METHOD OF MAKING BOWLING PINS

4 Claims, 6 Drawing Figs.

ABSTRACT: A method of manufacturing a pin bottom for use in combination with a bowling pin which has a central reduced shank at its butt end formed by an undercut at the juncture of the bottom surface and side surface of the pin, with the undercut forming a downwardly facing annular groove. The pin bottom comprises a flexible upper base member which embraces the shank and is positioned entirely at the uppermost areas of the groove and bonded thereto. A wear-resistant lower base member extends at its upper end into the groove and terminates at its lower end in a shoulder which defines a continuation of the bottom and side surfaces of the bowling pin. The two base members are mechanically interlocked to form the pin bottom and to releasably secure the lower base member on the bowling pin.
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This is a division of our copending application Ser. No. 772,450, filed Oct. 9, 1968 now U.S. Pat. No. 3,477,721, which is a continuation-in-part of parent application Ser. No. 520,974, filed Jan. 17, 1966 now abandoned.

BACKGROUND OF THE INVENTION

One of the main disadvantages of most commercial bowling pins is that they have a relatively short life resulting from damage caused by the angle of the bowling alley. One of the factors that contributes to this problem is the shape of the pin. The pin is made of a material that is soft and can be easily damaged. Another attempt has included post-forming thermoplastic materials in the recess to form a base interlocked to the bowling pin itself. Such methods have proven unsatisfactory because the same "hooping"-type flexure breaks the interlock. Other attempts have included the provision of a two-piece mechanically interlocked base member having a wear-resistant outer shock member and a flexible inner member. It is most desirable to adhesively bond the flexible inner member to the pin, but because the inner member is usually exposed to the "hooping" stresses, the bond is rapidly broken. Attempts have been made to mechanically interlock the flexible inner member to a projecting shank portion of the pin by forming an annular cut or groove in the shank portion into which a lip or bead on the flexible inner member extends to mechanically interlock the inner member to the shank portion and obviate the necessity of adhesives. Such means have proven unsatisfactory because the cut formed in the shank portion causes a "stress riser." More particularly, the annular cut causes an abrupt change in the area of the impact zone where the "hooping stresses" are most pronounced. The stresses are disproportionately high at that point and the pin is prone to crack or split. This invention is directed to solving this dilemma.

SUMMARY OF THE INVENTION

It is the principal object of this invention to provide a new and improved pin bottom for protecting the bottom end of a bowling pin, and a method of fabricating the same. It is another object of this invention to provide a method of manufacturing a pin bottom of the character described wherein an inner flexible member is remote from the impact zone and therefore unexposed to "hooping" stresses with the flexible member permitting limited axial movement of an adjacent base member.

It is still a further object of this invention to provide a method of manufacture wherein the inner flexible member is molded in place between a prepositioned outer impact member and the bottom of a recess in the bowling pin, thereby creating a tight bond between the inner member and the bowling pin itself.

Other objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial sectional view through the base of a bowling pin illustrating the annular groove or recess into which the base member of this invention is positioned; FIG. 2 is a partial sectional view through the base of a bowling pin illustrating one embodiment of the invention; FIG. 3 is a partial sectional view through the base of a bowling pin illustrating a second embodiment of the invention; FIG. 4 is a partial sectional view through the base of a bowling pin illustrating a third embodiment of the invention; FIG. 5 is a partial sectional view through the base of a bowling pin illustrating a fourth embodiment of the invention; and FIG. 6 is a partial sectional view through the base of a bowling pin illustrating means facilitating the method of this invention prior to inserting the settable plastic inner base member.

DETAILED DESCRIPTION OF THE INVENTION

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail an embodiment of the invention with modifications thereof with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiments illustrated. The scope of the invention will be pointed out in the appended claims.

The invention is illustrated herein in combination with a bowling pin having a central reduced outwardly projecting shank 11 at its butt end. The shank 11 is formed by an undercut at the juncture of the bottom surface 12 and the side surface 13 of the pin. The shank extends outwardly of the body of the pin adjacent the shank 11 forming a downwardly facing annular groove or recess 14 into which the novel pin bottom of this invention is positioned. In wooden bowling pins, the undercut or groove may be formed by turning. In aluminum or synthetic bowling pins, the undercut or groove may be molded directly with the pin. Like numerals will be employed throughout the drawings and specification to indicate like parts in the various embodiments shown.

The novel two-piece interlocked pin bottom of this invention is generally comprised of a flexible upper base member 15 and a wear-resistant lower base member 16. The flexible upper member 15 is the bonding member and embraces the shank 11 of the pin entirely at the uppermost areas of groove 14. The wear-resistant lower member 16 is the impact member and extends at its upper end into groove 14 and terminates at its lower end in a shoulder 17. The shoulder forms a continuation of the bottom surface 12 and side surface 13 of the bowling pin. The shoulder 17 has an upper surface 17a spaced from the pin surface 13a to permit limited axial movement of the base member 16. The upper member 15 may be secured tightly in the groove 14 by a high tensile adhesive. The two base members 15 and 16 are mechanically interlocked by a means, generally designated 18 and described below, to releasably secure the lower member 16 to the upper member 15 with the upper end of member 16 positioned in groove 14. The flexible upper member 15 is formed of a vinyl or other soft material and the lower member 16 is formed of a nylon or other wear-resistant material.

It can readily be seen that the flexible upper bonding member is completely remote from the impact zone. Thus, when the impact member is struck by blows approximately in the direction of arrows A, FIG. 2, the nylon impact member will "hoop" in normal fashion, thereby absorbing the impact of the blow and protecting the binding. However, the vinyl or other soft material which forms the flexible member 15, being discontinuous from the nylon member 16, will not be exposed to these "hooping" stresses. A high tensile adhesive bonding the flexible member 15 to the bowling pin will therefore not be affected in any manner. In fact, a direct blow in the direction of arrow B, FIG. 2, would likewise have no effect on the high tensile adhesive between the bottom of the groove 14 and the innermost surface 19 of the flexible member 15. The flexible member 15 thus provides a hinged joint for the impact member 16 and yet it may yield to some slight stress encountered with affixing the strong adhesive bond between it and the bowling pin.
FIGS. 2 through 5 illustrate various embodiments of the hinge means 18 mechanically interlocking the impact member 16 to the flexible member 15. FIG. 2 shows an embodiment wherein an annular securing bead 20 is formed integral with the impact member 16 at its upper end. A corresponding annular securing groove 21 is molded integral with the flexible member 15 to receive the securing bead 20 and mechanically interlock the two members.

The embodiment of FIG. 3 is a reverse of the hinge means shown in FIG. 2 in that an annular securing bead 22 is molded integral with the flexible member 15 and a corresponding annular securing groove 23 is molded integral with the impact member 16 to provide a mechanical interlock for the two members.

FIG. 4 shows an embodiment wherein the flexible member 15 is provided with an outer laterally extending lip 24 which is spaced from the body of the flexible member to form an annular lip receiving recess 24a, and the impact member 16 is provided with a complementary inner lip 25 which forms a corresponding lip receiving annular recess 25a to provide complementary interengaging surfaces 26 on the respective members to provide a mechanical interlock therefor.

The embodiment illustrated in FIG. 5 is similar to that shown in FIG. 4 but the lips 24 and 25 are provided with camming surfaces 27 and 28 to facilitate assembly while providing a complementary interengaging surfaces 26 to mechanically interlock the two members together.

The two members are preferably assembled prior to their insertion into groove 14 whereby structural adhesive may be applied to the outer surfaces of the flexible member 15 and the entire assemblage, comprised of the flexible member 15 and impact member 16, may be inserted into groove 14 and then tightly pressed against the pin in the direction of arrow B, FIG. 2, whereby the adhesive will tightly adhere to the bottom and/or sides of groove 14.

It can be seen that sufficient flexibility in the flexible member 15 would facilitate replaceability of the impact member 16 should the impact member become damaged. For instance, the walls of the annular securing groove 21, in the embodiment illustrated in FIG. 2, could be deformed to permit the securing bead 20 to be removed from groove 21 to facilitate replacement of the impact member 16. Likewise, sufficient flexibility in member 15 will permit deformation of the appropriate portion thereof in the embodiments illustrated in FIGS. 3 through 5 to permit replacement of the impact member 16.

FIG. 6 illustrates a means whereby the principle and objectives of this invention can be accomplished in a method of fabricating a pin bottom for bowling pins wherein the upper flexible member 15 is molded in position within groove 14. The preferred method includes the steps of forming a recess or groove extending into the body of the pin member 10 at the juncture between the bottom surface 12 and the side surface 13 of the bowling pin, as above described and as illustrated in FIG. 1. The impact member 16 is then positioned in the recess 14 spaced from the bottom of the recess as illustrated in FIG. 6. The next step includes the insertion of a settable resilient material of the plastic type into the space between the impact member and the bottom of the recess. The material may be a thermosetting material, such as flexible epoxy or urethane, and could obviate the use of adhesives since such materials develop high adhesive strength in adhering to the preferably wooden bowling pin. To facilitate insertion of the plastic material, the material may be poured through a passage 30 drilled from the center of the shank 11. The material is poured to completely fill the remaining space in the annular groove 14 and effectively interlock the impact member 16 within the groove on setting of the material. The passage 30 may also be filled with the plastic material, or other appropriate substitutes to avoid "stress risers," as above described. A similar passage may extend vertically upwardly through the impact member 16 to facilitate insertion of the plastic material.

The plastic material may be placed into the bottom of groove 14 prior to positioning the impact member 16 therein. For instance this may be accomplished by turning the pin upside down.

By molding the inner flexible member 15 in position within the space between the impact member 16 and the bottom of the groove 14, the problem of maintaining correct tolerances between the two members is completely obviated. The tolerances are critical since the shoulder 17 forms a continuation of the bottom surface 12 and side surface 13 of the bowling pin. It is highly undesirable to have abrupt changes in this preferably smooth continuation.

Thus it can be seen that I have provided a new and improved bowling pin having a novel two-piece protective base member wherein the bonding member is unexposed to the impact zone thereby permitting the use of high tensile adhesives creating a tight bond and eliminating fallout of the base member without creating "stress risers."

We claim:

1. In a method of fabricating a bowling pin from a pin member of the type having a bottom surface and a side surface, the steps comprising: forming a recess extending into the body of the pin member adjacent the juncture between the bottom surface and side surface thereof; positioning an impact member having an engageable surface thereon in said recess in a position spaced from the bottom of the recess and with said engageable surface residing within said recess; pouring a settable resilient material of a plastic type into the space between the bottom of the recess and the impact member and around said engageable surface, and permitting said settable material to harden whereby a disengageable mechanical interlock between the inserted plastic material and the impact member is created.

2. The method of claim 1 wherein the insertion of the settable resilient material continues until the entire space between the impact member and the bottom of the recess is filled.

3. The method of claim 1 wherein said settable resilient material is inserted through a passage in one of said members.

4. The method of claim 1 wherein the settable resilient material of the plastic type is one which bonds to the adjacent surfaces of the bowling pin.