United States Patent [19]

Egtvedt

[11] **3,824,710**

[45] **July 23, 1974**

[54] **FRICTION-TYPE SWIVEL SHOE**

[75] Inventor: **Robert B. Egtvedt,** Comstock Park, Mich.

[73] Assignee: **Wolverine World Wide, Inc.,** Rockford, Mich.

[22] Filed: **Sept. 10, 1973**

[21] Appl. No.: **395,927**

[52] **U.S. Cl.** ..... **36/2.5 AE**

[51] **Int. Cl.** **A43b**

[58] **Field of Search** ..... 36/2.5 R, 2.5 AE, 2.5 A, 36/8.3, 59 R

[56] **References Cited**

UNITED STATES PATENTS

3,081,562	3/1963	Oakley	36/2.5 AE
3,680,231	8/1972	Dymond	36/2.5 AE
3,744,160	7/1973	Dymond	36/2.5 AE

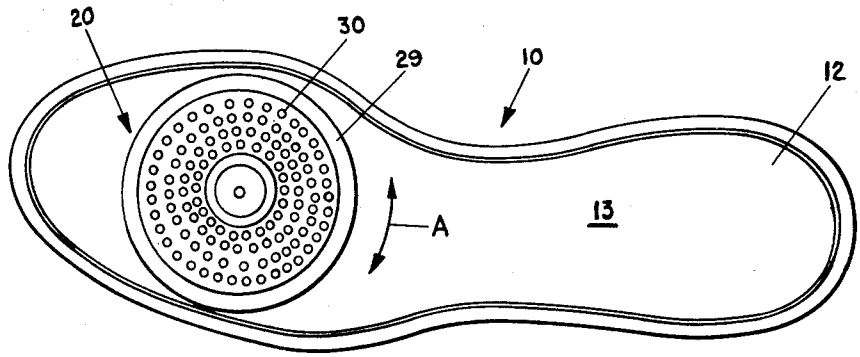
Primary Examiner—Patrick D. Lawson

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

[57] **ABSTRACT**

The ball of an athletic shoe sole includes a rotating swivel with a configurated surface engaging bottom. The swivel is integrally molded within the sole of the shoe with a lubricating film positioned between the shoe sole and swivel. The generally circular swivel includes an upwardly and outwardly extending central holding member and a peripheral outwardly extending shoulder for securing the swivel within the shoe sole. A reinforcing ring is integrally molded in the shoe sole and extends around the periphery of the frictional member below the peripheral shoulder to prevent the deflection of the sole material away from the area adjacent the swivel.

15 Claims, 6 Drawing Figures



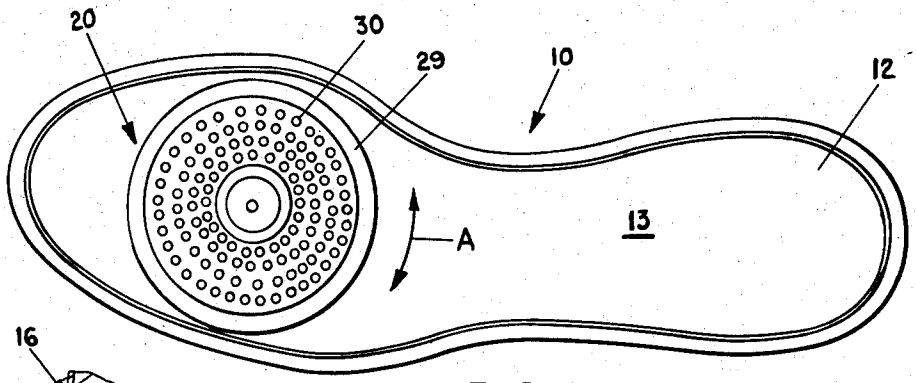


FIG. 1

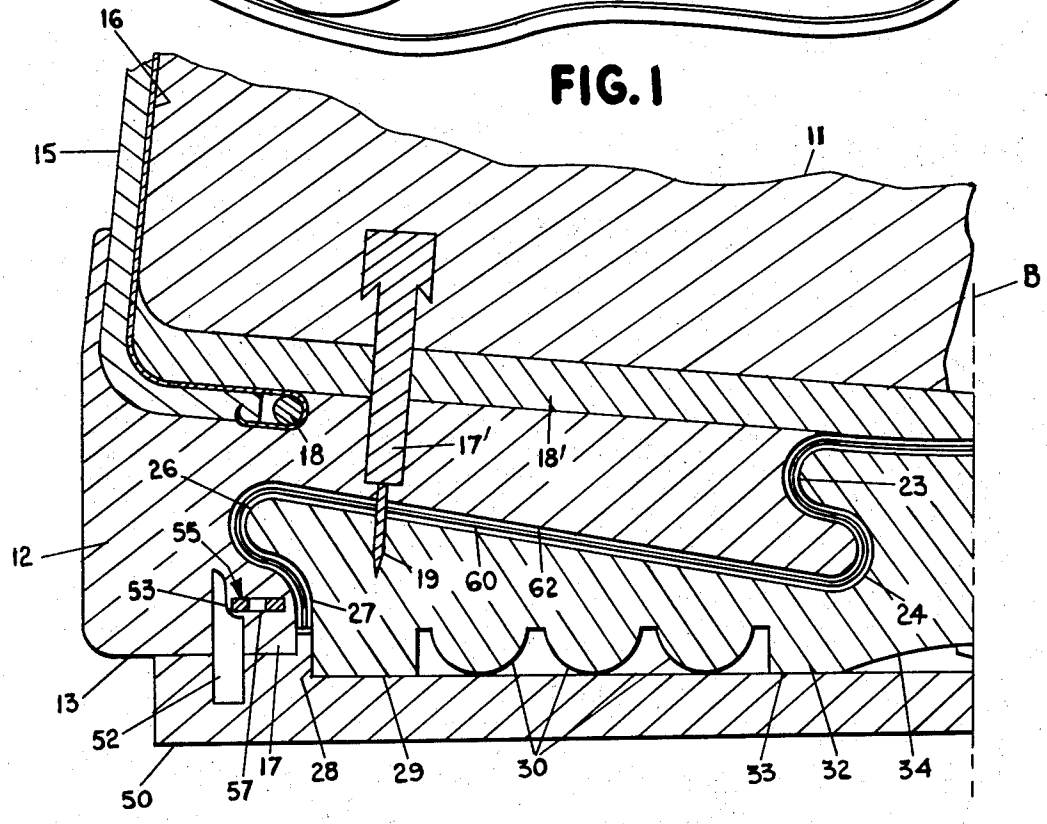


FIG. 2

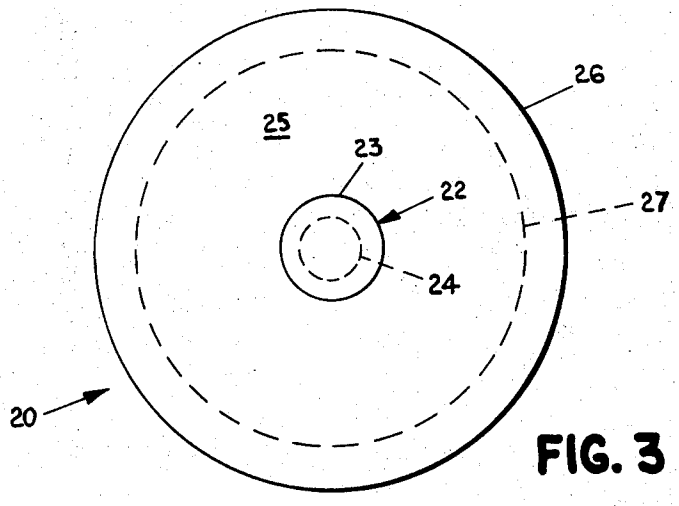


FIG. 3

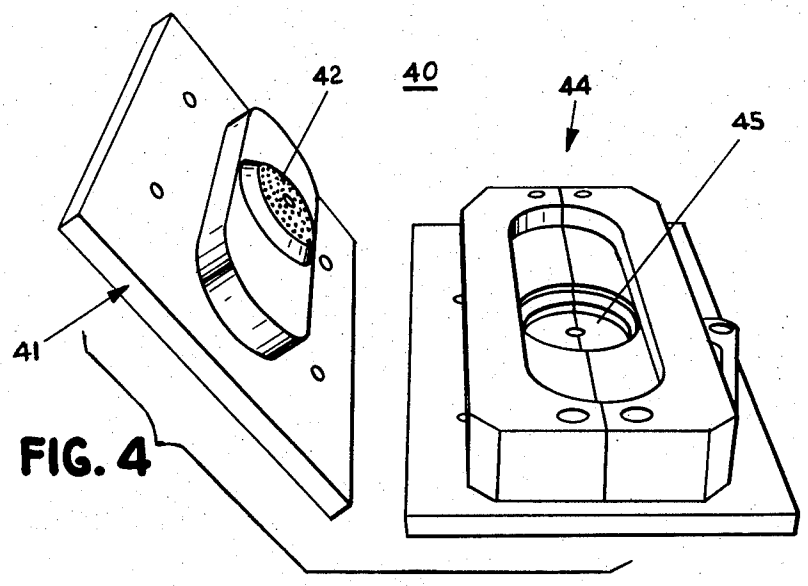


FIG. 4

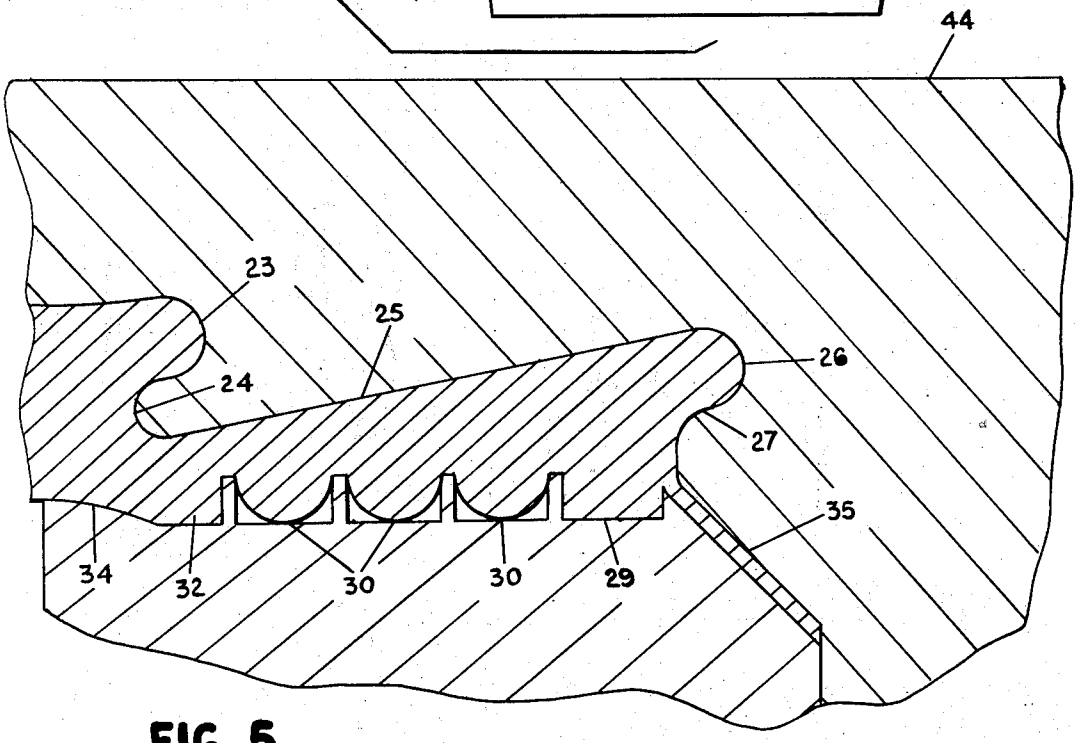


FIG. 5

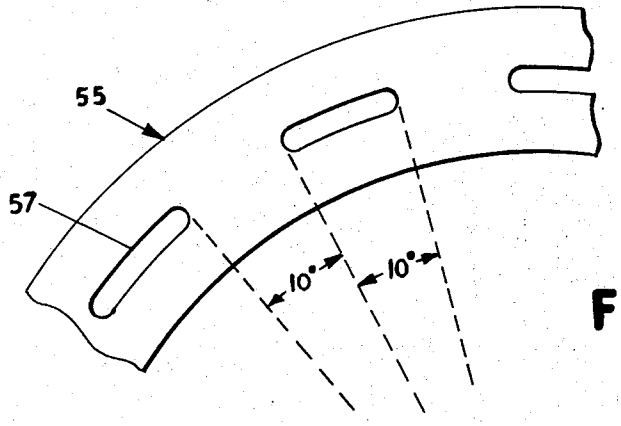


FIG. 6

FRICTION-TYPE SWIVEL SHOE

BACKGROUND OF THE INVENTION

The present application relates to an athletic shoe having a rotatable swivel molded within the sole of the shoe.

Frequently in sporting events such as tennis, it is necessary for the contender to pivot about the ball of his foot. Typically, tennis shoes are designed for maximum frictional engagement with the surface of the tennis court thereby somewhat inhibiting pivoting as is frequently necessary during the game. Although pivotal friction engaging type of rotating devices have been proposed which strap onto the bottom of a shoe or are otherwise secured to the bottom of a shoe as a separate attachment, such devices have limited application to activities such as dancing and are not designed for nor would they successfully withstand the stresses frequently encountered, for example, during a game of tennis. U.S. Pat. Nos. 2,671,971 issued Mar. 14, 1954 to D. J. Garretson and 3,081,562 issued Mar. 19, 1963 to J. Oakley are representative of such prior art devices. Also, such devices extend considerably from the shoe, are bulky and would severely impair the motion of a user engaged in an athletic event.

Although several cleat type swivels have been proposed, such devices are of a structure unsuitable for shoes employed for use in playing racket sports such as tennis, squash or other sports such as handball or paddleball played on courts where cleats cannot be employed and where a frictional surface engaging shoe sole is required.

SUMMARY OF THE INVENTION

The present invention, however, provides a unique swivel of simplified construction and which can be positioned within a shoe sole during the molding of the shoe sole for holding the device integrally within the sole and provide a pivotal frictional pad for engaging a floor surface such as a tennis court. Apparatus embodying the present invention comprises a swivel disc having vertically and horizontally spaced peripheral shoulders for securing the disc within a shoe sole integrally molded therearound. A lubricating film is provided between the disc and the shoe sole to permit relative rotation therebetween. In some embodiments, a reinforcement ring is positioned in the shoe sole around the periphery of the lowermost of the peripheral shoulders to prevent deflection of the shoe sole away from the disc. The swivel disc extends slightly below the bottom surface of the shoe sole to engage the playing surface without obstructing non-pivotal movement of the shoe along the surface of the floor.

It is an object of the present invention, therefore, to provide an improved frictional type swivel for athletic shoes.

Another object of the present invention is to provide a substantially unitary swivel construction to be integrally molded within a shoe sole.

Still a further object of the present invention is to provide a swivel disc for a shoe and which has a configurated bottom for frictionally engaging a relatively smooth surface.

Yet a further object of the present invention is to provide a frictional swivel with improved means for securing the swivel within a shoe sole.

These and other objects of the present invention will become apparent upon reading the following description thereof together with the drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a bottom plan view of a shoe embodying the present invention;

FIG. **2** is a greatly enlarged cross-sectional view of one-half of the frictional swivel during molding in the shoe sole;

FIG. **3** is a top plan view of the frictional swivel shown in FIG. **1**;

FIG. **4** is a perspective view of the upper and lower mold halves for manufacturing the frictional swivel;

FIG. **5** is a greatly enlarged view of one-half of the frictional swivel as it appears in the mold of FIG. **4** during the molding step; and

FIG. **6** is an enlarged fragmentary plan view of a segment of the reinforcing ring shown in FIG. **2.**

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. **1,** there is shown a shoe **10** having a sole **12** with a bottom surface **13.** Fitted within the sole of the shoe, as seen in FIG. **1,** is a frictional swivel device **20** which permits relative rotation between the device and the shoe as indicated by arrow A in FIG. **1.**

As best seen in FIGS. **1, 2** and **3,** the frictional swivel device comprises a substantially pancake- or disc-shaped member molded of a resilient polymeric material such as polyvinyl chloride, polyurethane or the like or of a rubber material such as butadiene, neoprene or the like with a durometer hardness ranging from about 45–80. A rubber having a durometer of 60 is employed in the preferred embodiment for the desired wearability. FIG. **2** shows one-half of the swivel and shoe sole during manufacturing which is symmetrical about axis B so that only one side of the structure need be shown to understand its construction. The swivel has a centrally positioned upstanding holding member **22** defining a peripheral flange or shoulder **23** of circular configuration and which tapers inwardly to a necked down portion **24** as best seen in FIG. **2.**

The upper surface **25** of the swivel tapers upwardly and outwardly, as best seen in FIG. **2,** to a peripheral flange or shoulder **26.** Shoulder **26** is spaced slightly below shoulder **23** and substantially outwardly from shoulder **23.** The body of swivel **20** is necked down below shoulder **26** and terminates at the outer edge **28** in an annular reinforcing band **29** with a substantially flat bottom surface and a rectangular cross section as seen in FIG. **2.**

Band **29,** as best seen in FIG. **1,** extends around the outer periphery of the bottom surface of the frictional swivel and reinforces the swivel to prevent its deflection due to applied stresses during use of the shoe.

The bottom of the swivel within reinforcing band **29** is configurated to provide an optimal floor or court surface engaging surface. In the preferred embodiment, the bottom of swivel **20** comprises a plurality of generally hemispherical dimples **30** as seen in FIGS. **1** and **2.** The dimples are approximately 5/32 inch in diameter and arranged in a substantially uniform pattern with a density covering approximately 50 percent of the annular surface area in which they are located. Although dimples are employed in the preferred embodiment

and are believed to provide optimal frictional engagement between the swivel and the floor surface during both lineal movement of the shoe and for pivoting, other configurated surfaces for the bottom of swivel **20** may be employed with some loss in the desired effect.

Around the center of the bottom surface of the frictional swivel there is formed a second annular support band **32** having a diameter substantially smaller than band **29** and having a flat annular surface **33.** A concave indentation **34** is centrally formed within band **29** at the center of the bottom of the frictional swivel and distributes the weight at a ball of the foot over a larger area instead of concentrating it directly upwardly. The bottom surfaces of bands **29** and **32** and the lowermost tips of dimples **30** lie in a common plane extending slightly beyond the bottom surface **13** of the shoe sole as seen in FIG. **2.** The extension is, however, sufficiently slight so that while although securely gripping the floor or other surface, it does not cause the user to stumble due to lateral forces against the peripheral edge **28** of the swivel.

The swivel is molded in a mold **40** as seen in FIG. **4.** Mold **40** includes an upper single piece segment **41** with a configurated member **42** for forming the dimples in the bottom surface of the frictional swivel and a two piece lower section **44.** Mold section **44** includes left and right halves defining a generally circular configurated recess **45** therein for defining the shoulders of the swivel. The two halves of section **44** permit removal of the swivel from the mold as is necessitated by shoulders **23** and **26.** Mold **40** includes conventional injection ports and means for locking the sections together.

With the mold in its closed and locked position, as seen in the half sectional view shown in FIG. **5,** the polymeric material is injected into the mold and forms the swivel including a flash skirt **35** extending downwardly and around the periphery of the swivel. Skirt **35** accommodates for shrinkage of the material during cooling and is subsequently trimmed off, forming edge **28,** before the molding of the swivel into the shoe as now discussed.

As seen in FIG. **2,** once the frictional swivel has been molded and the flash removed, it is positioned on a platform **50** forming a mold insert for a conventional shoe sole mold employed for molding the soles of the tennis shoe to the uppers. The shoe is manufactured generally by providing a string lasted upper **15** of suitable leather, cloth, synthetic or other material and having an inner fabric surface **16.** A string **18** is sewn around the end of the upper material holding the upper in position during the sole molding step. An innersole **18'** is positioned over the inside surface of sole **12.** The sole is, like the frictional swivel, manufactured of a suitable polymeric material such as rubber or other polymers.

The mold insert platform **50** includes a plurality of upstanding pins **52** spaced in a circle having a diameter somewhat larger than the diameter of the necked down portion **27** of the frictional pivot. Each pin **52** has a shoulder portion **53** directed inwardly toward the frictional swivel. A flat annular ring **55** is positioned on the pins **52,** as seen in FIG. **2,** and extends around the swivel to reinforce the sole. As best seen in FIG. **6,** ring **55** includes a plurality of elongated apertures **57** centrally spaced along the ring at 10° intervals. These apertures permit the sole material to securely anchor the ring within the sole by surrounding the ring and filling the apertures as seen in FIG. **2.** In the preferred embodiment, ring **55** was stamped from 410 type stainless steel approximately 0.015 inches thick and was approximately 0.25 inches wide.

In order to secure the swivel in place during the molding step, a foot form **11** is positioned within the shoe against the insole **18'** as seen in FIG. **2.** Foot form **11** includes a plurality of spaced downwardly depending dowels **17',** each including a pin **19** inserted therein for piercing into the body of the swivel disc through the top surface thereof. The pins securely hold the disc during molding of the sole around the swivel and when foot form **11** is removed, the resultant pierce holes are sufficiently small so they do not reduce the structural strength of the swivel or sole and do not interfere with its rotation.

To facilitate rotation of the swivel, lubricious films are applied to the upper surfaces of the swivel prior to insertion into the shoe sole mold. In the preferred embodiment, a first lubricious film **60** of Teflon is sprayed over the upper surfaces of the swivel using a commercially available aerosol charged Teflon spray or its equivalent. A second lubricious film **62** is then applied and comprises, in the preferred embodiment, a permanent mold release such as commercially available Korax or its equivalent.

The swivel is then positioned on platform **50,** the wire **55** positioned on pins **52** and the shoe upper placed in the conventional mold (not shown). Next, the pin plate with pins **19** is pressed into the swivel to secure it in position relative to the shoe upper. Subsequently, the polymeric shoe sole material is conventionally injected into the space between foot form **11** and the upper surface of the second film **62** around the shoulders **23** and **26** and ring **55** as seen in FIG. **2.**

Ring **55,** which extends around the periphery of and is vertically positioned below the lower shoulder **26** of the swivel, prevents the shoe sole at the inwardly projecting area **17** from deflecting outwardly thereby securing shoulder **26** within the shoe even under high stress conditions during use. In some embodiments, however, this ring may not be necessary or a closed loop of wire or other circular reinforcing member substituted. The mutually engaging lubricious films **60** and **62** permit slippage between the frictional device and the shoe sole at the interface between the two films which is the interface with the least friction. Although two applied films are used in the preferred embodiment, in some embodiments, a single film will suffice to provide the desired slippage between the swivel and the shoe sole. Also, other lubricious coatings, sheets or films could be employed. In some embodiments, thin sheets of Teflon or other lubricious material may be employed by positioning them over the swivel disc prior to the sole molding step. Sheets of approximately 0.005 inches thickness or less will conform to the upper topology of the swivel disc to provide the desired lubricious interface between the swivel and the sole.

These and other modifications to the preferred embodiment falling within the spirit and 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. An athletic shoe sole comprising:

a disc-like swivel member having a configurated bottom surface and at least one shoulder extending outwardly from an upper surface thereof;

a lubricious coating over said upper surface of said swivel; and

a sole of moldable material molded around said swivel and said shoulder to capture said swivel within said sole whereby said lubricious coating permits rotation of said swivel with respect to said sole.

2. The shoe sole as defined in claim **1** wherein said swivel comprises a disc-like member and said one shoulder extends outwardly around the outer periphery thereof.

3. The shoe sole as defined in claim **2** and further including an upwardly and outwardly projecting member extending centrally from said swivel defining a second shoulder.

4. The shoe sole as defined in claim **3** wherein said configurated bottom surface of said swivel extends below the bottom of said shoe sole and includes a plurality of dimples.

5. The shoe sole as defined in claim **4** wherein said configurated bottom surface of said swivel further includes a first annular band formed around the outer periphery thereof.

6. The shoe sole as defined in claim **5** wherein said configurated bottom surface of said swivel further includes a second annular band of lesser diameter than said first band.

7. The shoe sole as defined in claim **6** wherein said configurated bottom surface of said swivel includes a concave recess formed within said second band.

8. The shoe sole as defined in claim **1** and further including a second lubricious coating over said first mentioned coating.

9. The shoe sole as defined in claim **1** and further including a circular reinforcing member embedded in said sole and circumscribing said swivel below said shoulder.

10. An athletic shoe sole including a frictional type swivel comprising:

a disc-shaped swivel member including first and second horizontally spaced circular shoulders extending outwardly from an upper surface thereof, and a configurated bottom surface;

means for lubricating said upper surface of said swivel member; and

a shoe sole molded around said shoulders of said swivel member.

11. The shoe sole as defined in claim **10** wherein one of said shoulders extends around the outer periphery of said swivel member.

12. The shoe sole as defined in claim **11** and further including a ring embedded in said sole circumscribing said swivel under said one shoulder.

13. The shoe sole as defined in claim **12** wherein said ring includes a plurality of spaced apertures extending therethrough.

14. The shoe sole as defined in claim **10** wherein said lubricating means comprises at least one lubricious coating applied to said upper surface of said swivel member.

15. The shoe sole as defined in claim **10** wherein said lubricating means comprises a first lubricating film on said upper surface of said swivel member, and a second lubricating film in engagement with said first film.

* * * * *