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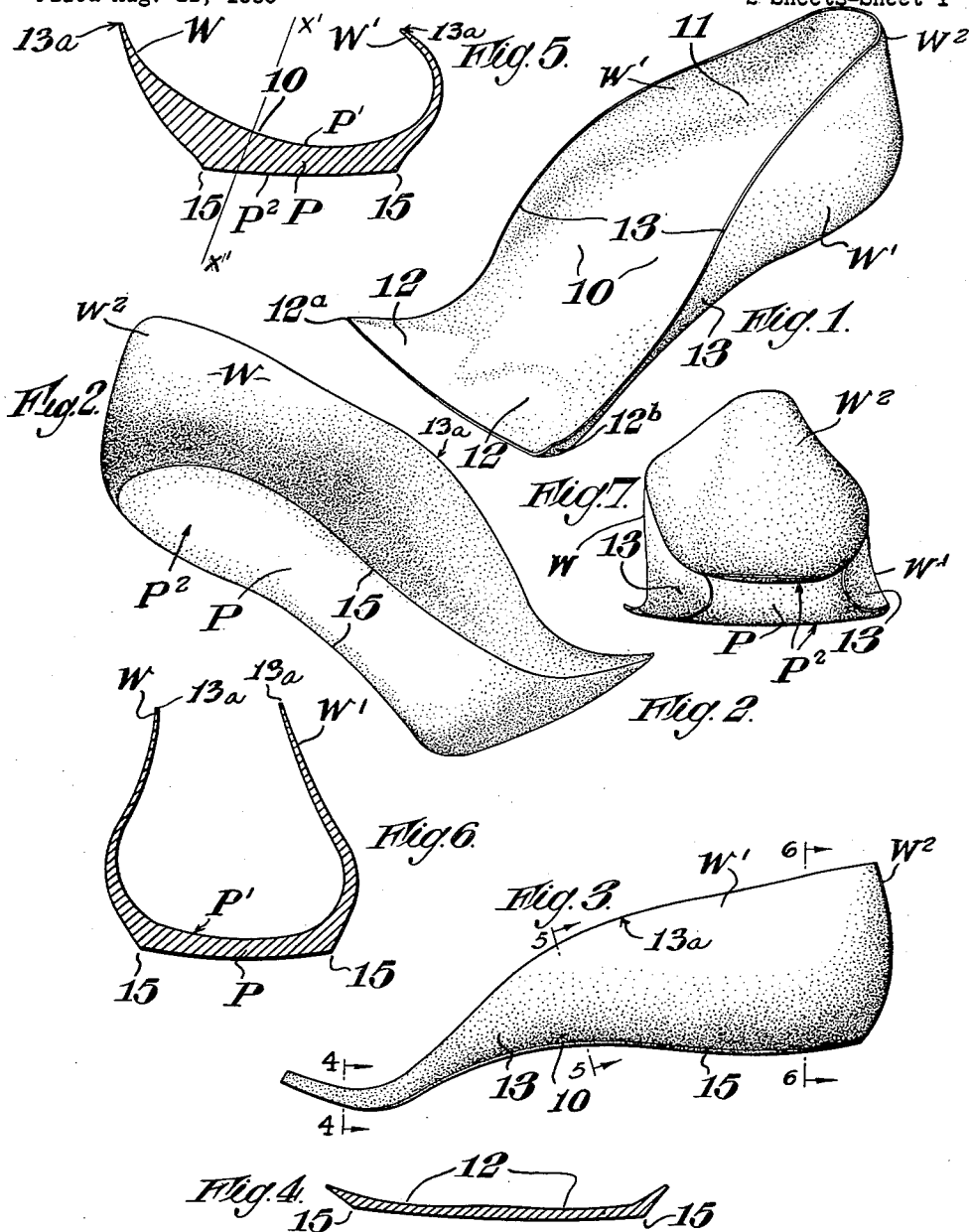
A. E. BRODY

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FOOT SUPPORTING DEVICE

Filed Aug. 11, 1959

2 Sheets-Sheet 1



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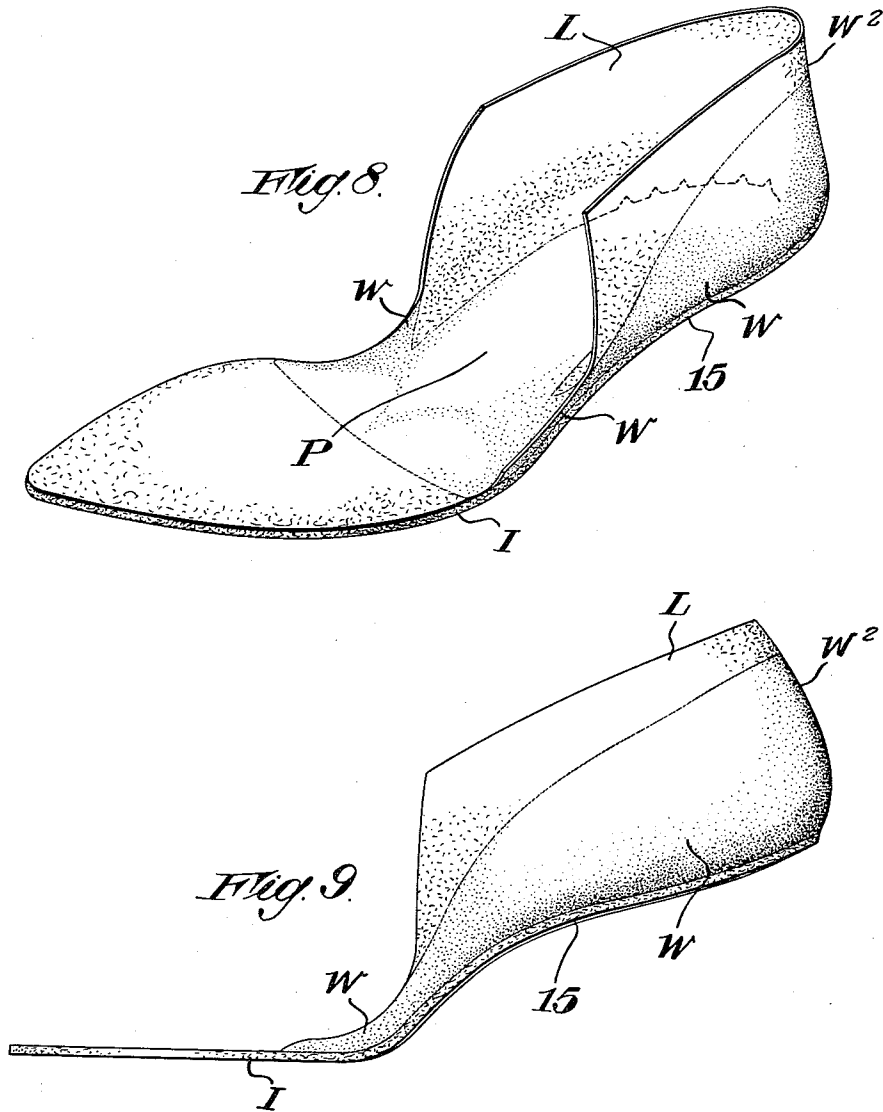
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1

3,068,872
FOOT SUPPORTING DEVICE
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1 Claim. (Cl. 128—595)

The present invention concerns foot supporting device for incorporation into mass produced shoes footwear, that is to say, boots and shoes. An object of the present invention is to provide foot supporting devices which enable an improved construction and method of making mass produced footwear, resulting in the production of boots and shoes wherein a more natural support is obtained. A further and important object of the invention is to provide a foot supporting device for a shoe construction in which shoe a foot will be adequately, comfortably and naturally supported, the device serving to maintain a shoe upper in a shape to fit and control the foot snugly, the construction being such that the device enables a shoe to be made by modern lasting methods without difficulty.

Another object of the invention is to provide a foot supporting device for building into an improved shoe, resulting not only in reduced manufacturing costs, but also a shoe which can be fitted to the foot with greater certainty than can present day mass produced shoes.

The present invention finds special application to foot supporting devices for building into casual and court type shoes with heels, although is not to be regarded as limited to such devices. High heels give rise to the tendency of the weight of the body being thrown forwardly from the heel area towards the toe area, and with the limitations imposed by present mass production methods, the shoe, even if manufactured so as to be a snug fit to the foot when first worn, through wear, spreads, and so support which should be given, for example, by the appropriate part of the upper of a shoe, to the rear or back part of the foot, is lost.

It is most desirable that a shoe should provide uniform support for the foot, and particularly should hold the rear of the foot so that when walking, the forward throw of the foot in the shoe is held to a minimum. The inside of the shoe should provide a firm yet comfortable grip around the heel, the arches and the joint, without gaping, permitting movement of the toes and toe joints, and support should be provided under the whole of the arch.

Ideally, the inside of a shoe must fit the foot. Practically, with known mass production methods, this is impossible, because the inner and outer surfaces of the shoes as presently made, are substantially level or regular to enable the lasting operations inherent to such methods of production to be performed and to ensure ease of production. Arch supports and heel counters are of little effect, giving support only to localised areas.

Further, owing to the diverse articulations of the foot, measurements taken for foot fitting without the body weight imposed on the foot are not accurate. In the act of walking, when the forward foot takes the full

2

weight of the body, the foot elongates and at the same time the forepart spreads and it is this action which, if uncontrolled, causes shoes made under customary methods to slip at the heel, gape at the sides, yet at the same time, cause pressure on the toes and the joints. It frequently occurs that in order to overcome this forward slipping movement, shoes are worn which are too short and sometimes too narrow. An undistorted foot takes the body weight naturally at the heel, the ball and outer border, and walking on a hard unyielding surface overtaxes the muscles, this being aggravated by the wearing of shoes with high heels.

According to the present invention, there is provided a foot supporting device for building into an article of footwear, said device comprising a sole plate which is peripherally shaped to conform to a foot outline from the heel to the metatarsal region of said foot, said sole plate having a transverse edge at said metatarsal region, and being of non uniform thickness providing a foot-supporting inner surface complementary to the contour of said foot and an outer surface of suitable shape for lasting, and a counter upstanding from said sole plate and extending peripherally thereof from adjacent one end of said transverse edge, around said heel, to terminate adjacent the other end of said transverse edge, to provide an inner counter surface which is contoured complementarily to the contour of said foot. Conveniently the counter at each side, at its front end, is shaped to provide upwardly curving parts, at each side corresponding to the curvature of the arch at the inner and outer sides of the foot, the rear of the counter curving from the sole plate upwardly and inwardly.

The bottom edge of the counter, on the outer surface of the device, may join the sole plate in a sharp angle or curve, which can be defined by a line or by a depression. This is an important feature of the device as it provides a guide line facilitating subsequent tooling operations during the manufacture of a shoe.

It is a feature of the device in accordance with the present invention that continuous curving, in conformity with the foot, is provided on that surface of the device which is adjacent the foot, thus holding the arches, the heel and walls of the foot firmly right up to the transverse edge at the forward end of the device. Corresponding curving of the outer surface of the device would not be acceptable for direct lasting. The outer surface of the device is similar in appearance to a conventional shoe last as at present used in the production of shoes, so that a last shaped so as to fit into the device is necessary, the inner sole being applied to the bottom (i.e. outer) surface of the sole plate. The device occupies volumes which, in a normal shoe, allow considerable play between the foot and the shoe, particularly adjacent the arch of the foot and around the heel. Thus, there is provided a device which enables a shoe to have solidity so as to be able to give strength and support to the foot, and also to maintain the shoe in correct form.

The device may be made in sections which are assembled before building into a boot or shoe. Preferably, however, it is made in one piece from a suitable plastics material, by moulding. The sole plate, and, if desired, the counter, may be lined with fabric or gauze, laid in the mould prior to forming, so that the securing of the

device by adhesive, in a shoe being manufactured, is facilitated.

The invention also enables a shoe to be built up from a unit, and according to a further feature of the invention, a unit is formed comprising a foot supporting device as above set forth, an inner sole secured to the outer surface of the sole plate, and a lining secured to the inner surface of the counter and top plate surface.

The unit is preferably made as a unitary article, and according to another feature of the invention there is provided a method of manufacturing a unit as above set forth and by, injection moulding, utilising a synthetic plastic material for the device, which method consists in setting up the inner sole and lining in a mould, and in injecting the material into the mould to form the device, which is thus, bonded to the inner sole and lining.

In order that a clear understanding of the invention may be obtained, reference will now be made to the accompanying drawings, which illustrate a preferred form of foot supporting device in accordance with the invention and a unit incorporating same. In the drawings:

FIGURE 1 is a front perspective view of the foot supporting device,

FIGURE 2 is an underneath perspective view,

FIGURE 3 a side view,

FIGURE 4 a section on the line 4—4, FIGURE 3,

FIGURE 5 a section on the line 5—5, FIGURE 3,

FIGURE 6 a section on the line 6—6, FIGURE 3,

FIGURE 7 a rear view, and

FIGURES 8 and 9 views similar to FIGURES 1 and 3, showing the unit, i.e. the device, inner sole and lining.

The foot supporting device illustrated and which is for building into a shoe at the time of the latter's manufacture is for the left foot and consists of a sole plate P and inner and outer counters W and W¹ respectively which merge into a rear wall W² to embrace the rear of a wearer's heel.

In practice, the device is moulded from a synthetic plastics material in a single operation, and is of a nature to a firm relatively stiff support but having an essential degree of flexibility so as to provide the intended necessary comfort. It will be noted in particular that the inner surface "P" of the sole plate P merges smoothly and clearly with the inner surface of the counters W, W¹ at the junction thereof with the counters and rear wall as is shown in FIGS. 5 and 6, for example. Moreover, the upper plate surface is curved and shaped so as to fit snugly beneath the foot, giving firm support especially to the arch as at 10, and is dishd somewhat (indicated diagrammatically by shading in FIG. 1) at the rear at 11 to fit the calcaneum and may have slight depressions such as 12, 12 (again indicated diagrammatically by shading in FIG. 1) at its front to take the toe joints. The plate terminates in substantially flat feathered edges 12^a and 12^b in advance of the arch area or in the area of the ball. The sole plate P extends forward to a transverse edge in the metatarsal region of the foot. The shape of the foot supporting device and the thickness and strength of that part into which the arch "sits" eliminates and obviates any need for any additional arch support, and the device is such that a firm support under pressure is obtained.

The inner wall W and outer wall W' of the base are shaped in the metatarsal area 13 to provide upwardly curving portions for the arch portion 10. These walls terminate in upper feather edge portions 13^a and form, together with the upper face P', a portion of an ellipse having the major axis x—x and minor axis x'—x' shown in FIGURE 5. The axis x—x is disposed at an angle inclined to the bottom of the plate P from the inner wall W downwardly to the outer wall W'. The thickness of the plate at the arch portion 10 is substantially greater adjacent the outside wall W than adjacent the inside wall W'. The shaping thereof is such that a

firm, foot contacting support area is obtained over the whole of the device. The outer surface of the device may follow approximately this curvature although the outside shape must be such that a shoe upper can satisfactorily be lasted thereto.

It will be noted that, in comparison with contour of the inner surface of the sole plate, the contour of the outer or bottom surface thereof is less pronounced, being almost flat or level over most of its area. The junctions 15 between the bottom surface P² of the sole plate and the outer surface of the counters are clearly defined, either by an angle join or by a sharp curve. This definition can be brought out in the device as a distinct line, as a depression or embossing, such line marking facilitating tooling.

In manufacturing a shoe incorporating a device as above described, normal lasting techniques are resorted to, although, as will be clear to those skilled in the art, many of the normal steps are obviated. The last is shaped to fit into the device, and the outer surface of the device presents contours which conform with the contours of a conventional shoe last, enabling the inner sole, the upper and the outer sole to be secured easily. The upper lining is brought inside the counters, and in the operations adhesive is used where desirable. For this reason some form of fabric can be bonded to the device during moulding in appropriate locations, such as on the outer surface of the sole plate to assist adhesion.

The device could extend further forwardly than is shown; for example, at the transverse edge, it could have a forepart added conforming with differing last shapes.

It is possible, however, further to simplify the manufacture of a shoe, by building up a unit comprising a device as set forth above, inner sole and lining. The shoe upper and outer sole can then be attached by conventional manufacturing techniques. The inner sole and counterlining can be attached by adhesive, but preferably the unit is made by injection moulding utilising a suitable synthetic plastic material for the device. The inner sole and lining are set up in the mould, and the material is injected into the mould to form the device. This thus becomes bonded to the inner sole and lining.

A typical unit is illustrated in FIGURES 8 and 9, wherein I is the inner sole and L the lining. The device merges into the inner sole at the transverse edge without steps or ridges.

Shoes built up using foot supporting devices as herein described give correct support under the whole of the foot arch of the foot and to the calcis or rear heel protuberance. The heel is in fact snugly held in a pocket of a resilient or flexible nature.

If desired, to facilitate the bedding of the heel, a slight stepped or depressed part may be formed on the bottom of the sole plate, to provide a seating for the heel.

I claim:

As an article of manufacture, a foot support for supporting the human foot from the heel to the longitudinal arch and adapted to be incorporated in footwear having an inner sole and a lining, said support comprising, in combination, a sole plate of less overall length than said insole and extending from the heel area to immediately beyond the arch area and including a rearward heel portion, an intermediate arch portion and a forward portion terminating just beyond the arch in the area of the ball, said plate having an upper and a lower face and being of uniform thickness at said heel portion, said plate having a greater and maximum transverse thickness at said arch portion, the thickness of said plate at the arch portion being substantially greater at one side than the other, said plate having a minimum uniform transverse thickness at said forward portion, a wall projecting upwardly from said plate around said heel portion, said wall extending forwardly on both sides of said plate to form inner and outer side walls, said side walls decreas-

5

ing in height from said heel portion towards said forward portion, said inner side wall terminating short of said forward portion and said outer side wall forming a feathered lateral edge with respect to said plate at said forward portion, the upper face of said plate in the arch portion forming a transverse semi-elliptical surface with the adjacent side walls, said surface extending transversely beyond the lower face of the plate in the arch portion, the major axis of said semi-elliptical surface inclined upwardly from said outer side wall to said inner side wall, and the minor axis of said surface passing through that side of said plate having the greater thickness, whereby the maximum amount of support is provided the wearer at a point at right angle to and centrally disposed beneath the arch.

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