Nov. 19, 1935. W. E. WOODMAN 2,021,163

SHOE AND INNERSOLE AND METHOD OF MAKING THE SAME

Filed March 7, 1934

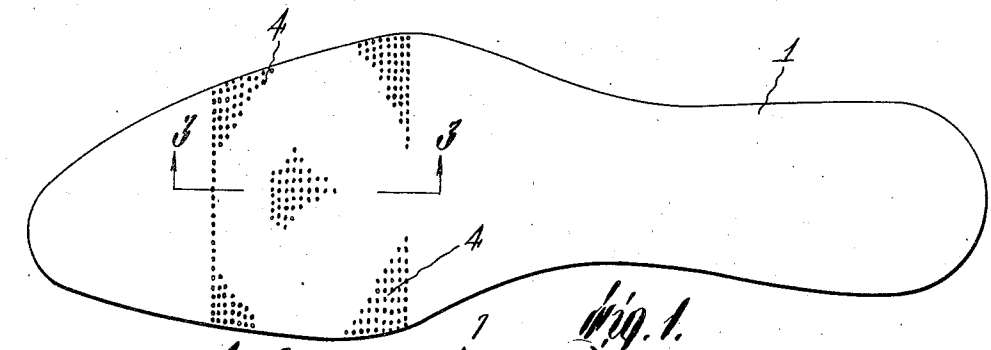

Fig. 1.

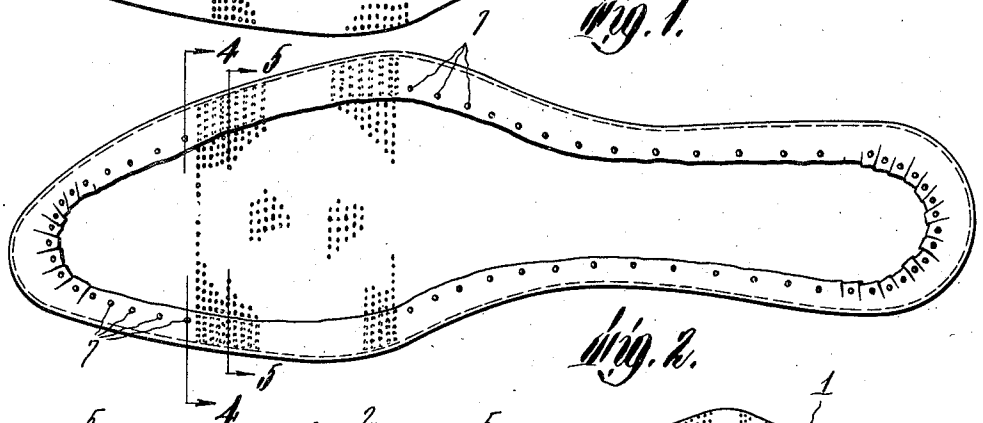

Fig. 2.

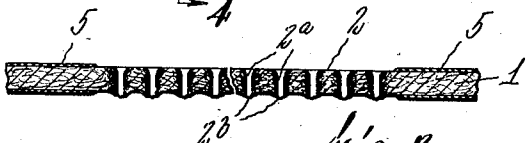

Fig. 3.

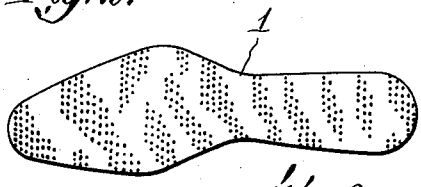

Fig. 9.

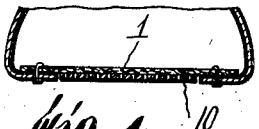

Fig. 4.

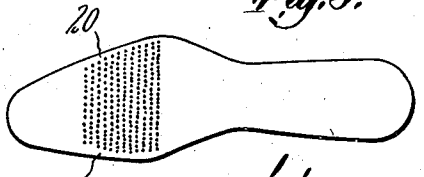

Fig. 10.

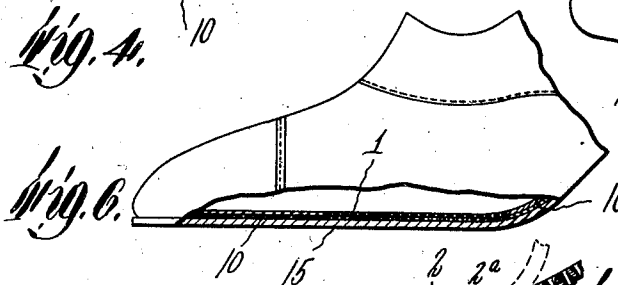

Fig. 6.

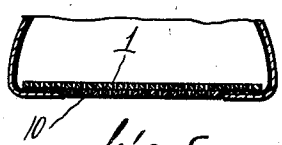

Fig. 5.

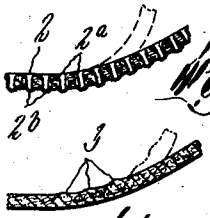

Fig. 7.

Fig. 8.

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SHOE AND INNERSOLE AND METHOD OF MAKING THE SAME

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Application March 7, 1934, Serial No. 714,381

10 Claims. (Cl. 12—142)

This invention relates to shoe construction, and more particularly to the innersole and to its attachment to adjacent parts.

An important feature of the invention relates to the treatment of the shoe innersole to increase its flexibility, more particularly in the fore part where flexibility is desirable, and at the same time to provide ventilation, this treatment of the innersole also aiding in the case of a cement process shoe in the securement by the cement of adjacent parts thereto. If desired, also, the heel portion or toe portion, or both, of the innersole may be so treated as to increase the stiffness of these parts thus to avoid, at least in some cases, the necessity of using a tuck at the heel end, or to increase the strength of the toe portion of the shoe, as may be desired.

By the use of this invention, increased flexibility and ventilation, both particularly desirable in cement process shoes and often desirable in shoes of other types are obtained.

This invention is also of particular advantage, though not limited to, innersoles constructed of other materials than leather.

In accordance with this invention the innersole, at least in the ball portion, is pricked as by one or more needles so as to form closely spaced small holes therethrough which provide for flexibility and ventilation, the needles also acting to compress the stock around the margins of the needle holes and cause that side of the innersole from which the needle, or needles, emerge to become substantially roughened. This roughening acts to provide a better bond for the cement by which other shoe parts may be secured thereto.

If desired the toe or heel portion, or both, may be subjected to a treatment with a coating of a stiffening agent, or, if desired, the needling operation may be extended over other portions of the shoe than at only the fore part.

For a more complete understanding of this invention reference may be had to the accompanying drawing in which

Figure 1 is a plan view of an innersole suitable for use in a Mackay, or cement process shoe, the innersole being needled in a zone across the fore part of the shoe, and at the ball.

Figure 2 is an inverted plan of a lasted shoe having an innersole such as is shown in Figure 1.

Figure 3 is a fragmentary section to an enlarged scale on line 3—3 of Figure 1, and shows the end portions of the innersole stiffened.

Figures 4 and 5 are fragmentary sections on lines 4—4 and 5—5, respectively, of Figure 2.

Figure 6 is a fragmentary view, partly broken away, of the forward portion of a shoe utilizing an innersole having a needled fore part.

Figures 7 and 8 are somewhat fragmentary views illustrating the difference in flexing of a needled and an unneedled innersole.

Figure 9 shows to a smaller scale an innersole needled over its entire area.

Figure 10 is a plan of an innersole of the general type shown in Figures 1 and 2, but prepared for tack or staple lasting throughout.

Referring first to the construction shown in Figures 1 to 7, at 1 is indicated an innersole blank comprising a flat sheet of innersole material such as is suitable for use in connection with shoes of the Mackay or cemented process types, though it will be evident that many of the desirable features of this invention may be incorporated in innersoles constructed and intended for other types of shoes. More particularly this invention has been developed in connection with innersoles made from materials other than leather, such, for example, as those formed from cellulosic fibrous material felted together into sheet form, as on a papermaking machine. Such material may, for example, be that disclosed in the Richter Patent No. 1,891,027 of December 13, 1932.

One of the disadvantages often found in connection with shoes of the cement process type is a tendency for the soles to be stiff. In accordance with the present invention, that portion, at least, of the innersole in which flexibility is particularly desirable, that is, in the fore part of the shoe at the ball, is subjected to a pricking or needling operation by which small holes are made closely spaced over the desired area. The pricking operation may be accomplished by the use of one or more needles as in a sewing machine, the innersole being fed through the machine past the needle or needles in closely spaced paths a sufficient number of times to produce the desired extent of pricking or needling, or if desired, the operation may be performed in a single step using a gang of closely spaced needles. The pricking operation causes the fibrous material to be pressed down and compacted around the margins of the holes where the needles enter as at 2*a*, and causes those fibers adjacent to that surface of the material from which the needles emerge to protrude therefrom as at 2*b*, thus roughing up that face of the material and rendering it more suitable to receive the cement, thus to produce a good bond with the adjacent portions of the shoe. Likewise, the turning in of the fibers adjacent that surface of the material at which the needles are passed into it so draws the sur-

face portions together that when the material is flexed, as shown at Figure 7, with that side of the material at which the needles entered, as at 2, on the concave side of the flexure, there is little or no crinkling or creasing of the surface. This crinkling or creasing is otherwise very apt to occur in material of this general nature, particularly when it is fairly heavy and the flexure is considerable, this crinkling or wrinkling being illustrated by the roughened surface shown at 3 in Figure 8.

As shown in Figure 1 this pricking operation is carried out throughout a zone of substantial width as at 4 which extends laterally of the innersole across the ball portion beginning preferably just backwardly of the break line of the shoe.

If desired the end portions of the innersole may be treated by a suitable stiffening compound such as a gum lacquer, or the like, and it may be applied by dipping the innersole into such a treating liquid. This has been illustrated in Figure 3 by the coating 5, which is shown applied to both end portions of the innersole and approaching the needled portion. Where such a stiffening agent is used through the heel and shank portions of the innersole, in many cases the use of a separate stiffening tuck may be entirely dispensed with, although if desired, such a tuck may be used in addition, in which case a very stiff heel seat and shank portion of the shoe results. Treatment of the toe end of the innersole may also be found desirable in order to strengthen and stiffen this portion of the shoe.

Besides increasing the flexibility of the innersole, the pricking or needling operation also produces ventilating openings therethrough so that the foot may "breathe" more freely.

When the innersole such as is shown in Figure 1 is incorporated in a shoe the upper materials may be turned over and lasted to its margin, and as shown in Figure 2 those portions of the shoe rearwardly and forwardly of the needled zone may be secured in position by suitable fastenings such as tacks or staples, tacks being illustrated in this figure, as at 7. Due to the needle perforations at the margins of the needled zone, it is preferable to employ other means of securing the upper materials during the lasting operation at these areas. Preferably this is done by applying a marginal coating of a cement such as a latex cement to one, or both, of the confronting parts, which comprise the innersole and the upper materials, and pressing them together, no tacks or other fastening means being used. This is shown best in Figures 2 and 5.

In Figures 4 and 5 a filler is shown between the inner edges of the upper materials and between the inner and outer soles, and against which the outer sole may be laid. While plastic compositions of known types may be used for this purpose, preferably the filler comprises a properly shaped piece of material similar to that employed for the innersole. Such a piece is illustrated at 10 in Figures 4 and 5, and where such material is used it is desirable that this be needled similarly to the innersole, and it may be found desirable to needle this over its entire area rather than over that portion only which corresponds to the needled portion of the innersole. The projecting fibers on the roughened face of the innersole, facing the filler, co-act therewith more or less to enter the perforations of the filler piece thus to lock these two portions together, preventing slippage, and at the same time affords the desired breather or ventilator openings which extend through the innersole and the filler piece to the outer sole. Preferably the roughed face of the filler piece faces outwardly, particularly in the case of cement process shoes, since this affords a better bond for the cement. The cement is applied to the margins of the upper which have been lasted in over the innersole and to the adjacent edge portions of the filler, preferably the inner areas of the filler being free from cement to take advantage of the flexibility of the innersole and filler produced by the pricking operation, and since the adhesion of the outer sole is sufficient without cementing over the central areas of the outer sole.

The outer sole is shown at 15 in Figure 6, and also in this figure is shown the forward end of a tuck at 16 which may be used in addition to or in lieu of the stiffening treatment indicated at 5 in Figure 3. Of course, the outer sole may be secured by other means, as, for example, Mackay stitching, if desired, and where the needling is employed in connection with innersoles of shoes of other types such as welts, for example, the outer sole may be secured in its usual manner.

Instead of needling only in a lateral zone across the fore part of the inner sole, in some cases it may be desired, either for flexibility or ventilation, or both, to needle over a more extended area, or even over the entire innersole, as has been indicated in Figure 9.

Should it be desired to tack or staple last the fore part, the pricking or needling may be omitted in the margin of the innersole, leaving unperforated marginal zones as shown at 20 in Figure 10, through which the tacks or staples may be driven during the lasting operation.

From the foregoing description of certain embodiments of this invention, it should be evident to those skilled in the art that various changes and modifications may be made without departing from the spirit or scope of this invention as defined by the appended claims.

I claim:

1. A shoe innersole having holes pricked therethrough over a substantial area of the fore part and treated with a stiffening agent rearwardly of said area.

2. A shoe innersole having holes pricked therethrough over a substantial area of the forepart and treated with a stiffening agent forwardly of said area.

3. A shoe innersole having holes pricked therethrough over a substantial area of the fore part and treated with a stiffening agent rearwardly and forwardly of said area.

4. A shoe having an innersole having an area at about the ball portion pricked through and presenting a substantially roughened bottom face due to such pricking, upper materials lasted over and secured to said innersole, and another sole member cemented to said roughened face inwardly of the upper margins.

5. A shoe having an innersole pricked through over substantially its entire area, said pricking forming a substantially roughened face, and upper materials cemented to the margins thereof on said roughened face.

6. A shoe having an innersole having an area pricked through inwardly of its edges, said pricking forming a substantially roughened face, upper materials secured to said edges outwardly of said area, and a sole member cemented to said face.

7. A shoe comprising an innersole having holes pricked therethrough over a lateral zone at the

ball portion and forming a roughened surface on one face of said innersole in said zone, upper materials lasted over and secured to said innersole by cement at said roughened surface, and fastening elements securing said upper materials to said innersole elsewhere than at said zone.

8. A shoe comprising an innersole having holes pricked therethrough over a lateral zone at the ball portion and forming a roughened surface on one face of said innersole in said zone, upper materials lasted over and secured to said inersole by cement at said roughened surface, fastening elements securing said upper materials to said innersole elsewhere than at said zone, and another sole member cemented to said innersole at said zone to said roughened surface.

9. A shoe having an innersole and another sole, upper materials having their margins secured to said innersole, said innersole having holes pricked therethrough in a zone extending thereacross at the forepart of the shoe, said pricked holes leaving a roughened surface on one face of said innersole, said innersole being stiffened forwardly and rearwardly of said zone, and said other sole being cemented to said innersole and facing said roughened surface.

10. The method which comprises securing to the bottom of a last an innersole having a lateral zone at the ball portion provided with closely spaced holes therethrough, pulling an upper over the last and laying its margin over the margin of said innersole, and securing said margins of said upper and innersole together by cement along the ends of said lateral zone, and elsewhere by fastening elements.

WILBUR E. WOODMAN.