Jan. 13, 1948. W. C. BURNS 2,434,258

BODY WEIGHT DISTRIBUTING SHOE PAD CONSTRUCTION

Filed April 16, 1946

Fig. 1.

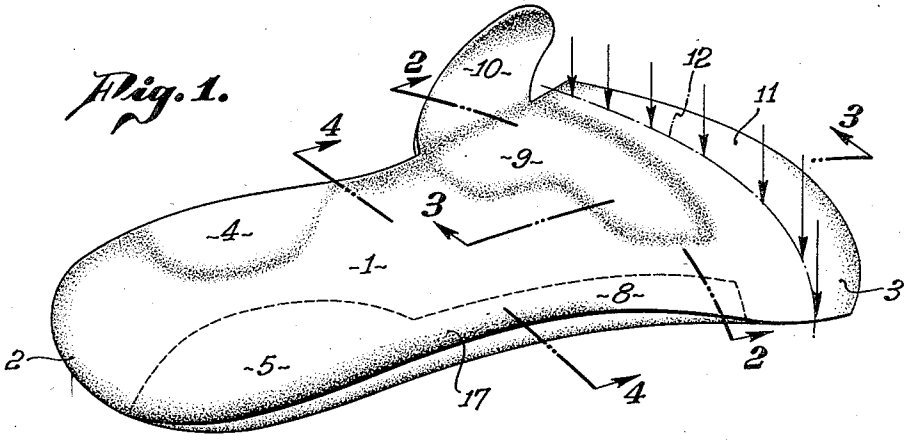


Fig. 2.

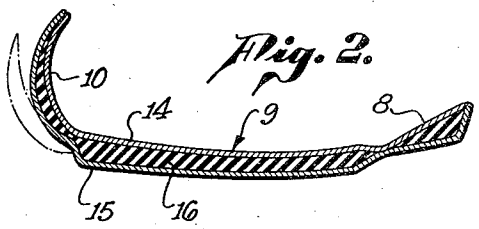


Fig. 3.

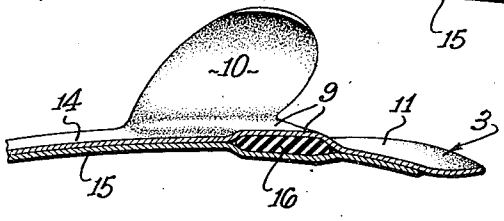


Fig. 5.

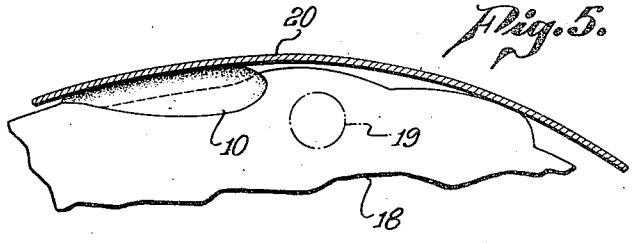
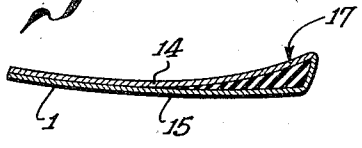


Fig. 4.



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BODY WEIGHT DISTRIBUTING SHOE PAD CONSTRUCTION

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3 Claims. (Cl. 36—71)

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This invention relates to a pad construction adapted for use in shoes to provide a weight-distributing element adapted to cause a desired distribution of the body weight to the portions of the foot structure which are best adapted to carry such weight without inducing a weakening of the muscular structure of the foot, and it is a particular object of this invention to provide a pad construction which is adapted to retain its position within the shoe and with respect to the foot of the wearer, and thereby provide a maximum utility and comfort over a long useful life period.

To the best of my knowledge, hitherto proposed forms of removable pads and so-called "arch supports" have for the most part a marked tendency to shift their position within the shoe as a result of the loads and foot movements imposed thereupon in use, rendering them unfit for the purpose for which they originally were intended, or at least resulting in a decrease in the comfort to the user. This undesirable shifting is found to take place at different rates with different structures, being usually more rapid or more marked when the structure is provided with "raises" or elevated pad sections adapted to underlie specific zones of the foot.

The human foot is so constructed that any weight imposed upon the arch portion of the foot, that is, the portion from immediately behind the articulated joints of the metatarsals and the phlanges (often termed the "ball" of the foot) rearwardly to just in front of the heel, will cause a shifting tendency between the foot and the supporting surface on which such weight is carried. If the surface is fixed, the foot tends to slip to the outside. If the surface is movable, the surface itself tends to shift to the inside of the foot. In a conventional shoe, with no weight-distributing pad structure, the result of this shifting tendency is to cause the foot to crowd to the outside of the shoe, placing lateral pressure upon the toes by engagement with the shoe upper. Where a removable weight-distributing pad or "arch support" structure is employed, the result of this shifting tendency is a crowding of the structure toward the inside of the foot, as well as a crowding of the foot toward the outside of the shoe, and the resulting pressure against the lateral sides of the toes stretches the shoe out of shape, hampers the use of the toes in the normal walking function, and causes misalinement to the toes with resulting pain and discomfort.

According to my invention, I provide a weight-distributing means, as a pad for a shoe construction, adapted to be worn subjacent the weight-bearing portions of the foot, wherein cooperating anchor elements are provided to substantially prevent dislocation or shifting of the weight-distributing means relative to the foot in use. This feature is attained through the agency of co-operating weight-bearing and position-locating portions. This invention may be considered as an improvement on the structures described and claimed in my earlier issued Patents Nos. 1,728,780, dated September 17, 1929; No. 2,081,474, dated May 25, 1937; and No. 2,287,341, dated June 23, 1942.

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The weight-distributing structure of this invention may comprise, essentially, a pad member adapted to underlie the sole of the foot, provided with one or more weight-distributing "raises" or elevations adapted to be located subjacent specific zones of the foot, together with a weight-bearing section substantially free of "raises" or elevations and located immediately subjacent the metatarsal-phalangeal articulations, and a lateral anchor pad so spaced with respect to such weight-bearing section as to extend upwardly from the pad member in position to bear laterally against the fifth metatarsal immediately rearwardly of the fifth metatarsal-phalangeal articulation, said lateral pad portion being of appreciable thickness in a lateral direction, whereby to absorb the normal lateral thrust of the foot by transmission of such thrust to the adjacent portion of the shoe upper, and maintain the user's toes substantially out of engagement with the shoe upper.

The above and other features of this invention will be brought out in the ensuing description of a preferred embodiment, or will be apparent from such description. The accompanying drawings illustrate such embodiment, and referring thereto:

Fig. 1 is a perspective view of a pad member according to the present invention, adapted for use under the left foot;

Fig. 2 is a sectional detail thereof as taken on line 2—2 in Fig. 1;

Fig. 3 is a sectional detail thereof as taken on line 3—3 of Fig. 1;

Fig. 4 is a sectional detail thereof as taken on line 4—4 in Fig. 1; and

Fig. 5 is a fragmentary plan view of the lateral edge of a left foot adjacent the fifth metatarsal-phalangeal zone, with the shoe-upper broken away, showing how a portion of the structure

of this invention cooperates with the foot and the adjacent portion of the show upper, in use.

Referring to the drawings, the pad structure is indicated generally at 1, comprising a posterior or heel portion 2 and an anterior portion 3. The length of the pad member will be so established with reference to the length of foot of the user that the anterior portion 3 lies subjacent the so-called "ball" of the foot, i. e., the muscular pad lying below the metatarsal-phalangeal articulations. The width of the pad member 1 is preferably made substantially that of the width of the foot.

In accordance with the teachings of my earlier issued Patent No. 2,287,341, above mentioned, I have shown the pad member 1 as provided with a plurality of protuberances or elevations formed by thickened portions of the pad structure, which are adapted to underlie certain designated zones of the foot and cooperate to secure a desired weight-distribution. The numeral 4 indicates an elevated member upon which the principal proportion of the body weight is intended to be concentrated, and this member is located along the lateral side of the foot at a position substantially below the cuboid and the forward portion of the os calcis, as taught in the above issued patent. Opposite the member 4 on the medial side of the foot, I may provide a complementary elevated member 5 which is of materially greater height than the member 4 and adapted to underlie the "cuboid" region. Similarly, at the forward or anterior portion of the pad I may provide additional elevated shoulder members 8 and 9 adapted to underlie selected areas of the metatarsals posteriorly of the metatarsal-phalangeal articulations.

The above-described elevated members, it will be comprehended, are given by way of illustration of a weight-distributing pad construction to which the instant invention has been applied, and other locations of one or more elevated shoulder members adapted for specific attainment of certain weight-distributing effects may be substituted therefor within the contemplation of this invention.

At the lateral edge of the pad structure, immediately posteriorly of the fifth metatarsal-phalangeal articulation, I provide an upwardly extending cushion member 10 adapted to bear laterally against the muscle structure which covers the forward end of the fifth metatarsal. The cushion member 10 is preferably skived off at its edges so that no abrupt shoulders will be present to cause discomfort to the user, and the attachment of the cushion 10 to the main structure of the pad 1 is preferably of a flexible nature so that the cushion 10 may readily adopt a position consonant with the foot structure, and thereby reduce possible discomfort to the wearer, as indicated by way of example of the dot-dash lines in Fig. 2. The anterior portion 3 of the pad member is made of rather extended area so as to provide a relatively large surface 11 upon which the ball of the foot may bear, the curved dot-dash line 12 in Fig. 1 indicating a preferred approximate line of pressure application resulting from the ball of the foot upon the surface 11.

The pad structure as a whole may be provided by upper and lower fabrics or leather sheet members 14 and 15, between which rubber or other pad members 16 may be inserted to establish the desired raises or elevations, and while I have shown both of the sheets 14 and 15 as extending forwardly a short distance, and only the sheet 14 extending the full distance, to form the surface 11, it will be appreciated that one or the other of these sheets may be omitted at this location, or both extended forwardly the full length, if desired, without detriment to the utility of the structure.

In Figs. 1 and 4 the pad structure is shown as provided with a raised portion 17 connecting the raises or shoulders 5 and 8, forming, in effect, a single shoulder member extending along the medial side of the foot. This raised portion 17, serves to equalize the weight on the great toe joint and eliminates the tendency for a weak foot to pronate. I have found that this connecting raise, which comes up high enough on the medial side of the arch of the foot to induce a leverage which will brace a weak arch and adjust the weight on the cuboid region and the portion of the shoulder or raise 9 just back of the fifth metatarsal articulation, actually makes the raises 5 and 8 more effective. The raise or shoulder portion 17 is caused to come up high on the medial side of the arch where there are no cords, arteries or nerves to be interfered with, and where there is a stable pad of muscles upon which pressure may be applied. The added tendency for the pad to shift beneath the foot, induced by the sloping raise 17 at the medial edge of the arch, is overcome by the cooperating members 10 and 11, as hereinafter described.

As brought out above, the application of pressure by the foot upon a supporting surface tends either to cause the foot to be moved laterally or the supporting surface to be crowded medially, and according to this invention, I provide the surface 11 against which the ball of the foot may bear in use, and also provide the cushion member 10 to bear against the lateral side of the foot at the fifth metatarsal. The provision of these two cooperating elements appears to be necessary to the proper maintenance of the pad structure within the shoe under the foot movements which take place in use, and I believe the function of these two members 10 and 11 to be as follows: as the weight of the foot is imposed upon the pad member, the foot will tend to roll upon the muscle structure at the bottom of the foot in a direction toward the lateral edge, even though the foot does not slide laterally on the surface of the pad, such as upon the surface 11. When the weight is taken off the foot, as in walking, the foot will tend to pull vertically away from the pad surface in the normal case, allowing a slight sliding movement of the muscle tissues toward the lateral side of the foot as the pressure is released, so that upon the next succeeding step the muscle portion of the foot will be brought down upon the pad structure at a position slightly removed laterally from the position experienced when the pressure was first applied in the preceding step. The cushion 10, bearing as it does upon the lateral margin of the foot, as a result of medially directed pressure imposed by the adjacent portion of the shoe upper, will counteract this tendency for the foot to roll laterally as pressure is released, and, in effect, causes the foot to be placed down upon the pad structure in the same position as each succeeding step.

In Fig. 5 I have illustrated, fragmentarily, a lateral edge of a foot, with the little or fifth toe curved medially as is normally encountered when the foot is located within a shoe, the fragmentary illustration of the foot itself being indicated at 18. I have represented the approximate location

of the fifth metatarsal-phalangeal articulation by the dot-dash circle 19, and have represented the adjacent portion of the shoe upper at 20. From this figure it would be seen that the cushion member 10 bears against the shoe upper, maintaining the forwardly adjacent portion of the foot out of substantial contact with the shoe upper. The cushion 10, being attached to the pad structure 1, is relatively fixed within the shoe, but by virtue of its flexible attachment to the pad, does not act as a rigid horn or protuberance which of itself prevents lateral dislocation of the foot with respect to the pad 1. In fact, if the shoe is not present, medial pressure on the pad structure with respect to the foot will allow the pad to some extent to slide under the foot, curving the cushion 10 outwardly as through the dot-dash position of Fig. 2. When the construction is in the shoe and in use, this outward movement is opposed only by the adjacent shoe upper portion, yet there is no tendency for the pad structure to move medially under the foot.

The above description of a preferred form of my invention is considered to be illustrative, and I do not choose to be limited to the precise details of shape and construction herein described, but rather to the scope of the subjoined claims.

I claim:

1. In a removable pad structure provided with elevated portions adapted to underlie specific zones of a wearer's foot when used in a shoe, to establish a desired body-weight distribution, such elevated portions including portions adapted to lie subjacent the metatarsals posteriorly of the metatarsal-phalangeal articulations, the construction which comprises: means defining a thin weight-bearing portion of substantially uniform thickness extending transversely of said structure anteriorly of said elevated portions which are adapted to lie subjacent the metatarsals and thereby adapted to underlie the metatarsal-phalangeal articulations of the foot, and means defining an upwardly extending cushion member at the lateral margin of such a pad structure adapted to bear against the lateral margin of the foot posteriorly of the fifth metatarsal-phalangeal articulation, said cushion member being flexibly attached to said removable pad structure.

2. In a removable pad structure provided with elevated portions adapted to underlie specific zones of a wearer's foot when used in a shoe, to establish a desired body-weight distribution, such elevated portions including one portion

adapted to underlie the cuboid region of the foot and another portion adapted to underlie the first metatarsal posteriorly of the first metatarsal-phalangeal articulation, the construction which comprises: means defining an elevated portion to underlie the medial edge of the arch of the wearer's foot; means defining a thin weight-bearing portion of substantially uniform thickness establishing an anterior weight-bearing portion and adapted to underlie the metatarsal-phalangeal articulations of the foot, and means defining an upwardly extending cushion member at the lateral margin of such a pad structure adapted to bear against the lateral margin of the foot posteriorly of the fifth metatarsal-phalangeal articulation, said cushion member being flexibly attached to said removable pad structure.

3. In a removable pad structure provided with elevated portions adapted to underlie specific zones of a wearer's foot when used in a shoe, to establish a desired body-weight distribution, such elevated portions including portions adapted to lie subjacent the metatarsals posteriorly of the metatarsal-phalangeal articulations, the construction which comprises: means defining a thin weight-bearing portion of substantially uniform thickness extending transversely of said structure anteriorly of said elevated portions which are adapted to lie subjacent the metatarsals and thereby adapted to underlie the metatarsal-phlangeal articulations of the foot, and means defining an upwardly and forwardly extending cushion member at the lateral margin of such a pad structure adapted to bear against the lateral margin of the foot posteriorly of the fifth metatarsal-phalangeal articulation, said cushion member being flexibly attached to said removable pad structure.

WILLIAM C. BURNS.

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