

June 9, 1953

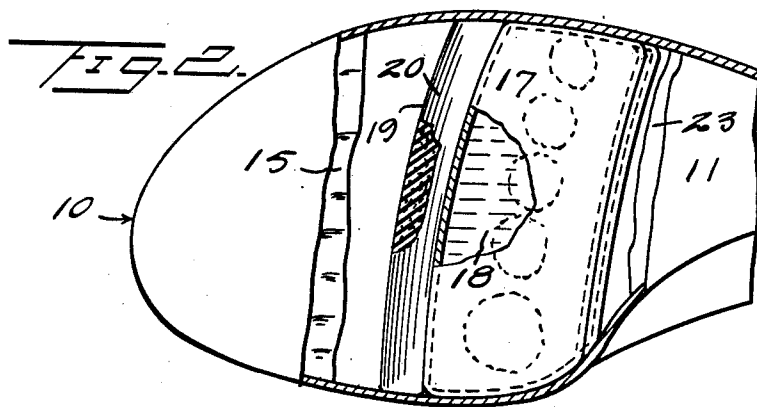
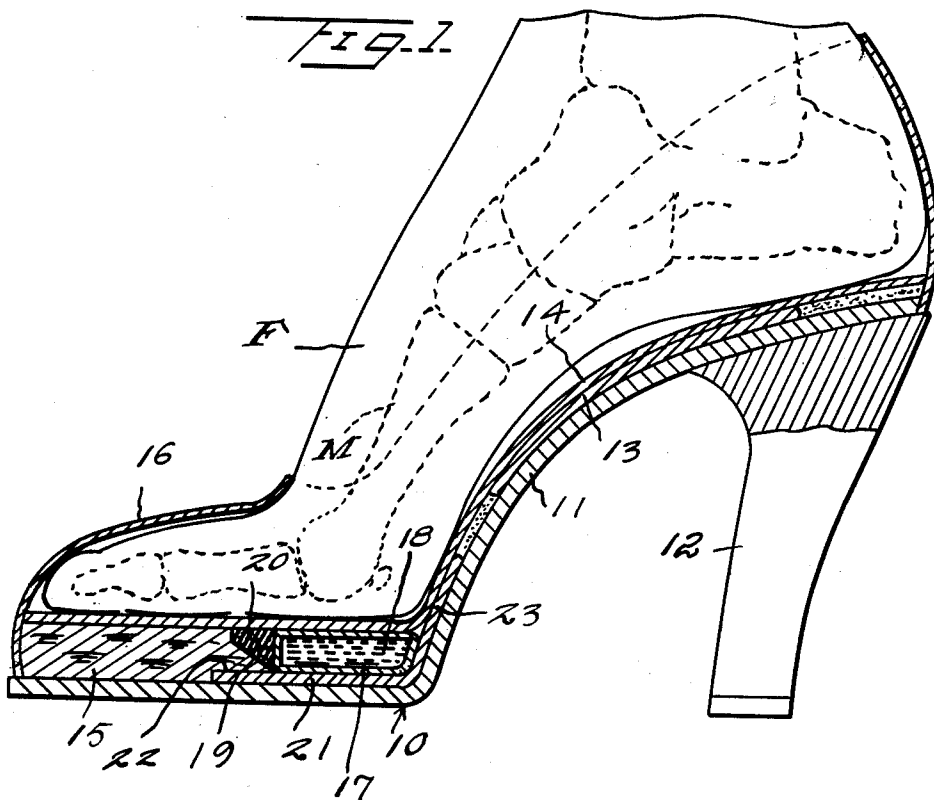
L. FILARDO

2,641,066

METATARSAL LENGTH COMPENSATING DEVICE

Filed Sept. 5, 1950

3 Sheets-Sheet 1



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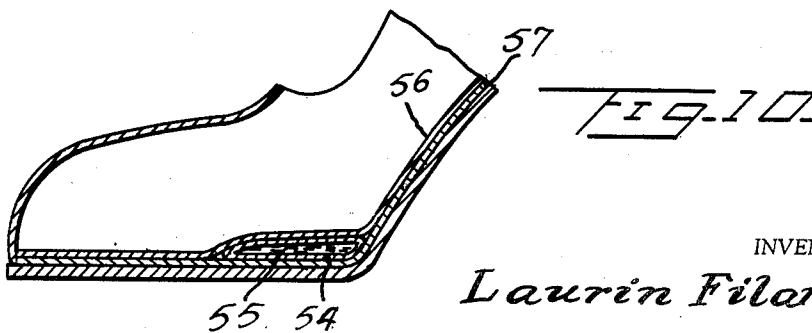
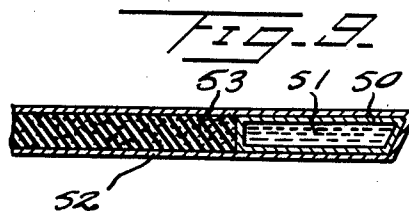
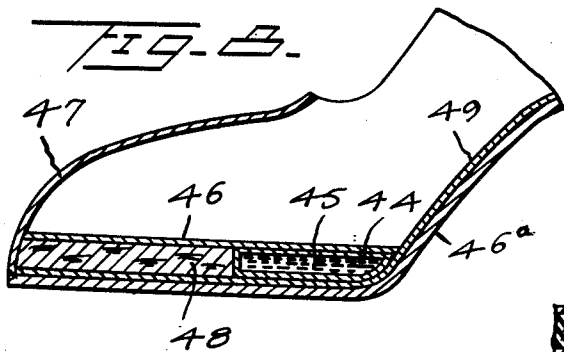
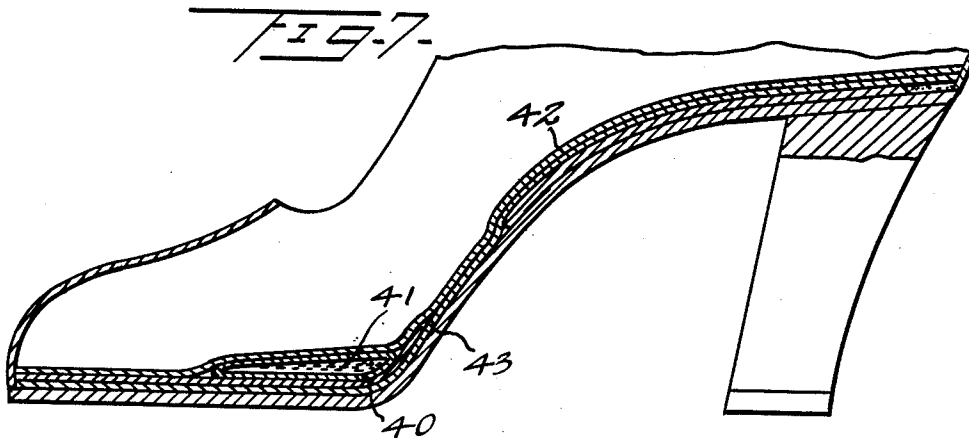
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METATARSAL LENGTH COMPENSATING DEVICE

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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

FIG. 3.

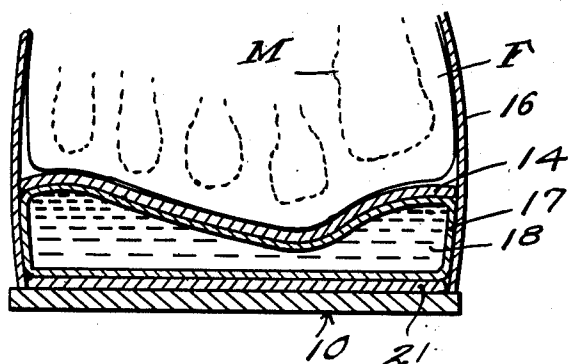


FIG. 4.

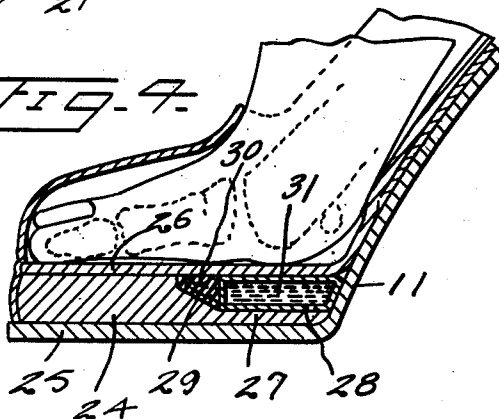


FIG. 6.

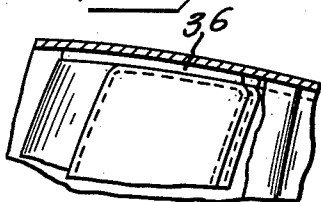
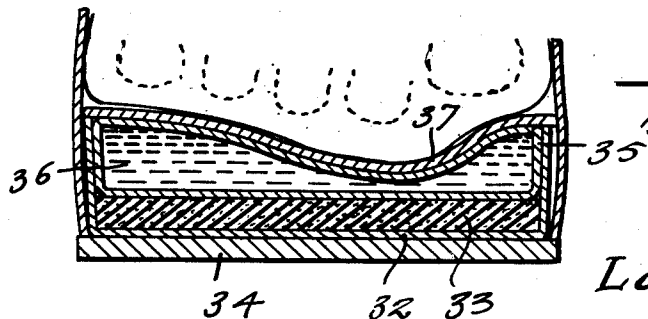


FIG. 5.



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2,641,066

METATARSAL LENGTH COMPENSATING
DEVICE

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Application September 5, 1950; Serial No. 183,187

18 Claims. (Cl. 36-8.5)

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This invention relates to shoes.

An object of this invention is to provide an improved shoe construction which is particularly adapted for use with high heel shoes and includes a displaceable means disposed in the region of the forward ends of the metatarsals so that substantially the entire width of the ball of the foot will be in firm contact with the shoe sole structure.

Another object of this invention is to provide a shoe sole construction which will automatically conform itself to the pressure exerted thereupon by the different metatarsals so as to provide an equal support for the metatarsals and will eliminate the use of conventional wedges or other fittings adapted for different types of feet.

In the carrying out of this invention a deformable casing is disposed in the ball portion of the shoe, the casing having either a liquid, semi-liquid, or other readily displaceable and resilient means mounted therein so that the casing will readily conform itself to the pressures exerted thereupon by the different metatarsals.

With the above and other objects in view, my invention consists in the arrangement, combination and details of construction disclosed in the drawings and specification, and then more particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a vertical section of a high heel shoe having a device constructed according to an embodiment of this invention mounted in the ball portion of the shoe,

Figure 2 is a fragmentary bottom plan partly broken away and in section of the shoe,

Figure 3 is a transverse sectional view of the device shown in Figure 1,

Figure 4 is a fragmentary longitudinal section of another modification of this invention,

Figure 5 is a fragmentary transverse section of a further modification of this invention,

Figure 6 is a fragmentary horizontal section of the structure shown in Figure 5,

Figure 7 is a fragmentary sectional view of another modification of this invention,

Figure 8 is a fragmentary sectional view of a further modification of this invention,

Figure 9 is a fragmentary sectional view of still a further modification of this invention,

Figure 10 is a fragmentary sectional view of another modification of this invention.

Referring to the drawings and first to Figures 1 and 2, the numeral 10 designates generally the outsole of a shoe of the high heel type which includes a shank portion 11, a heel 12, and a brace

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or reinforcing member 13 in the shank portion 11. An insole 14 is disposed within the shoe, and in the present instance a platform 15 is disposed between the insole 14 and the outsole 10 at the forward portion of the shoe. An upper 16 encompasses the opposite edges of the platform 15 and insole 14 and is of conventional construction.

In order to provide a means whereby the ball portion of the foot generally designated as F will be equally supported transversely thereacross, I have provided a flexible casing 17 which is disposed in a cutout formed in the rear portion of the platform 15. The casing 17 extends transversely across the outsole 10 beneath the insole 14 and may be formed out of any suitable flexible or elastic material which is preferably impervious so that the interior of the casing 17 may be filled with a liquid 18 or with a semi-liquid or readily displaceable material which is responsive to Pascal's law such as a silicon plastic which is commonly referred to as bouncing putty. Certain semi-fluids such as clay are only partly responsive to Pascal's law because of the friction produced by the solids which take up some of the energy, but these semi-fluids are responsive enough to produce the desired results. Certain powdered or granular material such as powdered graphite, talc or the like may also be used as a displaceable element. The rear portion of the platform 15 is cut off on a bevel as indicated at 19, and a resilient strip 20 of substantially wedge shape is disposed in the cutout 19 and bears against the forward edge of the casing 17.

The resilient strip 20 is substantially triangular in transverse section and is provided so that when the casing 17 is distorted under the weight of a foot in the shoe, the forward edge of the casing will not become pinched or will not be forced upwardly.

A bracing plate 21 is disposed beneath the casing 17 projecting forwardly of the casing and engaging in a recess or cutout 22 which is formed in the lower rear portion of the platform 15. The plate 21 also includes an obtusely disposed upwardly and rearwardly projecting extension 23 which is interposed between the instep portion of the outsole 10 and the insole 14.

Referring now to Figure 4 there is disclosed a modified form of this invention wherein the platform 24 which is interposed between the outsole 25 and the insole 26 is provided with a reduced rear extension 27. The extension 27 terminates at the lower end portion of the instep 11,

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and a flexible casing 28 similar to casing 17 is disposed on the extension 27. Normally the top of the casing 17 will be substantially flush with the upper surface of the platform 24. The platform 24 is also formed with a bevelled cutout 29 extending upwardly and forwardly within which a rubber cushioning strip 30 is adapted to be seated. The interior of the casing 28 is adapted to be filled by a displaceable means 31 which may be the liquid, semi-liquid, or other suitable displaceable material.

Referring now to Figures 5 and 6, there is disclosed another modification of this invention wherein a reinforcing plate 32, similar to plate 21, is interposed between the rubber cushioning member 33 and the outsole 34. A flexible casing 35 engages on the upper side of the cushioning member extension 33, and the casing 35 is held against lateral displacement by means of a pair of upwardly projecting side plates 36.

An insole 37 engages over the casing 35 and projects forwardly to the forward end of the shoe in a conventional manner.

In the use of this shoe structure, the platform or lift which is provided in the shoe is cut out as herein indicated, and the distortable casing 17 which is filled with a displaceable element such as liquid or the like, is inserted in the shoe at the rear of the platform. The cushion member 20 is also secured to the platform 15 at the forward edge of the casing 17.

When downward pressure is applied to the insole 14 by the foot F, the different and unequal lengths of the metatarsal bones M will cause the insole 14 and the casing 17 to become displaced after the manner shown in Figure 3. The longer metatarsal bones will cause the casing 17 to be pressed downwardly to a greater degree than the shorter metatarsal bones while at the same time an equal pressure will be applied between the metatarsal bones and the casing 17. In this manner where the shoe is formed with a relatively high heel, the upending of the metatarsals will cause downward pressure to be exerted on the forward ends of the metatarsal bones and equalized pressure will be produced on the metatarsals across the entire foot.

Referring now to Figure 7, there is shown a flexible casing 40 having displaceable material 41 disposed therein. The casing 40 extends transversely across the shoe at the ball portion thereof and is disposed beneath a sock lining 42 which is in addition to the regular insole 43.

In Figure 8 there is disclosed another modification of this invention, wherein the flexible casing 44 which has displaceable material 45 therein is disposed beneath a flexible insole member 46 which extends only from the forward or lower end of the shank 46a to the toe 47. An insert 48 is interposed between the insole member 46 and the regular insole 49.

In Figure 9 there is disclosed a further modification of this invention wherein the flexible casing 50 having the displaceable material 51 therein is formed as a shoe attachment or insert, and a flexible covering 52 substantially encompasses casing 50 and an insert 53.

In Figure 10 there is disclosed another modification of this invention wherein the flexible casing 54 having displaceable material 55 is fixed as by glue to insole member 56 which is mounted over regular insole 57.

With the structure as hereinbefore described there is produced a new method of arch support by placing a block of displaceable material under

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the forward base of the longitudinal arch, rather than by placing a support under the span of the arch itself.

I do not mean to confine myself to the exact details of construction herein disclosed, but claim all variations falling within the purview of the appended claims.

What is claimed is:

1. In a shoe construction having an outsole, an upper and an insole, a platform between the insole and outsole, a flexible flat casing at the rear of the platform and limited in area by the area of the region of the ball of the foot, fluid means in said casing, and a resilient cushion strip interposed between the forward edges of said casing and the adjacent rear portion of said platform.

2. In a shoe construction having an outsole, an upper and an insole, a platform between the insole and outside, a flexible flat casing at the rear of the platform and limited in area by the area of the region of the ball of the foot, fluid means in said casing, a resilient cushion strip interposed between the forward edge of said casing and the adjacent rear portion of said platform, and a reinforcing plate interposed between said casing and said outsole.

3. In a shoe construction having an outsole, an upper and an insole, a platform between the insole and outsole, a flexible flat closed casing at the rear of the platform and limited in area by the area of the region of the ball of the foot, fluid means in said casing, a resilient cushion strip interposed between the forward edge of said casing and the adjacent rear portion of said platform, a reinforcing plate interposed between said casing and said outsole, and relatively rigid upright wings engaging between the opposite ends of said casing and the upper.

4. In a shoe construction having an outsole, an upper and an insole, a platform between the insole and outsole, a flexible flat casing at the rear of the platform and limited in area by the area of the region of the ball of the foot, displaceable means in said casing, a resilient cushion strip interposed between the forward edge of said casing and the adjacent rear portion of said platform, a reinforcing plate interposed between said casing and said outsole, a cushion element interposed between said plate and said casing, and upright wings engaging between the opposite ends of said casing and the upper.

5. A shoe construction comprising an outsole, an upper, a heel at the rear of said outsole, an insole, and a platform interposed between said insole and said outsole between the ball and the toe of the shoe, said platform being formed of a non-distortable forward portion and a distortable rear portion and limited in area by the area of the region of the ball of the foot.

6. In a shoe construction having an outsole, an upper, an insole, and a heel, a platform interposed between said insole and outsole, said platform terminating forwardly of the shank of the shoe, a flat casing extending transversely of said shoe at the rear of said platform and limited in area by the area of the region of the ball of the foot, and a liquid in said casing whereby the latter will be displaced under pressure of the ball of the foot to thereby equalize pressure on the foot at the ball thereof.

7. In a shoe construction having an outsole, an upper and an insole, a platform interposed

between the insole and outsole, a flexible closed flat casing at the rear of the platform beneath said insole and limited in area by the area of the region of the ball of the foot, and fluid means in said casing.

8. In a shoe construction having an outsole, an upper and an insole, a platform between the insole and outsole, a flexible flat casing at the rear of the platform and limited in area by the area of the region of the ball of the foot, fluid means in said casing, and a resilient cushion strip interposed between the forward edges of said casing and the adjacent rear portion of said platform.

9. In a shoe insole, an amount of semi-liquid material disposed across the area lying beneath the ball of the foot, and limited to that area, in a quantity and depth enough to allow the longer of the metatarsal bones of the foot to sink into the material and thrust it up beneath the shorter of the metatarsal bones in sufficient degree to afford them intermediary ground purchase comparable to that of the longest metatarsal, means to hold the said material in the proper position beneath the ball of the foot, and over the said material a retaining membrane flexible enough to allow through it the interplay of the metatarsals with the material below, while strong enough to hold the material from escape from beneath the ball of the foot.

10. In a shoe insole construction, a quantity of fluid material disposed across the area covered by the ball of the foot, and coinciding with that area, means to hold the said material in the proper position beneath the ball of the foot, the top portion of said means to comprise a flexible membrane to allow the interplay of the metatarsals with the fluid material below, whereby said fluid material will be displaced by the pressure of the longer metatarsals and will be pressed up beneath the shorter metatarsals to give them support.

11. In a shoe insole construction, a quantity of fluid material disposed across the area beneath the ball of the foot and limited to that area, means for containment at the bottom and sides of said material, a flexible membrane across the top of the material to complete the containment and to allow the interplay of the metatarsals with the fluid material below, and means to hold the containing means in position beneath the ball of the foot.

12. In a shoe construction having an outsole, an upper and an insole, a platform interposed between the insole and the outsole and formed with a closed recess coinciding in area to the area of the region beneath the ball of the foot and located in the region of the ball of the foot, and fluid means in said recess.

13. In a shoe construction having an outsole,

an upper and an insole, a platform interposed between the insole and outsole, a flexible flat closed casing at the rear of the platform beneath said insole and coinciding in area to the area of the region beneath the ball of the foot and located in the region of the ball of the foot, and fluid means in said casing.

14. In a shoe construction, a flexible closed casing disposed in a position to be engaged by the ball of the foot and coinciding in area to the area of the region beneath the ball of the foot, said casing having a width substantially equal to the width of the shoe and terminating in its forward end rearwardly of the toe portion of the shoe, and a fluid means in said casing.

15. In a shoe construction, a flexible casing disposed in a position to be engaged by the ball of the foot and coinciding in area to the area of the region beneath the ball of the foot, fluid means in said casing, and a forward toe portion extending from the forward end of said casing formed of non-distortable material.

16. In combination, a shoe including an insole, a flexible closed casing in said insole in a position to be engaged by the ball of the foot and coinciding in area to the area in the region beneath the ball of the foot, and a fluid means in said casing.

17. A shoe insole for use with a shoe, said insole including a flexible casing in a position to be engaged by the ball of the foot and coinciding in area to the area of the region beneath the ball of the foot, a fluid element in said casing and a non-distortable member carried by said insole extending forwardly from said casing and having a thickness substantially equal to the thickness of said casing and the normal thickness of said element.

18. In a shoe construction, a flexible closed casing adapted to be disposed within the shoe in a position to be engaged by the ball of the foot and coinciding in area to the area of the region beneath the ball of the foot, and displaceable liquid means within said casing movable therein under pressure of the metatarsal bones for equalizing the pressure of the foot on the forward ends of the metatarsal bones.

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