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ANTI-INVERSION DEVICE FOR SNEAKERS

Filed March 17, 1964

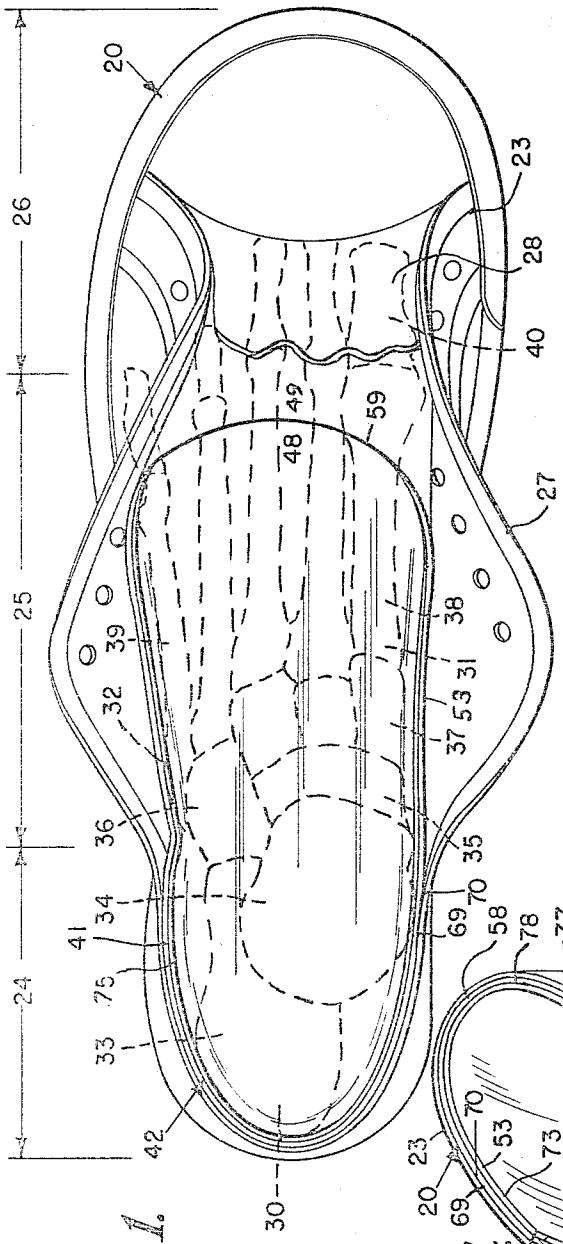


Fig. 1.

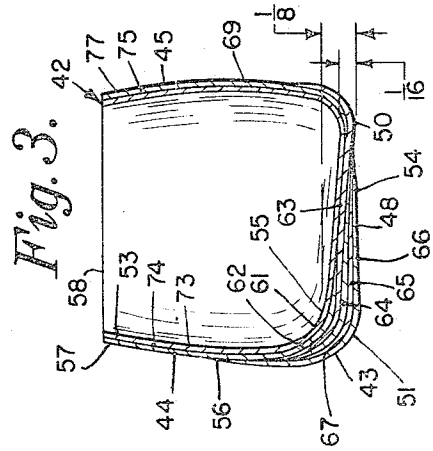


Fig. 3.

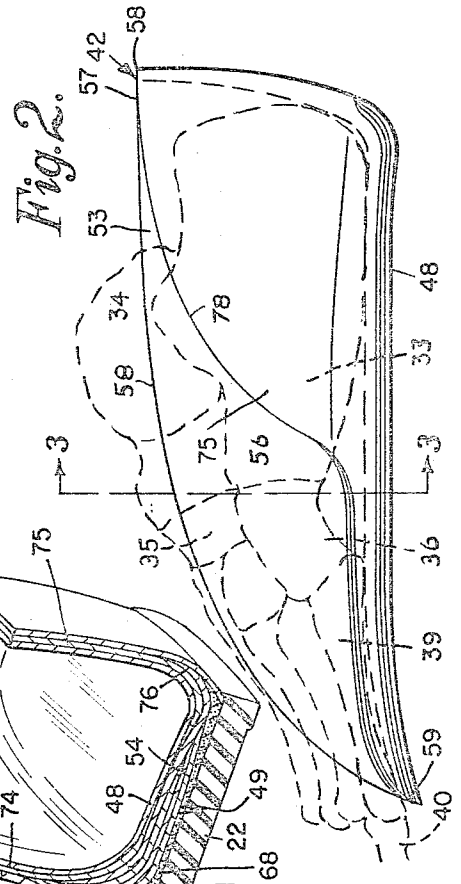


Fig. 2.

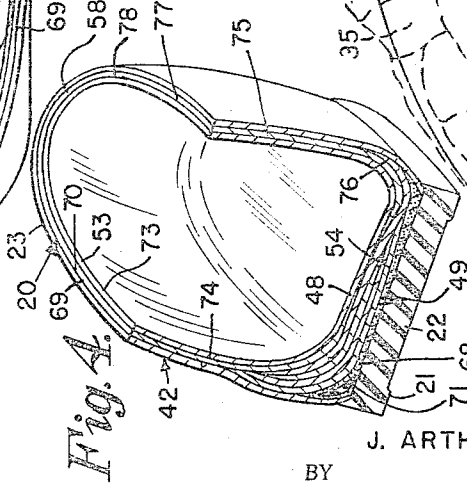


Fig. 4.

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ANTI-INVERSION DEVICE FOR SNEAKERS

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This invention relates to an anti-inversion device for use with sneakers, or the like, to support the human foot against inward turning from the oscalcis, through the longitudinal arch to proximate the proximal phalanax bones.

Conventional shoes usually have a semi-rigid counter and a leather upper, which provide suitable support for the foot of the wearer. However, sneaker type shoes, much worn by children in their formative years, and much worn by athletes in various foot straining sports, usually have a flat, soft sole without a heel and a pliable upper without a counter. Such sneaker type shoes, soft back, casual footgear, or canvas shoes, offer little, or no, support against the tendency of the foot to roll or turn inwardly, this tendency being called inversion herein.

Various shapes of resilient pads have been proposed for insertion in a shoe to correct such inversion, after it has occurred. For example, the scoop shaped orthopedic foot supporter shown in U.S. Patent No. 2,086,242 to Sheridan of July 6, 1937. A somewhat similar scoop shaped device, operable only in the oscalcis portion of the heel, is disclosed in U.S. Patent No. 2,821,032 to Helfet of Jan. 28, 1958. In both said patents a convexed wall portion, or a convexed pad, on the inside upstanding wall is intended to exert upward and lateral pressure on the inside of the heel to evert, or rotate, the heel back to normal vertical position. In U.S. Patent No. 2,572,860 to Hipps of Oct. 30, 1951, a similar pad is shown upstanding from a bottom pad to tend to rotate the heel back to normal vertical position in combination with a ridge in the bottom for tilting the heel backwardly.

The principal object of this invention is to provide a device for use in sneakers which tends to prevent inversion of the entire foot, rather than merely seeking to correct inversion of the heel by resilient upward and lateral pressure, the device being a scoop shaped body of incompressible material which prevents all of the foot except the toes, from inverting downwardly and inwardly by, not only supporting the medial structure of the foot from underneath, but also from alongside substantially the full height of the articulated bones in the medial part of the foot.

Another object of the invention is to provide a scoop shaped body, for use in a sneaker, with an elongated bottom, and an elongated inside wall, both co-extensive with the oscalcis, longitudinal arch and metatarsals of the foot, and the inside wall including an intermediate portion for laterally supporting the said bones against inversion.

A further object of the invention is to provide such a scoop shaped body wherein the elongated bottom increases in thickness from the outside to the inside and the elongated inside wall increases in thickness from the top to the bottom so that the under part of the inside of the human foot is incompressibly supported against inversion from the heel up to the toes, and the inside of the longitudinal arch portion of the foot is also incompressibly supported against inversion and rolling.

Still another object of the invention is to provide an elongated scoop shaped body of semi-rigid, self supporting material, interiorly lined with a softer material and arranged to firmly seat the heel against lateral rocking while continually resisting downward and inward rotation of the foot from its normal position.

A still further object of the invention is to provide a low cost, support for attachment to the inner face of the

sole of a soft back, casual or canvas type shoe, which fits around and receives all of the human foot except the toes and supports the heel, longitudinal arch and first metatarsal against turning inwardly and downwardly.

Other objects and advantages of the invention will be apparent from the claims, the description of the drawings and from the drawing in which:

FIGURE 1 is a plan view of the device of this invention fitted inside a sneaker, the bones of the human foot being shown in dotted lines;

FIGURE 2 is a side elevation of the elongated scoop shaped device of the invention, looking from the outside and with the foot bones shown in dotted lines;

FIGURE 3 is a section on line 3—3 of FIGURE 2, and

FIGURE 4 is a perspective view in section showing the laminated structure of the preferred embodiment of the invention and showing a layer of adhesive securing the device to the sole of a sneaker.

As shown in FIGURE 1, 20 represents a soft back, casual or sneaker type shoe such as the canvas upper, flat soled tennis shoe or other athletic shoe used in sports, or play shoe worn by children. Sneakers such as 20, do not usually have a heel, the ground contacting lower face 21 of the sole 22 being planar and not tilting the foot forwardly as with the conventional leather shoe. Similarly the upper 23 of the sneaker 20 is without a reinforcing counter customary with conventional shoes and the material of the upper is flexible, pliable and only barely self-supporting. While the pliable upper 20 in an athletic shoe, rubber boot, slipper or the like is more comfortable to the feet it offers practically no support to the structure of the foot.

For convenience of description the sneaker 20 is divided into a heel zone 24, a longitudinal arch zone 25, and a toe zone 26. In FIGURE 1 the pliable upper is shown turned back upon itself at 27 to reveal the interior, the tongue 28 is similarly turned back and a portion of the tongue is broken away in the toe zone.

The bony structure of the human foot is well known, including the three bearing points 30, 31 and 32 of the foot tripod, the oscalcis at the heel and the first and fifth metatarsal heads, intermediate of the length of the foot. The various articulated bones of the foot to which reference is made herein are designated by the following numerals, oscalcis 33, astragalus 34, scaphoid 35, cubiod 36, internal cuneiform 37, first metatarsal 38, fifth metatarsal 39 and first proximal phalanx 40.

Unlike the devices of the prior art in which a scoop shaped body, or an upstanding inner wall receives, or engages, only the portion of the human foot in the heel zone 24, and in which the oscalcis bone only is resiliently propped up from underneath, the bottom and inside wall of the elongated scoop shaped body 42 of this invention is co-extensive in length with the heel zone 24 and with the longitudinal arch zone 25, extending up to, but not including the toe zone 26. The elongated body 42 is unitary and formed of substantially incompressible material 41 such as "Celastic," a cotton flannel impregnated with pyroxylin, which, when wet with a solvent such as alcohol, forms a plastic mass moldable onto a last and hardens in air in about an hour. Synthetic, or natural, rubber, fibrous sheet material and the like can also be shaped to the desired configuration and impregnated, or adhered, into the desired shape. While body 42 is not entirely rigid, as if made of metal or plastic, the lower portion 43 of the inside wall is substantially rigid and the upper portions of the walls are semi-rigid, self-supporting and able to resiliently yield slightly, as at 44 and 45 in FIGURE 3.

The elongated body 42 includes an integral bottom 48 which extends from the mid point of the back of the

heel zone 24, forwardly through zone 24, through longitudinal arch zone 25 and through the zone of the metatarsals 38 and 39, to proximate the proximal phalanx bones. The bottom 48 thus covers all of the inner face 49 of the sole 22, or insole, except for the portion in the toe zone 26 and underlies all of the human foot except the toes. The bottom 48 is of substantially uniform wedge shaped section from end to end, with the outside edge 50 about one sixteenth inch in thickness and the inside edge 51 about one eighth inch in thickness. It thus increases in thickness from the outside to the inside and unyieldably and incompressibly supports the medial structure of the foot from underneath in the normal vertical position thereof while, together with a substantially vertical, inside wall, preventing inward inversion of all of the overlying bone structure from the heel to the toes.

The elongated body 42 also includes an integral inside wall 53, co-extensive in length with bottom 48 and upstanding from the inside edge 51 thereof. The inside wall 53 is self-supporting and substantially normal to the plane of the lower face 54 of the bottom 48, in its lower portion 55 and intermediate portion 56 but the upper portion 57 of wall 53 is curved inwardly in conformance with the shape of a human heel. As best shown in FIGURE 2, the upper portion 57 of inside wall 53 terminates in an upper rim 58 which extends from the mid-point of the back of the heel zone 24, substantially in parallelism with the bottom 48, through the heel zone and then curves downwardly and arcuately in a gradual curve until it is flush with the forward edge 59 of bottom 48 just beyond the terminus of the first metatarsal. It will thus be seen that the intermediate portion 56 of inside wall 53 is substantially vertical and extends alongside the transverse arch structure of the foot providing lateral support, not only to the oscalcis 30 and astragalus 34 in the heel zone, but also to the scaphoid 35, internal cuneiform 37 and the entire first metatarsal 38. In the case of a child wearing sneakers and jumping down from a high place, or an athlete wearing canvas shoes and landing hard on his feet as in basketball or tennis, the elongated, substantially unyieldable, upstanding wall 53 prevents all of the articulated bones in the medial part of the foot from turning inwardly and downwardly and maintains the same in their normal vertical position.

The upstanding wall 53 is of substantially uniform, wedge-shaped section increasing in thickness from the upper portion 57 where it is about one sixteenth inch in thickness, to the lower portion 55 where it is about one eight inch in thickness. The scoop shaped body 42 is gently curved where the inside edge of the bottom 48 and the bottom edge of the inside wall 53 merge and meet at 61. As shown in FIGURES 3 and 4, I prefer to form the body 42 in laminations, there being an inner lamination 62 of uniform thickness to outline the interior of the body and the rigid, unyieldable incompressible inside of the bottom and lower and intermediate portion of the inside wall being formed by overlying laminations 63, 64, 65 and 66, each extending from the inside wall of the body for a different distance toward the outside, or opposite, wall to create a wedge-shaped section. The laminations are adhered to each other by suitable adhesive layers 67, or in the manner of an impregnated gauze cast, and become relatively stiff to the degree that the thickened lower inside portion of the body is rigid and inflexible while the single thickness remainder of the body is semi-rigid and yieldable.

As best shown in FIGURE 4, the elongated scoop shaped body 42 is preferably firmly secured to the sole 22 of the sneakers 20 by suitable means such as a layer of adhesive 68 which bonds the lower face 54 of bottom 48 to the inner face 49 of the sole 22 so that the body 42 and sole 22 are relatively immovable. If desired the outside face 69 of the body 42 may also be adhered to

the inside face 70 of the sneaker upper 23, but the device will function satisfactorily if the sneaker upper 23 is unsupported by, and unconnected to, the body 42.

In view of the relatively stiff, incompressible nature of the material 41, a soft lining 73 of leather, or the like, is adhered to the inside face 74 of the body 42 and the forward edge 59 of bottom 48 is skived, or tapered for comfort of the foot.

The scoop shaped body 42 also includes an outside wall 75, upstanding from the outside edge 50 of the bottom 48 and extending forwardly from the mid-point of the back of the heel zone 24 through the heel zone to the cuboid 36 proximate the head of the fifth metatarsal 39. Outside wall 75 is of a single thickness of the material 41, and forms with the opposite portion of inside wall 53, a seat for the heel of the wearer which firmly holds the heel against rocking, or side slipping from its normal vertical position. Like wall 53, the lower portion 76 of outside wall 75 is normal to the plane of the lower face 54 of bottom 48 but the upper portion 77 curves inwardly to conform to the shape of the human heel.

A filler 71, of rubber or the like is shown in FIG. 4, this being conventional in sneaker construction for rounding out the inner corners to conform to the shape of the human foot.

It will be apparent that if the heel of the foot were not firmly held in normal vertical position in the oscalcis portion of the heel zone 24, the wearer might seat his heel so far to the outside of the sneaker that the upstanding wall 53 would not be in proper supporting contact to prevent inversion. Thus the outside wall 75 performs the double function of fitting around, firmly receiving and holding the heel in the correct position with the medial side of the foot structure closely against the inside wall 53 while contributing to the unyieldability of wall 53 by forming a horizontal arch therewith anchored to the bottom 48. The upper portion 77 of outside wall 75 terminates in an arcuate upper rim 78 which commences at the level of upper rim 58 of wall 53 at the back of the heel and curves gradually downwardly to the level of bottom 48 just below the cuboid 36.

The elongated scoop shaped body 42 with its elongated upstanding substantially vertical inside wall is not intended to be an orthopedic appliance or an arch support to correct existing deformities. It is designed to maintain the full length of the medial structure of the foot rigidly in the normal vertical position and to prevent inward rolling, or inversion, of the feet of growing children and athletes when wearing sneaker type shoes. While only the left sneaker is shown in the drawing, it will be apparent that the right sneaker and scoop shaped body will be a mirror image and constructed in a similar manner.

I claim:

1. An anti-inversion device comprising:

a unitary, scoop-shaped body of substantially incompressible material adapted to fit around, and receive the oscalcis portion of the human foot to support the same against rocking or side slippage;

said body having an integral bottom extending forwardly from the heel, through the longitudinal arch to proximate the forward terminus of the metatarsals of the foot, said bottom being of substantially uniform, wedge-shaped section increasing in thickness from the outside to the inside thereof for supporting the medial structure of the foot from underneath,

said body having an integral, upstanding, self-supporting, inside wall extending from the heel through the longitudinal arch to proximate the forward terminus of the metatarsals of the foot, said inside wall being of substantially uniform wedge-shaped section decreasing in thickness from the lower to the upper portion thereof, and having a substantially vertical, intermediate portion, extending alongside the scaph-

oid, internal cuneiform and entire first metatarsal, for suporting the medial structure of the foot laterally from the inside, the lower and intermediate portions of said inside wall and the inside portion of said bottom being rigid and unyieldable and the remaining portions of said body being semi-rigid and yieldable.

2. A device as specified in claim 1 wherein said upper portion of said inside wall terminates in an arcuate, upper rim, conforming in configuration with, extending generally parallel to, and located slightly above the level of, the arc formed by the scaphoid and first metatarsal bones of a human foot.

3. A device as specified in claim 1 wherein the outside wall of said scoop-shaped body extends forwardly from the heel through the cuboid portion of the foot to lend support to said inside wall, said outside wall terminating in an upper rim generally at the level of the upper rim of said inside wall to define a generally horizontal arch therewith.

4. A device as specified in claim 1 wherein the inside and outside walls of said scoop-shaped body extend upwardly from said bottom substantially normal thereto in said oscalcis portion but are inturned inwardly in the upper portions thereof in a curve conforming to the shape of the human heel.

5. In combination with a soft back shoe having no counter;

a unitary, scoop-shaped body of self-supporting, substantially incompressible, relatively stiff material having an integral bottom and integral inside and outside walls upstanding from said bottom, said body fitting around, and firmly receiving the oscalcis portion of the human heel to prevent rocking or side slippage thereof;

said bottom and upstanding inside wall extending from said oscalcis portion, through the longitudinal arch to proximate the terminus of the metatarsals and rigidly supporting the said portions of the foot structure against inversion,

said inside wall including a substantially vertical, intermediate portion, extending alongside the transverse arch structure of the foot, closely against the medial side of the foot structure to laterally and rigidly support the scaphoid, internal cuneiform and the entire first metatarsal of the foot;

said bottom sloping uniformly downwardly from the inside to the outside thereof and being substantially flat on the lower face thereof, and

means firmly affixing said lower face to the adjacent face of the insole of said soft back shoe for preventing relative movement of said body and said sole.

6. In combination with a soft back shoe of the type

having a flat, soft unheeled sole and a pliable, uncountered upper;

an anti-inversion, foot-supporting, scoop-shaped body for insertion inside all of said shoe except the toe section, said body being unitary and formed of self-supporting, substantially incompressible, relatively stiff material and having;

an integral bottom extending from the back of the heel forwardly through the longitudinal arch to proximate the proximal phalanx bones of the human foot, said bottom increasing in thickness substantially uniformly from the outside to the inside thereof for supporting the overlying foot portions, from underneath, against inversion;

an integral inside wall upstanding from the inside of said bottom and having an upper rim conforming in configuration with, but slightly above the level of, the scaphoid, internal cuneiform and first metatarsal bones of the foot, said wall extending from the back of the heel, forwardly through the longitudinal arch to proximate the proximal phalanx bones of the foot for supporting the adjacent portions of said foot, from along the inner side thereof, against inversion and

an integral outside wall upstanding from the outside of said bottom, said outside wall extending forwardly from the back of the heel to proximate the cuboid bone of the foot and firmly receiving the oscalcis portion of the foot in cooperation with said inside wall to prevent rocking, or side slippage, thereof in said scoop-shaped body.

7. An anti-inversion scoop-shaped body as specified in claim 6 wherein said inside wall is of wedge-shaped section, increasing in thickness from said rim downwardly toward the portion thereof merging with said bottom.

8. An anti-inversion scoop-shaped body as specified in claim 6 wherein said bottom is formed by a plurality of lamina of said material, each adhered to the other, and each extending from the inside thereof for a different distance toward the outside thereof to create said wedge-shaped section.

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