July 4, 1961 F. STÜBBE 2,990,627

HEEL LIFT

Filed Nov. 12, 1958

Fig. 1

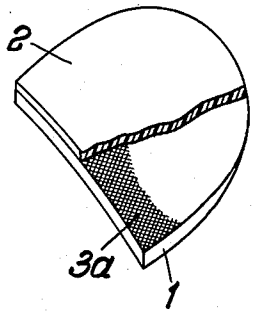


Fig. 2

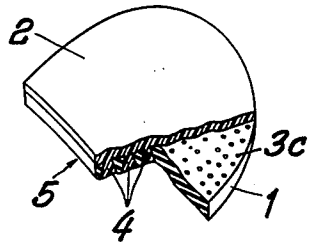


Fig. 3

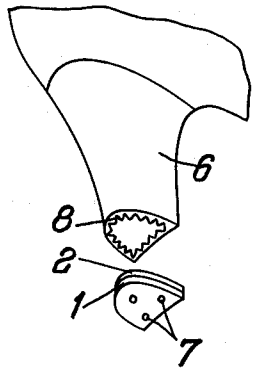


Fig. 4

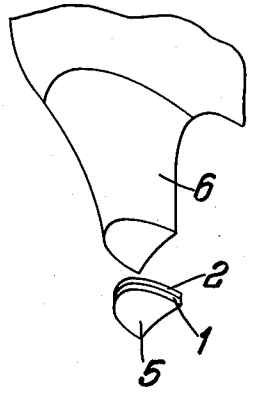
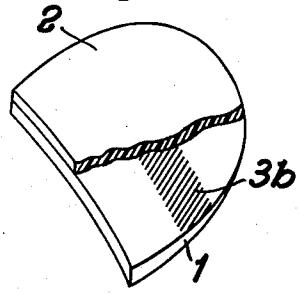


Fig. 5



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HEEL LIFT

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This invention relates to heel construction and particularly to heel lifts for ladies' shoes.

In heel construction, particularly in ladies' shoes, it is desirable that the heel lifts have sufficient softness and resiliency in order to assure minimum abrasion and maximum absorption of the shocks. If the material is too hard and brittle, abrasion will result together with breaking out or chipping of the heel. If the heel lift is too soft and too resilient, the heel lift will easily give way under load. In addition, if tacks are used to fasten the heel lift in position, the tacks cannot obtain a sufficiently reliable hold on the material if it is too resilient. In addition, if the material is too resilient, it is not possible to insure good contact between the heel lift and the lower surface of the heel body.

In order to overcome these drawbacks, it has been heretofore customary to reinforce the rubber elastic heel lift with a reinforcing layer consisting of less resilient, strong material. The hitherto known reinforcing layers consist of plywood, leather, aluminum or celluloid. In all cases such a reinforcing layer must be of a thickness which is sufficient to provide a reliable hold for the fixing tacks and to avoid any undesirable deformation of the heel lift which would impair the appearance of the heel when the tacks are driven in. The danger of such deformation or deflection is especially great in the case of heels for ladies' shoes when the heel body is provided with a covering which is drawn around the lower edge of the heel body and fixed to the lower side thereof. In such a case, the underside of the heel body does not present a plane surface but has a cavity in the middle thereof.

The reinforcing layers hitherto proposed can be readily applied in the required thickness so that the aforementioned disadvantages can be obviated in a reliable manner. There become apparent, however, a number of further drawbacks. In the case of a plywood reinforcing layer there is a danger of splintering-off of edge fibers. Also there is difficulty in cleanly trimming or finishing the edges. In the case of a sheet metal reinforcement it is practically impossible to obtain an effective adhesive bond. In contrast thereto the reinforcing layer of celluloid has proven of particular advantage due to the convexity or curvature of the outer or walking piece or layer which is brought about by the dry shrinkage of the material. On the other hand the celluloid reinforcement layer presents the difficulty that it cracks when a plurality of tacks are driven into a small piece at close spacing. In addition, the sharp outer edge of the celluloid reinforcing layer cuts into the covering of the heel. These drawbacks of the celluloid layer can be obviated by using an additional, relatively soft cushion of leather, rubber or fibrous material.

With the heels of ladies' shoes becoming more and more tapered and thinner, and with the introduction of the so-called "miniature heel lifts" new difficulties have arisen which are due to the exceptionally high specific loads to which the heel lifts are subjected. With very thin and pointed heels the heel lift with cushioned celluloid layer no longer stands up under the high loads when rubber, normal leather or fibrous material is used for the cushioning layer. The cushioning layer is ground up by the high specific pressure and is easily squeezed out at the sides so that it impairs the appearance of the heel. In addition, the durability of the elastic walking layer is

substantially reduced if it is no longer firmly supported.

On the other hand, the cushion loses the actual purpose for which it was originally intended, namely to prevent cracking of the celluloid when the tacks are driven in, and to protect the covering of the heel against cutting by the sharp peripheral edges of the celluloid.

There has therefore arisen a demand for a new reinforcing layer which does not require any cushioning and has sufficient thickness for retaining the fixing tacks, which can reliably and readily be connected to the rubber-elastic material of the heel lift especially by adhesive bonding, and which, finally, is of sufficient strength to prevent bending of the layer when the heel lift is nailed to the heel body, and also to avoid cracking of the layer when the tacks are driven in closely spaced from each other.

I have found that all the above requirements can be met by using certain synthetic material or plastics. It is therefore the principal object of the invention to provide a heel lift in which the reinforcing layer constituting the basis of the heel lift consists of plastic of high ductility and high resistance to bending, tensile and compressive stresses, having a Shore hardness which is higher than that of the rubber-elastic walking or outer layer. Of the usable plastics, polyamide has been found to be very suitable. Still more suitable is a reinforcing layer of a co-polymer of the group of tertiary polymers which contains the acrylonitrile-butadiene-styrene co-polymers. Co-polymers of this type permit of especially neat trimming and finishing of the edges and are therefore of particular advantage in connection with heels for which good appearance and neat finish and workmanship are of special importance. Moreover, the material possesses substantial advantages in comparison with hard polyvinyl chloride, normal shock-resistant polystyrene, nitrile gum mixtures and the like, especially higher resistance to tearing, higher elongation, higher resistance against shock and bending, higher surface hardness, as well as better resistance to cold and heat.

The plastic reinforcing layer may be fixed to the walking or outer layer of the heel lift in various ways, for example by bonding or vulcanizing. If bonding with an adhesive is employed it is preferred to provide the sides of the walking layer and reinforcing layer facing each other with a grooved, grained, or roughened surface.

A very efficient bond can also be obtained by inserting an adhesive foil of celluloid between the walking layer and the plastic reinforcing layer; in softened or partly dissolved condition the celluloid forms a very firm and durable bond with the usual materials of the walking layer as well as with the plastic of the reinforcing layer according to the invention.

An especially simple and also very effective connection of the two layers of the heel lift may also be obtained by liquefying the plastic material constituting the reinforcing layer and spraying it in the liquid state onto the walking or outer layer which is provided with a roughened, grooved or grained surface, whereby the plastic penetrates into the small cavities of the uneven surface and becomes firmly anchored thereto. The connection between the outer layer and the reinforcing layer can be still further improved by conveniently perforating the outer or walking layer in such a manner that the cross section of the perforations increases in the direction towards the walking or outer surface. The plastic penetrating into the perforations forms dowels after hardening, which make it impossible for the outer or walking layer to become detached from the reinforcing layer.

With the heel lift according to the invention, one is not restricted to the fixing by means of tacks. If the heel body itself is made from plastic or is covered with plastic then, according to the invention, there is also the possibility of connecting the heel lift and the heel body by

welding. However, with this type of connection the adhesion between the walking layer and the reinforcing layer of the heel lift must be assured so that the walking layer does not become detached from the reinforcing layer and gets lost. Therefore, a heel lift with a sprayed-on plastic layer which is anchored by means of dowels in perforations of the walking or outer layer, will be particularly suitable for welding to the heel body. Such welding may be carried out for example by means of a tool having separate relatively movable clamping means for the heel body and the heel lift, the heating and liquefying of the surfaces to be connected being accomplished by means of a heatable thin metal plate which is pivotably mounted on the tool.

The invention will now be described in more detail with reference to the accompanying drawings in which

FIG. 1 shows a heel lift embodying the invention.

FIG. 2 shows a modified form of heel lift.

FIG. 3 shows a heel lift and a heel body ready to be connected by means of tacks;

FIG. 4 shows a heel lift and a heel body ready to be connected by means of welding; and

FIG. 5 shows a further modified form of heel lift.

The heel lifts shown in FIGS. 1 and 2 comprise a walking or outer layer **1** and a reinforcing layer **2**. The walking layer **1** consists of rubber-elastic material and the reinforcing layer **2** consists of polyamides, or an acrylonitrile-butadiene-styrene copolymer, or of a similar plastic with high ductility and high resistance to bending, tensile and compressive stresses. The two layers may be connected with each other by means of vulcanization. In the embodiment shown in FIG. 1, an adhesive bond is used which is improved by providing the walking layer with a roughened surface *3a*, in which the plastic material becomes firmly anchored. Alternately a grooved surface *3b* (FIG. 5) or a grained surface *3c* (FIG. 2) may be used. This means anchoring is also to be recommended when the plastic constituting the layer **2** is applied to the walking layer **1** in the liquid state. However, in the latter case an even better anchorage may be obtained by perforating the walking layer **5** (FIG. 2). The liquid plastic penetrates into the perforations **4** of the walking layer **5** and forms dowels therein. It is preferred that the cross section of the perforations **4** increase in the direction towards the walking layer **5**.

FIG. 3 illustrates in perspective view the fixing of a heel lift **1, 2** to a heel body **6** by means of tacks. For this fixing the heel lift is provided with three nail holes **7**. The driven-in tacks are retained on the one hand by the reinforcing layer **2** and on the other hand in the heel body **6**. The heel body **6** is provided with a leather covering **8** which is bent around the lower peripheral edge of the heel body onto the bottom surface thereof so that it forms a raised marginal border on this surface.

FIG. 4 illustrates another method of fixing the heel lift **1, 2** to the heel body **6** which is made from plastic. If the heel body is provided with a covering this is cut off even with the bottom surface of the heel body. The heel lift **1, 2** is connected with the heel body **6** by welding. This method of connection is possible because the adjacent surfaces of the heel lift and of the heel body are both made of plastic.

I claim:

1. A heel lift adapted to be fastened on a ladies' heel, said heel lift comprising an outer walking layer of wear resistant elastic material and an inner reinforcing layer bonded to said walking layer, said inner layer comprising a plastic material having high ductility and high resistance to bending, tensile, and compressive stresses and having a Shore hardness higher than the elastic material comprising the outer layer.

2. The heel lift set forth in claim 1 wherein said plastic material comprises polyamide.

3. The heel lift set forth in claim 1 wherein said plastic material comprises an acrylonitrile-butadiene-styrene copolymer.

4. A heel lift adapted to be fixed to the lower end of a ladies' heel, said heel lift comprising an outer walking layer of wear resistant elastic material and an inner reinforcing layer of elastic material formed in situ on the outer layer, said plastic material having a high ductility and high resistance to bending, tensile and compressive stresses and a Shore hardness which is higher than that of the elastic material comprising the outer layer.

5. A heel lift adapted to be fixed on the lower end of a ladies' heel, said lift comprising an outer walking layer of elastic material, said layer having an outer surface defining the walking surface of the heel lift, said outer layer having perforations therein extending from the inner surface to the outer surface thereof, the cross section of said perforations increasing from the inner surface to the outer walking surface thereof and an inner reinforcing layer of plastic material formed in situ on the inner surface of the outer layer with portions of said plastic material filling said perforations in the outer layer thereby anchoring said inner layer to said outer layer, said plastic material having a high ductility and high resistance to bending, tensile and compressive stresses and a Shore hardness greater than that of the elastic material comprising the outer layer.

6. In ladies' shoes, the combination comprising a heel body having the lower end thereof made of plastic and a heel lift comprising an outer walking layer of wear resistant elastic material and an inner reinforcing layer of plastic material bonded to the outer layer, said plastic material comprising the reinforcing layer having a high ductility and high resistance to bending, tensile and compressive stresses and having a Shore hardness which is higher than that of the elastic outer layer, said heel lift being fastened to said heel body by fusion of the plastic of said heel body with the plastic material of said inner layer of said heel lift.

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