Aug. 13, 1940. H. G. LUMBARD 2,211,509

SHOEMAKING

Filed Nov. 17, 1938

Fig. 1

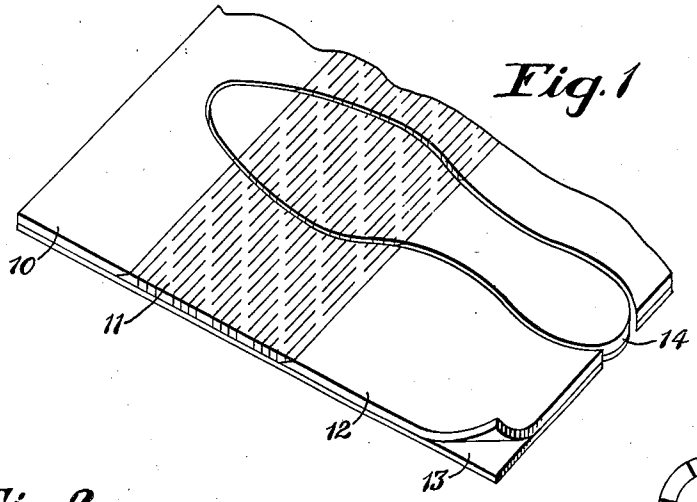
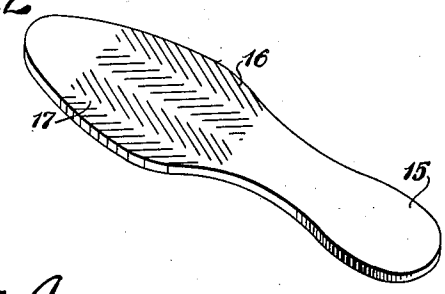



Fig. 2



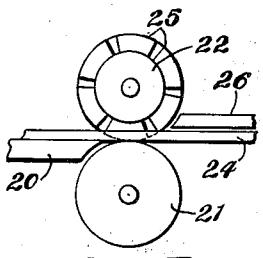




Fig. 3

Fig. 4

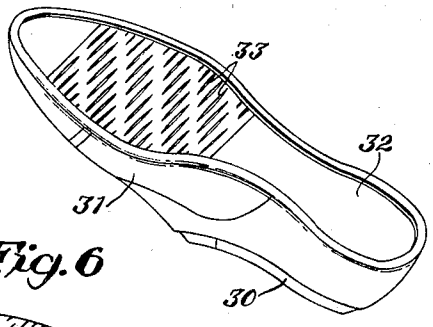
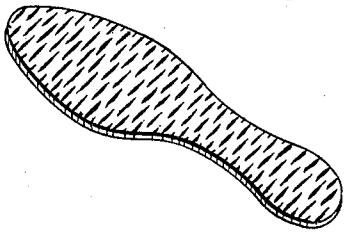



Fig. 6



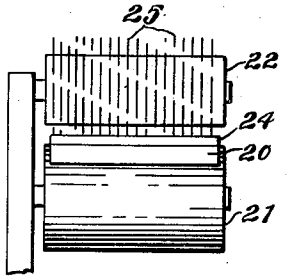



Fig. 5

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# UNITED STATES PATENT OFFICE

2,211,509

## SHOEMAKING

Henry G. Lumbard, Auburn, Maine

Application November 17, 1938, Serial No. 240,987

2 Claims. (Cl. 36—43)

The present invention relates to shoemaking and comprises an improved flexible shoe having incorporated in its structure an insole slashed in a novel manner.

The most important object of the invention is to provide an insole by means of which an unusually high degree of flexibility can be imparted to any desired portions of a shoe. Flexibility is of paramount importance especially in women's shoes, and workers in the shoemaking art have long experimented with various methods of construction, all tending toward the goal of flexibility. The most serious limitation on flexibility has been that a shoe having a thin sole or combination of soles is uncomfortable, though flexible, because pebbles and other objects underfoot can be felt by the wearer.

Another object of the invention is to provide a shoe with an insole which, though extraordinarily flexible, is also sufficiently thick and resilient to be comfortable and to guard the foot of the wearer from irregularities underfoot.

A further object of the invention is to provide a shoe with a flexible insole combined with a cushion for increasing the comfort of the finished shoe.

To these ends the insole either wholly or in part may be provided with a multiplicity of short through and through transverse slashes, some of which extend to and intersect the edges of the insole. The slashing or slitting is so thoroughly done that the sole may be stretched longitudinally to open the slashes and this may be done while the sole remains flat without tendency to curl or buckle. Ordinary slashing either fails to penetrate the entire thickness of the insole or is confined to the central portion of the sole blank so that a solid maginal band is left in the scle, with the result in either case that the insole cannot be stretched. An insole which has been treated according to the present invention may be united in face to face relation with a resilient layer of cork and rubber or other resilient composition. The cushion layer thus provided serves not only to cushion the foot but also as a backing to support the slashed ply of the insole while at the same time allowing the insole to be stretched.

An important advantage resulting from practicing the process of the invention is that the insole material is increased in area after slashing. Therefore it is possible to save material and reduce the cost of manufacturing by slashing at least a portion of the material used in the insoles in the particular manner above discussed.

These and other features of the invention will be more readily understood and appreciated from the following detailed description of preferred embodiments thereof, selected for purposes of illustration and shown in the accompanying drawing, in which:

Fig. 1 is a view in perspective showing an insole died from sheet material according to my invention,

Fig. 2 is a view in perspective of an insole constructed according to another embodiment of the invention,

Fig. 3 is a view in side elevation showing the operation of slashing a portion of the insole,

Fig. 4 is a view in perspective of a shoe lasted according to the invention,

Fig. 5 is a view in front elevation of the apparatus shown in Fig. 3,

Fig. 6 is a view in perspective of an insole slashed throughout its area.

One form of the invention is illustrated in Figs. 1 and 4 wherein an upper layer or ply composed of three contiguous bands or strips 10, 11 and 12 of material, such as artificial leather or paper board, is united in face to face contact with a layer of more resilient material 13 such as sponge rubber or ground cork and rubber. The central strip 11 of the upper layer is slashed either before or after being united with the side bands 10 and 12. The slashing operation in accordance with my invention consists of cutting through short transverse slashes in the strip 11 the slashes being separated by short bridges of solid material. One satisfactory form of slashing mechanism is shown in Fig. 3 wherein a feed table 20 is located adjacent the bite of two rolls 21 and 22. The lower roll 21 serves as a feed roll and rotary cutting bed and the upper roll 22 is provided on its circumference with a series of short radially disposed circumferential knives 25. A stripper 26 is disposed on the far side of the rolls 21 and 22 to insure separation of the treated strip from the slashing roll. As shown, the knives 25 penetrate in staggered relation entirely through the material 24 which is being fed between the rolls. As will be seen from an inspection of Fig. 6, the slashes in any two adjacent rows are staggered so that substantially the entire width of the insole is interrupted by the slashes of the two rows. The staggering of the slashes eliminates the formation of strips or bridges of unslashed material running longitudinally of the sole and tending to prevent the insole from becoming perfectly flexible.

Following the operation of slashing the central strip 11 of the composite sheet, a series of in-

soles is died out either before or after the upper layer is united with the cushion layer 13, and it will be apparent that some of the slashes extend through the edges of the upper ply 11 of the insole thus cut out. It is advantageous to form the side bands 10 and 12 of material which is stiffer than that employed for the central strip 11, and, since it is generally desirable that the ball portion of the shoe should be the most flexible zone of the shoe bottom, the insoles are included in the bands 10 and 12 and are cut so that the heel, shank, and toe portions are relatively stiff—in contrast with the extraordinarily flexible ball portion which is cut from the central strip 11. It is possible to save material by cutting sole blanks first from the strips 10, 11 and 12 and uniting the blanks with corresponding sole blanks cut from the cushion layer 13. It is possible to cut the cushion layer 13 from a homogeneous sheet, a fact which results in less waste cushion material than would be left if the insoles were cut from the superposed layers.

There is shown in Fig. 4 a composite insole 32 which has been cut so that the entire ball portion is slashed through and through with interrupted cuts from edge to edge and only the toe, heel seat and shank portions are stiff is stretched upon a last 30. The insole 32 is temporarily secured to the last under tension so that all of the slashes 33 are expanded lengthwise of the sole and opened somewhat. An upper 31 is then worked over the last 30 and its overlasted margin is secured to the insole 32 by any of the usual methods. It is understood that the cushion layer does not appear in Fig. 4 but is disposed in face to face contact with the bottom of the last 30, the flexible underlying ply of the insole being exposed. After lasting has been accomplished the outsole is attached and the shoe is finished by conventional shoemaking methods. Since the slashes 33 are opened, their edges do not bind on each other, and the finished shoe is more flexible than would be the case if the insole was not stretched on the last. It will be seen that the insole is incorporated in stretched condition into the shoe bottom and it is permanently maintained in this condition in the shoe. Furthermore a resilient cushion ply is provided for engagement with the foot of the wearer.

The invention also includes within its scope and as another embodiment an insole which is provided with zig-zag through and through slashes 16 from edge to edge as shown in Fig. 2. Between the rows of herring-bone slashing are solid strips 17. The result is that the sole 15 cannot be stretched lengthwise but can be stretched laterally. It should also be carefully noted that the insole 15 is formed of one piece of material such as insole leather which is strong enough to stand up during lasting in spite of the fact that a portion thereof is slashed. Furthermore the slashed portion may be located in any portion of the insole or throughout its entire area as shown in Fig. 6. In some types of shoe construction it may be found desirable to have an insole which is flexible in its shank portion and relatively stiff in other portions.

Experiments have shown that by constructing an insole having a portion slashed according to my invention approximately as wide as that indicated in Fig. 1, the sole becomes a full size longer than it would be if the slashing had not been carried out. For example, a strip such as that shown at 11 in Fig. 1 which is 3¼" wide before slashing becomes $3\frac{5}{16}$" wide after slashing. The above figures apply to insoles having transverse slashes therein. An insole which has been provided with zig-zag slashes similar to those shown at 16 in Fig. 2 is appreciably wider after the slashing operation.

It must be emphasized that the operation of slashing a sole as described herein has no relation to the well-known operation of slashing the forepart of an insole. An insole which has a solid marginal band does not display a much higher degree of flexibility (in a finished shoe) than an insole which has not been slashed at all. The solid marginal band, when reinforced by the lines of stitching or cement or other methods of attachment which hold the outsole to the shoe, exhibits substantial stiffness. An insole which is slashed in this manner throughout its width to such an extent that it can be stretched longitudinally or laterally is quite different in its characteristics and is the type of insole with which the invention deals. It will be apparent from an inspection of Fig. 4 that any means used to fasten an outsole to the upper and insole will be interrupted at intervals by the free spaces of the slashes.

When the insole is formed of artificial leather or other composition material, it will be found advisable to support it with a resilient backing sheet 13 such as that shown in Fig. 1 so that it will withstand the stresses occasioned in lasting.

The composite insole sheet comprising bands 10, 11 and 12 is in itself no part of my invention but constitutes the subject matter of U. S. Letters Patent No. 2,130,968, granted September 20, 1938 to A. C. Sewall.

The foregoing description is sufficient to convey to those skilled in the art the essential principles of the invention and to illustrate at least two practical embodiments thereof. However, the possible variations are too numerous to describe, and it must be understood that such variations are within the scope of the invention so long as the insole is slashed in the manner herein explained. The limits of the invention are circumscribed in the following claims, in which the term "slashing" means through and through slashing from edge to edge sufficient to permit stretching of the insole.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination with a shoe, an insole forming a part thereof and having a plurality of parallel rows of short slashes penetrating entirely through the thickness of the insole and spaced apart by unsevered and intact portions of the insole which are of the full thickness of the insole, some of the slashes intersecting the edges of the insole, the unsevered portions of the insole lying in one row of slashes being in staggered relation to unsevered portions lying in adjacent rows.

2. In combination with a shoe, an insole forming a part thereof and having a plurality of transverse rows of short slashes penetrating entirely through the thickness of the sole and spaced by unsevered and intact portions of the insole which are of the full thickness of the insole, some of the slashes intersecting the edges of the insole, the slashes and unsevered portions of adjacent rows being so disposed in staggered relation that substantially the entire width of the insole is interrupted by the slashes of a pair of adjacent rows.

HENRY G. LUMBARD.