

Aug. 30, 1955

R. P. SCHWARTZ ET AL
SHOE AND SHOE LAST

2,716,294

Filed Feb. 12, 1953

4 Sheets-Sheet 1

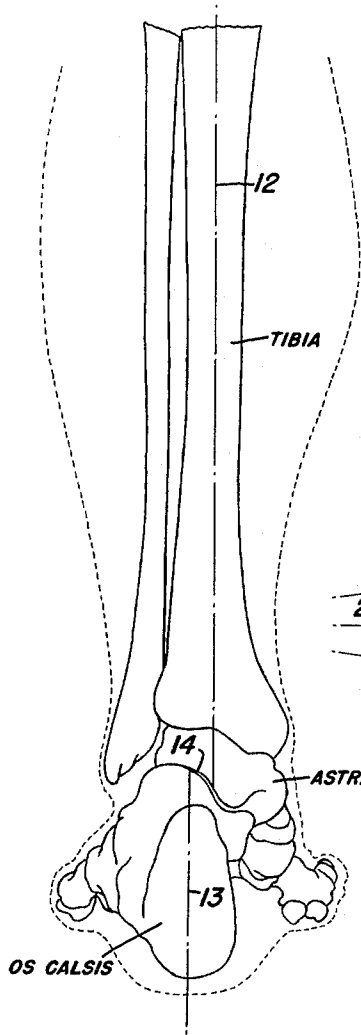


FIG. 1.

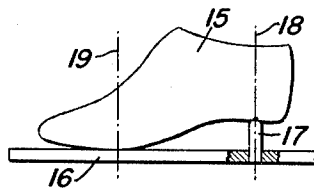


FIG. 2.

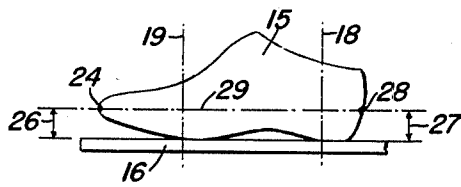


FIG. 2a.

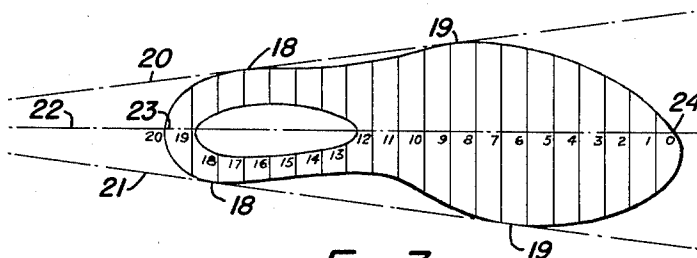


FIG. 3.

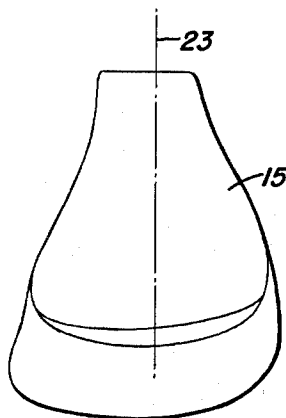


FIG. 4.

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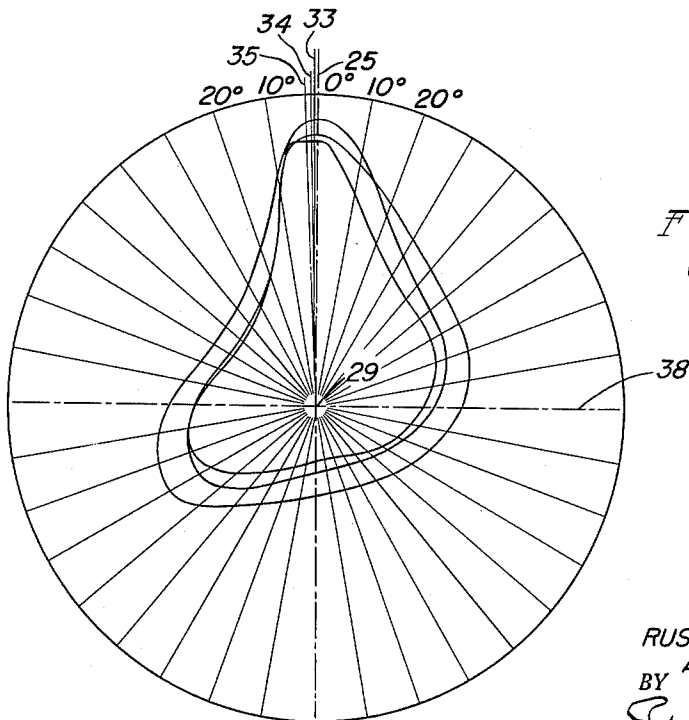
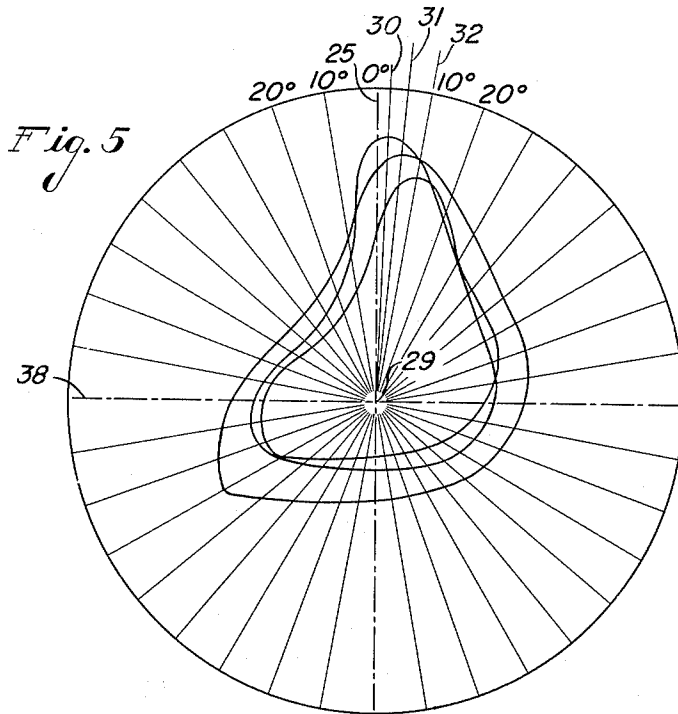
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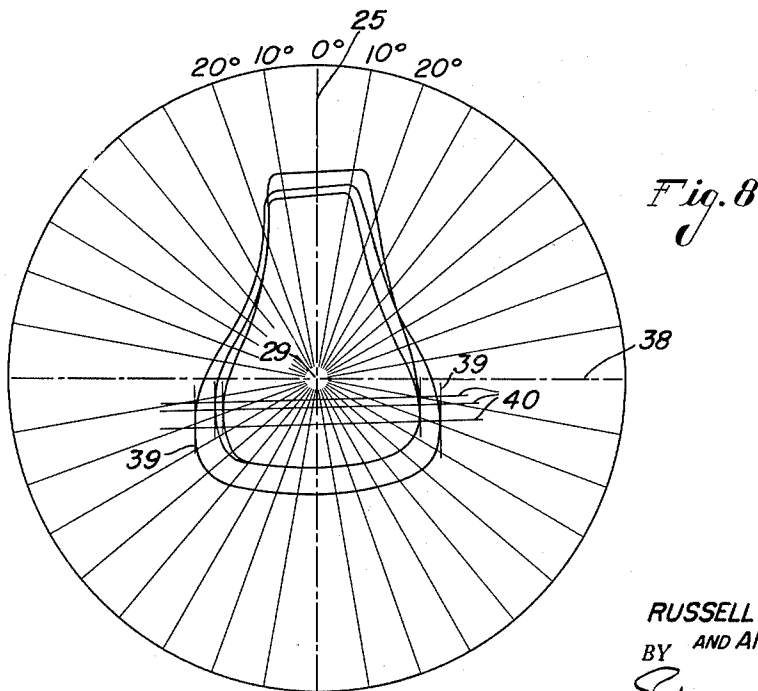
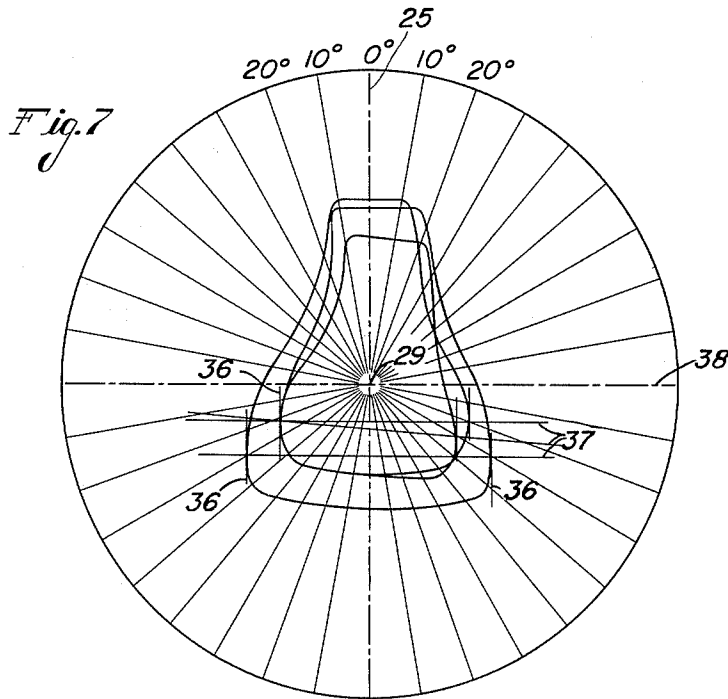
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4 Sheets-Sheet 3



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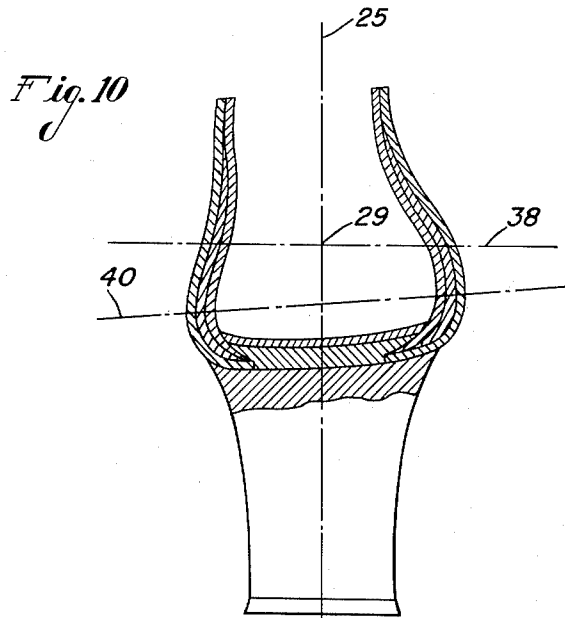
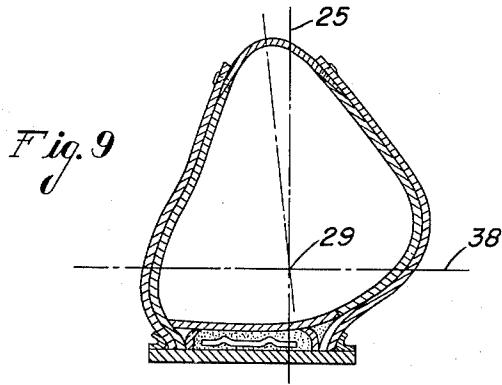
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SHOE AND SHOE LAST

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4 Sheets-Sheet 4



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2,716,294

SHOE AND SHOE LAST

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Application February 12, 1953, Serial No. 336,484

6 Claims. (Cl. 36—8.5)

This invention relates to shoes and shoe lasts, one object being the provision of an improved shoe construction adapted to meet, in a simple, practicable and effective way, the requirements disclosed by accurate and thorough study of the structure and functions of the bones, joints, ligaments, tendons and muscles of the leg and foot, both in the stationary support and the propulsion in motion of the weight of the body.

Another object, more specifically stated, is to provide a shoe construction affording improved compensation for the normal and natural malalignment in the axial relationship of the bones of the leg and foot and to thereby produce and maintain a condition of equilibrium in the weight-bearing functions of the foot, to maintain a strong posture and prevent pronation or lowering of the medial longitudinal arch with the ills attendant thereto, as well as to preserve the natural propelling functions of the foot and proper propulsion of the forefoot, so as to reduce fatigue and promote more natural and easy functioning in stance and gait.

Another object is to increase the effectiveness of the characteristics of a shoe last and shoe constructed as described in the patent to Schwartz No. 2,160,991, by improving the relationship of the upper of a shoe of such construction to the functions of the foot in stance and locomotion.

A further object of the invention is to provide an improved relationship between the cone of the last and the foot in all aspects of its functions, that will minimize objectionable pressures over the lacing area of the forefoot and minimize the tendency to chronic inflammation and the formation of calluses, corns and exostoses in this region of the foot.

Still a further object is to assure maintenance of precise alinement of the foot on the weight-bearing contours described in said patent by improving the relationship thereto of the contours of the upper at both the shank and heel portions of the shoe made over such a last as regards the functional requirements of the foot.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a schematic, rear elevation of portions of the bones of the left leg and foot to illustrate generally their natural malalignment in weight-bearing function;

Fig. 2 is a side elevation of a preliminary or prior art last shown with the bottom of its forefoot portion resting on a horizontal surface and the bottom of its heel portion elevated to the height specified for said last;

Fig. 2-a is a similar view but showing the bottoms of the forefoot and heel portions resting on said surface in another position occupied in producing the construction of the present invention;

Fig. 3 is an enlarged top plan view of a last for a shoe for the left foot, supported as in Fig. 2 in constructing a last embodying the present method;

Fig. 4 is a rear elevation of a last for a shoe for the

2

left foot, embodying the invention and with its heel elevated to the height specified therefor.

Fig. 5 is a polar chart showing typical contours of the shank or instep portion of three prior art lasts;

Fig. 6 is a similar view showing similar contours of three lasts made in accordance with the present invention;

Fig. 7 is a similar view but showing typical heel contours of prior art lasts;

Fig. 8 is a similar view but showing typical heel contours of lasts embodying the present invention;

Fig. 9 is a transverse sectional elevation of the instep or arch portion of a shoe for the left foot as seen from the rear and embodying the present invention, and

Fig. 10 is a similar view of the heel portion of a shoe for the left foot as viewed from the rear and embodying the present invention.

Improvement of the foot-to-shoe relationship naturally begins with consideration for the structural and functional alinement of the foot in regard to both stationary support and forward propulsion of the weight of the body. Such studies have indicated that there is, in the relationship of the os calcis to the tibia, and to some extent in the shape of these bone structures, a normal malalignment of the weight-bearing axes and shapes which, with other pertinent functional and structural characteristics of the foot, make the foot an unstable weight-bearing structure in relation to the leg in stance and gait. This is illustrated, for example, in Fig. 1, representing a fragmentary, rear elevation of the bones of the left foot. It will be seen from this view that the weight-bearing axis 12 of the tibia is offset substantially inwardly from the weight-bearing axis 13 of the os calcis as at 14. Furthermore, while this axis of the os calcis passes substantially through its lowest point, the lower surface of this bone is inclined upwardly and inwardly at an angle, varying with different individuals between substantial minimum and the maximum limits. The tendency of this malalignment of the bone structures of the leg and foot is to roll the os calcis inwardly so as to bring the weight-bearing point of its lower surface more nearly in line with the weight-bearing axis of the tibia, producing in the foot the inward turning or pronation commonly termed "flat foot." Such pronation brings in its train the flattening of the longitudinal and other arches of the foot, the stretching of the ligaments and tendons, and maladjustment of the many related elements and their functions, with the resulting fatigue, and failure to function in the normal manner indicated above, or even serious injury to the elements themselves. It is a necessary function of the ligaments, tendons and muscles of the leg and foot to compensate for such normal malalignment of the bone structures by resisting the tendency to pronation and by maintaining the bone structures and associated elements in a normal, strong posture and relationship, and a proper shoe construction must be one in the design of which due consideration is given to these factors for the purpose of promoting these desired functions.

The lowering of the medial longitudinal arch may be prevented, in part, by retaining the os calcis and heel of the foot in a position which prevents or corrects such pronation. If the heel, from the time of its first contact with the ground, is positioned to compensate for the normal malalignment of the processes of the foot and leg of which it is structurally and functionally a part, pronation and its resulting defects are resisted. This is confirmed by the familiar fact that the rear edge of the bottom surface of the heel is usually worn away toward the outer side in most shoes, thus indicating the normal tendency of the foot to assume, in its initial contact with the ground, the outward inclination accomplished by shoes constructed in accordance with this invention.

This control of the os calcis and heel of the foot is partially accomplished by inclining the heel seat of the shoe outwardly, with a corresponding outward inclination of the midfoot portion or shank of the shoe, these being the primary weight-bearing portions of the shoe. But the forefoot portion of the shoe should be substantially horizontal and level and the forward end of the midfoot or shank portion should be gradually merged into such forefoot portion in order that the weight may be transmitted medially across the forefoot portion to its inner side in the region of the great toe for the final propelling action of the foot, as described in said Patent No. 2,160,991.

The subsequent construction and testing of lasts and shoes embodying the features of said Patent No. 2,160,991, however, have revealed that particular relationships must prevail between those parts of the last which determine the shape and alinement of the upper portions of shoes and the characteristics of the sole construction disclosed in said patent, if full advantage is to be gained from such sole construction. These relationships involve the shape and position of the cone portion of the last and the corresponding portions of the shoe, as well as the formation of the opposite sides of its heel portion, as hereafter described.

Referring first to our improved last, Fig. 2 illustrates a prior art last 15 such, for example, as disclosed in said Patent No. 2,160,991, or any preliminary last finished to approximate last shape, as shown, so as to be adapted for final conformation and completion in accordance with the present invention, such last being positioned with the bottom of its forefoot portion resting upon a horizontal plane surface 16 and its heel portion elevated, as by means of a pin 17 to the heel height specified for said last, for which purpose pin 17 is preferably formed with a somewhat pointed or rounded upper end to provide point support for the heel portion. Pin 17 may be supported for vertical adjustment in any suitable manner as by a frictional fit in an opening in the surface or board 16. The last is thus supported in a position to correspond with the shoe to be made over it.

With the last positioned as shown in Fig. 2, vertical lines, as 18 and 19, are drawn tangent to the sides of the heel and forefoot portions at their widest parts, so as to project said widest parts vertically on surface 16. These pairs of projected points on opposite sides of the shoe are connected by straight lines, as 20 and 21 (Fig. 3), which are extended to an intersection with each other (not shown), in rear of the heel. The angle included by these lines is then bisected as by a line 22 drawn on said surface 16. A vertical plane containing this bisector has its intersection traced up the back of the last, as at 23, and over its toe portion adjacent the break between the sole and upper, as at 24, this plane being represented at 25 in the polar charts shown in Figs. 5-8, inclusive, and in Figs. 9 and 10, as hereafter described.

The last is then supported with the bottoms of its heel and forefoot portions resting on surface 16, as shown in Fig. 2-a. In this position, the toe spring or vertical distance 26 from the point 24 to the surface 16 is measured and an equal distance 27 is measured up the back of the heel along the line of intersection therewith of the said vertical plane 25, to locate a point 28 forming one of the holding centers for the last, for turning the same in a contour tracing machine as hereafter described. The other holding center is the point 24, corresponding in elevation to the intersection of the sole and upper or toe surfaces, or the projections of such surfaces in the case of a substantially rounded intersection. These points at the toe and heel portions provide centers for supporting the lasts between the spaced, aligned spindles of a machine for tracing the contours of the last on polar charts, as described in Schwartz Patent No. 2,111,815, Machine for Copying Contours. The points 24 and 28 serve to locate a longitudinal central axis 29 for the lasts which is preferably marked off with a convenient number, as 20, of equally

spaced points for locating transverse plane or contour intersections, numbered consecutively from toe to heel, for obtaining accurate measurement and analysis of all surface portions of the lasts at said contours. Such contours are preferably represented graphically by polar charts obtained by a contour tracing machine as disclosed in said Patent No. 2,111,815, and shown in Figs. 5-8, inclusive. Such contour points may be marked on a scale forming part of said machine, or may be actually traced on the surface of the last.

The contour numbered 6 from the toe of the last may be taken for convenience as representative of the forefoot portion of the last, contour 12 of the instep or shank portion contour 18 as the heel portion thereof. Figs. 5 and 6 thus shown shank contours 12 of prior art lasts and also lasts embodying the present invention, respectively, while Figs. 7 and 8 show heel portion contours 18 of prior art lasts and lasts embodying the present invention, respectively, these showing in each case a last for a shoe for the left foot in rear elevation. However, the characteristics described in relation to contour 12 also prevail essentially from contour 10 through contour 19, inclusive, and the characteristics described in relation to contour 18 are likewise found to prevail essentially from contour 14 to contour 19, inclusive, suitably melded into each other and into the remainder of the shoe.

Extensive investigation in this systematic and precise way of the characteristics of prior art lasts and shoes in relation to the principles of the present invention has demonstrated that such prior art lasts and shoes are largely empirical in regard to the disposition of the shoe upper. Thus, we have found that the provisions for positioning the cone portions of such lasts and the corresponding portions of the uppers of shoes, as at contour 12, for example, have placed such portions in widely varying and improper positions definitely detrimental to the foot because enhancing the inherent tendency of the normal foot to incline to the medial border, and producing excessive and unnecessary strain on the bones, ligaments and capsules of the foot. Such improper location of the cone portion, furthermore, tends to place the maximum pressure over the lacing area of the shoe directly above the prominence of the scaphoid bone of the foot and exerts considerable pressure against the scaphoid, resulting in irritation of the skin and soft tissue, inflammation, callosities, and marked discomfort in this area which, when duly prolonged, may result in permanent damage to the bone structure.

To illustrate such improper position of the cone portion, contours 12, taken on three typical prior art lasts, are shown in Fig. 5 where medial longitudinal planes of such cone portions, containing the longitudinal central axis 29 are shown at 30, 31 and 32, respectively, inclined upwardly and inwardly from the vertical plane 25 and making included angles therewith, ranging up to as much as 10°, with the unfavorable tendencies described above.

We have found, consistently with the principles partially disclosed in said Patent No. 2,160,991 and to improve the effectiveness thereof, that the cone portion of the last and the proper positioning of the corresponding portions of the uppers of the shoe require such distribution of the wood of the last that the median plane through the apex of the cone portion and containing its longitudinal central axis 29, should be inclined upwardly and outwardly from the longitudinal vertical plane 25, so as to include therebetween an angle which may range up to about 5°.

To illustrate this principle, the contours 12 of three typical lasts embodying the present invention are illustrated in Fig. 6, where such longitudinal median planes through the apex of the cone portion are shown at 33, 34, and 35, inclined upwardly and outwardly to the longitudinal vertical plane 25 and making angles therewith, respectively, of about 1°, 2°, and 3°.

Such improved positioning of the cone portion assures

that the shoe made over such a last, as shown in Fig. 9, promotes the maintenance of a more effective and a more efficient, strain-free alinement of the foot in all of its functions, in complementary relation to the principles of said Patent No. 2,160,991. By such realinement of the apex of the cone, as shown in Fig. 6, much of the undesirable pressure is averted by shifting the lacing area, and particularly the metal eyelets used for the protection of the uppers at this level, from immediate proximity of the scaphoid bone laterally outward to an area of the dorsum of the foot that is less susceptible to pressure. Furthermore, by such realinement of the cone, and in conjunction with further innovations in relation to the positioning of the upper at the heel portion as hereafter described, the shoe is made to cling more firmly to the foot and therefore requires less pressure over the lacing area to assure stability of the foot within the shoe. Since such disposition of the cone portion contributes to a better fitting of the shoe and therefore requires less pressure at the lacing area to hold the shoe in proper fitting relation to the foot during the continuous changes in the relationship of the respective bones of the foot in all of its functions, the cone portion may be made broader to more properly accommodate this relatively delicate portion of the foot.

Similar investigation has shown that in prior art shoes, generally, it has been a common practice also to shape and position the curved opposite sides of the heel portion of the last so that they extend symmetrically upward and with a general inclination toward the inner sides of the last. That is, when vertical lines 36 are drawn tangent to the widest parts of the sides of the heel portion of such shoes, Fig. 7, and a line 37 is drawn connecting the tangent points of the lines 36 on opposite sides of the heel portion, it has been found that such line 37 extends either parallel to a horizontal plane 38 through the longitudinal axis, or inwardly and downwardly with respect to such plane so as to make an included angle therewith of substantial size, as illustrated in Fig. 7. Such positioning of the upper at these parts having the effect of increasing the inherent tendency of a normal foot to incline to the medial border, with detrimental pronation and weakness in stance and function, straining the bones, ligaments and capsules of the foot.

We have found that as a further improvement on the invention of said Patent No. 2,160,991, assuring a more perfect fit between the heel of the shoe and the heel of the foot and correct positioning of the latter in a ball and socket relation to the upper and heel seat, with the inner border of the socket elevated as described in said patent, these heel portions of the upper should be so shaped and positioned that lines connecting the contact points of vertical tangents 39, should be inclined outwardly and downwardly relative to the horizontal plane through the axis 29 and make an angle therewith of not less than about 2° or not more than about 5°. Such lines of three lasts embodying the present invention are shown at 40 in Fig. 8 from which it will be seen that such arrangement of the uppers at the opposite sides of the heel portion is more consistent with the downward and outward inclination of the heel seat as disclosed in said Patent No. 2,160,991. A preliminary last, such as described, is accordingly examined and/or cut away or built up as may be found necessary, by adding or removing "wood," as well understood in the art, in conformance with the above procedure and so as to embody the above-described principles of the invention. A shoe having the heel portions of its upper so formed and positioned is illustrated in Fig. 10 to show such co-ordination of the characteristics of the upper with the desirable characteristics of the heel seat.

The invention has thus been practically employed in the progressive development of a last from a preliminary or prior art last, as described above by examining, checking and controlling its shape and making such progressive alterations as found necessary in order that the final ex-

pression of the last conforms precisely to those requirements shown by extensive investigation to be so essential to the trouble-free functioning of the human foot in stance and gait. A single application of the present principles of construction may prove sufficient in some cases to correct the shape of the preliminary last, depending somewhat upon the skill displayed in their preliminary development, but the application may be repeated one or more times, if necessary, until the construction shows that a shape has been attained which accurately embodies the principles of the invention. Thus, a preliminary or prior art last may first have its bottom surface shaped to correspond with the construction disclosed in said Patent No. 2,160,991, and if such shaping be found to substantially alter the position of the longitudinal axis 29, the correction may be repeated to relocate such axis. The sides of the heel portion of the last may then be shaped as described and if such shaping be found to substantially alter the position of the longitudinal axis, the correction may be again applied to insure the correct position of the axis. The shaping of the cone portion, as described, does not affect the position of the longitudinal axis. The shaping of the several parts is preferably performed in the order described, although it is contemplated that it may be found desirable, in some cases, to alter the order of such steps of shaping. While few articles present as irregular, intangible and variable form as the human foot and its reproduction in a last, the present invention has proven to afford principles of construction, the application of which consistently yields the uniform functional results desired.

It is evident from the above disclosure that the invention provides, through the use of a complete and exact measurement technique, for precisely and systematically determining and controlling the distribution of wood in a shoe last, to shape and arrange the upper at the heel and midfoot portions in closely co-ordinated and consistent relation with the desirable characteristics of the bottom of the last and inside of the sole of a shoe lasted thereon. A shoe made on such a last, of course, is closely conformed thereto and provided with the same advantageous characteristics for creating and maintaining a condition of equilibrium in the weight-bearing functions of the foot so as to maintain a strong posture and prevent lowering of the medial longitudinal arch and the attendant deformation and discomfort, as well as to preserve the natural functions of the foot in propulsion of the body to reduce fatigue and afford more natural and easy functions in stance and gait. This application is a continuation-in-part of the applicants' copending application, Serial No. 140,112, filed January 23, 1950 (now abandoned).

It will thus be seen that the invention accomplishes its objects and, while it has been herein disclosed by reference to the details of a preferred embodiment, it is to be understood that such disclosure is intended in an illustrative, rather than a limiting sense, as it is contemplated that various modifications in the construction and arrangement of the parts will readily occur to those skilled in the art, within the spirit of the invention and the scope of the appended claims.

We claim:

1. A shoe last comprising a cone portion having a median plane passing through its apex and containing a longitudinal central axis of said last extending through a point at the toe portion of the last adjacent the break between the sole and upper and through a point at the back of the heel portion, said axis lying substantially parallel with a plane tangent to the bottoms of the heel and forefoot portions of the last and said axis lying midway between vertical lines tangent to the sides of the heel and forefoot portions at their widest parts when said last is positioned with its forefoot portion resting on a horizontal plane surface and its heel elevated to the height specified for said last, said median plane being inclined upwardly and outwardly from a central plane passing vertically through said axis in said position of said last with an

included angle between said planes of not more than about 5° and said last having the bottom surfaces of its heel and shank portions inclined from the inner sides thereof downwardly toward the outer sides thereof, for shaping a shoe made on said last to compensate for the malalignment of the bones of the leg and ankle and to support the weight of the body against inward pronation and lowering of the medial longitudinal arch in stance and gait.

2. A shoe last having a longitudinal central axis extending through a point at the toe portion of the last adjacent the break between the sole and upper and through a point at the back of the heel portion, said axis lying substantially parallel with a plane tangent to the bottoms of the heel and forefoot portions of the last and said axis lying midway between vertical lines tangent to the sides of said heel and forefoot portions at their widest parts when said last is positioned with its forefoot portion resting on a horizontal plane surface and its heel elevated to the height specified for said last, the opposite sides of said heel portion being so formed and positioned that a line connecting the points of tangency of said lines tangent thereto is inclined downwardly and outwardly relative to a plane through said axis parallel to said tangent plane and making an included angle therewith of not less than about 2° and not more than about 5° and said last having the bottom surfaces of its heel and shank portions inclined from the inner sides thereof downwardly toward the outer sides thereof, for shaping a shoe made on said last to compensate for the malalignment of the bones of the leg and ankle and to support the weight of the body against inward pronation and lowering of the medial longitudinal arch in stance and gait.

3. A shoe last comprising a cone portion having a median plane passing through its apex and containing a longitudinal central axis of said last extending through a point at the toe portion of the last adjacent the break between the sole and upper and through a point at the back of the heel portion, said axis lying substantially parallel with a plane tangent to the bottoms of the heel and forefoot portions of the last and said axis lying midway between vertical lines tangent to the sides of the heel and forefoot portions at their widest parts when said last is positioned with its forefoot portion resting on a horizontal plane surface and its heel elevated to the height specified for said last, said median plane being inclined upwardly and outwardly from a central plane passing vertically through said axis in said position of said last with an included angle between said planes of not more than about 5°, the opposite sides of said heel portion being so formed and positioned that a line connecting the points of tangency of said lines tangent thereto is inclined downwardly and outwardly relative to a plane through said axis parallel to said tangent plane and making an included angle therewith of not less than about 2° and not more than about 5° and said last having the bottom surfaces of its heel and shank portions inclined from the inner sides thereof downwardly toward the outer sides thereof, for shaping a shoe made on said last to compensate for the malalignment of the bones of the leg and ankle and to support the weight of the body against inward pronation and lowering of the medial longitudinal arch in stance and gait.

4. A shoe comprising an upper portion corresponding to the cone of a last, said portion having a median plane passing through a point corresponding to the apex of the cone of the last and containing a longitudinal central axis of said shoe extending through a point at the toe portion thereof adjacent the break between the sole and upper and through a point at the back of the heel portion, said axis lying substantially parallel with a plane tangent to the inner surfaces of the heel and forefoot portions of the shoe and said axis lying midway between vertical lines tangent to the sides of said heel and forefoot portions at their widest parts when the shoe is po-

sitioned with its heel and forefoot portions resting on a horizontal plane surface, said median plane being inclined upwardly and outwardly from a central plane passing vertically through said axis in said position of the shoe, with an included angle between said planes of not more than about 5° and said shoe having the inner surfaces of its heel and shank portions inclined from the inner sides downwardly toward the outer sides thereof, for supporting the foot in position to compensate for the malalignment of the bones of the leg and ankle and to support the weight of the body against inward pronation and lowering of the medial longitudinal arch in stance and gait.

5. A shoe having a longitudinal central axis extending through a point at the toe portion of the shoe adjacent the break between the sole and upper and through a point at the back of the heel portion, said axis lying substantially parallel with a plane tangent to the inner surfaces of the heel and forefoot portions of the shoe and said axis lying midway between vertical lines tangent to the sides of said heel and forefoot portions at their widest parts when the shoe is positioned with its heel and forefoot portions resting on a horizontal plane surface, the opposite sides of said heel portion being so formed and positioned that a plane connecting the points of tangency of said lines tangent thereto is inclined downwardly and outwardly relative to a plane through said axis parallel to said tangent plane and making an included angle therewith of not less than about 2° nor more than about 5° and said shoe having the inner surfaces of its heel and shank portions inclined from the inner sides downwardly toward the outer sides thereof, for supporting the foot in position to compensate for the malalignment of the bones of the leg and ankle and to support the weight of the body against inward pronation and lowering of the medial longitudinal arch in stance and gait.

6. A shoe comprising an upper portion corresponding to the cone of a last, said portion having a median plane passing through a point corresponding to the apex of the cone of the last and containing a longitudinal central axis of said shoe extending through a point at the toe portion thereof adjacent the break between the sole and upper and through a point at the back of the heel portion, said axis lying substantially parallel with a plane tangent to the inner surfaces of the heel and forefoot portions of the shoe and said axis lying midway between vertical lines tangent to the sides of said heel and forefoot portions at their widest parts when the shoe is positioned with its heel and forefoot portions resting on a horizontal plane surface, said median plane being inclined upwardly and outwardly from a central plane passing vertically through said axis in said position of the shoe, with an included angle between said planes of not more than about 5°, the opposite sides of said heel portion being so formed and positioned that a line connecting the points of tangency of said lines tangent thereto is inclined downwardly and outwardly relative to a plane through said axis parallel to said tangent plane and making an included angle therewith of not less than about 2° nor more than about 5° and said shoe having the inner surfaces of its heel and shank portions inclined from the inner sides downwardly toward the outer sides thereof, for supporting the foot in position to compensate for the malalignment of the bones of the leg and ankle and to support the weight of the body against inward pronation and lowering of the medial longitudinal arch in stance and gait.

References Cited in the file of this patent

UNITED STATES PATENTS

2,160,991	Schwartz	June 6, 1939
2,241,502	Brophy	May 13, 1941
2,371,751	Freeman	Mar. 20, 1945
2,447,070	Hooper	Aug. 17, 1948