Aug. 13, 1940. M. E. DUCKOFF 2,211,057

SHOE

Original Filed Feb. 13, 1937 2 Sheets-Sheet 1

Fig. 1

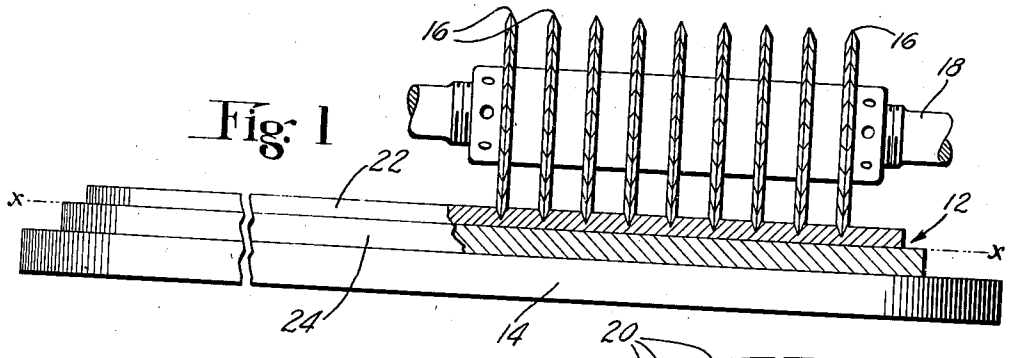

Fig. 2

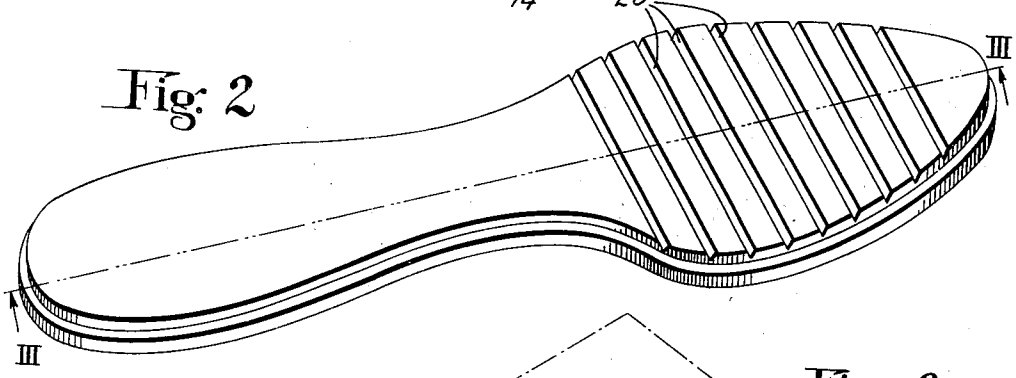

Fig. 3

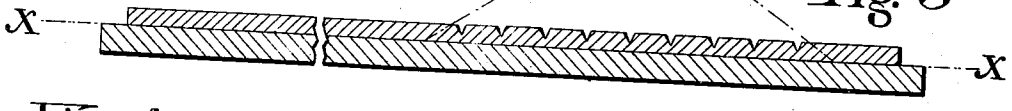

Fig. 4

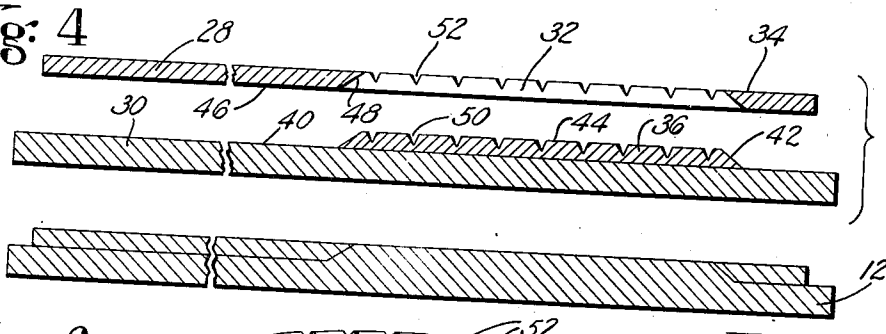

Fig. 5

Fig. 6

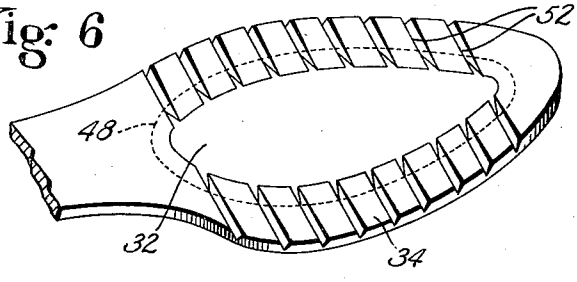

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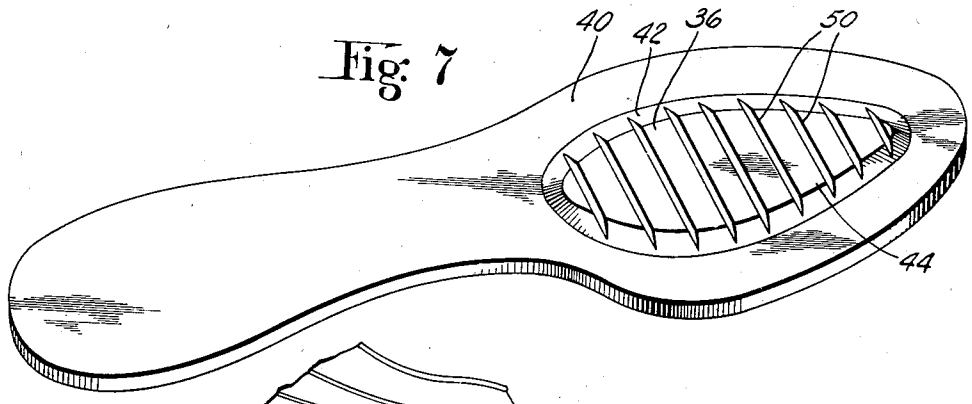
Fig. 7



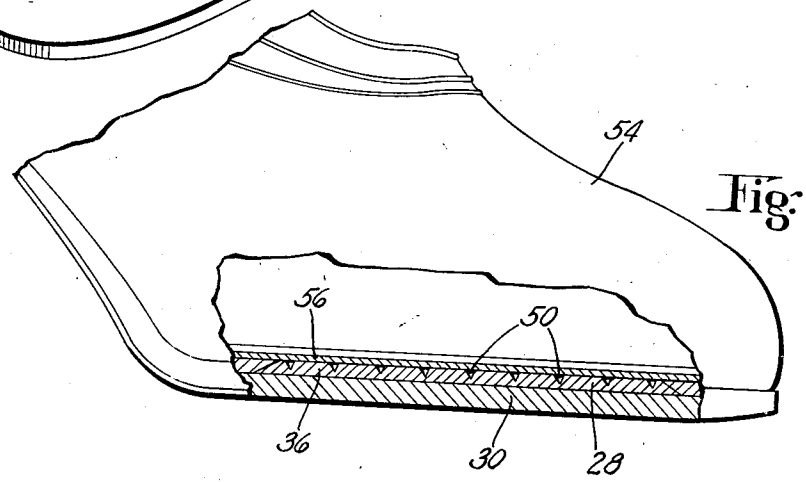


Fig. 8

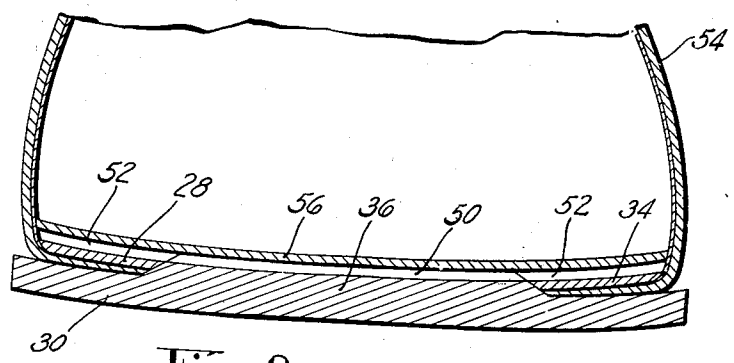


Fig. 9

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Patented Aug. 13, 1940

2,211,057

UNITED STATES PATENT OFFICE

2,211,057

SHOE

Maxwell E. Duckoff, Manchester, N. H., assignor to United Shoe Machinery Corporation, Borough of Flemington, N. J., a corporation of New Jersey

Original application February 13, 1937, Serial No. 125,635. Divided and this application October 31, 1938, Serial No. 237,932

4 Claims. (Cl. 36—2.5)

This invention relates to improvements in shoes and is herein illustrated in its application to the manufacture of shoes having insoles with central forepart openings and outsoles with central forepart projections that are complemental to the insole openings. The present application is a division of my copending application Serial No. 125,635, filed February 13, 1937.

The bottoms of shoes of the type above referred to, having no insoles in their central forepart areas are generally regarded as being more flexible than the bottoms of shoes having insoles of the conventional construction. However, the excess thickness of the central forepart areas of the outsoles and the double sole structure in the forward marginal portions of the bottoms of such shoes are factors which militate against the securing of a maximum amount of flexibility in the shoes. Moreover, in cases where an insole and an outsole are split from a sole blank of laminated formation the outsole forepart projection and the insole forepart rand portion may have even more tendency to stiffen the shoe bottom inasmuch as those portions may consist of two or more layers which are bonded together and which for that reason do not bend or flex so readily as if they were each of integral or one piece formation.

In view of the foregoing it is an object of the present invention to minimize the stiffening effect of the outsole projections and the insole rand portions in shoes of the above-mentioned type and thereby to render such shoes even more flexible than those heretofore manufactured.

With this object in view the invention, as herein illustrated, resides in the combination, in a shoe, of an outsole having an inward central projection or island on its forepart, and an insole having a forepart rand portion defining a central forepart opening or aperture within which said projection is received, said outsole having a plurality of cuts formed in the upper surface of its projection and said insole having a plurality of cuts extending across said rand portion whereby the forepart of the shoe bottom is rendered more flexible. The illustrated cuts are in the form of V-shaped grooves and they extend in directions crosswise of the shoe so as to reduce the resistance of the shoe bottom to such bending as is required to accommodate the flexing movements of the foot.

The invention will now be explained with reference to the accompanying drawings, in which:

Fig. 1 is a view, partially in section and partially in elevation, illustrating the operation of grooving a laminated sole blank which is subsequently to be divided into an insole and an outsole;

Fig. 2 is a perspective view of the sole blank after it has been grooved;

Fig. 3 is a sectional view taken along the line III—III of Fig. 2;

Fig. 4 is a longitudinal sectional view of the grooved insole and the grooved outsole produced by means of a splitting operation performed upon the sole blank shown in Fig. 2;

Fig. 5 is a longitudinal sectional view of a sole blank of solid or non-laminated formation, the blank being shown as it appears after having been divided or split but before having been grooved;

Figs. 6 and 7 are fragmentary perspective views of the insole and the outsole, respectively, which are produced by the performance of splitting and grooving operations upon the sole blank shown in Fig. 2;

Fig. 8 is a view, partially in elevation and partially in longitudinal section, of a shoe embodying the grooved insole and the grooved outsole; and

Fig. 9 is a cross-sectional view of the forepart of a shoe which is similar to that shown in Fig. 8 but in which the outsole island or projection is formed as an integral part of the sole.

The improved shoe shown in the drawings comprises, as illustrated in Figs 8 and 9, an insole **28**, an outsole **30**, an upper **54**, and a sock lining **56**. The insole **28** is formed with a central forepart opening **32** defined by a marginal forepart rand portion **34**. The outsole **30** is provided with a central forepart projection or island **36** which is complemental to and interfits within the opening **32** in the insole. The insole **28** and the outsole **30** constitute a so-called complemental insole-outsole combination which, so far as its complemental features are concerned, is of a type commonly employed in shoe making for the purpose of securing flexibility in the foreparts of shoe bottoms. Such insole-outsole combinations are commonly produced by splitting a sole blank into two parts as, for example, by the use of a matrix roll type splitting machine, such as that disclosed in United States Letters Patent No. 2,053,304, granted September 8, 1936, upon application of W. D. Thomas. The sole blank may consist entirely of one material, such as leather, as indicated in Fig. 5, in which case the outsole projection or island will be formed as an integral part of the outsole or the blank may be

of laminated formation, as indicated in Fig. 3, in which case the outside projection will consist, in whole, or in part, of material which is not integral with the outsole. The blank shown in Fig. 3 may be split along the line X—X to divide it into an insole 28 and an outsole 30, the insole having a central forepart opening 32 and the outsole having a central forepart projection 36. By reference to Figs. 4 and 7 it will be seen that the splitting operation will result in forming a substantially plane surface 40 upon the upper side of the heel and shank portion of the outsole and around the edge of the forepart thereof and that the central forepart projection of the outsole will have a frusto-conical surface comprising a sloping marginal portion 42 and an upper surface 44 which was originally part of the upper surface of the sole blank. By reference to Figs. 4 and 6 it will be seen that, as a result of the splitting operation, the insole 28 will be formed with a plane surface 46 on the lower side of its heel and shank portion and around the edge of its forepart and with a beveled surface 48 which defines the forepart opening 32 and is complemental to the sloping portion 42 of the outsole projection.

While it is well known that the use of complemental insole-outsole combinations of the type above referred to results in securing flexibility in shoe bottoms, nevertheless, it is sometimes desirable to secure even greater flexibility than that resulting exclusively from the use of such combinations. It is particularly true that the use of complemental insoles and outsoles does not always afford the desired shoe bottom flexibility in cases where the outsole projection is made of a separate piece of material and is cemented in place upon the outsole, inasmuch as the laminated structure thus produced in the central forward portion of the shoe has some tendency at least to stiffen the outsole so as to offset in part the flexibility gained from the intermating relationship of the inner and outer soles. Accordingly, in order to provide for a maximum amount of flexibility in the foreparts of shoe bottoms I provide a plurality of cuts in the upper surface of the outsole projection, the cuts, as shown, extending transversely with respect to the outsole and being preferably in the form of grooves 50 which are V-shaped in cross-section, the widest portion of the grooves being located at the upper surface of the projection and the grooves being of substantial depth but preferably not extending throughout the full thickness of the projection, at least in cases where the projection is formed of material which is not integral with the outsole. I prefer also to provide cuts or grooves in the marginal forepart rand portion of the insole, such as the grooves 52 (Figs. 4 and 6), the grooves 52 being also preferably V-shaped in cross-section and extending transversely across the rand portion of the insole at opposite sides of the central opening 32. The grooves being open at the upper or foot-facing sides of the insole and the outsole, it will be appreciated that they will be capable of closing so as best to facilitate the bending of the bottom of the shoe in accommodating itself to the flexing movements of the foot.

As illustrated in Figs. 1 and 2 the sole blank may be first grooved and later split or, as illustrated in Fig. 5, the sole blank may be first split and thereafter grooved. In either case the grooves may advantageously be formed by means of a series of rotary cutters 16 (Fig. 1) which may be mounted in spaced relation on a driven shaft 18 and which function to make a plurality of parallel grooves in the work as the latter is fed edgewise across a table or support 14. The cutters 16 are shown in Fig. 1 as operating upon a sole blank 12 of laminated formation comprising a sole-shaped layer 22 of insole material and a sole-shaped layer 24 of outsole material which is secured to the layer 22 by means of cement. The cutters 16 are constructed and arranged to remove material from the sole blank so as to form in the forepart thereof a series of open grooves 20 (Fig. 2). However, the improvements in shoemaking which involve the making of the grooved insoles and outsoles are not claimed herein, the same being the subject-matter of the copending application above refered to.

Whether the grooves are cut before the sole blank is split or thereafter, there will be provided, as a result of the splitting and grooving operations, an outsole 40 having a series of parallel open grooves 50 (Fig. 7) extending transversely across its forepart projection 36 and an insole 34 having a series of open grooves 52 (Fig. 6) extending transversely across its marginal forepart rand portion. Obviously, if the sole blank is grooved first and thereafter split, the grooves formed in the insole will be disposed in line with the grooves in the outsole when the insole and outsole are arranged in mating relation as when they are incorporated in a shoe. On the other hand the sole blank may be split before being grooved and the insole and the outsole produced by the splitting operation maintained in mating or interfitting relation while being subjected to the action of the grooving means, in which case the grooves in the insole will be accurately alined with those in the outsole when the soles are incorporated in a shoe. In other words, the grooves in the forepart of the outsole and the corresponding grooves in the forepart of the insole will be, in effect, continuations of one another. Thus, the grooves will function most effectively to impart a maximum amount of flexibility to the bottom of the shoe.

While the grooves in the outsole projection or island are effective to increase the flexibility of the shoe bottom whether the island is integral or whether it consists of a separate piece of material and is secured to the outsole by cement, the grooves are particularly effective in the latter case inasmuch as the grooves, which extend nearly through the layer constituting the island, reduce to a minimum the resistance of that layer to bending and thus practically offset any stiffening effect which may result from the cementing together of the two layers which constitute the island and the body portion of the forepart of the outsole.

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

1. In a shoe, an insole having a central forepart opening and a forepart marginal rand portion, and an outsole having a central forepart projection complemental to said insole opening, said insole rand portion having a plurality of open grooves formed in its foot facing side, each of said grooves extending from said forepart opening to the outer edge of said rand portion and said outsole projection having a plurality of open grooves in its upper surface extending in the same directions as the grooves in the insole whereby the forepart of the shoe bottom is rendered more flexible.

2. In a shoe, an insole having a central fore-

part opening and a forepart marginal rand portion, and an outsole having a central forepart projection complemental to said insole opening, said insole rand portion and said outsole projection each having a plurality of cuts extending transversely thereacross, the cuts in said projection being aligned with corresponding cuts in the rand portion.

3. In a shoe, an insole having a central forepart opening and a forepart marginal rand portion, and an outsole having a central forepart projection complemental to said insole opening, said insole rand portion having a plurality of open grooves extending entirely across said portion and said outsole having a corresponding number of open grooves formed in the surface of said projection only whereby the flexibility of the forepart of the shoe bottom is increased to the same extent in its central and marginal portions.

4. A shoe comprising an insole having a central forepart opening and a marginal forepart rand portion, said rand portion having a plurality of open grooves extending transversely thereacross, an outsole having a central forepart projection complemental to and interfitting within said insole opening, said projection having a plurality of open grooves extending transversely thereacross, said grooves being disposed in line with said insole grooves, and an upper having a marginal portion inturned between said insole and said outsole.

MAXWELL E. DUCKOFF.