

[54] SHOE AND METHOD OF MAKING SAME

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[58] Field of Search ..... 12/142 R, 142 RS;  
36/2.5 R, 2.5 AH, 59 R, 59 B, 67 R

[56] **References Cited**

**UNITED STATES PATENTS**

3,577,503	5/1971	Innocenti .....	12/142 RS
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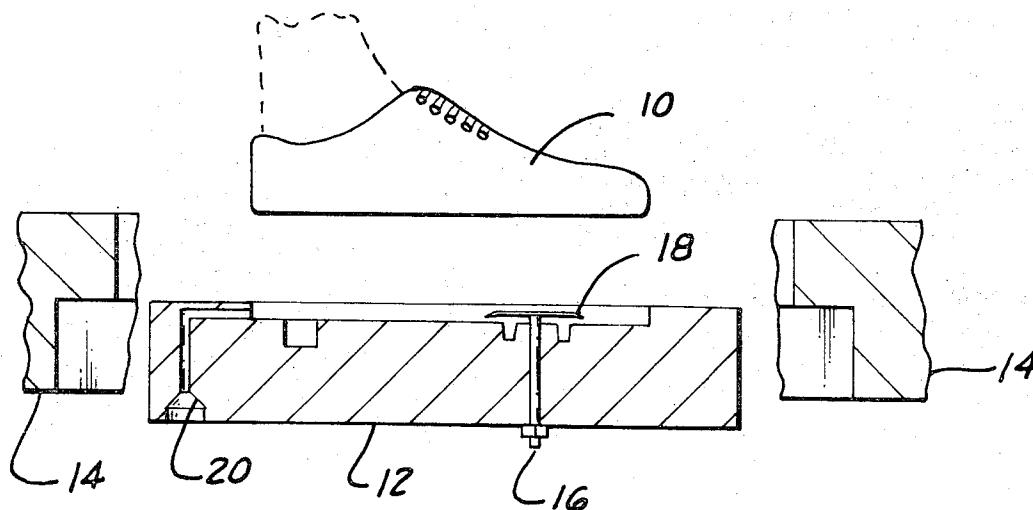
**FOREIGN PATENTS OR APPLICATIONS**

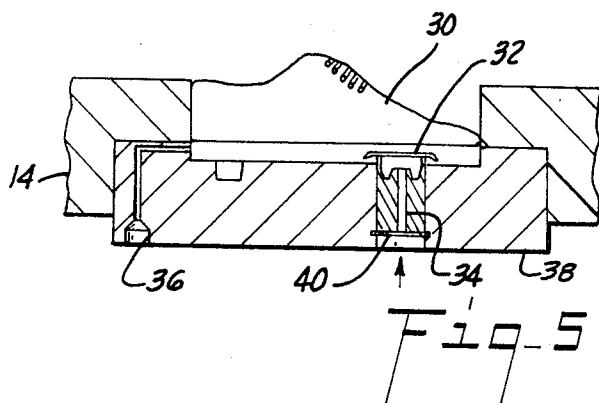
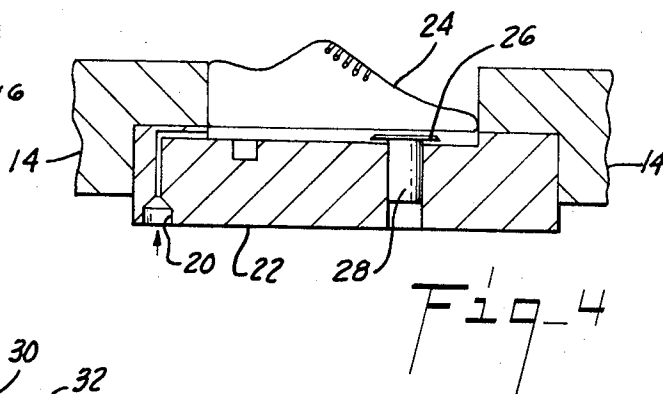
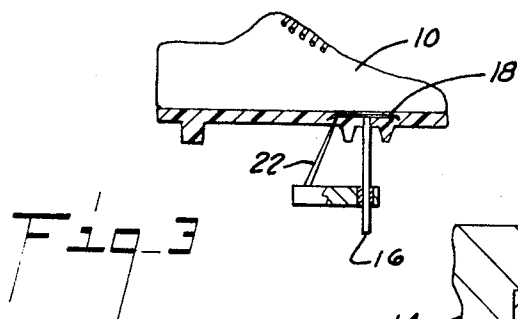
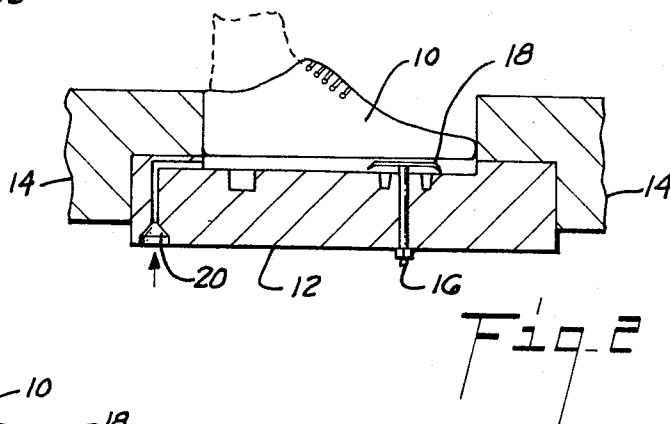
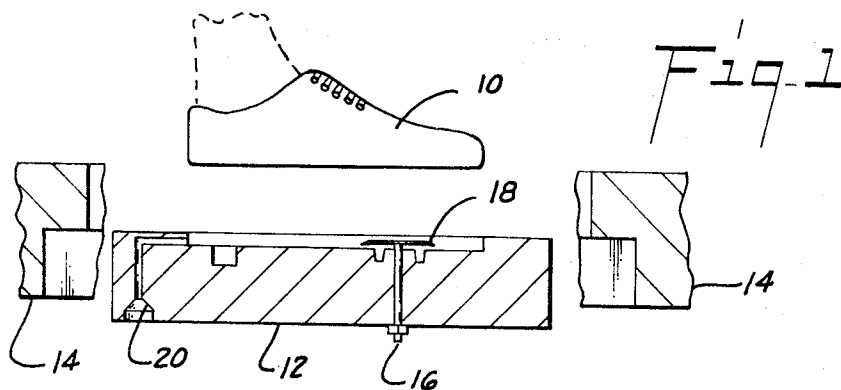
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[57] **ABSTRACT**

A shoe having an upper and a sole molded thereon with a disc molded in and rotatable in said sole and having a ground-engaging pad secured thereto and the method of coating the disc with a releasing agent, supporting the disc in the sole mold together with the upper so that the injection of sole material forms a sole bonded to the upper with the disc molded therein but because of the releasing agent is rotatable. This abstract is not to be construed in any way to define or limit the invention set forth below.

**15 Claims, 10 Drawing Figures**





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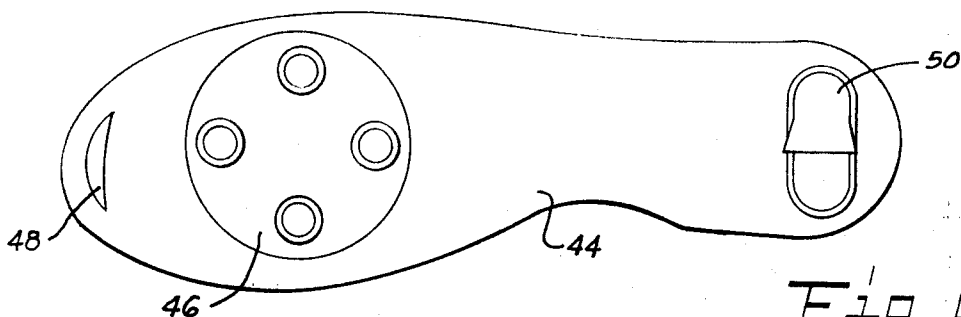


Fig-6

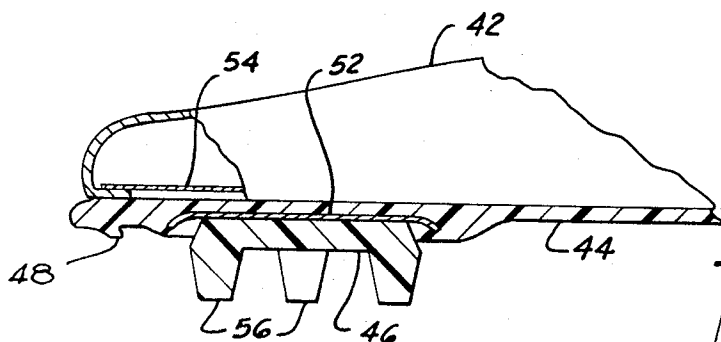


Fig-7

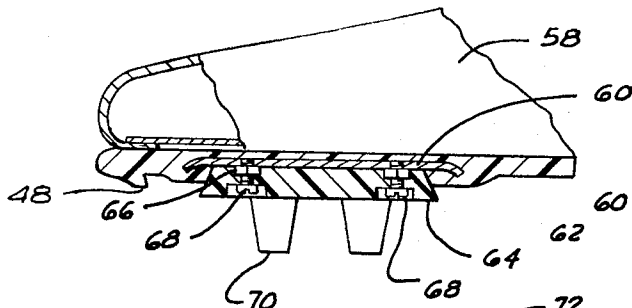


Fig-8

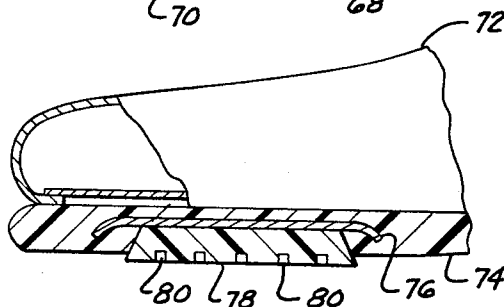


Fig-9

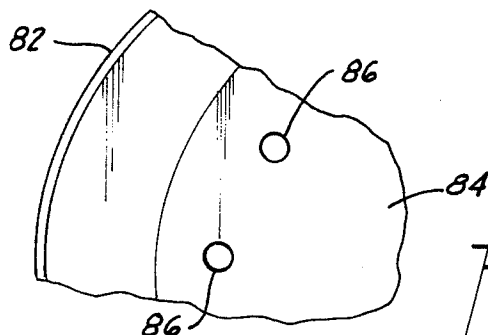


Fig-10

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## SHOE AND METHOD OF MAKING SAME

### BACKGROUND OF THE INVENTION

In athletic shoes and some other shoes it has been found to be advantageous to have a ground-engaging portion of the sole near the ball of the wearer's foot to be rotatable with respect to the sole. In athletic shoes such shoes provide greater agility for the wearer and also a protection against subjecting the wearer's legs, knee and ankle to excessive torsional forces.

An example of such athletic shoe is disclosed in my prior U.S. Pat. No. 3,354,561 issued Nov. 28, 1967.

### SUMMARY

The present invention relates to an improved shoe having a rotatable ground-engaging surface in the ball portion of the sole and the method of making such shoe.

An object of the present invention is to provide an improved shoe having rotatable ground-engaging means which is easy and relatively inexpensive to manufacture.

A further object is to provide an improved shoe having rotatable ground-engaging means with a sole which is molded with a portion of the rotatable means imbedded therein.

Another object is to provide an improved shoe with a rotating ground-engaging means having a minimum weight which is protected against entry of deleterious material developing excess torsion on said rotating means.

Another object is to provide an improved method of making a shoe with a rotatable ground-engaging portion formed in the sole which method relies on the molding of the sole onto the upper.

Still another object is to provide an improved method of making the improved shoe of the present invention at low costs.

### DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the present invention are hereinafter set forth and explained with reference to the drawings wherein:

FIG. 1 is a schematic view of the first step in the improved method of the present invention.

FIG. 2 is another schematic view showing the sole molding step of the improved method.

FIG. 3 is a schematic view showing the step of separating the ground-engaging pad from the sole.

FIG. 4 is schematic view showing a modification of the sole molding step.

FIG. 5 is a schematic view showing another modification of the sole molding step.

FIG. 6 is a bottom view of the improved shoe of the present invention.

FIG. 7 is a sectional view of the sole of FIG. 6 taken along the line 77.

FIG. 8 is a similar sectional view of a modified form of shoe.

FIG. 9 is another similar sectional view of another modified form of shoe of the present invention.

FIG. 10 is a partial sectional view of a modified form of rotating disc.

### DESCRIPTION OF THE PREFERRED EMBODIMENTS

The shoe of the present invention is designed to be

as light as possible to maintain the rotatability of its rotating ground-engaging means and to make such shoe at a minimum cost.

The shoe includes a suitable upper, a sole attached to the upper, disc rotatable in the ball portion of the sole, and ground-engaging means rotatable with said disc.

As shown in the sequence of steps in FIGS. 1, 2 and 3, there is illustrated the method of making the preferred shoe of the present invention. In FIG. 1, the upper 10 formed on a last is lowered into position in a sole mold. The sole mold includes the base block 12 and the side blocks 14 which when clamped together with the lasted upper 10 therein define the cavity for forming the molded sole. As shown in FIG. 1, base block 12 defines the sole-shaped recess with the heel plate recess and the cleats for the ground-engaging means. The post 16 extends through the hole in block 12 and supports disc 18 in a position spaced from and generally parallel to the bottom of the sole recess, and also spaced from the underside of the lasted upper when it is properly positioned in the mold. The block 12 defines the injection passage 20 into the sole recess and one or more vents (not shown) are provided as needed.

Before installing the disc 18 on the post 16, a suitable release agent is applied to the upper surface and to the outer annular portion of the lower surface to assure that the sole material does not bond thereto. Also if needed a bonding agent is applied to the central portion of the lower surface of the disc. Depending on the material of disc 18 and the sole material, the release agent or the bonding agent may not be needed. Care should be taken in the selection of materials to assure that disc 18 rotates in the sole and that the sole material below the disc bonds securely to the central portion of the disc 18.

When the parts are all properly positioned for molding, the sole material is injected through the passage 20 into the recess. After the sole material completely fills the sole recess and cools, the last is removed from the mold.

After the last is removed with the completed shoe thereon, a suitable separating means such as the cutter 22 separates the portion of the sole material forming the ground-engaging pad from the remainder of the sole. Assuming the post 16 is connected to the center of disc 18 and perpendicular thereto, the cutter 22 may be centered on post to assure that the separated pad is concentric with the rotating of disc.

It should be noted that such separation may also be accomplished by providing a divider at least partially surrounding the ground-engaging pad and is rotated while the sole material is setting up to assure that the pad is separated from the sole.

In a modified form of the method of the present invention as shown in FIG. 4, the upper 24 is positioned in the mold and the disc 26 is supported in the sole recess in the mold by the cylinder 28. Disc 26 is held against cylinder 28 with only an outer portion of its under surface exposed. Thus on injection of sole material, the disc 26 will be imbedded but rotatable on the sole, but the central portion of its lower surface which is held against the cylinder will be free of sole material. With this shoe design, the ground-engaging pad is suitably secured to the disc as hereinafter explained so that it rotates with the disc 26 with respect to the rest of the sole. As previously explained, a release agent may be

used on the disc 26 to assure that it does not bond to the sole material.

Another modification in the method of the present invention is illustrated in FIG. 5 wherein the upper 30 is positioned in the mold and the disc 32 is supported by the cylinder 34 in its desired position with its upper surface and the outer periphery of its lower surface exposed to the sole material which is injected through passage 36 in the mold block 38. The cylinder 34 as shown defines a cleated ground-engaging pad recess below disc 32. Also the passage 40 extending through cylinder 34 is provided for the separate injection of the pad material into the pad recess while the shoe is still in the mold. The top surface and outer under surface of the disc 32 may be coated with a release agent before injection and the lower central portion of the disc 32 exposed to the pad recess may be coated with a bonding agent to assure that the pad bonds to the disc and that the pad and disc are rotatable with respect to the sole.

As a further modification of the method step illustrated in FIG. 5, the cylinder 34 may include parts providing communication between the sole recess and the pad recess so that the sole material when injected fills the pad recess to form the pad. This modified step is only applicable when the sole material to be used is suitable as the ground-engaging material for said pad. In such method care is taken to assure that the pad bonds to the disc and the disc is rotatable in the sole.

A still further modification contemplated would be the use of an envelope of plastic which is molded with a ground engaging pad which is rotatable therein and then is suitably secured to the sole of a shoe by molding or otherwise. With such structure, the ground engaging pad and the sole could be molded at separate locations and later joined to form the shoe.

It is also contemplated that the ground engaging pad may include means other than the disc for providing the rotating engagement with the sole. The pad may be of a material which when intermolded with the sole could be rotatably attached thereto without the inclusion of a disc.

The shoe shown in FIGS. 6 and 7 includes the upper 42 having a molded sole 44, and the rotatable ground-engaging pad 46. The sole 44 as shown includes the integral toe ridge 48 and the integral heel bar 50, which heel bar has a limited transverse traction and is provided with a notch facing the outside of the shoe. The disc 52 is imbedded in the sole 44 in a position generally parallel to and spaced from the insole 54 and the pad 46 which includes the cleats 56 is bonded to the disc 52. The disc 52 and pad 46 are adapted to rotate with respect to the sole to minimize the torsional forces exerted on the wearer's legs.

The sole 44 has increased thickness in the area of the disc 52 to assure that the disc 52 is securely embedded therein. Also disc 52 is circular in shape and has an outer periphery which is turned downwardly to provide disc 52 with some additional strength and to further assure that even though it is free to rotate in sole 44 it will be maintained therein despite the forces which are exerted on the disc when the shoe is in use.

The sole 44 further defines a circular recess in which the pad 46 is positioned for rotation with disc 52. It is preferred that the edge of pad 46 and the sole recess have mating tapers so that the pad 46 can be in sealing engagement with the surface of the sole defining the

edge of the recess. Such sealing between the rotating pad and the sole is preferred to avoid entry of dirt and other deleterious material between the pad and the sole. Even when some dirt does gain entry therein a minimum of extra torque is needed for rotation of the pad and the disc.

The shoe illustrated in FIG. 8 is substantially the same and includes the upper 58, the sole 60 having the disc 62 rotatably imbedded therein. The ground-engaging pad 64 is secured to the disc 62 for rotation therewith by the threaded receptacles 66 secured to disc 62 as by welding, and the screws 68. The pad 64 also includes depending cleats 70 to provide traction.

The shoe illustrated in FIG. 9 is a shoe such as a basketball shoe or a work shoe. This shoe includes the upper 72 and the sole 74 which has the disc 76 rotatably imbedded therein. The ground-engaging pad 78 is bonded or otherwise suitably secured to disc 76 so that it rotates with the disc 76 in respect to the sole 74. The bottom of the pad 78 may be provided with grooves 80 as shown to provide traction.

Certain materials which may be used for the sole of the shoe may include releasing agents or may not bond to stainless steel. With such materials it is suggested that the disc 82 illustrated in FIG. 10 may be used to assure that the ground engaging pad bonds thereto. The disc 82 is similar in structure to the previously described discs but includes a perforated sheet 84 secured to the central portion of the disc, i.e., the area of the disc 82 to which the pad is to be bonded. The perforated sheet 84 or any other suitable means such as wire screen or expanded metal provides a means establishing a mechanical bond or connection between the disc 82 and the pad and therefore does not rely solely on the chemical bond. The sheet 84 is suitably secured to the disc 82 as by spot welding 86 in a plurality of locations preferably near the outer periphery of sheet 84 to assure that such spot welds 86 have sufficient strength to transmit torque from the pad to the disc 82 when the shoe is in use.

With the disc 82 shown in FIG. 10, the ground engaging pad may be molded thereto before the disc 82 is molded into the sole of a shoe. Any other pad and disc design may be premolded before their inclusion in the sole by molding if the heat and material of the sole molding are compatible with the intermolding of the pad in the sole.

From the foregoing it can be seen that the improved method and shoe of the present invention are greatly simplified and the shoe may be made at a relatively low cost. Further, the rotating element of the shoe is a simple metal or plastic disc of suitable shape to assure that it is retained in the sole. This disc is imbedded in the sole by molding the sole with the disc held in the sole recess in the mold. As has been described, the pad may be the same material as the sole material, such as a 60 Durometer on the Shore D scale polyurethane. When the pad is the same material, it may be molded as a part of the sole molding step and separated therefrom in a suitable way such as is shown in FIG. 3. If a different pad material is preferred, it may be formed by injection molding as illustrated in FIG. 5. Further, the pad may be formed separate from the shoe of any desired material and then bonded to the disc.

The improved shoe of the present invention is thus applicable to many types of uses and is relatively inexpensive since the sole is molded with the rotating disc

embedded therein. If desired, the sole may be molded separately and then attached to an upper.

What is claimed is:

1. The method of making a shoe, including the steps of
  - forming an upper on a last,
  - positioning the last with the upper thereon and a ground engaging pad in a mold, and
  - injecting material into the mold to form a sole bonded to the upper and to connect to the ground engaging pad which is in rotating engagement with the sole.
2. The method of making a shoe including the steps of
  - forming the upper on a last,
  - positioning the last with the upper thereon in a mold, coating a portion of a disc with a release agent, supporting said disc within the sole cavity defined in said mold in spaced relation to said last, said disc being in a plane generally parallel with said insole, and
  - injecting sole material into said mold to form a sole bonded to said upper,
  - said disc being imbedded and rotatable in said sole and having a circular pad of sole material attached to its central portion so that said pad rotates in a recess in the sole with the rotation of said plate.
3. The method of making a shoe according to claim 2 including the step of
  - coating the central portion of the lower side of said disc with a bonding agent so that injected sole material bonds to said disc to provide said circular pad.
4. The method of making a shoe according to claim 3 including the step of
  - separating the sole material bonded to said disc from the remainder of injected sole material to form a circular pad of said material which rotates with said disc relative to the remainder of said sole material.
5. The method of making a shoe according to claim 4 including the step of
  - isolating a space below the central portion of said disc prior to said injection step whereby sole material is excluded during said injection step to provide a circular recess in the sole formed by said injection step.
6. The method of making a shoe according to claim 5 including the step of
  - securing a traction material to the central portion of said disc for rotation therewith at least partially within said circular recess.
7. The method of making a shoe including the steps

- of
- supporting a disc within a sole mold cavity, injecting sole material into said cavity to form a sole said disc rotatably imbedded therein with a ground-engaging pad attached to said disc for rotation therewith, and
  - attaching the sole to an upper.
  8. A shoe, comprising
    - an upper,
    - a sole attached to said upper, and
    - a ground engaging pad,
 one of said sole and said pad being molded to the other whereby said pad is retained in rotating engagement with said sole.
  9. A shoe comprising
    - an upper,
    - a sole attached to said upper,
    - a disc molded in said sole,
 said disc being approximately positioned at the ball of the wearer's foot and extending in a plane parallel to the bottom of said sole, said disc being rotatable within said sole, said sole defining a circular recess beneath the central portion of said disc, a ground-engaging pad, and means for attaching said traction pad to said disc so that said pad is free to rotate with said disc in said recess.
  10. A shoe according to claim 9 wherein said attaching means includes
    - bonding said pad to the central portion of the bottom of said disc.
  11. A shoe according to claim 10 wherein said pad is formed during the molding of said sole and separated therefrom to form a pad of circular section rotatable in a recess of circular section.
  12. A shoe according to claim 9 wherein said pad includes cleats.
  13. A shoe according to claim 12 wherein said attaching means includes
    - a plurality of receptacles having internal threads, and
    - a plurality of threaded screws each being adapted to extend through said pad and threadedly engage in one of said receptacles.
  14. A shoe according to claim 9, including means secured to said disc for providing a mechanical bond for said pad to said disc.
  15. A shoe according to claim 14 wherein said mechanical bonding means includes
    - a perforated plate secured to the pad portion of said disc.

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