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FOOT CUSHIONING DEVICE

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FIG. 1

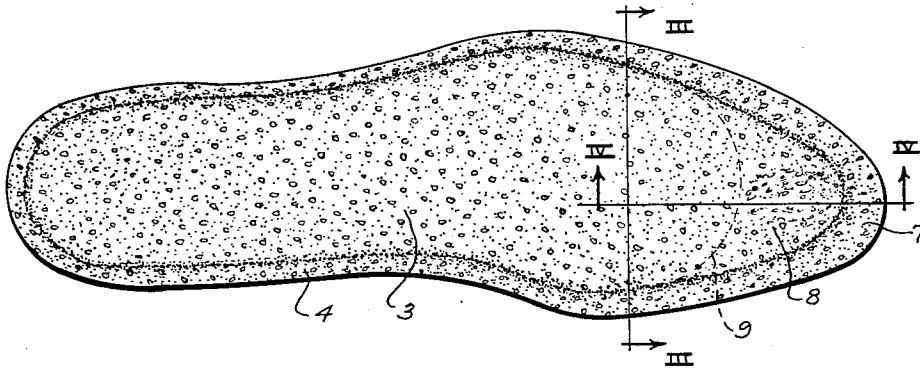


FIG. 2

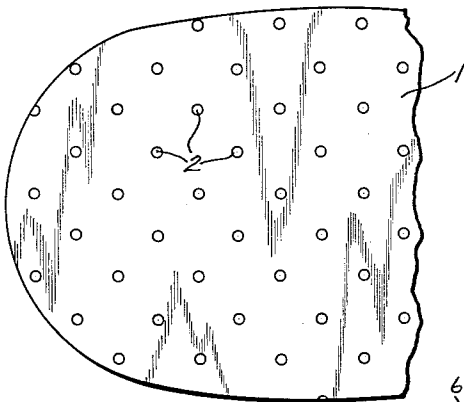
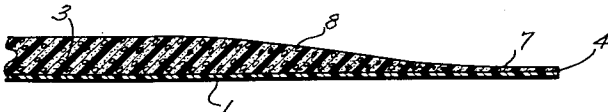


FIG. 3



FIG. 4



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## FOOT CUSHIONING DEVICE

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1 Claim. (Cl. 36-44)

This invention relates to improvements in a foot cushioning device, and more particularly to a device for disposition in an article of footwear beneath the plantar surface of the foot, the invention being highly desirable for use as a cushion type full or partial insole, although it may take other forms as will be apparent to one skilled in the art.

In the making of foot cushioning devices heretofore, and particularly foot cushioning devices such as full or partial insoles, difficulty has been experienced in constructing an insole that would lie flatly in an article of footwear such as a shoe, because of the fact that the structural insole of the shoe in most cases turns upwardly slightly in the marginal portions. Further difficulty has been experienced in providing foot cushioning devices underlying the forward part of the foot that did not cramp the toes by occupying too much space in the forward part of a shoe or the like, and thus causing a crowded condition for the toes. Extreme difficulty has also been heretofore experienced in providing a cushion type insole or other foot cushioning device that is comparatively extremely thin and yet provides adequate cushioning relief.

With the foregoing in mind, it is an important object of the instant invention to provide a foot cushioning device so constructed as to lie flatly in the shoe and overlap the edges of the structural shoe insole and compensate for the upwardly turned margins of that structural insole.

Also an object of the invention is the provision of a foot cushioning device which may be constructed in the form of a cushioning insole, and which comprises a cover layer and an underlayer of cushioning material which is secured to the cover layer by a marginal seam, the cushioning material being thicker and curving toward the upper layer inside the relatively thin marginal seam.

Also a feature of the instant invention is the provision of a foot cushioning device comprising a relatively thin cover layer, a thicker layer of cushioning material joined to the cover layer by a thin marginal seam in the nature of a lateral flange substantially in the plane of the cover layer, while the underlayer curves toward the cover layer inside the seam.

A further object of the instant invention is the provision of a foot cushioning device including a relatively thin cover layer and a thicker underlayer of cushioning material secured to the cover layer by a marginal seam in which the cushioning material is compressed to substantially the thickness of the cover, and which seam gradually widens in the forward portion of the device until it reaches maximum width at the anterior end of the device, thereby providing ample toe room within the article of footwear.

Another feature of the instant invention resides in the provision of a foot cushioning device comprising a cover layer and a thicker layer of cushioning material joined to the cover layer by a marginal heat seal seam which

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graduates in width in the forward portion of the device, reaching its maximum width at the anterior end of the device, the cushioning material being compressed in the heat seal seam and the density of the cushioning material in the widest part of the heat seal seam varying from a maximum at the anterior end of the device to a lesser amount in the inner portion of the seam at that end of the device.

Also a feature of the invention is the provision of a foot cushioning device which may preferably be made in the form of an insole, and which embodies a cover layer and a thicker layer of cushioning material, the cushioning material decreasing gradually in thickness in the forward portion thereof to merge with a relatively wide heat seal seam of considerably less thickness than the cushioning layer alone in its body portion.

While some of the more salient features, characteristics and advantages of the instant invention have been above pointed out, others will become apparent from the following disclosures, taken in conjunction with the accompanying drawing, in which

Figure 1 is a bottom plan view of a cushioning insole embodying principles of the instant invention;

Figure 2 is a fragmentary enlarged top plan view of the rear or lefthand end of the structure of Fig. 1;

Figure 3 is an enlarged transverse vertical sectional view taken substantially as indicated by the line III—III of Fig. 1, looking in the direction of the arrows; and

Figure 4 is a fragmentary enlarged vertical sectional view taken substantially as indicated by the line IV—IV of Fig. 1.

As shown on the drawings:

While the instant invention may take a number of several different forms and sizes as will be apparent to one skilled in the art, the invention lends itself quite favorably for use as a cushion insole, and by way of illustration, therefore, an embodiment of the invention has been selected for illustration and description herein which is in the form of a cushion type insole of a size to underlie the complete plantar surface of the human foot. Also, in the illustrated instance, the insole is of the type that is placed freely in an article of footwear on top of the structural insole of the footwear. It is to be understood that for purposes of clarity the invention is illustrated in Figs. 1, 3 and 4 in inverted position.

The illustrated embodiment of the instant invention comprises a relatively thin cover sheet 1 which is preferably a thermoplastic material such as an unsupported vinyl film. Preferably the sheet 1 is provided with numerous perforations 2 as seen clearly in Fig. 2.

A sheet 3 of cushioning material is secured to the under face of the cover sheet 1 preferably by a marginal seam 4, which is also preferably a heat seal seam. The cushion sheet 3 is considerably thicker than the cover sheet 1 and is also preferably a thermoplastic material, a chemical foam such as vinyl foam being highly satisfactory for the purpose.

One satisfactory example of a cushioning material which may readily be heat sealed is vinyl foam made from a liquid composition generically known as a plastisol. The plastisol is expanded preferably by the use of an inert gas, and then cured in the expanded condition to provide a lightweight structural material which is highly flexible, resilient, and possesses intercommunicating cells. The plastisol may satisfactorily be a dispersion or suspension of polyvinyl chloride resin, or a copolymer in one or more plasticizers selected from a large number of high boiling esters, for example, such as dioctyl phthalate, dioctyl adipate, dicapryl phthalate, etc.

Such material, when compared with a material such as foam latex, is more shock absorbing, more resistant to

foot acids and detergents, affords little back pressure against the foot, at least apparently provides more room in a shoe even with the same thickness of cushioning material, and is very much more durable. In addition, as stated above, it may readily be heat sealed whereas foam latex and numerous other materials cannot be satisfactorily commercially heat sealed.

The cover 1 may be of the same material, insofar as chemical constituents are concerned, as the cushion layer 3, but in the instance of the cover no expansion of the ingredients is caused, but they may be charged directly into a Banbury mill and then passed between calender rolls, which results in a very much thinner and denser product, commonly referred to as a film.

The cushion layer 3, if a foam, has intercommunicating cells, whereby during use air will be pumped into and out of, as well as through the cushion layer. This, coupled with the apertures 2 in the cover sheet 1, provides adequate ventilation for both the device and the foot during use.

The two layers or sheets 1 and 3 are preferably heat sealed together at the bounding margin only, remaining unsecured to each other in the intermediate region whereby wrinkling of the device or permanent creasing thereof during use is avoided. The heat sealing is preferably accomplished with suitable dies by way of a high frequency electronic process. With the instant invention, one of those dies is preferably so shaped and constructed as to provide a graduated effect in the region of the heat seal seam. With reference to Fig. 3, it may thus be seen that this effect causes a curving of the marginal portion of the cushion sheet 3 toward the cover sheet 1, as indicated at 5. In the actual seam, the cushion material is compressed and held compressed to substantially the same thickness as the cover sheet, as indicated at 6 in Fig. 3. Thus a thin and narrow heat seal seam 4 is provided which is in the nature of a lateral flange substantially in the plane of the cover sheet. Thus, when the finished device is placed in a shoe or the like, the curvate margin 5 of the cushion sheet 3 compensates for the upward curvature of the marginal portion of the structural insole in the shoe, while the heat seal seam 4 which is elevated above the under face of the cushion sheet 3 overlies the edge of the structural insole. Accordingly, the instant invention lies flatly in a shoe and presents a flat upper surface to the foot of a user, adequately compensating for the deviation from flatness in ordinary shoe construction. At the same time, when the body weight is placed on the device, it will yield to any protuberance or excrescence of the foot and adequately cushion the foot throughout the entire surface of contact.

Another important feature of the instant invention is best shown in Figs. 1 and 4. That is the fact that the heat seal seam 4, from a region substantially in the vicinity of the metatarsal heads in the illustrated instance, gradually widens toward the forward end of the device, the seam reaching its widest part 7 at the anterior end of the device. The widening of that seam in the anterior portion of the device of course results in the decrease in thickness of the cushion sheet in that region so as to provide adequate toe room for the user, and not cause a crowded condition within the toe portion of the shoe.

As seen best in Fig. 4, as the heat seal seam is widened in the region 7, the cushion layer 3 gradually increases in thickness toward the inner portion of the seam, and thereby the seam has a variation in density, being denser

at the outer forward edge than it is at the inner part of the wide portion of the seam. This causes a gradual lessening in the cushioning characteristic of the device toward the ends of the toes, with no abrupt change in character present.

For the purpose of aiding in the provision of ample toe room in the shoe and also to provide the lessening of cushion effect toward the tips of the toes, another structural feature is incorporated in the instant invention. This feature resides in the gradual decrease in thickness of the cushion layer in the forward portion thereof, as indicated by numeral 8 in Figs. 1 and 4. In the illustrated instance, this gradual decrease in thickness occurs from substantially the dotted line 9 shown in Fig. 1. While the decrease in thickness of the cushion sheet 3 may be molded into the sheet 3 if the same is molded, it is preferable to slice the sheet 3 from a thick piece of stock, and provide the decrease in thickness by a skiving action during the slicing operation.

It will be noted that ample toe room is provided in a shoe when the decrease in thickness at 8 of the cushion sheet 3 is coupled with the widened seam portion 7, and yet the full cushioning effect of the sheet 3 is maintained throughout the greater portion of the device.

From the foregoing, it will be apparent that I have provided a simple form of foot cushioning device which is economical to manufacture, highly durable, and which effectively compensates for the variations from a flat condition in ordinary articles of footwear, and which allows ample-toe room at all times. Further, the device may be made in any color, is extremely clean in appearance, may be laundered at will, is not adversely affected by foot acids, detergents, and the like, resists fungus, bacteria and the like, and is extremely light in weight.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

A heat sealed flat cushion insole for free disposition in an article of footwear, comprising a relatively thin flat vinyl cover sheet for disposal against the foot of the wearer and a relatively thick flat vinyl foam pad coextensive with said sheet and secured thereto by a heat seal seam along the bounding edges only of said sheet and pad, said pad having a curvate margin along the lower surface only thereof compressed to the same thickness as the cover sheet with the marginal edges of said sheet and pad being relatively flat, the heat seal seam substantially in the vicinity of the metatarsal heads being substantially wider and the curvate margin of the pad being of greater density and lesser thickness along the outer forward edge and decreasing in density and increasing in thickness a controlled distance rearwardly from said forward edge.

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