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FOOT SUPPORTING CUSHION
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2,917,846

FIG. 1

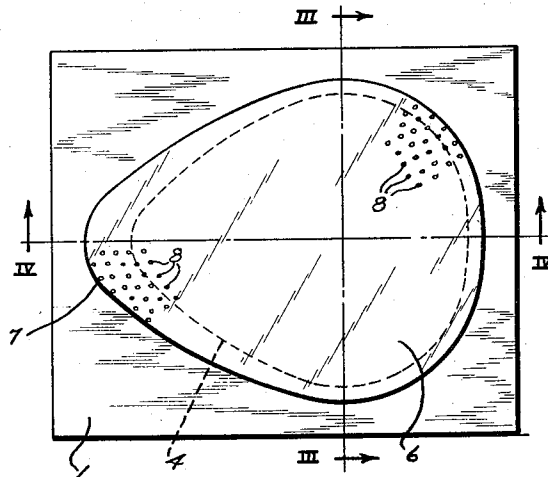


FIG. 2

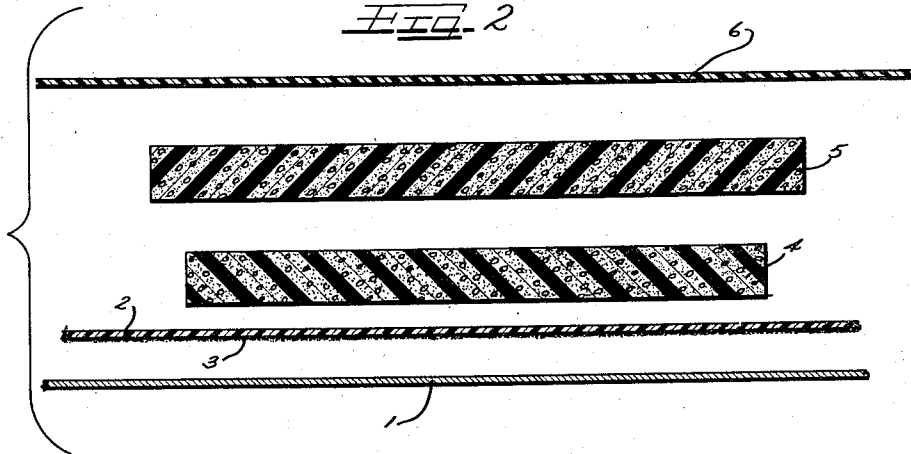


FIG. 5



FIG. 4

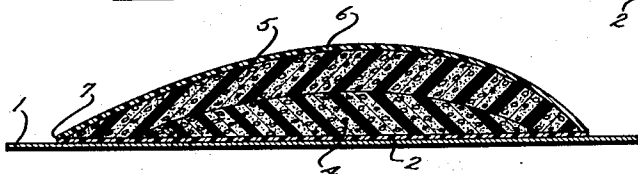
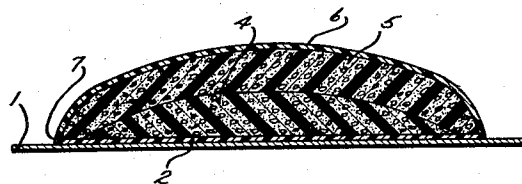


FIG. 3



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FOOT SUPPORTING CUSHION

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2 Claims. (Cl. 36—71)

This invention relates to improvements in a foot supporting cushion, the invention being highly desirable for use as a metatarsal arch support, and in slightly varying shapes may be used to alleviate callosities of the foot and lend other and various types of support where needed for particular afflictions, the device being easily and removably mounted in fixed position within the shoe or other article of footwear, and the device will obviously have many uses and purposes as will be apparent to one skilled in the art.

In the past, many and various types of foot supporting cushions have been developed, and many of these were made of single piece cushioning material shaped for the desired purpose, and a number of them were laminated. Heretofore, however, extreme difficulty has been experienced in providing a foot supporting cushion of the type that underlies the plantar surface of the foot which was exceedingly soft and comfortable to the foot, and yet supplied substantial support for the foot in the region of the particular affliction. Past experiences included the use of pads of extremely soft cushioning material, but in a short time the pads compacted and presented a firm uncomfortable surface and did not give the yielding and yet substantial support necessary to properly alleviate an affliction and still give the wearer comfort when walking. Thus, formerly known devices of this character were prone to lose their effectiveness long before their actual mechanical life expired. Consequently, notwithstanding an objectionably high original cost, these formerly known devices were rendered far more expensive by virtue of their short duration of effective use.

With the foregoing in mind, it is an important object of the instant invention to provide a foot supporting cushion that is extremely light in weight, extremely soft, and yet provides substantial and comfortable support to the afflicted area of the foot.

Another object of the instant invention is the provision of a foot supporting pad for disposition beneath the plantar surface of the foot and embodying cushioning means of foam material enclosed in cover means in such a manner that while the foam material may readily yield with foot pressure, its distortion is laterally limited, so that there always is adequate support for the foot.

A further object of this invention is the provision of a metatarsal arch supporting pad fabricated of different layers of material, and having numerous perforations in the cover layer with an under layer of foam material having intercommunicating cells, whereby ventilation is provided within the pad during its use.

Another feature of the instant invention resides in the provision of a foot supporting cushion element, wherein a layer of cushioning material is covered by a layer of similar material but of greater area, and these layers are encased within upper and lower cover members so that the larger top layer of cushioning material encloses the top face and bounding edge of the under layer, pro-

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viding a smooth convex upper surface for the finished cushion.

Also, a feature of the instant invention is a provision of the foot supporting cushion comprising a pair of superposed layers of foamlike cushioning material, the upper layer being of greater area than the lower, and both layers being encased between a pair of thermoplastic sheets heat sealed together around the bounding edge of the cushion.

Also, an object of the invention is the provision of a foot cushioning device wherein initially flat layers of cushioning material are superposed, with the under layer being of less area and disposed within the bounding edge of the upper area, both said layers being disposed between thermoplastic sheets heat sealed together around the bounding edge of the cushion in such a manner as to cause the upper layer of cushioning material to curve downwardly around the edge of the lower layer whereby the upper face of the cushion is given a smooth convexity.

Also, an object of this invention is the provision of a metatarsal supporting cushion of generally ovate shape and which comprises a pair of superposed layers of cushioning material enclosed by upper and lower thermoplastic sheets heat sealed around the bounding edge of the cushion, the lower layer of cushioning material being of less area than the upper layer, and disposed within the confines of the upper layer, but spaced farther from the narrow end of the cushion than elsewhere, the upper layer curving downwardly in all directions around the lower layer and causing a similar curvature to be effected in the lower layer, and the curvature is less abrupt toward the narrow end of the cushion.

Still a further object of the instant invention resides in the provision of a foot cushioning pad comprising top and bottom thermoplastic sheets with a pair of thermoplastic foam cushioning elements disposed therebetween, the cushioning elements being initially flat, and the thermoplastic sheets being heat sealed together around the bounding edge of the cushion in such a manner as to cause a marginal curvature in the cushioning layers whereby the finished cushion is provided with an intermediate point of greater thickness, and curves with a gradual reduction in thickness in all directions away from the high point.

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 drawings in which

Fig. 1 is a top plan view of a foot supporting cushion embodying principles of the instant invention;

Fig. 2 is a greatly enlarged central vertical sectional view in exploded form indicating how the cushion is constructed;

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

Fig. 4 is a longitudinal vertical sectional view of the structure of Fig. 1, taken substantially as indicated by the line IV—IV of Fig. 1; and

Fig. 5 is a view similar in character to the showing in Fig. 3, but illustrating a different form of construction.

As shown in the drawings:

While the instant invention is herein shown and described in the form of a supporting cushion for the metatarsal arch of the human foot, it will be understood that the device may be changed in shape without departing from the spirit of the invention so as to perform

other functions and alleviate other disorders of the foot.

With reference more particularly to Fig. 2, it will be seen that the illustrated form of the instant invention embodies four superposed pieces of material as well as a facing sheet 1 which is, of course, removed from the pad and discarded when the pad is put to use. This facing sheet may be a relatively tough impregnated paper having a release coating, parchmentized paper, cellophane or the equivalent laminated to paper or the like, or a sheet of any other suitable material capable of effectively protecting a pressure sensitive adhesive surface on the pad until it is desired to use the pad, and preferably some material that is inert to a heat sealing operation.

The pad of supporting cushion itself embodies a bottom sheet 2 of thermoplastic material which carried a pressure sensitive adhesive on its under surface. Above that sheet 2 is a lower layer 4 of cushioning material; and over the layer 4 is an upper layer 5 of cushioning material, the upper layer being of greater area than the lower layer. Over the upper layer 5 is a second thermoplastic sheet 6, these sheets and layers being superposed in the order above described. Preferably, as illustrated, the cushioning layers 4 and 5 are of considerably greater thickness than the thermoplastic sheets 2 and 6. In the illustrated instance, all the layers and sheets are of generally ovate shape, as seen best in Fig. 1.

If it is desired to catch, lock, or incorporate the edge of the upper layer 5 of cushioning material in the ultimate heat seal to be later described herein, then that layer of cushioning material is preferably a thermoplastic material. A satisfactory substance of this character is vinyl foam made from a liquid composition generically known as a plastisol which is expanded preferably by the use of an inert gas, and then cured in the expanded condition to provide a lightweight structural material that 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 alcohols, for example, such as dioctyl phthalate, dioctyl adipate, dicapryl phthalate, etc. The thermoplastic sheets 2 and 6 may also be vinyl film having the same chemical constituency as the foam, but made under a process devoid of expansion, being rolled on a calender, or the like, into a finished and considerably denser sheet.

While for manufacturing economy, the lower and smaller sheet of cushioning material 4 may be the same substance as the layer 5, it is not essential that the layer 4 be of thermoplastic material, as it is not essential that the layer 5 be of thermoplastic material unless it is to ultimately be caught in the heat seal to be later described, but either of these layers could be chemical sponge, felt, cut or molded rubber, etc.

In making the instant invention, the lower thermoplastic sheet 2 is preferably given its coating of pressure sensitive adhesive initially and before the supporting cushion has been completely formed. One suitable method of manufacture is to coat the bottom sheet with its adhesive 3 initially and then lay it over the facing sheet 1 at the start of the operation. Next the lower layer 4 of cushioning material is placed in position, and then the upper layer 5 of cushioning material is placed over the lower layer so as to extend beyond the lower layer in all directions. With an ovate metatarsal supporting cushion in mind, the upper layer 5 preferably extends beyond the lower layer 4 to a greater extent at the narrow end of the device, as clearly seen from the showing in Figs. 1 and 4. The top sheet 6 is then placed over the upper layer 5, and the top sheet is then heat sealed to the bottom sheet 2 around the bounding edge of the cushion, this heat sealing operation not affecting the adhesive 3 or the facing sheet 1 in any manner whatever. The heat seal seam 7 will be at the very bounding edge of the resultant cushion, and there will be no laterally extending flange at the heat seal.

While both the cushioning layers 4 and 5 are initially flat sheets of material of uniform thickness, the heat sealing operation is accomplished in such a manner as to curve the upper sheet 5 downwardly around the bounding edge of the lower layer, as seen both in Figs. 3 and 4. This upper layer 5, if made of thermoplastic material, may be caught in the heat seal seam, that is, incorporated in the seam in a manner tending to maintain the curvature provided. The downward curving of the upper layer also causes a similar curvature to appear in the lower layer, which is not actually secured to any layer or sheet of the structure, but is merely maintained in proper position and with the marginal curvature therein by virtue of being enclosed by the upper layer and bottom sheet 2. From the showings in Figs. 3 and 4, it will be seen that the high point or thickest portion of the resultant cushion is approximately where the section lines cross in Fig. 1, and the cushion curves so as to gradually decrease in thickness in every direction away from the high point. As seen in Fig. 4, the pad or cushion decreases more gradually in thickness, that is the curvature is flatter, from the high point toward the narrow end of the cushion than elsewhere, thereby providing a gentle lift to the foot just to the rear of the metatarsal arch.

Now it will be noted that with the instant invention, the layers of cushioning material provide an extremely soft and yielding substance beneath the foot of the user. The structure of the pad, however, with the upper layer enclosing the lower layer and the heat seal confining the layers against excessive lateral expansion, always provides adequate and sufficient support for the foot so that an optimum of softness and yet effective support is approached to a far greater degree than has heretofore been accomplished. Further, it will be noted that the instant invention is economical to manufacture, and is extremely economical to use by virtue of its long life coupled with enduring effectiveness.

In use, it is a simple expedient to remove the pad or cushion from the facing sheet 1 and mount it in proper position in an article of footwear by virtue of the pressure sensitive adhesive surface 3. Of course, the pad may be removed from that article of footwear and placed in a different shoe or the like whenever desired.

In the event a lesser lift in the region of the metatarsal arch is desired for certain patients, either of the layers 4 or 5 may be omitted.

A further feature of the instant invention should be noted, and that is that the upper sheet 6 is preferably provided with numerous perforations over its area as indicated at 8 in Fig. 1. Since the foam cushioning means has intercommunicating cells, as above mentioned, that substance will take in air and expel air due to successive applications and removals of pressure by the foot on the pad during walking, and this air will pass through the apertures 8, thus providing ventilation for both the foot and the pad.

In Fig. 5, I have illustrated a slightly different form of construction, wherein the smaller foam layer is disposed on top of the larger foam layer. In this construction, the same facing sheet 1, bottom sheet 2, and top sheet 6, as above described, are utilized. A bottom layer 9 of cushioning material of substantially the same area as the sheet 2 is superposed on that sheet 2, and a top layer 10 of cushioning material of lesser size is disposed on the layer 9. The material forming the layers 9 and 10 may be of the same character as above described in connection with the layers 4 and 5.

In the instance of Fig. 5, the top sheet 6 is heat sealed to the bottom sheet 2 around the bounding edge of the pad to form a heat seal seam indicated at 11. The larger lower layer 9 of cushioning material may be caught in this heat seal seam, if so desired. The upper layer 10 of cushioning material is disposed freely on the lower layer, and is given a curvate exterior shaping when the heat sealing operation is performed, the lower layer being

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caused to curve around its margin as seen in Fig. 5 at the same time. This manner of construction results in a pad of the same general character as that shown in Figs. 1 to 4 inclusive, but is a simpler arrangement for providing a pad of maximum thickness at a particular point. This can readily be accomplished by sizing the upper layer 10. Making that layer considerably smaller than the lower layer results in a pad definitely higher in the middle region than elsewhere, and by varying the size and thickness of the upper layer the effect may be increased or decreased as desired, depending upon the character of the affliction to be treated.

The use of the structure shown in Fig. 5 is substantially the same as that previously described.

The instant invention is an addition to the invention more fully set forth, described, and more broadly claimed in my previously filed copending application entitled "Foot Cushioning Devices," filed September 12, 1956, Serial No. 609,453.

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:

1. In a foot supporting cushion, a bottom sheet of unsupported vinyl film, a lower layer of vinyl foam overlying said bottom sheet and of lesser area than said bottom sheet, an upper layer of vinyl foam of substantially the same area as said bottom sheet overlying said lower layer, an unsupported vinyl film top sheet, and a fine line heat seal seam connecting the bottom and top sheets and defining the bounding edge of the cushion whereby the

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larger upper foam layer encloses the lower foam layer except at the bottom.

2. A foot supporting cushion appliance comprising upper and lower sheets of vinyl film, an initially substantially flat upper face and thicker sheet of vinyl foam cushioning material between said films, and a fine line heat seal seam defining the bounding edge of the appliance and joining said upper and lower sheets in the plane of the lower sheet holding the marginal portion of the initially flat cushioning sheet compressed from its initially flat upper face and curved downwardly toward the seam whereby the appliance has a convex top and flat bottom.

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