replaceable heel system include at least providing a user the ability to extend the life of a shoe by replacing one replaceable heel with another replaceable heel. In at least one embodiment, the replaceable heel system is provided with a rigid orthotic plate to cup or hold a human heel in place during use, thus distinguishing the replaceable heel system from other footwear in the industry. A typical foot includes twenty-six bones. Bones are fragile. There is little distance between bones. Accordingly, a foot needs considerable support from footwear not only for use and functionality, but to relieve pain during use. The best support is rigid rather than flexible. Bones of a foot exposed to considerable impact and pressure during use are best supported, therefore, by a combination of a rigid orthotic plate and associated cushioning. The result is an orthotic plate that distributes weight of the user both longitudinally and laterally that provides cushioning for a foot. Alternative currently available orthotic inserts are malleable, soft, and consequently offer little or no support.
SUMMARY

[0011] The replaceable heel system includes a plurality of substantially inelastic dimensionally different heel bodies. The dimensionally different heel bodies are demountably connectable to the footwear. Means are provided to attach and detach the plurality of heel bodies to footwear that is adapted to hold the plurality of heel bodies. A substantially rigid orthotic plate is removably insertable in or disposable on the footwear for distributing forces longitudinally and laterally during use of the footwear. A resilient pad is provided. The resilient pad is mountable on the top surface of the rigid orthotic plate adapted to cushion a foot during use of the footwear.

[0012] In addition, in at least one aspect of the replaceable heel system, a plurality of dimensionally different compressible springs is provided that is positioned in the plurality of heel bodies and footwear to relieve pain to the user during use of the footwear. In all aspects of the replaceable heel system, the means for interchangeably mounting to and detaching from the footwear the plurality of substantially inelastic dimensionally different heel bodies does not require a separate tool by the user.

[0013] In another aspect of the replaceable heel system, the rigid orthotic plate is contoured to accommodate the shape of a user’s foot. A lock-and-release device is provided to lock the plurality of substantially inelastic dimensionally different heels on a substantially inelastic housing and to release the plurality of substantially inelastic dimensionally different heels from the substantially inelastic housing. The lock-and-release device is formed in the substantially inelastic housing. It includes a lever that protrudes through a first opening in the plurality of substantially inelastic dimensionally different heels to allow a user to lock the plurality of substantially inelastic dimensionally different heels on the substantially inelastic housing and to release the plurality of substantially inelastic dimensionally different heels from the substantially inelastic housing. In addition, a compressible plunger is provided. The compressible plunger is inserted through an orifice formed in the plurality of replaceable heels to provide resilient support during use of the footwear.

[0014] In still another aspect of the replaceable heel system, the lock-and-release device is formed in a replaceable heel, but in the rigid orthotic plate that is shaped and dimensioned to lock the plurality of substantially inelastic dimensionally different heels on the substantially inelastic housing and to release the plurality of substantially inelastic dimensionally different heels from the substantially inelastic housing. The lock-and-release device also includes a flexible lever formed with a lip. The lip of the flexible lever extends through a second opening formed in the plurality of substantially inelastic dimensionally different heels. It is operable by the user of the footwear to lock and release the plurality of substantially inelastic dimensionally different heels from the footwear.

[0015] In yet another aspect of the replaceable heel system, opposing pressure connectable and detachable dimensionally different members are provided. The members are mounted on the plurality of replaceable heels and on a substantially inelastic housing adapted to demountably connect to, and disconnect from, the plurality of replaceable heels and the footwear. The substantially inelastic housing further comprises a hollow passage adapted to dispose one end of a compressible spring. The replaceable heels further comprise a cavity adapted to receive the other end of the compressible spring. The opposing pressure connectable and detachable members are made from material selected from the group of materials consisting of hook and loop-type fasteners including Velcro®.

[0016] In another aspect of the replaceable heel system, at least one flared plug is provided. The flared plug is formed with an edge. The plug is mountable on the footwear. In addition, a hollow receptacle is formed in the plurality of heels. The hollow receptacle has an inner surface dimensioned for slideable engagement by the flared plug. In addition, at least one peripherally mounted protrusion extends from the inner surface of the substantially hollow receptacle toward the longitudinal axis of the substantially hollow receptacle adapted to removably connect the at least one flared plug and the substantially hollow receptacle to grasp on contact the peripherally mounted protrusion so as to connect the heel body to the footwear.

[0017] It will become apparent to one skilled in the art that the claimed subject matter as a whole, including the structure of the apparatus, and the cooperation of the elements of the apparatus, combine to result in a number of unexpected advantages and utilities. The structure and co-operation of structure of the replaceable heel system will become apparent to those skilled in the art when read in conjunction with the following description, drawing figures, and appended claims.

[0018] The foregoing has outlined broadly the more important features of the invention to better understand the detailed description that follows, and to better understand the contributions to the art. The replaceable heel system is not limited in application to the details of construction, or to the arrangements of the components, provided in the following description or drawing figures, but is capable of other embodiments, and of being practiced and carried out in various ways.

[0019] The phraseology and terminology employed in this disclosure are for purposes of description, and therefore should not be regarded as limiting. As those skilled in the art will appreciate, the conception on which this disclosure is based readily may be used as a basis for designing other structures, methods, and systems. The claims, therefore, include equivalent constructions.

[0020] Further, the abstract associated with this disclosure is intended neither to define the replaceable heel system, which is measured by the claims, nor intended to limit the scope of the claims.

[0021] The novel features of the replaceable heel system are best understood from the accompanying drawing, considered in connection with the accompanying description of the drawing, in which similar reference characters refer to similar parts, and in which:

BRIEF DESCRIPTION OF THE DRAWING

[0022] FIG. 1A of the drawing is an exploded perspective view of one aspect of a replaceable heel system illustrating use of a compressible spring suspension system as optional;

[0023] FIG. 1B is an exploded perspective view of another aspect of a replaceable heel system also illustrating use of a compressible spring suspension system;

[0024] FIG. 1C is a perspective view of one of the replaceable heels of the replaceable heel system shown in FIG. 1B in greater detail;

[0025] FIG. 1D is a perspective view of a human foot with a solid orthotic positioned below the human foot, and showing in phantom an alternative aperture as illustrated in FIG. 1B;
Fig. 1E is a perspective view of the assembled components of the replaceable heel system shown in Fig. 1A illustrating use of a compressible spring suspension system;

Fig. 1F is side cross-sectional view of the assembled components of the replaceable heel system shown in Figs. 1B and 1C illustrating use of a compressible spring suspension system;

Fig. 2A is an exploded perspective view of another aspect of a replaceable heel system illustrating use of a compressible spring suspension system as optional;

Fig. 2B is a perspective view, partially cut-away, of the replaceable heel system illustrated in Fig. 2A;

Fig. 3A is a side perspective view of another aspect of a replaceable heel system; and

Fig. 3B is an exploded side perspective view of the replaceable heel system illustrated in Fig. 3A.

In the detailed description to follow, to the extent that the numerical designations in the drawing figures include lower case letters such as “a,b” such designations include multiple references, and the letter “a” in lower case such as “a-n” is intended to express a number of repetitions of the element designated by that numerical reference and subscripts.

DETAILED DESCRIPTION

Definitions

As used in this document, the term “footwear” means, in general, a durable covering made for covering the human foot, to include at least shoes, athletic shoes, boots, chaps, and platforms.

The term “compressible spring suspension system” means at least the apparatus that includes the coil spring as shown and claimed in U.S. Pat. No. 5,435,079 issued on Jul. 25, 1995 to Gallegos, and in U.S. Design Pat. No. 434,548 issued Dec. 5, 2000 to Gallegos, and may include one or more leaf springs.

The term “replaceable,” as in the term “replaceable heel,” means to substitute one heel for another, indicating that each such replaceable heel is demountably attachable to, and detachable from, footwear, allowing a user to change at least one replaceable heel for another replaceable heel.

Because the unmodified term “heel” may have at least two different meanings, as used in this document the term “replaceable heel,” means a structure removably attachable to footwear adjacent the back of a shoe or sole of footwear, whereas the term “human heel” as used in this document means the part of a human foot below the ankle and behind the arch.

The terms “integral” and “integral formed” as used in this document means a method of manufacture and assembly that includes “monolithic” and “unitary,” and is intended to be broad enough to not be limited to “one piece,” but sufficiently broad enough to embrace construction of the unit by means of, for example, uniting laminations or pieces of material by any means for fastening, including, but not limited to, interconnecting the component pieces by welding and/or connectors such as rivets or screws. The term “integral,” therefore, is intended to be broad enough to include any means of manufacture that maintains parts in a fixed relationship as a single unit, whether or not originally formed as a single unit, so as to work together as a single complete piece or unit, and be incapable of being easily dismantled without affecting the integrity of the piece or unit.

The term “upper” means the top most part of footwear such as a shoe and, depending on type and style, may include components such as the toe cap, vamp, tongue, quarters, and back. The term “vamp” means the front of the footwear normally covering the tops of the toes and foot. The term “quarters” generally describes the sides of an upper joining onto the vamp at the front, and meeting each other at the back of the heel.

DESCRIPTION

As illustrated in Figs. 1A-3B, a replaceable heel system is provided that in its broadest context includes a plurality of replaceable heels and/or heel bodies. The replaceable heel system includes a plurality of substantially inelastic dimensionally different heel bodies. The dimensionally different heel bodies are demountably connectable to the footwear. Means are provided to attach and detach the plurality of heel bodies to footwear that is adapted to hold the plurality of heel bodies. A substantially rigid orthotic plate is removably insertable in or disposable on the footwear for distributing forces longitudinally and laterally during use of the footwear. A resilient pad is provided. The resilient pad is mountable on the top surface of the rigid orthotic plate adapted to cushion a foot during use of the footwear.

In addition, in at least one aspect of the replaceable heel system, a plurality of dimensionally different compressible springs is provided that is positioned in the plurality of heel bodies and footwear to relieve pain to the user during use of the footwear. In all aspects of the replaceable heel system, the means for interchangeably mounting to and demounting from the footwear the plurality of substantially inelastic dimensionally different heel bodies does not require a separate tool by the user.

In another aspect of the replaceable heel system, the rigid orthotic plate is contoured to accommodate the shape of a user’s foot. A lock-and-release device is provided to lock the plurality of substantially inelastic dimensionally different heels on a substantially inelastic housing and to release the plurality of substantially inelastic dimensionally different heels from the substantially inelastic housing. The lock-and-release device is formed in the substantially inelastic housing. It includes a lever that protrudes through a first opening in the plurality of substantially inelastic dimensionally different heels to allow a user to lock the plurality of substantially inelastic dimensionally different heels on the substantially inelastic housing and to release the plurality of substantially inelastic dimensionally different heels from the substantially inelastic housing. In addition, a compressible plunger is provided. The compressible plunger is inserted through an orifice formed in the plurality of replaceable heels to provide resilient support during use of the footwear.

In yet another aspect of the replaceable heel system, the lock-and-release device is formed not in a replaceable heel, but in the rigid orthotic plate that is shaped and dimensioned to lock the plurality of substantially inelastic dimensionally different heels on the substantially inelastic housing and to release the plurality of substantially inelastic dimensionally different heels from the substantially inelastic housing. The lock-and-release device also includes a flexible lever formed with a lip. The lip of the flexible lever extends through a second opening formed in the plurality of substantially inelastic dimensionally different heels. It is operable by the
user of the footwear to lock and release the plurality of substantially inelastic dimensionally different heels from the footwear.

[0043] In another aspect of the replaceable heel system, opposing pressure connectable and detachable dimensionally different members are provided. The members are mounted on the plurality of replaceable heels and on a substantially inelastic housing adapted to demountably connect to, and disconnect from, the plurality of replaceable heels and the footwear. The substantially inelastic housing further comprises a hollow passage adapted to dispose one end of a compressible spring. The replaceable heels further comprise a cavity adapted to receive the other end of the compressible spring. The opposing pressure connectable and detachable members are made from material selected from the group of materials consisting of hook and loop-type fasteners including Velcro®.

[0044] In another aspect of the replaceable heel system, at least one flared plug is provided. The flared plug is formed with an edge. The plug is mountable on the footwear. In addition, a hollow receptacle is formed in the plurality of heels. The hollow receptacle has an inner surface dimensioned for slidable engagement by the flared plug. In addition, at least one peripherally mounted protrusion extends from the inner surface of the substantially hollow receptacle toward the longitudinal axis of the substantially hollow receptacle adapted to removably connect the at least one flared plug and the substantially hollow receptacle to grasp on contact the peripherally mounted protrusion so as to connect the heel body to the footwear.

[0045] More specifically, in the aspect illustrated by cross-reference between FIGS. 1A-1F, a replaceable heel system 10 is illustrated that includes a contoured rigid orthotic plate 12. As shown, the contoured rigid orthotic is an integral contoured rigid orthotic. The integral contoured rigid orthotic plate 12 extends from a region adjacent to a plurality of human toes 14 to a region adjacent to a human heel 16 as perhaps best shown in FIG. 1D. The integral contoured rigid orthotic plate 12 preferably is made from material selected from the group of materials consisting of one or more resins, plastic, metal, rigid rubber, metal alloys, and/or vinyl.

[0046] As also shown by cross reference between FIGS. 1A-1F, the integral contoured rigid orthotic plate 12 is insertable in at least an upper 18 of footwear 20, as shown by cross-reference between FIGS. 1A-1B. The contoured rigid orthotic is illustrated in another aspect in FIG. 1F. The contoured rigid orthotic plate 12 is formed with a leading end 22, a trailing end 24, a top surface 26, and a lower surface 28, as illustrated by cross-reference between FIGS. 1A, 1B-1F. As indicated, the orthotic plate 12 is rigid. Rigidity of the integral contoured rigid orthotic plate contributes to independently supporting each foot of a user during use, which has been proven to help reduce or eliminate pain experienced by those who wear footwear constructed of conventional materials and manufactured in conventional ways without a rigid orthotic. Except as improved by the Prior Patents and Applications identified in this document, conventional footwear is composed of soft, resilient materials that create the illusion of comfort, but fail to address pain relief afforded by the footwear disclosed, illustrated and claimed in the Prior Patents and Applications, and in this document.

[0047] As also shown by cross-reference between FIGS. 1A-1C and 1E-1F, a substantially inelastic housing 30 is included. In one aspect, the substantially inelastic housing 30a,b is integrally formed and mounted on the lower surface 28 of the integral contoured rigid orthotic plate 12. The substantially inelastic housing 30a is positioned adjacent the trailing end 24 of the integral contoured rigid orthotic plate 12. In another aspect, the substantially inelastic housing 30b as illustrated in FIG. 1B is located substantially beneath a human heel 16. The substantially inelastic housing 30a,b is formed and designed to be removably engageable with a replaceable heel 32a-n.

[0048] In the aspect shown in FIG. 1A, the substantially inelastic housing 30a includes a plurality of grooves 34. As shown, the plurality of the grooves 34 is provided to achieve at least the following mechanical advantages: the plurality of grooves 34 in the exterior surface 36 of the housing 30a is adapted to reduce the weight of the footwear 20, to provide for slidable engagement of the substantially inelastic housing 30a with the plurality of substantially inelastic replaceable heels 32a-n, while maintaining rigidity of support between the substantially inelastic housing 30a and the substantially inelastic replaceable heels 32a-n. The substantially inelastic housing 30a also includes a bore 38. In the aspect illustrated in FIG. 1A, bore 38 is adapted for insertion of one of a plurality of dimensionally different compressible springs 40. As indicated by broken lines for illustrating compressible spring 40, use of a compressible spring 40 in connection with the replaceable heel system 10 is not a limitation of the replaceable heel system 10 as illustrated and claimed in this document, as the substantially inelastic replaceable heels 32a-n may be attached to housing 30a-n without deployment of a plurality of dimensionally different compressible springs 40.

[0049] In addition, as illustrated by cross-reference between FIGS. 1A, 1B, and 1E-1F, the replaceable heel system 10 includes a lock-and-release device 42. The lock-and-release device 42 is included to provide for removable attachment of the plurality of the replaceable heels 32a-n to the substantially inelastic housing 30.

[0050] In one aspect of the replaceable heel system 10, as illustrated in FIG. 1A, the lock-and-release device 42 is provided to lock the plurality of substantially inelastic dimensionally different heels 32a-n on a substantially inelastic housing 30a, and to release the plurality of substantially inelastic dimensionally different heels 32a-n from the substantially inelastic housing 30a. The lock-and-release device 42 is formed in the substantially inelastic housing 30a. It includes a flexible lever 46 and lip 50 that protrudes through a first opening 46 in the plurality of substantially inelastic dimensionally different heels 32a-n to allow a user to lock the plurality of substantially inelastic dimensionally different heels 32a-n on the substantially inelastic housing 30a, and to release the plurality of substantially inelastic dimensionally different heels 32a-n from the substantially inelastic housing 30a by applying pressure on the lip 50 which displaces the flexible lever 46 away from aperture 44 in the direction of the trailing end 24 of the contoured rigid orthotic plate 12, allowing the plurality of substantially inelastic dimensionally different heels 32a-n to be locked on or release from the substantially inelastic housing 30a. In addition, a compressible plunger 52 is provided. The compressible plunger 52 is inserted through an orifice 56 formed in the plurality of substantially inelastic dimensionally different heels 32a-n to provide additional resilient support during use of the footwear 20a.
In another aspect of the replaceable heel system 10, as illustrated in FIG. 1B-1C, the lock-and-release device 42b is formed not in one of the plurality of substantially inelastic dimensionally different heels 32b, but in the contoured rigid orthotic plate 12. The lock-and-release device 42b is shaped and dimensioned to lock the plurality of substantially inelastic dimensionally different heels 32b-n on the substantially inelastic housing 30b and to release the plurality of substantially inelastic dimensionally different heels 32b-n from the substantially inelastic housing 30b. The lock-and-release device 42b includes a flexible lever 48f formed with a lip 50f. The lip 50f of the flexible lever 48f extends through a second opening 46c-d formed in the plurality of substantially inelastic dimensionally different heels 32b-n. Flexible lever 48f formed with a lip 50f is operable by the user of the footwear 20 to lock and release the plurality of substantially inelastic dimensionally different heels 32b-n from the footwear 20 by applying pressure on the lip 50f which disengages the flexible lever 48f away from aperture 46c-d in the direction of the trailing end 24 of the contoured rigid orthotic plate 12, allowing the plurality of substantially inelastic dimensionally different heels 32b-n to be locked on or release from the substantially inelastic housing 30b. In addition, a compressible plunger 52 is provided. The compressible plunger 52 is inserted through an orifice 56b-c formed in the plurality of substantially inelastic dimensionally different heels 32b-n to provide additional resilient support during use of the footwear 20b.

As illustrated in FIGS. 1A-1B, the compressible plunger 52 is adapted to engage the end of the compressible spring 40. The orifice 56 is adapted to slidably extend and retract a portion of the compressible plunger 52 as shown in FIGS. 1A-1B, and 1F. As indicated by broken lines for illustrating compressible spring 40, as well as for orifice 56, however, use of a compressible spring in connection with the replaceable heel system 10 is not a limitation of the replaceable heel system 10, as illustrated and claimed in this document.

In addition, as shown in FIGS. 1A-1B and 1F, a resilient pad 58a-c is included. The resilient pad 58a-c is replaceably mountable on the top surface 26 of the rigid orthotic plate 12a-c. The resilient pad 58a-c provides cushioning to a user’s foot 60 during use of the footwear 20. The resilient pad 58a-c may be made of a variety of materials, including foamed materials that have elastic or rebounding properties, such as materials comprised of silicon, neoprene, natural rubber foams, synthetic rubber foams and polyurethane, polyether and polyester foams, neoprene, Vinyl Nitrile, Styrene-Butadiene Rubber (SBR), Polyethylene (PE), ethyl vinyl acetate (EVA), ethylene propylene terpolymer (EPT), EPT/PE/Butyl Rubber, Neoprene/EPT/SBR, epichlorohydrin (ECH), and nitrite (NBR) or a combination thereof or other cushioning materials known or used by one skilled in the art. The density and cell characteristics of the padding of the foam material are believed to be not material features in terms of providing the appropriate cushioning and rebound characteristics for cushioning, and may vary depending upon the type of activity of footwear in question.

The resilient pad 58a-c may have low to medium density to enhance deformability of the resilient pad 58. A low-density padding comprises material within the range of about 0.08 g/cm³ to about 0.50 g/cm³. An even more preferred range of densities for padding is material between about 0.1 g/cm³ to 0.30 g/cm³. The resilient pad 58a-c also may be constructed of a closed-cell foam material, having a density in the range of about 0.08 g/cm³ to 0.50 g/cm³, or of other suitable densities known to one skilled in the art. Alternatively, open-cell foam material, having a density in the range of about 0.08 g/cm³ to 0.40 g/cm³ may be used, or of other suitable densities known to one skilled in the art.

In another aspect, as illustrated in FIGS. 2A-2B and 1D, footwear 100 with a plurality of replaceable heels 102a-n includes a contoured rigid orthotic plate 104 integrally formed with a housings 106. In addition, a resilient pad 108 is replaceably mountable on the contoured rigid orthotic plate 104 to cushion a foot 60 during use of the footwear 100.

Substantially inelastic housing 106 is defined by the distance D in FIG. 2A. The substantially inelastic housing 106 includes a plate 112 adapted to receive one end of a compressible spring 114. The housing 106 is attachable to the contoured rigid orthotic plate 104 to removably hold one of a plurality of replaceable heels 102. The at least one compressible spring 114 is removably positionable in the housing 106 and in the plurality of replaceable heels 102a-n. As indicated by broken lines for illustrating compressible spring 114, however, use of a compressible spring 114 in connection with the replaceable heel system 10 is not a limitation of this aspect of the replaceable heel system 10 as illustrated and claimed in this document. A cavity 116 is formed in replaceable heels 102a-n to receive the other end of the at least one compressible spring 114.

In the aspect shown by cross-reference between FIGS. 2A-2B, opposing pressure- connectable and detachable members 118a,b are provided. The opposing pressure connectable and detachable members 118a,b are mounted on a plurality of replaceable heels 102 and on housing 106 to removably connect the plurality of replaceable heels 102 to footwear 100. The opposing pressure-connectable and detachable members 118a,b are made from material selected from the group of materials consisting of hook-and-loop type fasteners such as Velcro®.

Another aspect of a replaceable heel system is illustrated in FIGS. 3A-3B. As shown, a system for interchangeably replacing heels 200 on footwear 202 is shown. As shown, the system for interchangeably replacing heels 200 on footwear 202 includes a plurality of heel bodies 204. The plurality of heel bodies 204 may be made of any material.

At least one flared plug 206 is provided. The at least one flared plug 206 is formed with an edge 208. As shown, the flared plug 206 is mountable in a substantially hollow receptacle 210 formed in the plurality of heel bodies 204 of the footwear 202. Material used to manufacture the at least one flared plug 206 is not a material consideration in the disclosure of this document, but preferably is formed from a plastic or resin material. The substantially hollow receptacle 210 is formed with an inner surface 212. The inner surface 212 is dimensioned for slidable engagement with the flared plug 206 and compressible engagement with edge 208.

A plurality of peripherally mounted protrusions 214 is included. The plurality of peripherally mounted protrusions 214 is formed on the inner surface 212 of the hollow receptacle 210, and extends toward the longitudinal axis of the substantially hollow receptacle 210. Each of the peripherally mounted protrusions 214 is provided to perform the mechanical advantage of removably connecting the flared plug 206 and the substantially hollow receptacle 210. More specifically, as illustrated in FIGS. 3A-3B, in operation the at least
one flared plug 206 is removably connectable to the substantially hollow receptacle 210 by application of pressure by the user of the footwear by applying hand pressure on the replaceable heel bodies 204 so as to direct the substantially hollow receptacle 210 against the flared plug 206.

[0062] Claim elements and steps in this document have been numbered solely as an aid in understanding the description. The numbering is not intended to, and should not be considered as intending to, indicate the ordering of elements and steps in the claims. In addition, the replaceable heel systems shown in drawings FIGS. 1A through 3B shows at least one embodiment that is not intended to be exclusive, but merely illustrative of the disclosed embodiments.

[0063] Means-plus-function clauses in the claims are intended to cover the structures described as performing the recited function that include not only structural equivalents, but also equivalent structures. Thus, although a nail and screw may not be structural equivalents, a nail and a screw may be equivalent structures.

What is claimed is:

1. A replaceable heel system for footwear, comprising:
   a rigid contoured orthotic plate adapted to support a foot by distributing variable forces associated with weight and walking both longitudinally and laterally during wearing of the footwear;
   means for disposing the rigid contoured orthotic plate in the footwear;
   a plurality of substantially inelastic dimensionally different heel bodies not installed on the footwear or on the rigid contoured orthotic plate as substantially permanent integral components; and
   means for interchangeably mounting to and demounting from the footwear the plurality of substantially inelastic dimensionally different heel bodies.

2. A replaceable heel system for footwear as recited in claim 1, further comprising a resilient pad replaceably mountable on the top surface of the rigid contoured orthotic plate adapted to cushion a foot during use of the footwear.

3. A replaceable heel system for footwear as recited in claim 1, wherein the plurality of substantially inelastic dimensionally different heel bodies and the rigid contoured orthotic plate are made from material selected from the group of materials consisting of one or more resins, plastic, metal, rigid rubber, metal alloys, and/or vinyl.

4. A replaceable heel system for footwear as recited in claim 1, wherein the means for interchangeably mounting to and demounting from the footwear the plurality of substantially inelastic dimensionally different heel bodies requires no tool.

5. A replaceable heel system for footwear as recited in claim 1, wherein the means for interchangeably mounting to and demounting from the footwear the plurality of substantially inelastic dimensionally different heel bodies further comprises one or more dimensionally different compressible coiled springs that compress on application of pressure during use but regain original shape as forces and pressures vary during use to relieve pain to the user during wearing of the footwear.

6. Footwear having a plurality of replaceable heels, comprising:
   a rigid orthotic plate adapted to support a foot during use of the footwear;
   a substantially inelastic housing integrally formed on the lower surface of the rigid orthotic plate adjacent the trailing end of the rigid orthotic plate;
   a plurality of substantially inelastic dimensionally different heels formed with a chamber for removably holding at least one compressible spring adapted to relieve pain during use of the footwear;
   a plurality of dimensionally different compressible springs interchangeably insertable into the chamber of the plurality of substantially inelastic dimensionally different heels;
   a lock-and-release device formed in the substantially inelastic housing formed with a flexible lever that protrudes through a first opening in the plurality of substantially inelastic dimensionally different heels adapted to lock the plurality of substantially inelastic dimensionally different heels on the substantially inelastic housing and to release the plurality of substantially inelastic dimensionally different heels from the substantially inelastic housing;
   a compressible plunger insertable through an orifice of the plurality of substantially inelastic replaceable heels adapted to provide resilient support during use of the footwear; and
   a resilient pad mountable on the top surface of the rigid orthotic plate adapted to cushion a foot during use of the footwear.

7. Footwear having a plurality of replaceable heels as recited in claim 6, wherein the substantially inelastic housing further comprises a bore adapted to receive one end of the plurality of dimensionally different compressible springs.

8. Footwear having a plurality of replaceable heels as recited in claim 7, wherein the compressible plunger is formed with a neck adapted to engage at least one other end of the plurality of dimensionally different compressible springs.

9. Footwear having a plurality of replaceable heels as recited in claim 8, wherein the substantially inelastic housing further comprises grooves in the outer surface of the substantially inelastic housing adapted to reduce the weight of the footwear, to provide for sidable engagement between the substantially inelastic housing and the plurality of substantially inelastic dimensionally different replaceable heels, and to maintain rigidity of support between the substantially inelastic housing and the substantially inelastic dimensionally different replaceable heels.

10. A system for interchangeably replacing heels on footwear, comprising:
    a rigid orthotic plate adapted to support a foot during use of the footwear;
    a substantially inelastic housing integrally formed on the lower surface of the rigid orthotic plate positioned substantially beneath a human heel during use of the footwear;
    a plurality of substantially inelastic dimensionally different heels formed with a chamber for removably holding at least one compressible spring adapted to relieve pain during use of the footwear;
    a plurality of dimensionally different compressible springs interchangeably insertable into the chamber of the plurality of substantially inelastic dimensionally different heels;
    a lock-and-release device formed in and extending from the rigid orthotic plate that is shaped and dimensioned to lock the plurality of substantially inelastic dimension-
ally different heels on the substantially inelastic housing and to release the plurality of substantially inelastic dimensionally different heels from the substantially inelastic housing,

wherein the lock-and-release device further comprises a flexible lever formed with a lip that extends through a second opening formed in the plurality of substantially inelastic dimensionally different heels, the flexible lever being operable by a user of the footwear to lock and release the plurality of substantially inelastic dimensionally different heels to and from the footwear; and

a compressible plunger insertable through an orifice of the plurality of substantially inelastic dimensionally different replaceable heels adapted to provide resilient support during use of the footwear.

11. A system for interchangeably replacing heels on footwear as recited in claim 10, wherein the lock-and-release device includes an aperture formed in the integral contoured rigid orthotic plate.

12. A system for interchangeably replacing heels on footwear as recited in claim 10, further comprising a resilient pad mountable on the top surface of the rigid orthotic plate adapted to cushion a foot during use of the footwear.

13. Replaceable heels for footwear, comprising:

a contoured rigid orthotic plate adapted for insertion into the footwear;

a substantially inelastic housing attachable to the footwear adapted to demountably hold a replaceable heel; and

opposing pressure connectable and detachable dimensionally different members mounted on the plurality of replaceable heels and on the substantially inelastic housing adapted to demountably connect to, and disconnect from, the plurality of replaceable heels and the footwear.

14. Replaceable heels for footwear as recited in claim 13, further comprising a resilient pad replaceably mountable on the contoured rigid orthotic plate adapted to cushion a foot during use of the footwear.

15. Replaceable heels for footwear as recited in claim 14, wherein the substantially inelastic housing further comprises a hollow passage adapted to dispose one end of a compressible spring.

16. Replaceable heels for footwear as recited in claim 15, wherein the replaceable heels further comprise a cavity adapted to receive the other end of the compressible spring.

17. Replaceable heels for footwear as recited in claim 16, wherein the opposing pressure connectable and detachable members are made from material selected from the group of materials consisting of hook and loop-type fasteners including Velcro®.

18. Interchangeable heels for footwear, comprising:

a plurality of dimensionally different heel bodies;

at least one flared plug formed with an edge, said plug mountable on the footwear;

a substantially hollow receptacle formed in the plurality of dimensionally different heel bodies having an inner surface dimensioned for slidable engagement by the flared plug; and

at least one peripherally mounted protrusion extending from the inner surface of the substantially hollow receptacle toward the longitudinal axis of the substantially hollow receptacle adapted to removably engage the edge formed on the flared plug and connect the at least one flared plug and the substantially hollow receptacle of the plurality of dimensionally different heel bodies.

19. Interchangeable heels for footwear as recited in claim 18, wherein the at least one flared plug is connectable to the substantially hollow receptacle by application of pressure.

20. Interchangeable heels for footwear as recited in claim 18, wherein the at least one flared plug is removable from the substantially hollow receptacle by exerting force to pull the interchangeable heels from the footwear.

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