March 27, 1951 F. L. RIGGS 2,546,408

INSOLE-TYPE APPLIANCE

Filed March 7, 1950 2 Sheets-Sheet 1

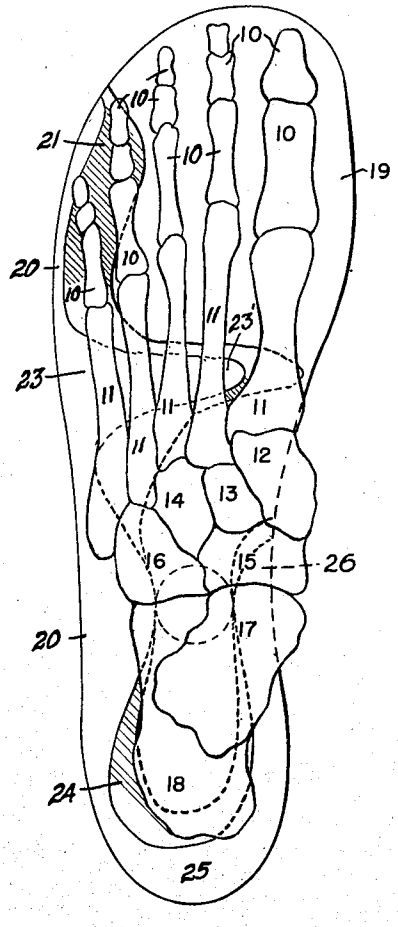



Fig. 1

INVENTOR.
FLORIDA L. RIGGS
BY Howard G. Sweet
ATTORNEY

March 27, 1951 F. L. RIGGS 2,546,408

INSOLE-TYPE APPLIANCE

Filed March 7, 1950 2 Sheets-Sheet 2

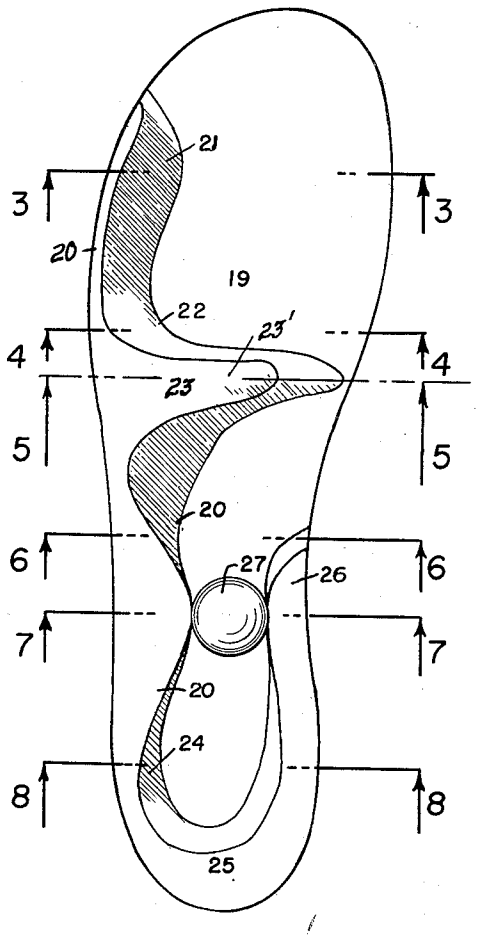



Fig. 2




Fig. 3




Fig. 4

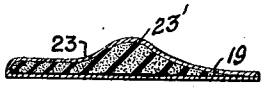



Fig. 5




Fig. 6




Fig. 7

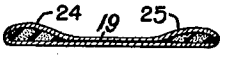



Fig. 8

INVENTOR.
FLORIDA L. RIGGS
BY Homer G. Sweet
ATTORNEY

Patented Mar. 27, 1951

2,546,408

# UNITED STATES PATENT OFFICE

2,546,408

## INSOLE-TYPE APPLIANCE

Florida L. Riggs, Gilcrest, Colo.

Application March 7, 1950, Serial No. 148,100

8 Claims. (Cl. 36—71)

1

This invention relates to corrective and therapeutic appliances of insole type adapted for wear to restore the natural attitude of the human foot and to thereby facilitate the normal and natural wholesome functioning of the circulatory and nervous systems serving the foot, and has as an object to provide an improved such appliance.

A further object of the invention is to provide an improved corrective and therapeutic appliance of insole type characterized by novelty of structure and arrangement effective in use to restore the natural attitude, function, and relationship of the foot constituent elements.

A further object of the invention is to provide an improved corrective and therapeutic appliance of insole type effective to support and strengthen the normal load-bearing arches of the foot.

A further object of the invention is to provide an improved corrective and therapeutic appliance of insole type conducive to normal foot attitudes and dispositions permissive of proper natural functioning of the circulatory and nervous systems serving the foot.

A further object of the invention is to provide an improved corrective therapeutic appliance of insole type susceptible of particular exact adaptations to use with a given human foot for maximum beneficial effect.

A further object of the invention is to provide an improved corrective and therapeutic appliance of insole type susceptible of wear association with conventional shoes.

A further object of the invention is to provide an improved corrective and therapeutic appliance of insole type adapted for simple, inexpensive production from readily available materials in a variety of appropriate sizes, that is convenient and simple of adaptation to effective use in a given situation, and that functions in use to stimulate operation of the normal and natural factors conductive to comfort and health.

With the foregoing and other objects in view, my invention consists in the construction, arrangement, and combination of elements as hereinafter set forth, pointed out in my claims and illustrated by the accompanying drawings, in which—

Figure 1 is a plan view of a typical embodiment of the invention as positioned for use in underlying relation with a dorsal diagram of the bones comprising a human left foot. Figure 2 is a plan view of the embodiment of the improvement represented in Figure 1. Figure 3 is a cross section taken on the indicated line 3—3 of Figure 2. Figure 4 is a cross section taken on the indicated line 4—4 of Figure 2. Figure 5 is a cross section taken on the indicated line 5—5 of Figure 2. Figure 6 is a cross section taken on the indicated line 6—6 of Figure 2. Figure 7 is a cross section taken on the indicated line 7—7 of Figure 2. Figure 8 is a cross section taken on the indicated line 8—8 of Figure 2.

2

As represented by the skeletal diagram of Figure 1, the human foot includes a load-bearing, articulated arrangement comprising the phalanges 10, the metatarsal bones 11, the internal, middle, and external cuneiform bones indicated respectively at 12, 13 and 14, the scaphoid bone 15, the cuboid bone 16, the astragalus bone 17, and the os calcis bone 18, in the general arrangement and interassociation shown. The great toe of the foot is constituted from and served by two phalanx elements 10 while the remaining toes of the foot are in each instance constituted from and served by three phalanx elements 10, and the metatarsal bones 11 are designated in numerical succession in a rising order from the inner and to the outer margin of the foot, the bone 11 in the series serving the great toe being hence the first metatarsal bone. The various bones of the foot are engaged and interarticulated to constitute a longitudinal arch extending from heel to toe with its maximum uprise on the line connecting the heel and great toe, a transverse arch through the cuneiform and cuboid bones, an anterior metatarsal arch at approximately the junction of the metatarsal bones 11 with the phalanges 10, and a point of load imposition at approximately the junction of the scaphoid, cuboid, astragalus and os calcis bones determined by the relation of the load-transmitting tibia with the astragalus. In natural, proper articulation, the bones of the foot receive the load from the tibia and normally support and balance such load through the agency of the foot arches with full accommodation of nerves and elements of the circulatory system and the pressures and displacements incident to ambulation. Manifestly, any distortion in the normal interrelation and articulation of the foot bones is reflected by abnormal and improperly compensated load incidence, by impairment of nerve and circulatory system functioning, and by consequent development of stresses, strains, growths and displacements, with their attendant aches and pains, inimical to normal health and well being. Modern foot wear, improper habits of posture and ambulation, and weaknesses inherent in the muscles and ligaments of the foot all contribute to aggravation of initial abnormalities and preclude natural correction thereof, hence the instant invention is directed to the provision of an appliance employable to urge and maintain the foot bones in natural articulation and proper interrelation conducive to natural correction and rehabilitation of any developed deficiency.

The natural operative conformation of the human foot is such as to substantially align the foot longitudinal arch in and with the direction of normal ambulation and any material variation in such arch line alters the angle and point of load imposition relative to the foot arches in an undesirable manner, and the instant improve-

ment is hence designed not only to support and strengthen the foot arches but to urge return of the foot attitude to normal, all without limitation or impairment of circulatory and nerve system functioning.

In any of its practical embodiments, the improvement takes the form of a generally flat, relatively thin, preferably flexible unit fabricated from appropriate material in a size and outline adapted for insertion as an insole within and in directly overlying relation against the inner face of a conventional shoe sole, said units hence being supplied in complementary pairs whereof the elements are adapted for use in shoes of right and left foot characteristics. In its general form and construction, the improved insole unit is analogous to devices commonly and presently available, and differs from conventional insole appliances primarily in the form, construction, and arrangement of support elements associated with the insole for corrective purposes.

In the illustrated embodiment of the invention, the numeral 19 designates an insole unit sized and contoured for reception within a conventional left shoe, said unit comprising a double thickness of relatively thin, flexible material, such as leather or the equivalent, whereof the adjacent ply surfaces are interbonded or adhered throughout the major extent of their areas. A very common foot condition requiring correction being a tendency to toe outward or to tilt the foot laterally in an outward direction, a corrective strip 20 of resiliently-yieldable material, such as sponge rubber, is associated with and fixed along the outer margin of the unit 19, preferably between the plies of material forming said unit, in a thickness effective to elevate the outer side of the foot and tilt the foot transverse arches inward; such tilting of the foot transverse arches tending to induce a straight line attitude of the foot and to restore the arches to proper supporting relation with the load. As is clearly shown in the drawings, the strip 20 is contoured into conformity with the unit 19 outer margin, is of variable width inward of the unit to define a particularly contoured strip inner margin, and is laterally inclined or sloped inwardly of the unit from a uniform maximum thickness adjacent the unit outer margin. At its forward end, the strip 20 is arrested near the end of the phalanges 10 of the fourth toe, and said strip forward end is curved inwardly, rearwardly, and then outwardly of the unit 19 to provide a laterally and inwardly sloped elevated area 21 disposed to underlie, elevate, and support the phalanges 10 of the fourth and fifth toes and to enhance the lateral support provided by said toes in a manner conducive to maintenance of the foot in straight line walking attitude. Rearwardly from the strip area 21, the strip inner margin is converged slightly toward the unit 19 outer margin and into a reduced spacing with the latter disposed in outward clearing adjacency with the joint between the fifth toe phalanges 10 and the fifth metatarsal bone 11 of the foot, thereby relieving said joint of any direct elevation deriving from the strip 20 and yet supporting and inducing elevation of the foot outer margin adjacent said joint. Just rearwardly of the strip 20 reduced width area above defined, said strip is curved and widened inwardly of the unit 19, as at 22, to establish a maximum width area 23 disposed to underlie, elevate and support the metatarsal bones 11 of the foot in engaging conformity with the transverse foot arch therefrom constituted and in a manner supplementing and enhancing the effect of the strip area 21 as above described. The area 23 bridges substantially across the unit 19 as a tapered projection from the strip 20 whereof the anterior and posterior margins are oppositely sloped or inclined to merge into the unit 19 plane, and said area 23 is contoured in section from coincidence with the strip 20 thickness at the unit outer margin to a maximum thickness defining an elevated boss 23' at the crown of the corresponding foot transverse arch, approximately beneath the second metatarsal bone 11, and thence to mergence with the unit 19 plane adjacent the unit inner margin. Rearwardly from said area of maximum width 23, the strip 20 inner margin is contoured from a narrow strip width at the root of the area 23 in substantial clearance with the fifth metatarsal 11 to an expanded strip width at the junction of the cuboid bone 16 and the os calcis 18 underlying outward margins of said members, and is then gradually tapered in width rearwardly of the unit 19 to a minimum width 24 adjacent and outwardly clearing the rearward outer margin of the os calcis 18. In a gradually increased width, the strip 20 is extended about and in inward adjacency with the heel outline of the unit 19, as indicated at 25, and terminates in an outwardly curved extension 26 along the inner margin of the unit in engagement beneath the scaphoid bone 15, thus defining a shallow cup between the strip portions 24 and 25 for accommodation of the os calcis 18. The strip 20 is preferably of uniform thickness throughout its variable width length and from its initial area 21 to its terminal point 26, save for the increased thickness of the area 23 above set forth, and the inner margin of said strip is sloped and inclined, as above described, throughout its entire contoured line, except at that area of increased width underlying the junction of the cuboid bone and os calcis and the extension 26 margin thereto opposed, to obviate any abrupt shoulders or corners where the strip engages the foot and to thereby enhance wearer comfort. As is readily apparent, the inner margin contour of the strip 20 in its forward portion provides for foot engagement in a manner to minimize any tendency of the foot to slip or move forwardly relative to the unit 19, since engagement of the strip portion 21 beneath the fourth and fifth toe phalanges, engagement of the strip area 23 with and beneath the natural transverse arch of the metatarsals, and accommodation of the fourth and fifth metatarsal forward end joints between said strip widened areas function through load-imposed pressure of the foot against the unit to largely inhibit relative displacement.

Completing the improved appliance for practical use, a domed boss 27 of resiliently-yieldable material, such as sponge rubber, is associated with the unit 19, preferably between the material plies of the latter, with its convex surface directed upwardly from the plane of the unit to correspond with the strip 20 mounted thereon and in position to engage beneath and support the common intersection or junction of the scaphoid bone 15, cuboid bone 16, astragalus 17 and os calcis 18 of the foot, in laterally bridging relation between and to close marginally against opposed, unsloped inner margins of the strip 20. While the boss 27 is fixed to the unit 19 when the appliance is in use, it is desirable that said boss be initially susceptible of adjustment relative to the unit to assure registration of said boss in proper relation with the foot bones as above set forth. Mani-

festly, initial adjustability of the boss 27 may be accommodated in various ways, and since the boss is fixed relative to the unit during use of the appliance it is so illustrated in the drawings. The boss 27 has a dimension outstanding above the major plane of the unit 10 a distance slightly greater than that represented by the strip 20 thickness, but it is contemplated that bosses 27 of various maximum thicknesses may be made avaiable for more perfect adaptation of the unit to corrective use with human feet of differing characteristics. In all instances the boss 27 is preferably circular in plan and of a diameter such as will close against the adjacent strip 20 margins when the boss is fixed in its position of use, it being manifestly feasible, if desired, to extend the strip 20 in its uniform thickness as a bridge laterally of the unit beneath the boss 27 position and to apply the boss 27 crown, in an appropriate thickness, as an uprise from said bridge. In use of the appliance, the boss 27 engages directly beneath the point of load imposition on the foot and its arches and functions as a fulcrum of yieldable altitude whereon the foot arches may rock, both longitudinally and transversely of the foot, under the varying loads accommodate by said arches. Engagement of the boss 27 with the foot area above specified fully relieves the elements of the foot circulatory and nerve systems from any boss-imposed pressure which might impair functioning of said systems, thereby supplementing the mechanical corrective support of the foot with a free and unrestricted circulation and nerve reaction conducive to restoration and maintenance of normal foot health.

Constructed and employed as shown and described, the improvement operates in association with either or both feet of an individual to restore and normally correct foot attitudes, to relieve abnormal frictions, stresses, and pressures adversely affecting the foot, and to encourage normal and correct functioning of the systems and muscles serving the foot; the points and areas of interengagement between the appliance and foot being chosen in such anatomical correlation with the foot structure as to supplement and assist, rather than to replace normal anatomical and physiological reactions.

Since changes, variations, and modifications in the form, construction, and arrangement of the elements shown and described may be had without departing from the spirit of my invention, I wish to be understood as being limited solely by the scope of the appended claims, rather than by any details of the illustrative showing and foregoing description.

I claim as my invention:

1. An insole-type appliance of the character described, comprising a thin, flexible unit contoured for co-operating accommodation and retention within a shoe in overlying relation with the shoe sole inner face, a cushioning strip of resilient material upstanding from, along, and in marginal coincidence with the outer side and heel outline of said unit, a forward terminal area on said strip disposed for engagement beneath the foot fourth and fifth phalanges, an integral, lateral extension of said strip transversely of the unit disposed for conforming engagement with and beneath the foot metatarsal arch, and a domed boss of resilient material upstanding from said unit in position for registration beneath the joint common to the foot scaphoid, cuboid, astragalus and os calcis bones.



2. The organization according to claim 1, wherein said strip is of substantially uniform thickness throughout its marginal coincidence with the unit and decreases in thickness inwardly of the unit to mergence into the plane of the latter.

3. The organization according to claim 1, wherein the strip portion marginally coincident with the unit heel outline terminates on the inner side in elevating engagement beneath the foot scaphoid bone, and said strip portion is decreased in thickness inwardly from the unit heel outline to mergence with the unit plane to define a shallow cup for the reception of the foot os calcis.

4. The organization according to claim 1, wherein said strip lateral extension is tapered in plan from a relatively wider base at its junction with the strip adjacent the unit outer side to a relatively narrower tip adjacent the unit inner side, is of non-uniform thickness laterally of the unit to define an upper surface conformably engageable with the foot metatarsal arch and marked by an elevated boss disposed for supporting registration with the crown of said arch, and is marginally tapered to mergence with the unit plane.

5. The organization according to claim 1, wherein said strip, strip forward terminal area, and strip lateral extension are adjacently marginally tapered to mergence with the unit plane in an association definitive of a shallow recess for the reception and accommodation of the fourth and fifth metatarsal end joints.

6. The organization according to claim 1, wherein said domed boss has a dimension outstanding perpendicularly from the unit exceeding the strip thickness adjacent the unit margin.

7. In an insole-type appliance of the character described having a thin, flexible unit contoured for cooperating accommodation and retention within a shoe in overlying relation with the shoe sole inner face, a foot-elevating support of resilient material along and outstanding above the outer margin and heel outline of said unit, a metatarsal arch support of resilient material laterally of said unit, and a domed boss of resilient material outstanding from said unit for registration with and support of the joint common to the foot scaphoid, cuboid, astragalus and os calcis bones.

8. In an insole-type appliance of the character described having a thin, flexible unit contoured for cooperating accommodation and retention within a shoe in overlying relation with the shoe sole inner face, a foot-elevating support of resilient material along and outstanding in a substantially uniform thickness above the outer margin and heel outline of said unit between a forward terminal area disposed to underlie the foot fourth and fifth phalanges and a forwardly-directed rearward terminal underlying the scaphoid bone at the unit inner side, a metatarsal arch support of resilient material laterally of the unit from said first support in a variable thickness productive of an upper surface contour conformable to that of said arch, and a domed boss of resilient material outstanding from said unit rearwardly of the metatarsal arch support for registration with and support of the joint common to the foot scaphoid, cuboid, astragalus and os calcis bones.

FLORIDA L. RIGGS.

No references cited.