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P. D. RAYNER

2,454,836

FOOT PAD

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FIG. 1.

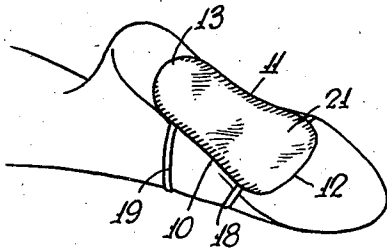


FIG. 2.

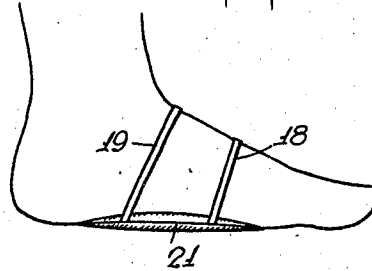


FIG. 3.

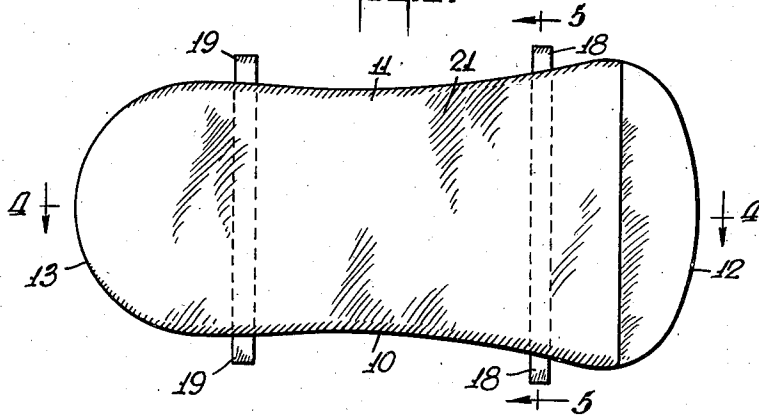


FIG. 4.

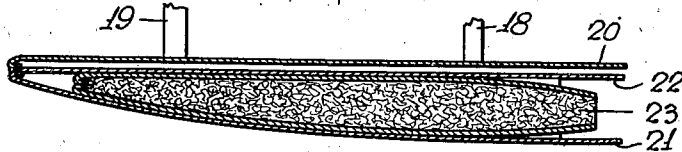


FIG. 5.

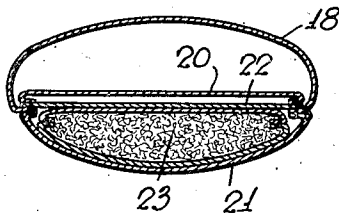
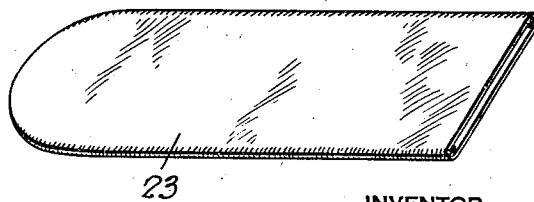


FIG. 6.



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1 Claim. (Cl. 128—80)

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This invention relates to a new and useful attachment or appliance for cushioning or supporting the foot along its arch.

A number of factors and influences may operate to cause relaxation of the natural support of the arch structure. This relaxation may be of a localized character and variably located between the heel and the metatarsal bones for different individuals or may be of a more extensive character.

One of the general objects of my invention is to provide an attachment which an individual can apply directly to his foot to effectively correct any undesired relaxation of the arch, whether the relaxation be of a general character or of a localized character and regardless of where localized. I attain this object by securing a casing in close engagement with the bottom of the foot for its full width and for a length which extends approximately from the inner end of the heel bone to the outer ends of the metatarsal bones, and within which casing can be entered and positioned where required, a pad, cushion or the like whose character is such that it will effectively support the foot arch or any portion thereof which has taken a relaxed position, thereby adding to the foot comfort of the wearer.

It is a further object of my invention that the pad, cushion or the like, when entered into the casing and adjusted to its optimum position, be retained in that position, and more particularly that it be retained in that position by the same means which secure the casing to the foot. I attain both this object and the more particular one by securing the casing to the foot by elastic means which encompass the upper or dorsal surface thereof.

Another object of my invention is to provide a casing which will be easily conformable to the contour of the bottom of the foot and which will be smooth, washable and non-irritating to the skin. This casing will serve primarily as a carrier for receiving and locating the cushioning element in an optimum position and therefore need not be and preferably is not of itself form-sustaining. Linen, satin, rayon or any other soft, closely woven material are suitable to effect my purposes.

It is a still further object of my invention to provide a casing having an intermediate partition of relatively firm material to make the casing form-sustaining and to provide a second compartment which will greatly enhance the adaptability of the appliance to the individually variable re-

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quirements of arch structure and support which may be encountered.

The attainment of the foregoing objects by the appliance of my invention will be more completely understood following a brief description of the anatomical structure of the foot arch and the structural and functional relationship of the invention thereto.

The human foot has both a transverse and two longitudinal arches. The transverse arch occurs in the region of the tarsometatarsal joints. The lateral longitudinal arch extends from the inner end of the heel through the cuboid and the two lateral metatarsal bones. The sole of the foot near its outer border rests lightly on the ground due to the shallowness of this arch. The medial longitudinal arch is considerably higher and more important and extends from the inner end of the heel bone through talus, navicular, the three cuneiforms and the first three or medial metatarsals. The inner border of the foot should be well domed from the ground with consequential elevation of the instep. The arches are normally sustained by the articular ligaments, connective tissue and by muscles.

It is thus apparent that the foot arch is a complex, composite structure extending transversely of the foot for its full width and longitudinally from approximately the inner end of the heel bone to the outer ends of the metatarsal bones. Undesired relaxation of the arch may result from weakness at any localized portion of the arch area or, in more severe cases, from weakness existing over a considerable portion of the arch area.

The arch appliance of my invention is expressly designed for maximum adaptability to the inevitable individual variability in the conditions of arch relaxation which require corrective support.

In order to accommodate the arch appliance to the variability in the conditions of arch relaxation a casing is provided which, when properly adjusted, will underlie the entire arch area of the foot defined by the contour of the side edges of the foot and extending longitudinally from approximately the inner end of the heel bone to the outer ends of the metatarsal bones.

The casing is secured to the bottom of the foot by elastic means which encompass the upper or dorsal surface of the foot. The securing means serves an additional purpose which will be hereinafter indicated.

Received within the casing is a supporting cushion contoured and dimensioned so as to underlie and support the relaxed portion of the

foot arch wherever the relaxation may occur. The desired size and optimum position of the cushion will be determined empirically by the wearer who will select that particular cushion or combination of cushions which contributes most effectively to his foot comfort. Once an adjustment of the cushion within the casing has been effected, the cushion will be retained in that position by the action of the same elastic means securing the casing to the bottom of the foot.

One modification of the arch appliance contemplates the use of a casing having an intermediate partition of relatively firm material to make the casing form-sustaining and to provide an additional compartment therein. This additional compartment will materially enhance the adaptability of the appliance to conditions where the arch relaxation is of a more extensive character.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description, taken in connection with the accompanying drawing, in which:

Fig. 1 is a perspective view showing the appliance adjusted in place on the foot;

Fig. 2 is a side view showing the appliance adjusted in place on the foot with the securing means extending across the dorsal surface of the foot;

Fig. 3 is a horizontal diagrammatic view of the arch appliance;

Fig. 4 is a sectional view taken along line 4—4 of Fig. 3 showing a modification of the arch appliance;

Fig. 5 is a sectional view taken along line 5—5 of Fig. 3; and

Fig. 6 is a perspective view of the supporting cushion shown also in Figs. 4 and 5.

The casing of the arch appliance is constructed of upper and lower sections 20 and 21 respectively, opening anteriorly to receive a compressible, resilient cushion 23. The casing is contoured and dimensioned to underlie the entire area of the foot arch, extending transversely for the full width of the bottom of the foot, so that its lateral edges 10 and 11 are substantially aligned with the lateral edges of the foot and extending longitudinally so that its anterior edge 12 underlies the front end of the metatarsal bones and its posterior edge 13 underlies the inner end of the heel. The material of which the casing is constructed should be washable, smooth and relatively soft to prevent chafing of the skin and highly flexible so as to conform to the outline of the arch. Linen, satin, rayon and the like are suitable materials for this purpose.

Affixed to the lateral edges of the casing anteriorly and posteriorly are securing means 18 and 19, preferably of elastic material, extending transversely across the casing and adapted to encompass the dorsal surface of the foot as shown in Fig. 2. The securing means enables the casing to be detachably secured to the sole of the foot in the desired position and serves an additional purpose hereinafter indicated.

Received within the casing is a supporting cushion 23 which will more or less fill and expand the casing. This mass may be made of cotton, synthetic rubber, sponge rubber or the like and should preferably have the characteristic of being compressible and resilient and of tending to return to its uncompressed form when the stress is removed. The character of the cushion may be varied to best suit the individual as to the ma-

terial employed, its dimensions and its compressibility.

One modification of the invention contemplates the use of a casing for the arch appliance having upper and lower compartments formed by a partition 22 disposed intermediately between the upper and lower sections of the casing as shown in Figs. 4 and 5. This partition is made of a relatively firm, resilient material to hold the casing distended and make it form-sustaining, surgical webbing being an example of one such material which may be used. This partition gives a relatively less yielding support than if the cushion 23 alone filled the casing and in addition protects the bottom of the casing from perspiration and the like.

The arch appliance when properly adjusted to the foot as previously described will register with the entire area of the foot arch, with the anterior edge of the casing underlying the front end of the metatarsal bones and the curved posterior edge reaching to the inner line of the heel and the lateral edges in substantial alignment with the lateral edges of the foot, the securing means 18 and 19 extending across the dorsal surface of the foot. The cushion insert 23 entered into the casing will be prevented from shifting by the action of the securing means which will hold the cushion located predeterminedly in the casing once the adjustment has been effected. The appliance has the additional advantage that the adjustment of the cushion may be varied to give the wearer the best supporting and most comfortable position of the cushion. The curved posterior edge 13 of the pocket will not give too abrupt a lift at the heel.

The modification of the arch appliance shown in Figs. 4 and 5, wherein a casing comprising upper and lower compartments formed by an intermediate partition is employed, affords ever greater adaptability of the arch appliance to the individually variable requirements of arch structure and support which may be encountered. For example, where the weakness of the arch is localized in the metatarsal region a cushion of the required size and character may be inserted into the upper compartment. If the weakness resides in the main longitudinal arch a cushion of the required size and character may be inserted into either compartment. Further, cushions of the proper size and shape may be inserted into both compartments if required in any given case.

It is contemplated that the arch appliance herein described may be made in various sizes such as small, medium and large or possibly in a graduated series of sizes similar to the graduated series of shoe sizes currently available.

It has been found that when the arch of the foot is rigidly constrained by an unyielding support to which the bottom of the foot must conform, there is a distinct tendency toward atrophy of the muscles which normally sustain the arch. Moreover, an unyielding support will not allow any adjustment essential to foot comfort. Additionally, there is little assurance that an unyielding support will invariably assume the same position even for the same pair of shoes and there is even less assurance where shoes of slightly different size and shape are used.

In addition to the advantages previously indicated, the appliance of the present invention gives resilient support to the foot arch and, rather than rigidly constricting the bone structure of the foot and the supporting muscles, permits free movement of the bone structure and supporting mus-

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cles and simultaneously induces such movement and aids the muscles because of the resilient support. While permitting the muscles their free movement, it strengthens the muscles without overworking them to the point of fatigue and relaxation.

In the drawings, the casing of the arch appliance has been shown in close engagement with the bottom of the foot for its full width and underlying the entire arch area from the inner or front end of the heel bone to the outer or front ends of the metatarsal bones. The inner end of the heel bone and the outer ends of the metatarsal bones may be considered the terminal pillars of the longitudinal arches and are the portions of the arch structure most closely adjacent the ground line. In addition there is a prominence situated back of the inner line of the heel bone and also at the outer ends of each of the metatarsal bones. It will therefore be understood that the outer or front ends of the metatarsal bones and the inner or front end of the heel bone have reference to these prominences and define the length of the casing to give the optimum results.

Since certain modifications in the appliance which embody the invention may be made without departing from its scope, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What I claim as new and desire to secure by Letters Patent is:

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An appliance to underlie the foot for preventing undesired relaxation in the arch, said appliance comprising a fabric casing having an upper wall lying against the foot and a lower wall adapted to lie against the sole of the shoe, a form sustaining partition lying parallel to and between said walls and co-extensive therewith to hold said casing against contraction, wrinkling, and folding, a resilient strap secured at its ends to the sides of the casing for detachably securing said casing against the bottom of the foot, said bottom wall being continuous throughout its length and width and free of projections or protuberances, said upper and lower walls being joined at one end to close said casing and terminating at the other end to form an opening into said casing for the insertion of a compressible resilient cushion between said form sustaining partition and a wall of said casing, and the pull of said strap retaining said cushion against movement relatively to said casing when said casing is applied to the foot.

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REFERENCES CITED

The following references are of record in the file of this patent:

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