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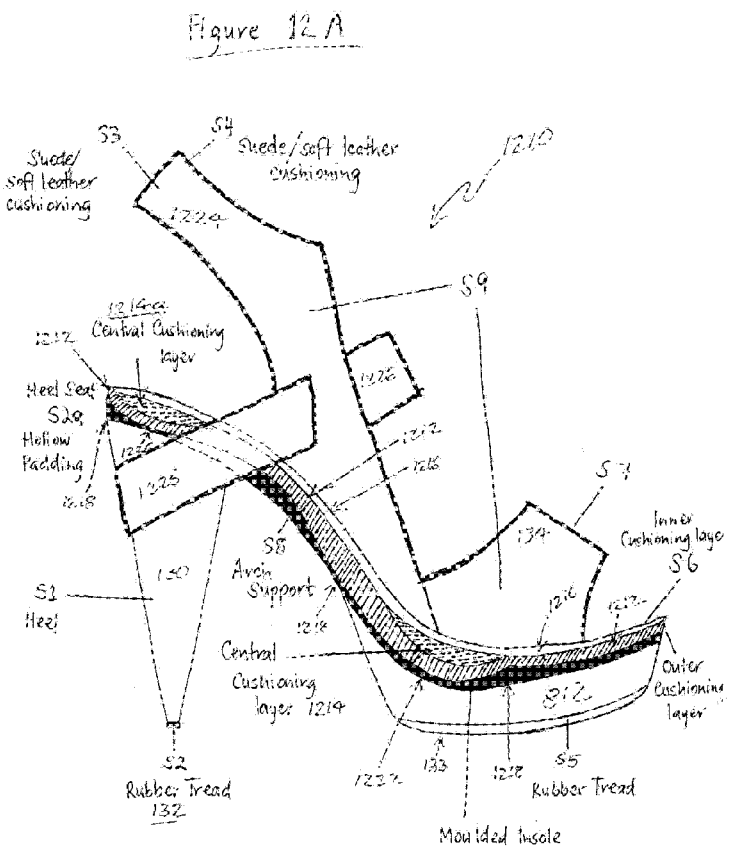
(54) Title: AN IMPROVED HIGH HEELED SHOE OR BOOT



(57) Abstract: A high heeled shoe (1210) with an insole (1218) with recesses (1220, 1222) corresponding to one or more anatomical features of the sole of the foot. An outer cushioning layer (1212) may be attached to the insole (1218). A softer central cushioning layer (1214) may be attached to the stiffer outer cushioning layer (1212) adjacent to the recesses (1220, 1222). An optional inner cushioning layer (1216) may be overlayed to the central and outer cushioning layers. The central cushioning layer is preferentially compressed by the foot in use to provide ridges, rises and moulding for securing the foot to the shoe (1210) when in use.

WO 2015/000036 A1

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An Improved High Heeled Shoe or Boot.

FIELD OF THE INVENTION

[001] The present invention relates to high heeled shoes or high heeled boots as footwear. In particular the invention relates to high heeled shoes or boots with a platform.

BACKGROUND OF THE INVENTION

[002] Conventional high heeled footwear is often uncomfortable, tiring, and even painful to wear and to walk in. In addition high heeled shoes may be insecure to walk in or provide poor stability to the wearer. There are several medical problems associated with wearing high heels, including foot, ankle, knee, hip and lower back problems. Yet many women wear high-heeled footwear regularly because it may improve the wearer's appearance to style, elegance, professionalism and height.

[003] In the following, the detailed description and the claims the terms high heeled footwear, high heeled shoes and high heeled boots may be used interchangeably. High heeled boots include shoes where the upper of the shoe may extend to the ankle and beyond. For example high heeled boots may have uppers extending to the thighs of the wearer.

[004] Heel heights may vary from approximately 1 inch (25 mm) to or over 3 inches (> 75 mm) and are most commonly used for business, evening, general fashion wear and dancing. There are various styles of the heel for example: cone, wedge, spool, louis, court, peep toe, prism, puppy, mule, pump, slingback, platform and stiletto. The style of heel may affect the stability and ease of wearing of high-heeled shoes. In addition a high-heeled shoe may include a platform under the sole of the shoe at the front section underneath the ball of the foot and the toes. The platform may vary from a few millimetres to 50 mm or more in height.

[005] A substantial percentage of wearers of high-heeled footwear report pain associated with the wearing of such high heeled footwear within thirty minutes to four hours of typical walking, standing, and sitting found in a work or a social environment. In many high-heeled shoes the steep ramp of a sole of the footwear may cause the foot to slide forwards and downwards, causing the toes to become crowded and/or cramped within the toe box of the shoe, often this may also result in blisters, calluses or corns forming at

the toes. In addition, a gap may form at the back of the high-heeled shoe as a result of the foot sliding forwards and/or downwards causing abrasion to occur between the heel and the shoe back when walking. Abrasion may also occur between the toes and the upper of the shoe at the toe box or toe section of the shoe.

[006] Slippage between the sole of the foot and the sole of the shoe may also contribute to reduced stability to the shoe wearer as well as making the shoe insecure to safely walk in.

[007] Further discomfort and pain from wearing high-heeled footwear may also arise because such footwear significantly alters the wearer's posture and stance. This is particularly noticeable when compared with flat-soled footwear, as the load distribution of a high-heeled shoe is greater towards the ball, forefoot and toe box sections of the shoe in comparison to the heel section of the shoe. This change in load distribution towards the front of the shoe may lead to common conditions like ball of foot pain, burning sensations under the foot, callous, corns, aching / fatigued legs and conditions such as metatarsalgia.

[008] Any reference herein to known prior art does not, unless the contrary indication appears, constitute an admission that such prior art is commonly known by those skilled in the art to which the invention relates, at the priority date of this application.

SUMMARY OF THE INVENTION

[009] The present invention aims to provide an alternative high-heeled shoe arrangement and/or methods for manufacture of shoes which overcomes or ameliorates the disadvantages of the prior art, or at least provides a useful choice.

[010] In one form the invention provides a high heeled shoe comprising: an insole; at least one recess in an upper surface of the insole; an outer cushioning layer adjacent the upper surface of the insole; a central cushioning layer adjacent to the outer cushioning layer and adapted to be received by at least one of: the recesses of the insole and a further recess formed by the outer cushioning layer within at least one recess of the insole; a high heel attached to a bottom surface of the insole; and an upper attached to the insole to aid in securing a foot to the shoe; wherein the central cushioning layer at least engages with one or more corresponding anatomical features of a sole of the foot to aid in securing the foot to the shoe.

[011] The ridge adjacent a periphery of the recess is formed in at least one of the central and outer cushioning layers by the sole of the foot depressing preferentially the central cushioning layer.

[012] The ridge also engages with one or more corresponding anatomical features.

[013] The ridge associated with a forefoot portion of a recess for the ball of the foot engages with the front of the ball of the foot.

[014] The ridge associated with the forefoot portion supports the foot more than the toes.

[015] The ridge associated with a front portion of a recess for the heel of the foot engages with the front of the heel of the foot.

[016] The support provided by the ridge increases as the sole of the foot further depresses the central cushioning layer.

[017] The invention further includes: when the central cushioning layer includes a fluid or a gel, the fluid or gel is displaced by the foot depression to form a protrusion about the periphery of the central cushioning layer, wherein the protrusion forms a further ridge for further engaging with at least one anatomical feature.

[018] The central cushioning layer moulds to at least one of the anatomical features to further aid in securing the foot to the shoe.

[019] The anatomical features of the sole of the foot include at least one of a ball of the foot, an arch of the foot, a heel of the foot and portions thereof the ball, arch and heel.

[020] The at least one recesses are located on the insole to correspond to at least one anatomical feature of the sole of the foot.

[021] The recess dimensions are proportioned from the corresponding anatomical feature.

[022] The central cushioning layer is defined by the recess in the insole.

[023] The invention further includes a platform to the insole at a front section of the shoe.

[024] The recess is an aperture in the insole to at least one of the heel seat and the platform.

[025] Three recesses in the insole respectively correspond to the ball of the foot, the arch of the foot and the heel of the foot.

[026] The central cushioning layer is softer than the outer cushioning layer.

[027] The outer cushioning layer is of the same material as the central cushioning layer.

[028] The invention further includes an inner cushioning layer adjacent the central cushioning layer and outer cushioning layer, wherein the inner cushioning layer is the layer in contact with the foot.

[029] The inner cushioning layer is softer than the central cushioning layer.

[030] The insole is more rigid than the cushioning layers.

[031] The insole includes a shank to improve a rigidity of the insole.

[032] The ridge is approximately between 2 and 6 mm higher than the outer cushioning layer not adjacent the recess.

[033] In a further form the invention provides a high heeled shoe comprising: an insole, at least one recess in an upper surface of the insole, an outer cushioning layer adjacent the upper surface of the insole, a central cushioning layer adjacent to the outer cushioning layer and adapted to be received by at least one further recess formed by the outer cushioning layer within at least one recess of the insole, a high heel attached to a bottom surface of the insole, and an upper attached to the insole to aid in securing a foot to the shoe, wherein an extent of the inner cushioning layer is defined by the further recess, and wherein a material of the central cushioning layer is less stiff than a material of the outer cushioning layer.

[034] In an alternate form the invention provides a method of forming a sole of a high heeled shoe including the steps of: providing an insole, providing at least one recess in an upper surface of the insole to correspond with at least one anatomical feature of a foot, securing and conforming an outer cushioning layer to the upper surface of the insole, providing and securing an inner cushioning layer to the further recesses formed by the outer cushioning layer on the insole, and selecting a material of the central cushioning layer to be less stiff than a material of the outer cushioning layer.

[035] A further form of the invention provides a high heeled shoe comprising: an insole, an outer cushioning layer adjacent the upper surface of the insole, a central cushioning layer adjacent to the outer cushioning , a slight rise formed in at least one of the outer cushioning layer and the central cushioning layer, a high heel attached to a bottom surface of the insole, and an upper attached to the insole to aid in securing a foot to the shoe, wherein the slight rise location corresponds to an anatomical feature of a sole of a foot.

[036] An alternate form of the invention provides a high-heeled shoe wherein the bottom forefoot section of the shoe (sole) has a layer of rubber, polyurethane (PU) with tread for slip resistance and that makes the heel light and flexible.

[037] An alternate form of the invention provides a high-heeled shoe where at least one shank is built into the sole of the shoe to give the extra support and stability needed to the arch of the foot.

[038] An alternate form of the invention provides a high-heeled shoe where a gap between the toes and ball of foot section has a rise of one cushioning layer is manufactured from a conformable material.

[039] An alternate form of the invention provides a high-heeled shoe where a cup heel with a cushioning layer at the base of the heel gives extra comfort and socketing or cupping support for the wearer's heel.

[040] An alternate form of the invention provides a high-heeled shoe substantially as herein in described.

[041] An alternate form of the invention provides a high-heeled shoe substantially as described herein with reference to the figures.

[042] An alternate form of the invention provides a high-heeled shoe substantially as herein described.

[043] An alternate form of the invention provides a shoe according to claim 4, wherein the ridge associated with the forefoot portion supports the foot more than freeing the toes.

[044] An alternate form of the invention provides a high heeled shoe comprising: an insole, an outer cushioning layer adjacent the upper surface of the insole, a central cushioning layer adjacent to the outer cushioning , a slight rise formed in at least one of the outer cushioning layer and the central cushioning layer, a high heel attached to a bottom

surface of the insole and/or an outsole, and an upper attached to the insole to aid in securing a foot to the shoe, wherein the slight rise location corresponds to an anatomical feature of a sole of a foot.

[045] An alternate form of the invention provides a high-heeled shoe where at least one shank is built into the sole and maybe the insole of the shoe to give the extra support and stability needed to the arch of the foot.

[046] An alternate form of the invention provides a high heeled shoe comprising: an insole; at least one recess in an upper surface of the insole; an outer cushioning layer adjacent the upper surface of the insole; a central cushioning layer adjacent to the outer cushioning layer and adapted to be received by at least one of: the recesses of the insole and a further recess formed by the outer cushioning layer within at least one recess of the insole; a high heel attached to a bottom surface of the insole; and an upper attached to the insole to aid in securing a foot to the shoe; wherein the central cushioning layer at least engages with one or more corresponding anatomical features of a sole of the foot to aid in securing the foot to the shoe, and wherein a rise or a ridge from the periphery of the recess of the insole is under the cushioning layers.

[047] The invention further provides a footwear or shoe substantially as herein in described.

[048] The invention further provides a high-heeled shoe substantially as herein described.

[049] In an alternate form the invention provides a high heeled shoe with: an insole with recesses corresponding to one or more anatomical features of the sole of the foot; an outer cushioning layer may be attached to the insole; a softer central cushioning layer may be attached to the stiffer outer cushioning layer adjacent to the recesses; an optional inner cushioning layer may be overlayed to the central and outer cushioning layers; wherein the central cushioning layer is preferentially compressed by the foot in use to provide ridges, rises and moulding for securing the foot to the shoe when in use.

[050] Further forms of the invention are as set out in the appended claims and as apparent from the description.

BRIEF DESCRIPTION OF THE DRAWINGS

[051] The description is made with reference to the accompanying drawings of which:

[052] FIGURE 1 shows a perspective view of a prior art high-heeled shoe;

[053] FIGURE 2 shows a cross-sectional side view taken along the line section 2-2 of the prior art high-heeled shoe of FIGURE 1;

[054] FIGURE 3 shows an alternate prior art embodiment of FIGURE 2.

[055] FIGURE 4 shows another alternate prior art embodiment of FIGURE 2.

[056] FIGURE 5 shows a perspective view of a high-heeled shoe with multiple pads applied to the inner of the upper;

[057] FIGURE 6 is a schematic of the prior art high-heeled shoe of FIGURE 1 showing a motion of the user when wearing a high heeled shoe;

[058] FIGURE 7 shows a perspective view of a high-heeled shoe embodiment of the invention with stiff resistive elements;

[059] FIGURE 8 shows a platform high heeled shoe with a heel gel cup cushioning means and a slight rise at the forefoot;

[060] FIGURE 9 shows a high heeled shoe with pockets of tiny gel balls;

[061] FIGURE 10 shows an alternate version of the shoes of FIGURES 8 and 9 with additional cushioning and support layers;

[062] FIGURE 11 shows an alternate version of the shoe of FIGURE 10 with pockets of tiny gel balls embedded in multiple cushioning and support layers;

[063] FIGURE 12A shows an embodiment of the invention with an insole including recesses;

[064] FIGURE 12B is an alternate version of FIGURE 12A with a different upper.

[065] FIGURE 12C is an exploded representation of FIGURE 12A but without the upper components.

[066] FIGURE 13 is a key to the hatching used in FIGURES 12A to 27;

[067] FIGURE 14 is a plan view of the cushioning layers of FIGURE 12A, with the inner cushioning layer shown as transparent so that the central cushioning layer may be viewed;

[068] FIGURES 15 to 18 are transverse sectional views of FIGURE 14;

[069] FIGURE 19 is the shoe of FIGURE 12A but only showing the insole with the cushion layers for clarity. A foot is shown to show correspondence between anatomical features of the foot and features of the shoe;

[070] FIGURE 20A shows the foot depressing the cushioning layers and insole of FIGURE 19;

[071] FIGURE 20B is an alternate insole to that of FIGURES 12A, 19 and 20A, for example.

[072] FIGURE 21 is the plan view FIGURE 14 also showing the ridges formed when the foot depresses the cushioning layers and insole as shown in FIGURE 20A.

[073] FIGURES 22 to 25 show various alternative configurations of the insole, recess and cushioning layers of FIGURE 12A;

[074] FIGURE 26 shows an alternative configuration of the recessed insole and outer cushioning layer to provide a rise; and

[075] FIGURE 27 is an exploded view of the assembly of the cushioning layers and insole to another Last for the shoe of FIGURE 12A.

[076] In the figures the reference numerals are prefixed by the figure number. For example FIG 1 is the "100" series, FIG 2 is the "200" series and so on.

DESCRIPTION OF EMBODIMENTS

[077] FIGURE 1 shows a perspective view of a prior art high-heeled shoe 110.

[078] The high-heeled shoe 110 includes an outer sole 112 and an upper 114 attached to the outer sole 112. The high-heeled shoe 110 shown in FIGURE 1, by way of example, is a closed back 116 high-heeled shoe. However open back, open toe, and strap shoes or various other shoe styles, such as a combination of a platform outer sole with a high heel are also common. The high-heeled shoe 110 may be sized (including both length and width) according to either standardized shoe fittings for the marketplace or country in which the shoe 110 is to be marketed and sold, or sized according to a custom fitting.

[079] As shown in FIGURE 1, the sole 112 comprises a front section 118, a rear section 120, and a midsection 122 located between the front section 118 and the rear section 120. The front section 118, the rear section 120, and the midsection 122 of the outer sole 112 are all shaped so that the general periphery of the outer sole 112 of a sole edge portion 124 defines the general outline of a corresponding left or right foot. The outer sole 112 is shaped so as to provide a generally arched configuration in which the midsection 122 slopes downwardly from the generally horizontal rear section 120 of the outer sole 112 to the generally horizontal front section 118 containing the ball of the foot and the toes.

[080] As shown in FIGURE 1, the outer sole 112 may have an adjacent inner surface usually termed an insole 126, an inner sole or a footbed 126 for engaging with the sole of a wearer's foot in use. A comfort liner 127 in the upper 114 of the rear section 120 may extend, as shown with the dashed lines, to the inner sole 126 and the upper 14 of the front section 118 on the inside of the shoe 110. The comfort liner 127 is described further with respect to FIGURE 2.

[081] Attached to the outer sole 112 or at the heel seat 128 of the rear section 120 is an elongate or high heel 130 having a generally tapered shape that extends downwardly from the outer sole 112 or heel seat 128 to a small ground engaging surface otherwise termed a "top piece" 132, the shape of the high heel 30 may depend on the style of the high heeled

shoe. The outer sole 112 may also include a ground engaging surface 133 located at the front section 118 of the outer sole 112.

[082] As shown in FIGURE 1, the upper 114 may be constructed from a single or multiple blanks (not shown), which may be cut to form a toe box 134 of the upper 114 of the front section 118, a quarter panel 136 of the upper 114 of the rear section 120, and two opposing lateral sections or vamps 138, 140 located on the upper 114 between the front section 118 and the rear section 120. A first of the two lateral or vamp sections defines an inner lateral section or inner vamp 138 adjacent the arch of the wearer's foot corresponding generally to a medial portion of the foot. A second of the two lateral sections forms an outer lateral section or outer vamp 140 corresponding to the outer lateral portion of the foot on the opposite side of the foot arch.

[083] As shown in FIGURE 1, the upper 114 may be attached to the inner sole 126 around the peripheral edge portion 124 by stitching and/or with an adhesive using a method known to those persons skilled in the art of shoemaking, including the use of a shoe Last (not shown) to help define the shape of the shoe 110 during forming and assembling the shoe. When attached to the edge portion 124 of the sole 112, 126, the front section 118, the rear section 120, and the two vamps 138, 140 of the upper 114 extend generally upwardly from the inner sole 126 to define or form an opening 142 for the user to insert their foot into the shoe 110. The front section 118 of the upper 114 with the outer sole 112, defines a toe section or toe box 134 of the shoe 110 in the form of a partial enclosure that is accessible via the opening 142 of the shoe 110, for receiving the wearer's toes when the shoe 110 is worn in use.

[084] The shoe 110 may also have a welt (not shown) in the form of a strip of leather, rubber, or plastic, that is stitched in-between the upper 114 and inner sole 126 and the outer sole 112, as an attachment point for the outer sole 112 to the upper 114.

[085] As shown in FIGURE 1, the toe box 134 extends from a front end 144 on the inner vamp 138 of the upper 114 around the front section 118 of the outer sole 112 and the upper 114 to a front end 146 on the outer vamp 140 of the upper 114. It will be readily appreciated that whilst the toe box 134 upper 114 is shown in FIGURE 1 as continuously enclosing the toes, the upper of the toe box may also have apertures (not shown) or other cut outs in the upper in order to reveal sections of the toes or all of the toes.

[086] The toebox 134 or front section 118 of the upper 114 is also prone to cramping the toes and causing abrasions and blisters to the toes by too tight a fit to the toes and the front section of the foot. It appears that some designers and manufacturers attempt to alleviate slippage down the sole of the shoe by the foot by designing and making a toebox 134 which is snug and firm despite the disadvantage to comfort and damaging the toes and the front section of the foot.

[087] As shown in FIGURE 1, the rear section 120 of the outer sole 112 or heel seat 128 and the rear section 120 of the upper 114 together define a heel section or quarter panel 136 of the shoe 110 located distal to the toe box 134. The quarter panel 136 extends from a rear end 148 on the inner vamp 138 of the upper 14 around the rear section 120, back 116 of the upper 14, the outer sole 112 and the heel seat 128 to the upper 114 to a rear end 150 of the outer vamp 140 of the upper 114.

[088] The upper 114 of the shoe may be made of soft material such as suede, gel like material and / or soft leather selected so as to reduce abrasions, rubbing and blisters to the foot by the upper 114. In particular the quarter panels 136 of the heel of the upper 114 is prone to causing damage to the heel of the foot as well as the toe box 134 to the toes.

[089] The outer sole 112, ground engaging surface 133 and the top piece 132 may be manufactured from a robust material including, but not limited to, such materials as a plant fibre based material, leather, wood, rubber, a synthetic material, a polymer, a plastic, a polyurethane (PU) or any combination thereof. The selection of the ground engaging surface 133 and top piece 132 may be to an additional layer to provide a tread which is slip resistant, stable, provide extra bounce and/or softness. The selection of the material for the top piece 132 may be to a material that is as per the ground engaging surface 133 and also comparatively low mass whilst hard wearing and flexible. The upper 114 may be manufactured from a flexible material including, but not limited to, such materials as leather, suede, a polymer, a plant fibre based material, cotton, nylon, a synthetic material, a polymer, or any combination thereof.

[090] FIGURE 2 shows the prior art shoe 110 in cross section taken along a longitudinal section as shown by the line section 2-2 in FIGURE 1 of the shoe 110 A partial outline of a wearer's foot 210 is shown in dashed outline.

[091] FIGURE 2 shows three comfort liners 127, 212, 214 although prior art shoes may have one to three comfort liners depending on styling and manufacturer. The three comfort liners may be joined together by stitching and/or by using a suitable adhesive. Each of the comfort liners has dimensions that conform to the general dimensions of the shoe 110 to aid in fitting and comfort.

[092] The comfort liners may also line all inner sides of the upper 114 including about the opening 142. In addition to the inner sides of the upper 114 shown in FIGURE 2 the comfort liners may also extend to the inner and outer vamps 138, 140 of the shoe 110. The comfort liners may be of foam and/or a soft leather and/or suede.

[093] The comfort liners may be attached to the rest of the shoe 110 by being adhered using a suitable adhesive or other fixing techniques to the inner surface of the outer sole 112, and adhered to the corresponding inner surfaces of the front section 118 and the rear section 120 of the upper 114. A Last is commonly used in this assembly to aid in forming the comfort layers as the rest of the shoe is fabricated.

[094] Alternatively one or more of the comfort layers, in part or fully, may be after-market comfort layer inserts that the wearer may insert themselves into the shoe. Such retrofitting of comfort liner inserts is commonplace amongst high heeled shoe wearers in an attempt to improve the fitting and comfort as well as reducing pain. The ready availability and broad range of aftermarket comfort liner inserts is a strong indicator of the prior, long standing and unsatisfactory performance of many high heel shoes and the discomfort experienced by many wearers.

[095] As shown in the prior art of FIGURE 2, each of the three comfort layers or inserts may extend along the full length of the shoe 110 outer sole 112 and further to the uppers 114 of the toe box 134 and the quarter panel 136. Moreover, at the toebox 134, the comfort liners or inserts may line the inner surface of the front section 118 of the upper 114 and the outer sole 112 so as to partially at least envelop the wearer's toes as shown in FIGURE 2 to alleviate abrasion to toes and provide more support. Similarly at the rear section 114, the comfort liners or inserts may line the inner surface of the quarter panel 136 of the upper 114 and the outer sole 112 so as to partially at least envelop the wearer's heel in use as shown in FIGURE 2.

[096] At the mid-section 122 comfort liners of an increased thickness may be used so as to form fit to the arch of the foot and provide further stability and comfort.

[097] The prior art attempts at form fitting using comfort liners and inserts of the foot to the shoe as shown in FIGURE 2 may provide more stability and comfort at the toe box, the ball of the foot and rear section of the shoe 110 as is desirable for walking and standing in high heels.

[098] However such a multitude of ad hoc measures to provide better comfort and fitting are highly variable in success. In addition after-market inserts are prone to failure by being displaced or lost as well as being aesthetically unappealing. Furthermore foot insertion into such complicated comfort liner arrangements in shoes may be difficult as care is required to not dislodge the comfort liner inserts from their preferred positions. Discomfort and pain in such arrangements is common for the heel, arch and ball of the foot as well other problems to, for example, pain and discomfort to the lower back and legs from poor fitting shoes.

[099] A further comfort liner may have very small breathing holes and/or a wicking arrangement to conduct away moisture and provide for some circulation of air to the sole of the foot. Such a further comfort liner may be necessary if the use of a multitude of ad hoc comfort liners results in a cramped shoe which does not breathe adequately.

[0100] FIGURE 3 illustrates another prior art shoe 110 where only the inner comfort liner 127 may line the inner surface of the upper 114 at the toe box 134, the quarter panel 136 of the rear section 114 and the inner and outer vamps 138, 140 (not shown).

[0101] FIGURE 3 also illustrates the common use of a prior art shank 310 installed into or onto the outer sole 112 to provide further reinforcing, support and stability to the arch of the foot as well as the mid-section 122 of the shoe 110. The shank 310 may be a strip, a plate or a number of rods extending from the heel seat 128 to the ball of the foot as shown in FIGURE 3. Alternatively the shank 310 may extend further to a forefoot section 312 of the outer sole 112 between ball of the foot and the toes. The shank 310 is often a steel, or an aluminium alloy, or other suitable material such as a composite or a durable plastic for example.

[0102] The outer sole's 112 uppermost surface within the shoe is typically smooth and regular to aid in fitting of comfort liners so that these are also free of bumps, depressions or other irregularities. A smooth surface for the inner sole is considered normal and highly desirable in the prior art both for fitting and aesthetics.

[0103] FIGURE 4 illustrates another prior art version of FIGURE 2 where no comfort liners are present for the upper 114 of the toe box 134. In addition for the inner side of the upper 114 of the quarter panel 136 a single inner comfort liner 127 may only present at a height sufficient to attempt to "cup" or socket the heel of the foot to the heel seat 128. The socketing of the heel of the foot 210 to the heel seat 128 may reduce forwards and downwards movement of the foot into the toe box 134 and the front section 118 of the high heel shoe 110. An absence of a comfort liner at the top of the quarter panel 136 allows for a space 410 between the back of the foot 210 and the quarter panel 136 and may prevent abrasion of the back of the foot 210 by the quarter panel 136. The toe-box 134 upper may be made of soft suede, leather or similar material to reduce or prevent abrasion.

[0104] Despite these prior art devices and methods: when a wearer of high-heeled shoes (without the invention) is standing upright, the wearer's body weight and/or load distribution is generally shifted to the at the front of the foot 210, often resulting in the foot sliding forwards and downwards within the high heeled shoe resulting in the toes becoming cramped or crowded within the toe box. At the same time, an undesirable gap may form between the back of the heel and the rear section of the shoe, which can result in abrasion between a skin surface of a foot and a high heeled shoe occurring as the wearer walks.

[0105] In addition to slipping between the sole of the foot and the shoe a lack of engagement or coupling between the anatomical features of the foot sole and the shoe inner may also contribute to a lack of security and stability when walking, dancing or otherwise using the high heeled shoe.

[0106] Prior high heeled shoes and boots lack in appropriate cushioning, support and engagement or coupling between the sole of the foot and the sole of the shoe.

[0107] FIGURE 5 is a perspective view of a high heel shoe 510 with multiple pads 512, 514, 516, 518, 520 for comfort and support applied to the inner surface of the upper 114.

The pads may contain foam as described elsewhere for the comfort liners and/or as per the pockets described below with respect to FIGURES 9 to 11. The pads may be located as follows in FIGURE 5:

- Pad-a 512 within the front of the toe box 134;
- Pad-b 514 within the toe box 134 and adjacent the opening 142.
- Pad-c 516 located on the upper 114 behind the forefoot section 312 and at the front end 146 of the outer vamp 140.
- Pad-d 518 located on the inner surface of the outer vamp 140.
- Pad-e 520 located at the quarter panel 136 adjacent the heel seat 128.

[0108] At these positions the cushioning may be supportively mounted on the inner of the shoe upper 114 and the compressible material adds resistive support by cushioning means.

[0109] As is shown in the prior art example of FIGURE 6, the art or skill of moving in high heels is a combination of maintaining balance but also to rock in a walking mode between engaging the ground with the heel 130, 132 and engaging the ground with the outer sole 112 at the front section 118 at the ground engaging surface 133. The rocking or walking motion is shown by the bold double ended arrow 612 together with the ground contact points of a rear point 614 at the heel 130, 132 and a front point 616 at the ground engaging surface 133. The rocking/walking motion between the rear point 614 at the heel 130, 132 and the front point 616 at the front section 118 requires dynamic support of the foot 210 within the shoe 110. Other axes of rotation and directions of movement are present for other complex and vigorous activities with high heeled shoes, for example dancing, running and acting or performing on stage.

[0110] An example of dynamic support for walking may be as follows. At first contact of the heel 130, 132 to the ground the user's heel can be directly supported. However with the rocking action from rear point 614 to front point 616 the foot at the ground engaging section 133 of the front section 118 of the shoe 110 gradually needs increasing support and a further element is the follow on roll-over of the front of the foot before the foot again is lifted in mid stride while the other foot is providing the ground support and engagement.

[0111] A use of reactive support may also be desirable. That is the cushioning means does not merely provide a resilient compressibility but instead provides a reactive support, or in other words a stiffer or harder support than the other liners or layers to the sole.

[0112] In one form of a shoe 710 as shown in FIGURE 7 this may be achieved by a combination of harder resistive or stiffer elements 712, compared with typical inner comfort liners. The stiffer elements may be embedded in a cushioning absorptive element 714. The upper 114 of the toe box 134 of FIGURE 7 has been partially cutaway in the drawing in order to view the features 712, 714. These resistive or stiffer elements 712 may provide a massaging effect. The resistive elements 712 may also provide a viscous flow between the toes and the resistive elements 714 if they are interconnected by channels 714 and filled with a semi-liquid gel or viscous liquid such as an oil. In an example the resistive element 712 may be a dashpot element so that there is a resistive force backwards but there is a cushioning by the dashpot effect. The dashpot effect may be considered as the viscous flow between interconnected 714 resistive elements 712 if filled with a semi-liquid gel or otherwise as described above. The amount of relative force resistance to force absorption provides a difference in the ride of the user in the shoe and can provide a massaging effect and support function.

[0113] Another effect of the arrangement in the shoe 710 of FIGURE 7 is to have a slight rise or raising at the forefoot section 312 between the toes and the ball of the foot provided by the resistive elements 712. This may give the wearer improved stability and placement for better support. Combined with a toe box the slight rise with the resistive elements 712 may help protect the toes, separate the toes and keep the toes from being crowded and cramped in the forefoot section which will then give further stability and comfort for the wearer as well as reducing abrasion and pressure between the toes which may lead to blisters, calluses and / or corns.

[0114] The provision of a slight rise 712 at the forefoot section 312 is described further with the following FIGURES 8 and 10. The slight rise may also provide further support to the front of the ball of the foot to prevent the foot moving forwards and downwards to the front section 118 of the shoe 710. The slight rise may be in the order of approximately 1 to 5 mm above the cushioning absorption elements 712 top surface. In contrast to a ridge described with respect to FIGURE 12 and further: the slight rise 712, 714, 816 is pre-

formed to or within the cushioning layers to the sole 112. That is the slight rise is present even when no foot pressure is applied to the cushioning layers and the sole.

[0115] In another embodiment or version, the resistive element 712 may be tiny balls of liquid gel, described in detail with respect to FIGURES 9 to 11, which are collected in pockets to form the resistive element 712. For example the resistive elements may also be a silicone/semi liquid gel, some as vessels with small, approximately 1/3mm to 3mm balls enclosed in them and further surrounded with a viscous gel at the inner sole 126 of the toe box 134.

[0116] The materials used for the features of FIGURE 7 are described below with respect to FIGURE 12 for cushioning materials.

[0117] In all embodiments to the invention herein, the high-heeled shoe is not limited to being a closed back high-heeled shoe as described above, but may instead be an open-back or strap shoe (not shown). For example as shown in FIGURES 12A and 12B.

[0118] FIGURE 8 is a platform high heel shoe 810. A platform 812 is located in the front section 118 of the outer sole 112 to raise the height of the front of the shoe as shown. The platform may also be made of a material that provides some cushioning. For example a rubber as described with reference to FIGURE 12A. It will be readily appreciated that respective heel and platform heights may vary and that a person skilled in the art may adjust the invention/s described herein to accommodate absolute and relative variations in heel and platform height. For example the person skilled in the art may adjust the invention/s to account for various angles between the front and back of the shoe for different shoe styles.

[0119] At and embedded within the heel seat 128 of the shoe 810 is a cushioning means provided as a heel gel cushioning cup 814, as shown in FIGURE 8. Alternatively the heel cup 814 may contain one or more of the materials described for cushioning materials with respect to FIGURE 12A.

[0120] The forefoot section 312 of the shoe 810 may also feature a pre-formed slight rise 816 in the inner cushioning layer 827 to provide support as well as reducing forwards and downwards movement of the foot in the shoe as described above with respect to FIGURE

7. The slight rise 816 may be approximately 1 to 5 mm in height compared with the rest of the inner layer 827 at the front section 118 of the shoe 810. Alternatively the slight rise may be up to 15mm high. The slight rise 816 may be pre-formed when an inner cushioning liner 827 is made or an additional cushioning element inserted, for example as described with respect to FIGURE 7. Alternatively the slight rise may be formed in one of the other cushioning layers (not shown).

[0121] Comfort liners as described with respect to FIGURES 1 to 4 may also be used together with the cushioning means and slight rise of FIGURE 8. Alternatively the cushioning layers and arrangements described below may also be used.

[0122] FIGURE 9 is a longitudinal cross-section of a shoe 910 with a single inner cushion layer 927 within which are three pockets 912, 914, 916 as shown. The three pockets may contain tiny balls 918 of a semi-liquid gel, a liquid, a semi-solid, a viscous liquid such as an oil and/or a silicon oil. The balls may have a diameter range of approximately 1 to 3 mm. Alternatively the diameter range may be approximately in the range of 0.5mm to 3mm. The semi-liquid gel used in the tiny balls may be as described here elsewhere for other pockets and liquids. The three pockets 912, 914, 916 of tiny gel balls may provide cushioning and support means respectively to the ball of the foot at the front section 118, the arch of the foot at the mid-section 122 and at the heel seat 128. That is to anatomical features of the foot requiring more support and / or cushioning in high heeled shoes. A diameter, and a number of balls 918 in each pocket 912, 914, 916 may be varied according to the level of cushioning and support means desired.

[0123] The pocket cushioning 914 provided in the midsection 122 of the shoe 910 may provide the wearer with improved arch support to reduce the pain and discomfort that may occur in the arch region of the foot 210. For example conditions such as metatarsalgia as a result of wearing such high-heeled shoes may be reduced by such cushioning and support in the midsection 122 of the shoe 910. Support of the arch region of the foot 210 may also help to reduce the occurrence of aching or fatigued legs, particularly in the wearer's calf region. A more detailed and alternate description to arch or instep support of the foot is provided below with respect to FIGURES 19 and 20A.

[0124] FIGURE 10 is another version of a cushioning and support means applied to a shoe 1010. In contrast to FIGURES 8 and 9 the inner cushioning layer 827 with a slight

rise 816 of FIGURE 8 and an outer cushioning layer 927 with the three pockets 912, 914, 916 of FIGURE 9 are used together. Within the central or outer layer three pockets 912, 914, 916 of tiny gel balls 918 may be placed as described above with respect to FIGURE 9. In addition the heel gel cushioning cup 814 may also be located at the heel seat 128 as described above with respect to FIGURE 8.

[0125] The use of the slight rise 816 with the cushioning pockets 912, 914, 916 in the shoe 1010 of FIGURE 10 enables the foot 210 to be supported in position by the rise 816 so that foot remains located or secured in place appropriately above the cushioning pockets 912, 914, 916. That is the anatomical features of the foot of the ball of the foot, the sole and arch at the instep and the heel are maintained in position above their corresponding front section pocket 912, mid-section pocket 914 and heel seat pocket 916.

[0126] Another example of a rise is described below with respect to FIGURE 26.

[0127] The shoe of FIGURE 10 may also include prior art comfort liners as described previously with respect to prior art FIGURES 1 to 4.

[0128] FIGURE 11 is an alternate version of FIGURE 10 where the shoe 1110 has three pockets 1112, 1114, 1116 as another cushioning means that instead bridges across or may be embedded in both an inner cushioning layer 1120 and an outer cushioning layer 1122 as shown. The inner cushioning layer 1120 may be as described elsewhere as well as it may be a layer of silicone or semi-liquid gel. The outer cushioning layer 1122 may be a memory foam as described elsewhere here. The pockets 1112, 1114, 1116 may each have within them tiny gel or liquid balls 918 as described above. In addition the mid-section pocket 1114 may also have one or two layers of a gauze or a mesh 1118 to improve the cushioning and/or stability provided by the mid-section pocket 1114. The mesh or gauze 1118 may be selected from open or closed aperture types and/or a scrim type depending on the level of cushioning and/or stability desired. The material for the mesh or gauze 1118 may be as selected by a person skilled in the art for compatibility and function within the pocket 1114. Alternatively one or more of the pockets 1112, 1114, 1116 may be formed of or contain a heat formable foam for custom fitting by heating of the shoe as described above. The order of the layers 1120, 1122 and the pockets 1112, 1114, 1116 embedded within them may also be varied in order to improve or change the cushioning and

supporting means as desired for comfort, stability and the other desirable features described above.

[0129] An advantage of one or more pockets 1112, 1114, 1116 extending through multiple cushioning layers is that the benefits of multiple cushioning layers with different softness or stiffness may be had together with the pockets. In addition thicker more effective pockets 1112, 1114, 1116 may be employed to supply more cushioning and support as described.

[0130] It will be readily appreciated that the cushioning layers, pockets, rise and other features described with reference to FIGURES 7 to 11 may be retrofitted to some existing high heeled shoes with conventional outer soles 112. That is the inner soles or foot bed 126 of an existing prior art shoe 110 may be removed or stripped out and the inventions of Figures 7 to 11 as an after-market conversion or retro fitting process or the like may be installed into the shoe to give it superior performance.

[0131] As shown in FIGURE 11, one or more of the three pockets 1112, 1114, 1116 may extend into a specially formed insole 1124 which also forms the outer sole. The heel pocket 1116 may extend through the insole 1124 to couple or otherwise join with the heel gel cushioning cup 814 to provide further cushioning at the heel. Specially formed insoles are described in more detail with respect to FIGURES 12 to 27 together with other cushioning means and their operation.

[0132] FIGURE 12A is a longitudinal cross-sectional view along the lines 12A-12A of FIGURE 14 for a shoe 1210. The shoe 1210 has a different arrangement and configuration of cushioning layers 1212, 1214, 1216 together with an insole 1218 featuring recesses corresponding to anatomical features of the foot. The upper 114 of the shoe 1210 are described after the description to the cushioning layers and the insole 1218, together with respect to FIGURE 12B for an alternative upper.

[0133] FIGURE 12C is an exploded representation of FIGURE 12A but without the upper components.

[0134] A key to the hatching for cushioning layers 1212, 1214, 1216 and the insole with recesses for FIGURES 12 to 27 is provided at FIGURE 13.

[0135] In FIGURE 12A the outer sole has been replaced by an insole 1218 with recesses corresponding to anatomical features of the foot. A heel recess 1220 corresponding to the heel is formed in the insole 1218 to accommodate a central cushioning layer 1214a for the heel together with an stiffer outer cushioning layer 1212 such that the upper surface towards the sole of the foot is still smooth and continuous. An optional inner cushioning layer 1216 which is softer or less stiffer than either of the central 1214 or outer 1212 cushioning layers may be overlaid to both the central and outer cushioning layers. In a similar fashion a ball of foot recess 1222 may be formed in the insole to also accommodate a corresponding central cushioning layer 1214b for the ball of the foot together with a stiffer outer cushioning layer 1212 such that the upper surface towards the sole of the foot is smooth and continuous for the ball of the foot.

[0136] An outer sole 112 and/or a tread 133 may also be attached to the insole 1218 if desired.

[0137] FIGURE 14 is a plan view of the cushioning layers of FIGURE 12A with the continuous overlaid inner cushioning layer 1216 shown as transparent to the central cushioning layer 1214 for illustrative purposes. A central cushioning layer 1214c corresponding to the sole of the foot at the instep or arch is also shown in FIGURE 14. The extent and shape of the central cushioning layer 1214a, 1214b, 1214c to the anatomical features of the foot that it is engaging or otherwise coupling with can be seen in FIGURE 14. That is the outline of the sole at the heel, instep through to the ball of the foot may be seen as the central cushioning layer 1214a, 1214b, 1214c.

[0138] FIGURES 15 to 18 are transverse sectional views of the cushioning layers 1212, 1214, 1216 and insole 1218 along the lines 15-15, 16-16, 17-17 and 18-18 shown in FIGURE 14. FIGURE 17 also shows the transverse cross-section of the recess corresponding to the sole of the foot at the arch or instep. The corresponding cushioning layer 1214c is shown within the recess 2712. Also in FIGURE 17 a transverse profile of the insole 1218 cushioning layers is shown supporting 1710 the arch of the foot as shown. At FIGURE 20A the support of the arch by the outer cushioning layer 1212 is described in association with the support for the rest of the foot. It will be readily appreciated that the profile of the insole 1218 for the arch support, FIGURE 17, may be varied depending on the support desired for the arch or instep for a group or subpopulation of shoe wearers. For

example the profile of the arch support 1710 provided by the insole and the cushioning layers may be varied depending specific arch demands and shapes, that is high and/or low arches as well as strong and weak arches of the foot.

[0139] A description to the performance of the cushioning layers and insole of FIGURES 12 to 18 is provided below with respect to FIGURES 19 and 20A.

[0140] It will be readily appreciated that the recess 1220 at the heel may extend through the insole 1218 and into the heel seat 128. Providing such an aperture through the insole at the heel may be used to increase the available depth for the cushioning layers to further improve their operation. The aperture (not shown) may also be used to couple with a heel gel cushioning cup 814 as described with respect to FIGURES 8 and 11. An example is shown in part at FIGURE 12B and described further at FIGURE 12B below. In a similar fashion the recess 1222 at the ball of the foot may also be extended to form an aperture (not shown) extending into the platform 812. Additional cushioning such as a platform version of the heel gel cushioning cup may also be present in the platform to be coupled with by the cushioning layers at the ball of the foot.

[0141] The insole 1218 with recesses corresponding to anatomical features of the heel, ball of the foot and the sole of the foot at the arch or instep may be moulded or otherwise formed from a Last model of a foot. Alternatively a standardised version of a foot for a subpopulation or shoe size may be used as is common for mass production of shoes. The Last may have additions to it to allow the forming of the recesses. The recess dimensions may be proportioned from the corresponding anatomical feature taking into account the placement of the outer cushioning layer 1212 and the central cushioning layers 1214a. 1214b, 1214c. In particular the depth of the recesses may be adjusted to the level of comfort, softness or secure fitting required by the shoe wearer as described with respect to FIGURES 12, 20A and earlier. The Last model or master template may be produced by a master shoemaker craftsman or as adapted by a person skilled in the art of mass production of shoes. A cordwainer is also another term used for a shoemaker. Another Last used for assembly of the shoe is described with respect to FIGURE 27.

[0142] The insole 1218 may be formed in one example by moulding on a Last template using a suitable thermoforming plastic. In another example a fibreglass or carbon fibre matting with epoxy lay-up may be done to mould a high strength composite insole. In yet

another example the dimensions of the Last template may be measured to provide a numerical template or co-ordinates for a numerically controlled machine, or otherwise programmed, to machine an insole from a suitable material. Another example of a mass production technique that may be used from Last template is the use of injection moulding techniques with those moulds being based on a Last template. Alternatively a master shoemaker craftsman may select a method and materials for making the insole with recesses from the Last as appropriate. For example a heel 130, a platform 812, the outer soles 112, and/or treads 132, 133 may be integrally formed as one piece with the insole 1218. Injection moulding techniques may be appropriate for this integral, one piece forming.

[0143] A shank (not shown) may also be formed with the insole or formed afterwards and attached to the insole 1218. For example if the insole was formed or moulded using fibreglass and carbon fibre matting then extra carbon fibre sections may be incorporated into the insole to provide strength where required and conveniently about the desired positions of the recess that correspond to various anatomical features. For example a loop of carbon fibres may be laid up around the periphery of the insole 1218 being formed in order to provide the structural rigidity performed by conventional shanks. Ribs or cross pieces of carbon fibre may extend from the periphery to the heel seat and ball of foot as required for strength and outer sole performance with the heel. In another example strips of shank material may be used in a similar fashion as described for the prior art of FIGURE 3. That is one or more strips of shank may be attached to the upper or lower surfaces of the insole to provide further strength. The shank pieces may be inserted into reliefs within the insole and shaped to the insole so as to be flush with the insole surface and not provide irregularities to the sole of the foot or cushioning layers. The shank material may be suitably selected from for example a high strength plastic, a carbon fibre composite, a fibreglass composite a metal or any other material selected by a person skilled in the art that is fit for purpose in terms of strength and weight. At FIGURE 27 a description of the fixing or otherwise fastening of the heel to the insole and shank is described.

[0144] The insole 1218 that may be formed is considerably more rigid than any of the cushioning layers. A rigid insole 1218 is generally considered highly desirable although some flexibility in the insole in the ball of the foot may aid in walking, dancing and running. Accordingly the construction of the insole may be varied to provide more

flexibility as desired, as would be designed and built for example by a master shoemaker craftsman.

Cushioning Materials

[0145] At FIGURES 19 and 20A a more detailed description to the operation of the cushioning layers with the recesses of the insole is provided. However to provide some background for the materials examples of below a short description to materials and cushioning layer function is provided here. The central cushioning layer 1214 may be of a greater thickness, a greater density (proportional to stiffness in some foams), reduced compressibility and/or a greater firmness (as determined by the layer's compression force deflection (CFD) rating or another industry measure of compressibility or hardness) relative to the inner cushioning layer 1216. In this respect, the softer, more compressible, inner cushioning layer, which directly engages the wearer's foot, is more readily conformable to the outline of the anatomical features to provide greater comfort, support and protection in use. The central cushioning layer may provide an intermediate layer of softness or stiffness between that of the inner cushioning layer and the outer cushioning layer 1212 so as to provide a lower degree of compressibility (higher stiffness) compared with the inner cushioning layer. The outer cushioning layer 1212 being stiffer or harder than the central cushioning layer 1214. In this arrangement, the lower, relative compressibility of each of the central cushioning layer 1214 and the outer cushioning layer 1212 may help to prevent the foot 210 from compressing or "bottoming out" through the cushioning layers and / cushioning means. That is the cushioning layers may also have a density or stiffness gradient from being softest closest to the sole of the foot to being harder closer to the insole 1218.

[0146] Preferably one or more of the cushioning layers may be made of Poron ®. Poron is a microcellular foam with air permeable open cells that aid the passage of air and moisture. That is Poron is a breathable foam. Poron is also highly durable in being able to withstand many cycles of compression as well as extreme compression and still being able to re-expand to provide original performance. It will be readily appreciated that a similar material may be used to provide a similar performance as Poron as described here and with respect to the invention. Such materials for cushioning are particularly favourable to preventing calluses and blisters to the foot.

[0147] Alternatively one or more of the cushioning layers may be manufactured from an open-celled structure memory foam.

[0148] Alternatively a closed cell structured foam may be used for one or more of the cushioning layers. The closed-celled structure affords the conformable cushioning material with a higher compression force deflection rating (greater firmness or stiffness), a lower moisture absorption coefficient, and a higher density than if it were an open-celled structure.

[0149] Alternatively a foam latex or sponge may be used.

[0150] In another alternative one or more of the cushioning layers may be of a memory foam or other cushioning material that may also be heat formable. Viscoelastic or a low resistance polyurethane (LRPu) foam, more commonly known as "memory foam" may also be suitable. Memory foam has an open-celled structure that reacts to body heat and weight, enabling the foam to conform to the shape of the wearer's foot 210 in use. Alternatively the memory foam may be substituted or augmented with a heat formable foam that may be heated moderately to allow a foot to shape the foam in-situ in the shoe. The heat formable foam may then be allowed to cool so that it permanently retains the shape of the foot used to form it in-situ.

[0151] It will also be readily appreciated that the material for the central cushioning layer may also be selected to improve its characteristics to moulding to an anatomical feature as described herein.

[0152] Alternatively one or more of the cushioning layers may instead be made from another suitable material such as natural or synthetic rubber, including but not limited to an unsaturated rubber, a saturated rubber, or another elastomer. Unsaturated rubbers may include natural rubber, synthetic polyisoprene, butyl rubber, halogenated butyl rubbers, polybutadiene, styrene-butadiene rubber, nitrile rubber, hydrogenated nitrile rubbers, chloroprene or neoprene rubber. Saturated rubbers may include ethylene propylene rubbers and ethylene propylene diene rubber, polyacrylic rubber, silicone rubber, silicone gel, latex, ethylene vinyl acetate, and polyurethane.

[0153] In yet another alternative one or more of the cushioning layers or cushioning means may be fluid or a gel such as: a compressible gas, silicone, a semi-liquid gel, liquid, semi-liquid, semi-solid, a gel, an oil, a silicone gel, a highly viscous liquid, gel, a combination of these or as chosen by a person skilled in the art.

[0154] Preferably the outer cushioning layer 1212 is made of Poron ® of approximate thickness between 3 to 6 mm and more preferably approximately 4.5 mm thick. Preferably the central cushioning layer 1214 is made of a memory foam with an approximate thickness range of 2 to 4 mm or more preferably approximately between 3.0 to 3.2 mm. Alternatively the central cushioning layer may have a thickness range of approximately 2 to 6 mm. Preferably the inner cushioning layer 1216 is made of a latex foam of approximate thickness between 2 to 4 mm and more preferably approximately 3 mm thick. Alternatively the inner cushioning layer may have an approximate thickness range between 2 to 6 mm.

[0155] It will be readily appreciated that the thickness of the layers and the presence or absence of the inner cushioning layer may be adjusted by a person skilled in the art to achieve the described level of fitting and comfort for the invention described herein.

[0156] In other embodiments, the cushioning and support means may be not limited to comprising three cushioning layers as described above for FIGURE 12, but may comprise one, two or more than three cushioning layers as desired together with other elements described here. For example as described with respect to FIGURES 22 to 26.

[0157] In other embodiments, the thickness, density, stiffness, softness and/or compression force deflection (CFD) rating, of the three cushioning layers may not be limited to that described above. In one example, the central cushioning layer may be of a thickness, density, and/or CFD rating that is less than those of the inner cushioning layer. That is the relative values of the properties of the cushioning layers may be changed to further improve the performance of the invention, for example the central cushioning layer may be more compressible than the inner cushioning layer as may be determined by a person skilled in the art. For example as described with reference to FIGURE 24.

[0158] The upper 114 of the shoe 1210 features conventional items of a heel strap 1224 for an open heel and the toe box 134 for open toes. Instead of a conventional buckle and

strap an elasticised strap or band 1226 about the heel 130 and over the instep of the foot is used instead. The elasticised band 1226 may be attached to the heel 130 by a suitable glue, stitching or a friction fit. The band 1226 may be approximately 15 to 25 mm wide or more preferably approximately 20 mm wide or as selected by a person skilled in the art such as a shoemaker.

[0159] In use the elasticised band 1226 stretches over the foot as the foot is inserted into the shoe. The elasticity of the band being chosen to expand with ease for putting the shoe on whilst firm enough to hold the shoe to the foot without a looseness or slipping. The elasticised band 1226 provides an advantage in replacing the use of a buckle and strap.

[0160] FIGURE 12B shows a shoe 1228 with an alternative upper 114 for the shoe 1210 of FIGURE 12. The shoe 1228 of FIGURE 12B has a closed heel upper 1230 and a buckle and strap 1232. The cushioning layers and insole are as described herein. In addition a heel gel cushioning cup 814 at the base of the heel is shown as for FIGURE 8. Accordingly the heel recess in the insole is extended to be an aperture through the insole in order for the cushioning layers to couple with the heel gel cup 814 for cushioning.

[0161] In general the upper of the shoes 1210, 1228 may also include features discussed with respect to the prior art of FIGURES 1 to 4 to improve the comfort and fit of the shoe.

[0162] FIGURE 19 is the shoe 1210 of FIGURE 12A but only showing for clarity purposes the insole 1218 with cushion layers 1212, 1214, 1216. The foot 210 is shown with the sole 1910 of the foot just above the inner cushioning layer 1216. The correspondence between the anatomical features of the sole 1910 of the foot and the corresponding recesses 1220, 1222 and central cushioning layers 1214a, 1214b is shown. For example the anatomical feature of the ball 1912 of the foot 210 corresponds to the recess 1222 and the cushioning layer 1214b. Similarly the anatomical feature of the heel 1914 of the foot corresponds to the heel recess 1220 and the cushioning layer 1214a.

[0163] FIGURE 20A shows the sole 1910 of the foot 210 depressing in the direction of the arrows 2010, 2012 the inner cushioning layer 1216 and the central cushioning layer 1214b at the ball 1912 of the foot and the heel 1914 as the full weight of the wearer is applied to the shoe 1210. The softest inner cushioning layer 1216 at the ball 1912 of the foot and the heel 1914 has been substantially compressed down to the central cushioning

layer 1214a,b in each respective recess. As the foot further depresses as shown by arrows 2010, 2012 the anatomical features of a front 2016 of the ball 1912 of the foot and a front 2018 of the heel 1914 respectively engage or couple with respective ridges 2020, 2022, as shown in FIGURE 20A, formed by the depressing foot. The respective ridges 2020, 2022 are formed at the upper surface of the outer cushioning layer corresponding to the front or forward edge of the respective recesses 1222, 1220 and the periphery of the respective central cushioning layers 1214b, 1214a. The ridge 2020 to the front of the ball of the foot 2016 is also formed by the presence of the front periphery 2030 of the ball of foot recess 1222. The front periphery 2030 may be shaped to provide a different rise or ridge as desired, for example as shown with the alternate front periphery 2032 shown in FIGURE 20B. The alternate front periphery 2032 of the recess 2026 in FIGURE 20B has been raised slightly and profiled differently so that it may increase the ridge 2020 height and profile so as to provide increased support to the front of the ball of the foot 2016. The ridge 2020 may also be formed by varying a shape and a thickness of the outer cushioning layer 1212 at and adjacent to the ridge 2020.

[0164] In a similar fashion the ridge 2022 for supporting the front of the heel 2018 may also be formed by the presence of the front of the periphery of the heel recess 2034 as shown in FIGURE 20B. The periphery of the heel recess 2034 may also be varied in height and profile to vary the height and profile of the heel ridge 2022. The heel ridge 2022 may also be formed by varying a shape and a thickness of the outer cushioning layer 1212 at and adjacent to the heel ridge 2022.

[0165] It will also be readily appreciated that the shape and materials of the central cushioning layer 1214a,b at its periphery where it joins the outer cushioning layer 1212 for the ridges 2020, 2022 may also be varied to change the height and profile of the respective ridge for its support and cushioning functions.

[0166] The ridges may be approximately 2 to 6 mm above the inner cushioning layer that is not substantially compressed by the foot. It will be readily appreciated that the ridge height will vary as the weight borne by the shoe varies with walking, running and dancing for example. Advantageously the ridge height increases with more weight or downward force, which is also the load conditions under which increased slipping and a lack of secure engagement between sole and foot may occur. That is the ridges increase their support with increasing load demands between the foot sole and the shoe.

[0167] It is also shown in FIGURE 20A that the outer cushioning layer's 1212 softness or stiffness has been selected so that it has not been substantially compressed by the weight of the wearer bearing down on the shoe. It will be readily appreciated that the softness or stiffness of the outer cushioning layer has been selected also so that it does not "bottom-out" or compress to such an extent that the wearer is jarred or can adversely feel the more rigid insole 1218 beneath the sole 1910 of their foot 210 when walking, dancing, running or other motions with the shoe.

[0168] It is apparent also from FIGURE 20A that the central cushioning layer 1214 is softer or less stiff than the outer cushioning layer 1212 so that the central cushioning layer 1214 is preferentially depressed or compressed in comparison to the outer cushioning layer 1212. Accordingly this results in the ridges 2016, 2018 being formed. This arrangement also moulds itself to the anatomical features of the ball 1912 and heel 1914 of the foot so as to provide a secure fitting by "cupping" or otherwise moulding to the desired anatomical features by the central cushioning layer 1214 and furthermore by one or more of the other cushioning layers 1212, 1216.

[0169] The respective ridges 2016, 2018 may aid in supporting the foot at the ridges' corresponding anatomical features to reduce or prevent slippage of the sole of the foot down the shoe 1210 and towards the shoe's front section 118. For example the ridge 2020 at the front section of the shoe provides support to the front 2016 of the ball of the foot 1912 so that the ball of the foot does not slip forward in the direction shown by arrow 2036. Another view of the ball of foot ridge 2020 is shown and described below with respect to FIGURE 21. In particular the support is supplied by a cushioned, moulding surface as well as the ridge to further improve engagement with the foot and reduce discomfort and fatigue to those sections of the foot. In a similar fashion the heel ridge 2018 may provide support and mould to the front portion of the heel at the sole to reduce slippage and provide better engagement between the foot sole and the shoe.

[0170] It will be readily appreciated that ridges 2020, 2022 as well as preventing forward 2036 and downward slipping of the foot in the shoe also provide a transfer or re-distribution of weight borne by the foot to the shoe more towards the ridges. For example the pressure on the ball of the foot is reduced in the shoe 1210 as consequence of the support provided by the ridge 2020 to the front of the ball of the foot.

[0171] The inner cushioning layer 1216 has also been substantially compressed at the sole 1910 corresponding to the instep or arch 2014 of the foot for this cross-section of the shoe 1210. However for the longitudinal cross-section of the shoe 1210 shown in FIGURES 12A and 20A and the transverse section of FIGURE 17 the central cushioning layer 1214 is not present at the arch 2014 of the foot. Instead some support is provided by the outer cushioning layer 1212 to the arch 2014, whilst the majority of weight bearing is at the ball 1912 and heel 1914 of the foot. Advantageously the arch support by the cushioning layer also provides further securing and moulding to the foot to provide a superior secure fitting for walking, dancing and running for example.

[0172] In addition a ridge 2110 of FIGURE 21 (below) that is formed along the sole of the foot opposite the arch may also provide further opposing support and securing to the arch support so as to also cup and otherwise mould to the sole of the foot corresponding to the arch/instep. That is the corresponding anatomical feature to the central cushioning layer 1214c as shown in FIGURE 14.

[0173] Too much arch support can lead to discomfort and pain with the ankles, knees and upper body. Accordingly the support between the arch and the ball of the foot and the heel needs to be adjusted so that the arch support is not bearing too much weight from the foot.

[0174] It will be readily appreciated that the softness or stiffness of the cushioning layers with respect to each other and in absolute terms may be selected to give the performance described above when using the invention.

[0175] Alternatively the central cushioning layer may include entirely or in part a fluid or gel (not shown) as described elsewhere here. When the foot depresses the central cushioning layer, the fluid or gel may be displaced to the periphery of the central cushioning layer so as to form a protrusion or bulge (not shown) about the periphery. The protrusion or bulging about the periphery of the central cushioning layer may provide further ridges to engage with the anatomical features of the sole of the foot. In addition this displacement of fluid or gel with formation of the peripheral protrusion or further ridges may provide additional moulding and cupping to the anatomical features to improve comfort and a more secure fitting. This feature may also provide more adaptability for fitting an extended subpopulation of shoe wearers.

[0176] FIGURE 20B is an alternate insole 2024 to that of FIGURES 12A, 19 and 20A, for example. The insole 2024 of FIGURE 20B has deeper recesses 2026, 2028 compared with the other insole 1218 of FIGURES 12A and 20A for example. A deeper recess for the ball of the foot 2026 and / or heel recess 2028 may be deeper with respect to the surrounding upper surface of the insole 2024. A deeper recess may provide a better fit and more comfort as a consequence of an increased thickness of the central cushioning layer 1214 associated with the deeper recess. In addition the deeper recess may be dimensioned or proportioned as thus according to the anatomical features of a subpopulation of wearers. A deeper recess may also provide for the formation of a higher ridge when the foot depresses the cushioning layers and in particular depresses the central cushioning layer preferentially in comparison to that of FIGURE 12A for example.

[0177] FIGURE 21 is the plan view of the cushioning layers of FIGURE 14. FIGURE 21 also shows in addition a plan view of the ridge 2020 formed across the front of the central cushioning layer 1214b and across to the outer cushioning layer 1212 for the ball of the foot as shown.

[0178] FIGURE 21 also shows another ridge 2110 formed along the side of the foot opposite the arch. This instep ridge 2110 is formed in a similar fashion to the other ridges described with respect to FIGURE 20A.

[0179] FIGURES 22 to 25 show various alternate configurations of the insole, recess and cushioning layers of FIGURE 12A. FIGURE 22 shows the configuration of FIGURE 12A but without the inner cushioning layer 1216.

[0180] FIGURE 23 shows another configuration where the outer cushioning layer 1212 has an aperture 2310 to allow the central cushioning layer 1214 to extend to the base of the recess 1220, 1222. In addition the outer cushioning layer does not extend into the recess.

[0181] FIGURE 24 shows another configuration where the position of the central cushioning layer 1214 and the outer cushioning layer 1212 have been reversed with respect to the recess 1220, 1222 only.

[0182] FIGURE 25 shows another configuration where the central cushioning layer 1214 is absent from the recess. The outer cushioning layer fills the recess and presents a continuous upper surface over the recess and to the rest of the insole for the foot.

[0183] The various example configurations of FIGURES 12A and 22 to 25 may be selected by a person skilled in the art according to a desired performance with respect to the forming of the ridges, moulding to the anatomical features by the cushioning layers, comfort and engagement with the anatomical features of the foot for example. For the example configurations of FIGURES 12A and 22 to 24 there is a preferential compression of the central cushioning layer to form the ridges. In the configurations of FIGURE 25 the absence of the softer central cushioning layer 1214 may result in a less desirable formation of the ridges with reduced performance and comfort.

[0184] FIGURE 26 shows a least preferred version of an outer cushioning layer 2610 which conforms as a layer with the recess 1220, 1222 to provide a further recess 2612 within which an anatomical feature of the foot engages with in FIGURE 26 the central cushioning layer 1214 is absent. In addition an alternate rise 2614 is pre-formed at the periphery of the recess 1220, 1222 and the further recess 2612 for further engaging or coupling with an anatomical feature of the foot. It will be readily appreciated that the thickness of the outer cushioning layer 2610 may be varied within and out of the recess in order to vary the height and shape of the alternate rise 2614.

[0185] FIGURE 27 is an exploded view of the assembly of the cushioning layers 1212, 1214, 1216 and insole 1218 to another Last 2710 that is used for shoe assembly. The Last 2710 used for shoe assembly is different to the Last described above with respect to FIGURE 12A which was used for forming the insole 1218 with the recesses.

[0186] In FIGURE 27 the insole 1218 is shown with the ball of foot recess 1222, the heel recess 1220 and a recess 2712 for the instep. The example insole 1218 shows the three recesses 1220, 2712, 1222 connected to each other. Alternate versions of the insole with recesses may have only one or two recesses corresponding to an anatomical feature for some shoes. For example some high shoe styles may not require the instep recess 2712.

[0187] The insole 1218 of FIGURE 27 also has shown a shank end with heel fastener aperture 2714. The shank end connects to the rest of a shank structure as described above with respect to FIGURE 12A. The heel fastener aperture is used to suitably fix the heel to the insole heel seat by at least one fastener. For example a screw fastener extending deep within the heel may be used. Alternatively up to or more than four fasteners may be used

depending on the insole and heel design. It will be readily appreciated that a person skilled in the art may design and apply a number of fastening and securing techniques that are fit for purpose.

[0188] The shoe may be assembled in the following manner and / or as would be done by a person skilled in the art such as a shoemaker.

- A Last for shoe assembly is produced.
- An upper of soft leather, suede or other high quality materials (as described herein) is added about the Last. This provides forming and positioning for the upper components. Optionally a further innermost layer to the upper may be provided that is soft and breathable to reduce moisture, for example leather, suede or other suitable material.
- The cushioning layers with insole are attached to the Last and the upper components. Optionally a further innermost layer to the sole may be provided that is soft and breathable to reduce moisture, for example leather, suede or other suitable material.
- The heel is fixed to the insole and/or outsole as necessary.
- The straps and other upper fixing devices to the foot are attached to the upper components. Good quality soft leather or other suitable materials may be used to improve comfort.
- When prototyping shoes a test by wearing of the shoe may be done at this point before permanent fixing of the shoe components together.
- Permanent fixing of the shoe components if required.
- An outer sole and tread is added to the insole, if not already incorporated in the insole fabrication.
- Trimming and polishing.

[0189] In addition for the heel upper an overlay of suede or soft leather as a padding or cover on the tip back centre stitch area may also improve heel comfort and alleviate rubbing or abrasion.

[0190] Alternatively the assembly of the shoe may be done by introducing the cushioning layers into the insole of the shoe section by section. For example, the inner cushioning layer, the outer cushioning layer, and the central cushioning layer may be first cut to correspond to the desired dimension for the insole and recesses and then stitched and/or

adhered together and affixed to the insole. The upper may then be constructed separately or with the use of a Last as described above. The rear section of the upper at the back of the shoe may be stitched and/or glued and then may be heat sealed together if the upper of the quarter panel is cut out as an inner quarter panel and an outer quarter panel. The outer sole area may be stitched and/or glued, then may be heat sealed together with the upper of the toe box. The upper of the toe box may be stitched and/or glued and maybe heat sealed together to the respective inner and outer vamps. Then the various upper sections are attached to the insole, possible with the aid of a Last to provide positioning and forming.

[0191] It will be readily appreciated that mass production techniques may be used to adapt the assembly of the shoe components but still be within the scope of the invention.

Further Advantages

[0192] In addition to the advantages and superior performance already described the following further advantages and features are also described.

[0193] It will be readily appreciated that the use of a recess, outer cushioning layer and central cushioning layer in this configuration provides an adaptable or mouldable arrangement to a sub-population of shoe wearers. That is individual, custom moulded insoles are not required to achieve a superior fitting for a high heeled shoe with this invention/s. For example the extent or dimensions of the recess to one or more anatomical features may be approximated and proportioned to a subpopulation of the female high heel shoe wearer population. Since the preferential depression (or compression) of the central cushioning layer moulds to the anatomical features it will also accommodate variations in shape of the anatomical features between individuals of a subpopulation of wearers. That is the moulding may accommodate slightly different dimensioned anatomical features in a subpopulation.

[0194] The recess dimensions, cushioning layer dimensions and materials may be selected so that the resulting composite of insole and cushioning layers is suitable for a subpopulation of high heeled shoe wearers. For example a subpopulation may be one or more of: a shoe size, a foot width, an arch or instep shape, subcutaneous fat about the foot, musculature of the foot, age, weight, racial type and as known by a person skilled in the art of orthopaedics and/or podiatry.

[0195] Shanks, fixing pegs, screws or other methods for fixing or fastening the heel to the insole may be incorporated into the moulded insole in a manner that is beyond and separate to the cushioning means used in the invention. In addition the cushioning means described here may prevent fixing or fastening techniques for the high heel from presenting a point of discomfort or pain to the heel of the foot.

[0196] The cushioning, moulding to anatomical features and ridges to anatomical features and the like are accommodated within a specifically formed insole with one or more recesses. The inner cushioning layer presented to the shoe wearer may be smooth and continuous that is both aesthetically appealing and makes for easy foot insertion without obstructions. For example after-market comfort liner inserts are not necessary. When the foot depresses the cushioning layers the invention to cushioning performance, moulding to anatomical features and ridges to support anatomical features becomes apparent and functions.

[0197] It will be readily appreciated that the invention may be not limited to high-heeled shoes as described above, but may instead be applied to other shoes including, flat-soled shoes, and sports shoes as appropriate. For example other shoes with an elevated rear section of the sole compared with a front section of the sole. Similarly the invention applies also to high heeled boots as described above.

Interpretation

Embodiments:

[0198] Reference throughout this specification to "one embodiment" or "an embodiment" means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrases "in one embodiment" or "in an embodiment" in various places throughout this specification are not necessarily all referring to the same embodiment, but may. Furthermore, the particular features, structures or characteristics may be combined in any suitable manner, as would be apparent to one of ordinary skill in the art from this disclosure, in one or more embodiments.

[0199] Similarly it should be appreciated that in the above description of example embodiments of the invention, various features of the invention are sometimes grouped together in a single embodiment, or description thereof for the purpose of concise

disclosure and aiding in the understanding of one or more of the various inventive aspects. This method of disclosure, however, is not to be interpreted as reflecting an intention that the claimed invention requires more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive aspects lie in less than all features of a single foregoing disclosed embodiment so reference may need to be made to the specification as a whole.

[0200] Furthermore, while some embodiments described herein include some but not other features included in other embodiments, combinations of features of different embodiments are meant to be within the scope of the invention, and form different embodiments, as would be understood by those in the art.

Different Instances of Objects

[0201] As used herein, unless otherwise specified the use of the ordinal adjectives “first”, “second”, “third”, etc., to describe a common object, merely indicate that different instances of like objects are being referred to, and are not intended to imply that the objects so described must be in a given sequence, either temporally, spatially, in ranking, or in any other manner, unless indicated otherwise.

Specific Details

[0202] In the description provided herein, numerous specific details are set forth. However, it is understood that embodiments of the invention may be practiced without these specific details. In other instances, well-known methods, structures and techniques have not been shown in detail in order not to obscure an understanding of this description and/or so as not to obscure the clarity of a drawing.

Terminology

[0203] In describing the preferred embodiment of the invention illustrated in the drawings, specific terminology may be resorted to for the sake of clarity. However, the invention is not intended to be limited to the specific terms so selected, and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar technical purpose. Terms such as "forward", "rearward", "radially", "peripherally", "upwardly", "downwardly", and the like are used as words of convenience to provide reference points and are not to be construed as limiting terms unless otherwise indicated.

[0204] In this specification, terms denoting direction, such as vertical, up, down, left, right etc. or rotation, should be taken to refer to the directions or rotations relative to the corresponding drawing rather than to absolute directions or rotations unless the context requires otherwise.

Comprising and Including

[0205] In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word "comprise" or variations such as "comprises" or "comprising" are used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the invention.

[0206] Any one of the terms: including or which includes or that includes as used herein is also an open term that also means including at least the elements/features that follow the term, but not excluding others. Thus, including may be synonymous with and means comprising.

Scope of Invention

[0207] Thus, while there has been described what are believed to be the preferred embodiments of the invention, those skilled in the art will recognize that other and further modifications may be made thereto without departing from the spirit of the invention, and it is intended to claim all such changes and modifications as fall within the scope of the invention. For example, any formulas given above are merely representative of procedures that may be used. Functionality may be added or deleted from the block diagrams and operations may be interchanged among functional blocks. Steps may be added or deleted to methods described within the scope of the present invention.

[0208] Although the invention has been described with reference to specific examples, it will be appreciated by those skilled in the art that the invention may be embodied in many other forms.

Industrial Applicability

[0209] It is apparent from the above, that the arrangements described are applicable to the footwear research, design, manufacturing and retail industries.

Claims

1. A high heeled shoe comprising:

an insole;

at least one recess in an upper surface of the insole;

an outer cushioning layer adjacent the upper surface of the insole;

a central cushioning layer adjacent to the outer cushioning layer and adapted to be received by at least one of: the recesses of the insole and a further recess formed by the outer cushioning layer within at least one recess of the insole;

a high heel attached to a bottom surface of the insole; and

an upper attached to the insole to aid in securing a foot to the shoe;

wherein the central cushioning layer at least engages with one or more corresponding anatomical features of a sole of the foot to aid in securing the foot to the shoe.

2. A shoe according to claim 1, wherein a ridge adjacent a periphery of the recess is formed in at least one of the central and outer cushioning layers by the sole of the foot depressing preferentially the central cushioning layer.

3. A shoe according to claim 2, wherein the ridge also engages with one or more corresponding anatomical features.

4. A shoe according to claim 2 or 3, wherein a ridge associated with a forefoot portion of a recess for the ball of the foot engages with the front of the ball of the foot.

5. A shoe according to claim 4, wherein the ridge associated with the forefoot portion supports the foot more than the toes.

6. A shoe according to any one of claims 2 to 5, wherein a ridge associated with a front portion of a recess for the heel of the foot engages with the front of the heel of the foot.

7. A shoe according to any one of claims 2 to 6, wherein a support provided by the ridge increases as the sole of the foot further depresses the central cushioning layer.

8. A shoe according to any one of claims 2 to 5, further including:

when the central cushioning layer includes a fluid or a gel, the fluid or gel is displaced by the foot depression to form a protrusion about the periphery of the central cushioning layer, wherein the protrusion forms a further ridge for further engaging with at least one anatomical feature.

9. A shoe according to any one of the preceding claims, wherein the central cushioning layer moulds to at least one of the anatomical features to further aid in securing the foot to the shoe.

10. A shoe according to any one of the preceding claims, wherein the anatomical features of the sole of the foot include at least one of a ball of the foot, an arch of the foot, a heel of the foot and portions thereof the ball, arch and heel.

11. A shoe according to any one of the preceding claims, wherein the at least one recesses are located on the insole to correspond to at least one anatomical feature of the sole of the foot.

12. A shoe according to claim 11, where in the recess dimensions are proportioned from the corresponding anatomical feature.

13. A shoe according to any one of the preceding claims, wherein the central cushioning layer is defined by the recess in the insole.

14. A shoe according to any one of the preceding claims, further including a platform to the insole at a front section of the shoe.

15. A shoe according to any one of the preceding claims, wherein the recess is an aperture in the insole to at least one of the heel seat and the platform.

16. A shoe according to any one of claims 10 to 15, wherein three recesses in the insole respectively correspond to the ball of the foot, the arch of the foot and the heel of the foot

17. A shoe according to any one of the preceding claims, wherein the central cushioning layer is softer than the outer cushioning layer.

18. A shoe according to any one of claims 1 to 16-1, wherein the outer cushioning layer is of the same material as the central cushioning layer.

19. A shoe according to any one of the preceding claims, further including an inner cushioning layer adjacent the central cushioning layer and outer cushioning layer, wherein the inner cushioning layer is the layer in contact with the foot.

20. A shoe according to claim 19, wherein the inner cushioning layer is softer than the central cushioning layer.

21. A shoe according to any preceding claim, wherein the insole is more rigid than the cushioning layers.

22. A shoe according to any preceding claim, wherein the insole includes a shank to improve a rigidity of the insole.

23. A shoe according to any one of claims 2 to 22-1, wherein the ridge is approximately between 2 and 6 mm higher than the outer cushioning layer not adjacent the recess.

24. A high heeled shoe comprising:

an insole,

at least one recess in an upper surface of the insole,

an outer cushioning layer adjacent the upper surface of the insole,

a central cushioning layer adjacent to the outer cushioning layer and adapted to be received by at least one further recess formed by the outer cushioning layer within at least one recess of the insole,

a high heel attached to a bottom surface of the insole, and

an upper attached to the insole to aid in securing a foot to the shoe,

wherein an extent of the inner cushioning layer is defined by the further recess, and wherein a material of the central cushioning layer is less stiff than a material of the outer cushioning layer.

25. A method of forming a sole of a high heeled shoe including the steps of:

providing an insole,

providing at least one recess in an upper surface of the insole to correspond with at least one anatomical feature of a foot,

securing and conforming an outer cushioning layer to the upper surface of the insole,

providing and securing an inner cushioning layer to the further recesses formed by the outer cushioning layer on the insole, and

selecting a material of the central cushioning layer to be less stiff than a material of the outer cushioning layer.

26. A high heeled shoe comprising:

an insole,

an outer cushioning layer adjacent the upper surface of the insole,

a central cushioning layer adjacent to the outer cushioning ,

a slight rise formed in at least one of the outer cushioning layer and the central cushioning layer,

a high heel attached to a bottom surface of the insole, and

an upper attached to the insole to aid in securing a foot to the shoe,

wherein the slight rise location corresponds to an anatomical feature of a sole of a foot.

27. A high-heeled shoe wherein the bottom forefoot section of the shoe (sole) has a layer of rubber, polyurethane (PU) with tread for slip resistance and that makes the heel light and flexible.

28. A high-heeled shoe where at least one shank is built into the sole of the shoe to give the extra support and stability needed to the arch of the foot.

29 A high-heeled shoe where a gap between the toes and ball of foot section has a rise of one cushioning layer is manufactured from a conformable material.

30. A high-heeled shoe where a cup heel with a cushioning layer at the base of the heel gives extra comfort and socketing or cupping support for the wearer's heel.

31. A high-heeled shoe substantially as herein in described.

32. A high-heeled shoe substantially as described herein with reference to the figures.

33. A high-heeled shoe substantially as herein described.

34. A high heeled shoe substantially as described herein with reference to the figures.

35. A shoe according to claim 4, wherein the ridge associated with the forefoot portion supports the foot more than freeing the toes.

36. A high heeled shoe comprising:

an insole,

an outer cushioning layer adjacent the upper surface of the insole,

a central cushioning layer adjacent to the outer cushioning,

a slight rise formed in at least one of the outer cushioning layer and the central cushioning layer,

a high heel attached to a bottom surface of the insole and/or an outsole, and

an upper attached to the insole to aid in securing a foot to the shoe,

wherein the slight rise location corresponds to an anatomical feature of a sole of a foot.

37. A high-heeled shoe where at least one shank is built into the sole and maybe the insole of the shoe to give the extra support and stability needed to the arch of the foot.

38. A high heeled shoe comprising:

an insole;

at least one recess in an upper surface of the insole;

an outer cushioning layer adjacent the upper surface of the insole;

a central cushioning layer adjacent to the outer cushioning layer and adapted to be received by at least one of: the recesses of the insole and a further recess formed by the outer cushioning layer within at least one recess of the insole;

a high heel attached to a bottom surface of the insole; and

an upper attached to the insole to aid in securing a foot to the shoe;

wherein the central cushioning layer at least engages with one or more corresponding anatomical features of a sole of the foot to aid in securing the foot to the shoe, and

wherein a rise or a ridge from the periphery of the recess of the insole is under the cushioning layers.

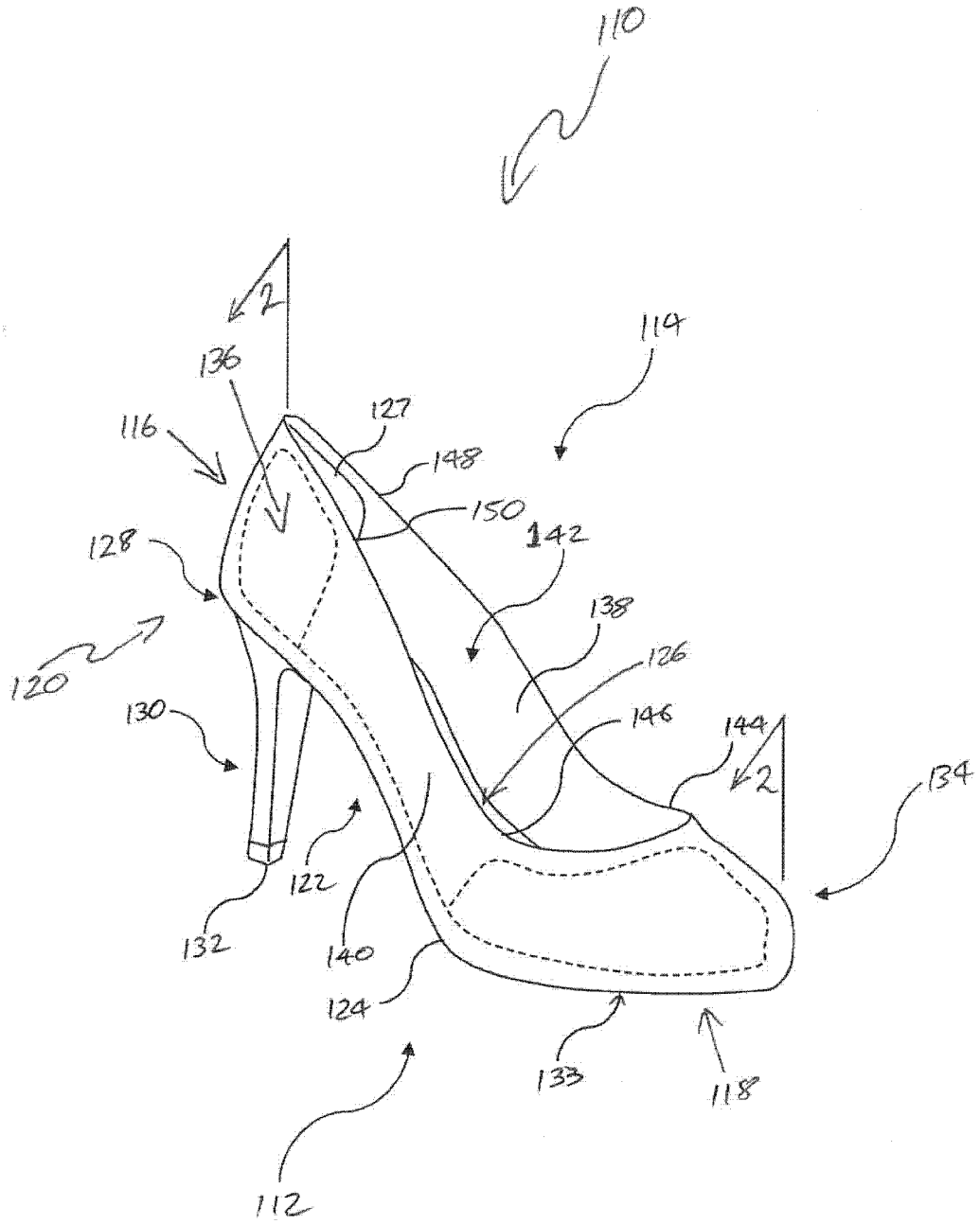


FIGURE 1 — PRIOR ART

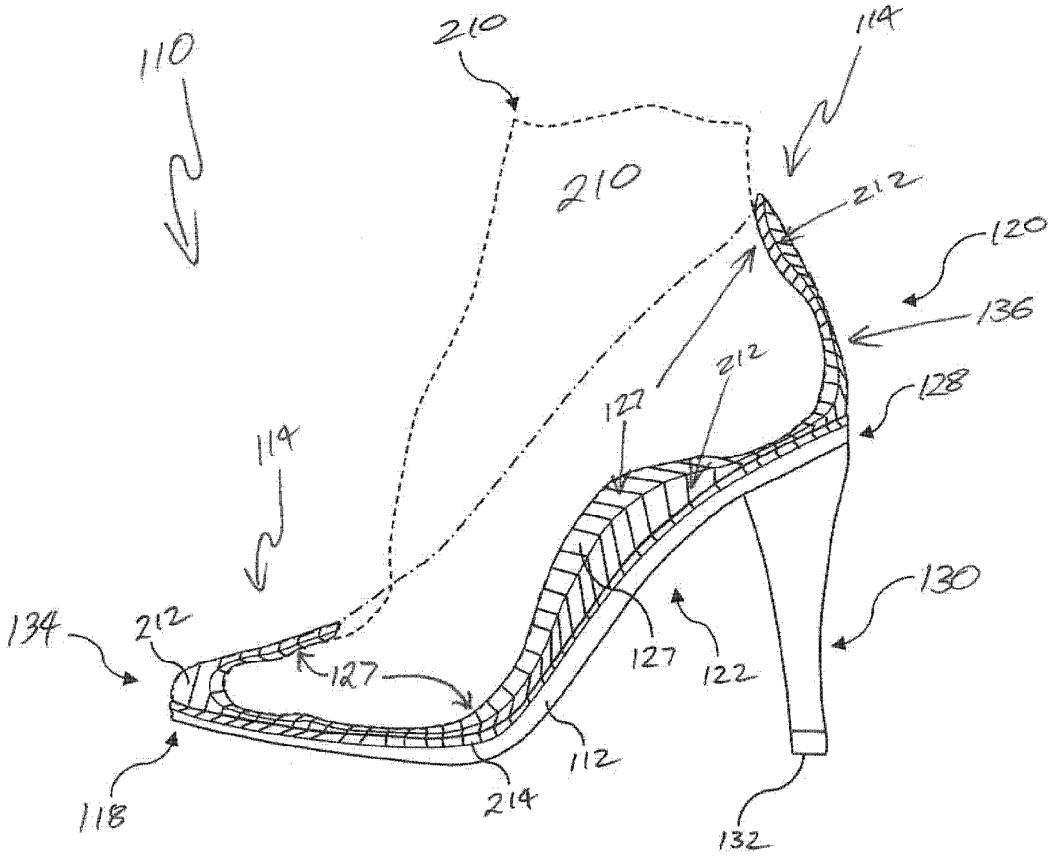
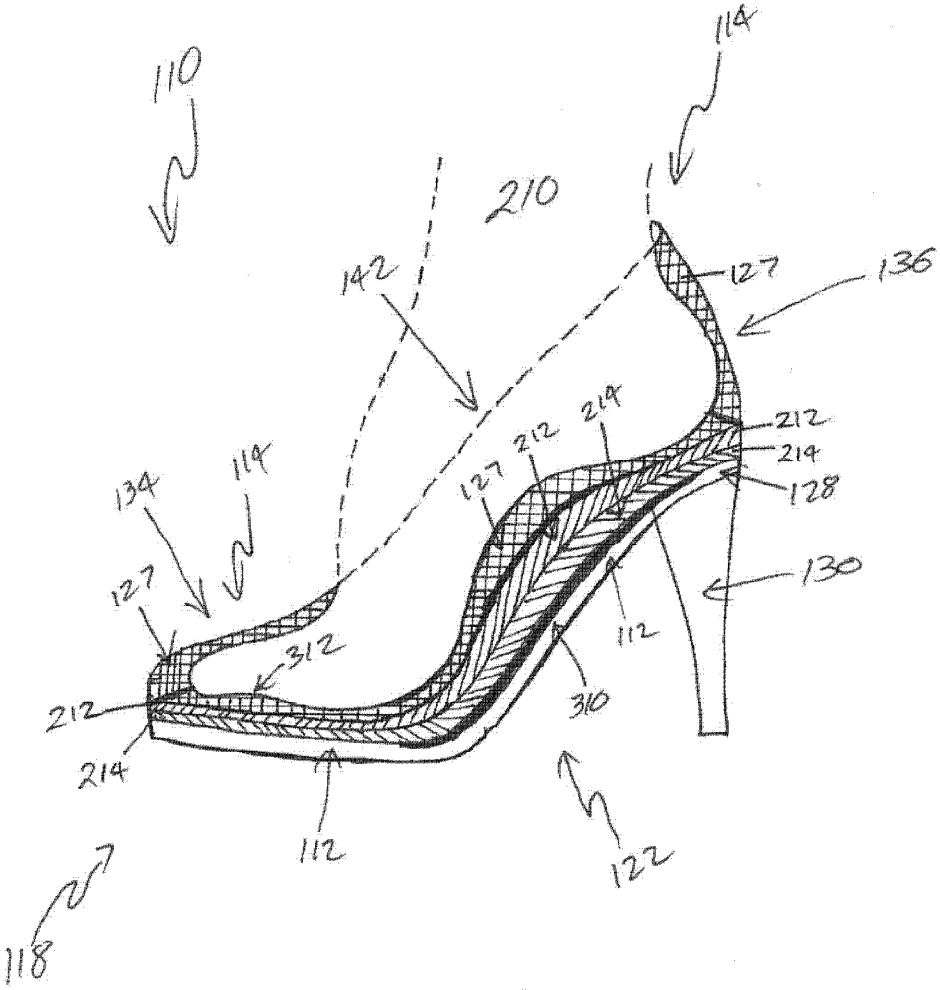


FIGURE 2 — PRIOR ART



PRIOR ART — Figure 3

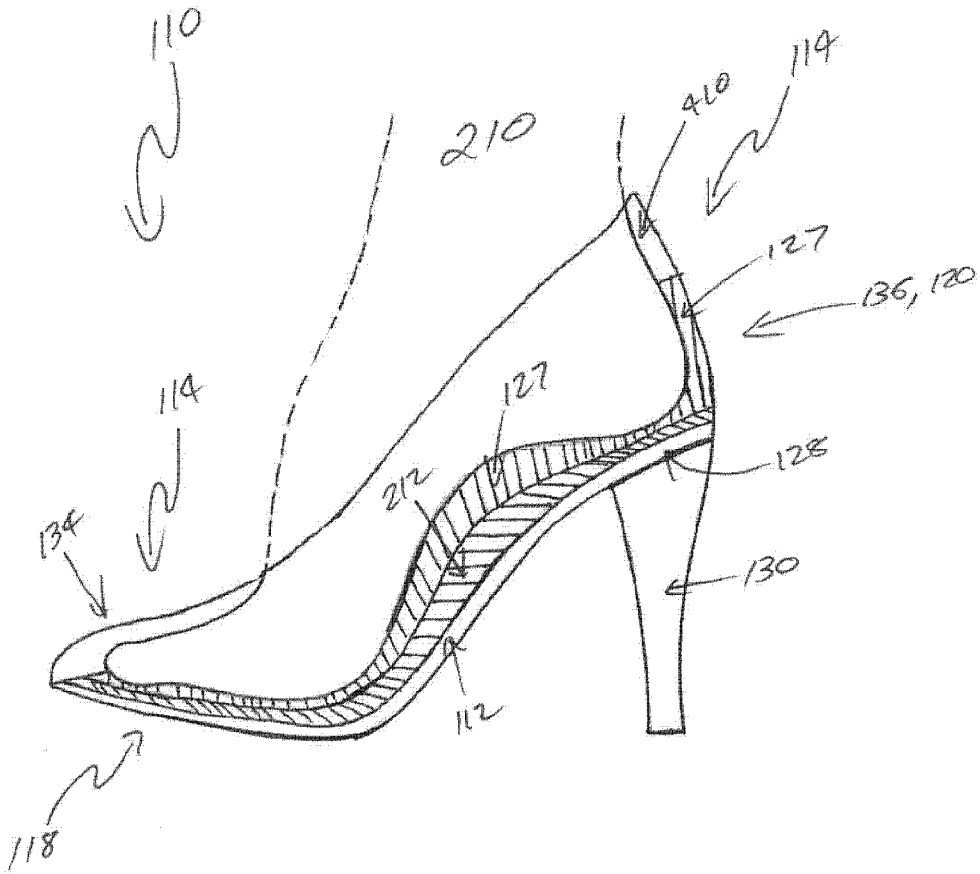
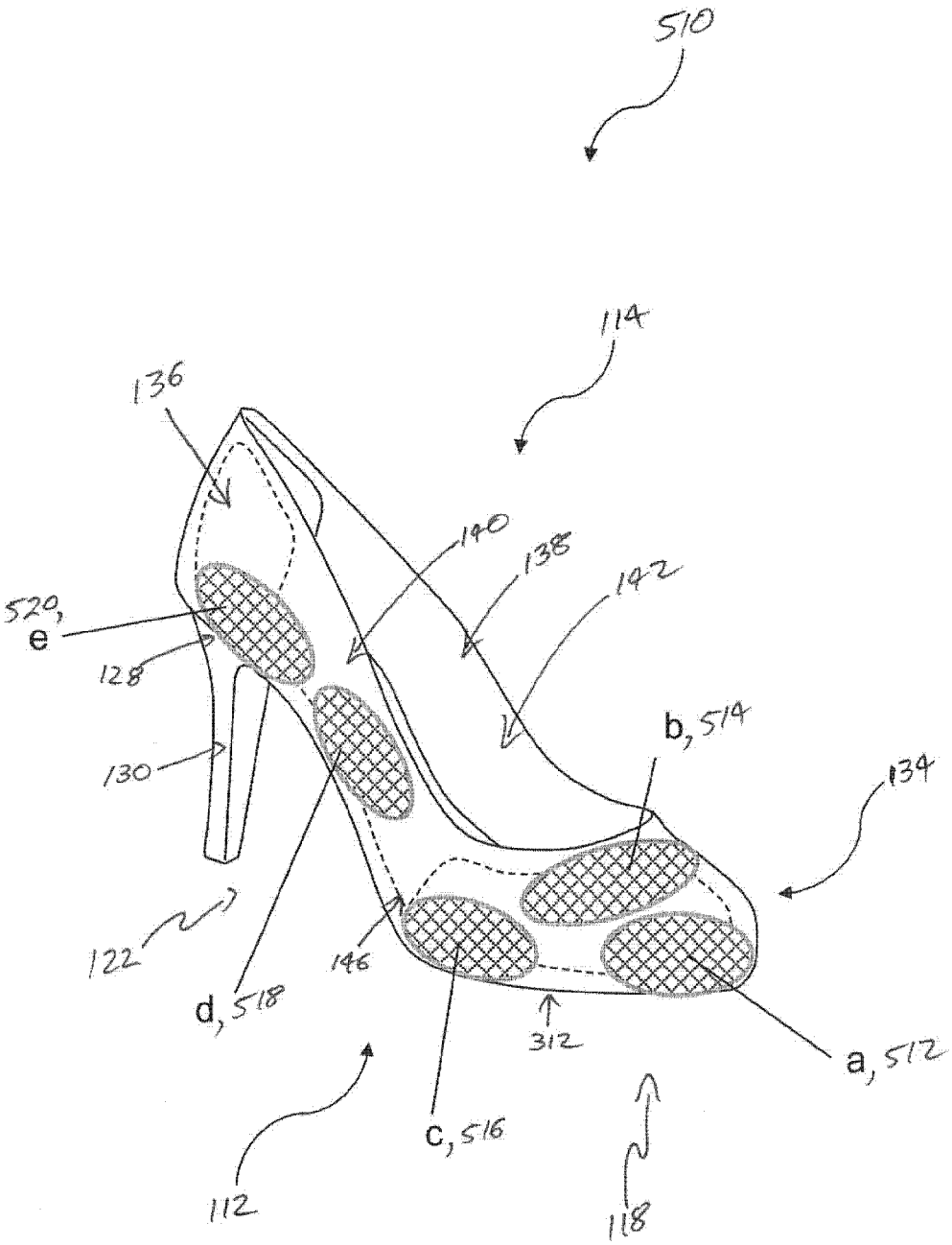


Figure 4 — PRIOR ART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d, 518
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a, 512
c, 516
112
118

FIGURE 5

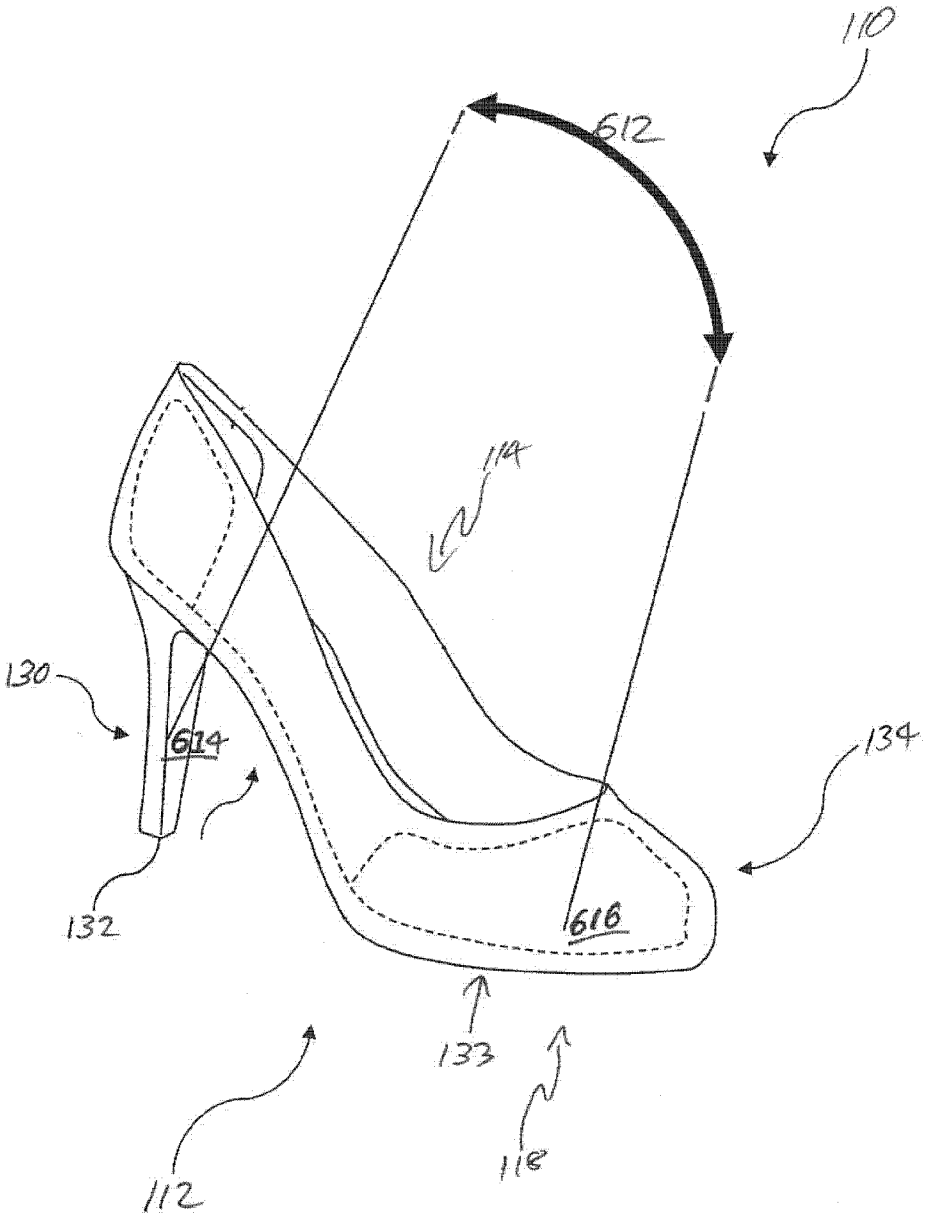


FIGURE 6 — PRIOR ART

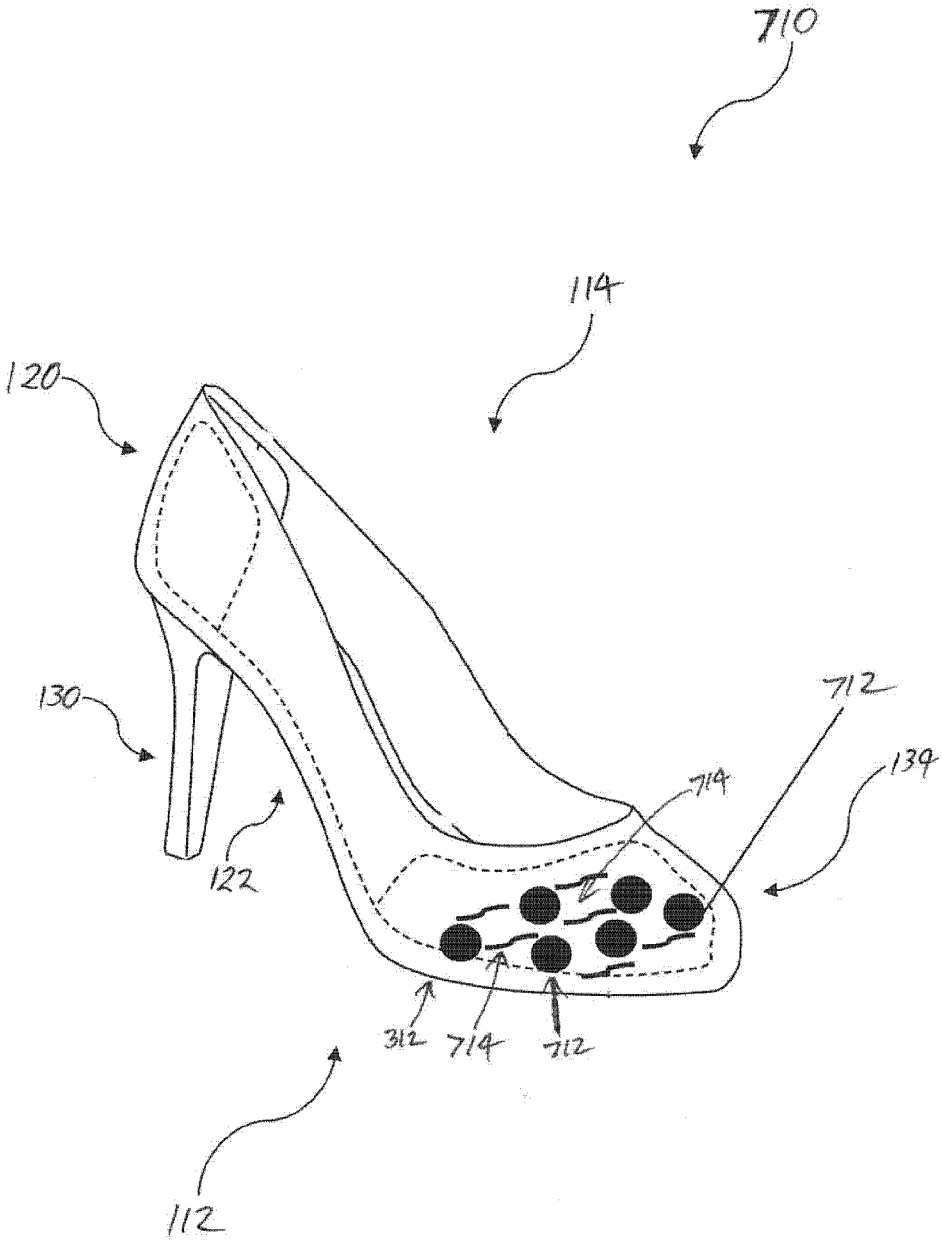
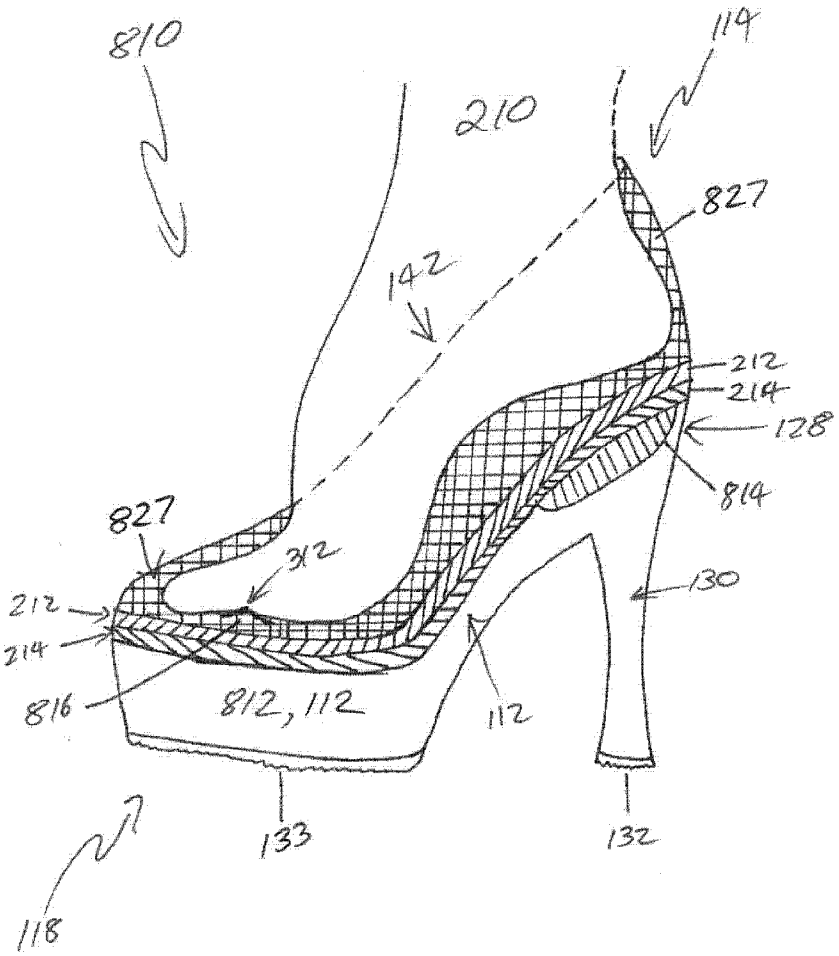


FIGURE 7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118

Figure 8

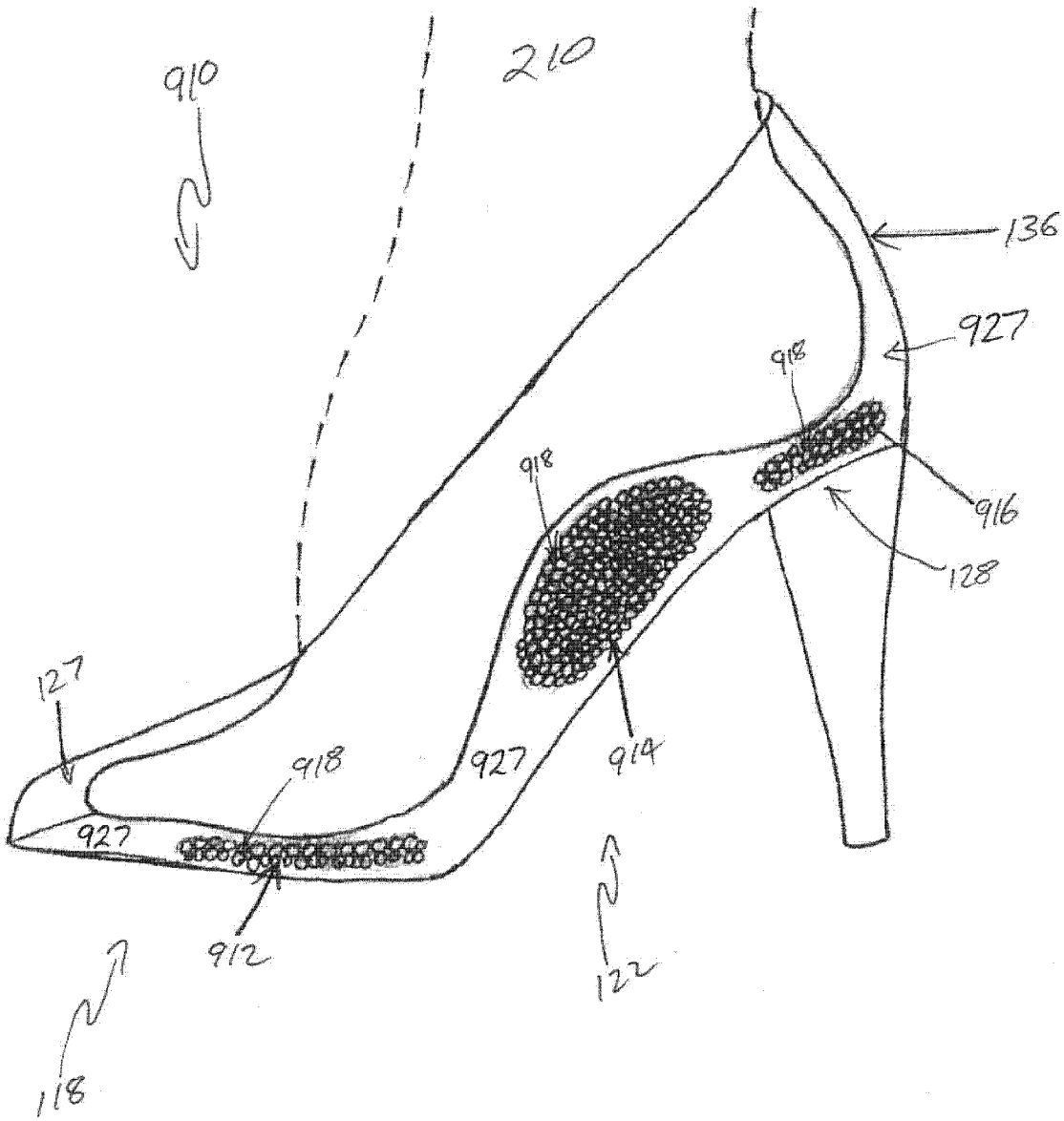
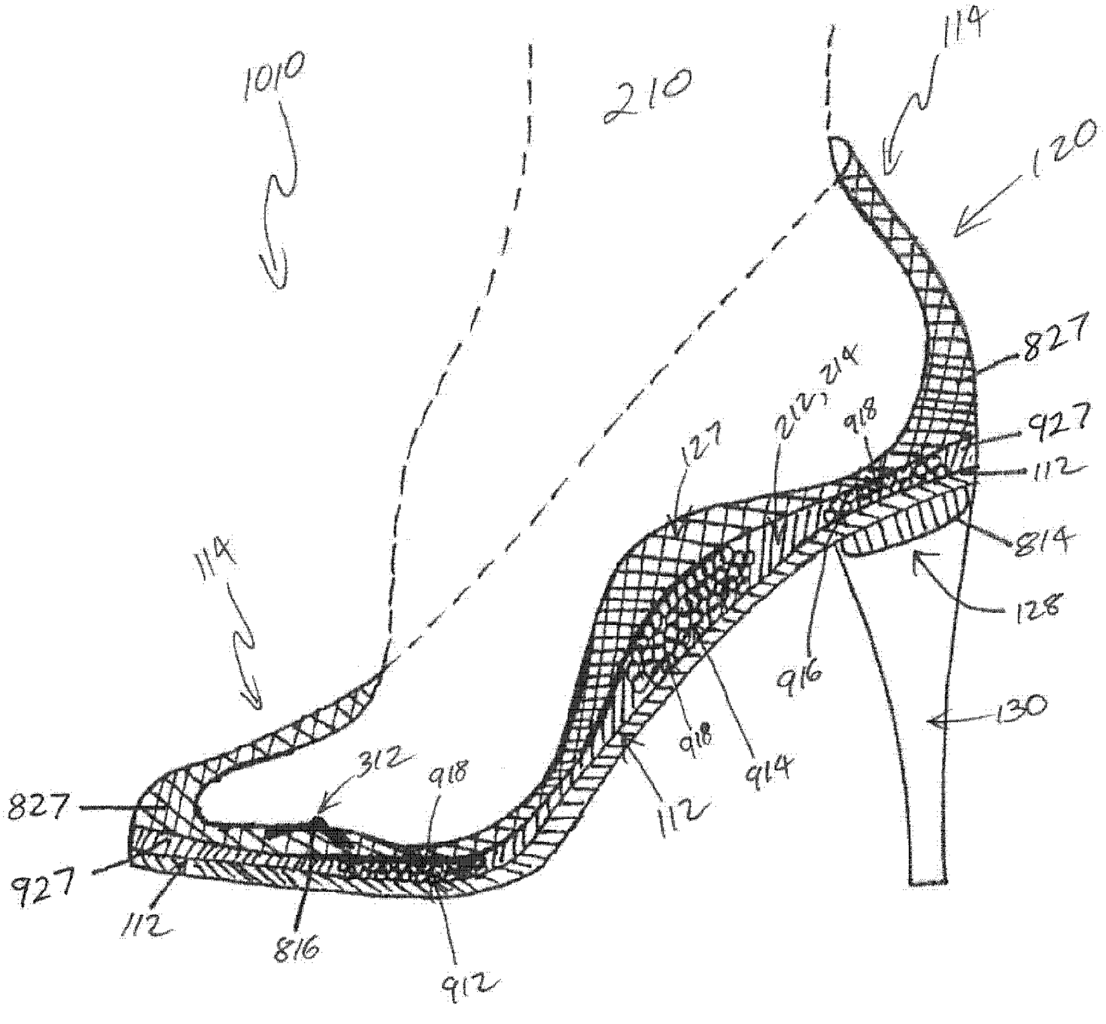


Figure 9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927
112
816
912
918
312

Figure 10

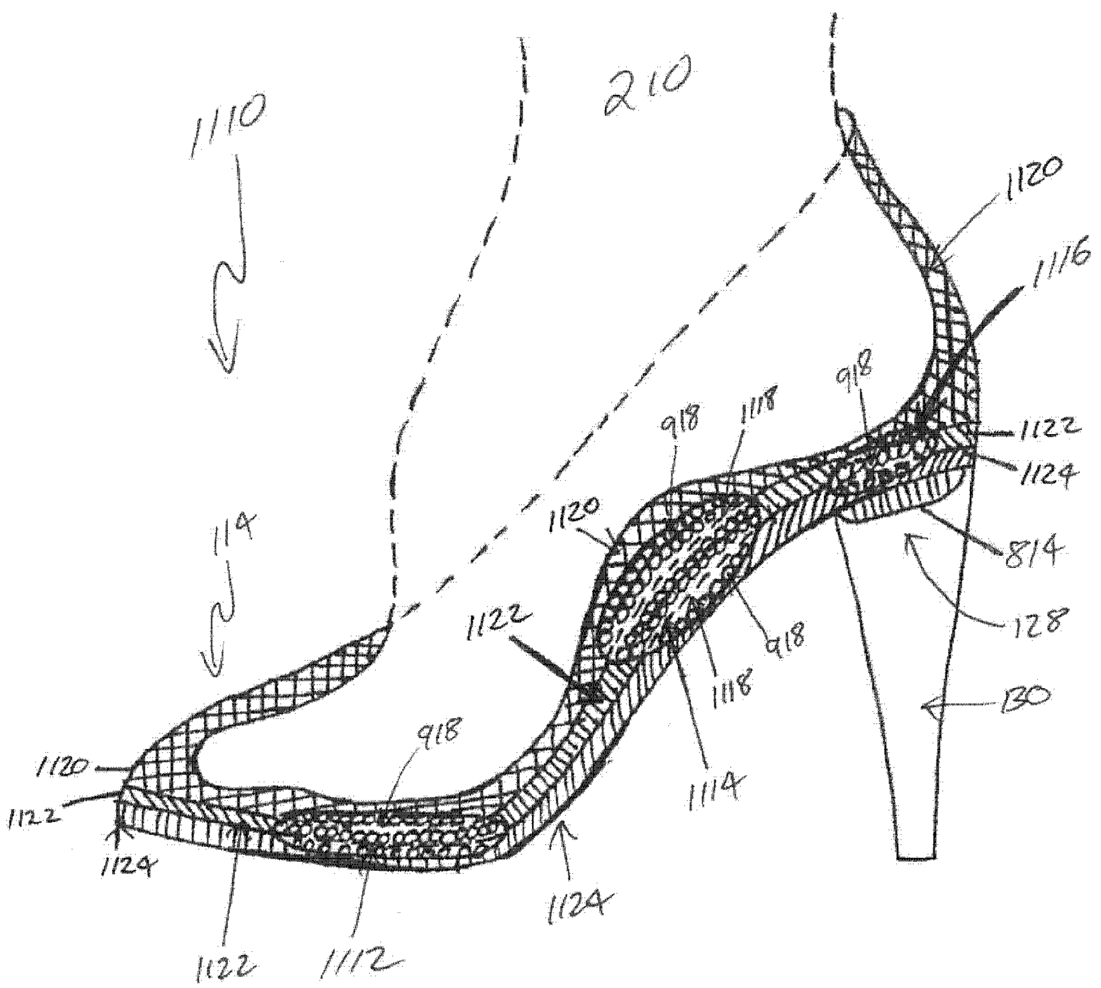

1110
210
114
1120
1116
918
1118
1122
1124
814
128
130
1114
1112

Figure 11

Figure 12A

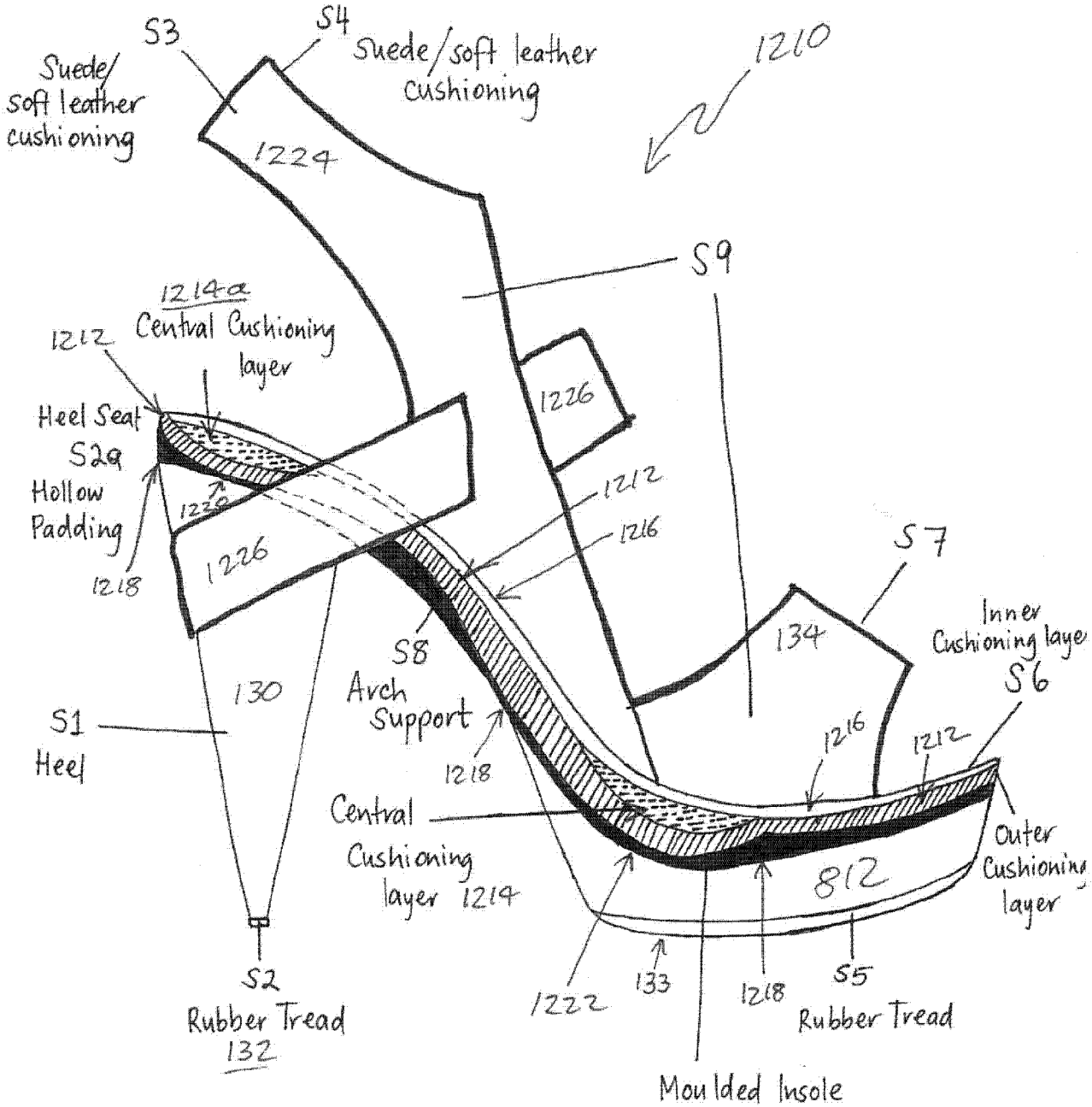

S3
S4
Suede/soft leather cushioning
Suede/soft leather cushioning
1210
1224
S9
1214a
Central Cushioning layer
1212
Heel Seat
S2a
Hollow Padding
1218
1226
1226
1212
1216
S7
Inner Cushioning layer
S6
S8
Arch Support
134
130
S1
Heel
1218
1216
1212
Central Cushioning layer 1214
812
Outer Cushioning layer
S2
Rubber Tread
132
1222
133
1218
S5
Rubber Tread
Moulded Insole

Figure 12B

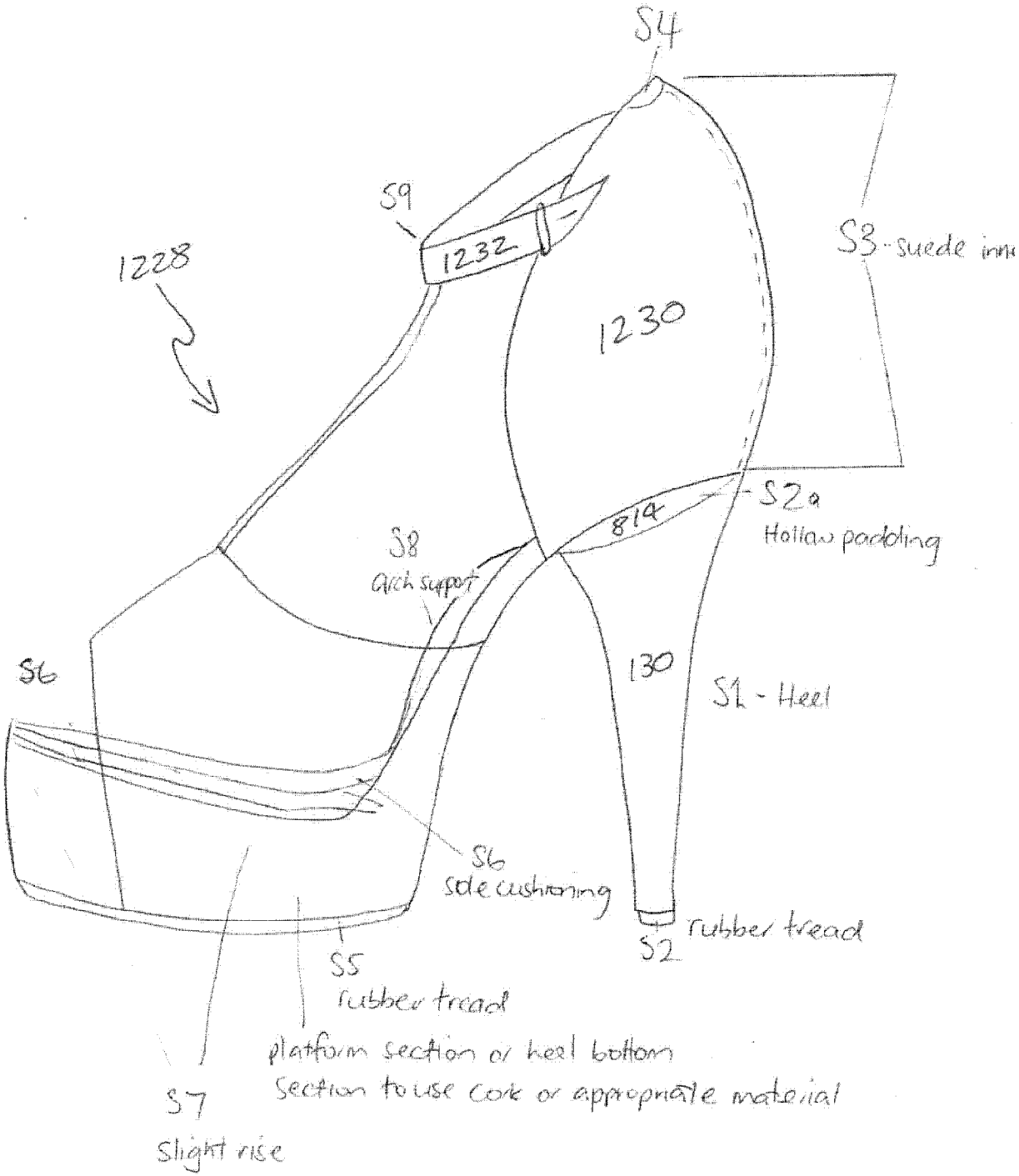
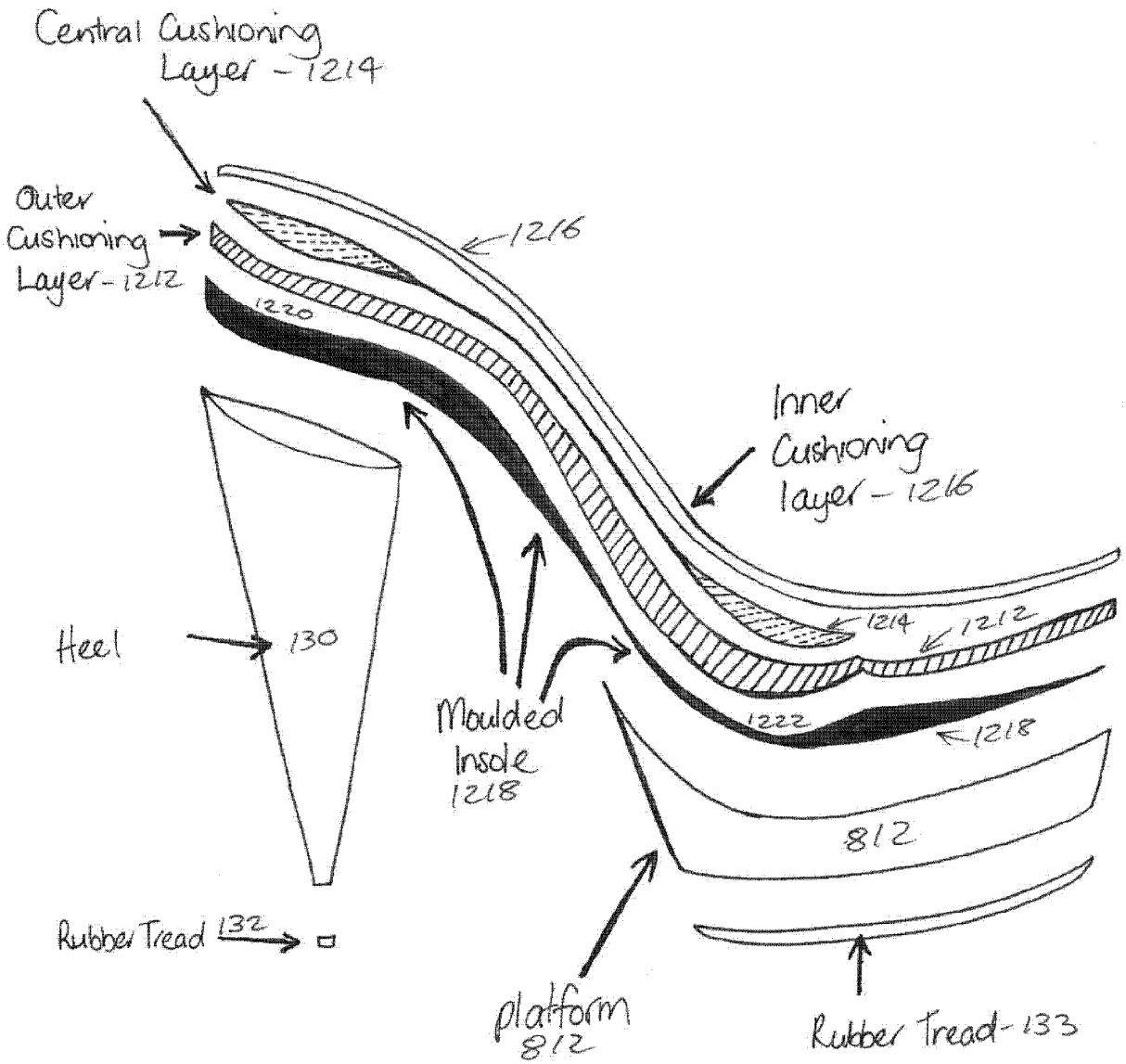

S4
S9
1232
1228
S3 - suede inn
1230
S2a
Hollow padding
814
S8
Arch support
S6
130
S1 - Heel
S6
Side cushioning
S2
rubber tread
S5
rubber tread
platform section or heel bottom
Section to use cork or appropriate material
S7
Slight rise

Figure 12C


Central Cushioning Layer - 1214
Outer Cushioning Layer - 1212
1216
1220
Inner Cushioning layer - 1216
Heel
130
Moulded Insole 1218
1214
1212
1222
1218
812
Rubber Tread 132
platform 812
Rubber Tread - 133

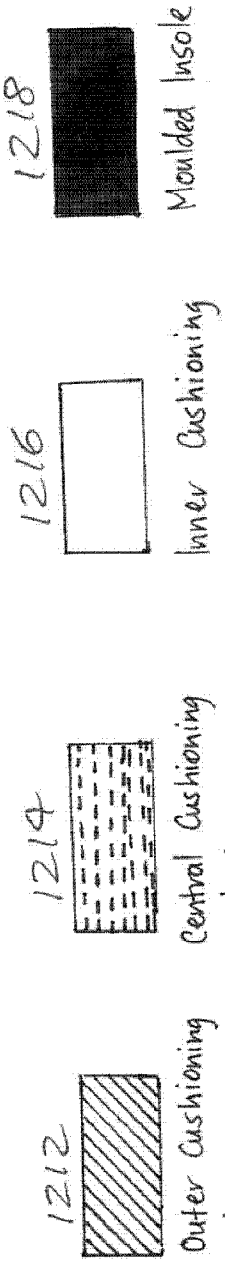

1218
Moulded Insole
1216
Inner Cushioning layer
1214
Central Cushioning layer
1212
Outer Cushioning layer

Figure 13

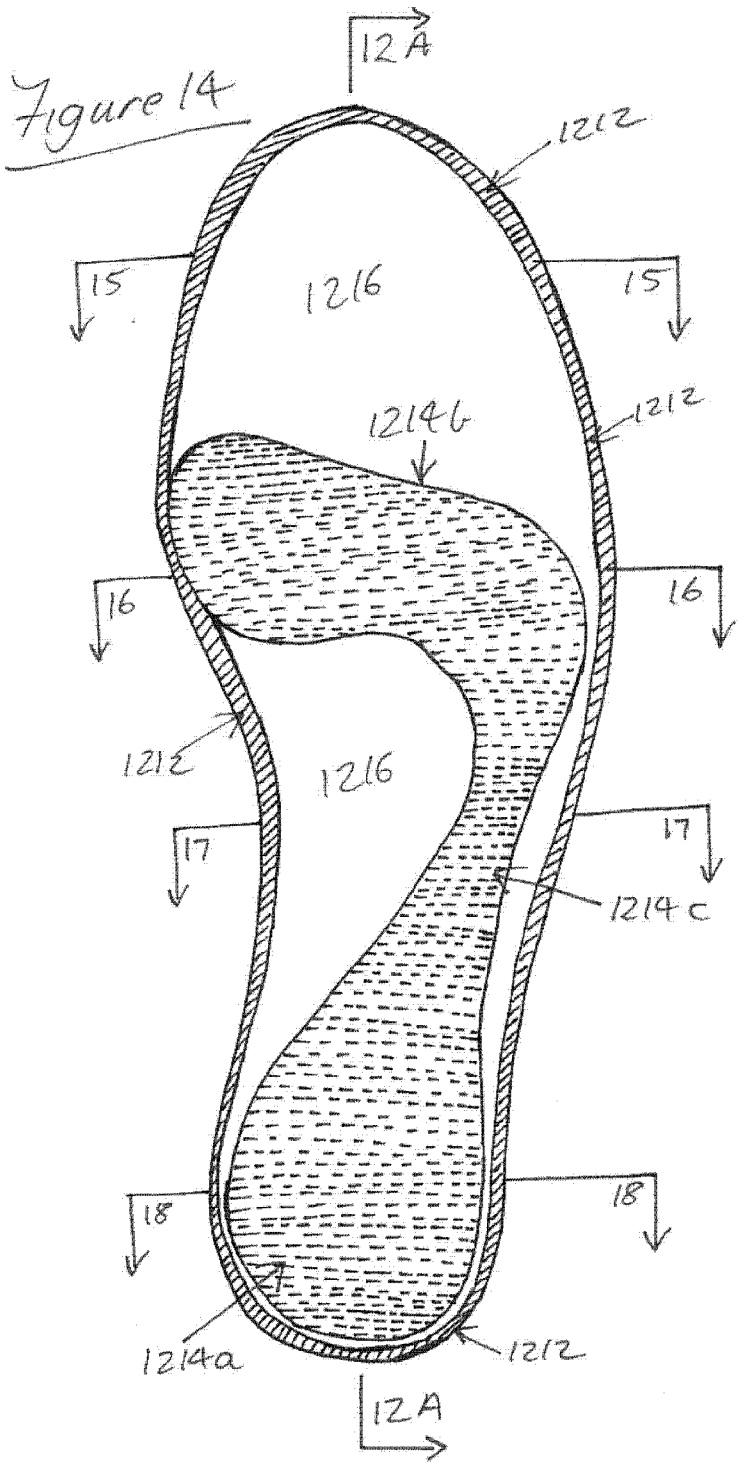


Figure 14

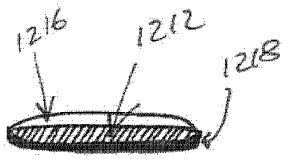


Figure 15

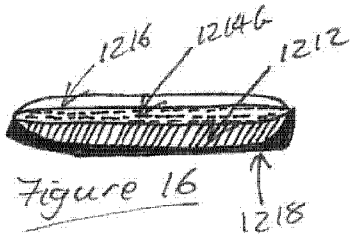


Figure 16

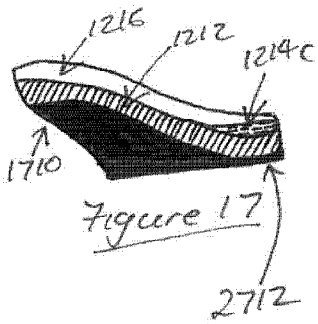


Figure 17

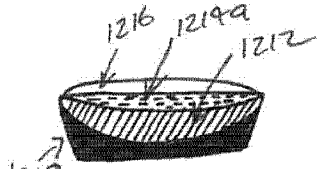


Figure 18

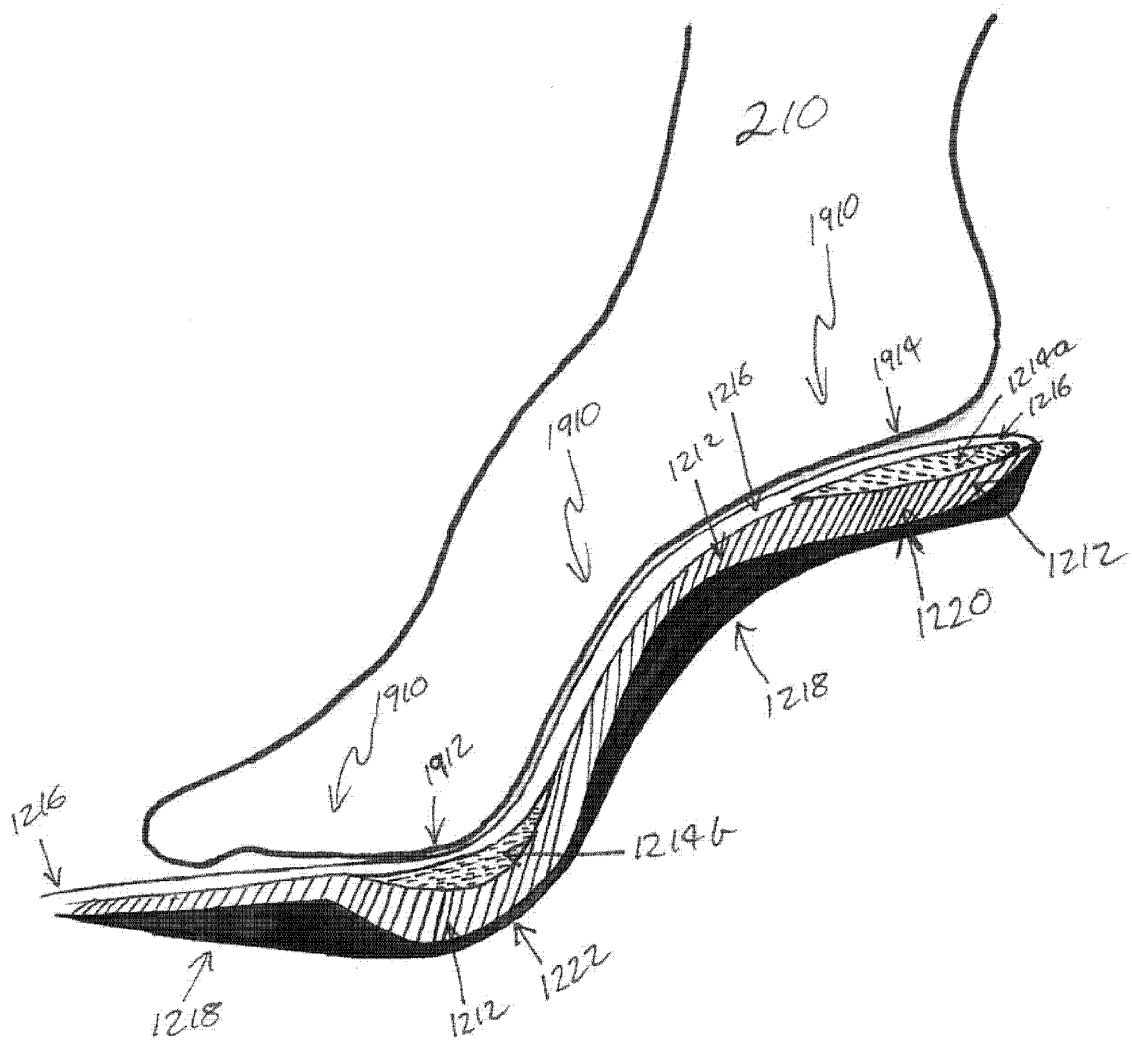

210
1910
1910
1914
1216
1212
1214a
1216
1212
1220
1218
1910
1912
1216
1214b
1218
1212
1222

Figure 19.

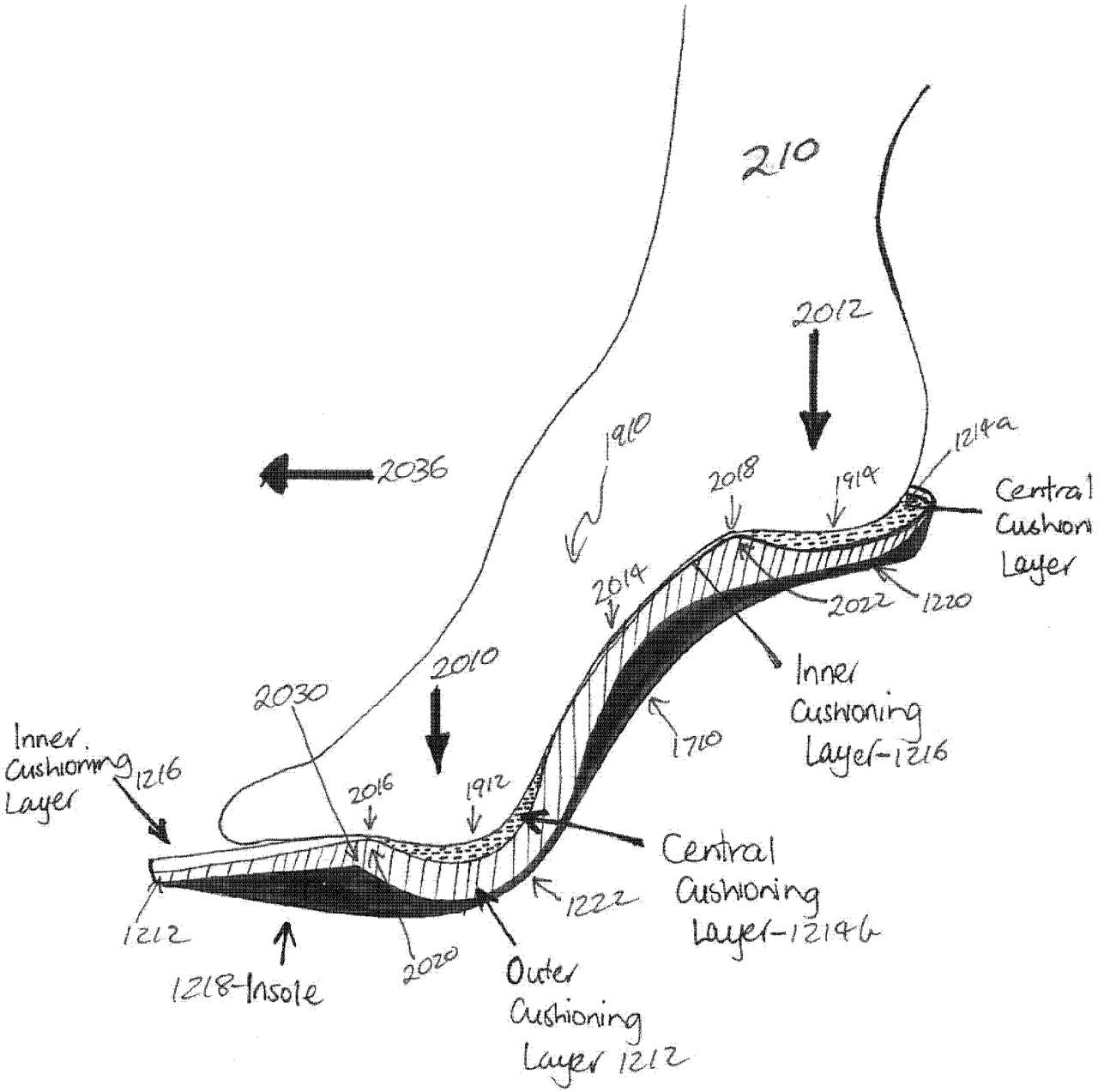
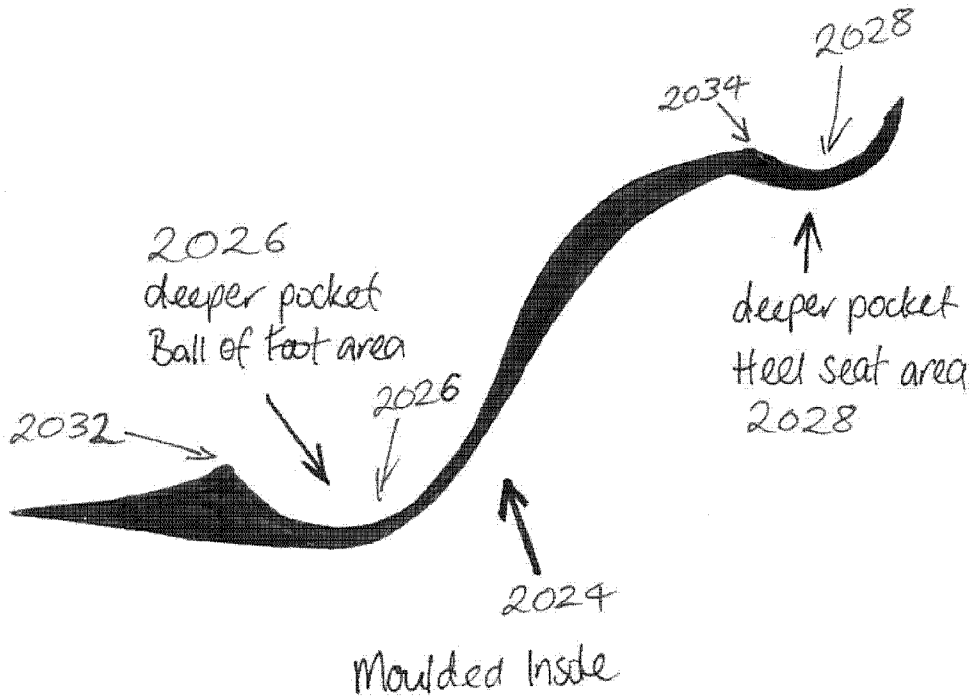

210
2012
2036
1910
2018
1914
1214a
Central Cushion Layer
2014
2022
1220
Inner Cushioning Layer-1216
2030
2010
1710
Inner Cushioning Layer
1216
2016
1912
Central Cushioning Layer-1214b
1222
1212
1218-Insole
2020
Outer Cushioning Layer 1212

Figure 20A

Figure 20B


2028
2034
2026
deeper pocket
Ball of foot area
2026
2032
deeper pocket
Heel seat area
2028
2024
Moulded Insole

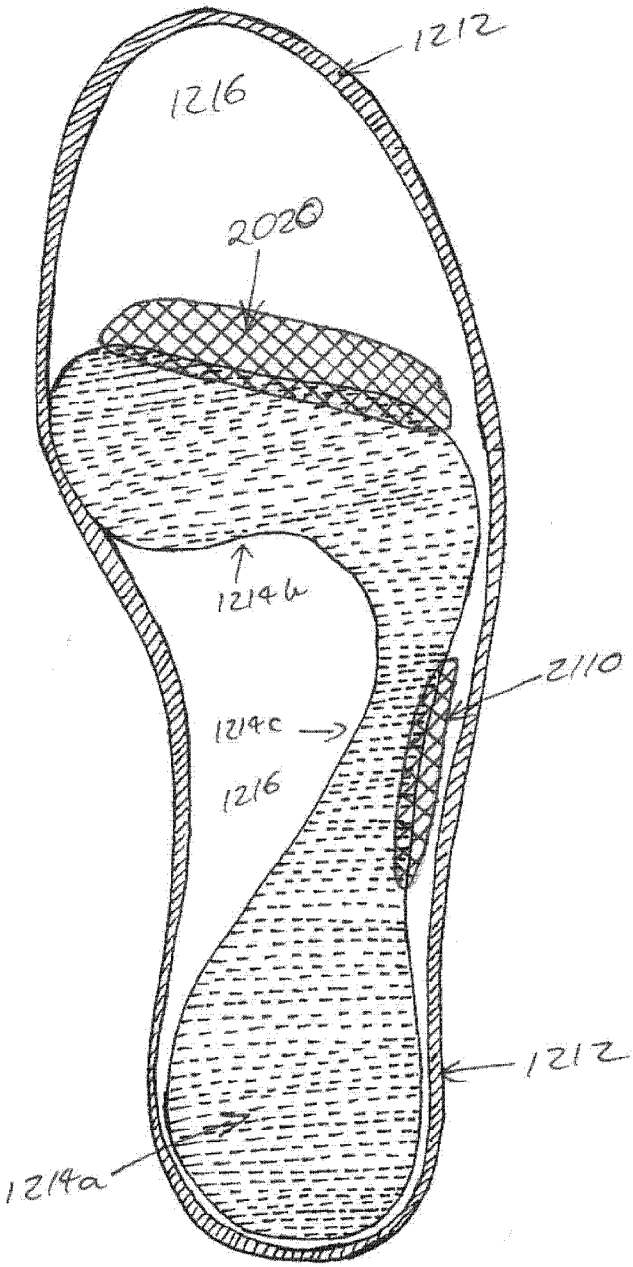
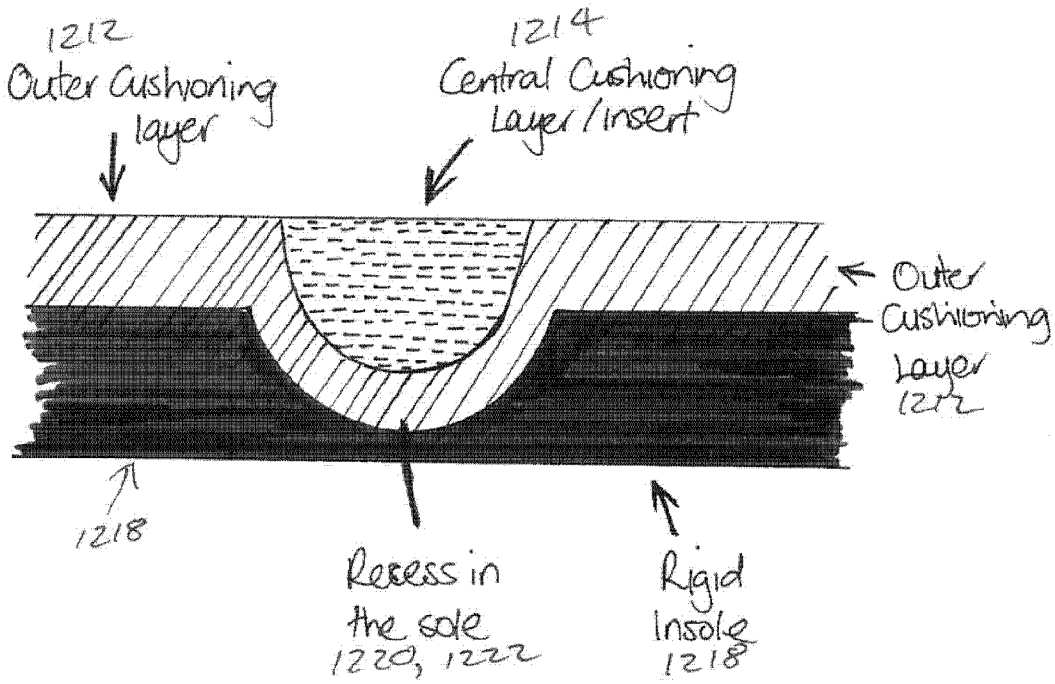


Figure 21

Figure 22


1212
Outer Cushioning layer
1214
Central Cushioning Layer/Insert
Outer Cushioning Layer 1212
1218
Recess in the sole 1220, 1222
Rigid Insole 1218

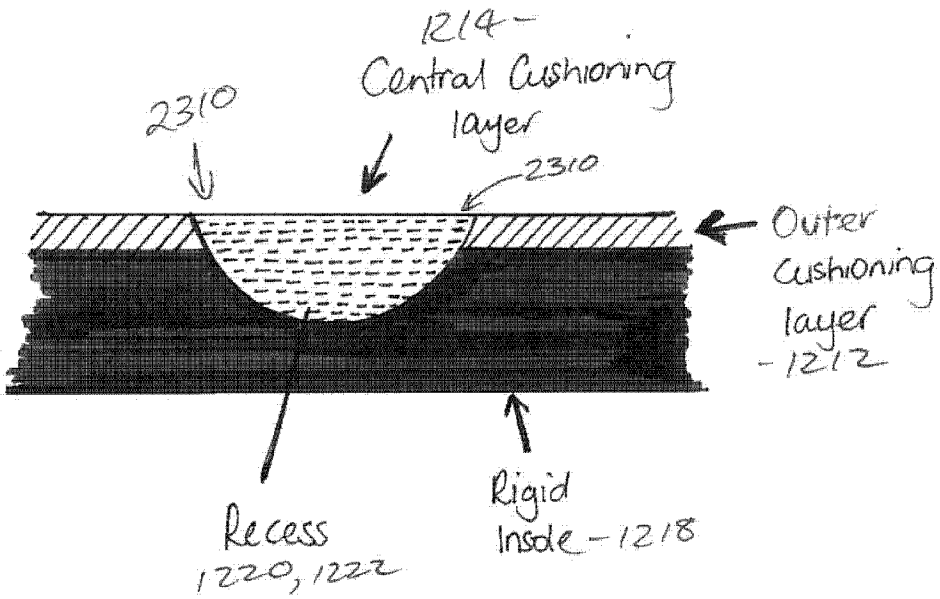

1214 –
Central Cushioning layer
2310
2310
Outer Cushioning layer – 1212
Recess 1220, 1222
Rigid Inside – 1218

Figure 23

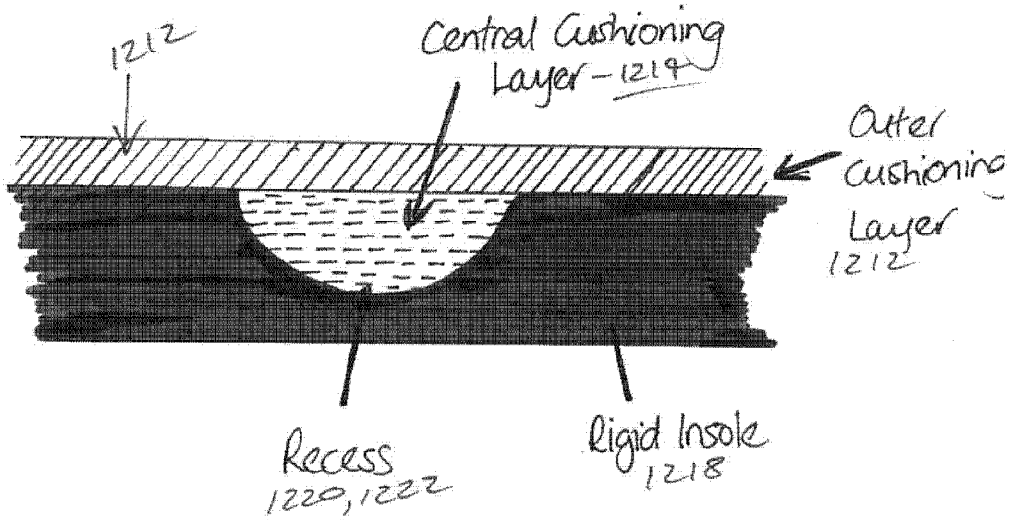

1212
Central Cushioning Layer - 1214
Outer cushioning Layer 1212
Recess 1220, 1222
Rigid Insole 1218

Figure 24

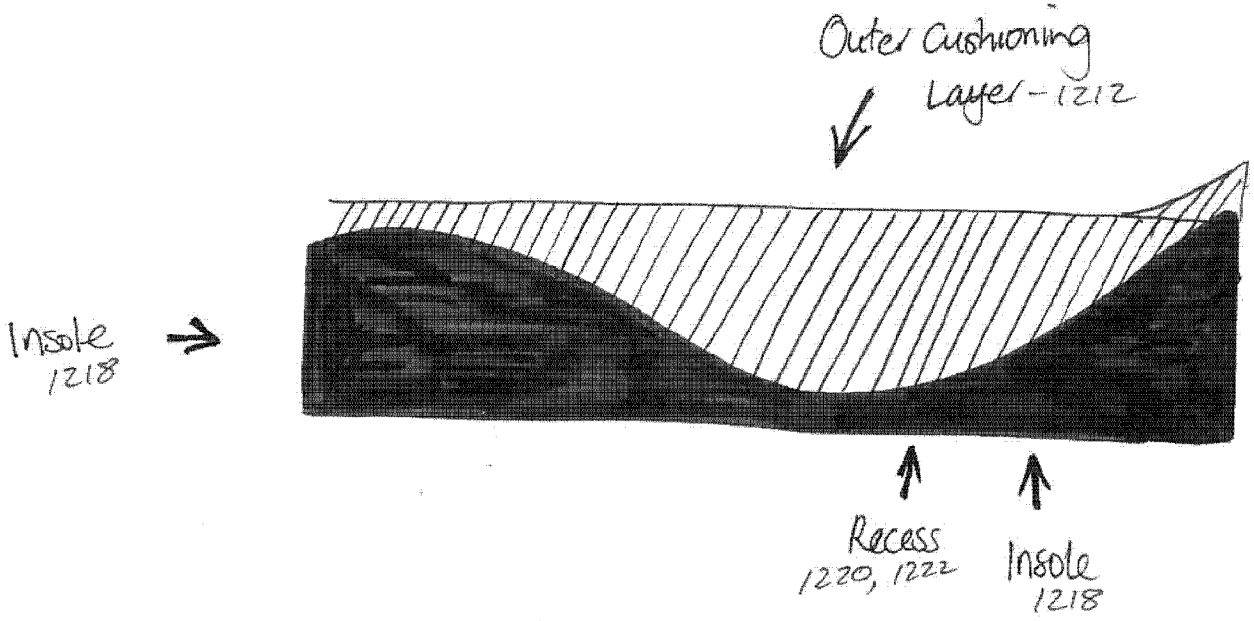
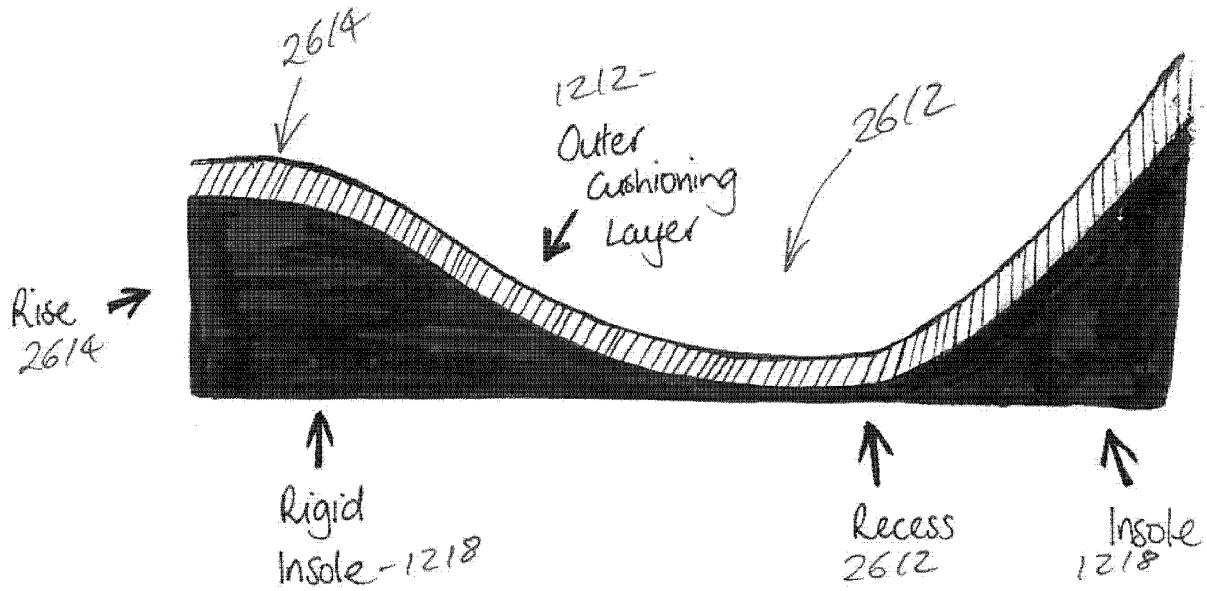

Outer Cushioning Layer - 1212
Insole 1218
Recess 1220, 1222
Insole 1218

Figure 25

Figure 26


2614
1212-
Outer
Cushioning
Layer
2612
Rise
2614
Rigid
Insole-1218
Recess
2612
Insole
1218

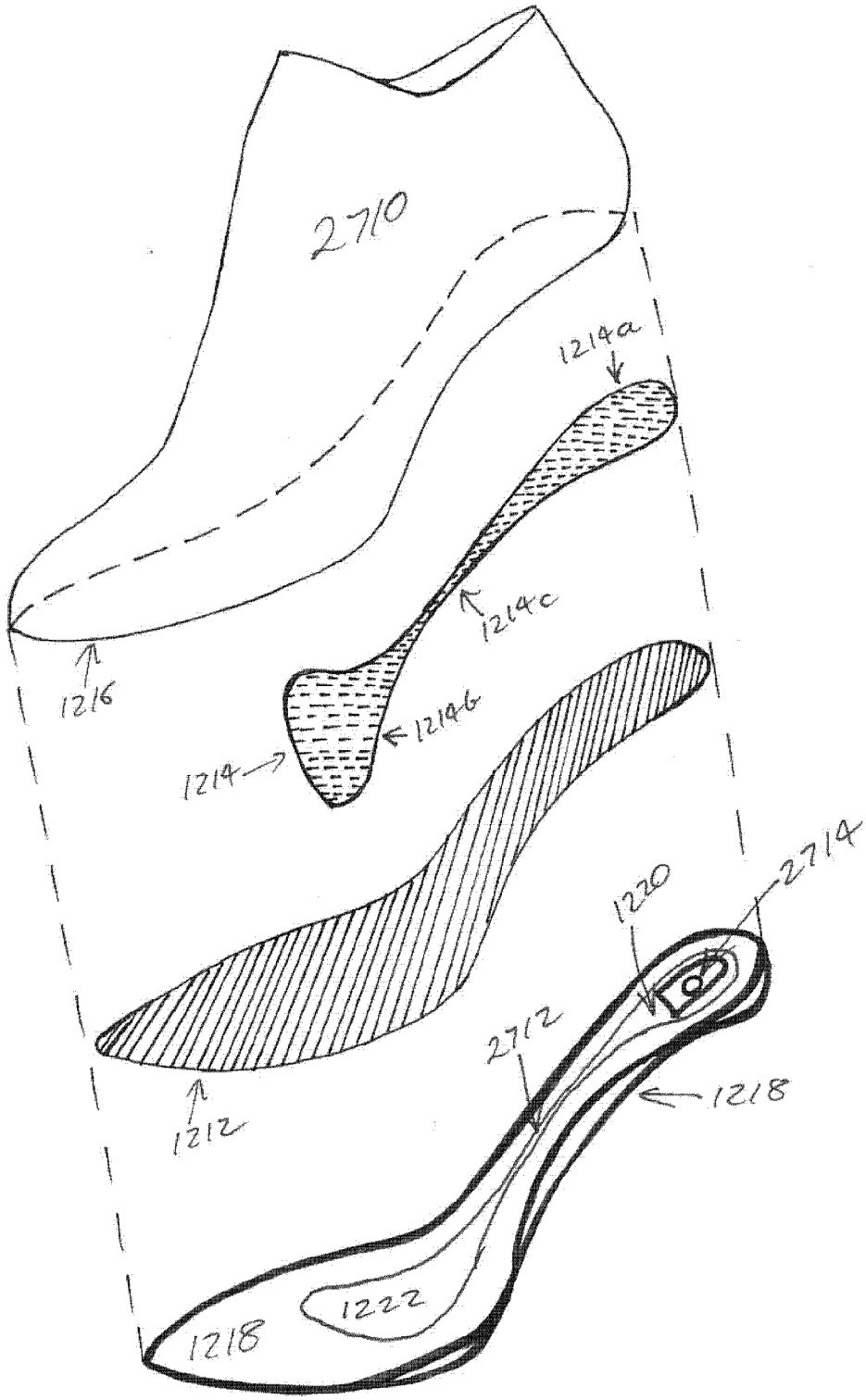

2710
1214a
1214c
1216
1214b
1214
2714
1220
2712
1212
1218
1222
1218

Figure 27

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2014/050111

A. CLASSIFICATION OF SUBJECT MATTER

A43B 13/40 (2006.01) A43B 13/38 (2006.01) A43B 13/18 (2006.01) A43B 7/14 (2006.01) A43B 19/00 (2006.01) A43B 21/00 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI: /IC/EC/CN A43B13/38, A43B13/386, A43B13/40, A43B13/18, A43B13/188, A43B13/189, "A43B7/14":"A43B7/145", A43B13/148, A43B13/149, A43B21/00, A43B19/00 & Keywords (High Heel, Stiletto, Wedge, Insole, Midsole, Inlay, Foot Bed, Recess, Cavity, Bowl, Cushion, Pad, Insert) and similar terms and/or combinations; Google Patent & Keywords (Insole, Recess, Cushion, "High Heel", Heel, Infil, Insert, Support) and similar terms and/or combinations; Google Patent, AUSPAT, Espacenet: Applicant/Inventor Search.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 November 2014	17 November 2014

Name and mailing address of the ISA/AU	**Authorised officer**
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au	Roger Small AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0399359630

INTERNATIONAL SEARCH REPORT C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		International application No. **PCT/AU2014/050111**
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/0026867 A1 (POLCEK) 09 February 2006 See: figs. 10 to 15; paragraphs [0017], [0042] ,[0045]-[0046]; and claim 18	1-5, 7-14, 17-23, 35
X	US 2005/0262733 A1 (DEAN) 01 December 2005 See: abstract; figs. 1 to 10; paragraph [0025] & [0028] to [0031].	1, 9-15, 17-18, 21-22
X	US 2007/0234590 A1 (MORALES et al.) 11 October 2007 See: abstract; figs. 1 to 3; and paragraphs [0013] to [0017].	1, 9-14, 17-18, 21-22
X	KR 2012-0022496 A (YU) 12 March 2012 See espacenet abstract; and figs. 1 to 4.	1, 9-14, 17-18, 21-22
X	GB 892156 A (CANADIAN FOOTWEAR RESEARCH INC.) 21 March 1962 See: figs. 4 & 10 to 13; pg. 5, lines 3 to 6, 24 to 34 & 34 to 41; and claim 1.	1, 9-14, 17-18, 21-22
X	US 2007/0151124 A1 (CHAN) 05 July 2007 See: figs. 3 to 5.	1, 9-18, 21
X	JPH 09140409 A (ACHILLES CORPORATION) 03 June 1997 See: espacenet abstract; and figs. 3 & 6.	26, 36
X	WO 2012/153882 A1 (HEESUNG CO., LTD.) 15 November 2012 See: espacenet abstract; and figs. 1 to 9.	26, 36
X	GB 420216 A (CRIDLAND et al.) 27 November 1934 See: figs. 1 & 2; and pg. 1, lines 79 to 82.	26, 36
X	WO 2008/113197 A2 (GROSS et al.) 25 September 2008 See: abstract; and figs. 1 to 7.	36
A	WO 2007/083898 A1 (SHIN) 26 July 2007 See: abstract; and figs. 1 to 4.	
A	US 2009/0094856 A1 (GUERRA) 16 April 2009 See: figs. 1 to 4c.	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2014/050111

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:

because they relate to subject matter not required to be searched by this Authority, namely:

the subject matter listed in Rule 39 on which, under Article 17(2)(a)(i), an international search is not required to be carried out, including

2. ☒ Claims Nos.: **31-34**

because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

See Supplemental Box

3. ☐ Claims Nos:

because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Supplemental Box for Details

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-23, 26, 35-36 and 38

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

Supplemental Box

Continuation of **Box II**
Claims 31 to 34 do not comply with Rule 6.2(a) because they rely on references to the description and/or drawings.

Continuation of: **Box III**

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

This Authority has found that there are different inventions based on the following features that separate the claims into distinct groups:

- Claims 1-23, 35 and 38 are directed to a high heeled shoe. The feature of wherein the central cushioning layer at least engages with one or more corresponding anatomical features of a sole of the foot to aid in sucuring the foot to the shoe is specific to this group of claims.

- Claims 24 and 25 are directed to a high heeled shoe and a method of forming a sole of a high heeled shoe, respectively. The feature of wherein a material of the central cushioning layer is less stiff than a material of the outer cushioning layer is specific to this group of claims.

- Claims 26 and 36 are directed to a high heeled shoe. The feature of a slight rise formed in at least one of the outer cushioning layer and the central cushioning layer, wherein the slight rise corresponds to an anatomical feature of a sole of a foot is specific to this group of claims.

- Claim 27 is directed to a high heeled shoe. The feature of wherein the bottom forefoot section of the shoe (sole) has a layer of rubber, polyurethanee (PU) with treat for slip resistance and that makes the heel light and flexible is specific to this group of claims.

- Claim 28 and 37 are directed to a high heeled shoe. The feature of where at least one shank is built into the sole of the shoe to give extra support and stability needed to the arch of the foot is specific to this group of claims.

- Claim 29 is directed to a high heeled shoe. The feature of where a gap between the toes and ball of foot section has a rise of one cushioning layer manufactured from a conformable material is specific to this group of claims.

- Claim 30 is directed to a high heeled shoe. The feature of where a cup heel with a cushioning layer at the base of the heel gives extra comfort and socketing or cupping support for the wearer's heel is specific to this group of claims.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

When there is no special technical feature common to all the claimed inventions there is no unity of invention.

In the above groups of claims, the identified features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship. Therefore there is no special technical feature common to all the claimed inventions and the requirements for unity of invention are consequently not satisfied *a priori*.
It is considered that the inventions defined in dot points one and three can be searched together.

INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/AU2014/050111**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		**Patent Family Member/s**	
Publication Number	**Publication Date**	**Publication Number**	**Publication Date**
US 2006/0026867 A1	09 February 2006	US 7526880 B2	05 May 2009
		WO 2007092002 A1	16 Aug 2007
US 2005/0262733 A1	01 December 2005	US 7152341 B2	26 Dec 2006
US 2007/0234590 A1	11 October 2007	US 7614164 B2	10 Nov 2009
		EP 1842443 A2	10 Oct 2007
		US 2010011617 A1	21 Jan 2010
KR 2012-0022496 A	12 March 2012	None	
GB 892156 A	21 March 1962	US 2863231 A	09 Dec 1958
US 2007/0151124 A1	05 July 2007	None	
JPH 09140409 A	03 June 1997	None	
WO 2012/153882 A1	15 November 2012	None	
GB 420216 A	27 November 1934	None	
WO 2008/113197 A2	25 September 2008	EP 2129251 A2	09 Dec 2009
		EP 2129251 B1	03 Oct 2012
WO 2007/083898 A1	26 July 2007	None	
US 2009/0094856 A1	16 April 2009	US 8490297 B2	23 Jul 2013
		WO 2010042221 A1	15 Apr 2010

End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.