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SHANK STRENGTHENED RUBBER SOLE SHOE

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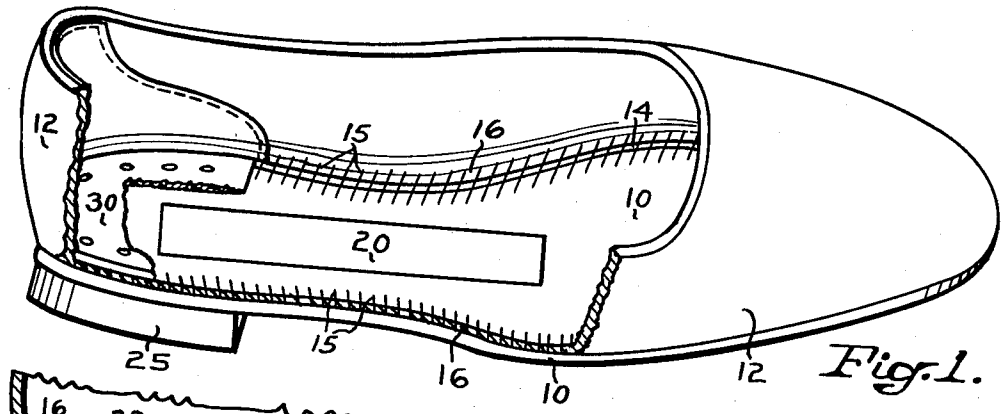


Fig. 1.

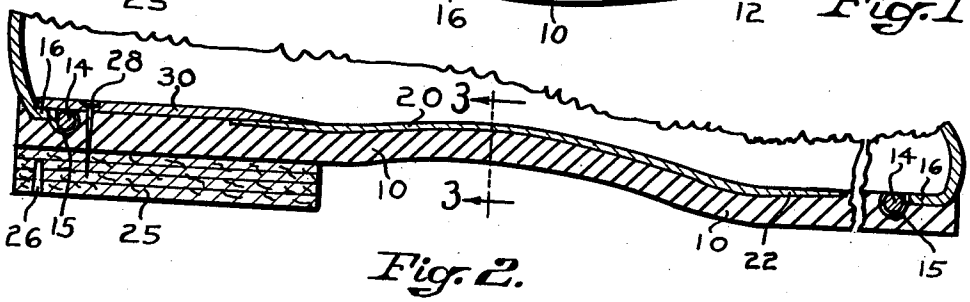


Fig. 2.

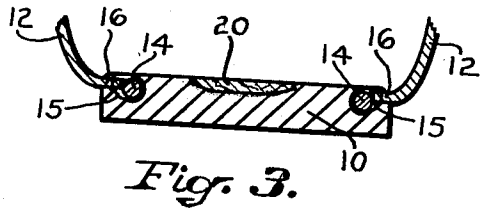


Fig. 3.

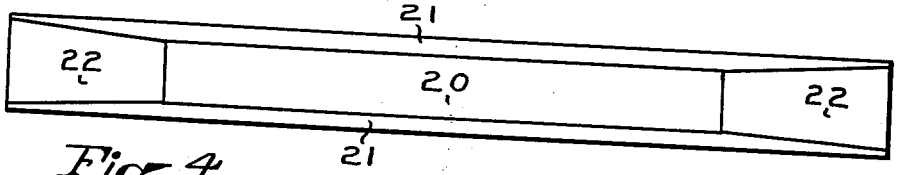


Fig. 4.

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SHANK STRENGTHENED RUBBER SOLE SHOE

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1 Claim. (Cl. 36—2.5)

This invention relates to a shoe comprising an upper secured by vulcanization to a rubber sole, and more particularly to a shoe having a shank reinforcement for the rubber sole.

Owing to the flexibility of the sole rubber, it is desirable to strengthen the central portion of the sole by a thin strip or shank of wood or other material which shapes the sole and provides support for the arch of the foot. I have found that if such a shank is placed loosely between two paper inner soles, it is not properly and permanently located. Also, if the inner soles are secured together by glue, the shank serves merely as an aid for supporting the arch and not for strengthening the rubber sole, and the connected inner soles form a too rigid inflexible construction which resists bending of the sole for comfortable walking.

In accordance with this invention, a reinforcing shank is permanently embedded in the rubber sole and integrally united there with, and the shank is so located between the heel and the ball of the foot that it will support the arch and give a needed strength while permitting bending of the sole beneath the ball of the foot. The shank is made of suitable material, such as hard wood preferably shaped to provide an upwardly bowed portion. It is embedded in the top surface of the rubber sole to lie flush therewith, so that it does not provide discomfort to the wearer and it is permanently located in the right position to resist a downward bending of the sole beneath the foot portion. The shank extends forward from the non-bendable heel portion of the sole to a point approximately near where the weight of the ball of the foot is carried, so as not to hinder bending of the rubber sole in front of the end of the shank. Since the shank is flush with the surface of the sole, it does not project or need to be covered with a protective layer to distribute the pressure against the user's foot.

The term "shoe" as used herein includes the standard forms of shoe or slipper or sneaker, or other type of footwear. It may comprise an upper of leather, fabric, plastic, or other suitable substance secured to a sole made of a vulcanizable rubber compound, and suitable provision is made for attaching a heel to the rear end of the sole, such as by means of pegs or nails.

Referring to the drawings illustrating one embodiment of this invention:

FIG. 1 is a perspective view of a shoe, partly broken away, showing the shank embedded in the rubber sole and flush with its top surface;

FIG. 2 is a fragmentary enlarged longitudinal section through the sole and shank;

FIG. 3 is an enlarged transverse section taken on the line 3—3 of FIG. 2; and

FIG. 4 is an enlarged plan view of a wooden shank.

Referring to the drawing illustrating one embodiment of the invention, a shoe may comprise a vulcanized rubber sole **10** secured permanently to an upper **12** of suitable material, such as leather. The composition of the rubber sole is a suitable vulcanizable mixture of rubber, sulphur, a vulcanization agent, a filler, or other ingredients, as may be desired, which is capable of being rendered soft by the application of heat and then converted by vulcanization to a condition satisfactory for use as a sole.

The upper may be initially shaped as a flat piece of leather or other flexible material to which a draw string **14** is secured, as by means of stitching **15** loosely attaching the string to the edge portion of the upper. This draw string makes a complete turn around the upper and its two ends are brought together at a point where they may be tied together. The string ends are drawn through the loose stitching to shape the upper on the last. To this end, the upper is placed on a suitably shaped and heated mold, and by tightening the strings the edge portion of the upper is drawn into position beneath the mold to form an inturned lasting margin **16**. The two ends of the draw string may be tied together to fix the upper shape, and the knot, which serves as a drawstring fastening means, subsequently becomes embedded in the plastic rubber of the sole. After the upper has been thus shaped and while it remains on the heated mold, it is brought into contact with the preheated rubber sole **10** of suitable shape and vulcanizable composition, and the two are forced together under pressure and at a temperature which causes vulcanization of the rubber compound of the sole. This serves to maintain the upper shape and to secure the upper portion to the sole. That is, the inturned lasting margin **16**, the draw string **14** attached to the periphery of the margin and a portion of the stitching **15** become embedded in the sole composition when the latter is rendered plastic by the vulcanizing heat, so that the parts become permanently attached. The procedure set forth in my co-pending application #13,579, filed March 8, 1960 may be adopted for the purpose.

In accordance with this invention a shank **20** of suitable material, such as hard wood, is embedded in and permanently secured by the rubber sole and preferably in substantially the longitudinal medial position relative to the sole, as shown in FIGURE 1. This shank need not conform with the shape of the sole, but it preferably has a substantially rectangular top surface and it is sufficiently narrow so that it may be embedded in the rubber material of the sole. This shank **20** has a smooth top surface and is preferably provided with bevelled side edges **21**, and bevelled ends **22**. A preferred size is about one half inch wide, four inches long, and one eighth of an inch thick, but the dimensions may be varied as desired. Preferably the shank is initially bowed longitudinally. When the bevelled faces are located on the underside in the shoe, the shank **20** is bowed upwardly, as shown in FIG. 2. This preferred bowing of the shank gives strength beneath the arch of the foot and aids in holding the rubber sole in the required shape, or at least resists a downward bending of the central portion of the sole. The shank is preferably of such length as is shown in FIG. 1 that it extends from about the middle of the heel portion of the shoe to a position forward of the arch supporting portion of the sole and it terminates near the rear of the ball portion of the sole. This insures that the shoe is strengthened beneath the foot arch, but it is free to bend at the toe and ball portions, as is required for comfortable walking. The shank has its top surface no higher than the top surface of the sole and preferably flush therewith.

In this structure, the heel **25** may comprise layers of leather, fibre, or other suitable material which are shown as held together by pegs **26**. This heel is preferably secured to the under side of the vulcanized rubber sole **10** by means of nails **28** which are driven from above through the heel piece **30** lying on top of the rear end of the shank and the rubber sole. This heel piece **30** of leather or fibre, which is bevelled at the front edge serves as a layer of strong material within the shoe to which the heel **25** is attached by means of the set of

nails therethrough. Other suitable constructions and methods may be employed for securing the heel on the rubber sole, or the latter may be molded to provide the extra thickness at the heel portion.

Although the procedure may be widely varied it is preferred, in accordance with my prior application, to pre-heat the vulcanizable rubber sole to a temperature slightly below that of vulcanization, but at which the rubber composition may be rendered plastic quickly by further heat. The upper **12** is placed on a pre-heated metal shoe last and the ends of the draw string **14** are drawn through the lacing or stitching **15** by which it has been loosely attached to the edge portion of the upper. As the draw string is tightened, the upper is drawn beneath and molded to the shape of the under side of the last and the inner edge is drawn inwardly to form a lasting margin **16** which is to be embedded in the sole composition. The ends of the draw string are tied in a knot to hold the shape of the upper.

The vulcanizable rubber sole is initially pre-heated to a temperature slightly below that of vulcanization by placing the sole on a reticulated grid, where radiant heat is applied to both sides of the sole to bring it up to a temperature at which the rubber is semi-plastic and is heated substantially uniformly throughout. The pre-heated sole is quickly placed in a mold of the required shape and the upper, while still mounted on its last, is forced against the rubber sole under suitable pressure, such as seventy pounds per square inch. The temperature of the mold is brought quickly to the vulcanization point, which may be in the neighborhood of 310° F. This causes the rubber to become plastic and the knotted ends of the drawstring **14**, as well as the lasting margin **16** of the upper, become embedded in the mastic of the rubber sole.

Particularly, the elongated wooden strip or shank **20** is placed longitudinally and medially on the rubber sole before the upper is applied thereto, and it is properly centered, as indicated in FIG. 1, so that when the heated mold of the upper is brought down against the shank, the latter is forced in accordance with the shape of the mold of the upper into its final position, as indicated in FIG. 2. The top of the sole strengthening and foot arch supporting shank **20** is embedded not higher than the top of the sole and preferably flush with the top surface of the sole, so as to cause no discomfort for the wearer. The bevelled faces **21** and **22** may be at the top or the bottom of the shank. The temperature of the pre-heated rubber mastic or composition is so near that of plasticity when the parts are assembled that the wooden strip becomes quickly embedded in the rubber under the molding pressure. Also, the lasting margin **16** and the exposed portion of the stitching **15** become fully embedded in the rubber mastic so that the parts are united permanently. The draw cord **15** and its knot are also secured in the mastic so that the shape of the shoe is maintained by the vulcanized rubber after the latter has attained a hard condition.

Because of the pre-heating of the rubber sole composition, vulcanization takes place very quickly, usually in about one and one-half minutes, so that time is not wasted in the manufacture of the shoe and the upper is not exposed to a deteriorating heat treatment. The pre-heating of the rubber insures vulcanization throughout its entire volume and not a mere surface case hardening in the mold. Thereafter, the heel **25** may be nailed to the shoe by means of the inner heel piece **30** and the nails **28**. These nails need not pass through the shank.

In view of the above disclosure, it will be appreciated that various modifications may be made in this structure and procedure and relative to the compositions of the various materials and that this description of a preferred embodiment of the invention is not to be interpreted as imposing limitations on the appended claim.

I claim:

A shoe comprising an upper of flexible material having a peripheral inturned lasting margin, a two-ended lasting margin, a two-ended lasting draw-string attached to said margin, fastening means for securing the ends of the drawstring and holding said upper in a lasted shape, a unitary vulcanized rubber sole having heel, ball and foot arch supporting portion contacting said margin, said drawstring, fastening means and lasting margin being embedded in and permanently secured in position by the rubber adjacent to the peripheral edge of the sole, and a separate, elongated, reinforcing shank extending longitudinal and medially of the arch supporting portion of the sole, said shank having an initially upwardly bowed central portion which reinforces and resists downward pressure on the sole, said shank being embedded in and secured permanently by the rubber of the sole and the top surface of the shank being flush with the top surface of the sole.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,061,949 November 6, 1962

Felix Rosenbaum

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, lines 19 and 20, strike out "a two-ended lasting margin,"; lines 28 and 29, for "longitudinal" read -- longitudinally --.

Signed and sealed this 2nd day of April 1963.

EAL)
test:

STON G. JOHNSON
testing Officer

DAVID L. LADD
Commissioner of Patents