

Foot support apparatus

The invention relates to a foot support apparatus for supporting a foot in footwear and to a method of selecting a foot support apparatus. The invention is directed particularly but not solely towards a foot support apparatus that supports all four arches of a foot to better balance the body weight of a person in a shoe.

Background of Invention

There are many types of so-called “foot supports” or “foot support apparatus” on the market. “Foot supports” can also be known as insoles or shoe inserts or orthotics though insoles are more about just providing padding for shock absorption. As there are so many different types of so called foot supports it is very difficult to compare and find the right support for each person. These supports can be very expensive and not able to last very long. There can be problems with these known foot supports being too delicate or soft, meaning that they can damage very easily requiring frequent replacement. Also if these supports are too soft there can be very little support provided.

In any foot there are various arches or multi-arches, though most people tend to know about only one arch which is the largest raised portion in the foot hence people tend to recognize the term “a foot arch” as relating to this particular arch. An arch in a foot can include muscle, bones, ligaments and tendons and as the name implies it is a curved support region. There is an “inner longitudinal arch” which begins behind the big toe joint and extends to the inner front of the heel. This is the arch that most people can see. In use if weight is put onto the inner longitudinal arch it can drop a little and then rise back to its original shape after the extra support is removed.

There is a first transverse arch called a “metatarsal arch” which appears as a hollow just behind the ball of the foot. There is an “outer longitudinal arch” which begins just behind the head of the little toe and extends rearward to the front of the heel bone. Also there is a second transverse arch called “a transverse arch” which is located under and across the cluster of bones just in front of the heel bone.

Support can also be centred in the wrong position in the foot which can in some instances causes problems further up the body. Poor support, like poor posture can damage the skeleton leading to other related problems such as back pain or muscle fatigue.

- 5 In this specification unless the contrary is expressly stated, where a document, act or item of knowledge is referred to or discussed, this reference or discussion is not an admission that the document, act or item of knowledge or any combination thereof was at the priority date, publicly available, known to the public, part of common general knowledge; or known to be relevant to an attempt to solve any problem with which this specification is concerned.

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Object of the Invention

It is an object of the invention to provide foot support apparatus and method of selecting a foot support apparatus that ameliorates some of the disadvantages and limitations of the known art or at least provide the public with a useful choice.

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Summary of Invention

- In a first aspect the invention resides in a foot support apparatus for supporting the multi arch area of a foot, the apparatus includes an elongate curved planar body fabricated from a strong resilient lightweight material comprising a plurality of suspended curvatures in the form of interconnected arches, the apparatus body having an in use upper surface, a lower surface, a toe end, heel end, sides, body thickness and body edges with the body being shaped having interrelated suspended curvatures forming continuous raised and depressed curved support areas so that, at least when not in use when compared to a horizontal datum surface, the toe end and heel end of the body contact the horizontal datum surface and all the other part of the apparatus body are suspended above the horizontal datum surface, there being defined a longitudinal axis coinciding with the longest part of the of the apparatus body and a transverse axis at right angles to the longitudinal axis, and an inner and outer sides coinciding with the inner and outer of a foot,

- wherein the elongate curved planar body include a periphery area whereby at least the lower surface tapers upwardly to the edge and suspended converging arches, the suspended converging arches include an inner longitudinal raised arch support area located on one side of the apparatus body, an outer longitudinal raised arch support area and a raised transverse arch area located at the toe end called a metatarsal raised arch support area, and another

transverse raised arch support area towards the heel end transverse curvature area, spaced from the metatarsal arch support area and lying between the longitudinal arches, so that all suspended converging arches comprise interconnected hill and valley-like areas smoothly connecting each area forming an interconnected alternating hill and valley shaped body acting in a frame-like manner to support the multi-arch area of the foot, wherein the periphery area of at least the lower surface provides a grip area positioned back from a peripheral edge of the elongate curved planar body and the grip area includes friction gripping means comprising a plurality of spaced raised discrete peaks of irregular or regular shape to allow gripping to the inside of the footwear of a user.

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Preferably the raised discrete peaks are irregular or regular shape including truncated peaks of regular or irregular shape, spacing and height of similar and/or mixed height in a hill and valley overall topographical shape.

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Preferably the apparatus body extends in length when in use to the end of the heel end of a foot wherein there is a valley area at the heel end of the apparatus body to allow a heel of a foot to be located thereon.

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Preferably the apparatus body thickness and height above the horizontal datum surface varies between the raised and depressing curved support areas.

Preferably the suspended curvature arches form a balanced box like support structure which acts as a frame like structure.

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Preferably there are four suspended converging arches.

Preferably the outer longitudinal arch support area is less in height above the datum than the inner longitudinal arch support area, the metatarsal arch support area is less in height than the outer longitudinal arch support area.

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Preferably, the foot support apparatus is fabricated from plastics.

Preferably, the inner longitudinal arch support area has the greatest curvature and height above the rest of the other arch support areas of the apparatus body.

Preferably, in plan view the apparatus body is transversely wider at the toe end than the heel end.

5 Preferably, the other areas of the lower surface of the apparatus body has friction gripping means to allow gripping to the inside of the footwear of a user.

Preferably, the metatarsal raised arch support area or toe end curvature can be formed in three different slopes to form three different foot support apparatuses.

10 Preferably, all of the suspended curvature areas are continuous and gradual or smooth in extent over the entire area of the apparatus body.

15 Preferably the height of the metatarsal arch support area from the lower surface of the apparatus body at that area position varies to form a first type of apparatus, a second type of apparatus and a third type of apparatus which are particularly adapted for different types of use such as the first type of apparatus is suited for least movement of a user which can be called a worker type, a second type of apparatus is a walker type and a third type of apparatus can be called a runner type.

20 Preferably the periphery area is 7.2 mm wide in plan view.

Preferably the apparatus body thickness at the edge is 0.3mm

25 Preferably the apparatus body thickness at the inner longitudinal arch area is 4.4mm.

Preferably the apparatus body thickness at the metatarsal raised arch support area is 3.6mm.

30 Preferably the height of the metatarsal raised arch support area from the lower surface of the apparatus body at that area position is 13.9mm for a first type of apparatus, 11.1mm for a second type of apparatus and 8.6mm for a third type of apparatus whereby there can be a difference in height from the highest or first type to the second type of 2.8mm and difference in height from the second to the third types of 2.5mm.

In a second aspect the invention resides in a method of selecting a foot support apparatus for supporting the arch area of a foot with a foot support measuring device, wherein the apparatus includes an elongate curved planar body fabricated from a strong resilient lightweight material comprising a plurality of suspended curvatures in the form of interconnected arches, the apparatus body having an in use upper surface, a lower surface, a toe end, heel end, sides, body thickness and body edges with the body being shaped having interrelated suspended curvatures forming continuous raised and depressed curved support areas so that, at least when not in use when compared to a horizontal datum surface, the toe end and heel end of the body contact the horizontal datum surface and all the other part of the apparatus body are suspended above the horizontal datum surface, there being defined a longitudinal axis coinciding with the longest part of the of the apparatus body and a transverse axis at right angles to the longitudinal axis, and an inner and outer sides coinciding with the inner and outer of a foot,

wherein the areas include a periphery area whereby at least the lower surface tapers upwardly to the edge and four suspended converging arches, the four arches include an inner longitudinal raised arch support area located on one side of the body, an outer longitudinal raised arch support area and a raised transverse arch area located at the toe end called a metatarsal raised arch support area, and another transverse raised arch support area towards the heel end transverse curvature area, spaced from the metatarsal arch support area and lying between the longitudinal arches, so that all areas comprise interconnected hill and valley-like areas smoothly connecting each area forming an interconnected alternating hill and valley shaped body acting in a frame-like manner to support the multi-arch area of the foot, wherein the metatarsal curved support area and an adjacent portion of the periphery area combine to provide a toe end ball joint grip area positioned back from the ball joint within the arch area of the foot the foot support measuring device having numbers thereon and a chart with measurements and symbols thereon, the method includes the following steps of:

-placing a pre-made foot support apparatus chart on a floor or horizontal surface with the heel end of the foot abutting a vertical support;

-placing each inside of the foot directly alongside or on the chart with the heel positioned against a vertical support;

-lifting the toe(s) (especially the big toe) to locate the ball of the foot and

-matching the position just behind the ball of the foot with the numbers on the chart, to select the size of the foot support apparatus required.

To those skilled in the art to which the invention relates, many changes in construction and widely differing embodiments and application of the invention will suggest themselves without departing from the scope of the invention as defined in the appended claims. The disclosures and the descriptions herein are purely illustrative and are not intended to be limiting.

Brief Description

The invention will now be described, by way of example only, by reference to the accompanying drawings:

Figure 1 is a top plan view of the foot support apparatus in accordance with a first preferred embodiment of the invention.

Figure 2 is a side cross sectional view A-A for a worker foot support apparatus.

Figure 3 is a side cross sectional view A-A for a walker foot support apparatus.

Figure 4 is a side cross sectional view A-A for a runner foot support apparatus.

Figure 5 is an end cross sectional view B-B of runner foot support apparatus of figure 4.

Figure 6 is an end cross sectional view B-B of walker foot support apparatus of figure 3.

Figure 7 is an end cross sectional view B-B of worker foot support apparatus of figure 2

Figure 8 is a plan view of the foot support apparatus showing positions of cross sections.

Figure 9 is a cross sectional view A-A of the worker foot support apparatus.

Figure 10 is a cross sectional view A-A of the walker foot support apparatus.

Figure 11 is a cross sectional view A-A of the runner foot support apparatus.

Figure 12 is a transverse cross sectional view C-C of the worker, walker and runner foot support apparatus.

Figure 13 is a plan view of the foot support apparatus showing positions of cross sections.

Figure 14 is a longitudinal cross sectional view A-A of the foot support apparatus of figure 13.

Figure 15 is a transverse cross sectional view B-B of the foot support apparatus of figure 13.

Figure 16 is a transverse cross sectional view C-C of the foot support apparatus of figure 13.

Figure 17 is a transverse cross sectional view D-D of the foot support apparatus of figure 13.

Figure 18 is a top plan view of the **worker** foot support apparatus in accordance with a first preferred embodiment of the invention.

Figure 19 is a side cross sectional view A-A according to figure 8.

Figure 20 is an end cross sectional view B-B according to figure 8.

5 **Figure 21** is a topographical plan view of the worker foot support apparatus.

Figure 22 is a top plan view of the **walker** foot support apparatus in accordance with a first preferred embodiment of the invention.

Figure 23 is a side cross sectional view A-A according to figure 22.

10 **Figure 24** is an end cross sectional view B-B according to figure 22.

Figure 25 is a topographical plan view of the walker foot support apparatus.

Figure 26 is a top plan view of the **runner** foot support apparatus in accordance with a first preferred embodiment of the invention.

15 **Figure 27** is a side cross sectional view A-A according to figure 26.

Figure 28 is a side cross sectional view B-B according to figure 26.

Figure 29 is a topographical plan view of the runner foot support apparatus.

Figure 30 shows the underneath of any foot support apparatus.

20 **Figure 31** shows the foot support apparatus on the foot with a chart.

Roughened perimeter area for a left side insert (example)

Figure 32 is bottom topography view of the lower surface.

Figure 33 is an isometric bottom view showing the right side and left from the heel end

25 **Figure 34** is a left side view with the rishi arch side in the distance and the outer side closest

Figure 35 is a right side view showing the arch area closest

Figure 36 is a bottom end view from heel end with the rising arch area on the right

Figure 37 is top end view from the toe end with the rising arch area on the left.

30 **Description of Drawings**

The following description will describe the invention in relation to preferred embodiments of the invention, namely a foot support apparatus. The invention is in no way limited to these preferred embodiments as they are purely to exemplify the invention only and that possible

variations and modifications would be readily apparent without departing from the scope of the invention.

As shown in the figures 1-31 there is a foot support apparatus 1 which for example can come in three different models or types (worker, walker and runner) which are related to the use a user of the foot support apparatus intends. In figure 1 there is a plan view of a foot support apparatus 1 which is shaped to match and support the foot multi-arch area in a person's foot. The apparatus 1 has interrelated arch supports areas which can relate approximately to a foot's arches which support the foot's bone structure. Any foot arch area can include four linked main raised arch areas which correspond to four main arch areas in the apparatus 1 which together are supported in a four arch balance box system or frame system. The foot support apparatus 1 can be fabricated from a strong resilient and lightweight plastic and in use is sized whereby the arch support areas only to fit within a foot's arch area and not cover or meet the ball joint of the foot and includes an elongate curved planar body. The thickness of the foot support apparatus is very thin (eg couple of or a few millimetres) and typically varies over its extent.

Each foot support apparatus 1 has a generally planar body with a generally elongate curved planar shape to enable it to fit within a shoe or footwear between the sock and inner base of the shoe. Overall the shape is essentially planar with a plurality of suspended converging curvatures or arches or a series of seamlessly interconnected smooth curves and depressions of varying height and depth in hill and valley alternating type shapes. In use, the planar body having edges and upper and lower surfaces, will be oriented such that the planar upper and lower surfaces are lie essentially in the horizontal plane. The body is elongate having a length which coincides with a defined longitudinal axis of the body having ends 2 and 3 corresponding in use approximately to the ends of a foot and shoe and to be spaced back from the ball of the foot. One end can be called the toe end 2 and the opposite end can be called the heel end 3. The axis at right angles to the longitudinal axis can be termed the transverse axis.

The foot support apparatus body also has a variation in body thickness 4, sides 5, an in use upper surface 6 and lower or rear or underside surface 7. The body shape has a continuous flat edge 8. The terms "inner" and "outer" are deemed to be in reference to the sides of the elongate body that are on the same side as in a person's foot. In plan view the body of the foot support apparatus 1 is wider at the toe end 2 than the heel end 3. The corners of the

apparatus 1 are curved or rounded in plan view with the corners at the toe end being more acutely curved than the corners at the heel end.

For each foot support apparatus there are suspended areas of curvature which can correspond in location to the parts of a foot which in use the foot support apparatus 1 will be immediately adjacent to. Typically the curvature areas of the entire apparatus body include a generally lower level which comprises a major portion of the entire plan area of the body of the apparatus 1 suspended above a flat or horizontal datum surface and a smaller portion that is raised less above the flat datum surface. This is only a generalization of the overall shape as there are smaller valley and hill like areas that are specifically formed and positioned across those general area portions.

The raised portion of the body comprises an inner longitudinal arch support area 10, an outer longitudinal arch support area 11, a toe end transverse arch support area which can be called a metatarsal arch support area 12 and a heel end transverse arch support area 13. The largest curvature in terms of height above the horizontal datum surface or generally lower level, is the inner longitudinal arch support area 10. All arch areas including the inner longitudinal arch support area 10, outer longitudinal arch support area 11 and metatarsal arch support area 12, heel end transverse arch support area 13 are raised areas. These main or multi arch areas approximately mirror the position of the arches in a foot, whereby the arch areas of the invention form a balanced box to act in the form of a frame-like structure.

All of these support areas or curvatures as discussed throughout the specification and shown in the figures are difficult to show in extent so that the dotted lines in figures 1-3 and in other figures and the topographical lines, can only be considered as indicators of extent rather than being strictly limiting.

The suspended converging arches of the foot support apparatus 1 are curved raised hill-like areas with the metatarsal support arch area 12 and transverse heel end arch support area 13 being shaped as sloping curves in plan view whereby together all of the arches of the apparatus working together almost able to be represented like a squashed frame or parallelogram. The heel end transverse arch support is not located directly at the heel but is more centre of the length of the body lying between the longitudinal arches (10 & 11).

When the foot support apparatus 1, is located on a flat horizontal surface which can serve as as a datum surface plane, without being in use ie no foot being on top, only two areas of the body touch the flat surface ie the lower surface of the toe end and the heel end.

- 5 As shown in the figures especially in figures 30, 31-37 for a left side (for example), foot support apparatus including the elongate curved planar body before or after being curved to an appropriate shape includes a peripheral area 15 or peripheral support area bordered by the edge. The drawings show this peripheral area represented or shown either as a cross hatched or dashed shaded area or in a series of randomly spaced raised dots, peaks, roughened or
10 speckled areas.

The periphery area 15 of at least the lower surface and/or upper surface, provides a grip area comprising at least a portion or spaced or continuous, positioned and extending back from a peripheral edge of the elongate curved planar body. Looking at the apparatus from the upper
15 surface 6, there is an arch area shown as being located on an inner side or right side for a left side foot support apparatus, with the arch area rising higher than the left side and the heel area forming a middle valley area with the toe end have a small middle peaked end falling away to two lower side valleys on each side.

- 20 The grip area includes friction gripping means. The friction gripping means can be for example comprise a plurality of spaced raised dots or discrete peaks, hills, peaks, truncated and or not truncated peaks or hills with or without valleys or simply a contoured base area, as an overall topographical shape of regular or irregular shape, spacing and height of similar and/or mixed height. For example the friction gripping means can be produced by sand
25 blasting the lower peripheral surface or any selected area at least at the edge, using a grit. The friction gripping means functions to allow gripping to the inside of the footwear of a user. At the toe end and at the heel end there can include another grip area as part of the heel grip.

As seen in figure 25 for example the contour or topographical lines (are just an indication of
30 changing slopes) are shown as continuing right to the edge of the apparatus whereas as seen in figures 32 and 33 the peripheral area 15 is shown as been roughened with random peaks and valleys or flattened areas in between without the topographical lines but in practice the lines which are indication of changing slope, continue through the peripheral area 15 right to the edge.

Each of a person's foot arches can drop over time and therefore can be supported to restore them to a more natural position. What is common to all foot support apparatus types of the present invention, is that the body has a raised curved inner longitudinal arch support region 10 with the rest of the body from the inner longitudinal arch support region 10 being curved
 5 downwardly to the periphery area 15. The periphery area 15 is also curved to follow with any particular adjacent support area so that underneath the body, at least the lower surface 7 curves upwardly or tapers to the end at the edge 8 but is much less in height than the inner arch support 10. The edge 8 is normally a flat edge at right angles to the upper and lower surfaces. A portion of the periphery support area 15 and the metatarsal support area 12 can
 10 also be termed "a ball edge grip" located at the toe end of the body.

The highest point in the foot support body is the inner longitudinal support area 10 with the other arches fanning out from there to describe the main shapes and contours to be found as shown by the plan views 1, 8, 13, 21, 25 and 29. Leading from the metatarsal arch support
 15 area 12 there are the three other linked arches. The inner longitudinal arch support area 10 is on one side of the apparatus body, with metatarsal arch 12 being transversely located at one end of the inner longitudinal arch 10. The transverse arch support area 13 is located in the middle (of the length of the apparatus) and extends across the apparatus, from the other end of the inner longitudinal arch support area 10. The inner and outer longitudinal arch support
 20 areas 10 & 11 are not quite parallel but do essentially converge or angle towards each other at the heel end, with the metatarsal arch support area 12 at one end and the transverse arch support area 13 at the other end. Past the transverse arch support area 13 the body curves down to a depressed or valley area 22 at the heel end 3. The length of the apparatus body is meant to be less than the distance from the heel end 3 to some distance before the ball joint of
 25 a foot. At the heel end beyond the transverse arch support area 13 there is the valley area 22 to allow a person's heel to be located thereon as shown in figure 31.

Between the inner longitudinal arch support area 10 there is a 'gentle' depression 21 leading directly to the transverse arch support area 13 and also leading to the outer longitudinal arch
 30 support area. It can be difficult to see all the changes in slopes especially between the longitudinal arch support areas 10 & 11 and the transverse arch support 13. The various curvatures and areas are curved such that the whole of the material is smoothly curved and not just the surface part though this can vary possibly depending also on manufacturing techniques.

Figures 8-12 further show the comparison in body thickness at the metatarsal arch support area 12 whereby the runner type apparatus has almost no raised metatarsal support area 12 and the walker type apparatus has a little more and the worker type apparatus has the most height in the metatarsal area 12. As seen in figure 12 from the under side surface 7 the runner type apparatus shows a height 25 of 8.6mm, the walker type apparatus a height 26 of 11.1mm and the worker type apparatus has a height 27 of 13.9mm so that the difference between them gives a better idea of the height differences. The periphery area 15 can be 7.2 mm wide from an edge in plan view.

10 The height of the metatarsal arch support area 12 from the lower surface 7 at that area position is 13.9mm for a first type of apparatus (worker type), 11.1mm for a second type of apparatus (the walker type) and 8.6mm for a third type of apparatus (the runner type). This can give the following relative differences whereby there can be a difference in height from the highest to the second type of 2.8mm and difference in height from the second to the third of 2.5mm.

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As shown in figure 13-16 a lead out width 28 of the periphery area 15 (fig 13) can be for example 7.2 mm, and the thickness 29 (see fig 14) at the longitudinal arch region 12 can be 4.4mm. The thickness at the edge 5 which is called the lead-out width 28, needs to be reducing to provide a smooth transition for shoe fit and comfort – see figure 14. The thickness 30 at the metatarsal arch support area 12 can be thicker as 3.6mm which is also contoured for shoe fit and comfort. A thickness 31 at the heel end 3 where no support is needed is as in figure 17 can be 1.3mm. The thickness at the edge 5 as shown at example positions 32 & 33 can be 0.3mm. Also shown in the drawings are the contoured edging at locations 34 (see figure 14-17).

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As shown in these examples of the present invention, there are three foot support styles or types ie a worker, a walker and a runner. The transverse cross sections made at the heel end 2 of the foot support apparatus 1 show how each apparatus type are different. For the worker type apparatus location 35 shows where the full metatarsal arch support specifically is as seen in figures 19 and 20, in figure 23 and 24 at location 35 for the walker type apparatus there is shown a slight metatarsal support, and also location 35 in figures 27 and 28 where there is no or little metatarsal arch support.

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Each support area of the apparatus includes high and low points of topography. The worker type of figures 19-21 has the highest metatarsal arch support area 12 than the others types as shown in the comparative figures 2-12. In figures 21, 25 and 29 there is shown a longitudinal arch high point 35, a heel low point 36, an arch support low point 37 and a metatarsal high point 38.

Also as shown in figure 30 on the underside surface 7 of the body the foot support apparatus 1 can have a heel gripping means 40 which can be in the form of at least one roughed area set back from the periphery area 15. This gripping means 40 can assist in keeping the foot support apparatus in place in the footwear. The ball edge grip of the periphery support area 15 also assists in the gripping and stability of the apparatus when being used in footwear.

A foot support measuring device in the form of a chart 45 for sizing the particular foot support apparatus 1 for the use is shown in figure 31 and will have measure lines corresponding to numbers or symbols that define a particular sized foot support apparatus. As shown there is a foot 46 with toes 47 and a sample foot support apparatus 1, on top of the chart 45. Also shown is the ball 33 of the foot. When the toes 47 are lifted you can see a ball 48 of the foot 46 which allows the user to determine which sized foot support apparatus 1 to use. The foot support apparatus 1 is better sized to be less that the distance from the heel to the ball of the foot so that the foot support is not located under the ball of the foot. It is better to have the support to be too short rather than too long. Each foot support apparatus 1 will have the same numbers or symbols the same as on the chart 45.

As shown in figure 31 there is also disclosed a method of selecting a foot apparatus which includes the following steps of:

- placing a pre-made foot support measuring device chart on a floor or horizontal surface with the heel end abutting a vertical support;
- placing inside of the foot directly alongside or on the chart with the heel positioned against a vertical support;
- lifting at least the toe(s) (especially the big toe) to locate the ball of the foot and
- matching a position just behind the ball of the foot with the numbers on the chart, to select the size of the foot support apparatus required.

Advantages

- a) Modest cost
- b) Fits most footwear
- c) Fits most type shapes and sizes of feet
- 5 d) Reduced uneven wear for footwear
- e) Less feet, back and leg problems
- f) Easy to fit using the foot support measuring device sizing method
- g) Stays in place in footwear, with the ball edge grip, heel grip and thin peripheral edging
- h) Stays in place under foot, fitting into foot's contours
- 10 i) Unique thin construction through out, with even thinner edging
- j) Customized fit using exclusive method for accurate arch sizing
- k) unbreakable design and construction, even when run over by a truck
- l) Three comfortable arch support metatarsal variations
- m) Perimeter edging to hold in place
- 15 n) Four-arch balance box action
- o) Avoids interfering with the action of the ball joint of the foot
- p) Roughened perimeter area aids in gripping to the shoe

Variations

- 20 Throughout the description of this specification, the word “comprise” and variations of that word such as “comprising” and “comprises”, are not intended to exclude other additives, components, integers or steps. Though one insert is shown for say the left foot, equally a right foot is the same but as a mirror image. In general the parallel topographical lines indicate the degree of slope whereby if the lines are close together then there is a sloping
- 25 surface. If there is a wide area with no lines then this area is relatively flat with the heel end 3 being a substantially central flat valley area at the heel end 3 which rises in the middle of the insert still as a valley towards the toe end 2 with an inner arch area rising upwardly on one side, and rising upwardly but less than the arch side and then the middle area curving downwardly but peaking (so not as a valley) in the middle towards the toe end 2.

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Though the material is described as been made from plastics, it can equally be fabricated from other materials or combination of materials which still provide robustness, comfort and structure as required. Three styles or types of the apparatus are shown but there can be any

number of styles or type which can involve varying the heights of various arches and their position whereby a customized fit can be achieved. The heights above the horizontal datum surface and thickness can be varied to suit various uses which can related to the degree of movement the foot is expected to carry out combined with the comfort required.

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The foot support apparatus can be sold in pairs or individually and can fit any type style and shaped footwear such as men's shoes and women's high heels.

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The roughened area 25 can be replaced by or added to, by say having an attached gripping means such as a pad. The apparatus can be coloured coordinated if desired. The apparatus body is a disc-like body, is shown as having the whole apparatus body curved for the various curvatures however in another option it is possible to just have the curves or curvature being different on the upper surface to that of the lower surface. The apparatus can be used inside or outside a sock or in other types of footwear.

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In yet further variations of the invention, the foot support apparatus can include many arches, at least having the metatarsal arch support area. The different thicknesses of any of each of the support arch areas of the foot support apparatus can be varied with respect to each foot support apparatus to suit a need or requirement and are not limited to those mentioned

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The foot support apparatus 1 is designed to fit into the natural hills and valleys of the more normally functioning foot which helps to hold it in place under the foot. In this fitting into the natural hills and valleys of a foot there can also be some correcting or improving of the posture of the foot and the rest of the body. In addition the apparatus 1 has features to secure it the footwear or shoe including a heel grip design at the rear, a ball grip edge at the front and uniquely fine edging all around helps to keep the apparatus snug within the shoe. Other layers or devices can be attached or not, to work with the foot support apparatus.

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The terms used to describe the functions of the apparatus body, like regions or arches or areas are general terms whereby their extent can not be strictly given so that in some instances there can be some overlap or merging like with the peripheral support area 15 and the metatarsal arch support area 12 and longitudinal arch support area 10.

It will of course be realised that while the foregoing has been given by way of illustrative example of this invention, all such and other modifications and variations thereto as would be apparent to persons skilled in the art are deemed to fall within the broad scope and ambit of this invention as is hereinbefore described.

What we claim is:

Claim 1: A foot support apparatus for supporting the arch area of a foot in footwear, the apparatus includes an elongate curved planar body fabricated from a strong resilient lightweight material comprising a plurality of suspended curvatures in the form of interconnected arches, the apparatus body having an in use upper surface, a lower surface, a toe end, heel end, sides, body thickness and body edges with the body being shaped having interrelated suspended curvatures forming continuous raised and depressed curved support areas so that, at least when not in use when compared to a horizontal datum surface, the toe end and heel end of the body contact the horizontal datum surface and all the other part of the apparatus body are suspended above the horizontal datum surface, there being defined a longitudinal axis coinciding with the longest part of the of the apparatus body and a transverse axis at right angles to the longitudinal axis, and an inner and outer sides coinciding with the inner and outer of a foot,

wherein the raised curved support areas include a periphery area whereby at least the lower surface tapers upwardly to the edge and suspended converging arches, the suspended converging arches include an inner longitudinal raised arch support area located on one side of the apparatus body, an outer longitudinal raised arch support area and a raised transverse arch area located at the toe end called a metatarsal raised arch support area, and another transverse raised arch support area towards the heel end transverse curvature area, spaced from the metatarsal arch support area and lying between the longitudinal arches, so that all suspended converging arches comprise interconnected hill and valley-like areas smoothly connecting each area forming an interconnected alternating hill and valley shaped body acting in a frame-like manner to support the multi-arch area of the foot,

Claim 2: The foot support apparatus as claimed in claim 1 wherein the raised spaced peaks are of irregular or regular shape including truncated peaks of regular or irregular shape, spacing and height of similar and/or mixed height in a hill and valley overall topographical shape, wherein the apparatus body extends in length when in use to the end of the heel end of the foot wherein there is a valley area at the heel end of the apparatus body to allow a heel of a foot to be located thereon, wherein the apparatus body thickness and height above the horizontal datum surface varies between the raised and depressed curved support areas.

Claim 3: The foot support apparatus as claimed in claim 2 wherein the plurality of suspended curvatures can form a balanced box like support structure which acts as a frame like structure.

5 Claim 4: The foot support apparatus as claimed in claim 3 wherein the outer longitudinal arch support area is less in height above the horizontal datum surface than the inner longitudinal arch support area, the metatarsal arch support area is less in height than the outer longitudinal arch support area, wherein, the foot support apparatus is fabricated from plastics.

10 Claim 5: The foot support apparatus as claimed in claim 4 wherein, the inner longitudinal arch support area has the greatest curvature and height above the rest of the other arch support areas of the apparatus body.

15 Claim 6: The foot support apparatus as claimed in claim 5 wherein, in plan view the apparatus body is transversely wider at the toe end than the heel end.

Claim 7: The foot support apparatus as claimed in claim 6 wherein, other areas of the lower surface of the apparatus body has friction gripping means to allow gripping to an inside of footwear of a user.

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Claim 8: The foot support apparatus as claimed in claim 7 wherein, the metatarsal arch support area is formed as three different slopes to form three different foot support apparatuses.

25 Claim 9: The foot support apparatus as claimed in claim 8 wherein, all of the suspended curvatures are continuous and gradual or smooth in extent over the entire area of the apparatus body, wherein, the apparatus body thickness varies over the various support areas.

30 Claim 10: The foot support apparatus as claimed in claim 9 wherein the height of the metatarsal arch support area from the lower surface of the apparatus body at that area position varies to form a first type of apparatus, a second type of apparatus and a third type of apparatus which are particularly adapted for different types of use such as the first type of apparatus is suited for least movement of a user which can be called a worker type, a second type of apparatus is a walker type and a third type of apparatus can be called a runner type.