

- [54] **SHOE OUTSOLE UNIT**
- [75] **Inventor: Edward H. Granger**, South Yarmouth, Mass.
- [73] **Assignee: F. C. Phillips Incorporated**, Stoughton, Mass.
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- [52] **U.S. Cl.** ..... 36/59 R, 36/2.5 AH
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- [58] **Field of Search** ..... 36/2.5 R, 2.5 AH, 36/59 R, 67 A, 67 B, 67 C, 67 D

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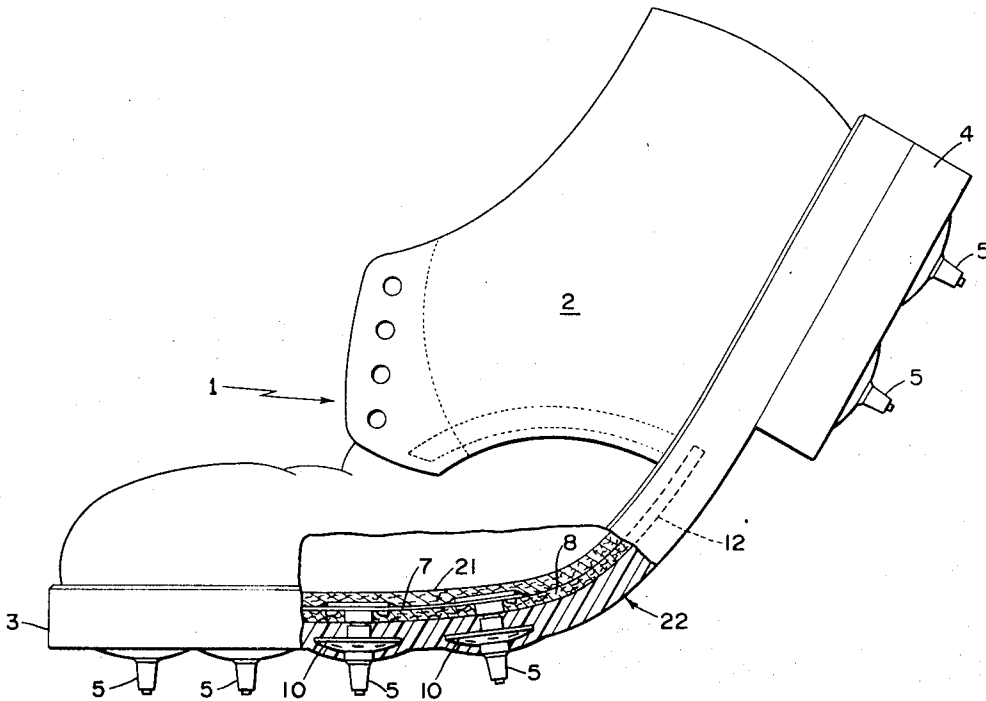
*Primary Examiner*—Patrick D. Lawson  
*Attorney*—Elmer J. Gorn

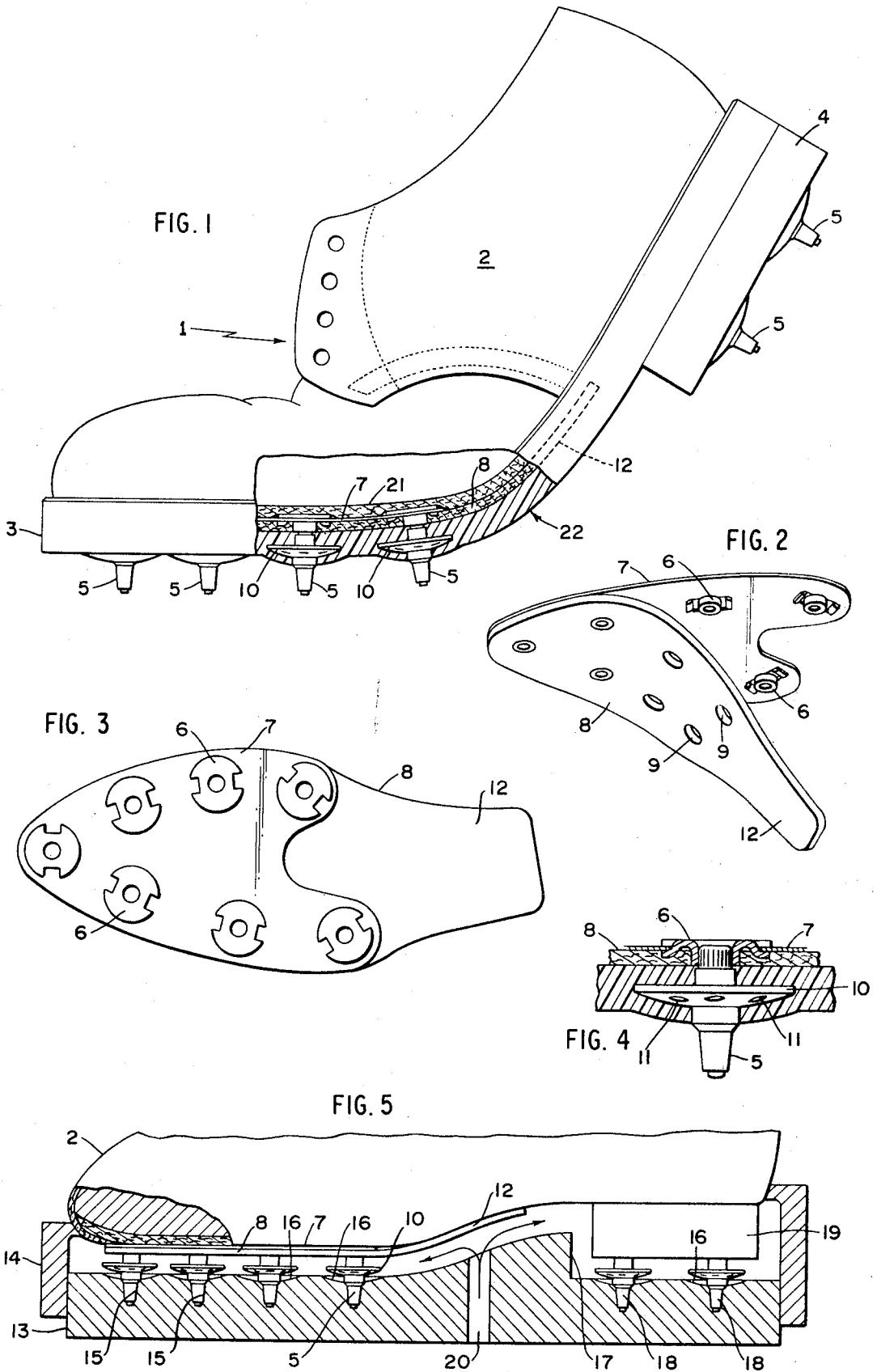
[57] **ABSTRACT**

A golf shoe outsole unit consisting of a moldable elastomer, such as P.V.C. or polyurethane or the like having an elongation restraining strip bonded to the upper surface of the outsole extending across a major portion of the outsole at its line of maximum flexure and extending for a substantial distance on both sides of that line. A spike anchor plate is mounted on top of the strip with golf shoe spikes extending from the lower side of the plate, through the strip and the elastomer and out beyond the lower surface of the outsole. The spikes are provided with perforated flanges sealed into the body of the elastomer.

- [56] **References Cited**
- UNITED STATES PATENTS**
- 3,327,412 6/1967 Wilmanns et al. .... 36/67 D
- 3,237,323 3/1966 MacNeill ..... 36/67 B

**7 Claims, 5 Drawing Figures**





## SHOE OUTSOLE UNIT

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

Shoe outsole made of molded plastic material such as P.V.C. or polyurethane.

## 2. Description of the Prior Art

A common method of manufacturing shoes, particularly golf shoes, is to form the outsole and heel of the shoe by injecting a moldable elastomer such as a highly plasticized polyvinyl chloride (P.V.C.) into an appropriate mold. In the case of golf shoes, a flexible spike anchor plate, such as that shown in U.S. Pat. No. 3,040,449 to F. C. Phillips, carrying golf spikes is incorporated into the molded outsole.

The outsole structures of such shoes suffer from a number of defects. After the shoe has been worn for a period of time, the outsole tends to crack along a line transverse to the sole approximately below the ball of the foot where the greatest degree of bending takes place. This is particularly true in the case of the golf shoe. The wearer of the golf shoe also often feels the pressure exerted by the golf spikes, which pressure is transmitted to the wearer's foot through the anchor plate and the usual insole. This results in discomfort to the wearer.

## SUMMARY OF THE INVENTION

The present invention substantially eliminates the above defects by bonding a flexible strip of a material, such as chrome sueded split leather, to the inner surface of the molded material of the outsole, extending across the major portion of the width of the outsole and also extending for a substantial distance ahead of and behind the line of maximum bending of the outsole. This strip is made of a material which resists stretching and compression to a substantially greater degree than the material of the outsole and is provided with a surface texture which bonds readily to the outsole material. In the golf shoe the strip is located between the anchor plate and the outsole.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view, partially broken away, of a shoe constructed in accordance with this invention;

FIG. 2 is a perspective view of a spike anchor plate to which the novel strip of this invention is attached;

FIG. 3 is a top view of the anchor plate and strip assembly;

FIG. 4 is a detail in cross-section through the completed outsole at one of the golf spikes; and

FIG. 5 is a vertical section taken longitudinally through a mold assembly showing a shoe in accordance with this invention, prior to the injection of the elastomer of the outsole and heel.

## DETAILED DESCRIPTION OF THE INVENTION

In FIG. 1 a shoe 1 is provided with an upper 2 and a unitary molded outsole 3 and heel 4 made of any one of a large class of well-known, moldable elastomers, including natural rubber, synthetic rubber and rubber compounds such as highly plasticized polyvinyl chloride (P.V.C.), polyurethane and other synthetic resinous compounds possessing the physical qualities of natural rubber when subjected to the process of being molded under heat and pressure. The term "moldable elastomer" will be used herein to define this class of

materials. Projecting from the outsole 3 and heel 4 is a plurality of metal golf spikes 5. The spikes in the outsole 3 are press fitted into receptacles 6 mounted on a flexible metal anchor plate 7 as disclosed more fully in the U.S. Pat. No. 3,040,449 to F.C. Phillips.

Prior to the attachment of the spikes 5 to the receptacles 6, a strip 8 of a tough, flexible material such as chrome sueded split leather is assembled on the anchor plate 7. Strip 8 is provided with a series of holes 9 corresponding in position and number with the receptacle 6 so that such assembly is accomplished by pressing the strip 8 onto the plate 7 with the edges of each receptacle projecting into a corresponding hole 9. At least one side of the strip 8 is preferably provided with a napped surface which is arranged to face downward. This surface insures good bonding to the elastomer of the outsole.

After the strip has been placed on the plate 7, the spikes 5 are press-fitted into the receptacles 6. Each spike 5 is also provided with an enlarged flange 10 provided with a plurality of holes 11 distributed around said flange. The strip 8 not only extends under the plate 7 but is also provided with an extension 12 which extends a substantial distance beyond the rear edge of said plate.

The anchor plate 7 carrying the strip 8 and spikes 5, as shown in FIG. 5, is placed in a mold assembly comprising a sole plate 13 and a side ring 14. The sole portion of the plate 13 is provided with a series of openings 15 for receiving the lower ends of spikes 5. The depth of openings 15 is such that the flange 10 of each spike 5 is supported at a distance from a concave depression 16 formed in the sole plate 13 around the upper end of each opening 15. The sole plate is also formed with a heel forming cavity 17 also provided with openings 15 and concave depressions 16 to receive heel spikes 18 identical with sole spikes 5. On top of the anchor plate 7 is placed the preformed upper 2 which is provided with a heel block 19 carrying spikes 18. The sole plate 13 is provided with an injection opening 20 through which the moldable elastomer may be injected. This opening 20 underlies the extension 12 on the strip 8.

After the elements have been assembled on the mold assembly, the desired moldable elastomer is injected through opening 20 and impinges on the extension 12 to force it up against the bottom of the upper 2. The elastomer also flows into the sole and heel cavities in the mold assembly and fills such cavities, thus embedding the portion of each spike 5 above its hole 14, including the flange 10, in the elastomer. The elastomer not only bonds firmly to the strip 8, but also extends through the holes 11 in each flange 10 to increase the lock between the spikes 5 and the outsole. Under the well known conditions of such molding process, the elastomer attains its final desired rubber-like properties, thus completing the shoe except for the insertion of an insole 21 covering the anchor plate 7.

During normal use, the wearer's foot will cause the outsole 3 to bend, with maximum flexing occurring approximately under the ball of the wearer's foot. Such maximum flexing occurs along a line, indicated at 22 in FIG. 1. This line is transverse to the outsole and will be termed the "maximum flexure line" of the outsole. It will be noted that such flexing exerts tension on the material of the outsole in a direction across the maximum flexure line.

In absence of the strip 8, such tension produces stretching of the material of the outsole throughout its thickness. Thus the outsole will stretch, not only along its outer side, but also to a lesser, but still substantial degree, along its inner side. Thus the outsole is subjected to repeated stretching in the vicinity of its maximum flexure line. Such repeated stretching has a deleterious effect on the outsole since it tends to crack in the vicinity of its maximum flexure line well before the end of the desired life of the shoe.

It has been found that the addition of the strip 8, according to this invention, materially prolongs the life of the shoe and substantially increases its comfort. It is believed that this is due to several factors. Firstly, the material of strip 8 has a substantially smaller elongation factor than the elastomer of the outsole. In other terms Young's modulus in tension is larger for the material of strip 8 than for the elastomer of the outsole. Thus the strip 8 acts to restrain elongation of the outsole 3 where it is bonded to strip 8. In order for the proper elongation restraint the strip 8 should extend across the major portion of the width of the outsole, particularly at the maximum flexure line. It should be noted that the strip 8 is highly flexible, more so than either the plate 7 or the outsole 3 so that it does not add stiffness to the structure which might decrease the comfort of the shoe.

Another life prolonging effect of the strip 8 is that it tends to retard the rate of loss from the outsole of the plasticizer used in the elastomer of the outsole. For this purpose the strip 8 should be impervious to such plasticizer. The type of leather described above for such strip is ideally suited for this purpose.

The presence of the strip also substantially reduces the perception by the wearer of the pressure exerted by the spikes 5. This is believed to be due to the fact that the compression factor of the material of the strip 8 is greater than that of the plate 7 and less than that of the elastomer of the outsole. In other terms, Young's modulus in compression of the material of strip 8 is greater than that of the elastomer of the outsole and smaller than that of the material of plate 7. Thus there is a graded compression effect through the overall sole structure which produces this desired effect.

It is to be understood that modifications of various details of this invention may be made within the scope of the appended claims. For example, the flexible strip 8 may be made of any suitable leather, which term is

intended to include animal materials and equivalent synthetic materials such as poromeric or expanded vinyl substances. Instead of the spikes being molded into the sole piece, they may be assembled by being inserted through the sole piece and screw threaded or press fitted into sockets in the anchor plate.

What is claimed is:

1. A shoe including an outsole unit comprising:

- a. an outsole piece formed of a moldable elastomer;
- b. an elongation restraining strip bonded to the inner surface of said outsole piece extending across a major portion of said outsole piece for a substantial distance on both sides of the maximum flexure line of said outsole piece;
- c. said strip being substantially more flexible than said outsole piece and having a substantially larger Young's modulus in tension than the Young's modulus in tension of said outsole piece.

2. An outsole unit comprising:

- a. an outsole piece formed of a moldable elastomer;
- b. an elongation restraining strip bonded to the inner surface of said outsole piece, extending across a major portion of said outsole piece for a substantial distance on both sides of the maximum flexure line of said outsole piece;
- d. a spike anchor plate mounted on the upper side of said strip;
- e. a plurality of spikes secured to said anchor plate and extending through said strip and said outsole piece and projecting beyond the lower surface of said outsole piece.

3. An outsole unit according to claim 2 in which each of said spikes is provided with an intermediate flange sealed into the elastomer of said outsole piece.

4. An outsole unit according to claim 3 in which each of said flanges is provided with a plurality of perforations through which said elastomer is formed, whereby the said sealing is substantially enhanced.

5. An outsole unit according to claim 1 in which said strip is substantially impervious to the plasticizer of said elastomer.

6. An outsole unit according to claim 1 in which said strip is composed of a strip of leather.

7. An outsole unit according to claim 6 in which said strip comprises chrome sueded split leather with the sueded side of said strip being bonded to said elastomer.

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