This invention relates to bowling pins, and more particularly to composite bowling pins wherein there is a body portion of one material and wear-resistant portions or inserts of another material.

An object of the invention is to provide a novel and improved bowling pin having a wear-resistant annular base member wherein a secure retention of the latter on the pin body is had with the use of only simple and inexpensive attachment or fastening means.

Another object of the invention is to provide an improved bowling pin above set forth, which is characterized by relatively few components of uncomplicated construction, thereby effecting a desirable economy of manufacture.

A further object of the invention is to provide a novel bowling pin construction in accordance with the foregoing, which is strongly resistant to breakage and deterioration, even under adverse conditions of use.

A still further object of the invention is to provide an improved bowling pin construction having wear-resistant inserts, which construction is characterized by compactness of the fastening means whereby the same requires but little space to position and secure the insert.

Still another object of the invention is to provide a bowling pin construction of improved characteristics as above set forth, which may be easily fabricated utilizing inexpensive materials and machining techniques for fabricating or molding the individual components which are already known and in current use.

Other features and advantages will hereinafter appear.

In the drawings accompanying this specification a single embodiment of the invention is illustrated. Identical components have been given like characters in the several views, in which:

FIG. 1 is a side elevational view of an improved bowling pin construction as provided by the invention, the lower portion of the pin being shown in vertical, axial section.

FIG. 2 is a perspective view of a thermo-plastic annular retainer annulus as utilized in the pin construction of FIG. 1.

FIG. 3 is a perspective view of the annular wear-resistant base member of the pin construction.

FIG. 4 is a fragmentary axial sectional view illustrating the method of assembly, there being shown a bottom portion of the pin body, the retainer annulus of thermoplastic material after heating and positioning of the same on the pin body, and the wear-resistant annular base member which is about to be forced or pressed into place.

FIG. 5 is a fragmentary vertical sectional view of a bottom corner of the composite pin construction, shown on an enlarged scale to reveal more clearly the structural details.

Referring now particularly to FIGS. 1, 4 and 5, the composite bowling pin is shown as comprising a usual type and shape of pin body 10, except for the lowermost portion thereof. As is usual, the pin body 10 has a central bore 12 to accommodate the positioning pins or rods of a pin setting machine.

Considering FIG. 4, the bottom of the pin body 10 has an annular recess 14 which is concentrically disposed, and which is made by removing the annular lower corner portion of the pin base, as by cutting away or removing material of the pin body to form a substantially cylindrical, ring-shaped groove or recess 16 which extends upward into the lower portion of the pin body, such groove preferably having inner and outer cylindrical walls 18 and 20 respectively and further having a flat circular bottom surface 22. As shown in FIGS. 1, 4 and 5, the inner cylindrical surface 18 of the groove 16 extends downward and meets the bottom or base surface 24 of the pin, being concentric with the pin axis.

In accordance with the present invention, a novel method and construction is provided by which a wear-resistant annulus or base member may be attached to the bottom of the pin body 10 to occupy the space where the annular corner portion of the pin previously existed. The wear-resistant annulus is shown by itself in FIG. 3, being indicated generally by the numeral 28. The annulus or base member 28 may be formed or any suitable tough material, it being preferred at the present time to fabricate such of a synthetic fiber-forming polymeric amide of the class of materials popularly termed "nylon." The annular base member 28 has a cylindrical inner surface 30 adapted to closely fit the cylindrical surface 18 at the bottom of the pin body 10, and has a relatively narrow bottom edge junction surface 32 the outer peripheral portion of which is rounded and merged with a tapered frusto-conical outer wall surface 34. The wall surface 34 at its upper portion terminates at an annular shoulder 36 which adjoins an integral upwardly extending ring shaped surface 38 meeting a flat circular top surface 40. The flat circular top surface 40 at its inner periphery meets the internal cylindrical surface 30, as clearly seen in FIG. 5 for example.

In accordance with the invention a novel method and means are provided, involving a thermoplastic retainer annulus 42 which is adapted to be heated and placed in the annular recess or groove 16 at the lower portion of the pin body 10 and thereafter engaged and deformed by application, with appreciable pressure, of the wear-resistant base member 28 to the bottom of the pin body 10. The retainer annulus 42 is preferably constructed of a plastic material such as ethyl cellulose which is stiff and relatively unyielding at normal room temperatures, and which becomes soft and capable of flowing when heated appreciably. While ethyl cellulose has been found to be eminently satisfactory for the purposes of the invention, it will be understood that other types of thermoplastic materials may be suitable, and the particular material identified herein is not to be considered as a limitation.

In accordance with the method of the invention, the retainer annulus 42 is heated to render it readily deformable, thereafter placed in the annular groove or recess 13 of the lower portion of the pin body, whereupon the wear-resistant base member 28 is forced upward into the said groove to deform the retainer ring and force the material thereof into interstices, pockets or the like of the pin body 10 and the base member 28 whereby an interlocking engagement and construction is effected which, upon cooling and stiffening of the retainer annulus 42 will effect a secure retention of the wear-resistant base member 28 and prevent dislodgement of the latter during normal use of the pin even under adverse conditions.

Any suitable construction for providing the interstices, pockets or the like may be utilized. As shown in FIGS. 1, 4 and 5 the inner wall 18 of the groove 16 is provided with an annular undercut or second, relatively small groove or recess 44, and the upper end portion of the wear-resistant base member 28 is provided with a plurality of sloping, interlocking type teeth or flutes 48. Accordingly, when the heat-softened retainer annulus 42 is subjected to pressure and force by the wear-resistant base member 28, the material of the retainer annulus will be forced into the undercut 44 and also forced around all
sides of the retainer teeth 48, as is clearly shown in FIG. 5. Therefore, an interlocking construction is effected by this method. It is preferred that the lower portion of the retainer annulus 42 be hotter and softer than the upper portion during such annealing, although this is not essential to practicing the invention. The retainer annulus 42 may be conveniently heat-softened by placing it on a hot plate, whereupon the surface of the annulus which contacts the plate will be hotter and softer than the upper surface, thereby effecting the above-preferred arrangement. The retainer annulus 42 is placed in the groove 16 with its hotter and softer side downward, whereby such side will be engaged by the retainer teeth 48 of the wear-resistant member 28.

I have found that by such organization and method it is possible to effectively and quickly deform the retainer annulus 42 without damage, excessive bending or the like of the retainer teeth 48 of the base member 28. Further, with such arrangement it is possible to effect a considerable deforming pressure on the retainer annulus 42 after the softened material thereof has flowed around the retainer teeth 48, thereby to effectively cause a layer flow of the thermo-plastic substance completely into the retainer groove or recess 44 of the pin body 10.

The volume of the retainer annulus 42 is so determined that the flowed material will completely take up and occupy all of the spaces within the area confined by the upper flat circular top surface 40 of the base member 28. Accordingly, a construction as clearly shown in FIG. 5 is evolved by this arrangement. Upon cooling of the retainer annulus 42 it will stiffen and provide an effective interlocking type retainer means by which the nylon base member 28 will be effectively secured in place in the pin body. The use of the cellular type retainer annulus 42 renders it unnecessary to heat-soften the nylon wear-resistant base member 28, and this is an important advantage inasmuch as such material does not readily lend itself to heat-softening and deformation.

It will now be understood from the foregoing that I have provided a novel and improved composite bowling pin construction and method which has important advantages in that it is simple and effective, and may be economically practiced. The composite pin composition is rugged and resistant to wear, breakage and the like, even under adverse conditions of use.

Variations and modifications may be made within the scope of the claims, and portions of the improvements may be made without others.

I claim:

1. A bowling pin comprising a pin body having an annular groove defined by spaced inner and outer walls, means defining a blind undercut formed on the inner wall of said groove; an annular wear-resistant base member disposed in said groove; and a deformable plastic retainer member disposed in the groove between the bottom surface of the latter and the base member and extending into said blind undercut, said retainer member being interlocking secured mechanically to both the pin body and base member to retain the latter in place.

2. A bowling pin comprising a pin body having in its bottom an annular groove; an annular wear-resistant base member disposed in said groove; and a thermoplastic retainer annulus disposed in the groove between the bottom surface of the latter and the base member, said retainer annulus being interlocking secured to the pin body and base member to retain the latter in place.

3. A bowling pin comprising a pin body having an annular groove defined by a pair of spaced wall portions formed in its bottom, said groove having a blind recess formed in a wall portion thereof; an annular wear-resistant base member disposed in said groove, said base member having projecting retaining teeth formed integrally therewith, and means for mechanically securing said base member to said pin within said groove without deforming said base member, said latter means including a deformable plastic retaining annulus interposed in said groove between said pin body and said base member whereby said teeth are imbedded in said retaining annulus and whereby the material of said retaining annulus displaced by said teeth occupies said blind recess to interlock said retaining annulus and base member connected thereto to said pin body.

4. A bowling pin comprising a pin body having an annular groove defined by an inner and outer wall portion formed in the bottom of said body, said groove being formed with a blind recess in a wall portion thereof; a wear resistant base member disposed within said groove, said base member having a plurality of inclined locking lugs projecting therefrom, and means for mechanically bonding said base member to said pin body within said groove, said latter means including a deformable plastic retainer interposed within said groove between said pin body and said base member whereby the locking lugs of said base member are imbedded into said retainer by the application of pressure to interlock the base to said retainer, and the material of said deformable retainer displaced by said lugs flowing into said blind recess for interlocking said retainer to said pin body.

References Cited by the Examiner

UNITED STATES PATENTS

1,008,029 11/1911 Gorman ------------ 264—249 X
1,580,688 4/1926 Sheldon ------------- 733—82
1,718,309 6/1929 Sheldon ------------- 733—82
2,680,023 6/1954 Ellis --------------- 273—82
2,684,504 7/1954 Sell ---------------- 18—59
2,701,719 2/1955 Dye ------------------ 273—82
2,809,038 10/1957 Scheidemanet al. ---- 273—82
2,814,835 12/1957 Faulkner ------------ 18—59
3,169,020 2/1965 Smith --------------- 273—82
3,178,182 4/1965 Ernst -------------- 273—82

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