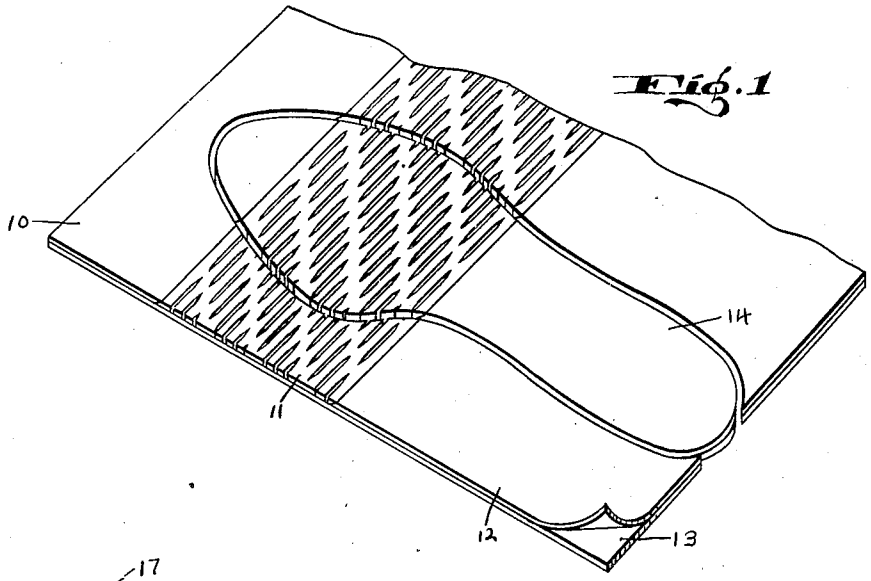
Nov. 28, 1939. H. G. LUMBARD 2,181,787

PROCESS OF MAKING INSOLES

Filed Sept. 12, 1939

Fig. 1



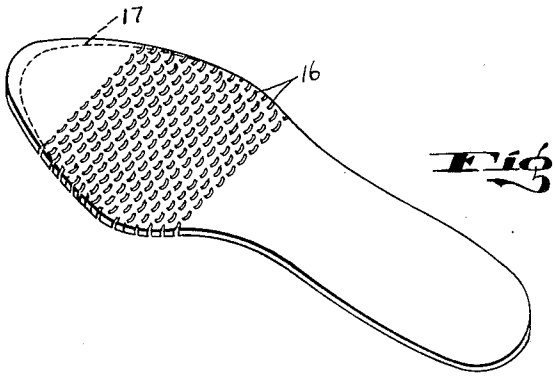
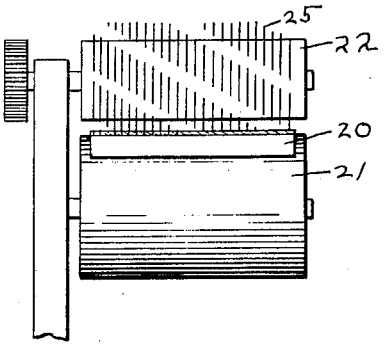


Fig. 3

Fig. 2



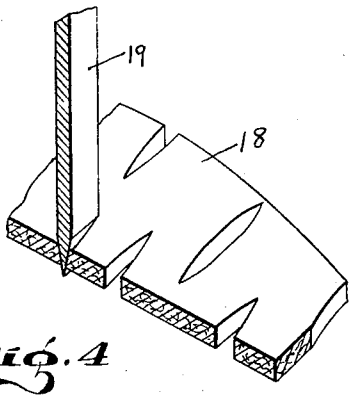


Fig. 4

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PROCESS OF MAKING INSOLES

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Application September 12, 1939, Serial No. 294,464

3 Claims. (Cl. 12—146)

The present invention consists in a novel process for making flexible insoles for use in shoes of all types.

The principal object of the invention is to provide an insole having an unusually high degree of flexibility throughout its whole area or in any selected portion such, for example, as the forepart. Flexibility is of paramount importance especially in women's shoes and a great many various expedients have been adopted with this end in view. One of the limiting conditions of flexibility is that a shoe having a thin sole is uncomfortable because uneven objects underfoot can be felt by the wearer. Accordingly the present invention contemplates an insole which, while being extraordinarily flexible, is also sufficiently thick and resilient to be comfortable under all conditions of wear.

Another object of the invention is to provide a flexible insole which may be used advantageously in shoes having an outsole attached by cement since shoes made in this manner tend otherwise to objectionable stiffness.

I have discovered that a particularly flexible insole may be produced by slitting or otherwise perforating it with a series of rows of transverse slits extending from edge to edge of the insole, intersecting both edges of the insole at spaced points and providing freely movable internal edges in the insole. This treatment not only produces an extraordinarily flexible insole, but it simultaneously expands or increases the area of the insole thereby introducing an important economy in the manufacture of insoles. For example, it permits the manufacturer to cut his insoles at least a half size shorter than required in the finished shoe and to gain a half size in the slitting or perforating operation. Preferably the insole is treated by forcing bevelled edge knives or other cutting instruments of substantial thickness into it forming lines or rows of slits separated by short bridges of solid material, and in this operation these bridges are stretched longitudinally and the slits opened at least to an extent that permits their opposite edges to move freely when the shoe is flexed in wear.

These and other characteristics of my novel process will be best understood and appreciated from the following detailed description of preferred ways in which it may be practiced as illustrated in the accompanying drawing in which,

Fig. 1 is a view in perspective showing an insole died out from sheet material,

Fig. 2 is a view in elevation of one form of rotary slitting mechanism suitable for use in producing the insole material shown in Fig. 1,

Fig. 3 is a plan view illustrating an insole of somewhat different design from that shown in Fig. 1, and

Fig. 4 is a fragmentary view in perspective illustrating the slitting operation as it may be carried out upon an insole blank.

As illustrated in Fig. 1 the insole 14 is shown as produced from a composite sheet of material wherein the upper layer or ply is composed of three contiguous bands or strips 10, 11 and 12 of material such as artificial leather or fibre board and this upper ply is united in continuous face to face contact with a layer 13 of resilient material such as ground cork and rubber composition or sponge rubber. In the upper ply the bands 10 and 12 which are cut into the toe, shank and heel seat portions of the insole may be relatively stiff, whereas the band 11 which is to be cut in the ball portion of the insole may be of a more flexible nature. Such insole material is available as a commercial product upon the market and is desirable from my standpoint although by no means necessary, since a homogeneous sheet may be employed for the upper ply of composite material.

As herein shown the central strip 11 is slashed in a very special manner either before or after it is incorporated with the bands 10 and 12 in the upper ply, but in any case before the upper ply is cemented to the lower resilient ply 13.

The slashes comprising the transverse rows of slits, cuts or perforations which extend entirely through the strip 11 are arranged in staggered relation, each being distinct and separated from the next by a short bridge of solid material. The slitting may be effected by any suitable mechanism or tool. One such mechanism is suggested in Fig. 2 where is shown a pair of cooperating rollers 21 and 22. The roller 22 is provided with rows of segmental circumferentially arranged knives 25 of substantial thickness and is positively driven by a gear shown on the end of its shaft or by any other suitable means. A work table 20 is provided for directing sheet material to the rolls and the material is fed forwardly between them while the knives 25 are forced downwardly through the material and embedded in the lower roll 21 which thus acts as a rotary cutting bed. The cutting edges of the knives 25 are beveled and compress the insole material as they are forced into it. When the knives are withdrawn, the stresses in the compressed portion of the sole from the knives cause an elonga-

tion of the sole which increases its area a substantial amount. For example, by slashing the ball portion of an insole in this manner the length of the slashed insole is increased a full half size as compared to the length of the unslashed insole.

Having prepared the insole material as suggested in Fig. 1 by slashing the band 11, and by cementing the upper ply to a homogeneous resilient ply 13 a complete insole 14 may be died out directly from the composite sheet. Satisfactory results would be secured by dieing out an insole blank from the ply 10—11—12 and then uniting it to a correspondingly died out resilient ply, but better economy is secured by following the procedure suggested in Fig. 1 of forming the complete composite sheet before dieing out the insole.

In Fig. 3 I have shown another insole constructed in accordance with the process of my invention. In this figure a leather insole blank is first rounded to the shape shown, that is to say, the blank is of nearly normal outline, its original length being indicated by the dotted line 17 at the toe. Generally speaking, the blank which is provided is somewhat shorter than and of substantially the same width as the insole desired. The ball part of the blank is then slashed or perforated with a plurality of curved slits 16. These slits are arranged in rows extending transversely from side to side of the insole and intersecting both edges thereof in a plurality of spaced points. The slits or perforations may be made by any properly shaped tool having a bevelled cutting edge such that the material of the insole is stretched and expanded as the result of the slitting operation. The slits may be formed row by row beginning at the ball line of the sole and working toward the toe, or they may be formed by a gang of cutters traveling transversely across the sole as would be the case in using the mechanism of Fig. 2, but in any case the forepart of the insole is simultaneously increased in length and rendered extremely flexible as the result of the slashing treatment described. It should be noted that it is important to intersect the edges of the insole so that no solid marginal frame shall be left in it. Such a solid portion would prevent the smooth expansion of the insole and would cause buckling in adjacent slitted areas.

The slitting step is further exemplified in Fig. 4 where a portion of an insole blank 18 is shown as being slitted by a bevelled edge knife 19. As shown the knife passes completely through the material of the insole and at each step longitudinally stretches the adjacent insole material. The collective result of these slits, as already explained, is to enlarge and render flexible the treated area. An insole constructed as above outlined may be employed very advantageously in the construction of women's shoes of all type, and results in an exceptionally flexible and comfortable shoe bottom. It is not only extremely flexible, but it does not buckle or blister when the shoe is flexed, but lies in a flat curve beneath the foot.

With its great flexibility however, the insole has sufficient body to protect the foot against uneven objects particularly when it is associated with a resilient cushion ply as suggested in Fig. 1.

In Fig. 1 an insole is shown in which the slashed and elongated body is cemented without initial tension to a resilient cushion layer 13. It is contemplated, however, that in many instances it may be advantageous to cut the leather insole blank short, cut another ply into a full length blank, slash all or a portion of the leather blank in rows of distinct cuts which in some locations intersect the edges of the blank, elongate the slashed blank by tension to the length of the solid ply and then cement the two together with the slashed blank under tension and the toe lines coinciding.

It will be apparent that the exact shape of the slits or slashes is of secondary importance so long as they pass entirely through the material and are of such a character as to permit expansion of the treated insole area and free the opposed internal edges for relative movement. I have shown straight slits in the insole of Fig. 1 and curved slits in the insole of Fig. 3 and contemplate that the length, shape and character of the slits, slots or perforations may be varied in accordance with the requirements of the particular work in hand. For example, distinct groups of small perforations arranged transversely and intersecting the edge of the insole at spaced points would be satisfactory and within the scope of the present invention. In all cases however the resulting insole when stitched or cemented to an outsole will lie flat without buckling or blistering when the shoe bottom is flexed and will not oppose the flexing of the outsole, but will follow it without resistance.

The insole herein shown as produced by my novel process may be employed in tensioned condition in the finished shoe as described and claimed in my copending application, Ser. No. 240,987, or it may be tensioned in a self-contained insole, or it may be employed without being subjected to any substantial initial tension on the last or otherwise. Moreover, while I have referred specifically to insoles as embodying my invention I use the term to include also soles known technically as middle soles.

Having thus disclosed my invention and described in detail several exemplary ways of practicing it, I claim as new and desire to secure by Letters Patent:

1. A process of making flexible insoles, which comprises providing an insole blank of nearly normal outline, elongating the insole blank by slashing it from edge to edge with rows of spaced, through and through slashes, each slash being formed by a cutting instrument of substantial thickness having a beveled edge.

2. A process of making flexible insoles, which comprises providing an insole blank of nearly normal outline, and elongating the insole blank by slashing it from edge to edge with rows of spaced through and through curved slashes, each curved slash being formed by a cutting instrument of substantial thickness having a beveled edge.

3. A process of making flexible insoles, which comprises providing an insole blank which is shorter than and of substantially the same width as the insole desired, elongating the insole blank to the desired length by slashing it from edge to edge with rows of spaced, through and through slashes, each slash being formed by a cutting instrument of substantial thickness having a beveled edge.

HENRY G. LUMBARD.