July 20, 1965 J. E. WHITCAS 3,195,244

BOWLING SHOES AND METHODS FOR MAKING THE SAME

Filed Feb. 20, 1963 2 Sheets-Sheet 1

Fig. 1

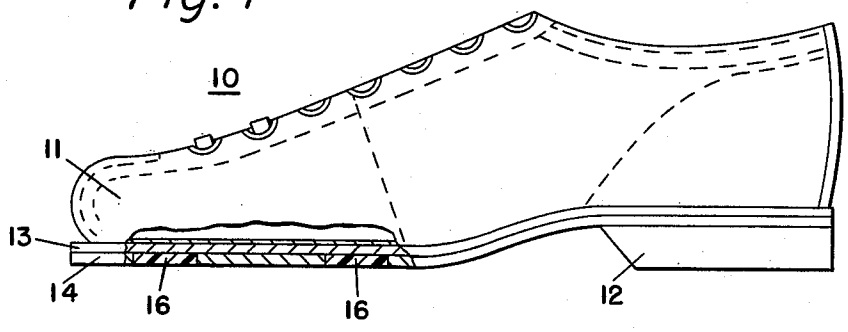


Fig. 2

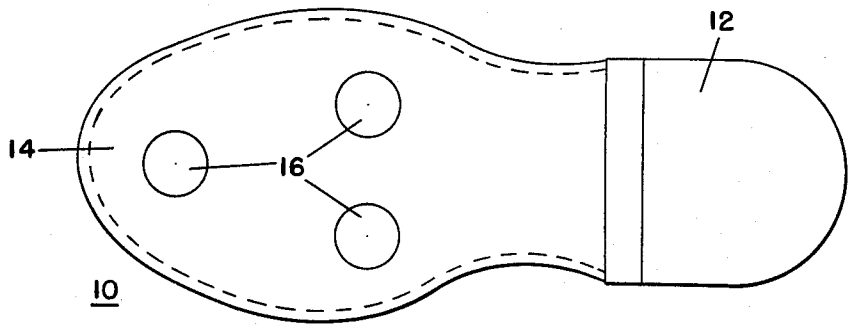


Fig. 3

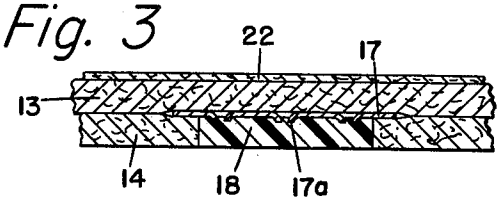


Fig. 4

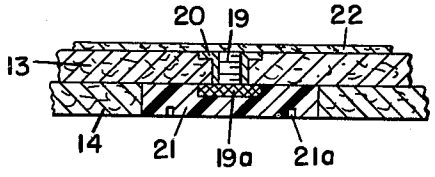
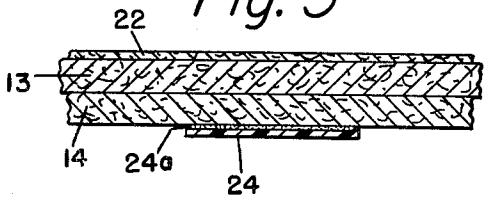


Fig. 5



BOWLING SHOES AND METHODS FOR MAKING THE SAME

Filed Feb. 20, 1963 2 Sheets-Sheet 2

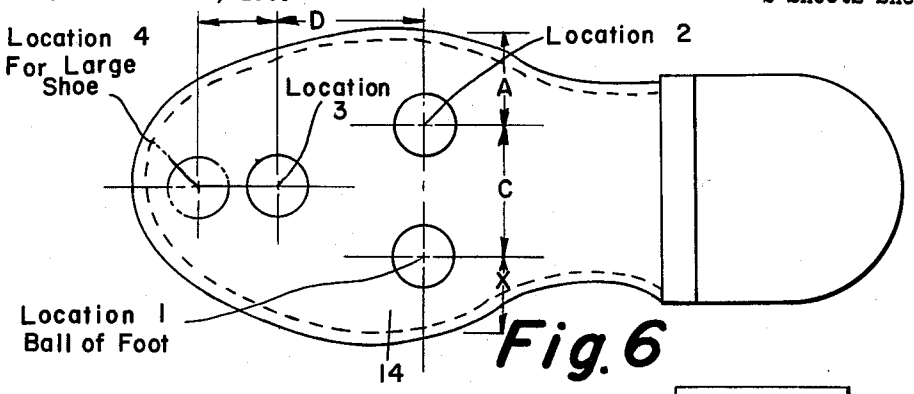
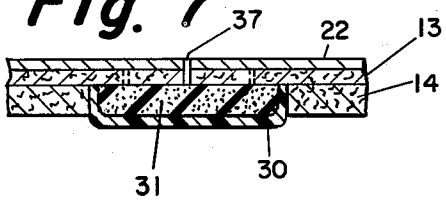


Fig. 6

Fig. 7



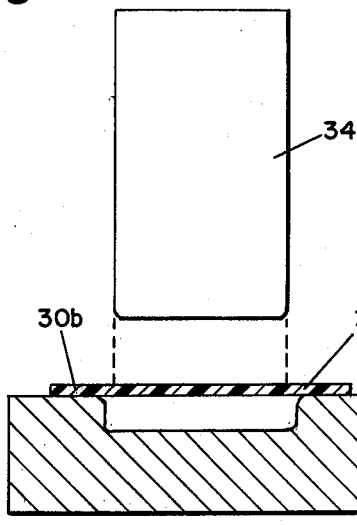


Fig. 8

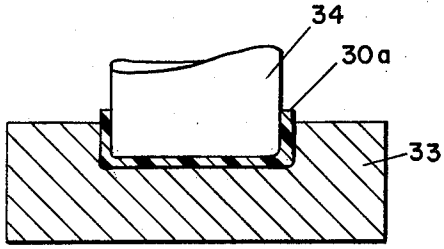


Fig. 9

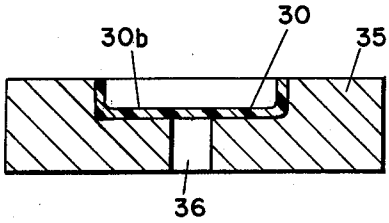


Fig. 10

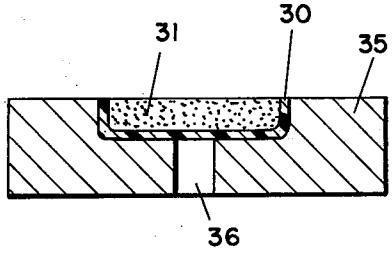


Fig. 11

United States Patent Office 3,195,244 Patented July 20, 1965

3,195,244
BOWLING SHOES AND METHODS FOR MAKING THE SAME

Joseph E. Whiteas, 416 Yale Ave., Cherry Hill, N.J.
Filed Feb. 20, 1963, Ser. No. 260,350
15 Claims. (Cl. 36—2.5)

The present application is a continuation-in-part of my application Serial No. 107,153, filed May 2, 1961, now abandoned.

This invention relates to the improvement of bowling shoes and has for an object the provision of a bowling shoe having a substantially uniform effective coefficient of friction which is lower than the coefficient of friction of the normal sole and is substantially unaffected by humidity conditions.

When bowling, the bowler is required to wear special shoes designed for bowling so as to keep the approaches of the bowling alleys clean. Ordinary street shoes are not permitted to be used for bowling as they would scar the smooth surface of the approach to the alleys and would also leave rubber marks from soles or heels on the alleys approaches. It is customary to construct bowling shoes differently from street shoes and they should never be used for street wear. The bowling shoe that is used on the foot on which you slide when delivering the ball normally is provided with a leather sole and a special white rubber heel. The shoe for the other foot has both a white rubber sole and heel to prevent the bowler from slipping or falling off balance during his delivery steps. The tip of the rubber sole is provided with a small piece of leather to prevent the rubber sole from dragging on the approach when the bowler takes his steps for delivery.

In order to insure that a bowler will have a proper and comfortable slide during delivery, it is necessary that the bowling alley approach be maintained in smooth condition and kept clean. Constant use of the alleys today, however, does not permit proper care and many times the approaches are dirty and sticky. Various factors contribute to the surface condition of alley approaches. For example, when an approach is new, dirty, or the air is humid and the alley is sticky, or some rubber has rubbed off a bowler's shoes, conventional bowling shoes will not glide over the surface of the approach with ease. As a result, the bowler's slide is shortened or he comes to a quick stop throwing him off balance, thus interfering with his delivery of the ball and possibly causing him to fall and injure himself. The fear of stopping quickly, while delivering a bowling ball, has been known adversely to affect many a bowler's game.

Manufacturers of bowling equipment and bowling alley proprietors recognize this problem and, in an effort to overcome the sticky surface conditions of the approaches, they supply a powder normally placed at one side on the starting end of the approach to the alley. Before starting the ball, a bowler tests the approach with his sliding shoe and if he finds that it is sticky, he puts his sliding shoe in the powder and then commences to bowl. While he is delivering the ball, the powder quickly comes off of his shoe and is spread over the approach to the alley. The powder will make his slide easy but for the next bowler the powder may have made the alley too slippery thus throwing off the latter's delivery. Such use of powder can even make the other shoe which you don't slide on slippery and this is undesirable. Additionally, it is possible for the powder to set off the foul line buzzer by getting into the beam of the photoelectric eye. Accordingly, it will be seen that the use of powder is not the best way for controlling the bowler's slide over the surface of the approach to the alley.

In accordance with the present invention there is provided an improved bowling shoe which insures a bowler

a more uniform slide and eliminates the need for the use of powder. In accordance with bowling shoes constructed according to the present invention, there are applied to the sole thereof predetermined areas of fluorocarbon material at spaced locations, at least one of which during use of the bowling shoe, is beneath the ball of the foot on the wear surface of the sole, such fluorocarbon areas having a low coefficient of friction and being substantially non-absorbent. The fluorocarbon areas are separated by other areas of the sole which have a higher coefficient of friction to provide a bowling shoe having a substantially uniform effective coefficient of friction over the wear surface which is lower than the coefficient of friction of the normal wear surface of the sole and is substantially unaffected by humidity conditions. The fluorocarbon areas should be substantially co-planar with the wear surface of the sole and may comprise thin layers of fluorocarbon material adhesively applied to the wear surface of the sole or they may comprise inserts disposed in recesses in the sole and having exposed surfaces of fluorocarbon material. In the preferred form of the invention the inserts have a resilient or cushioned backing.

For further objects and advantages of the invention, and for a more detailed understanding thereof, reference is to be had to the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is an elevational view partly in section of an improved bowling shoe embodying the present invention;

FIG. 2 is a bottom view of the bowling shoe shown in FIG. 1;

FIGS. 3–5 are fractional sectional views of modifications of the sole construction of the bowling shoes shown in FIGS. 1 and 2;

FIG. 6 is a diagram of a shoe sole useful in explaining the positioning of the fluorocarbon areas;

FIGS 7–11 are sectional views of a preferred modification of the sole construction and method of making the cushioned inserts used therein.

Referring to FIG. 1, there is shown a bowling shoe 10 having a conventional soft leather upper 11 and a white rubber heel 12. The sole is of two-ply construction including plys 13 and 14 and since this is the shoe on which the bowler slides during his delivery, the ply 14 which comprises the tread or wear surface of the sole is made of leather. As may be seen in FIGS. 1 and 2, the wear surface of the sole beneath the ball and toe area of the foot is provided with a plurality of recesses in which are disposed predetermined areas of fluorocarbon material 16. Fluorocarbon material is particularly suited for this application as it is a soft but durable material, absorbs no moisture and has a very low coefficient of friction. Any of the various types of fluorocarbon resin or equivalents may be utilized, such for example as polytetrafluoroethylene sold under the trademark "Teflon" or polychlorotrifluoroethylene sold under the trademark "Kel-F."

As may be seen in FIG. 1, the fluorocarbon members 16 have a thickness corresponding at least to the depth of the recesses in the tread or sole 14 and thus the exposed or wear surfaces of the fluorocarbon members 16 are substantially coplanar with the wear surface of the sole 14. This is important in order that the bowler will not feel the members 16 through the sole of the shoe while he is sliding on the approach. Otherwise it might interfere with his balance or delivery. The inner or upper surface of the fluorocarbon members 16 may be provided with a cementable surface so that the fluorocarbon members 16 may be adhesively secured within the recesses in the sole 14.

The areas of the fluorocarbon members 16 are predetermined and are so positioned in the wear surface of the sole 14 as to provide a bowling shoe with a substantially

uniform effective coefficient of friction which is lower than the coefficient of friction of the normal leather sole and substantially unaffected by humidity conditions. It has been found that such uniformity can be obtained by utilizing areas of fluorocarbon material having a diameter of approximately one-half to three-quarters of an inch and positioned at spaced locations on the wear surface of the sole beneath the ball and toes of the foot as illustrated in FIG. 2. While slightly larger areas of fluorocarbon material may be utilized depending upon the size of the shoe, in general, the fluorocarbon areas should not exceed more than about fifty percent of the wear surface of the sole 14, i.e., not more than fifty percent of the surface of the sole that engages the alley approach during the slide. Fluorocarbon resin has a coefficient of friction in the order of 0.04 whereas leather has a much higher coefficient of friction, for example, in the order of 0.6 (Handbook of Chemistry and Physics, 41st edition, 1959–1960). Thus it will be seen that by applying the fluorocarbon material areas 16 to the leather sole of the bowling shoe, the overall coefficient of friction of the wear surface of the sole 14 will be substantially reduced.

As the fluorocarbon material does not absorb moisture, it is unaffected by humidity conditions and greatly minimizes loss of slide due to the slightest dampness of the shoe sole or a liquid spot or sticky substance on the sole. Heretofore with conventional bowling shoes, when approaches became sticky and it was difficult to slide to a stop at the foul line, the usual practice was to reduce the bowler's normal speed. Such corrective measures are not necessary with bowling shoes constructed in accordance with the present invention since the fluorocarbon material areas in the sole are substantially non-absorbent and provide the bowling shoe with a substantially uniform effective coefficient of friction which is lower than the coefficient of friction of the normal leather sole and is substantially unaffected by humidity conditions.

In FIG. 3, there is shown a modification of the invention where the fluorocarbon members 18 have been provided with a flange 17 at the rear thereof which is larger in diameter than the diameter of the recess in the sole 14. The flange 17 is made of metal and is provided with tangs 17*a* which are struck from the metal discs 17 and embedded into the fluorocarbon members 18. The flange portion of the member 17 projects beyond the circumference of the fluorocarbon member 18 and is secured between the plies 13 and 14 or the sole. With this construction no adhesive is necessary to hold the fluorocarbon members 18 within the recesses in the sole 14.

In FIG. 4, there is shown another modification of the invention where the fluorocarbon members 21 are provided with a screw member 19 which is adapted to be threaded into a nut member 20 which is secured in the inner ply 13 of the sole. An insole 22 covers the nut members 20. The screw member 19 has been illustrated as being provided with a head portion 19*a* which preferably is knurled and is secured to the fluorocarbon member 21 as by molding or by means of a press fit. The fluorocarbon member 21 is provided with a pair of recesses 21*a* which are adapted to be engaged by a spanner wrench for screwing the fluorocarbon member 21 into the recesses in the sole 14.

In FIG. 5, there is shown a further modification of the invention and one which is readily adapted for providing conventional bowling shoes with the new improvement of the present invention. In FIG. 5 it will be noted that the fluorocarbon material areas have been illustrated on enlarged scale as thin tape material 24 the rear surface of which is provided with a layer of pressure sensitive adhesive 24*a*. The pressure sensitive adhesive 24*a* for example may be of the type sold under the trademark "Permacel" and it has the desirable characteristic that it adheres tightly to the sole yet it leaves no adhesive on the shoe sole when the tape is removed. It is of course to be understood that other suitable types of adhesive may be used, such for example as rubber cement, contact cement and epoxy resin. As mentioned above, the thickness of the fluorocarbon tape material 24 in FIG. 5 must be maintained thin in order that the wear surface thereof will be substantially co-planar with the wear surface of the sole 14. The fluorocarbon material 24 must not be so thick that the bowler will feel the members 24 through the bottom of the sole nor should the fluorocarbon material 24 be so thick that the bowler will be sliding only on the fluorocarbon material and not on a composite surface including both fluorocarbon material and leather areas. If the fluorocarbon tape members 24 are too thick they may become dislodged when the bowler steps up onto the edge of the approach. Satisfactory results have been obtained with fluorocarbon tape having a thickness of from about .004" to .012". By using disc-shaped fluorocarbon material or other shaped areas having a rounded leading edge any tendency for the material to be removed during the slide on the approach is minimized.

As shown in FIG. 2 the preferred location for the fluorocarbon areas is a triangular arrangement with one of the areas being substantially beneath the ball of the foot. To aid in positioning the fluorocarbon areas either in insert form or in tape form an explanatory diagram is shown in FIG. 6. The principal location is at 1 being the area under the ball of the foot. Location 2 is to the right of location 1 in a straight line, the distance being dependent upon the size of the shoe. The position of location 2 is determined from the position of location 1. It will be noted in FIG. 6 that the center of location 1 is X distance from the left hand edge of the sole. The center of location 2 is determined by measuring in the same distance from the right hand edge of the sole. This distance has been indicated in FIG. 6 as dimension A and thus it will be seen that X is equal to A. It will also be noted that the distance between the centers of locations 1 and 2 has been indicated in FIG. 6 by dimension C. Location 3 is determined by drawing a straight line midway between the centers of locations 1 and 2 and perpendicular to line C. The center of location 3 is positioned along this perpendicular line at a distance D which is equal to distance C. These are the three important locations for the fluorocarbon resin areas. If the shoe is unusually large in size or if a fourth location is desired then such location 4 is on the same perpendicular line just above the location 3. The foregoing dimensions have been given looking at the sole of the slide shoe for a right hand bowler, which shoe would be his left shoe. For a left handed bowler the slide shoe would be the right shoe and the dimensions would start from the right side to the left.

It has been found that in many instances small particles of metal are on the bowling alley approach and area surrounding it. Most likely these particles are from the automatic pin setters and are carried to the approach area by the returning bowling ball. Additionally, hard particles of grit have always been carried to the alley from the street. These particles ordinarily do not become embedded readily into the soft leather sole of a bowling shoe. Probably this is due to the fact that the sole flexes or gives and thus offers resistance to penetration. Similar results are derived when thin layers of fluorocarbon tape are used on the leather sole. The dirt particles and metal particles do not embed themselves in the fluorocarbon resin surface because these areas, being thin, flex with the sole and resist penetration.

When using thick inserts of fluorocarbon resin (in the order of ⅛") it has been found that such inserts are harder than leather or thin fluorocarbon tape and thus did not flex as much. As a result this thicker fluorocarbon resin material has a tendency to pick up particles of grit and metal which have an adverse effect on the slide. However, it has been found that if the fluorocarbon inserts are made from material produced under substantial pressure the increased density apparently makes up for the lack

of flexing and they do resist the embedding of particles and accumulation of dirt. On the other hand, free baked fluorocarbon resin material which is not made under substantial pressure apparently is not as hard or as dense and particles of grit and metal become embedded therein more easily. While material of this latter type can be cleaned periodically to renew its surface it is preferable that the high density fluorocarbon material or thin fluorocarbon tape material be utilized as it eliminates the need for periodic cleaning.

Referring to FIG. 7 there is illustrated a preferred embodiment of the invention. In FIG. 7 the fluorocarbon resin areas are produced in the sole by inserts which additionally include the advantages of the thin tape construction. As shown in FIG. 7 the insert comprises a cup-shaped member 30 of fluorocarbon resin which is filled with a resilient or cushioning material 31. The cushioning material may comprise various suitable materials having cushioning characteristics. However, neoprene rubber of approximately 60 durometer has been found to be satisfactory. The rubber cushioning 31 has a thickness of about ⅛" corresponding to the thickness of the outer layer 14 of the leather sole.

To provide the recesses in the sole of the shoe to receive the inserts, the sole is first marked according to the diagram illustrated in FIG. 6. A circular cutter is used and the cutter is inserted in the bottom of the shoe sole until the first layer 14 of the leather sole has been cut through. The cushioned fluorocarbon resin inserts are produced in the following manner. As previously mentioned, one of the common types of fluorocarbon resin is polytetrafluoroethylene. A cup 30 is formed by placing a piece of tape 30 of this material over the female die 33 and beneath the male member 34 as shown in FIG. 8. The tape material 30*a* is provided with an etched surface 30*b* on the upper side thereof, such etched surface being produced by known methods so as to render the surface suitable for receiving cement or adhesive. The tape member 30*a* may be heated either before placing it in the position shown in FIG. 8 or by heating the dies 33 and 34. The male member 34 is moved downwardly into the position shown in FIG. 9 and pressure is applied forcing the tape 30*a* down into the die 33 thereby forming a cup. The tape is removed from the die and immersed in water or other suitable medium for cooling. The excess tape material is trimmed off leaving the polytetrafluoroethylene cup-shaped member 30 with the etching on the inner surface 30*b* thereof as shown in FIG. 10. The heating and cooling steps produce a more satisfactory cup-shaped member and help the cup retain its shape. The heat employed during the forming operation is not critical but should not be so high as to remove the etched surface 30*b* on the inside of the cup 30.

As shown in FIG. 10, the cup-shaped member 30 has been inserted in a retaining fixture 35 having a diameter and depth corresponding to the outside dimensions of cup-shaped member 30. The bottom of the recess in fixture 35 is provided with a knockout hole 36, the purpose of which will be described hereinafter. With the cup-shaped resin member 30 positioned in the fixture 34 as shown in FIG. 10 it is ready to receive the flexible or resilient cushioning member 31. As mentioned above, the cushioning member 31 is preferably made from rubber which allows the cup-shaped member 30 to flex during use in the bottom of the sole. The rubber member 31 may be punched from ⅛" rubber sheet material or it may be molded to predetermined size so as to fill the inside of cup member 30. It is preferable that the rubber member 31 have a radius at its lower end to accommodate the radius on the inside of the bottom of the cup 30. By providing the rubber member 31 with such radius there is achieved a longer wear of the insert since a sharp corner would tend to weaken the insert at that point.

Contact cement is applied to the inside surfaces of the cup member 30 and to the side and bottom of the rubber disc member 31. The contact cement may be of any of the suitable known types. Such cements dry quickly in about 15 to 20 minutes. The rubber disc 31 is then pressed into the resin cup 30 as shown in FIG. 11. A knockout pin is then inserted into the hole 36 and the completed cup-shaped insert is removed from the fixture 35. The insert may be left in the fixture 35 until the cement is thoroughly set or a number of the inserts may be wrapped into a stack in the same manner as the wrapping of a stack of coins and thus the wrapper will maintain pressure on the sides of the cup until the cement is thoroughly set.

When the insert has been completed it is ready to be installed in the sole of the shoe. As shown in FIG. 7, the sole 14 has been provided with a recess of appropriate diameter which is slightly larger than the diameter of the cup-shaped insert 30. The recess is cut to the depth of the thickness of the sole layer 14 which is approximately ⅛" thick. The rubber cushion 31 is also ⅛" thick and thus the thickness of the resin tape is left exposed from the sole 14 until pressure is applied by standing on it. Cup-shaped inserts have been satisfactorily produced from polytetrafluoroethylene tape having a thickness from .015 to .020". Thus when the cup-shaped insert is inserted in the recess and cemented in place by contact cement located between the upper surface of the rubber cushion 31 and the intermediate layer 13 of the sole the cup-shaped member 30 will protrude from the sole 14 a distance corresponding to the thickness of the tape until pressure is applied by standing on it. When the bowler puts his weight on the sole of the shoe, the side walls of the inserts will be compressed against the sides of the corresponding recesses and the bottom surfaces of the inserts will be compressed into the recesses, leaving the bottoms of the cup-shaped members 30 extending out from the sole 14 by only a few thousandths of an inch. The side compression along with the adhesive holds the inserts in place and since these inserts include a cushioning member 31 as well as being formed from flexible resin tape 30 they can conform with the sole of the shoe. By reason of this flexible construction the cushioned cup-shaped inserts of FIG. 7 cannot be felt under the bowler's foot. This is an advantage over the solid inserts shown in FIGS. 3 and 4 since considerable care must be exercised in installing solid inserts in order to avoid their being felt through the bottom of the sole.

To cooperate with the resilient cup-shaped inserts the inner sole lining 22 and the intermediate sole layer 13 are provided with air relief holes 37, FIG. 7. This relieves the pressure within the recesses in the sole 14 when the bowler's weight is applied to the inserts. The cup-shaped inserts as shown in FIG. 7 have several advantages over the solid inserts in FIGS. 1 to 4 and the tape insert in FIG. 5. The cushioned cup-shaped inserts require less fluorocarbon resin material than the solid inserts and thus are less-expensive to manufacture. Additionally, they include a cushioning member which insures that they will not feel harder to the bowler's foot than the remainder of the sole of the shoe. The cushion member 31 being of a material which is readily secured in place by contact cement enables the cup-shaped inserts to be easily installed and retained in the recesses in the sole 14. This eliminates the need for mechanical attaching means such as the plate 17 in FIG. 3 and the screw and socket arrangement shown in FIG. 4.

The cup-shaped embodiment is preferable to the tape modification shown in FIG. 5 since the edges of the cup are not exposed but instead are formed upwardly so that they extend into the recesses within the sole. This avoids any possibility of the edge of the fluorocarbon resin material from being pulled off during use and the weight of the bowler insures good adhesive contact between the cushion member 31 of the insert and the sole.

While preferred embodiments of the invention have been described and illustrated, it is to be understood that

modifications thereof may be made within the scope of the appended claims.

What is claimed is:

1. A bowling shoe having a leather sole the wear surface of which is provided with a plurality of predetermined areas of fluorocarbon material at spaced locations at least one of which, during use of the shoe, is substantially beneath the ball of the foot and all of which are substantially co-planar with said wear surface of said sole, said fluorocarbon areas having a low coefficient of friction and being substantially non-absorbent, and said fluorocarbon areas being separated by other areas of said wear surface of said sole having a higher coefficient of friction whereby said bowling shoe has a substantially uniform effective coefficient of friction which is lower than the coefficient of friction of the leather sole and substantially unaffected by humidity conditions.

2. A bowling shoe according to claim 1 wherein said areas of fluorocarbon material each comprise a layer of polytetrafluoroethylene secured to the sole by adhesive.

3. A bowling shoe according to claim 1 wherein said areas of fluorocarbon material each comprise a thin layer of fluorocarbon tape secured to the wear surface of said sole and having a rounded leading edge to prevent removal of said tape during a slide.

4. A bowling shoe according to claim 1 wherein said sole includes recesses formed therein, said fluorocarbon areas being positioned in said recesses in said leather sole, and means is provided for retaining said fluorocarbon areas in said recesses so that the wear surface of said fluorocarbon areas are substantially co-planar with said wear surface of said sole.

5. A bowling shoe according to claim 4 wherein said fluorocarbon areas comprise fluorocarbon members having structural means for retaining them in said recesses in said leather sole.

6. A bowling shoe having a sole the wear surface of which is characterized by separate areas of leather and fluorocarbon material, said areas of fluorocarbon material having a rounded leading edge and a lower coefficient of friction than said leather areas, and said fluorocarbon material areas being substantially non-absorbent so as to provide a bowling shoe with a composite wear surface having a substantially uniform effective coefficient of friction which is lower than the co-efficient of the normal leather sole and is substantially unaffected by humidity conditions.

7. A bowling shoe having a rubber heel, and a sole having a composite wear surface consisting of exposed areas of leather and fluorocarbon resin, said composite wear surface of said bowling shoe having a substantially uniform effective coefficient of friction which is lower than the coefficient of friction of the leather and substantially unaffected by humidity conditions.

8. A bowling shoe having a high friction heel, and a sole having a composite wear surface consisting of exposed areas of leather and fluorocarbon resin, said leather having a coefficient of friction less than that of said heel and said fluorocarbon resin being non-moisture absorbent and having a coefficient of friction substantially less than that of said leather, whereby said composite wear surface of said bowling shoe has a substantially uniform effective coefficient of friction which is lower than the coefficient of friction of said leather but higher than said coefficient of friction of said fluorocarbon resin and substantially unaffected by humidity conditions.

9. A bowling shoe having a high friction heel and a sole having a composite wear surface consisting of exposed areas of leather and polytetrafluoroethylene, said leather having a coefficient of friction less than that of said heel and said polytetrafluoroethylene being non-moisture absorbent and having a coefficient of friction substantially less than that of said leather, said sole including recesses formed therein said polytetrafluoroethylene areas being positioned in said recesses in said sole, said polytetrafluoroethylene areas comprising cup-shaped members filled with cushioning material, and means for retaining said polytetrafluoroethylene cup-shaped members in said recesses so that said cushioning material is disposed within said recesses and the bottom surfaces of said polytetrafluoroethylene cup-shaped members are substantially co-planar with said wear surface of said sole.

10. For use in the sole of a bowling shoe to produce a composite wear surface comprising exposed areas of leather and polytetrafluoroethylene, the improvement of a resilient insert comprising a cup-shaped member of polytetrafluoroethylene having a coefficient of friction substantially less than that of leather, a cushioning member filling said cup-shaped member, and means for securing said cushioning member within said cup-shaped member.

11. The method of making a resilient insert for a bowling shoe wherein the insert has a low coefficient of friction comprising the steps of heating a thin sheet of fluorocarbon resin having the characteristics of a low coefficient of friction and being substantially non-absorbent, and thereafter shaping it into a cup, filling the cup with resilient cushioning material, and adhesively securing the cushioning material within the cup.

12. A method of making a bowling shoe having a composite wear surface comprising cutting a plurality of recesses in the leather sole of the bowling shoe at triangularly spaced locations at least one of which, during use of the shoe is substantially beneath the ball of the foot, positioning an insert of fluorocarbon material having the characteristics of a low coefficient of friction and being substantially non-absorbent, in each of said recesses, each insert comprising a relatively thin cup-shaped piece of fluorocarbon material, the interior of the cup being filled with resilient material and bonded thereto to provide cushioning, and adhesively securing the resilient material of the inserts in each of the recesses so that the bottom of each cup-shaped piece of fluorocarbon material of the inserts when positioned within the recesses is substantially co-planar with the wear surface of said sole thereby providing a composite wear surface of exposed areas of leather and fluorocarbon resin.

13. For use in the sole of a bowling shoe to produce a composite wear surface comprising exposed areas of leather and fluorocarbon resin, the improvement of a resilient insert comprising a layer of cushioning material and a layer of fluorocarbon resin adhesively secured together so that said insert when positioned in a recess in said bowling shoe has the outer surface of said fluorocarbon resin exposed to form a part of said composite wear surface, said fluorocarbon resin being selected from the group consisting of polytetrafluoroethylene and polychlorotrifluoroethylene.

14. A bowling shoe having a high friction heel and a sole having a composite wear surface consisting of exposed areas of leather and fluorocarbon resin, said leather having a coefficient of friction less than that of said heel and said fluorocarbon resin being non-moisture absorbent and having a coefficient of friction substantially less than that of said leather, said sole including recesses formed therein, said fluorocarbon resin areas being positioned in said recesses in said sole, said fluorocarbon resin areas comprising cup-shaped members filled with cushioning material, and means for retaining said fluorocarbon resin cup-shaped members in said recesses so that said cushioning material is disposed within said recesses and the bottom surfaces of said fluorocarbon resin cup-shaped members are substantially co-planar with said wear surface of said sole.

15. For use in the sole of a bowling shoe to produce a composite wear surface comprising exposed areas of leather and fluorocarbon resin, the improvement of a resilient insert comprising a cup-shaped member of fluorocarbon resin being non-moisture absorbent and having a coefficient of friction substantially less than that of leather,

a cushioning member filling said cup-shaped member, and means for securing said cushioning member within said cup-shaped member.

References Cited by the Examiner

UNITED STATES PATENTS

Re. 14,119	4/16	Berenstein	36—59
1,350,839	8/20	Rendle	36—59
2,640,283	6/53	McCord	36—2.5
2,732,065	1/56	Marchese	36—59 X
2,744,340	5/56	Gerber.	
3,011,272	12/61	Goldenberg	36—2.5

OTHER REFERENCES

"Plastic Bulletin," volume 12, 1950, pages 183–186, inclusive.

JORDAN FRANKLIN, *Primary Examiner.*