INSOLE WITH IMPROVED CUSHIONING FOR SIDES OF FEET AND HEELS

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ABSTRACT

A heel cup (44) permits the user to custom fit each foot to various shaped footwear, using adjustable bottom wall and side wall cushions (76, 246), thereby providing optimum comfort and safety whether simply walking or during vigorous sports activity. The heel cup includes bottom, side and heel portions (72, 74), an attachment mechanism secured at least to one of the portions, and an insole (54, 78) secured to a hook and loop attachment mechanism for supporting the foot. A complete adjustable insole is together used with an adjustable sidewall cushioning because it is difficult to reach into the interiors of footwear to make adjustments, such as installing moving or removing a cushion to obtain necessary comfort. Attachments for the insole may comprise tabs (158, 172, 188) to which the insole can be secured. A heel grip bracket (420) with a cushion (422) may be mounted on the heel portion of the bracket and one or more cushions (438) may be coupled to cushion (422) on its sides.
FIG. 3a

FIG. 3b

FIG. 3c

FIG. 4
INSOLE WITH IMPROVED CUSHIONING FOR SIDES OF FEET AND HEELS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Applications No. 60/219,792 filed Jul. 19, 2000 and No. 60/276,595 filed Mar. 16, 2001.

REFERENCE REGARDING FEDERAL SPONSORSHIP

[0002] Not Applicable

REFERENCE TO MICROCROME APPENDIX

[0003] Not Applicable

BACKGROUND OF THE INVENTION

[0004] 1. Field of the Invention

[0005] The present invention relates to orthotics or insoles for shoes and, more particularly, to stabilize, cushion and provide pressure relief of both the bottom and sides of the feet and to protect the feet from impact and shock, in particular, by use of customizable heel cups and the like.

[0006] 2. Description of Related Art and Other Considerations

[0007] Heel cups, which may be characterized as falling within the general category of insoles, are usable alone or insertable in footwear to provide support and cushioning for the heel, or other foot parts, such as are disclosed in U.S. Pat. Nos. 4,179,826, 4,928,404, 6,041,524 and 6,059,744. These devices are generally molded in a set design and, therefore, are not readily customizable or adjustable to accommodate many different foot variations. They are also very expensive to manufacture, as requiring a usually very high mold cost. For example, it is costly to mold side walls over 1/2” in height for insoles used to fit into footwear. Use of an improperly fitting heel cup or similar insole either fits the foot too snugly, or permits the foot to move with excessive side to side or lateral movement within the footwear. Thus, variations in the widths of the forefoot and the heel area cannot be accommodated, except in custom-manufactured and, accordingly, expensive models. The corollary is that standard, generally molded, insoles lack sufficient sidewall height and do not provide a means of securing feet with narrow heels from side to side sliding which can result in painful plantar fasciitis.

SUMMARY OF THE INVENTION

[0008] These and other problems are successfully addressed and overcome by the present invention. Heel cups are cushioned and otherwise modified to tailor them as needed by any person, whether the individual or foot-care professional, as appropriate to the foot and foot condition of the individual user, such as by adding cushions on one or more vertical inside and/or outside walls of the heel cup, or by changing the shape or dimension of the wall portions or elongating the bottom portion. One or more stabilizing, cushioning and pressure relief mechanisms are provided as built-in or modified adjuncts to the heel cup. The preferred cushion attachment means is by a hook-and-loop fastening or attachment system. Where a component of the system may contact the user, it is further preferred that the component be the loop component to avoid irritation to the skin.

[0009] For example, as the user ages, the foot changes, but not necessarily in all particulars, e.g., the heel may remain the same, but the rest of the foot may broaden out. For sports and like activities, side-to-side movement must be controlled; likewise, weak ankles and flat foot conditions need to be addressed. Thus, such modifications as specialized cut outs, notching and slits may be provided in the heel cup for insertion of an orthotic therein. The heel cup may be molded or otherwise provided with an integral orthotic, or a full or partial ledge and/or bottom.

[0010] The present invention can be installed in shoes and some sandals. It can be installed in boots and, using firmer cushions and higher and thicker sidewalls, be useful in sports such as skiing and climbing which require a firm and individualized fit between the foot and the boot. Many different materials may be used and incorporated into a heel cup design.

[0011] In addition, no specific hook and loop attachment mechanism, such as the VELCRO® hook and loop attachment mechanism, need be used to achieve relocation of cushion pads for optimum support of the feet to minimize discomfort.

[0012] Loop cloth is laminatable to both sides of the vinyl sheet and, thereby, to enable cushion pads with hook cloth to be attached to the loop cloth, such as may be useful to provide relief from heel pain for some people, and avoids the problems associated with the use of conventional sheet molding processes.

[0013] Several advantages are afforded by the present invention, such as lower cost, improved heel and side of foot cushioning, and the avoidance of the need for foot pad adjustment to achieve adequate foot support. Use is made possible of complete adjustable insoles, as provided in prior inventions of one or both of the herein-named inventors, with the adjustable sidewall cushioning of the present invention, to avoid any difficulty in reaching into the interiors of footwear to make adjustments, such as installing moving or removing a cushion to obtain necessary comfort. The user can custom fit each foot to various shaped footwear, thereby providing optimum comfort and safety whether when simply walking or during vigorous sports activities. Complete flat and sidewall combination assemblies can easily be removed from footwear, adjusted, if need be, or transferred to other footwear and adjusted again to that footwear.

[0014] Although the adjustable sidewall cushioning of the present invention is designed to be used with hook and loop flat insoles disclosed in previous patents of one or both of the herein-named inventors, it is feasible to construct footwear with loop cloth inside covered sidewalls where needed for attachment of hook covered cushions, such as manufactured under the VELCRO® trademarked loop and hook cloth products.

[0015] Layers of loop cloth can be bonded to either one or both sides after molding the cushion material. The inability, to mold shapes having high enough walls to cup the sides of the heels and to provide the required rigidity to stay vertically, is overcome.

[0016] For attaching these insoles to the same sidewall tabs, the loop side of the tabs can be covered with small hook
tabs which wrap around the existing loop tabs to grip the hook tabs to the loop underside of the insole.

[0017] The side walls of generally foam cushioning have demonstrated improved foot comfort and a means of securing the feet from side to side or lateral movement within footwear. It is difficult and costly to permanently attach such cushioning to the inside walls of footwear.

[0018] Alternatively the insoles and tabs can be manufactured to have loop underside insoles and tab hook surfaces on top to grip the insoles.

[0019] To accommodate variations in the forefoot width and in the heel area, the sidewall cushion width can be made removable and changed to suit individual feet and varieties of footwear, especially when such footwear is not commonly manufactured.

[0020] Other aims and advantages, as well as a more complete understanding of the present invention, will appear from the following explanation of exemplary embodiments and the accompanying drawings thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG. 1 is a cross-sectional side view of a shoe with an orthotically formed heel cup inserted therewithin, which is typical of one of the many types generally encompassed by the present invention.

[0022] FIG. 2 is a view taken along line 2-2 of FIG. 1 of the shoe and orthotic illustrated therein.

[0023] FIGS. 3a-3c are, respectively, (a) a side view, in cross-section, of one embodiment of a medium length heel cup formed from a laminating of a thin, relatively stiff plastic sheet of vinyl and VELCRO® loop cloth material, (b) a top view of the FIG. 3a embodiment having a loop cloth top surface, and (c) a view of the FIG. 3b embodiment after die cutting a portion to provide for more room in the show. A loop covered rim is left in place for attaching the hook bottom of an insole to create a flat insole attached to a heel and side of foot assembly. The hook bottom can hold loop covered cushions in place and the sidewalls hook covered cushions also. Hook coverings are not placed on cushions facing the foot to avoid roughness of feel and irritation. After die cutting away the bottom, a ledge of plastic and loop remain onto which the hook bottom of the insole is attached.

[0024] FIG. 4 is a view similar to that depicted in FIG. 3c but with additional ledge for more secure insole attachment, if needed. Here, for example, the vertical wall and the mounting ledge are formed from a loop/plastic material.

[0025] FIGS. 5a-5d are several views of a short length heel cup embodiment of the present invention. FIG. 5a is a view of a short length in which a sheet of vinyl film in the range of 0.015 inches thick is laminated to a sheet of VELCRO® loop cloth. Using a last suitable for this heel cup embodiment, the laminated sheet assembly is vacuum thermo-formed and die cut into a heel cup. The loop cloth side faces the heel. FIG. 5b is a view of the heel cup embodiment illustrated in FIG. 5a looking toward the back of the cup. To obtain cushioning that will secure the heel in the shoe, cushion strips or shaped cushions with a VELCRO® hook back layer can be attached to the VELCRO® loop layer on the front walls. FIG. 5c is an expanded view of the heel cup embodiment shown in FIG. 5b with some cushions attached thereto, with one strip on the back, and two strips attached on the respective sides of the cup inside walls. FIG. 5d is a view of an elongated heel cup embodiment, which has been lengthened through use of an insole which has a VELCRO® hook bottom attached to the VELCRO® loop bottom of a short length heel cup, such as depicted in FIG. 5c. This combination provides for excellent heel support on the sides. The back attached cushion prevents irritation on the back of the heel due to shoe rubbing the skin as the foot moves up and down, typically while the wearer is playing tennis.

[0026] FIGS. 6a and 6b are, respectively, (a) a side view of another heel cup embodiment with long, low height sidewalls which can extend to about two-thirds the foot length to protect the sides of the feet from irritation from stitching and any existing rough interior walls, and (b) a top view of the FIG. 6a embodiment showing its loop covered ledge. An insole with VELCRO® hook bottom can be attached to the loop layer on the ledge which is capable of providing additional sidewall support.

[0027] FIGS. 7a-7c are, respectively, (a) a top view of a heel cup embodiment which is permanently attached to a heel cup section, (b) a composite laminated sheets material from which the heel cup and insole embodiment of FIG. 7a may be vacuum formed and die cut, and (c) a view of a die cut sheet laminate useful in the embodiment depicted in FIG. 7a comprising a cushion layer, a thin vinyl layer and a thin layer of grip material of, for example, rubber or plastic. This embodiment is useful as a household slipper.

[0028] FIG. 8 is a view of another heel cup embodiment similar to that illustrated in FIG. 5d, but with sidewalls which may be a full insole length or about one half to approximately two thirds length. For this embodiment, the lamination portrayed in FIG. 7c may have an additional cushioning layer between the grip material and the vinyl.

[0029] FIGS. 9a-9b depict the formation of an alternate heel cup embodiment. FIG. 9a is a view of a flat laminated sheet for use in this embodiment. FIG. 9b is a flat or plan view of a sidewall pattern which has been cut or otherwise removed from the sheet shown in FIG. 9a, such as by die cutting, laser cutting or water jet cutting. FIG. 9c is a partial configuration of the cut sheet shown in FIG. 9b whose tabs are bent as legs having insole attachment material thereon. FIG. 9d illustrates a curved formation of the FIG. 9c configuration. FIG. 9e is a view of the formation depicted in FIG. 9d with an insole mounted atop its tabs at the rear foot heel cushioning section, and is particularly useful for users having very narrow heels which can be made very secure, such as by mounting additional cushions with a hook area on one side to attach to the loop side of the side wall, e.g., as shown in FIG. 9f. FIG. 9g is a top view of an insole mounted on a longer length sidewall cushioning assembly, in which several loop tabs under the insole keep the sidewall and the insole together as one completely adjustable assembly which can readily be removed and re-inserted into footwear. The sidewall strip can be one continuous length around the insole periphery or a series of shorted spaced apart lengths. Separate lengths can be mounted around the area if needed. It has been demonstrated that superb comfort has been achieved due to relief from chafing of the skin due to the rougher feel of the inner walls, seams, stitching, etc.
which is typical of most footwear. The sidewall can be removed and periodically washed, dried and re-inserted. By the above advantages the cost and comfort of low cost footwear will be more advantageous than very costly footwear. FIG. 9b shows a side view of sidewall cushioning mounted on tabs and ready to be inserted into footwear. The sidewall height is lower than the show sidewall height but can be shaped to help remove virtual side of foot irritation such as corns or bunions. The user can readily trim by scissor sidewall height or remove and or replace all or portions of the sidewall or add additional hook on one side cushions where thicker cushioning is indicated. By adding and relocating the underside of the insole the complete assembly becomes the ultimate in adjustability for best comfort the individual and his or her foot problems and differences in footwear for everyone seeking different shoes profiles, heel height, sense of feeling of fit and of styling. For people more dependent on medical expertise this system is a useful tool to obtain superior fitting results and at lower cost.

[0030] FIGS. 10a-10f shown a further heel cup embodiment. FIG. 10a shows a side view of a sidewall strip with a loop layer on a plastic layer which has a narrow shelf which attaches to the hook bottom of the insole. FIG. 10b shows a side view of a portion of the insole with the FIG. 10a strips attached to the medial and outside edges of the insole. FIG. 10c is a view of a flat sheet of the attachment after die cutting to provide flexibility when attached around the curving periphery of the insole. FIG. 10d shows the forming of the FIG. 10c die cut sheet which may be done during die cutting or later to suit production or shipping needs. If the item is shipped flat and have the customer bend the tabs up, shipping costs can be reduced. FIG. 10e is a side view of a portion of an insole with a side cushion mounted on an attachment. FIG. 10f is a view of a surface with an additional cushion mounted thereon, if thicker cushioning is needed in a certain area.

[0031] FIGS. 11a-11e depict an alternative heel cushion embodiment. FIG. 11a is a view of strip of an attachment loop and plastic sheet lamination after die cutting of suitable holes therein, from which prototype tabs are to be formed. FIG. 11b is a view of the FIG. 11a strip after its being cut into half sections to form a plurality of tabs. FIG. 11c is a view showing a 90° bending of the FIG. 11b tabs. FIG. 11d is an edge view of the FIG. 11e strip. FIG. 11e is a view of the FIG. 11d strip with an insole mounted thereon.

[0032] FIGS. 12a-12f illustrate methods of augmented heel cup embodiments. FIG. 12a is a side view of heel cup. FIG. 12b is a top view of the FIG. 12a heel cup with a hole formed therein. FIG. 12c is a side view of an assembly incorporating the FIG. 12b embodiment with an insole attached thereto along with, on its bottom, a covered cushion connected through the hole by a mating attachment with the insole. FIGS. 12f and 12c respectively are side and bottom views of the heel cushion depicted in FIG. 12c and is adapted for possible relief of planter fasciitis pain when the calcaneus bony rear bottom can fit into the hole to relieve some of the pressure. FIG. 12f is a top view of the insole, cushion and cup assembly, in which the holes can be rectangular or otherwise shaped.

[0033] FIGS. 13a-13c are further heel cup embodiments depicting (a) the top view of the left foot insole mounted on a heel cup, (b) the side view of the FIG. 13a embodiment with typical cushions shown attached to the underside of the insole, and (c) a view of the assembly from its forefront side.

[0034] FIGS. 14a-14c illustrate views of other heel cup embodiments with various advantages in increased comfort for more elderly and diabetic people when the bottom of the insole has a loop cloth layer instead of a hook layer as previously shown. FIG. 14a shows a PORON® top layer and a loop-cloth layer. FIG. 14b discloses a sandwich configuration of a hook top of a heel cup, a vinyl layer and a loop bottom of the cup. FIG. 14c illustrates a sandwich configuration of a hook top layer, a vinyl layer and a loop bottom layer.

[0035] FIGS. 15a-15c illustrate construction details of a short length heel cup embodiment comprising (a) a top view of the short length cup with perforate holes and a large hole for heel shock and pressure relief, (b) materials under the heel of the foot, and (c) a longer heel cup modification.

[0036] FIG. 16 is a view of a typical perforated ramp pad useful in the several disclosed heel cup embodiments.

[0037] FIG. 17 is a side view of a heel cup assembly with a loop cloth on the foot facing side.

[0038] FIGS. 18a-18c depict further heel cup embodiment depicting (a) a top view of a loop cloth on the top surface and on the walls of the heel cup, (b) a side view of the insole with cushions mounted thereon, (c) a top view of the insole mounted on the heel and sidewall assembly, (d) a side view of an assembly with straps to secure the foot in place, in which the straps can be attached to exterior sidewalls on other side of the assembly, which is useful as a slipper, for foot cushioning and correction in post surgical applications, and (e) a side view where an additional cushion is added if additional heel cushion or other cushion height is needed.

[0039] FIGS. 19a-19e illustrate another heel cup assembly including (a) a top view of the assembly, (b) a side view of the FIG. 19a assembly, (c) a view similar to that shown in FIG. 19a but with places for positioning heel, arch, metatarsal and toe grip cushions therein, (d) a view similar to that shown in FIG. 19e but the respective cushions positioned therein, and (e) a top view of the FIG. 19f design.

[0040] FIG. 20 is a front view of an arrangement for supporting a heel.

[0041] FIG. 21 is a view of a cushion mount insert.

[0042] FIG. 22 shows a heel grip bracket with formed edging on both its sides to provide spring tension to maintain inward pressure against cushion mount vertical walls.

[0043] FIG. 23 is a bottom view of FIG. 22 depicting a heel pressure relief hole positioned within the formed edging to provide an inward pressure of cushions against sides of heel.

[0044] FIG. 24 is side view of the cushion mount insert of FIG. 21.

[0045] FIG. 25 is a rear view of the heel of a foot cupped in a heel grip and support arrangement.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0046] A general construction of the present invention is depicted in FIGS. 1 and 2. A shoe 30 of conventional
construction, as shown in cross-section, includes a bottom portion 32, including heel and toe sections 34 and 36, side portions 38, a back portion 40 and a forward foot covering portion 42. An orthotically formed heel cup 44, which is inserted within shoe 30, is typical of one of the many types generally encompassed by the present invention.

[0047] Reference is now made to FIGS. 3a-3c which comprise the present invention embodied in these figures as a medium length heel cup 50 which, in turn, is illustrated in its completed form in FIG. 3c. Heel cup 50 is formed from a prototype heel cup 50', shown in FIGS. 3a and 3b. Prototype heel cup 50' includes a bottom portion 50a and upstanding side and wall portions 50b, and comprises a cup-shaped lamination of a thin, relatively stiff plastic sheet of vinyl 52 and a loop cloth material 54, such as of VELCRO®. A portion of vinyl sheet 52 and loop cloth material 54 is cut away from bottom portion 50a, as shown in FIG. 3a, such as by die cutting, to form a ledge or rim 56, as illustrated in FIG. 3c. Means, such as laser cutting and water jet cutting, can be used in place of die cutting.

[0048] Loop covered rim 56 is employed for attachment of an insole thereto. In this embodiment, the insole is provided with a bottom having hooks thereon for attachment to the loop material remaining on ledge or rim 56. The resultant construction thus forms a flat insole attached to a heel and side of foot assembly. The hook bottom of the insole and loop covered side and back wall portions 50b of heel cup 50 are further adapted to respectively hold loop-covered cushions and the sidewalls hook-covered cushions in place, as is suggested in later illustrated embodiments of the present invention (e.g., see FIGS. 5c and 5d). It is preferred that hook coverings not be placed on cushions facing the foot to avoid roughness of feel and irritation. It is to be understood, however, that such hook-coverings can be used, provided that such roughness of feel and irritation is avoided, such as by improved hook and loop materials.

[0049] FIG. 4 is a view of a heel cup 60 which is similar to but modified from that depicted in FIG. 3c. Here, additional ledging 62 is provided for more secure insole attachment, if needed. The vertical wall and the mounting ledge may be formed from a loop and plastic material lamination. To suit various styles, the ledge outline and shape can be varied.

[0050] FIGS. 5a-5d depict several views of a short length heel cup embodiment 70 of the present invention. This embodiment was initially devised to meet a specific problem. A major contributor to plantar fasciitis is the difficulty in retaining the heel securely in shoes. Due to large variations in dimensions of feet and dimensions inside shoes, it is quite possible for an individual to have feet with a wider forefoot and a narrower heel than those of generally normal dimensions and, for economical reasons, for shoe manufacturers to provide for the many special combinations required to satisfy such unusual foot sizes. Accordingly, heel cup 70 is intended to provide such changes in sidewall thickness which will alleviate narrow heel feet which must fit in wider width footwear.

[0051] Accordingly, as shown in FIGS. 5a and 5b, heel cup 70 is of relatively short length, comprising a bottom portion 72 and back and side portions 74, that are cast from an outer sheet of vinyl film in the range of 0.015 inches thick which is laminated to an inner sheet of loop cloth, e.g., of VELCRO® loop cloth. Heel cup 70 may be formed by use of a suitably shaped last for this heel cup embodiment, in which the laminated sheet assembly is vacuum thermformed and die cut. The loop cloth side is disposed to face the heel. As depicted in FIG. 5c, to obtain cushioning that will secure the heel of the user in the shoe, cushion strips or shaped cushions 76 with a VELCRO® hook-back layer may be attached to the VELCRO® loop layer on the front walls. In FIG. 5c, one cushion strip is positioned on the back portion of heel cup 70, and two cushion strips are attached on the respective side portions of inside walls of the heel cup.

[0052] A lengthening of heel cup 70 may be obtained, as illustrated in FIG. 5d, to provide an elongated heel cup embodiment, through use of an insole 78 which has a VELCRO® hook bottom 80 attached to VELCRO® loop bottom portion 72 of short length heel cup 70. This combination provides for excellent heel support on the sides of the individual's feet. The back attached cushion prevents irritation on the back of heel due to shoe rubbing the skin as the foot moves up and down, typically while the wearer is playing tennis or other active sport.

[0053] It is envisioned that cushions of different thickness, softness, shape and size may be quickly attached and detached to obtain the right feel and protection for the user. Also, by placing cushions on only one side of the inside walls of the cup, some degree of pronation or supination may be possible. Other materials may be substituted and variations in material thickness and shape can all fit into the scope of this invention.

[0054] A further heel cup improvement utilizes a VELCRO® loop cloth laminated to both sides of the vinyl sheet. With this arrangement, it is possible to attach cushion pads with VELCRO® hook cloth to the loop layer on the bottom of the heel cup. An extra cushion under the heel may also provide relief from heel pain for some people.

[0055] This design also enables the employment of sufficiently high walls to cup the sides of the heels and the rigidity to stay vertically.

[0056] FIGS. 6a and 6b depict the present invention embodied also as a heel cup 90 having a bottom portion 92, a back wall 94 and long side walls 96 having a low-height sidewall portion 98 which can extend to about two-thirds the foot length to protect the sides of the feet from irritation from stitching and any existing rough interior walls. Bottom portion 92 is cut to form a loop covered ledge 100. An insole with a VELCRO® hook bottom can be attached to the loop layer on ledge 100 to provide additional sidewall support for the individual. Cushioning strips can be placed on loop covered extended length walls 96 to protect the sides of the feet.

[0057] FIGS. 7a-7c show a further embodiment of the present invention including a heel cup 110 configured with a bottom portion 112 which is fully enclosed by a side wall portion 114, a back wall portion 116 and a front wall portion 118. Bottom portion 112 comprises and insole which is permanently attached to heel cup 110. Both may be vacuum-formed and die-cut from a laminated sheet, such as depicted in FIG. 7b, which comprises a sandwiched composition of a loop cloth 120, a vinyl sheet 122 and a second loop cloth 124. Heel cup 110 may also be used as a household slipper.
which, as shown in FIG. 7c, includes a cushion layer 126, a thin vinyl layer 128 and a thin layer 130 of grip material of, for example, rubber or plastic.

[0058] FIG. 8 is a view of another heel cup embodiment 140 similar to that illustrated in FIG. 5d, but with an insole 142 and sidewalks 144 which may extend a full length or about one-half to approximately two-thirds of that of the insole. For this embodiment, the laminations portrayed in FIG. 7c may be provided with an additional cushioning layer between the grip material and the vinyl.

[0059] FIGS. 9a-9h depict a heel cup 150 (FIG. 9d) and its method of formation (FIGS. 9a-9e) from a flat laminated sheet 150a which is illustrated in FIG. 9a. Flat laminated sheet 150a comprises a top layer 152 of a loop or hook cloth, a central layer 154 of a soft cushion material such as PORON® which is an open cell foam polyurethane, and a bottom layer 156 of a thin plastic or fibre board or any material of relative stiffness which can provide a support means for the sidewalks assembly after the above layers are adhesively or otherwise bonded together. The above-mentioned materials represent examples of a wide variety of alternative materials that can be used. Laminated sheet 150a is die cut or otherwise cut to form a prototype heel cup 150b having tabs 158 lying in the same plane as the prototype heel cup. Tabs 158 are then bent at a 90° angle with loop or hook material 152a, remaining from top layer 152, affixed thereto. Laminated sheet 150c with its bent tabs is then curved to provide the finished product depicted as heel cup 150.

[0060] An insole 160, as shown in FIG. 9f, is mounted atop tabs 158 of heel cup 150 to provide a rear foot heel cushioning section 162. This embodiment is particularly useful for users having very narrow heels which can be made additionally very secure, such as by mounting, e.g., as shown in FIG. 9f, additional cushions 164 with a hook area on one side to attach to the loop side of a side wall 166.

[0061] FIG. 9g is a top view of an insole 168 mounted on a longer length sidewall cushioning assembly 170, in which several loop tabs 172 under the insole keep the sidewall 174 and the insole together as one completely adjusted assembly which can readily be removed and re-inserted into footwear. The sidewall strip can be one continuous length around the insole periphery or a series of shorter spaced apart lengths. Separate lengths can be mounted around in the toe box area if needed. It has been demonstrated that superb comfort has been achieved due to relief from chafing of the skin due to the rough feel of the inner walls, seams, stitching, etc. which is typical of most footwear. Sidewall 174 can be removed and periodically washed, dried and re-inserted. By the above advantages, the cost and comfort of low cost footwear will be more advantageous than very costly foot wear.

[0062] FIG. 9h shows a side view of a sidewall 176 having cushioning 178 mounted on tabs and ready to be inserted into the footwear. The sidewall height is lower than the shown sidewall height but can be shaped to help remove virtual side of foot irritation, such as corns or bunions. The user can readily trim the sidewall height by scissors or remove and/or replace all or portions of the sidewall, or add additional hooks on one side cushion where thicker cushioning is indicated. By adding and relocating the underside of the insole, the complete assembly becomes the ultimate in adjustability for best comfort of the individual and his or her foot problems and differences in footwear for all seeking different shoe profiles, heel height, sense of feeling of fit and of styling. For people more dependent on medical expertise, this system is a useful tool to obtain superior-fitting results and at lower cost.

[0063] FIGS. 10a-10f show a further heel cup embodiment. This series shows an additional type attachment that has side strips of similar plastic sheet laminated to a loop layer to provide vertical sidewalks of loop cloth facing the sides of the mid-foot or, additionally, the forefront. These walls, approximately 0.5 to 1.5 inches above the top surface of the insole, provide the attachment of cushioning pieces or strips to protect the sides of the feet from irritation of the inside walls of the footwear. This cushioning, when attached to the loop sidewalks of the heel cup or the mid and forefront loop sidewalk attachments, can also be used to prontate or supinate the position and direction of the foot with respect to the footwear. These attachments can also be adjusted for narrow heel shapes of feet and possibly narrower areas of mid-foot and forefront that are difficult to match and fit with commonly available manufactured shoes.

[0064] Accordingly, FIG. 10a shows a side view of a sidewall strip 182 including a loop layer 184 laminated or otherwise bonded to a plastic layer 186. Sidewall strip is bent at an end to form a narrow shelf 188. Strip 182 is adapted to be flexible to enable it to be curved when attached around the curving periphery of an insole 190, as shown in FIG. 10b. Specifically, insole 190 has a hook bottom 192 which is supported on and attached at its ends to opposed shelves 188 on sidewall strip 182, in particular, a portion of the insole has strips attached to the medial and outside insole edges.

[0065] The formation of sidewall strip 182 is shown in FIG. 10c, commencing with a flat sheet which had been die cut into a prototype sidewall strip 182' having unnotched tabs 188'. Unbent tabs 188' may be bent, as depicted in FIG. 10d, like that shown in FIG. 10a. Thus, FIG. 10d shows the forming of the FIG. 10c die cut sheet which may be done during die cutting or later to suit production or shipping needs. For example, if the item is shipped flat, such as to reduce shipping costs, the tabs may be later bent by a customer.

[0066] As an addition to the immediately preceding embodiment, additional cushions, such as cushion 194, as depicted in FIG. 10e, may be coupled to loop layer 184 on plastic layer 186. Also, as illustrated in FIG. 10f, an additional cushion 196 may be mounted on cushion 194, if thicker cushioning is needed in a certain area of the foot. To effect this purpose, cushion 196 is provided with a cushioning portion 198, such as of PORON® material, with a hook side 200 thereon for attachment to an existing cushion or side wall. It is believed that this type of construction enables podiatrists and all other health professionals, as well as typical consumers, to obtain optimum foot care, comfort, at minimum cost due to all possible means of adjustment to suit all possible conditions.

[0067] FIGS. 11a-11e depict an alternative heel cushion embodiment. FIG. 11a is a view of strip 210 of an attachment loop and plastic sheet laminations after being cut with suitable holes 212 therein, from which prototype tabs 214 are to be formed. FIG. 11b is a view of the FIG. 11a strip after its being cut into half sections, such as half section 216,
to form a plurality of prototype tabs 218. FIGS. 11c and 11d are views showing a 90° bending of prototype tabs 218 into bent tabs 220 on a formed strip 222. As shown in FIG. 11e, an insole 224 is mounted on and attached to the tabs, as evidenced by single tab 220.

[0068] FIGS. 12a-12f illustrate methods of augmented heel cup embodiments. These additions preferably use a design which utilizes a VELCRO® hook layer attached to the bottom surface of, preferably, a flat layer of PORON® upon which the plantar aspect of the feet are placed to perform as a shock absorbent, cushioned, insole for foot- wear. A plastic sheet of thin but stiff vinyl in the range of approximately 0.01 to 0.03 inches has, at least, a VELCRO® layer bonded to one side of the plastic sheet. The VELCRO® layer is preferably a thin loop cloth. The sheet is then vacuum thermoformed and then die cut to the shape described below.

[0069] Accordingly, referring to FIG. 12a, a heel cup 230 includes a bottom portion 232 and back and side walls 234, comprising a laminating of an outside plastic layer 236 and an inner layer of loop cloth 238. A hole 240 is formed in the bottom layer, and extends entirely there through, as illustrated in FIGS. 12b and 12c. As further shown in FIGS. 12c and 12d, an insole 242 is placed on bottom portion 232 and attached thereto by mating hook cloth 244 engaging loop cloth 238. A covered cushion 246, see also FIG. 12d, is provided with a loop top layer 248 to attach it to hook cloth 244 on insole 242 through hole 240. Cushion 246 is adapted for possible relief of plantar fasciitis pain when the calca
eus bone rear bottom can fit into the hole to relieve some of the pressure. Cushion 246 may be further modified, as shown in FIG. 12e. Here, a cushion 250 has an optionally centrally located hole 252 into which a removable cushion disc 254 can be placed.

[0070] Modifications of the embodiments depicted in FIGS. 12c and 12d, for example, may include holes which can be rectangular or otherwise shaped. In all the foregoing, the materials, such as vinyl and PORON® sheets, are suggested as being exemplary of the many materials that may be can be substituted therefor by using many other types of plastic sheet and cushioning materials, utilizing the described methods of construction. Typically, dimensions, such as diameters and material thickness, can vary whether shoe sizes vary, or light or heavy duty footwear is used as for dress shoe, sports use, or for ski and military type of activities.

[0071] A further heel cup embodiment is depicted in FIGS. 13a-13c, and comprises a heel cup 260 into and onto which an insole 262 with a hook cloth layer 264 is secured. Heel cup 260 has an inner surface covered with a loop cloth layer 266 to which the insole is secured. Cushions 268 may be attached to hook cloth layer 264 on the underside of insole 262.

[0072] FIGS. 14a-14c illustrate views of other heel cup embodiments with various advantages in increased comfort for more elderly and diabetic people when the bottom of the insole has a loop cloth layer instead of a hook layer as previously shown.

[0073] FIG. 14a shows a laminate 270 having a PORON® top layer 272 and a loop-cloth layer 274. Laminate 270 provides some advantage in increased comfort for more elderly and diabetic people is gained when the bottom of the insole has a VELCRO® loop cloth layer instead of hook as shown in FIG. 14b.

[0074] In FIG. 14b, a laminate 276 includes a sandwich configuration of a hook top 278 of a heel cup, a vinyl layer 280 and a loop bottom 282. This laminate is adaptable for the FIG. 13b embodiment.

[0075] FIG. 14c illustrates a sandwich laminate 284 of a hook top layer 286, a vinyl layer 288 and a loop bottom layer 290. This laminate is required for those cushions that are attached to the bottom of the insole. After lamination of these layers, the laminate can be die cut into all the resilient cushions previously described.

[0076] In further embodiments, to further improve the cushion resilience and shock absorption the cushions can be perforated in various hole patterns either after they have been die cut or before, when entire sheet stock rolls are perforated. It is also advantageous to perforate the FIG. 13a laminated heel cup material if necessary, before or after forming into a cup shape. As an alternate, the heel cup with a loop top layer or the one in FIG. 13a above can be used with a hook bottom or loop bottom insole. For a loop bottom insole and loop top cut a thin round washer of hook on both sides will connect cup and insole together.

[0077] FIGS. 15a-15c illustrate construction details which improve the functions of the heel cups to provide further insole performance by adding die cutting a large hole in the heel area and small perforating holes on the flat bottoms of the short and longer length heel cups. In FIG. 15a, a short length heel cup 300 incorporates perforate hole 302 surrounding a large hole 304 for heel shock and pressure relief.

[0078] Construction 310 shown in FIG. 15b, which is directed to materials placeable under the heel of the foot, comprise a PORON® layer 312 of the insole having a hook layer 314 laminated thereon, a VELCRO® loop layer 316 at the top surface of the heel cup, a vinyl layer 318 laminated to the above loop layer, and another VELCRO® loop layer 320 laminated to the bottom of vinyl layer. Large hole 304 passes through the three cup materials.

[0079] During the installation of the insole into the foot- wear, the heel area of the insole is first placed on the flat bottom of the cup. Then, the hook bottom of the insole is bonded to the loop top flat area of the heel cup. The heel cushion is placed under the heel cup and the hook area of the insole that is exposed by the large hole bonds to the loop top of the heel cushion.

[0080] FIG. 15c describes a heel cup 330 which is longer than construction 300, shown in FIG. 15a. Like the prior construction, construction 330 includes a large hole 332, but further incorporates additional perforations 334 and an extended heel cup wall 336.

[0081] All previously described cushions which are attached to the bottom of the insoles with a VELCRO® hook or loop laminated layer can also be made from perforated material to increase flexibility and foot comfort.

[0082] As disclosed in FIGS. 16a and 16b, it is also contemplated that a ramp pad 340 can be utilized in the several heel cups of the present invention. If desired, ramp pad 340 may be provided with perforations which also
function usefully in very tender areas of the feet. Such ramp pads may be placed in post surgical areas so that, when the pads are gradually fed into these areas, they will provide protective lift with time.

[0083] As depicted in FIG. 17, a heel cup 350 is formed from a molded assembly of a loop cloth 352 laminated to a semi-rigid vinyl layer of a thin vinyl plastic film 354. The loop cloth is positioned on the foot facing side of the heel cup. This assembly is preferably laminated with loop cloth upon which the earlier described insole models with a VELCRO® hook bottom can be seated and attached to. The loop cloth covered side walls on the foot facing side of the formed assembly can be used to attach cushions with VELCRO® hook on the side facing the assembly heel and foot sidewalks. Additional similar cushions can also be attached on the bottom loop surface of the foot facing plantar aspect of this assembly.

[0084] The versatility of cushion attachment is greatly increased by using the bottom hook surface for attaching loop covered cushions to the bottom of the insole, and hook covered cushions attached to the loop surfaces of the foot facing and sidewalks of the attachment.

[0085] FIGS. 18a-18c depict a further embodiment of a heel cup 360. As shown in FIG. 18a, this heel cup includes a bottom portion 362 and back and side wall portions 364 covered with a loop cloth 366. An insole 368 with hooks is secured to loop cloth 366 on bottom portion 362. Additional heel, arch and metatarsal cushions 370, 372 and 374 (see FIGS. 18b and 18c) are mounted on insole 368.

[0086] Straps 376, as shown in FIG. 18d, may be affixed to the assemblies previously depicted to help secure the wearer’s foot in place. The assembly can be used as a slipper. It can also be used for foot cushioning and correction in post surgical applications. The patient can wear the slipper in bed and get out of bed to go to wash up, eat, etc., without disturbing the bandages. The loop bottom may assist the surgeon in separating the toes by using bandages with VELCRO® hook dots to hold down to the loop top surface. The patient may participate in outpatient visits wearing such slippers.

[0087] For all these additional applications, the material thickness and sturdiness can be modified to suit and need. As an example for use in army type boots, ski shoes, etc., the walls can be higher, the cushions firmer or thicker but the same principles of my invention apply.

[0088] With respect to FIG. 18c, a heel cup 380 incorporates one or more additional cushions 382 are added if additional heel cushion or other cushion height is needed. For sports, such as skating, the extra, adjustable cushioning will protect, to a great extent, damage to the feet and ankles and reduce fatigue and pain.

[0089] FIGS. 19a-19f illustrate another heel cup assembly in which essentially no VELCRO® hook and loop is used to achieve relocation of cushion pads for optimum support of the feet to minimize discomfort. This type of insole, however, has several advantages such as lower cost, improved heel and side of feet cushioning, and has no need of pad adjustment to achieve adequate foot support.

[0090] FIGS. 19a and 19b show an assembly 390 fabricated from a plastic sheet shaped to provide the bottom of the insole and sufficient material to form the vertical walls surrounding the heel and sidewalks of the feet using a suitable machining and heat forming or molding process. The particular assembly shown is the result of die cutting the plastic material prior to forming the desired shaped part of the insole assembly. It is also possible to form this shape out of sheet material and then to die cut the desired part. The sheet material can be a flexible or semi-rigid foam or non-foam polyurethane but many suitable materials can be used.

[0091] Accordingly, assembly 390 includes a bottom portion 392, a medial sidewall 394, a heel section wall 396, and cushioning walls 398 for the sides of the foot. Cushioning walls 398 can extend around a greater or lesser extent of the periphery of the foot as is needed or desired. For reduced manufacturing cost, the walls and insole shapes for both feet can be made identical.

[0092] Referring to FIGS. 19c and 19d, the top surface of the bottom portion 392 may be embossed with recesses or slightly elevated walls to retain foot cushions in place for assembly, such as location 400 for a heel cushion 402, location 404 for an arch cushion 406, location 408 for a metatarsal cushion 410 and location 412 for a toe grip cushion 414. The cushion surfaces and other surfaces of FIG. 19c can be coated with dry powder which becomes an adhesive bond when the final assembly is heated and pressed into a sealed assembly, as shown in FIG. 19e.

[0093] The lower level shown in FIG. 19f can be made of a clear plastic material which then makes it possible to view the internal construction of the insole assembly when the insole is turned over. The plastic material can be perforated with a fine hole pattern which enables the moisture to escape the enclosed cavity where the cushions are seated in position. When the insole is in footwear or walking and running is taking place, the cushions become compressed with each step and the air and moisture will escape through the fine holes. The resultant constant air movement acts to exhaust air from the interior of the shoe and to cool the feet during vigorous sports activity. The holes can be fine enough to prevent sand and other particles from entering the cushion chamber area. The insoles can be washed and dried to maintain freedom from odors and mold formation.

[0094] The present invention thus described relates to a first type of heel cup, which is designed to attach to the bottom side of a hook or loop surface on an insole. FIGS. 20-25 depict a second type of heel cup. This additional heel cup design is useful in common types of footwear, which may or not have insoles and which can assist in side of foot cushioning and can be readily removed, adjusted and placed back into footwear readily. This type can be used in the heel or vamp portions of the shoes with models of appropriate sizes.

[0095] FIG. 20 illustrates a heel grip bracket 420 in which a cushion mount 422 is inserted, for supporting a heel. A typical cushion mount insert 422 is depicted in FIG. 21, and comprises a vinyl layer 424 sandwiched between loop cloth layers 426 and 428. Heel grip bracket 420 is further shown in FIG. 22 and includes a base or bottom portion 422a and wall portions 422b joined by outwardly extending edgings 430 and 432 on both its sides to provide spring tension to maintain an inward pressure of bracket 420 against the foot of the user through its cushion mount vertical walls. As
shown in FIG. 23, a heel pressure relief hole or opening 434 may be provided within edgings 430 and 432 to provide an inward pressure of cushions 422 against the sides of the heel. A suitable cushion mount insert 436 is illustrated in FIG. 24. FIG. 25 is a rear view of the heel of a foot capped in a heel grip and support arrangement.

[0096] The elevated side of foot and heel sidewalls can be bonded with an outside strip approximately ½" wide of VELCRO® hook or loop upon which soft cushions with a VELCRO® layer can be attached. This exterior to the foot cushioning will customize the fit between the footwear interior when the heel and sides of feet are too loose in the footwear.

[0097] Despite the superior protection from shock and irritation for the feet that the present invention will provide, the products encompassed thereby can be produced at relatively low cost and will benefit tired, sore, and aching feet due to the simple and effective design.

[0098] Although the invention has been described with respect to particular embodiments thereof, it should be realized that various changes and modifications may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A heel cup for placement in a shoe comprising bottom, side and heel portions, an attachment mechanism secured at least to one of said portions, and at least one foot support device secured to said attachment mechanism for supporting a foot.

2. A heel cup according to claim 1 in which said foot support device comprises a cushion.

3. A heel cup according to claim 1 in which said side portion comprises opposing side sections and said foot support device comprises a cushioning system secured to at least one side of said side portion for inhibiting side-to-side movement of the foot.

4. A heel cup according to claim 1 in which said foot support device comprises an insole extending as an integral extension from said bottom portion.

5. A heel cup according to claim 1 in which said foot support device comprises an insole secured to said bottom portion.

6. A heel cup according to claim 5 in which said bottom portion comprises a ledge extending from said side and heel portions.

7. A heel cup according to claim 6 in which said ledge is fully closed for attachment to and support of said insole about its entire periphery.

8. A heel cup according to claim 1 in which said side portion comprises opposing side sections which extend to the arch portion of the shoe.

9. A heel cup according to claim 8 in which said opposing side sections extend upwardly to at least the foot’s ankles.

10. A heel cup according to claim 1 in which said side portion comprises opposing side sections which extend to the toe portion of the shoe.

11. A heel cup according to claim 10 in which said opposing side sections extend upwardly to at least the foot’s ankles.

12. A heel cup according to claim 11 in which said opposing side sections slope downwardly to the arch portion of the shoe.

13. A heel cup according to claim 11 in which said opposing side sections slope downwardly to the arch portion of the shoe and extend therefrom to the toe portion of the shoe.

14. A heel cup according to claim 1 in which said bottom portion comprises tabs from said side and heel portions.

15. A heel cup according to claim 14 in which said tabs are formed from a cut in half laminated strip having a plurality of closed opening therein wherein the cut was extended through the closed openings.

16. A heel cup according to claim 1 in which said foot support device comprises an insole extending from said bottom portion and a cushioning pad system secured to said insole for attending to podiatric problems associated with the foot.

17. A heel cup according to claim 1 in which said foot support device comprises an insole extending from said bottom portion and a cushioning pad system secured to said insole for attending to podiatric problems associated with the foot, and further comprising perforations in said insole.

18. A heel cup according to claim 1 in which said foot support device comprises a heel grip bracket.

19. A heel cup according to claim 18 in which said heel grip bracket includes a base portion and wall portions, and a spring bias coupling between said base and wall portions to effect spring tension to maintain inwardly pressure against a user’s foot.

20. A heel cup according to claim 18 in which said foot support device further comprises a cushion insert conformably mounted within said heel grip bracket.

21. A heel cup according to claim 20 in which said heel cup bracket includes terminal portions positioned adjacent a user’s ankles, further comprising at least one cushion mounted on said cushion insert within said heel grip bracket terminal portions.

22. A heel cup according to claim 18 in which said foot support device further comprises a pressure relief cushion mounted in an opening in said heel grip bracket.

23. A method for supporting a foot in a heel cup comprising the step of placing at least one foot support device in the heel cup.

24. A method according to claim 22 in which the heel cup includes opposing side sections and further comprising the steps of utilizing a cushioning system secured to at least one side of the side portion for inhibiting side-to-side movement of the foot.

25. A method according to claim 22 further comprising the step of forming tabs on a bottom portion angularly bent from side and heel portions of the heel portion.