April 30, 1957 W. C. BURNS 2,790,254

REMOVABLE SHOE PAD CONSTRUCTION

Filed Dec. 6, 1955

FIG. 1.

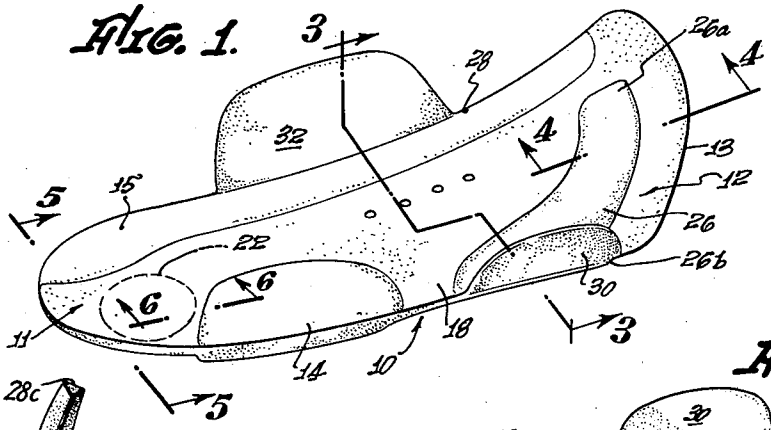


FIG. 2.

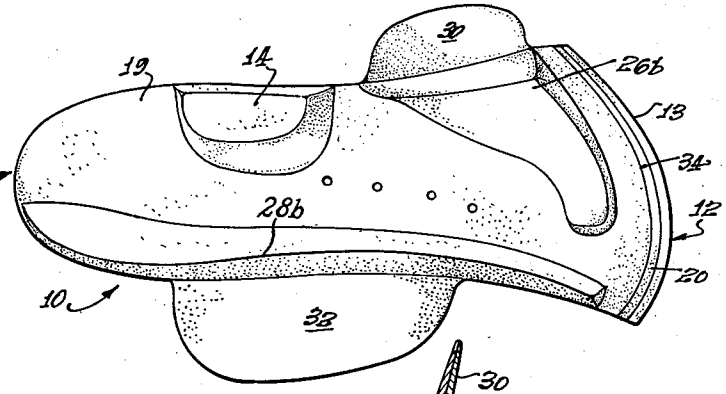
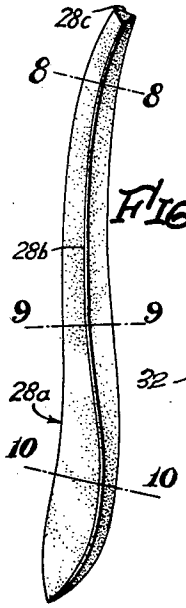


FIG. 7.



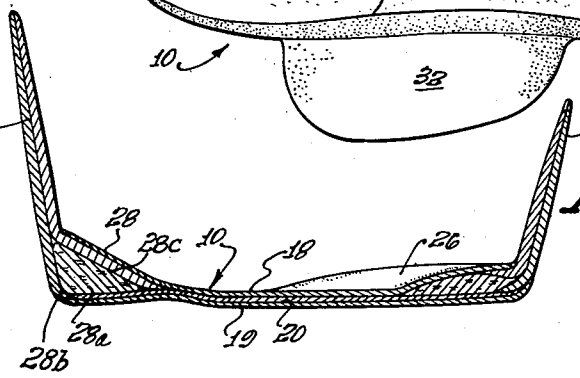


FIG. 3.

FIG. 4.

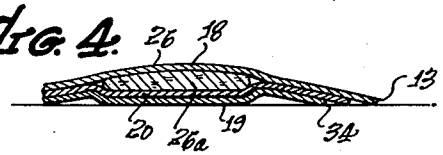


FIG. 6.

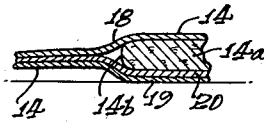


FIG. 5.

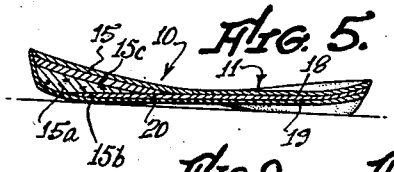


FIG. 8.

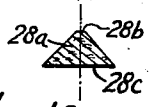


FIG. 9.

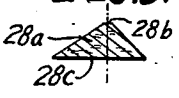
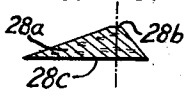


FIG. 10.



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2,790,254

REMOVABLE SHOE PAD CONSTRUCTION

William C. Burns, Santa Ana, Calif.

Application December 6, 1955, Serial No. 551,346

5 Claims. (Cl. 36—71)

The present invention relates generally to a removable pad construction for use in shoes, and more particularly to a pad construction designed to provide a weight distributing element which brings about a desired distribution of the body weight onto those portions of the foot structure which are best adapted to carry this weight.

This application is a continuation-in-part of my copending application Ser. No. 471,753 filed November 29, 1954 now abandoned for the same subject.

The structure of the human foot is such that the weight of the body should not be carried directly on the arch which is raised to avoid such carrying of weight. The body weight should be carried along the outside of the foot with a large share of the weight upon portions of the foot just forward of the heel and immediately behind the "ball" of the foot, the "ball" being the area beneath the metatarsal-phalangeal joints. When the weight is so distributed, the circulation of blood in the foot is free and normal, the muscles of the foot function and develop in the proper manner, and there is no undue pressure upon the joints. However when body weight is partly carried upon the metatarsal or arch area of the foot, the pressure on the underside of the arch results in undue restriction of the blood circulation and often causes stretching of the ligaments in the arch with a resultant weakening of the structure of the foot.

Accordingly, it is a general object of my invention to provide a removable pad construction adapted to be used within an ordinary shoe which brings about a desirable distribution of weight with respect to the foot structure.

It is also an object of the present invention to take the weight off the arch and to distribute more of the weight onto the outside marginal area of the foot between the heel and the ball of the foot with as much weight as possible removed from the heel and ball of the foot.

A further object of my invention is to straighten up the ankle which has a tendency to turn in when the arch is weak or flat.

It is another object of my invention to provide means for holding the removable pad in proper position relative to the foot and prevent the pad from "creeping" because of the horizontally directed forces applied by normal walking.

I achieve these objects of my invention by providing a pad structure which underlies most of the foot and includes elevated portions adapted to underlie specific areas of the foot to receive weight from these areas. Another elevated portion is relatively narrow and elongated and extends along the inner lateral margin of the foot along side the metatarsal or longitudinal arch. The pad structure has flexibly attached to it, along this same side, an upwardly extending cushion member which is adapted to bear against the inner side of the foot above the arch but below and forwardly of the ankle. This narrow elevated portion of the underlying pad and the upwardly extending cushion combine to shift or rotate the ankle outwardly and to bring the main weight of the body upon the outside portion of the foot. Other elevated portions of the pad structure are provided to receive this weight and none of the body weight is actually carried on the raised arch portion of the foot.

Among these other elevated portions is one in the heel area below the cuboid and forward of the os calcis. The rear edge of this elevated area rises abruptly to provide a shoulder facing rearwardly to engage the os calcis. This engagement prevents the foot from moving forwardly relative to the pad, and holds the pad in proper position with its elevated portions under the desired areas of the foot.

This invention may be considered as being an improvement on the shoe pad structures described and claimed in my earlier issued Patents Nos. 2,287,341, issued January 23, 1942 and 2,434,258, issued January 13, 1948.

How the above and other objects of my invention, as well as others not specifically mentioned herein, are attained will be better understood by reference to the following description and to the attached drawing, in which:

Fig. 1 is a perspective view showing the upper side of a removable pad member constructed according to the present invention, the particular pad illustrated being one adapted for use under the right foot;

Fig. 2 is an inverted plan view of the pad member with the two side cushions bent to project out sideways;

Fig. 3 is an enlarged transverse vertical section thereof taken on line 3—3 of Fig. 1;

Fig. 4 is a fragmentary vertical longitudinal section taken on line 4—4 of Fig. 1;

Fig. 5 is a fragmentary transverse section on line 5—5 of Fig. 1, showing in elevation the elevated portions of the pad immediately forward of the plane of the section;

Fig. 6 is a fragmentary vertical longitudinal section on line 6—6 of Fig. 1;

Fig. 7 is a plan view of the insert which lies along the inner edge of the pad; and

Figs. 8, 9 and 10 are, respectively, transverse cross-sections of the insert of Fig. 7, taken in the planes of lines 8—8, 9—9 and 10—10 of that figure.

Referring now to the drawings, and especially to Figs. 1 and 2, the body of the removable pad structure is indicated generally at 10 and comprises a posterior or heel portion 11 and a front or anterior portion 12 which tapers in thickness at the frontal margin to a thin forward edge 13. The length of pad 10 is established with reference to the foot of the user so that anterior portion 12 lies immediately behind the so called "ball" of the foot, that is, the muscular pad beneath the metatarsal-phalangeal joints. Likewise, the width of the removable pad 10 is determined by reference to the user's foot to be substantially the same width as the foot. It preferably fits snugly within the shoe to prevent lateral shifting relative to the foot.

In accordance with the general teachings of my earlier issued Patents Nos. 2,287,341 and 2,434,258, mentioned above, I show pad 10 as provided with a plurality of elevations formed by thickened portions of the pad structure which are adapted to underlie certain designated zones or areas of the user's foot and to cooperate in securing a desired weight distribution.

The areas in question are thickened portions of pad 10 and are referred to as elevated areas since they rise above the level of the top surface of the pad after it is worn for a while. When the pad is new the top surface has comparatively little relief and the shape of the inserts making the thickened or elevated areas is most easily seen from the underside of the pad. Accordingly the underside of a new pad is shown in Fig. 2. It is to be

understood that use of the pad has the effect of transferring the relief from the underside to the top side.

The numeral **14** indicates an elevated area partly in and forwardly of the heel portion **11** and upon which a large proportion of the body weight is intended to be concentrated. This elevated area is located along the outer side of the foot at a position substantially below the cuboid and the forward portion of the os calcis, the general location being taught in my patents referred to above. On the opposite side of pad **10** from area **14**, or at the inner side of the foot, I provide in heel portion **11** a complementary elevated area **15** which along its outer edge rises to a greater height than area **14**.

Pad **10** as a whole is constructed of at least an upper layer **18** and a lower layer **19** of sheet material such as leather or fabric. Preferably there is also an intermediate layer **20**; and there may be more than one intermediate layer. The several layers are cemented together where they overlie each other. The material for each layer may be chosen to provide a particular characteristic; and it is not necessary all layers be of the same material, though I prefer to use leather of different kinds for all layers.

Between two of the layers are inserted bodies of cork or other comparatively firm but resilient material, to form the elevated areas, including those at **14** and **15**. Thus in Fig. 6, the body **14***a* of cork is seen between layers **18** and **20** to form elevation **14**. The section **6—6** is taken to show the rear edge **14***b* of cork body **14***a*. The rear face **14***b* is vertical, or nearly so, and has a width substantially equal to the full thickness of insert **14***a*. This edge provides an abrupt and definite shoulder in pad **10**. The shoulder faces rearwardly and is so located as to lie immediately in front of the os calcis. The area on pad **10** where the os calcis normally bears is within the dotted outline **22**. As a result, the shoulder engages the foot anteriorly of the os calcis in a manner that prevents relative rearward movement of the pad or forward movement of the foot. This engagement anchors the entire pad in place against any tendency to "creep" or become displaced as a result of the horizontally directed forces applied to it during normal walking. The pad is always in the proper position beneath the foot where it can function effectively.

The insert **15***a* forming elevated area **15** tapers inwardly and rearwardly to a narrow edge. It slopes upwardly to a maximum height at its outer edge. Area **15** is relocated from the showing in my issued patents as it extends all the way back to the rear edge of pad **10** in the heel portion **11** and extends inwardly to near the area **22** of bearing of the os calcis.

The two areas **14** and **15** cooperate to anchor the heel of the user's foot in place relative to the pad, as the slope of area **15** directs the heel to a position behind the shoulder on raised area **14**.

Immediately behind the anterior portion **12** of the pad, I prefer to provide an elevated area **26** which is adapted to underlie the forward end of the second, third, fourth and fifth metatarsals, posteriorly of the metatarsal-phalangeal joints. The thickened portion **26** tapers gradually inwardly and rearwardly in thickness from the forward and lateral edges of pad **10**. The elevated portion is of maximum thickness at forward inside corner **26***b*. At the inner end **26***a*, and along the rear curved edge, this elevated portion is thinnest, preferably blending smoothly with the portion of the pad consisting only of layers **18**, **19**, and **20**. Elevated area **26** tapers from front to rear, being thicker along its forward edge as shown in Fig. 4. By being thicker at the front edge, this elevated area takes weight off the metatarsals and gives more use of the toes.

The pad is also provided with a relatively narrow, elongated elevated portion **28** which connects at its rear end to and is continuous with raised portion **15**. In practice, one continuous insert is used for both elevated areas and it is of generally triangular form in cross-section, as indicated in Figs. 2, 3 and 5 and as more particularly shown in Figs. 7 to 10, following the contour of the inner edge of the pad and hence of the shoe to which it is fitted, and having its apex **28***b* at substantially uniform altitude with respect to its base **28***c* throughout the major portion of its length but of gradually decreasing altitude as it merges with and forms the portion **15**. It will be noted, moreover, as hereinbefore stated, that where this altitude is decreased in the portion **15** there is a gradual shelving and widening of the inner side **15***b*, and of the base **15***c*, where such side is skived off to blend with the adjacent heel portions of the pad. Ridge portion **28** extends forwardly to terminate under the first metatarsal posteriorly of the first metatarsal-phalangeal joint. Thus there is formed a continuous raised portion in the pad extending along the lateral margin of the pad at the inner side of the foot. This raised portion serves to raise the inner side of the foot, thus tending to shift the body weight to the outer side of the foot where it should properly be, and it is effective, furthermore, to equalize the weight on the great toe joint. It also makes more effective the elevated portion **15** under the heel, and in cooperation with area **15** provides an elevated area for the full length of the foot posteriorly of the first metatarsal joint. The elevated portion **28** formed by the inserted body **28***a*, Fig. 3, slopes steeply downwardly and inwardly on its upper side or base **28***c* and is highest at the side of the arch of the foot where there are no cords, arteries, or nerves to be interfered with. Moreover, portion **28** assists in holding the foot upright in the shoe and in holding the ankle straight. This portion **28** slopes much more steeply than the element in a similar position in my earlier patents. The slope is purposely made so steep that this area does not act as an arch support and carry weight under the arch but, as hereinbefore stated, tends to hold the foot against the outer side of the shoe and presses sideways against the arch to oppose and correct the inward turning of the ankle found with many weak arches. Children are often handicapped by weak foot structures so that the ankle rolls in, breaking down the arch and causing flat feet. This pad structure is designed to restore the ankle to its proper position.

It is to be understood that the elevated portions as described above are considered to be typical of a weight-distributing pad construction according to the present invention. The extent and thickness of these elevated portions are not necessarily uniform in all pads but may be varied to fit different feet or changing conditions in a particular foot. Other locations of one or more elevated portions adapted for other specific weight-distributing effects may be added within the scope of my invention.

At the lateral edge of the pad structure, just rearwardly of the fifth metatarsal-phalangeal joint, there is an upwardly extending cushion member **30** which is adapted to bear against the muscle structure which covers the forward end of the fifth metatarsal. Cushion member **30** is tapered or feathered from the center outward to its edges to avoid discomfort to the user and may be made of two layers of leather to obtain the desired thickness. The connection of cushion **30** to the main structure of pad **10** is preferably flexible in nature so that the cushion may easily adopt a position conforming to the foot structure and thereby eliminate discomfort to the wearer.

At the inner edge of the pad structure adjacent elevated portion **28**, there is provided an upwardly extending cushion member **32** which is adapted to bear against the side of the foot at the upper portion of the metatarsal arch and under the ankle bone. This cushion member is thickest at its central portion where the arch is normally farthest away from the shoe and then tapers to a relatively thin feathered margin along the free edges not attached to pad **10**. The connection between cushion **32**

and pad **10** is flexible in nature so that the cushion may readily adapt itself to conform to the wearer's foot.

Cushion member **32** is made of one or two layers of leather to produce a maximum thickness of perhaps ⅛" which decreases toward the edges of the cushion. The cushion should be flexible but relatively non-compressible, otherwise it does not exert the required lateral force against the foot. Cushion member **32** is located entirely at one side of the foot below the ankle, in order to straighten up the ankle. It is designed to engage the side of the foot to position the ankle and in no way lifts or supports the under surface of the foot at the arch thereof.

When confined within the wearer's shoe, particularly if the shoe is tightly laced, cushion **32** presses against the inner side of the foot at a position below the ankle. For most satisfactory results the cushion is located posteriorly of the first metatarsal-phalangeal joint and anteriorly of the tarsus. Lateral pressure by the cushion prevents the foot from turning or rolling inwardly and thus takes weight off of the arch. As hereinbefore stated, contact of the foot upon a firm, steeply slanting surface of ridge **28** at the side of the arch causes the foot to shift outwardly because of the slope of the underside of the foot at the arch. Both cushion **32** and ridge **28** bear against the foot in a manner to cause this lateral movement; and these two elements of the pad structure cooperate to cause the foot to shift to a weight distributing position in which the weight is chiefly supported on the outside of the foot, principally on the portions of the foot which bear on elevations **14** and **26**. For this purpose the steeply sloping surface of ridge **28** engaged by the foot preferably makes an angle of about 35° or more with the horizontal. Weight is still carried on the ball of the foot, but less than without this shoe pad. Cushion **32** and elevations **14** and **26** are preferably made of a thickness determined by the individual user's foot in order to secure the best weight distribution. In general, the elevations **14** and **26** and cushion **32** are made as thick as possible since the thicker these three elements are made, the more weight is carried on elevations **14** and **26**.

A further function of side cushions **30** and **32** is to hold the pad structure in the proper position under the foot. These cushions engage the sides of the foot and the shoe and hold the pad against lateral displacement from its proper location beneath the foot. The rearward slope of elevation **26** cooperates with both the side cushions to hold the pad **10** in place under the foot.

Cushion **30** is an active part of the combination of elements. It bears against the lateral face of the foot behind the little toe. It serves to keep the foot from spreading but leaves the toe free to flex normally while walking. The ability of the toes to move freely and naturally, together with the distribution of the weight to those locations where the foot is structurally best able to support that weight, promotes better blood circulation and prevents stretching of the cords and ligaments in the foot. The result is a stronger foot in which the muscles are better developed and which is free from many common pains and discomforts.

To avoid a thick front edge on the pad, not all of layers **18**, **19**, and **20** extend forwardly for the full length of the pad. It is preferable to extend only the upper one for the full distance, as seen in Fig. 4, to provide a smooth upper surface to the pad. The lower layer **19** ends at the curved line **34** which is about ¼" or more rearwardly of the front edge **13** of top layer **18**. The intermediate layer **20** ends between the other two layers to form a smoothly tapered marginal portion. As mentioned before, the length of the pad is established by the length of the user's foot. The anterior portion **12** of the pad is smooth and free from elevated areas to permit this part of pad **10** to extend as close as possible

to the ball of the foot. By graduating the length of the layers of the pad, the thickness at the front end is gradually reduced without relying entirely upon tapering or skiving the individual layers though that may be done too. The thin forward end is very soft and flexible so that it does not irritate the foot of the user. Consequently it is possible to extend the pad farther forward or closer to the ball of the foot than heretofore possible with a thick pad.

It should be understood that modifications in the structure described above may occur to persons skilled in the art, but without departing from the spirit and scope of my invention. Accordingly, it is to be understood that the foregoing description is considered to be illustrative of, rather than limitative upon, the appended claims.

I claim:

1. In a removable pad structure for use in a shoe in contact with the user's foot, a pad body adapted to underlie the foot posteriorly of the metatarsal-phalangeal joints, a continuous elongated element of substantially triangular form in cross-section applied to the body at and extending along its inner edge to form in the body a raised portion underlying the lateral edge of the metatarsal arch of the user's foot, a forward portion of said continuous elongated element lying in that zone of the foot comprising the first phalangeal and the first metatarsal bones, the rear portion thereof extending into and including the zone of the os calcis, a first cushion member upstanding from said body at the inner lateral margin thereof substantially midway of the length of said elongated element and lying in the zone of the first matatarsal and cuneiform bones and flanking the joint between said bones, and thus being adapted to bear against the inner side of the foot in the zone of the metatarsal arch, said cushion member serving with said elongated element to urge the foot toward the outer side of the shoe, and a second upwardly extending cushion member arranged at the outer lateral margin of said pad body, said second cushion member being adapted to bear against the muscle structure adjacent to the forward portion of the fifth metatarsal.

2. A removable pad as claimed in claim 1 in which the cushion member is of relatively thin construction and may flex upon its connection at the edge of the body in order that it may be accommodated to fit between the abutting surfaces of the foot and shoe.

3. A removable pad structure as claimed in claim 1, in which the body is provided at its heel portion with a member providing upon the foot-contacting face of said body an elevated element underlying the cuboid region of the foot and having a rearwardly facing relatively abrupt shoulder for engagement by the os calcis to retain the pad against displacement.

4. A removable pad structure as claimed in claim 1, in which said continuous substantially triangular element is of approximately uniform altitude throughout its major portion which extends in proximity to the arch of the foot and is of gradually reduced altitude from said major portion to its rear end which lies adjacent to the heel of the foot.

5. A removable pad structure as claimed in claim 1, in which the said first named cushion member is located posteriorly of the first metatarsal-phalangeal joint and anteriorly of the tarsus.

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