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2,918,733

SPIKE ANCHORAGE IN SHOE BOTTOMS

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Fig. 1

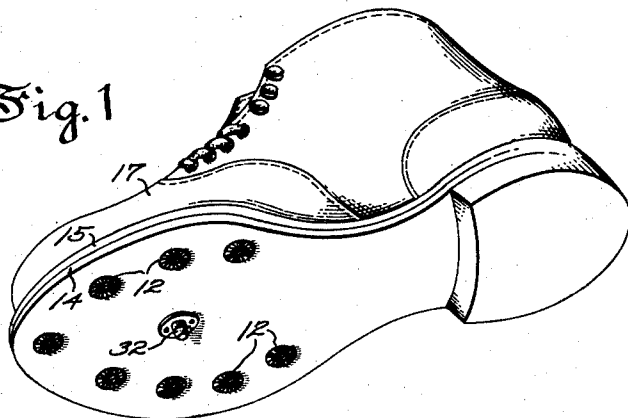


Fig. 2

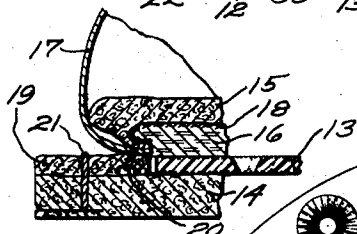
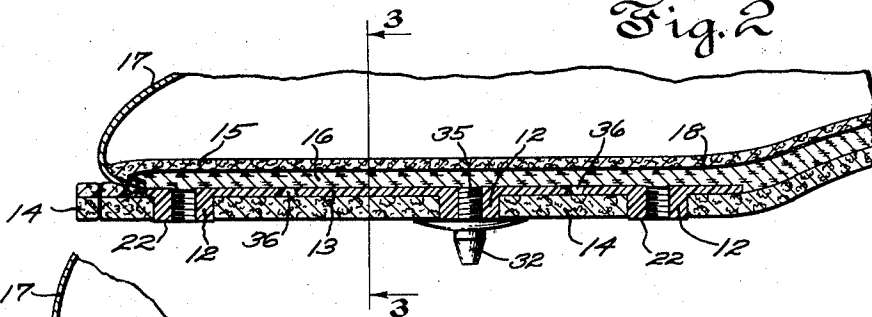


Fig. 5

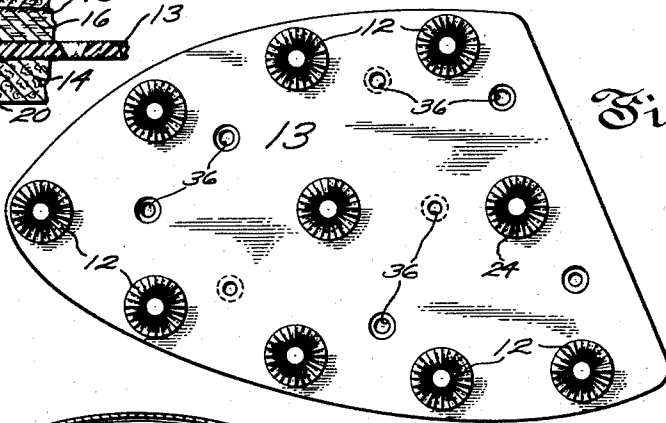
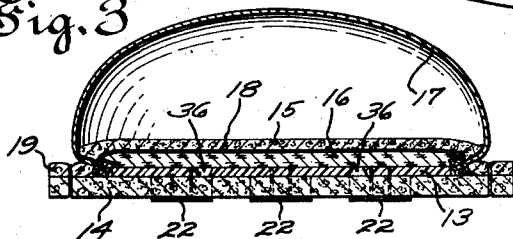


Fig. 4

Fig. 3



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SPIKE ANCHORAGE IN SHOE BOTTOMS

John Wiley Anderson, Newton, Conn.

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1 Claim. (Cl. 36—2.5)

This invention relates to improved shoe construction according to which there is incorporated within the sole structure of a shoe a unitary member for anchoring to the shoe a plurality of demountable or replaceable calks, spikes or cleats adapted to afford sure footing in outdoor occupations and sports such as hiking, football, golf, etc.

Heretofore it has been proposed that each of such spikes have separate and independent means of mechanical attachment to the leather of the shoe sole although it also has been proposed that a plurality of mounting sockets receptive to spikes as separate parts be joined at the shoe bottom by a thin plate of sheet steel.

The use of a metal plate for this purpose has proved unsuccessful particularly if embedded as an insert within the sole structure of a shoe because it involves an assembly of metallic structures that is costly and it does not permit the sole leather to flex in all the necessary various directions with a natural freedom of action. Also metal in a shoe bottom is objectionable because it is readily conductive of cold and heat. If of ferrous composition, sheet metal so used is attacked by corrosion and deterioration from moisture soaked up from the ground through the leather of the outersole of the shoe. This is particularly detrimental where, as in the case of sod on a golf course or football field, the moisture is impregnated with chemical fertilizers that are damaging to metal. Furthermore sheet metal possesses a grain due to the rolling out process by which it is fabricated and when incorporated in a shoe bottom it is incapable of warping in full conformity with the universal flexibility of leather. The contrast between the resistance to bending offered by the grained sheet metal and that offered by the sole leather leads to enforced wrinkling of the latter. It also promotes bunching of the pliant cork filler commonly employed between the insole and outersole of a shoe bottom. The only use of metal in a shoe bottom successfully of which I am aware is its employment as a stiff arch brace or shank commonly built into a shoe bottom just forward of the heel. So used the metallic shank is usually floated in the body of cork filler so as to be called upon for practically no flexure.

An object of the present invention is to overcome the above mentioned disadvantages of incorporating sheet metal in a shoe bottom as part of a spike anchorage structure and yet to retain the advantages offered by providing a unitary structure tougher than leather to which all of the spikes in a single shoe may be anchored.

A further object is to provide a unitary anchorage structure of such nature and relationship to other components and materials of the shoe bottom that it can conform in flexing performance with the various directional flexing of the leather of the shoe sole thus in no way to impair the comfortable allover feeling of "give" characteristic of a spikeless shoe bottom of conventional construction.

A further object is to attain a thorough and allover adhesion of the surfaces of a plate-like spike anchoring

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unit to adjoining materials of the shoe bottom so that no slippage takes place between the plate and said adjoining materials. This avoids wrinkling and the setting up of voids in the shoe sole structure even after extensive use involving repeated wettings and drying out of the leather of the soles.

The foregoing and other objects of the invention will appear in greater particular from the following description of a preferred form of the invention having reference to the accompanying sheet of drawings, wherein:

Fig. 1 is a perspective view of a golf shoe having a sole structure receptive to a plurality of replaceable spikes, one of such spikes being shown in place.

Fig. 2 is a view taken in section on an upright plane through the longitudinal center of the shoe showing spike anchorage structure incorporated in the shoe bottom in accordance with the present invention.

Fig. 3 is a view taken in section on the plane 3—3 in Fig. 2 looking in the direction of the arrows.

Fig. 4 is a bottom plan view of the spike anchoring unit removed from the sole structure of the shoe.

Fig. 5 is a fragmentary enlarged view of the stitched together edges of the upper, the insole and the welt appearing in Figs. 2 and 3 and also shows the outersole stitched to the welt to complete the fabrication of the shoe.

In the form of the invention herein illustrated internally threaded bosses 12 project from one broadside face of a plate 13 of plastic material which is molded integrally with the bosses 12 and which has physical properties such that it can flex in true conformity with all bending that occurs in a shoe bottom of conventional construction. The plate 13 and bosses 12 form a homogeneous anchorage unit for the demountable attachment of ground spikes one of which is shown in place in Figs. 1 and 2.

The outline of plate 13 as delineated in Fig. 4 parallels and falls inside of the similarly shaped outside boundary of the shoe bottom so that plate 13 is completely concealed within a cavity formed in the shoe bottom between the outersole 14 and the insole 15, both of which soles are preferably but not necessarily of leather. The leather of the insole is softer than the tough leather of the outersole and is covered on its bottom surface next to the pliant body of cork filler with a coarse fabric 18 to promote allover surface cemented adhesion of the insole to said body of filler.

In the cavity between the insole and outersole, atop plate 13 and beneath the insole 15, the said pliant cushioning filler 16 of soft resin bound cork particles, or of some equivalent squeek preventing, non-drying, heat-insulative cushioning substance, is confined with uniform distribution. The attachment of the shoe upper 17 to the shoe sole structure is by conventional means best shown in Fig. 5 and hereinafter more fully discussed.

As in my copending application, Serial No. 440,065, filed June 29, 1954, now Patent No. 2,784,503, dated March 12, 1957, the exposed outermost face 22 of each boss 12 is provided with ridges 24 and intervening grooves that radiate from the threaded hole in the boss. An annular surface on the plug portion 35 of a ground spike 32 faces the boss surface 22 and carries mating ridges (not herein shown) of shape and size to match the grooves between ridges 24 on the boss 12. This effects releasable interlocking engagement for preventing accidental loosening of the spike as is described in fuller detail in my above said copending application.

The present improvements more particularly concern the structural characteristics and disposition of plate 13 with bosses 12 in the bottom of the shoe as a built-in component of the sole structure, which characteristics and disposition give rise to a distinctive cooperative ac-

tion of the plate with associated parts of the shoe bottom in response to flexure, moisture, and heat effects encountered in use.

I have discovered that when made of certain materials and incorporated in a shoe bottom in a certain manner the presence of the plate can be caused to have no perceptible interference with the natural flexing characteristic of a conventional shoe bottom. This is in contrast to the hereinbefore mentioned bad results of incorporating a steel plate in the shoe bottom.

The improved results are due in part to a more thorough allover bonding of the plastic plate 13 to the outsole 14 and to the pliable body of cork filler 16 than has been possible to a steel plate, wherefore all bunching or forcing of the cork filler into uneven distribution in the cavity of the shoe bottom is avoided. The plate 13 is made perforate preferably by any suitable number of taper sided holes 36, some of which holes have sides which taper toward one surface of the plate and others of which holes have sides that taper toward the opposite surface of the plate. In addition, I prefer to roughen or pebble the broadside surfaces of plate 13 sufficiently to promote the cling thereto of a flexible bonding cement. The cement will enter and partially or fully occupy and cling to the taper sided holes 36. To whatever extent the cement fails to fill these holes they will serve to increase the ventilation of the shoe bottom as a whole.

The manner of securing together the edges of an outsole, an insole and an upper, and if desired of a welt 19, is well understood in the art of shoe making. One form thereof is illustrated in Fig. 5 and will need no detailed description it being clear that the insole, upper, and welt, are sewed together by stitches 20 while the welt and the outsole are sewed together by the stitches 21.

Because the limberness of plate 13 is uniform in all directions of flexure, I may rely upon the mechanical engagement of the bosses 12 with the close fitting holes in the outsole 14, through which they respectively project, to prevent edgewise sliding or non-conforming flexure of the plate relative to the outsole 14, but I prefer to cement the top roughened surface of this perforate plate thoroughly to the body of the cork filler 16.

For attaining the full benefits of this invention, I prefer to make the web spans of plate 13 between the bosses 12 about $\frac{1}{16}$ " thick and to dimension the bosses in the proportion thereto shown in the drawings. A successful material for plate 13 is resilient molded nylon capable of bending deflection within its elastic limit from the flat to an angle of at least 30° with the plane of the flat. Nylon and similar molded synthetic thermoplastic resins are found to have physical properties very compatible with leather in flexing behavior while tough enough to serve as a sturdy spike anchorage structure. The properties of such molded plastics which make them particularly suited to the present purpose include relatively light specific gravity, which for nylon molding compounds is about 1.14 as against appreciably greater weight in thermosetting plastics. In comparison with an anchorage suit of the same shape and size as that herein shown, if made of sheet spring steel and with the plate 13 made suitably thinner than the nylon plate herein

shown, the steel unit would be at least one pound heavier than the nylon construction.

Next there is a relatively small modulus of elasticity in terms of stress per square inch divided by the elongation in one inch caused by such stress, which modulus for nylon is about 4.5 as against more than double that value and correspondingly less resilience in some thermosetting plastics, wherefore a larger degree of deflective yielding is sustained at localized spots in the area of the plate without causing permanent deformation of the plate. There is also possessed a flexural strength of about 13,800 pounds per square inch and a surface hardness superior to many other thermoplastics amounting to a hardness of about R118 in the Rockwell testing system. Nylon further has a low rate of water absorption amounting to about 1.5 percent in a one-eighth inch thickness of the material after twenty-four hours of exposure. Nylon further has particularly good immunity against attack by acid and alkalis.

While I have herein disclosed the best mode of practicing the invention now known to me, it is apparent that the principles underlying these improvements may be incorporated in many variations from the exact shapes, materials and relative arrangement thereof that have herein been employed to teach the invention, wherefore the appended claim are directed to and intended to cover all substitutes and variations as come within a broad interpretation of their terms.

I claim:

In a shoe bottom the combination with an outsole containing apertures and an insole separated from said outsole by an intervening shallow cavity, a homogeneous integral body of nylon, a polymeric carbon amide comprising a span of resilient web having a broadside face in allover abutting closeness to said outsole uniformly limber in all directions of flexure sufficiently thinner than the depth of said cavity to leave a cushioning space therein and conforming to said cavity in outline size and shape, said body also including hollow bosses interconnected by said web projecting from said broadside face thereof and extending through said apertures in the outsole and terminating approximately flush with the external surface of the outsole thereby to receive and mount in the hollows of said bosses detachable spikes received from the exterior of the shoe, and an amorphous pliant substance sandwiched between and bonded in allover surface attachment to said insole and to the nearest surface of said web and filling said space therebetween whereby to resist collapse of said cavity space and to be prevented from bunching responsively to the flexing of the shoe bottom.

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UNITED STATES PATENT OFFICE
CERTIFICATION OF CORRECTION

Patent No. 2,918,733

December 29, 1959

John Wiley Anderson

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.

In the grant, line 3, for "Newton, Connecticut" read -- Newtown, Connecticut --; in the heading to the printed specification, line 3, for "Newton, Conn." read -- Newtown, Conn. --.

Signed and sealed this 25th day of April 1961.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents