Nov. 14, 1961 A. H. WELCH 3,008,469

MOLDED OUTSOLE FOR FOOTWEAR

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Fig. 1.

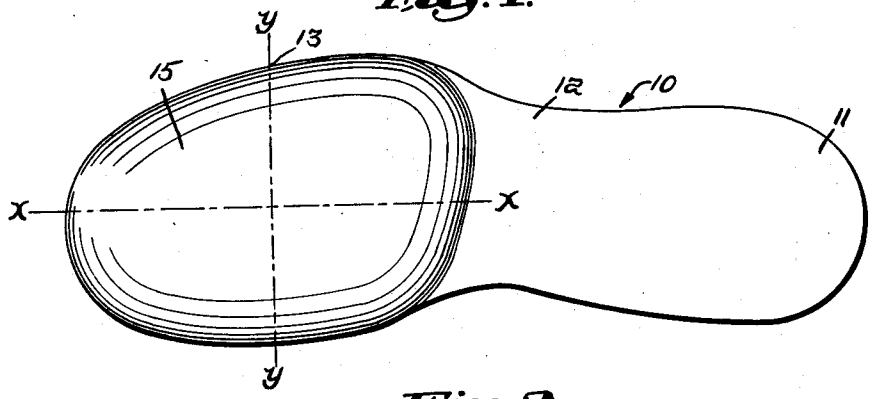


Fig. 2.

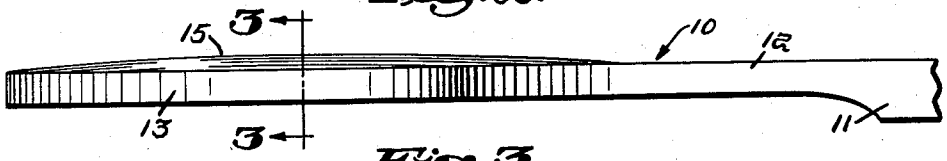


Fig. 3.



Fig. 4.



Fig. 5.

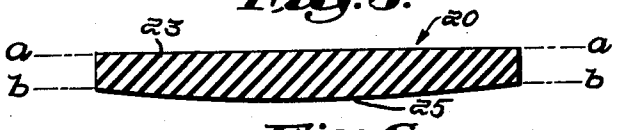


Fig. 6.

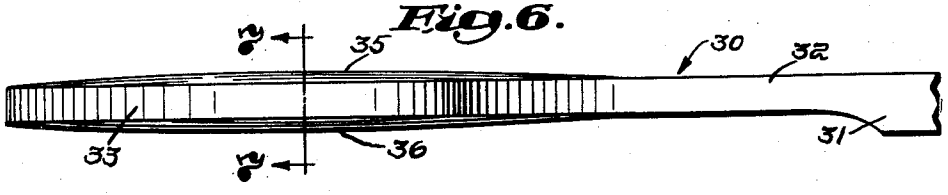
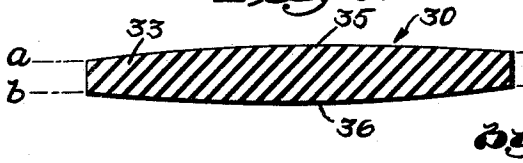


Fig. 7.



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Fig. 8.

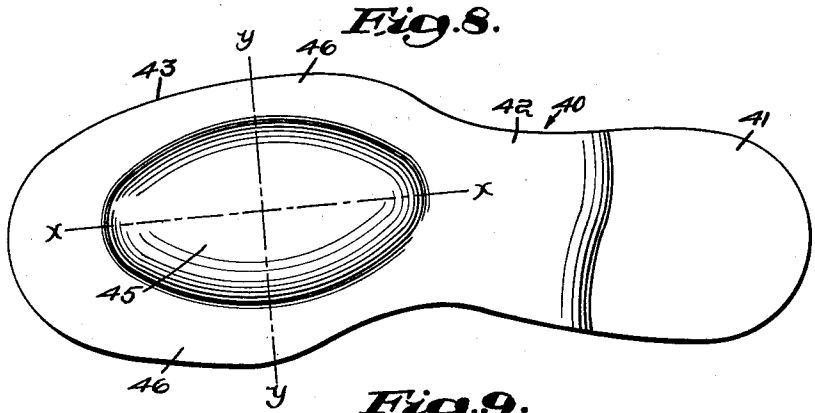


Fig. 9.

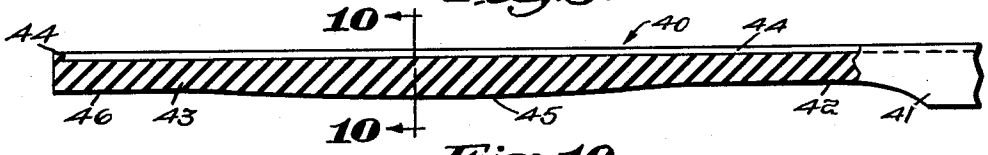


Fig. 10.

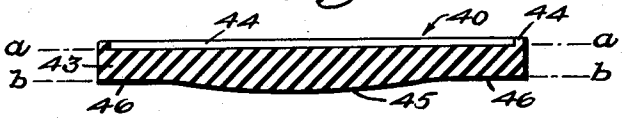


Fig. 11.

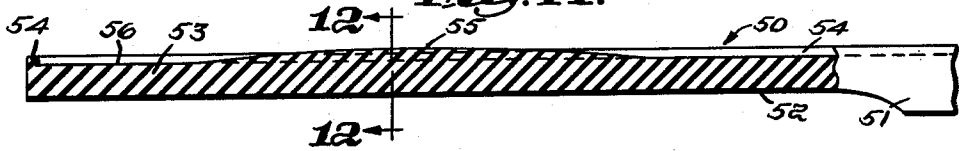


Fig. 12.

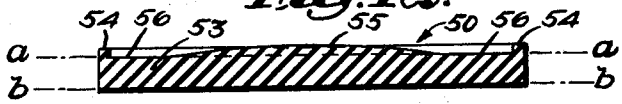


Fig. 13.

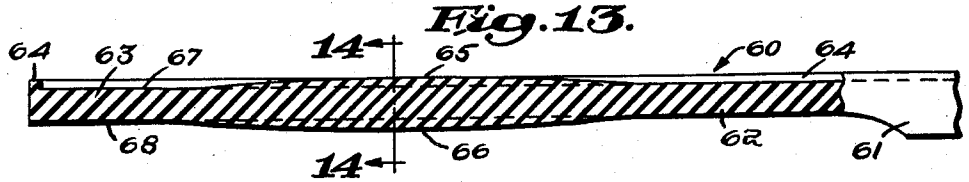
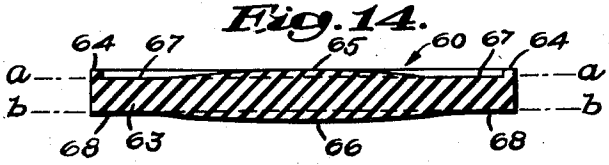


Fig. 14.



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United States Patent Office 3,008,469 Patented Nov. 14, 1961

3,008,469

MOLDED OUTSOLE FOR FOOTWEAR

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9 Claims. (Cl. 128—595)

This invention relates to the construction and design of footwear outsoles, particularly molded soles of rubber and rubberous compositions including the various known or preferred synthetic substances and mixtures. It aims to provide for such soles novel structure integrally formed at the fore portion and particularly at the region underlying the metatarsal arch and the ball of the wearer's foot whereby appropriate support is afforded in use and the usual depressive or downward dishing effect upon the sole in the course of wear is reduced or avoided by compensating provision built in to the molded sole structure.

Thus a major object of the invention is to provide a molded outsole novelly constructed and arranged to lend support at the region of the wearer's metatarsal arch, the transverse zone at the base of and rearwardly of the toes, and conjointly and in large part by the same means to provide for compensating against and retarding the dishing or depressed hollowing of the central fore portion of the sole that ordinarily results in the course of wear.

In the accompanying drawings illustrating certain embodiments of the invention:

FIG. 1 is a top plan view of one form of the molded sole;

FIG. 2 is a side elevation of the same;

FIG. 3 is a transverse section as on the line **3—3** of FIG. 2;

FIGS. 4 and 5 show another sole embodiment, FIG. 4 being a side elevation and FIG. 5 a transverse section as on the line **5—5** of FIG. 4;

FIGS. 6 and 7 illustrate a further sole embodiment representing in effect a combination of those of the preceding views, FIG. 6 again being a side elevation and FIG. 7 a cross-section as on the line **7—7** of FIG. 6; and

FIGS. 8 to 14 show another group of embodiments of the invention, wherein:

FIG. 8 is a bottom plan view,

FIG. 9 is a view in part in side elevation and in main part in longitudinal section, and

FIG. 10 is a transverse section as on the line **10—10** of FIG. 9, of one modified construction;

FIG. 11 is a similar view as in FIG. 9, and

FIG. 12 is a sectional view as on line **12—12** of FIG. 11 of another modification; and

FIG. 13 shows similarly as in FIGS. 9 and 11 a further modification, with

FIG. 14 being a transverse section on the line **14—14** of FIG. 13.

Considering first FIGS. 1 to 3, the molded sole **10** thereof comprises a heel **11**, an intermediate shank **12** and a fore portion **13**. As to width, length and peripheral contour these may be as customary or preferred in conventional practice for a sole of the given size. In accordance with the invention such fore portion **13** of the sole is initially and integrally molded to present over a substantial area of a horizontal face thereof a mounded or mound-like vertically directed protuberance or convexity such as designated generally at **15**.

Such convex element **15** in the example of FIGS. 1 to 3 is wholly upon the top face of the sole **10**. It is so constructed and arranged that the major central region of both the *x*-axis and the *y*-axis of the sole fore portion **13** is predeterminately thickened by a protuberant

mass of material homogeneous with that of which the particular sole is molded. This convexity **15** is in general symmetrical with respect to both said axes but as shown in FIG. 1 may deivate from full geometrical symmetry toward the margin of the sole **10**, so as to slope gradually in all directions to or substantially to the sole periphery. It is of maximum height, depth or thickness at the central area containing the intersection of the *x*- and *y*-axes, shown by light broken lines *x—x* and *y—y* on FIGS. 1 and 8, and from the central plateau decreases progressively in height in all directions radial of the axis intersection. Thus it merges into the sole body at or adjacent the marginal zone thereof, extending to or approximately to the sole periphery in the example of FIGS. 1 to 3, and also in FIGS. 4 to 7.

It will be understood that the body proper of the sole may for any given sole be of the customary or selected thickness or weight as commonly expressed in irons. For the purposes of the invention disclosure, such sole body proper is defined by and between the generally horizontal top and bottom planes *a—a* and *b—b*, see FIG. 3, respectively extending between and containing the top edges and the bottom edges of the generally vertical side faces of the fore portion **13** of the sole body.

The described shallow mounded and gradually tapering convexity **15** is so located and conformed as to afford support for the wearer's foot at and adjacent the metatarsal arch, the transverse arch which extends across the foot just behind the base or inner joints of the toes. Ordinarily the outsole of a new shoe or other item of footwear is flat. Looking down upon the right foot in a new shoe the metatarsal or transverse arch referred to is at the line from left to right across the ball of the foot and ending slightly behind the little toe. In the case of such new shoe it will usually be found that the bottom or tread face of the sole and the top face of the outsole, and of the insole thereon, are planar, horizontal and parallel to each other. The planes here referred to correspond to those as identified by the dotted lines *a—a* and *b—b* of FIG. 3 above mentioned. In the course of wearing of the sole the bottom thereof at least at the major central area remains substantially flat and horizontal while the top or inner surface such as defined by the top plane *a—a* becomes concave. This allows the transverse arch of the wearer's foot to sag. Nature frequently attempts to compensate for this by the formation of calluses.

Under the invention the initial provision of the described protuberance or convexity such as **15** assists the transverse arch of the wearer's foot to remain arched.

Such calculated additional thickness **15** in effect affords predetermined compensation for the otherwise expectable depression or dish-like hollow at the stated central region of the fore portion of the sole, such as otherwise usually results from the conjoint effects of compression of the sole under the weight of the wearer's foot and the wearing out of the sole through use. In other words, by means of the present invention, the usual "wear through" center of the fore portion of the sole is kept approximately parallel to the ground line and any thinning of the sole in the course of wear is distributed substantially evenly over the entire underface of the fore portion of the sole.

The initial height or thickness of the convexity **15** is proportioned to that of the body of the sole, the mass between the horizontal planes *a—a* and *b—b*. Generally it will not substantially exceed the body thickness and may be less than the latter. Thus for example if the height of the protuberance **15** is made equal to that of the sole body **13** and if it be assumed that wear at the central area will occur at twice the rate as at the marginal portions, then at a time when an ordinary sole would have become internally dished and thinned to an objectionably

worn or "worn out" status, the top or platform surface of the sole of the invention would still remain at or not appreciably below the initial top horizontal plane of the sole body corresponding to the line *a—a* of FIG. 3.

In the illustrative examples the convexity **15** of FIGS. 1 to 3, **25** of FIGS. 4 and 5, and **35** of FIGS. 6 and 7, tapers from the central plateaus thereof to or substantially to the periphery of the sole. Thus the disappearing line of merger of the convexity into the body of the sole in general is parallel to or coincides with the sole periphery.

In the modified sole **20** of FIGS. 4 and 5, having heel, shank and fore portions **21**, **22** and **23** respectively, the mounded convex protuberance **25** is downward and is wholly below the bottom horizontal plane *b—b* of the body of the sole fore portion **23**. The overall mass of this protuberance again corresponds substantially to the volume of the depression or convexity as would normally be formed at the top face of a like-sized ordinary sole in the course of wear.

In the further modified example of FIGS. 6 and 7, comprising the sole **30** with heel, shank and fore portions **31**, **32**, **33**, similar convexities **35** and **36** are integrally molded both at the top and at the bottom of the sole **30**. Here the thickness of each such convex formation **35** and **36**, one above the top horizontal plane *a—a* and the other below the bottom horizontal plane *b—b* is not substantially more than about half that of the convexities **15** and **25** of the previous figures. Thus the two together present approximately an equal overall thickening of the central area of the sole as in said earlier examples. The mass of these two together again approximates the concavity volume otherwise expectable in use of a corresponding ordinary sole.

In the other examples of FIGS. 8 to 14 the soles **40**, **50** and **60** are shown as formed each with a substantially continuous upstanding rim **44**, **54** and **64** respectively about the sole periphery, in known manner. The narrow top face of such rim may be formed with mock stitch or other decoration. These FIGS. 8 to 14 embodiments of the invention further differ from those of FIGS. 1 to 7 mainly in that the convex mounds or protuberances **45** of the sole **40** of FIGS. 8 to 10, **55** of the sole **50** of FIGS. 11 and 12, and **65**, **66** of FIGS. 13 and 14, are restricted laterally to considerably less than the entirety of the fore portions **43**, **53** and **63** of the respective soles. Likewise they are more nearly geometrically symmetrical with respect to the *x*- and *y*-axes of the sole fore portions. Similarly as in the earlier examples the respective protuberances **45**, **55** and **65**, **66** are of maximum thickness at the central plateaus thereof in the region of intersection of said axes, and taper gradually in all directions radial of such intersection. They merge into the carrying surfaces of the sole fore-portion body at some distance laterally inward of the sole peripheries, so as to provide flat marginal zones **46**, **56** and **67**, **68** respectively surrounding the convexities **45**, **55** and **65**, **66** of the soles **40**, **50** and **60** of FIGS. 8 to 10, FIGS. 11 to 12 and FIGS. 13 to 14. Thus as viewed in plan said protuberances or convexities are elongate lengthwise the soles and are approximately elliptical in horizontal contour.

From the foregoing description in connection with the drawings it is apparent that in the several embodiments the convex sole-thickening protuberances have the capacity of affording support and comfort to the wearer's foot at the region of the metatarsal arch and of predeterminedly compensating for the concave dishing or depressive hollowing at the fore portion of the sole and also that of compensating for wear and keeping the wearer's foot at least at or above the level of the top or medial horizontal plane of the sole body at the fore portion thereof.

In the examples of FIGS. 1 to 7 the transverse arch support function and that of wear compensation are of substantially equal significance. In those of FIGS. 8 to 14 the transverse arch support function is somewhat

dominant over that of wear compensation, but both capacities are again present in the illustrated construction and arrangement of the convexities of less-than-total horizontal extent over the sole fore portions.

Also, in the examples of FIGS. 1 to 3 and of FIGS. 11 and 12, wherein the convex thickenings **15** and **55** are wholly above the top horizontal surface *a—a* of the sole bodies, the arch supporting function and capacity is somewhat more prominent than that of the predeterminate wear compensation, although again both aspects are present. Similarly, the "all-below" modified constructions of FIGS. 4 to 5 and FIGS. 8 to 10 more prominently afford the feature of wear compensation than that of transverse arch support but still possess both capacities conjointly.

The dual protuberant forms of FIGS. 6 to 7 and of FIGS. 13 to 14 respectively, having the mounding protuberances **35**, **36** and **65**, **66** at both the top and the bottom of the sole fore portion bodies likewise afford the dual capacities of wear compensation and of transverse arch support in a cooperative relation by which each function is served in an intermediary fashion suitable for many average requirements in use.

In the accompanying drawings no attempt has been made to represent the lower outer or tread surface of the soles of the invention as other than smooth or with whatever texture is resultant from the customary molding of the given rubberous or other composition for the particular sole. It is to be understood however that any known or preferred patterning or design for such tread surface may be employed, such as ribs, interrupted or otherwise, grid-like lineations, cleats, hobs or other superficial formations, so long as the overall contour defined by the lower terminal parts and underfaces of such formations conform to the general centralized convex protuberant structure and arrangement of the here disclosed invention and affords the functions and accomplishes the result thereof as herein illustrated or described.

In connection with any of the embodiments of the invention as herein illustrated or described it is to be understood that the central plateau of the mound or protuberance may present a considerable or major area which is externally flat or substantially so. In such case the sloping of the mound into the sole body is disposed at the circumferential marginal portion around such flat or flattened central plateau, consistent with the stated purposes of the invention. Also while in general the mound is molded of the same material as the sole body and is formed simultaneously with it, in some cases the mound may be of other compatible composition or may be unitarily joined with the body otherwise than in one molding operation.

My invention is not limited to the particular embodiments thereof illustrated and described herein, and I set forth its scope in my following claims:

I claim:

1. An outsole for footwear comprising an integral one-piece moldable-material sole body having a fore portion extending rearwardly into shank and heel portions, the fore portion comprising a main body layer of desired lateral conformation for sole purpose with vertical side faces at the sole periphery, said body layer defined between horizontal top and bottom planes respectively extending between and containing the top edges and the bottom edges of the said vertical side faces of said fore portion of the sole body, and said fore portion further comprising a supporting and dish-counteracting mounded integral protuberance external to at least one of said horizontal planes and of small vertical dimension not exceeding the distance between said planes, said protuberance extending over and defining the external surface for a major area of the entirety of that face of the fore portion sole body at which it is located, and said protuberance being of maximum vertical dimension over the

central area of said fore portion such as to afford full dish compensation therefor and decreasing progressively in vertical dimension in all radial directions toward the sole periphery to the level of that body face at which it is located.

2. An outsole according to claim 1 wherein the protuberance is wholly at and above said top horizontal plane of the sole body fore portion.

3. An outsole according to claim 1 wherein the protuberance is wholly at and below said bottom horizontal plane of the sole body fore portion.

4. An outsole according to claim 1 wherein like but oppositely projecting protuberances are formed at both horizontal planes, above and below them respectively, said protuberances together being of that height as predetermined for dish compensation.

5. An outsole composed of moldable material having a fore portion comprising an imperforate body of selected thickness as desired for the given size and weight of sole and defined between horizontal top and bottom planes, said fore portion having at least at one horizontal face thereof a convex protuberant formation integral and of homogeneous composition with said imperforate body extending over the major central area of said fore portion and being of maximum height at a central plateau region about the intersection of the x- and y-axes of said fore portion and not substantially exceeding the thickness of the sole body and sloping at least at the marginal portions from said plateau region into the sole body in all directions radial of said axial intersection.

6. An outsole according to claim 5 in which the convex formation is wholly above the top horizontal plane of the sole body.

7. An outsole according to claim 5 in which the convex formation is wholly below the bottom horizontal plane of the sole body.

8. An outsole according to claim 5 in which the convex formation is dual and opposite and is partly above the top horizontal plane and partly below the bottom horizontal plane of the sole body.

9. An outsole according to claim 5 in which the outsole is formed with an upstanding rim substantially continuous about the sole periphery.

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