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SESAMOID-CUBOID FOOT BALANCER

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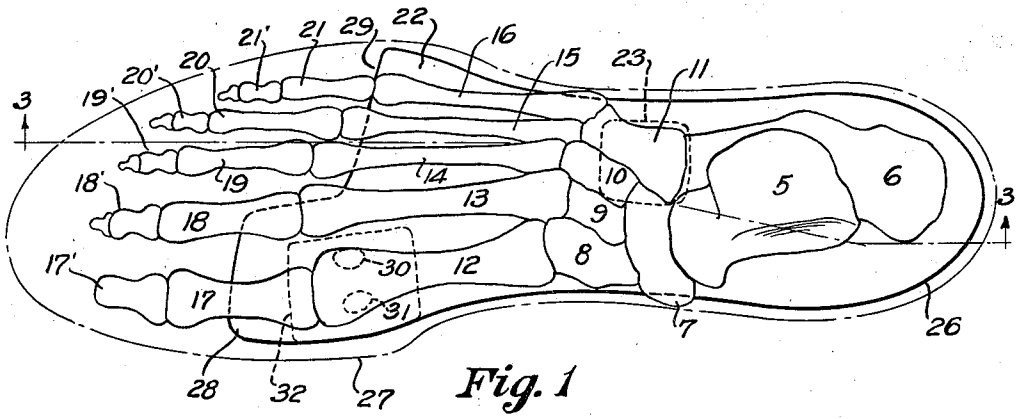


Fig. 1

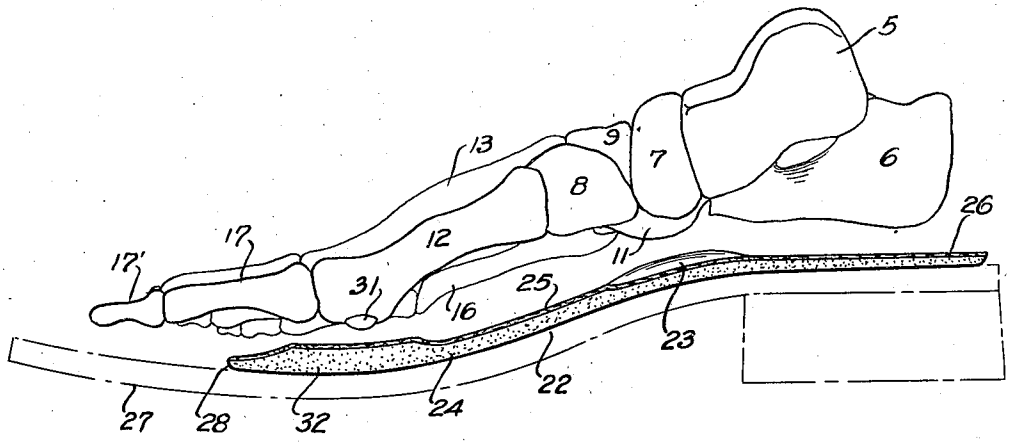


Fig. 2

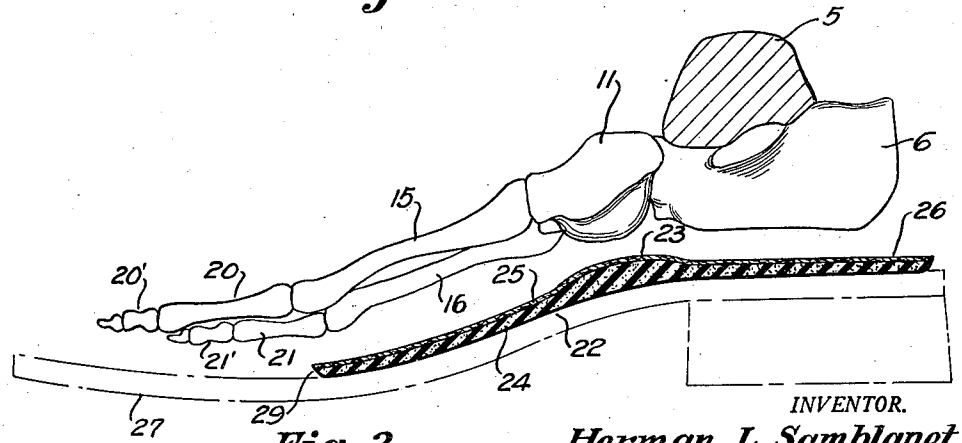


Fig. 3

INVENTOR.

Herman L. Samblanet

BY

Frease and Bishop

ATTORNEYS

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SESAMOID-CUBOID FOOT BALANCER

Herman L. Samblanet, Canton, Ohio

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3 Claims. (Cl. 36—71)

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The invention relates generally to means for correcting foot abnormalities, and for maintaining the foot in normal posture and balance. More specifically, the invention relates to a novel insole constructed to support the foot in such manner as to restore and maintain all of its parts in normal healthy condition in which they function properly with natural freedom.

There have been many arch supports designed to fit or be located under the internal longitudinal arch of the foot, but most of such supports cause pressure on the soft fleshy under part of the arch where the muscles, vessels and nerves are located. Nature did not intend these soft structures to carry weight, but rather, located them on the under part of the internal arch to protect them from being compressed.

Numerous other foot supports which have been proposed, have pads or elevated portions under various parts of the foot, as for example, under the os calcis, the cuboid, and extending laterally under the heads of the metatarsals; but all of these prior supports have failed to recognize the fundamental requirements of the normal foot.

I have determined that the three most important factors in foot ease and health are posture, balance, and freedom of movement of the various parts. I have discovered that the most important points of support, for maintaining the foot in proper posture and balance during walking and standing, are the distal or front abutment of the internal longitudinal arch, and the external abutment of the transverse arch.

The distal abutment of the internal arch is at or just behind the head of the first metatarsal, and actually on the two small sesamoid bones located at the head of the first metatarsal, which sesamoid bones act as rounded bearing points for the front end of the internal longitudinal arch during walking and standing. The external abutment of the transverse tarsal arch is the cuboid bone which supports the outer end of the transverse arch formed by the three cuneiform bones and the cuboid.

Many painful foot ailments are caused by failure of one or both of these points of support to function properly. For example, if the first metatarsal bone is too short, callouses may form at the heads of the second and third metatarsals because they try to supply the bearing support normally provided by the sesamoids on the first metatarsal. This shortness of the first metatarsal may also cause depression of the internal longitudinal arch due to internal rotation of the foot.

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Other foot ailments which may occur because of improper functioning of these points of support include bunions on the great toe, corns on the fourth and fifth toes due primarily to dropping and rotating of the cuboid bone, eversion or turning outwardly of the foot on a vertical axis, external rotation of the os calcis, and many attendant aches and pains due to the foot strains caused by any or all of the foregoing conditions.

Accordingly, it is a general object of the present invention to provide novel foot supporting means which will restore and maintain natural foot posture, balance and freedom.

A more specific object is to provide a novel insole construction adapted to be worn in any type of shoe or slipper, which will tend to restore and maintain natural foot posture, balance and freedom.

Another object is to provide a novel foot support which has elevated means under the sesamoid bones of the great toe and elevated means under the cuboid bone.

A further object is to provide a novel insole adapted to be worn in any type of shoe or slipper, and having soft rubber pads located under the sesamoid bones of the great toe and under the cuboid bone.

These and other objects are accomplished by the parts, improvements, constructions and arrangements comprising the present invention, a preferred embodiment of which is shown by way of example in the accompanying drawing; and which is hereinafter described in detail and set forth in the appended claims.

Referring to the drawing forming part hereof,

Figure 1 is a plan view of the skeleton of a human foot, with the improved insole of the invention positioned thereunder, the outline of the sole of the shoe in which the insole is located being shown in dot-dash lines;

Fig. 2 is a side elevation thereof looking toward the internal longitudinal arch of the foot; and

Fig. 3 is a longitudinal sectional view taken substantially on line 3—3, of Fig. 1.

Similar materials refer to similar parts throughout the several views of the drawing.

The skeleton of a right foot is shown somewhat diagrammatically in the drawings, being patterned along the lines of an X-ray photograph, and no attempt has been made to show the fleshy parts of the foot or how the foot fits within the upper part of a standard shoe, the shoe sole being outlined merely to give a general idea of its position relative to the foot skeleton and to the improved insole.

As shown, the skeleton includes the astragalus bone 5 on which the leg bones are supported, the os calcis 6, the scaphoid 7, the cuneiforms 8, 9 and 10 and cuboid 11, the metatarsals 12, 13, 14, 15 and 16, the proximal phalanges 17, 18, 19, 20 and 21, and the distal phalanges 17', 18', 19', 20' and 21' respectively.

The internal longitudinal arch of the foot is formed by the first metatarsal 12, the internal cuneiform 8, the scaphoid 7, the astragalus 5 and the os calcis 6. Thus the head of the first metatarsal 12 forms the front abutment of the internal longitudinal arch, and the os calcis or heel bone provides the rear abutment.

The external longitudinal arch of the foot is formed by the fourth and fifth metatarsals 15 and 16, the cuboid 11 and the os calcis 6; the heads of the fourth and fifth metatarsals 20 and 21 forming the front abutment of this arch, and the os calcis forming the rear abutment thereof.

The transverse tarsal arch is formed by the cuneiform bones 8, 9 and 10, and the cuboid 11, the cuboid being the external abutment for this arch. Since the internal abutment of the transverse tarsal arch is the internal cuneiform 8 which is part of the internal longitudinal arch, and the external abutment of the transverse tarsal arch is the cuboid 11, which is part of the external longitudinal arch; it is obvious that a dropping or rotation or displacement of the cuboid bone will effect the posture and function of all three arches. Accordingly, my novel and improved insole 22 is provided with an elevated pad or raised portion 23 which is located directly beneath the cuboid 11 to provide a support therefor.

The improved insole 22 is preferably constructed on its underside with resilient material such as sponge rubber, as indicated at 24, with a thin liner 25 of leather and the like adhering to the upper surface of the sponge rubber. As shown the heel portion 26 of the insole is rounded to conform to the shape of an ordinary shoe sole and is substantially flat on its upper surface. The insole 22 extends forwardly from the heel portion in substantial conformance with the shoe sole 27 and terminates on its inner side in a front portion 28 in front of the joint between the first metatarsal 12 and the proximal phalange 17 of the great toe. On the outer side the front portion of the insole may be cut back as at 29 so as to terminate substantially under the heads of the third, fourth and fifth metatarsals 14, 15 and 16 respectively.

As indicated in Figs. 1 and 2, the head of the first metatarsal 12 is provided immediately behind its joint with the phalange 17 with two laterally spaced sesamoid bones 30 and 31. These bones are attached to the underside of the head of the metatarsal 12 and form rounded or ball bearing points for supporting the front end of the internal longitudinal arch during standing and walking. The improved insole is provided with a raised portion or pad 32 which may be substantially rectangular in plan, which is adapted to be positioned directly beneath the sesamoid bones 30 and 31, and the pad 32 has sufficient length to allow for some sliding movement of the sesamoids during walking.

The pads 32 and 23 are preferably formed by increasing the thickness of the sponge rubber 24, but if desired the pads may be of semi-resilient or non-resilient material in order to correct certain foot abnormalities. Likewise, the material of the body of the insole may be varied to suit conditions.

Accordingly, if the second and third metatarsals 13 or 14 are too long or the first metatarsal 12 is too short, front abutments of the internal longitudinal arch will occur at the heads of the metatarsals 13 and 14 instead of at the head of the first metatarsal 12, which may cause callouses at those points and may cause imbalance and internal rotation of the foot resulting in a depressed internal arch, and other related ailments. The pad 32 tends to elevate the internal longitudinal arch by raising the front or distal abutment thereof, thus preventing or alleviating internal rotation of the foot or a depressed internal arch.

The pad 23 supports the external longitudinal arch and the transverse tarsal arch by providing an elevated support for the cuboid, and thus tends to prevent dropping or rotating of the cuboid which may cause strain on the fourth and fifth metatarsals, resulting in Morton's toe or kindred ailments.

The combination of the elevated pads 23 and 32 provides supports at the two most important abutments of the three arches of the foot, and results in the maintenance of the three most important factors in foot ease and health, namely, posture, balance and freedom of movement.

Thus, the novel insole provides a sesamoid-cuboid foot balancer which tends to force the weight of the body to be carried primarily over the external longitudinal arch of the foot while standing and walking, which is the normal function of the external arch. The novel insole tends to prevent or alleviate eversion of the foot and external rotation of the os calcis, with attendant strain of the muscles and tendons, and tends to prevent or alleviate the formation of corns; bunions and callouses and to relieve the many aches and pains due to abnormal foot strains, without causing pressure on any of the soft tissue of the foot.

In using the novel and improved insole, it is necessary that it be carefully designed and constructed to fit accurately the particular foot under which it is to be worn, careful attention being paid to the accurate positioning of the pads 32 and 23 under the sesamoids and the cuboid of the particular foot. Moreover, the condition of the foot as to ailments and abormalities should be diagnosed by a foot specialist, so that the relative thickness of the pads 32 and 23 is designed properly to correct or alleviate the same.

I have found in actual practice that while certain abnormalities and ailments of the foot can be temporarily alleviated or relieved by proper manipulation and treatment tending to restore the foot to proper balance, posture and freedom of movement; such relief is at best only temporary and the weaknesses and abnormalities constantly tend to return the foot to its unhealthy and painful condition.

I have found in actual practice with a large number of patients, that the use of the novel and improved insole comprising the present invention produces remarkable results, not only in maintaining the foot in proper posture and balance after manipulation and treatment, but also in strengthening and restoring the various parts of the foot through continued wear, so as to ultimately restore it to a healthy and normal condition.

The novel insole is simple and inexpensive to manufacture, and is adapted to be easily in-

serted and worn in any type of ordinary shoe, sandal or slipper.

In the foregoing description, certain terms have been used for brevity, clearness and understanding; but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiments of the improved construction illustrated and described herein is by way of example, and the scope of the present invention is not limited to the exact details, the constructions comprising the invention, and reasonable mechanical equivalents thereof obvious to those skilled in the art, being set forth in the appended claims.

I claim:

1. A shoe insole for maintaining a foot in proper posture and balance, having a flat elevated portion located directly under and bearing primarily on the sesamoid bones of the first metatarsal, and a separate elevated portion located under only the cuboid bone of said foot, said insole being otherwise substantially flat.

2. A shoe insole for maintaining a foot in proper posture and balance, having a flat elevated

resilient pad located directly under and bearing primarily on the sesamoid bones of the first metatarsal, and a separate raised resilient pad located under the cuboid bone of said foot, said insole being otherwise substantially flat.

3. A shoe sole including a flat elevated pad supported thereon and maintained directly beneath and bearing primarily on the sesamoid bones of the first metatarsal of the wearer's foot, and a separate elevated pad supported on said shoe sole and maintained directly beneath only the cuboid bone of said foot, said shoe sole being otherwise substantially flat on its upper surface.

HERMAN L. SAMBLANET.

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