

[54] **SHOE SOLE AND HEEL**

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[51] Int. Cl. A43b 13/18

[58] Field of Search 36/28, 32 R

[56] **References Cited**

UNITED STATES PATENTS

2,766,800	10/1956	Rockoff.....	36/32 R UX
2,374,487	4/1945	Jayne	36/32 R
2,651,118	9/1953	Root	36/32 R
2,757,461	8/1956	Cartmell	36/59 C X

3,046,172	7/1962	Reid.....	161/160 UX
3,219,600	11/1965	Rucker	161/DIG. 5
3,515,625	6/1970	Sedlak et al.	161/DIG. 5
3,596,381	8/1971	Fukuoka	36/32 R X

Primary Examiner—Alfred R. Guest

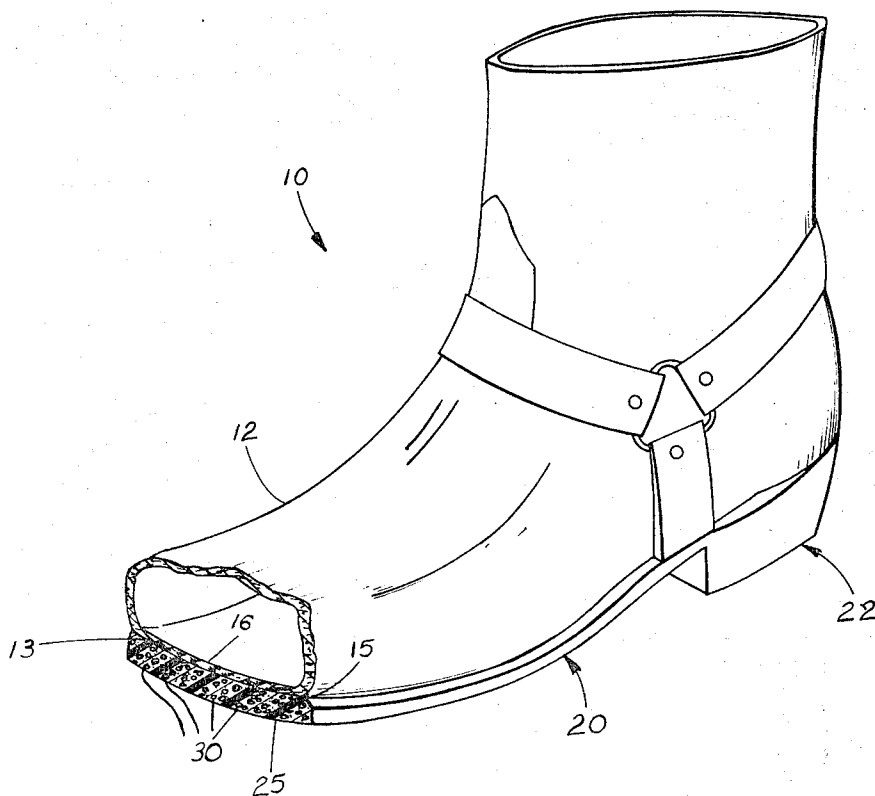
Attorney, Agent, or Firm—Price, Heneveld, Huizenga & Cooper

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ABSTRACT

A shoe sole and heel integrally molded of an elastomeric material having a filler of hollow glass spheres dispersed therein. The spheres are mixed with the elastomeric material prior to molding. The resulting composition is injection molded in the shape of a heel and sole directly on the bottom of a shoe upper to form a lightweight, relatively inexpensive and wear-resistant shoe bottom.

9 Claims, 2 Drawing Figures



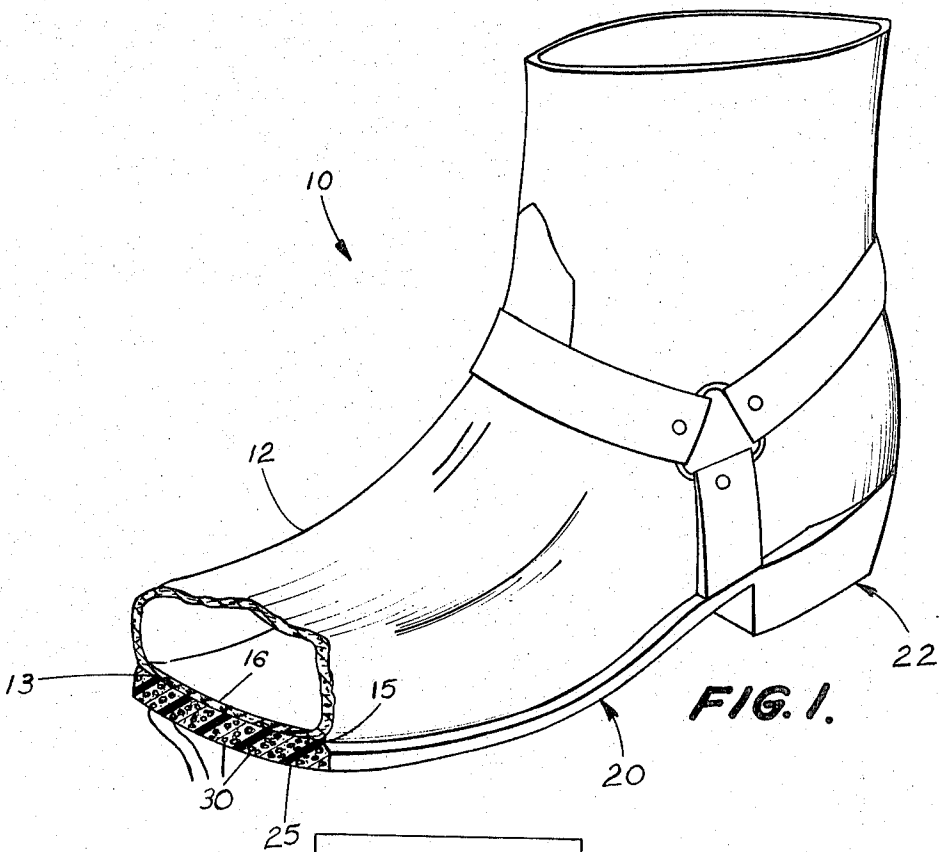
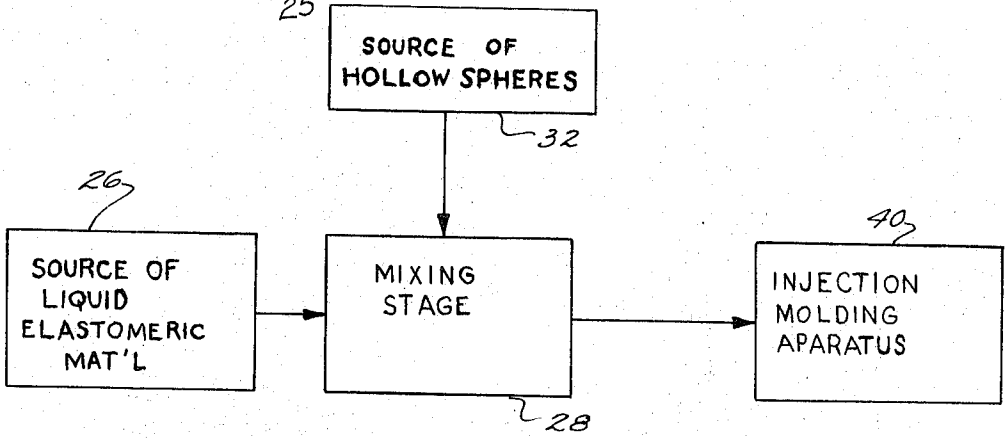


FIG. 2.

SHOE SOLE AND HEEL

BACKGROUND OF THE INVENTION

The present invention relates to shoe soles and heels and more specifically, to a shoe sole and heel molded of an elastomeric material including a filler of hollow glass spheres.

Shoe sole material molded entirely of an elastomeric material such as polyvinyl chloride (PVC) is relatively expensive due to the cost of the material, as well as being heavy, due to the density of the PVC employed. Additionally, a sole and heel made of a pure elastomeric material does not have wear-resistant properties as good as composition sole and heel materials.

Shoe soles and heels have been molded of an elastomeric material having uniform gas bubbles dispersed within the material to reduce the cost of the material as well as reducing the weight of the shoe. The matrices formed with the gas bubbles within the sole material, however, are primarily for the purpose of increasing the elasticity of the shoe bottoms and do not increase the wear-resistance of the material. The wear-resistance of the shoe sole and heel so formed is actually reduced. U. S. Pat. Nos. 3,005,272, Shelare, et al., issued on Oct. 24, 1961 and 3,552,039, Fukuoka, issued on Jan 5, 1971, describe shoe soles and heels so formed.

U. S. Pat. No. 3,046,172, J. S. Reid, issued on July 24, 1962, suggests the use of hollow clay spheres within an elastomeric material for the manufacture of the shoe sole material. This patent, however, teaches the step of crushing the spheres after the molding process to form gas voids directly within the shoe sole material thereby increasing its elasticity. Such a process is directed primarily to forming an elastic, compressible material and not a process or material for increasing the wear-resistance properties of the shoe material. The process of the patent eliminates the difficulties of dispersing small gas bubbles within the binding material to achieve the same purpose as described in the Shelare, et al., and Fukuoka patents, supra.

SUMMARY OF THE INVENTION

The shoe sole and heel material of the present invention, employs a filler of hollow glass spheres mixed within an elastomeric material such that the spheres remain intact to provide rigidity to the shoe sole material as well as wear-resistance at the surface of the material. The integrally molded shoe sole and heel so formed can be molded directly to a shoe bottom as by using an adhesive to insure the molded shoe sole and heel will adhere securely to the bottom of the shoe.

It is an object of the present invention to provide shoe sole and heel material which is lightweight, relatively inexpensive, and wear-resistant.

It is an additional object of the present invention to provide a shoe sole material having a filler of hollow spheres that can be molded directly to a bottom of a shoe during the manufacturing of the shoe.

It is still an additional object of the present invention to provide an improved shoe sole and heel material comprising an elastomeric material having uniformly dispersed hollow glass spheres within the material to reduce the weight of the shoe sole and heel material as well as increasing the wear-resistant properties of the resulting shoe sole and heel so formed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially cut-away perspective view of a shoe having a sole and heel embodying the present invention; and

FIG. 2 is a block diagram of the process employed to manufacture the shoe sole and heel material shown in FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in detail to FIG. 1 there is shown a shoe 10 having an upper portion 12 made of a leather material such as pigskin. Edges 13 and 15 of the upper material are inwardly turned around an innersole 16 and cemented to the innersole during the manufacturing process.

Attached to the bottom of the innersole 16 is an integrally formed shoe sole 20 and heel 22. The sole 20 and heel 22 can be integrally molded as shown in FIG. 1 or can be separately molded and attached to the shoe 10. Also the shoe 10 may include only a sole portion 20 made according to the present invention and use a conventional rubber or composition heel 22 which is later attached to the shoe 10. Also, the shoe sole and heel 20, 22 embodying the present invention can be employed with a variety of shoes and boots having designs different than that illustrated in FIG. 1.

The manufacture of the sole and heel 20, 22 is illustrated by the block diagram of FIG. 2 which shows that a source 26 of liquid elastomeric material 25 (FIG. 1) such as PVC supplies the liquified elastomeric material to a mixing stage 28 which includes a suitable mixing vessel. The mixing stage 28 is also supplied with hollow glass spheres 30 (FIG. 1) from a source 32 of such glass spheres. These spheres can range in diameter from 25-100 micrometers and are commercially available from the Minnesota Mining and Manufacturing Company. Spheres of 50 micrometer diameter were used in the preferred embodiment.

The mixing stage 28 combines the glass spheres 30 with the PVC binder 25 in a mixture of 15-20 percent spheres to 85-80 percent PVC by volume. The volumetric ratio of spheres to binder can vary somewhat although the range of 15-20 percent provided the best results. A uniform mixture is achieved by well known processes as exemplified in U. S. Pat. No. 3,046,172 referred to above. After mixing the liquified PVC and glass spheres, the mixture is fed to an injection molding apparatus 40 having a plurality of molds (not shown) shaped in the form of the sole and heel 20, 22 illustrated in FIG. 1. The molds are mounted adjacent the innersole 16 of the shoe 10 such that the molded shoe sole 20 and heel 22 can be directly bonded to the bottom of the shoe 10. A neoprene binder, applied to the outer edges 13 and 15 of the upper material 12 prior to the application of the sole and heel insures adhesion. It is possible, of course, to mold the integral shoe sole and heel 20 and 22 and later cement it to the bottom of the shoe 10. Likewise, it is equally possible to mold the sole and heels separately for later adhesion to the shoe bottom.

Various elastomeric materials which can be liquified for mixing the spheres within the material can be used as the shoe sole and heel material. Such elastomeric materials include styrene-butadiene rubber (SBR), polyurethane, and other well known materials. Al-

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though glass spheres have been successfully employed in the preferred embodiment, spheres of materials such as ceramic, epoxy, polyester resin, or "Saran" can likewise be successfully employed. It is important, however, that the spheres remain intact such that the shoe sole material maintains its rigidity and wear-resistant properties.

Other variations of the present invention falling within the scope of the present invention as defined by the appended claims will become apparent to those skilled in the art.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows.

1. A shoe sole molded of an elastomeric material having a rigid filler material comprising intact hollow spheres dispersed uniformly therein, said spheres being of lesser density than said elastomeric material and forming approximately 15–20 percent by volume of the sole.

2. The shoe sole as defined in claim 1 wherein said spheres comprise hollow glass spheres having a diameter of from 25 to 100 micrometers.

3. The shoe sole as defined in claim 1 wherein said

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elastomeric material is polyvinyl chloride.

4. The shoe sole as defined in claim 1 and further including an integrally molded heel.

5. In a shoe sole molded of an elastomeric material, the improvement comprising a rigid filler of uniformly dispersed hollow spheres within said elastomeric sole material and comprising 15–20 percent of the total volume of said shoe sole.

10 6. The shoe sole as defined in claim 5 wherein said filler comprises 15 to 20 percent of the total volume of said shoe sole.

7. A shoe having an innersole with a bottom attached thereto, said bottom comprising a heel and sole integrally molded from an elastomeric material and including a plurality of hollow glass spheres uniformly dispersed therein, said spheres having a diameter of from 25 to 100 micrometers and comprising 15 to 20 percent by volume of said bottom.

20 8. The shoe as defined in claim 7 wherein said elastomeric material comprises PVC.

9. The shoe as defined in claim 8 wherein said bottom is molded directly to said innersole of said shoe.

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