Nov. 7, 1944. R. B. HARRISON 2,361,941

REINFORCED INSOLE AND METHOD OF MAKING THE SAME

Filed Oct. 17, 1942

Fig. 1.

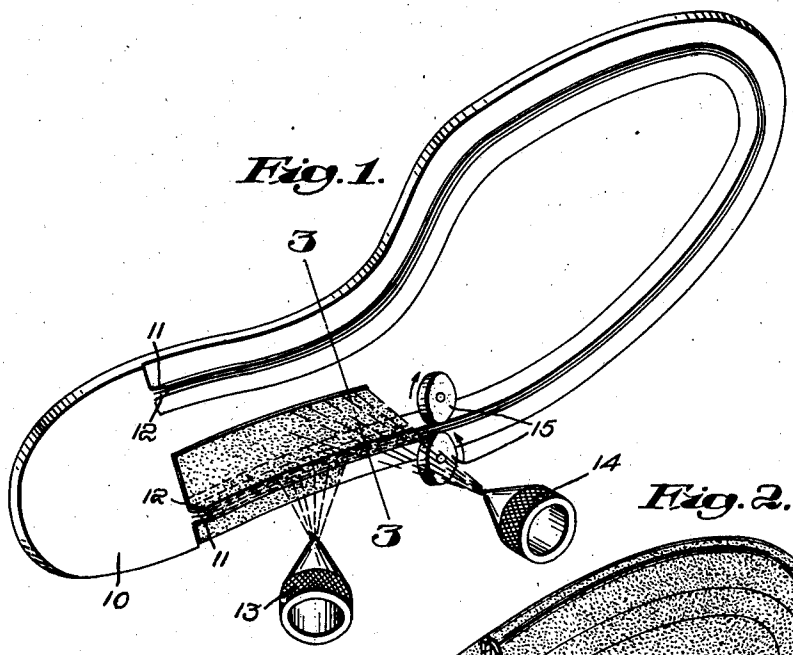


Fig. 2.

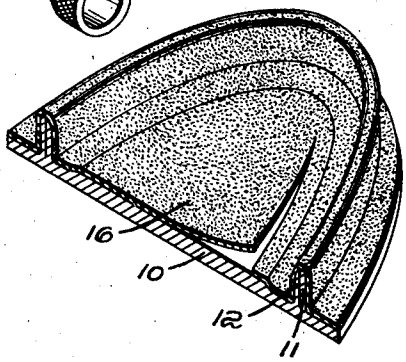


Fig. 3.

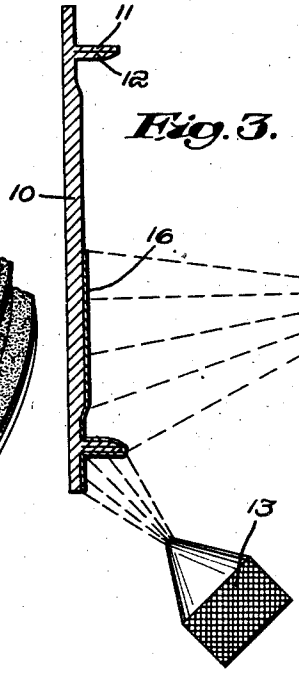
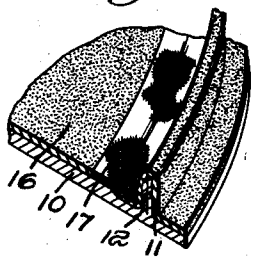


Fig. 4.



Inventor:
Raymond B. Harrison.
By Kenway & Witter
Attorneys

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REINFORCED INSOLE AND METHOD OF MAKING THE SAME

Raymond B. Harrison, Dover, N. H., assignor to Beckwith Manufacturing Company, Dover, N. H., a corporation of New Hampshire

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5 Claims. (Cl. 36—22)

This invention relates to ribbed insoles for shoes, and consists in an insole having an improved rib-reinforcing structure and in a novel process of preparing the said insole.

Heretofore it has been the practice to reinforce the ribs of insoles by adhesively securing a sheet of "Gem" duck or canvas to the body of the insole, tucking it into the angle of the rib, pressing or setting it in adhesive contact with one or both walls of the rib and finally trimming its upstanding portions flush with the free edge of the rib. In this way the strength of the rib is greatly increased, particularly at its root through which the inseam is subsequently passed, and where the lasting stress must be met. While such reinforcement is structurally satisfactory it is wasteful of duck, slow because it requires four or five consecutive and related operations if done properly and expensive because it demands considerable skill and experience on the part of the operator.

I have discovered that a reinforcing ply of improved character may be applied to a ribbed insole blank much more quickly and inexpensively than adhesive fabric or any other material heretofore known, thus eliminating the disadvantages above discussed and deriving certain shoemaking advantages which will be pointed out hereinafter.

The process of my invention is characterized by applying to the rib and adjacent insole surface a liquid coating of a resinous monomer and then causing the liquid of said coating to polymerize into a solid continuous adherent sheet reinforcing the portions of the rib and insole to which the liquid coating was applied.

The insole of my invention, accordingly, comprises a leather or fibrous body with upstanding ribs projecting therefrom, and a solid water-resistant or waterproof sheet of polymerized resinous plastic material closely adhering to the surface of the insole body adjacent to the ribs and extending continuously over the ribs as a reinforcing and stiffening envelope. The reinforcing sheet may extend continuously across the body of the insole throughout its length or it may be restricted to narrow zones that do not overlap except in the shank of the sole.

As an optional feature I may embed in the coating before it hardens a strip of textile material in any desired location and thus amplifying the thickness of the insole body as well as restricting the elasticity of the resinous reinforcing ply.

Various resinous plastics may be employed within the scope of my invention provided only that they are capable of being laid down on the insole in liquid form, that they may be polymerized in situ by drying or heating or by radiation, and that they may be thus converted into a solid tough adhesive sheet. Whether the solution is applied by spraying, brushing or rolling is a matter of secondary importance only depending on the current requirements of the industry and all within the scope of my invention.

These and other features of my invention will be best understood and appreciated from the following description of a preferred manner of putting it into practice, selected for purposes of illustration and shown in the accompanying drawing in which—

Fig. 1 is a view in perspective of a ribbed insole blank in process of treatment,

Fig. 2 is a fragmentary view in perspective of a reinforced insole, showing a portion of the reinforcing sheet separated from the body of the insole,

Fig. 3 is a cross-sectional view on an enlarged scale on the line 3—3 of Fig. 1, and

Fig. 4 is a fragmentary view in perspective suggesting the insertion of a textile strip in the reinforcing coating.

The drawing illustrates the application of the plastic coating by a spraying process to an insole body 10 which has been channeled in the usual manner to provide insole lips 11 and 12. These are herein shown as turned up and cemented together to form the continuous rib required in the manufacture of Welt, Littleway and some styles of Compo shoes.

In applying the liquid plastic to the insole a machine may be employed having an outside nozzle 13, an inside nozzle 14 and a pair of rotary feed rolls 15 for compressing the rib and feeding the sole past the nozzles. The nozzles and feeding rolls only are shown in the accompanying drawing. Any machine of more or less conventional design may be employed for this function. As the feed rolls 15 advance the sole liquid plastic is sprayed through the nozzle 13 upon the outer wall of the rib and feather of the insole, while from the inner nozzle 14 the liquid is similarly sprayed upon the top and inner wall of the rib as well as the surface of the insole blank between the ribs. The combined action of the nozzles results in the spreading of a thick coating of liquid plastic upon the selected areas of the insole. The insole is then removed from the machine and the liquid coating polymerized by suitable treatment so that the coating is converted to a tough homogeneous solid sheet or integument, firmly and adhesively

united to the areas upon which it has been deposited.

If desired two or more coatings may be applied, but in all cases the result is a tough contiguous integument which is worked accurately into the angle of the insole rib, about the feather of the insole and continuously across its face between the ribs. The transformation of the plastic from liquid to solid form takes place in situ and accordingly provides a skin-fitting, reinforcing integument conformed perfectly to the contour of the insole and the ribs. The reinforcing function of the integument is especially effective at the base of the rib where the needle strikes in the inseaming operation.

While the insole blank may be channeled and the lips cemented and then turned up as above outlined, it may be desirable in some cases to apply a wide band or zone of liquid plastic to the insole before turning up the channel lips, thereby utilizing the plastic coating as a cement in the formation of the rib. This procedure places a band of polymerized plastic upon the face of the insole, but will leave uncoated strips on both sides of the rib. When the rib is formed in this manner, a second coating step may be carried out upon the upstanding walls only of the rib and the bands in the insole left bare by the turned up lips. The liquid plastic applied in this manner merges with the plastic already applied and results in a contiguous reinforcing integument as before.

If it is desired to incorporate a non-stretching element in the reinforcement a tape 17 may be placed in the liquid or semi-liquid band adjacent to the inner wall of the rib and adhesively incorporated in the plastic during the polymerizing step. This construction is suggested in Fig. 4.

As already noted, my invention contemplates the employment of any suitable plastic or plastic compound. The best compound now known to me comprises 55% low viscosity ethyl cellulose plasticized with 45% "Hercolyn," which is the trade name of hydrogenated methyl abietate. Other suitable plastics are cellulose acid butyrate, many of the vinyl compounds, such as vinyl acetate or vinyl chloride, polystyrene or methyl methacrylate. These resinous plastics may be liquefied and adjusted as to viscosity by the addition of solvents and plasticizers or may be otherwise compounded so that they may be readily applied to the insole blanks and may be polymerized conveniently and rapidly into solid phase. Ethyl cellulose or Vinylite a co-polymerization of vinyl chloride and acetate, may be plasticized with 40% to 50% castor oil.

The coated insoles may be now dried, heated, radiated or acid treated according to treatment best calculated to cause polymerizing of the applied compound. In some cases it is expedient to carry the coated insoles on a conveyor through a short tunnel in which they are subjected to intense ultra violet radiation. In other cases mere drying out of the solvent will induce the desired polymerization.

When the ethyl-cellulose-Hercolyn compound is used a light-brown, semi-transparent integument is formed upon the insole having a thickness of 0.03 to 0.04 inch. It adheres so firmly to the fibre of the leather that when forcibly stripped away it carries the imprint of the leather texture. It is exceedingly tough and flexible in itself although it has a desirable stiffening effect upon the insole when adherently bonded to it. It presents a hard smooth surface between the ribs over which the needle of the inseaming machine tends to slip so that it will strike directly in the angle of the rib without tendency to dig. It provides a very effective reinforcement beneath the inseam stitches and reinforces the insole as a whole against the lateral lasting strain. It laso provides a waterproof ply in the shoe bottom which is separated from contact with the foot of the wearer by the body of the insole.

Having thus described my invention I claim as new and desire to secure by Letters Patent:

1. The process of making ribbed insoles which includes the steps of channeling a leather insole blank, turning up and cementing the channel lips in face to face contact to form a single upstanding rib, then applying a liquid resinous monomer continuously to the exposed surface of the rib and to the body of the insole at the base of the rib, and finally converting by polymerization the liquid coating in situ into a solid continuous sheet adhering closely and continuously to the rib and body and providing a tough and resilient stitch-retaining reinforcement directly combined with the insole.

2. A reinforced insole comprising a leather sole body with upstanding rib portions projecting therefrom adjacent to opposite edges of the insole, and a solid layer of polymerized resinous plastic material applied in liquid form and closely and continuously adhering to the surface of the insole adjacent to the rib portions and extending continuously over the rib portions as a reinforcing and stiffening envelope.

3. A reinforced insole comprising a body having an upstanding rib projecting therefrom, and a solid layer of polymerized vinyl compound applied in liquid form adhering to the insole body and extending into the angle of the rib and along the inner wall of the rib, said layer being in continuous intimate contact with the insole body and rib throughout their contiguous faces and providing a reinforcing integument for stitches passing through the base of the rib.

4. A reinforced insole comprising a leather sole body having an upstanding rib, and a continuous layer of compounded ethyl cellulose and hydrogenated methyl abietate applied in liquid form to the insole and polymerized and presenting a solid and tough integument enveloping in continuous adhesive contact the said rib and adjacent feather of the insole, said layer stiffening the insole feather, supplying a reinforcement for the rib and providing a smooth hard surface adjacent to the root of the rib tending to direct the needle to the angle at the base of the rib in the inseaming operation.

5. A reinforced insole comprising a fibrous body having an upstanding rib projecting therefrom, and a solid layer of polymerized resinous plastic material applied in liquid form, adhering to the insole body and extending into the angle of the rib and along the inner wall of the rib, said layer being in continuous intimate contact with the insole body and rib throughout their contiguous faces and providing a tough flexible reinforcing integument for stitches passing through the base of the rib.

RAYMOND B. HARRISON.