Dec. 1, 1925. 1,564,158

G. E. WARREN

CUSHION HEEL

Filed Dec. 26, 1922

Fig. 2.

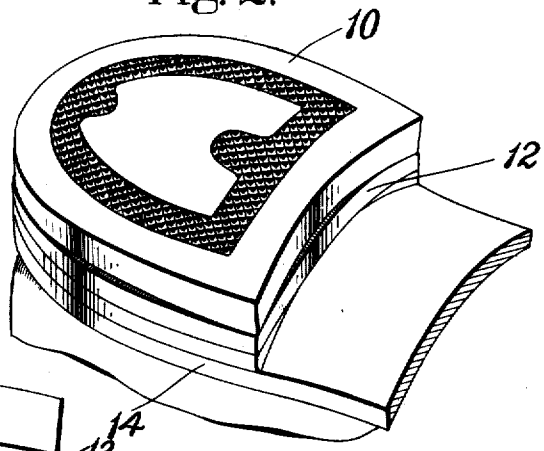


Fig. 5.

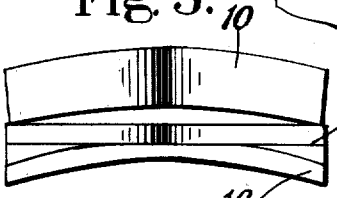


Fig. 6.

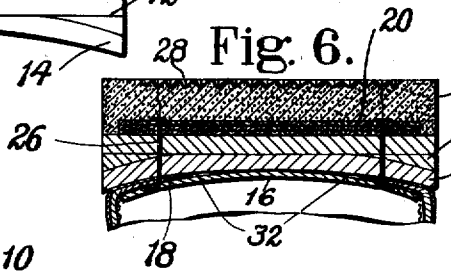


Fig. 1.

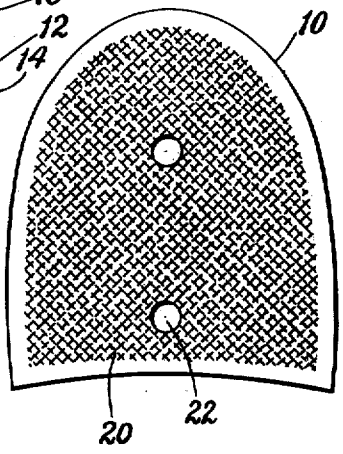


Fig. 4.

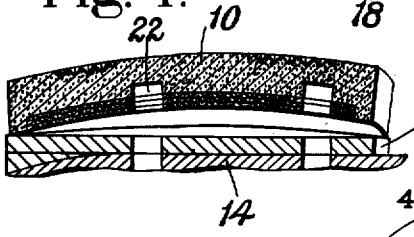
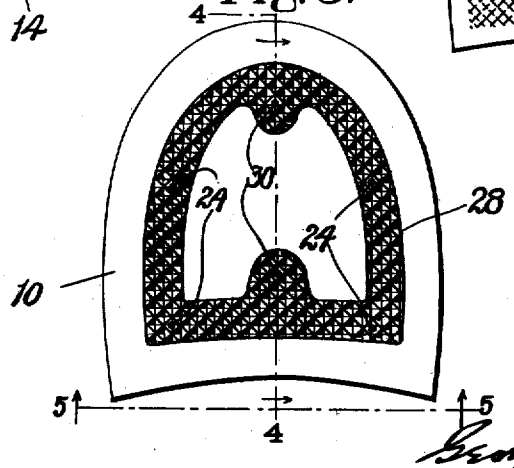


Fig. 3.



INVENTOR.

George E. Warren

Patented Dec. 1, 1925. 1,564,158

UNITED STATES PATENT OFFICE.

GEORGE E. WARREN, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

CUSHION HEEL.

Application filed December 26, 1922. Serial No. 608,908.

To all whom it may concern:

Be it known that I, GEORGE E. WARREN, a citizen of the United States, residing at Swampscott, in the county of Essex and State of Massachusetts, have invented certain Improvements in Cushion Heels, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to cushion heels and is aimed at the improvement of a type of heel which is known in the art and which has gone into use, such heel being a deformable rubber heel which is normally of concavo-convex form. Heels of this type, as heretofore made, have had certain imperfections which have prevented them from going into as extensive use as they otherwise might and which have restricted the use of such heels to hand attaching.

The object of the present invention is to produce a heel of this type having important advantages in comparison with those heretofore used. In the accomplishment of this object I have provided a normally concavo-convex rubber heel the material at the attaching face of which is substantially inextensible so that the neutral axes of the heel lie approximately at its attaching face. In the heel illustrated herein inextensibility of the attaching face is secured by the provision of a reinforcing element consisting of a piece of suitable fabric, which may be molded to the proper shape and vulcanized solidly in the heel when the latter is made. This reinforcing fabric terminates a short distance inside of the edge of the heel, so that the heel presents an unbroken edge surface of rubber from its tread face to its attaching face. No foreign material is visible at the edges of the heel, which, therefore, appears as if it were of solid rubber while, at the same time, the full effect of the reinforcing element is secured.

When a non-reinforced concavo-convex heel, such as those of the prior art, is flattened, the neutral axis, considered on any plane of cross section, is approximately half way between the attaching face and the tread face. When the heel is flattened the rubber between the neutral axis and the attaching face is stretched, while the rubber between the neutral axis and the tread face is compressed. When the reinforced concavo-convex heel of the present invention, the attaching face of which is substantially inextensible, is flattened, the neutral axes of the heel lie substantially at its attaching face and substantially all of the rubber of the heel is compressed Thus, for a given deflection of the heel, the rubber adjacent to the tread face of a heel having the inextensible attaching face of the present invention is compressed to a much greater extent than is the rubber adjacent to the tread faces of the concavo-convex heels of the prior art, and the tendency of the new heel to return to its original concavo-convex form is correspondingly greater, producing a correspondingly tighter edge joint. From this it follows that, with the heel of the present invention, the necessary tightness of the edge joint can be secured with much less curvature than was necessary with the non-reinforced concavo-convex heels of the prior art.

With its less curvature the heel of the present invention is much easier to handle in a heeling machine, and one of the obstacles which has heretofore made it impracticable to attach concavo-convex heels by commercial heeling machinery is eliminated, namely that the heels had to be curved or dished so deeply, particularly in the larger sizes, that they could not be held and flattened accurately in the machine.

When the heel herein disclosed has been pressed flat upon the surface to which it is to be attached, the attaching nails are driven in until their heads are seated solidly upon the reinforcing, heel-stiffening element the material of which is perforable by nails. The reinforcing element is thereby nailed down tightly in contact with the surface of the heel base, or the like, with no yielding material between the heads of the nails and said surface. The reinforcing member is thus flattened and placed in a permanent state of tension and is caused to hug tightly to the surface to which it is nailed, producing a flat tread face on the attached heel and tight edge joints without the use of cement.

It is highly desirable that the tread portion of a cushion heel be soft and resilient in order to secure the best cushioning effect and the greatest wearing qualities. In the production of an all-rubber heel of the type under consideration, however, it has hereto-

fore been necessary to make some sacrifice in this respect by making the heel somewhat harder and stiffer than desired, in order that its edges, which are quite remote from the attaching nails should be drawn sufficiently tightly against the heel base and that the material of the heel should not bulge out too much between the nails and between the nails and the edge. Even with this compromise it is found that, as a result of the tendency of the comparatively soft rubber to spring back to its original curvature, the attaching nails, cannot hold the heel flat over its entire area, but that certain portions of the rubber bulge materially and consequently the tread face of the attached heel is not flat. In the heel of the present invention the body portion of the heel, including the tread portion, may be made as soft and resilient as desired, inasmuch as it is securely attached to the reinforcing, heel stiffening element, which is nailed down flat. Accordingly this softer material, which is under compression when the heel is flattened and thereby insures the maintenance of tight edge joints, cannot bulge in spots and consequently the tread face of the attached heel is flat.

Furthermore, the attaching nails may be driven nearer to the margin of the heel than has heretofore been practicable with all-rubber heels of the concavo-convex type. This is very advantageous in the production of tight edge joints and a flat tread for the reason that the rubber heel bases in common use consist of only one or two leather lifts and a rand, and there is often an unfilled space in the heel seat portion of a shoe, between the outersole and the innersole, bounded by the lasted in edges of the upper, counter and lining. If the heel attaching nails are driven within the boundaries of this space, the central portion of the heel base has a tendency to sink into the space and there is also a tendency toward the formation of a crack at the edge of the heel which tendency does not exist when the attaching nails are driven near enough to the margin of the heel to pass through the solid material which lies outside of the space above referred to.

The illustrated heel is normally of concavo-convex form on every plane of cross section, and its tread and attaching surfaces may be defined by portions of concentric spheres. Such surfaces are, therefore, parallel, and the heel is of substantially uniform thickness throughout. Modifications of this specific shape may, however, be made within certain limits without departing from the invention. Thus, to obtain the substantial benefits and advantages of the invention, it is not essential that the concavo-convex heel be concavo-convex on every plane of cross section.

The above and other features and advantages of the invention will be fully understood and appreciated from reading the following detailed description of one embodiment thereof in connection with the accompanying drawings, in which—

Figure 1 is a view of a cushion heel embodying the invention, showing its inner, or attaching, face;

Fig. 2 is a perspective view showing the heel and an unfinished heel base applied to a shoe ready for the attaching operation;

Fig. 3 is a plan view of the tread face of the heel;

Fig. 4 is a longitudinal sectional view taken upon the line 4—4 of Fig. 3, showing the heel and base in position upon the shoe sole ready for the application of the flattening pressure;

Fig. 5 is a similar view taken upon the line 5—5 of Fig. 3; and

Fig. 6 is a cross sectional view of the heel end of a shoe with the heel attached and finished.

In the drawings, 10 indicates a deformable heel which may be made of rubber or any suitable composition having the desired qualities of elasticity and resiliency and, as shown in the drawings, is concavo-convex upon every plane of cross section. One practicable form for the heel is one in which the convex tread surface and the concave attaching surface are defined by sections of substantially concentric spheres and are consequently substantially parallel. A heel of this form, when placed upon the flat outer surface of a heel base section 12, as shown in Fig. 2, will, before the application of flattening pressure, touch at three points, namely, the two breast corners and a point at the back of the heel.

The heel base 12, as illustrated, consists of a single leather lift and a rand, this being a form of base in common use on shoes which have rubber heels originally attached in the shoe factory during the process of shoe manufacture. It will be understood, however, that more than one lift may be employed in the heel base if desired or necessary to bring the entire heel to the proper height. The outer sole of the shoe is shown at 14, the inner sole at 16, and the lasted in edges of the upper, counter and lining at 18.

A substantially inextensible reinforcing element 20 is embedded in the heel flush with its concave attaching face, as shown in Figs. 1, 4 and 6. The reinforcing element 20 renders the attaching face of the heel substantially inextensible, causing the neutral axes on every plane of cross-section to lie approximately at the attaching face, all of the material of the heel at any substantial distance from the attaching face being under compression when the heel is flattened and

the greater the distance from the attaching face the greater the compression. The heel is thus stiffened so that a given amount of deformation causes a much tighter edge joint than with the concavo-convex heels of the prior art and, accordingly, a less degree of curvature is necessary to produce a satisfactorily tight edge joint. The element 20 may conveniently have approximately the same outline as the rubber heel and should extend over the greater portion of the attaching face thereof, terminating inside of the edge of the heel, so that there is an unbroken edge surface of rubber from the tread face to the attaching face of the heel. All the advantages resulting from the use of the inextensible reinforcing element are thus secured without the appearance of the heel being impaired by any visible foreign material at its edge. In a successful practical embodiment of the invention the reinforcing element 20 consists of one or more layers of suitable fabric which may be frictioned so that it shall vulcanize solidly and securely to the rubber.

In Figure 4 a plurality of jig holes 22 are shown. These have the dual function of aiding in locating the heel upon a shoe and locating the element 20 accurately in the vulcanizing mold in which the heel is made. In the manufacture of the heel the fabric stiffener is placed in the heel mold, being accurately centered therein by the mold pins which form the jig holes 22, the rubber biscuit is then placed in the mold and the process of molding and vulcanizing proceeds in the usual manner. In the molding process the element 20 is forced into close contact with the surface of the mold which gives form to the concave attaching face of the heel and is thereby molded accurately and smoothly so that its surface is flush with the said attaching face.

The principal body portion of the heel of the present invention may consist of any desired grade of rubber and may be as soft and resilient as desired at the tread face, while the form of the heel at any given time is determined by the relatively thin stiffening element 20 which lies at its inner or attaching face.

The dots 24 and 30 indicate suitable locations for the attaching nails 26, although the attaching nails may be driven anywhere within the corrugated area 28, which is provided for the purpose of obscuring any marks that may be produced by driving the nails through the rubber. The improved construction of the illustrated heel makes it practicable to place the attaching nails 26 close enough to the margin of the heel to ensure that they shall pass through the lasted in edges of the upper, counter and lining 18, while holding the rubber heel 10 down flat and in close contact with the base 12. The stiffening effect upon the heel of the element 20 is such that nails driven at the points indicated will hold it flat without any bulging between the nails or between the nails and the margin of the heel. The side nails driven at the points 24, for example, overcome the transverse curvature of the heel and the nails driven at the points 30, in the longitudinal median line of the heel, overcome the longitudinal curvature of the latter very effectively. The attaching nails are driven in until their heads are seated solidly upon the reinforcing element 20, which is thus held in a permanent state of tension. The heel is held flat upon the surface to which it is attached and nailed down tightly without any yielding material between the heads of the nails and the surface to which the heel is attached. This insures a flat tread surface and tight edge joints, particularly at the breast corners and the rear end, which are the places where the greatest difficulty exists in securing tight joints, and eliminates working of the heel upon the nails.

The space shown at 32 between the inner sole and outer sole is often left unfilled in the manufacture of the shoe and it will be apparent that a much firmer and more secure attachment will result from locating the attaching nails as described than if they were driven through this space. The whole tendency of the attaching nails is to hold the parts together tightly at the edges and to maintain the heel elements flat and level.

For convenience the term "rubber" is used in the foregoing specification and the following claims to designate the material of the body portion of the heel, but it should be understood that it is used in the sense which is customary in this art, namely, as designating any of the various resilient materials or compounds suitable for use in the manufacture of cushion heels.

Having described the invention, what is claimed as new and desired to be secured by Letters Patent is:—

1. A rubber heel normally of concavo-convex form deformable to flatness and having an unbroken edge surface of rubber from its tread face to its attaching face, having a relatively thin layer of substantially inextensible material at its attaching face so that the neutral axes of the heel lie approximately at its attaching face.

2. A deformable heel normally of concavo-convex form having an unbroken edge surface of rubber from its tread face to its attaching face, said heel having at its attaching face a layer of substantially inextensible material which is perforable by nails, said layer being relatively thin, to cause the neutral axes of the heel to lie approximately at its attaching face.

3. A deformable heel normally of con-

cavo-convex form, comprising a body portion of rubber and a substantially inextensible, nail anchoring, reinforcing element vulcanized to the body portion of the heel at its concave attaching face, terminating inside of the edge of the heel and embedded in and flush with the rubber, the area of said reinforcing element sufficiently approximating the area of said concave attaching face to prevent substantial stretching of said concave face during the application of pressure in the heel attaching operation.

4. A deformable heel normally of concavo-convex form comprising a body portion of rubber and a nail anchoring, substantially inextensible, fabric reinforcing element, said fabric reinforcing element terminating inside of the edge of the heel and being embedded in and flush with the rubber at the attaching face of the heel.

5. A deformable heel normally of concavo-convex form on every plane of cross section comprising a body portion of rubber and a nail anchoring, substantially inextensible fabric reinforcing element united to the body portion of the heel at its concave attaching face, said fabric reinforcing element terminating inside of the edge of the heel and being embedded in and flush with the rubber.

In testimony whereof I have signed my name to this specification.

GEORGE E. WARREN.

cavo-convex form, comprising a body portion of rubber and a substantially inextensible, nail anchoring, reinforcing element vulcanized to the body portion of the heel at its concave attaching face, terminating inside of the edge of the heel and embedded in and flush with the rubber, the area of said reinforcing element sufficiently approximating the area of said concave attaching face to prevent substantial stretching of said concave face during the application of pressure in the heel attaching operation.

4. A deformable heel normally of concavo-convex form comprising a body portion of rubber and a nail anchoring, substantially inextensible, fabric reinforcing element, said fabric reinforcing element terminating inside of the edge of the heel and being embedded in and flush with the rubber at the attaching face of the heel.

5. A deformable heel normally of concavo-convex form on every plane of cross section comprising a body portion of rubber and a nail anchoring, substantially inextensible fabric reinforcing element united to the body portion of the heel at its concave attaching face, said fabric reinforcing element terminating inside of the edge of the heel and being embedded in and flush with the rubber.

In testimony whereof I have signed my name to this specification.

GEORGE E. WARREN.

DISCLAIMER.

1,564,158.—*George E. Warren*, Swampscott, Mass. CUSHION HEEL. Patent dated December 1, 1925. Disclaimer filed December 16, 1926, by the assignee, *United Shoe Machinery Corporation.*

Hereby enters this disclaimer to said claims 1 and 2 of said Letters Patent, which are in the following words, to wit:

"1. A rubber heel normally of concavo-convex form deformable to flatness and having an unbroken edge surface of rubber from its tread face to its attaching face, having a relatively thin layer of substantially inextensible material at its attaching face so that the neutral axes of the heel lie approximately at its attaching face.

"A deformable heel normally of concavo-convex form having an unbroken edge surface of rubber from its tread face to its attaching face, said heel having at its attaching face a layer of substantially inextensible material which is perforable by nails, said layer being relatively thin, to cause the neutral axes of the heel to lie approximately at its attached face."

[*Official Gazette January 4, 1926.*]

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