April 7, 1925. 1,533,008

C. R. KEISER

RUBBER HALF SOLE

Filed Nov. 17, 1923

Fig. 1.

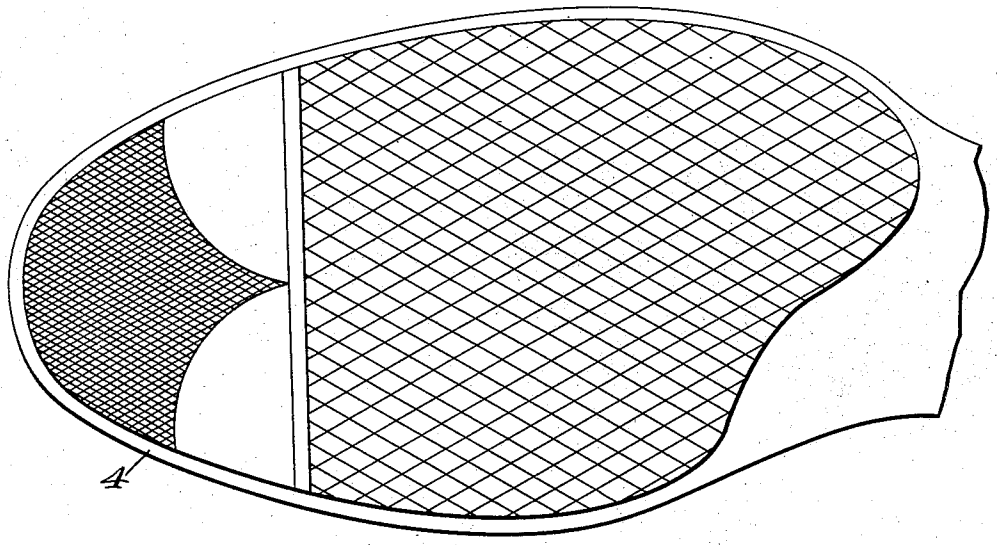


Fig. 2.

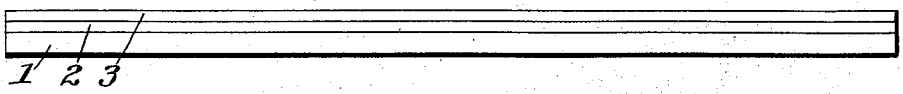
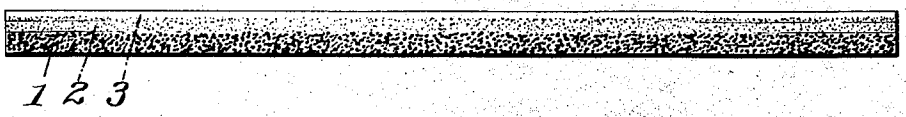


Fig. 3.



Inventor

Charles R. Keiser,

By

Attorney

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UNITED STATES PATENT OFFICE.

CHARLES R. KEISER, OF AUBURN, INDIANA, ASSIGNOR TO THE REGAL RUBBER CO., OF DAYTON, OHIO.

RUBBER HALF SOLE.

Application filed November 17, 1923. Serial No. 675,387.

To all whom it may concern:

Be it known that I, CHARLES R. KEISER, a citizen of the United States, residing at Auburn, in the county of De Kalb and State of Indiana, have invented new and useful Improvements in Rubber Half Soles, of which the following is a specification.

The invention relates to rubber soles for half soling worn shoes or new shoes when extra protection is desired.

Rubber soles which have been heretofore used have been of such structure that it has been necessary to have the soles attached by a skilled cobbler or manufacturer of footwear. The attachment of rubber soles has heretofore been accompanied by the use of stitching, nailing or metallic fasteners. None of these soles or the means of attachment of the same to the leather soles have been entirely satisfactory or successful because the rubber sole being fastened to the leather sole only at particular points and around the outer edge and not uniformly over the entire surface of the sole, a greater strain is placed upon these points where the fastening or attachment to the leather sole is made than the rubber can withstand, thereby causing the rubber to break away from the stitching, nails or fasteners and ruining the usefulness of the sole.

The object of the present invention is to improve the construction of rubber soles and to provide a simple practical and efficient rubber sole of strong and durable construction and increased wearing qualities, which will require no stitches, nails or other metallic fasteners and which will not be secured in separate points only, but attached to the leather sole uniformly throughout the entire area of its upper surface.

A further object of the invention is to provide a rubber sole of this character adapted to be applied to the leather sole of a new or old shoe without removing any of the layers of the original leather sole, thereby enabling the leather sole to insulate the rubber half-sole from the feet and prevent discomfort to the wearer, particularly preventing what is generally termed "drawing of the rubber" or "drawing of the feet."

Another object of the invention is to afford a neat, servicable, satisfactory and economical method of half soling shoes and of enabling the half soles to be applied by either an experienced workman or an inexperienced person.

A further object of the invention is to provide a rubber half sole which will be pliant and elastic and adapted to elongate and adjust within itself, the strains put upon it by a person in the act of walking, thereby relieving the strains at the point of attachment or union of the rubber sole with the leather sole.

With these and other objects in view, the invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, in which like characters of reference designate corresponding parts in the several views:

Figure 1 is a reverse plan view of a portion of a shoe provided with a rubber half sole constructed in accordance with this invention.

Figure 2 is an edge view of the rubber sole showing the layers before vulcanization.

Figure 3 is a similar view illustrating the layers of the rubber half sole after vulcanization.

The rubber half sole of the present invention comprises a lower or tread layer 1, and intermediate and upper layers 2 and 3 of a thickness less than the thickness of the bottom or tread layer which is subjected to the wear of the shoe. The tread layer 1 consists of rubber or a rubber compound, contains vulcanizing agents of the well known character such as sulphur, etc. On the tread layer 1, is laid one or more of the layers 2 and 3 of rubber of the proper thickness or rubber compound and these layers 2 and 3 do not contain any vulcanizing agents. The sole thus constructed is placed in a mold and subjected to heat. The layers of rubber and rubber compound 2 and 3 are of such nature as to prevent vulcanization from taking place throughout the entire thickness of

the sole and are designed to be of such a thickness as to leave the upper or outer surface of the top layer 3 unvulcanized, the vulcanization extending throughout the tread layer and sufficiently through the intermediate layer and into the lower portion of the top layer to unite the layers and form a unitary structure. It is preferred to have the top layer of pure rubber and not compounded rubber.

It is very important that the proper thickness of the layers of rubber without vulcanizing agents be maintained because vulcanization is a chemical reaction and during this reaction, there is a certain amount of diffusion within a vulcanizing stock itself and rubber stock placed in contact with it. It is due to this diffusion that the rubber layers without vulcanizing agents are vulcanized or partially vulcanized. The extent of this diffusion or migration of sulphur is limited by the nature of the compound and by the fact that rubber placed under vulcanizing heat will not become a liquid and this limited diffusion in turn, limits the extent of the vulcanization in the rubber containing no vulcanizing agents. It is therefore, necessary that the proper thickness of the rubber containing no vulcanizing agents be such that diffusion and vulcanization take place beyond the points of union but not to the upper or outer surface of the top layer of rubber containing no vulcanizing agents.

Heretofore, rubber soles composed of a combination of various layers have been vulcanized together, the layers having each a vulcanizing agent in its composition. The methods heretofore in use have permitted a vulcanization to take place throughout the entire mass. This would defeat the object of the present invention, in which the upper surface and substantially the upper half of the top layer is left unvulcanized. In Figure 2 of the drawing, the layers are indicated plain to illustrate the sole before vulcanization and in Figure 3, the layers are shown after vulcanization of the tread. The tread layer which is illustrated darker than the intermediate layer shows complete vulcanization of the tread part of the half sole.

The dotted portions show partial vulcanization as having taken place due to the vulcanizing agents in the lower tread layer and that partial vulcanization has passed beyond the lines separating the layers having no vulcanizing agents from the tread layer having vulcanizing agents. The top surface and unvulcanized top portion of the uppermost layer is indicated above the dotted portion by a plain or white section or portion.

The attachment of the rubber half sole thus formed to a leather sole is accomplished by roughening the leather sole with a sharp instrument and applying several coats of rubber cement to the leather sole and a coating of cement to the rubber sole to freshen the latter and as soon as both are dry, they are united by pressure with the hands. In Figure 1, the rubber sole is attached to the leather sole 4 of a shoe. The leather sole 4 preferably extends beyond the edges of the rubber sole, the latter being designed to be somewhat smaller in length and breadth than the leather sole to which it is applied so that the rubber sole will not be seen and the shoe will maintain substantially its natural appearance when on the foot. This also enables the outer edge of the leather sole to be polished.

Adhesion of the two layers of cement is obtained by pressing the soles together as above stated and this also causes the soft unvulcanized rubber to fill and become firmly embedded in the uneven surface of the leather sole, all the air being excluded from between the rubber sole and the leather sole and prevented from entering by a perfect union of the two soles. The rubber sole is held firmly to the leather sole by adhesion and by atmospheric pressure. The present invention does not attempt to have the tread of the rubber sole possess the same physical characteristics as the leather sole, but instead, as above stated, the rubber tread is pliable and elastic and treads of this character will outwear leather soles several times their thickness. The plurality of layers of rubber, as indicated in Figure 3 of the drawing possess different characteristics and due to the complete and partial vulcanization are of different composition and properties, and each serves a particular purpose in the present invention.

The merits of the invention may be summarized as follows:

First, an economical rubber half sole so easily attached that no skill is required in making a permanent attachment, and at the same time greatly prolonging the wearing surface of shoes.

Second, a soft pliable sole tread which will readily conform to the ground so as to prevent slipping.

Third, a half sole that is water proof and does not detract from the neatness of the shoe.

The vulcanizing of a mixture of rubber stocks together, one of which does not vulcanize on its outer surface, will cause difficulty such as the adherence of the raw stock to the mold or to any covering that may be placed between the raw stock and the mold, thereby making it impossible to properly separate from the mold or covering. This is due to the fact that practically all rubber is milled and calandered into sheets before vulcanizing and thereby materially softened. The present invention has obviated this difficulty by not calandering or milling the raw

rubber, but by using that part of his rubber in a crêpe form just as it comes from the plantation.

Rubber in "crêpe form" is thin sheets of raw rubber having a rough surface and marketed under various trade names as "Thin first latex crêpe" and "Clean thin brown crêpe."

What is claimed is:

1. A partially vulcanized rubber half sole comprising a plurality of layers of rubber having latex arranged to control the migration of sulphur, the vulcanization extending from the bottom of the half sole and terminating short of the top of the half sole, leaving the upper surface of the half sole unvulcanized whereby a uniform adhesion and firm attachment between all parts of the entire surface of the rubber half sole and a leather sole may be obtained by an adhesive air completely excluded.

2. A partially vulcanized rubber half sole comprising a plurality of layers of rubber, one of the layers of rubber having a vulcanizing agent incorporated in it and the sole being vulcanized, and having latex controlling the migration of sulphur, the vulcanization uniting the layers and extending through the bottom layer and terminating short of the upper surface of the top layer, the upper surface and adjacent portions of the top layer being unvulcanized, so that a uniform adhesion and firm attachment between all parts of the entire surface of the rubber half sole and the leather sole may be obtained by an adhesive and air entirely excluded from between the rubber half sole and the leather sole.

3. A partially vulcanized rubber half sole comprising a bottom tread section having a vulcanizing agent incorporated in it, and a plurality of layers containing no vulcanizing agent including latex for controlling the migration of sulphur, the sole being vulcanized and the vulcanizing agent of the tread layer extending from the bottom layer beyond into the top layer and terminating short of the upper surface thereof, the layers being united by the vulcanization and the upper surface and adjacent portions of the top layer being unvulcanized to permit a uniform adhesion and firm attachment between all parts of the entire upper surface of the rubber half sole and the leather sole and air to be completely excluded from between the rubber half sole and the leather sole.

In testimony whereof I have hereunto set my hand.

CHARLES R. KEISER.