Sept. 26, 1967 J. P. KOWAL 3,343,285

SPIKED SHOE

Filed May 4, 1966 2 Sheets-Sheet 1

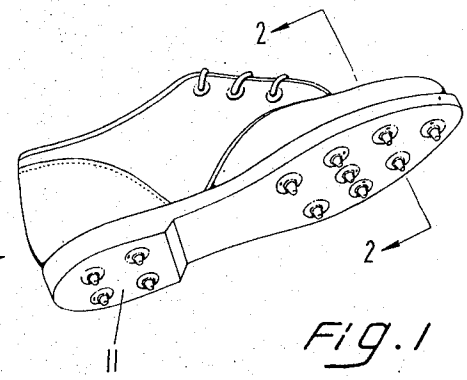


Fig. 1

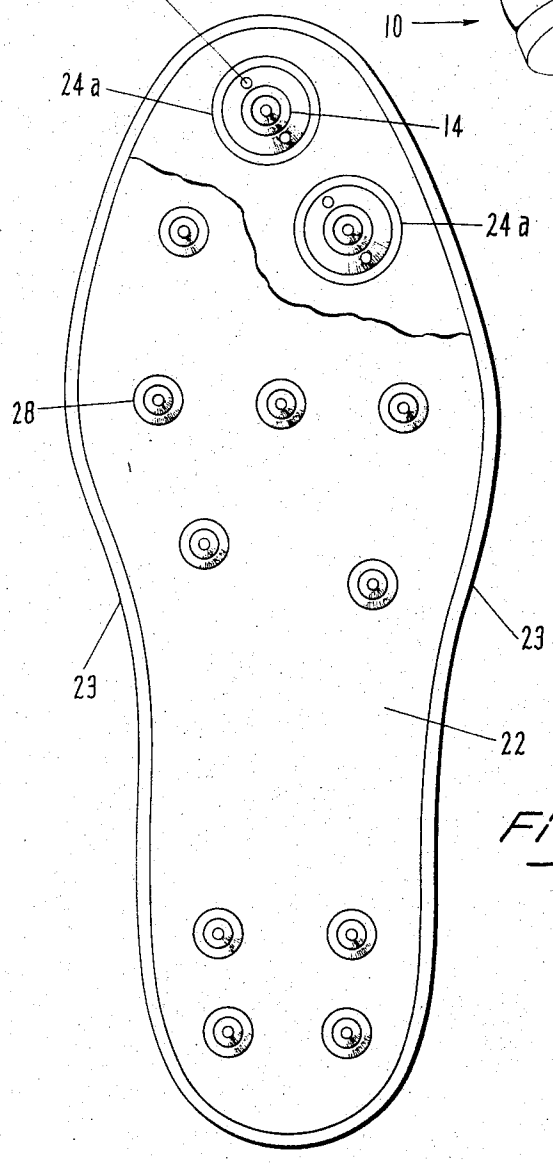


Fig. 4

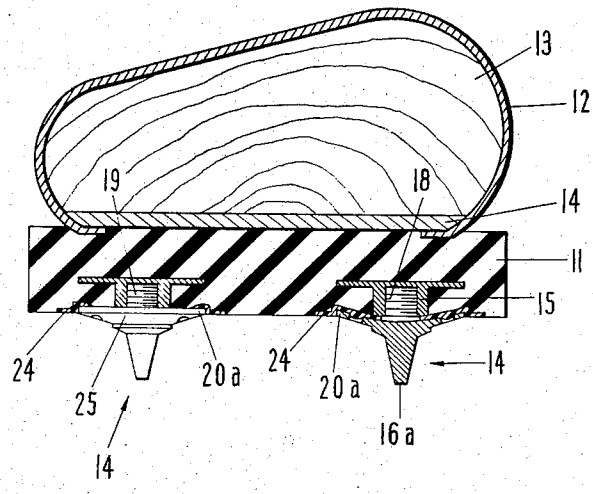
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Fig. 2



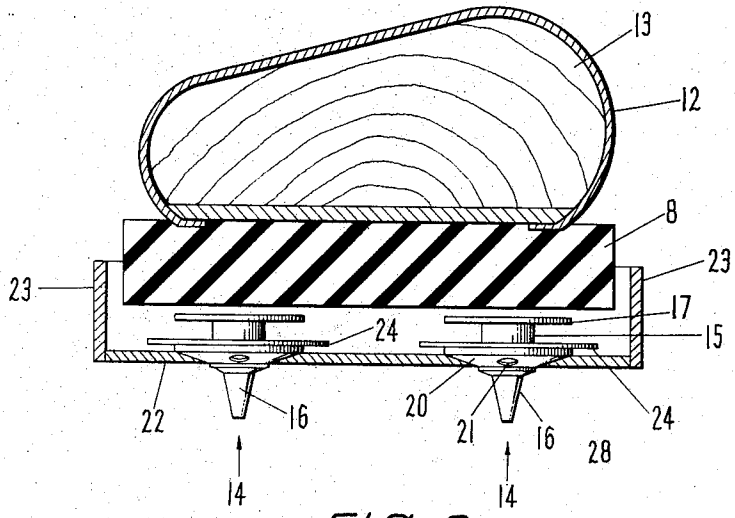


Fig. 3

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SPIKED SHOE

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ABSTRACT OF THE DISCLOSURE

A shoe sole construction and method of manufacture is provided where spike assemblies are used as in an athletic shoe and the lowermost flange of each spike assembly underlies a disc embedded in the shoe sole with a portion of the disc extending outwardly of a rim of the flange. This construction is particularly useful in permitting rapid and accurate construction of spiked shoes at low cost with mass production methods.

Many spiked shoe constructions are known. The most satisfactory spiked shoe constructions usually employ a plurality of two-piece spike assemblies. These assemblies have an upper stem portion with a coaxial circular flange mounted in the sole, and a lower spike portion having an upper threaded end and a coaxial outwardly extending circular flange positioned between ends of a spike. The spike is threadably engaged with the stem and can be removed to allow replacement of the spike when necessary due to damage or wear. Such assemblies are extremely useful but problems have arisen in properly mounting the assemblies on athletic shoes such as golf, track and baseball shoes.

In many cases the mounting of the assemblies in known shoes constructions is time consuming and relatively expensive resulting in relatively high cost of production. In some cases, the mounting procedure does not provide for suitable support of the spikes against lateral forces. In the copending application of the present inventor, Ser. No. 446,018 filed in the United States Patent Office Apr. 6, 1965, an improved method and shoe construction is set forth which overcomes many of the difficulties encountered in the prior art. The present invention provides even greater advantages than those disclosed in the above-noted prior patent application.

An important object of this invention is to provide an improved method of forming a shoe outer sole with a plurality of spike assemblies firmly mounted therein in positions which minimize damage to turf when used.

Another object of this invention is to provide a method in accordance with the preceding object which can be used to obtain high speed and low cost in mass production.

Still another object of this invention is to provide a method in accordance with the preceding objects which permits creation of decorative effects in a shoe sole.

Still a further object of this invention is to provide a shoe construction having a plurality of spike assemblies firmly mounted in fixed, preselected positions on a shoe outer sole wherein spikes of the assembly can be replaced when desired and decorative and informational indicia carried by the sole.

A shoe construction according to this invention has a molded shoe outer sole with an upper surface and a lower surface. A plurality of spike assemblies have spikes which extend downwardly from the lower surface in predetermined positions. At least two positioning and supporting flanges are attached to and extend about each spike assembly with one flange of each spike assembly lying substantially at the plane of the lower surface of the sole and a second flange of each spike being firmly embedded in the sole between its upper and lower surfaces. A ring insert compatible with the sole is positioned in the sole

underlying the one flange and embedded in the sole with a portion thereof firmly backing the lower one flange acting to mount the lower one flange substantially flush with the lower sole surface. Preferably the sole is constructed of elastomeric material.

In a method of manufacturing athletic shoes in accordance with this invention, a moldable sole blank is positioned over a mold plate having a plurality of spaced spike receiving apertures. The mold plate carries a plurality of two-piece spike assemblies of conventional design which are positioned in the apertures with spikes of the assemblies extending downwardly through individual ones of the mold plate apertures. Each of the spike assemblies comprise spaced apart flanges extending outwardly from the axis of each of said spikes with the lowermost flange of each assembly having an outer perimeter greater than the perimeter of the apertures thus prevent the assemblies from falling through the apertures. The lowermost flange also carries a preformed disc or ring insert, preferably of a cured rubber, which maintains its structural identity thoughout the molding method. The sole blank is heated and pressed into contact with the sole plate to form the blank into a shoe outer sole having an uppermost flange of each assembly embedded in the sole with a lower surface of the sole indented by the disc to cause the disc to abut an upper surface of each of the lowermost flanges to support and position the spike assemblies.

The method of this invention permits detachment and replacement of the lowermost flanges and spikes of the assemblies with the stems or upper portions of the spike assemblies firmly embedded in the outer sole. It is a feature of this invention that the use of the disc prevents flashing of the sole about the peripheral rim of the lowermost flange during molding thereby resulting in a product which does not damage turf to as great an extent as if the flashing were allowed to surround the rim of the lowermost flange. Moreover, the use of the disc which is preferably of greater diameter than the lowermost flange enables creation of design effects about the inset spike assemblies. Since the disc is preferably compatible with the material of the outer sole, it will bond to the outer sole during the molding procedure. The use of the disc is further advantageous in preventing counter sinking of the spike assembly and particularly embedding of the outer flange of the assembly below the surface of the outer sole which could create a commercially unusable product.

These and other objects, features and advantages of the present invention will become apparent from the following description and drawings in which:

FIG. 1 is a perspective view of a shoe manufactured in accordance with this invention;

FIG. 2 is a cross sectional view thereof taken along line 2—2;

FIG. 3 is a cross sectional view similar to FIG. 2 showing a step in the manufacture of the invention; and

FIG. 4 is a bottom view with parts broken away, of the apparatus used in the step of FIG. 3.

Turning now to the drawings and more particularly FIGS. 1 and 2, a shoe construction **10** is shown having a shoe sole **11**. As used with reference to this embodiment, the term "sole" refers to a full sole including the heel portion. It should be understood that the fore sole and heel can be separate if desired or separate fore soles can be individually treated in accordance with this invention. A conventional shoe upper **12** is attached to the outer sole **11** by conventional means and an insole or liner **14** is preferably provided.

The shoe upper **12** can be formed in a conventional manner from fabrics, leather, imitation leathers, vinyl and similar products. As shown in FIGS. 1 and 2, a conventional last **13** is positioned in the shoe construction **10**.

The last **13** is used in lasting the shoe construction as is conventional in the art.

The outer sole **11** is preferably made of a resilient yet firm material such as vulcanized rubber conventionally used in shoe sole constructions. Other materials such as polyethylene or other plastics can also be used. The shoe sole **11** carries a total of eleven spike assemblies **14** embedded therein with seven spike assemblies in the fore sole and four spike assemblies in the heel portion.

It is preferred to use conventional two-piece spike assemblies as well known in the art. Such assemblies **14** are best shown in FIGS. 2 and 3 and each comprise a stem portion **15** and a spike portion **16**. The stem portion **15** has a tubular centrally located member substantially perpendicular to upper and lower surfaces of the outer sole **11**. A circular flange **17** extends coaxially of the stem and outwardly thereof. The upper flange **17** preferably has a plurality of apertures (not shown) passing from top to bottom to provide for locking of the material of the outer sole during the molding procedure which will be described, to prevent rotation of the flange and stem about the stem axis. The flange **17** may be noncircular if desired. Preferably the inner bore of the stem is threaded at **18** to receive a corresponding thread **19** carried by an upper part of the spike portion **16**.

The spike portion **16** has an outwardly projecting pointed spike **16***a* as best shown in FIGS. 2 and 3 with a slightly concave flange **20** fixed to the spike and coaxial therewith. Flange **20** preferably has at least two apertures **21** permitting the shoe sole material to cause material to interlock with the apertures during molding as will be described.

A disc **24** is provided preferably interlocked or clamped between the end of the stem portion **15** and the upper surface of the lower flange **20**. The disc **24** is preferably formed of a precured rubber material cured at a temperature above that required for curing or molding the shoe sole material **11**. Thus, the disc **24** will not appreciably soften and will not melt during the molding procedure. Disc **24** has a diameter greater than the diameter of the flange **20** so that a portion thereof comprising its peripheral edge **24***a* is clearly seen in the completed shoe as illustrated in FIG. 4, where part of the mold plate is broken away at the top portion. The extension of the disc past the flange **20** is preferably about ⅛ inch although large or smaller extensions can be used. The peripheral edge **24***a* can have any configuration desired. For example, if a star configuration is used, this will enhance the esthetic appeal of the shoe sole. Similarly, other geometric shaped outlines for the edge of the disc can be employed to enhance esthetic appeal. Preferably, the disc is colored differently than the material of the sole **11** although the coloring can be the same to cause blending of the disc material with the sole if desired.

Preferably as shown in FIG. 2, the disc prevents flashing of the sole material over the rim edge **20***a* of the flange **20** and allows the rim edge **20***a* to be inset in the sole as shown in FIG. 2. This expedient is particularly desirable to provide the conical portion of the flange meeting the lower surface of the sole directly at its end rather than along the vertical edge **20***a* thereby presenting a surface which causes minimal damage to turf when the shoe is used on golf course greens and the like. In some cases the disc **24** can remain substantially planar and the side rim edge **20***a* is exposed. In such cases the disc **24** prevents flashing of the sole about the rim edge **20***a*.

During molding of the spike assemblies with the outsole **11**, the material of the outsole pushes portions of the disc partially through the apertures **21** to aid in interlocking and preventing unwanted rotation of portion **16**. However, inserting of a key in the apertures **21** permits easy removal of the lower spike portion of the spike assembly **16** for replacement if desired.

The disc **24** is preferably formed of a flexible material

which may comprise cured or vulcanized natural or synthetic rubbers including neoprene, butadiene-styrene and the like. Suitable plastics can also be employed for the disc including vinyl and related polymers. In all cases, the melting or decomposition temperature of the disc is higher than that encountered in molding of the sole **11** so that structural integrity of the disc is maintained during the molding operation. Preferably the disc is of a material compatible with that of the sole so that bonding of the sole material to the disc occurs during the molding procedure with the lower exposed peripheral edge **24***a* of the disc preferably substantially coplanar with the lower surface of the sole **11** as best seen in FIG. 2.

Since the spike assembly is embedded in the outer sole with a portion **21***a* of the outer sole pressing a portion of the disc against the concave surface of the flange, additional strength against lateral twisting forces is provided. Moreover, since the peripheral vertical rim edge **20***a* of each flange portion is below the lower surface of the sole, extremely firm and secure mounting of the spikes is accomplished.

Turning now to the novel and improved method of manufacturing the shoe sole construction of this invention, and with reference to FIGS. 3 and 4, a shoe sole is conventionally lasted with a sole blank **8** preferably consisting of a moldable resilient elastomeric material such as rubber. The sole blank **8** is then placed over a mold plate **22** preferably with the last **13** still positioned in the shoe. The sole mold plate **22** is preferably the mold plate of a conventional "Desma" shoe making apparatus for heating and vulcanizing a shoe sole blank in a shoe construction. The sole mold plate is surrounded by two conventional half sole rings which form upstanding side walls **23** extending entirely about the sole to form the side edges thereof.

As best shown in FIG. 4, the sole plate **22** has a plurality of apertures **28** at preselected positions to allow entrance of the spike portions of the spike assemblies with the lower flanges **20** having a diameter only slightly larger than the diameter of the apertures **28**. Preferably apertures **28** are milled down on the upper surface of the sole plate to allow flanges **20** to seat substantially adjacent the sole plate. Thus, the entire spike assembly with the threadably engaged spike portions, disc and stem portion assemblies is positioned in each aperture **28** prior to molding as shown in FIG. 3.

In a subsequent step, the last is moved downwardly, the half sole rings closed to define the outer edge of the sole, and the shoe sole blank **8** is heated and pressed into the mold cavity formed. The sole blank **8** is thus softened and caused to flow over, through and in the holes formed in flange **17** and into contact with the disc pressing against the surface to force the disc into the concave portion and form the disc as shown in FIG. 2.

Pressures of about 40 to 75 p.s.i., times of from 1 to 15 minutes, and temperatures of from about 250° F. to about 350° F. are preferably employed when using conventional shoe sole rubber and vulcanizing the sole blank in the mold formed by the mold plate **22** and upwardly extending walls **23**. When using the latex sole blank having a thickness of approximately ¾ inch, a pressure of 55 p.s.i., time of 10 minutes and temperature of 285° F. produces excellent results when the discs are formed of a similar rubber cured at 300° for 2½ hours. In this case the flange **20** has a diameter of ¾ inch and disc **24** a diameter of 1 inch and a thickness of 1/16 inch. The times, pressures and temperatures used as well as the dimensions of the flanges and discs can vary greatly depending upon the specific material used and the thickness of the soles.

After the molding step, the shoe construction and last are removed from the mold after which the last is removed from the shoe and the shoe is ready for use. In some cases, the insole **14** can be inserted after the sole molding operation.

In an alternate method of this invention, the sole mold plate with its aligned apertures **28** can be used as part of an injection mold. The sole in this embodiment is injection molded about the assembled two-piece spike assemblies with discs carried thereon positioned in the mold. The sole can later be attached to a shoe upper by conventional procedures.

While specific embodiments of this invention have been shown and described, it should be understood that many variations thereof are possible within the scope of this invention. For example, other molding procedures can be used so long as a plurality of assembled two-piece spike assemblies are simultaneously embedded in the shoe outer sole with their attached discs preferably in a single step. In some cases, the use of the disc can be carried out with a one-piece spike assembly to achieve the advantages of elimination of flashing and firm mounting. The edge **20***a* can be exposed if desired rather than inset in a rabbeted portion of the disc if desired. Therefore, this invention is to be limited only by the spirit and scope of the appended claims.

What is claimed is:

1. A shoe sole construction comprising, a molded shoe outer sole having an upper surface and a lower surface,

a plurality of spikes extending downwardly from said lower surface at predetermined positions,

at least two positioning and supporting flanges attached to and extending about the axis of each of said spikes with one flange of each spike lying substantially at said lower surface and extending thereover and a second flange of each spike being firmly embedded in said sole between said upper and lower surfaces,

and a plurality of discs embedded in said shoe sole with each disc having a first portion thereof substantially coextensive with said lower surface and and a second portion thereof underying said one

flange of one spike with said first portion extending outwardly of said one flange about its periphery.

2. A shoe sole construction in accordance with claim **1** wherein each disc is bonded to said sole and said one flange is generally conical having a side rim edge embedded in said disc.

3. A shoe sole construction in accordance with claim **1** wherein each disc is composed of a rubber material having a higher melting point than the melting point of said sole.

4. A shoe sole construction in accordance with claim **3** wherein each of said spikes and each second flange comprises a plurality of two-piece spike assemblies, and means removably mounting said spikes to said second flanges.

5. A shoe sole construction in accordance with claim **4** wherein each disc is flexible and surrounds the axis of each of said spike assemblies,

and wherein said means comprises threaded means for holding each disc clamped in said spike assemblies.

6. A shoe sole construction in accordance with claim **3** wherein said one flange has a side rim edge embedded in said disc and an outer surface thereof exposed.

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