July 16, 1946. A. E. MURRAY 2,404,083

FOOTWEAR

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Fig. 1.

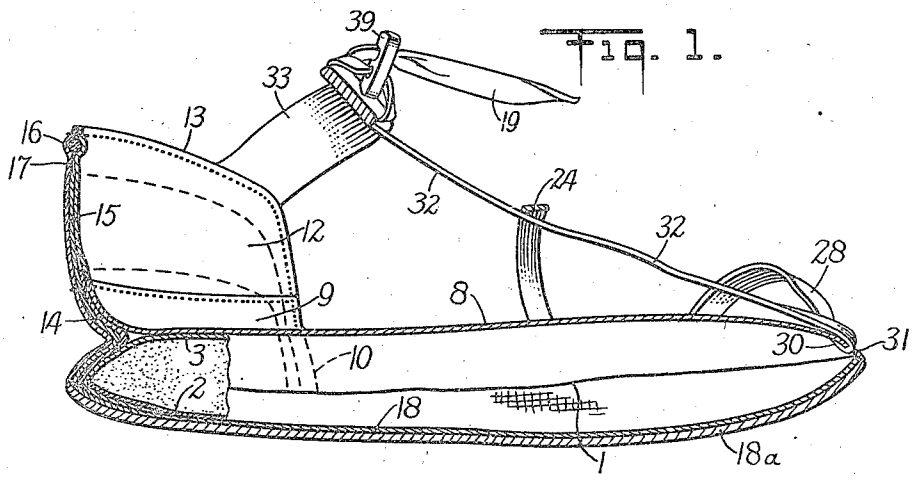


Fig. 2.

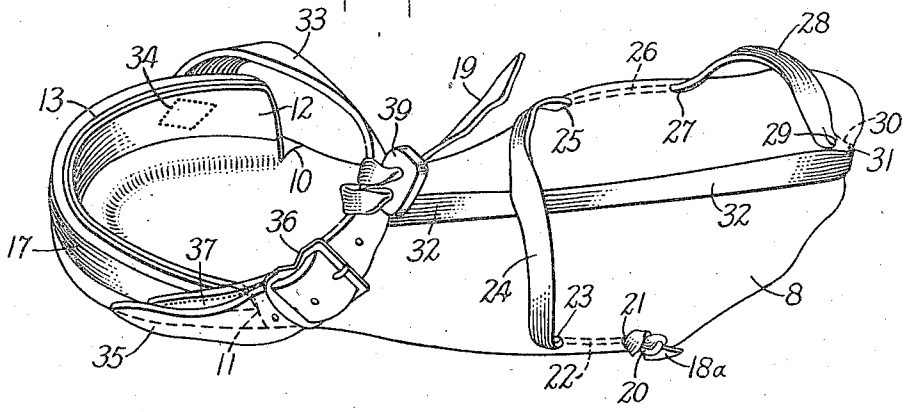
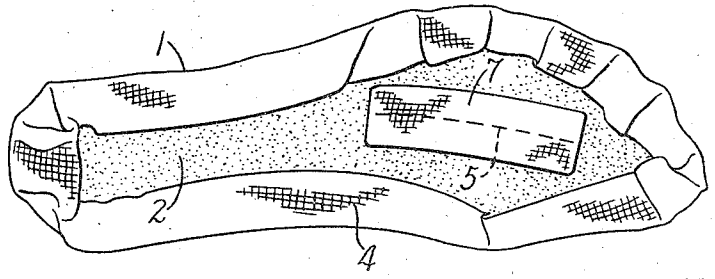


Fig. 3.



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Fig. 4.

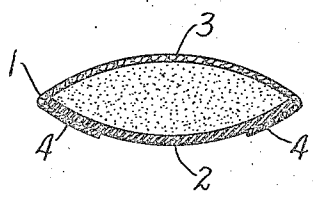


Fig. 5.

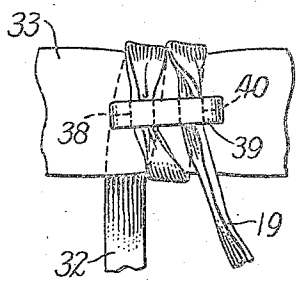


Fig. 6.

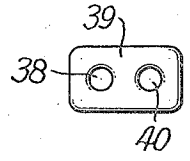
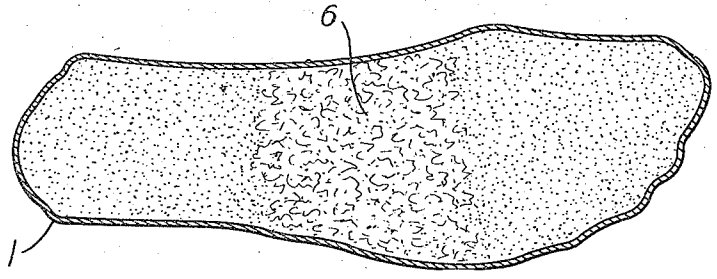


Fig. 7.



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Fig. 8.

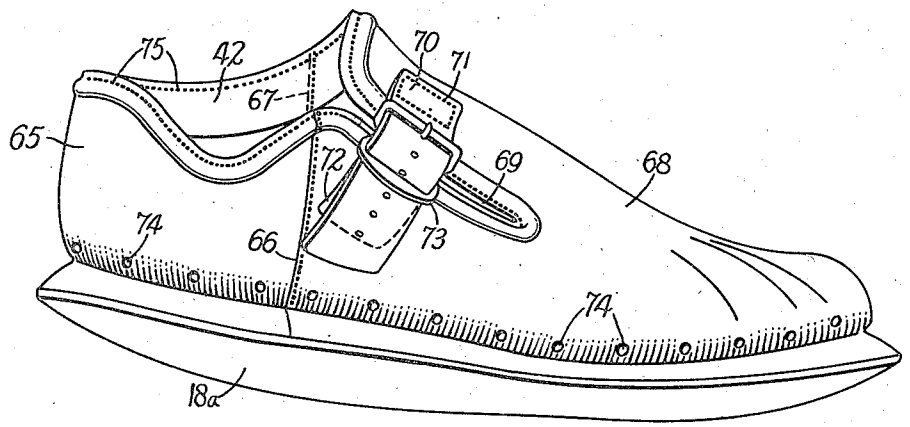
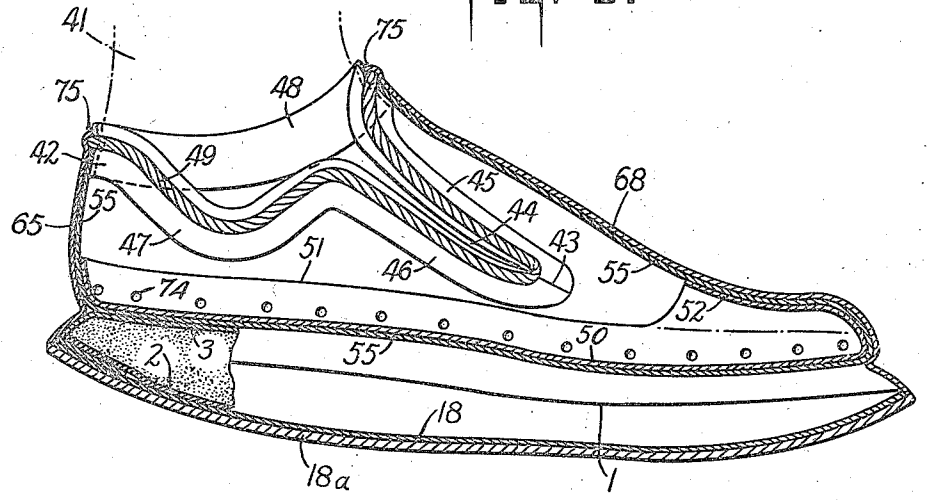


Fig. 9.



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Fig. 10.

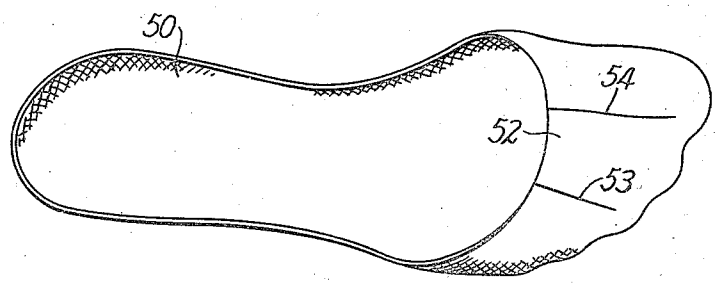
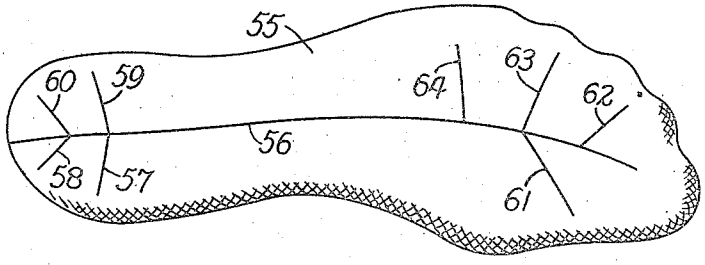


Fig. 11.



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UNITED STATES PATENT OFFICE

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FOOTWEAR

Alan E. Murray, Wilmington, Del.

Application November 2, 1943, Serial No. 508,705

2 Claims. (Cl. 36—8.5)

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My invention relates particularly to an improved form of footwear, which may, for example, be in the form of sandals or shoes.

The present application is a continuation in part of my copending application upon Foot support, filed September 30, 1941, Ser. No. 412,936.

The object of my invention is to provide articles of footwear by means of which foot supports are obtained providing supporting reaction forces distributed throughout the undersurface of the foot, from a restricted contact area with the ground or floor. A further object is to obtain this end while at the same time permitting angular adjustment of the foot to the ground or other surface supporting the footwear. A further object is to secure this end with a pad, incorporated in a sandal or shoe, containing a powdered material, but which is so constructed as to maintain the tight packing and distribution of the powder in the pad notwithstanding hard wear or usage of the foot support. Still another object is to provide an advantageous type of fastening means for the sandal. Further objects of my invention will appear from the detailed description of the same hereinafter.

While my invention is capable of embodiment in many different forms, for the purpose of illustration I have shown only certain forms in the accompanying drawings, in which

Fig. 1 is a side elevation of a sandal shown partly in section, made in accordance with my invention;

Fig. 2 is a plan view of the same;

Fig. 3 is an underneath view of the pad used therein;

Fig. 4 is a transverse cross section of the said pad;

Fig. 5 is a plan view of a detail showing the fastening means of the sandal;

Fig. 6 is an elevation of a perforated disk used in said fastening means;

Fig. 7 is a horizontal section through a modified form of the pad, showing an improved stuffing means for the same;

Fig. 8 is a side elevation of a shoe made in accordance with my invention;

Fig. 9 is a longitudinal vertical sectional view of the same showing certain parts in elevation in the foreground in front of the section;

Fig. 10 is a plan view showing the first layer applied to the sole of the cast; and

Fig. 11 is an underneath view of the second layer applied over the top of the cast.

In the drawings, referring first to the sandal type of my invention in Figs. 1 to 7, I have shown

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in Figs. 3 and 4 a pad 1 which is used therein. This pad 1 comprises a lower layer 2 of canvas, rubber or other material, and an upper layer 3 of similar material, which has a margin 4 folded over the edge of the lower layer 2, the said margin 4 being cemented to the lower layer 2 by "latex," which is a water-suspended form of prevulcanized rubber or a similar form of artificial rubber known as Neoprene, or any other suitable cementing material. This pad is then provided with a slit 5 in the undersurface and a powdered material, such as powdered cork or balsa wood, is stuffed tightly into the pad between the layers 2 and 3, through the slit 5, until the material is tightly packed throughout therein. If desired, however, instead, as shown in Fig. 7, the said powder can be stuffed tightly into the toe and heel portions of the pad, the intermediate portion being filled in tightly by a body of cotton or kapok or other fibrous material 6. This body of cotton, etc., will keep the bodies of powdered material tightly packed in the toe and heel portions of the pad throughout the use of the same and notwithstanding hard usage thereof. After this the slit 5 is permanently closed by applying a strip 7 of adhesive tape over the same. The pad 1 is now ready for incorporation into the sandal shown in Figs. 1 and 2. For this purpose there is cemented over the top of the pad 1, by said "latex," Neoprene, etc., a layer 8 of leather which, at the front and sides of said sandal, extends down to the lateral edge of the pad and which, at the top of the pad, extends back to the rear portion of the pad and is formed into a cup-like portion 9 which extends upwardly at the rear of the counter portion as well as upwardly a short distance to either side of the counter portion. This is accomplished by providing slits 10 and 11 at the two sides of the leather layer 8 and thereafter turning up the resulting flap. This cup-like portion 9 abuts against the edge of an inner layer 12 of leather which is of such a shape as to form, with the cup-like portion 9, a counter 13 for the sandal. The cup-like portion 9 and the leather layer 12 are cemented together with the same cementing material, with the aid of a strengthening strip 14 of burlap, which extends very slightly above the joint between the layer 9 and 12, down to the lateral edge of the pad 1 and forwardly to approximately the positions of the slits 10 and 11. Over this burlap layer 14 there is cemented by the same cementing material a layer 15 of monks cloth, which also extends down to the lateral edge of the pad 1 and forwardly to approximately the position of the slits 10 and 11. Over the outside

of the leather layer 12, and adjacent to the edge of the layer 15, there is now applied a cord of cotton or other twisted fibres 16 near the edge of the counter 13, the same being cemented in place by the same cementing material. There is then applied over the cord 16 and over the layer 15 a leather layer 17 forming the outside of the counter 13 and which extends down to the lateral margin of the pad 1 and forwardly to abut against the ends of the leather layer 8 at the slits 10 and 11. There is now fastened to the undersurface of the pad 1 a rubber or canvas layer 18 cemented in place by the same cementing material and ending at the lower edge of the burlap strip 14. Beneath the layer 18 there is then cemented in place with the same cementing material, a soft leather sole 18*a* which underlies the lower edge of the leather layer 17. In order to retain the sandal on the foot, a fastening means is provided, as shown in Fig. 2, comprising a narrow leather strip 19, which is first provided with a knot 20 and is then inserted in a hole 21 cut through the upper layer or layers of the foot support so as to provide a portion 22 extending beneath the surface of the same. The strip 19 then passes outwardly through a hole 23 to provide a diagonal cross strip 24 which again enters, similarly, a hole 25 providing a portion 26 inside the support, which then passes outwardly through a hole 27 to form a diagonal toe engaging portion 28. This toe engaging portion 28 passes through a hole 29 in a similar way, to form an inner strip 30 which passes outwardly through a hole 31 so as to provide a longitudinal portion 32 extending beneath the diagonal portion 24. The longitudinal portion 32 is then passed beneath a transverse strap 33, one end of which has a stitching 34 fastening it to the counter 13. The said strap 33 has an end 35 adapted to be passed through a buckle 36 on a strap 37 which is similarly stitched to the other edge of the counter 13. The longitudinal portion 32 of the leather strip 19, after passing beneath the strap 33, passes forwardly over the top of the same and thence through a hole 38 in a fastening disk 39, thence again beneath the strap 33 and forwardly over the top of said strap through a hole 40 in said disk.

As shown in Figs. 8 to 11, the said footwear may be made in the form of a shoe. For this purpose there is provided the same type of pad 1 previously described. In this instance, also, there are provided the lower layer 18 of canvas and the soft leather sole 18*a*, previously described, cemented to each other and to the undersurface of the pad 1. A plaster cast 41 is then provided, of any desired shape, but preferably made to conform to the exact contours of wearer's foot, as for instance, in accordance with my Patent No. 2,177,304, upon Process of obtaining effective foot impressions and product thereof, issued October 24, 1939. Around the ankle portion of the cast 41 and beneath the ankle joint there is then cemented on the cast 41, with the same cementing material, a leather strip 42 having the shape shown in Fig. 9, and having a joint 43 at the lower end of a slit 44 which is left open in the resulting shoe in order to facilitate the putting on and removal of the shoe on the foot. It will be noted that this leather strap thus contains two depending tongues 45 and 46 as well as a curved horizontal portion 47 on the outside of the foot, and a curved horizontal portion 48 on the inside of the foot. At this stage of the making of the shoe the upper edges of the portions 47 and 48 are made longer than necessary to

be subsequently cut off in the finishing of the shoe. There is then cemented on the outside of the leather strip 42, entirely around the upper edge of the same, a cord 49, of twisted cotton or other fibres, the same cementing material being used, and the cord 49 being located in a position equidistant from the top edge of the shoe. Beneath the sole of the cast 41 there is cemented in place, with the same cementing material, a layer of monk's cloth 50 so that the same extends around the foot up to an undercut line 51 of the plaster cast and so that the said layer 50 is folded over the top of the toes of the cast to form a flap 52, also cemented to the cast in the same way, thus forming two tucks or puckers 53 and 54 which are cut off. There is then cemented over the top of the cast a monk's cloth layer 55 so that the edges of said layer join at the rear of the heel and over the bottom of the cast to form a joint 56. This results in producing, at the rear of the sole, puckers or tucks 57, 58, 59 and 60, which are then cut off, as well as at the front of the foot, puckers or tucks 61, 62, 63 and 64, which are likewise cut off. This layer 55, it will be noted, extends merely up to the under edge of the cord 49. A rear leather heel-piece 65 is then applied over the layer 55 and cemented thereto, which extends around the rear of the counter portion and forwardly to middle positions on the sides of the shoe to form, ultimately, joints 66 and 67, which extend down to the lateral edge of the pad 1, on the opposite sides of the shoe. Accordingly, adjacent the edges at the joints 66 and 67 there is then cemented over the front of the shoe a top leather piece 68 which also extends down to the lateral edge of the pad 1 to join the sole 18*a*. This front leather piece 68 is provided with a slit 69 conforming to the position of the slit 44. The slits 44 and 69 are then provided with a fastening means comprising a strap 70 having stitching 71 securing it to the leather piece 68, and below the slit 69 the said leather piece is provided with a short leather strap 72 having thereon a buckle 73 to receive the end of the strap 70. A series of holes 74 may be made in the shoe all around the same above the pad, through the layers 50, 55 and 68, to provide added ventilation. The plaster cast 41 is then broken into pieces by light taps from a hammer and is removed from the shoe. Any remaining particles of the plaster and cementing material may then be removed from the inner surface by rubbing the same with a cloth or brush and any suitable solvent of the cementing material. The edges of the shoe can now be finished in any desired manner, as for example by clipping off the upper edges above the cord 49 and then providing stitching 75 around the margin adjacent to the cord 49.

In the operation of my invention, both in the case of the sandal shown in Fig. 1 and the shoe shown in Fig. 8, it will be noted that both the upper and lower surfaces of the portion supporting the foot are in a bowed or convex position, both transversely and longitudinally. Also, the convex under-surface of the foot support contacts with the ground or floor over a very restricted area less than the width and length of the foot support, thus causing upwardly directed divergent reaction forces therefrom in all directions from the point of contact with the ground or floor towards the foot, thus meeting equally the downwardly divergent forces exerted by the foot and expanding or spreading the powder in all directions within the pad 1 to keep the same

tightly packed therein throughout the use of the support notwithstanding hard usage thereof. This effect is aided, in the form of my invention shown in Fig. 7, by the intermediate body of cotton or kapok, which tends to push the powdered material towards the toe and heel portions of the foot support throughout in the use of the shoe. This provides at all times a uniform distribution of the forces supporting the different portions of the foot and notwithstanding the differences in angularity between the position of the foot and the ground or floor, laterally as well as longitudinally. This arrangement results in an extraordinarily beneficial effect on the foot, which conforms the supporting pad to the different contours of the sole of the foot. It has been found that footwear so constructed is an invaluable aid to restoring the natural shape and functions of the feet where the feet have become malformed or damaged due to unnatural causes, as for example the supporting of the feet by the usual flat-soled footwear and on hard flat surfaces such as the ground or floors.

While I have described my invention above in detail I wish it to be understood that many changes may be made therein without departing from the spirit of the same.

I claim:

1. A ground contacting foot support comprising a sack having a yielding material tightly stuffed therein, said support having at both the top and bottom oppositely transversely substantially equally sharply curved normally convex exteriors extending the entire width of the foot support, each of said top and bottom convex exteriors constituting a single crown-shaped curvature transversely, enabling the downwardly divergent forces applied therein to meet the upwardly divergent reaction forces in the support, with an underneath supporting contact restricted transversely to less than the width of the foot support, the bottom of said foot support being also curved longitudinally throughout its entire length, and means carried by the foot support to attach the same to the wearer.

2. A ground contacting foot support comprising a sack containing a body of powdered material tightly stuffed therein at the front and rear of the support separated by an intermediate fibrous expansible spreader different from said material, having at both the top and bottom, transversely thereof, oppositely substantially equally sharply curved normally convex exteriors extending the entire width of the foot support, each of said top and bottom convex exteriors constituting a single crown-shaped curvature transversely, enabling the downwardly divergent forces applied therein to meet the upwardly divergent reaction forces in the support, with an underneath supporting contact restricted transversely to less than the width of the foot support, the bottom of said foot support being also curved longitudinally throughout its entire length, and means carried by the foot support to attach the same to the wearer.

ALAN E. MURRAY.