Dec. 1, 1964 E. B. NICHOLS 3,159,402

BOWLING PIN AND METHOD OF MAKING SAME

Filed Sept. 5, 1956

FIG. 1

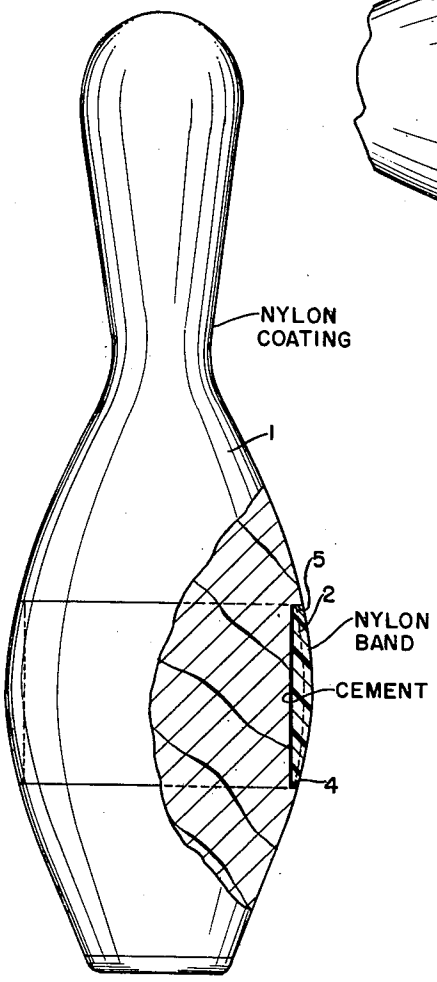


FIG. 2

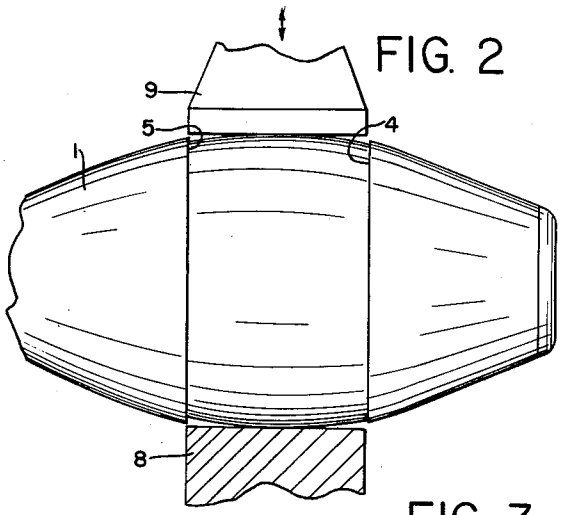
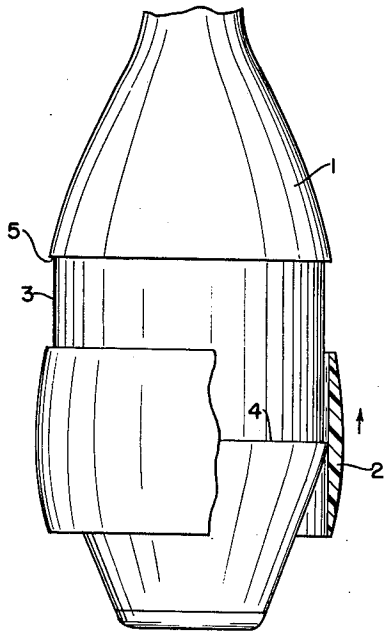


FIG. 3



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United States Patent Office 3,159,402 Patented Dec. 1, 1964

3,159,402

BOWLING PIN AND METHOD OF MAKING SAME

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Filed Sept. 5, 1956, Ser. No. 608,036
5 Claims. (Cl. 273—82)

This invention relates to bowling pins and methods of making the same and specifically to improvements on the bowling pin described in my pending application Ser. No. 477,498, filed December 24, 1954 and since abandoned.

The bowling pin of this application comprises, in common with the bowling pin of my pending application, a band of nylon surrounding the middle of the pin where it is subject to the initial impact of the balls and the invention of the present application relates primarily to improved means of attaching the band to the pin and to improved means of protecting the surface of the pin, in areas not covered by the band, from damage by impact and abrasion. Other objects of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein I have illustrated my improved pin and the novel steps in its method of manufacture.

In the said drawings

FIG. 1 shows my improved pin, partly in side elevation and partly in vertical section;

FIG. 2 shows diagrammatically a step in the process of manufacture; and

FIG. 3 shows the pin with the band partially assembled thereon.

My improved pin, as shown in FIG. 1, consists of the conventional hard wood solid pin 1 with a band 2 of nylon around its mid portion. The entire surface of the pin including the band is covered with a coating consisting of a film of nylon applied to the surface in a volatile solvent.

Also, as will be noted from FIG. 1, the nylon band is seated in a groove 3 around the middle of the pin, the shoulder 4 at the lower edge of the groove being somewhat lower than the shoulder 5 at the upper edge of the groove.

As is well known, there are a number of different grades of nylon, differing from one another in their physical properties, such as hardness, tensile strength, elasticity, heat resistance, etc., and I have found that certain grades give better results than others when subjected to impact and abrasion such as a bowling pin is subjected to. Some of the characteristics that are subject to measurement of a preferred grade are hardness Rockwell R107, stiffness 200,000 pounds per square inch at 77° F., tensile strength 8880 pounds per square inch. This grade begins to soften at 402° F. and is substantially non-hygroscopic.

As stated in my pending application a new wooden bowling pin improves in performance after a period of use due to the fact that the fibers of the wood around the mid portion of the pin are compacted by the repeated impact of the bowling balls. In the said application I describe a method of impacting the pin before the band is applied to give this superior performance to my improved pins. In the process of this application I also impact the mid portion of the pin before applying the band.

The wooden portion of the pin as originally cut is of conventional shape except for the groove cut around the middle of the pin between the shoulders 4 and 5. This groove is cut to the depth and contour indicated by the dotted line in FIG. 1. That is to say, the bottom of the groove follows the usual curve of the mid portion of the pin with the shoulder 5 at the upper edge of the groove approximately 0.35 inch in height and the shoulder 4

approximately 0.3 inch in height. The pin, shaped as shown, is then compressed by impact until the middle portion of the pin between the shoulders 4 and 5 is substantially cylindrical in contour. That is to say, the intersection of a radial plane with the surface at the base of the groove after compacting is a substantially straight line, as shown in FIGS. 1 and 3. This compacting may be readily accomplished by mounting the pin in a slowly revolving chuck between a flat anvil 8 and a rapidly reciprocated gravity hammer 9. After the pin has been compacted as described, the nylon ring 2 which has been previously molded to the desired shape is heated sufficiently to so expand the ring that it can be pushed with light pressure over the bottom end of the pin and the shoulder 4 at the lower edge of the groove. As stated above, the shoulder 5 at the upper edge of the groove is of somewhat greater width than the shoulder 4 and consequently the movement of the ring relative to the pin will be stopped by engagement of the edge of the ring with the oppositely projecting shoulder 5. The band so assembled on the pin will gradually contract as the band cools, shrinking into the groove and gripping the flat compacted surface between the shoulders.

The band is preferably cemented in place and I have found most suitable for the purpose a cement formed of nylon. This nylon cement can also be used as a coating for the pins, which adds materially to the longevity of the pin.

The nylon cement and coating composition is made from nylon scrap and is more fully described in my copending application filed concurrently herewith. As there described, the nylon scrap is first ground in a granulator to pellets from 1/8" to 3/16" in size when screened. This ground material is dissolved in phenol then diluted with methanol to the desired consistency until the phenolic content is between 2% and 5%. Some grades of nylon can be dissolved by reflux condensing. The amount of methanol or other solvent is not critical and depends upon the use to which the completed article is to be put and also the method by which the coating is to be applied. If the coating is to be applied by dipping or spraying the amount of methanol will advantageously be greater than if the coating is to be applied by a brush or roller. Also, if the solution is to be applied to metal or cement it is preferable to employ less methanol in order for the solution to have sufficient viscosity to be applied in a fairly thick layer at one application.

After the impacting step above described, the pin is preferably coated by dipping or spraying with the nylon solution above described. After the pins are first dipped they are allowed to drain by gravity and are then re-dipped and allowed to stand until dry. The pins are preferably inverted during the second period of drying so as to permit the nylon solution which might have accumulated on the shoulder 4 to distribute itself over the bottom surface of the groove. If desired, the nylon solution may be rendered opaque by including a small amount of ground titanium oxide.

After the pin is dipped as described, the base of the groove 3 is covered with a layer of the nylon solution made up with a limited amount of methanol so as to be of a gluelike consistency. As soon as the glue is applied, the nylon band, which has been previously heated and thereby expanded in diameter, is pushed over the shoulder 5 at the base of the groove 3 until it contacts the shoulder 4 at the upper edge of the base, in which position it remains until on cooling the band shrinks tightly against the base of the groove with the interposed layer of nylon cement. After the band is thus attached to the pin any cement which may have been squeezed out of the space between the band and the shoulders 4 and 5 is removed and the meeting edges of the nylon and wood

smoothed off by sandpaper or otherwise to give the pin a smooth unbroken contour from base to stem.

The pin is now ready for use or, if desired, a third coating of the nylon solution is applied, after which the pin is ready for use. This is done by dipping the otherwise finished pin into a methanol solution of nylon with added phenol, as described. Titanium oxide may be added to this dip also or other pigments may be added to give the pin a color other than white.

I have found that the nylon film or coating thus formed on the surface of the pin by the evaporation of the solvent provides a protective layer which will insure a satisfactory surface on the pin as long as the nylon band protects the middle of the pin from destruction through impact and abrasion. With pins not so coated it has been my experience that the mid portion of the pin covered by the nylon band would be in good playing shape after the surface of the rest of the pin through the knocking about to which the pin is subjected, even though not directly hit by the ball, has made it necessary to refinish or replace the pin.

I have stated above that I prefer to use as a cement between the band and the pin a solution of nylon such as used for the coating applied to the entire surface of the pin. It has to date proven most satisfactory. I wish it to be understood, however, that my invention is not limited to the use of such a cement or to any particular cement between the band and the pin. Any cement which is not brittle and which has adequate adhesion to the nylon and the wood of the pin can be used.

It will also be understood that my improved pin and its method of manufacture may be otherwise variously modified within the scope of the appended claims.

I claim:

1. The method of making a bowling pin which consists in shaping a wooden bowling pin to provide a midportion of conventional convex shape, compressing the midportion where it will be hit by a bowling ball throughout the circumference of the pin to a smooth, substantially cylindrical shape of reduced diameter, thereby densifying the wood of said midportion substantially throughout the circumference and the length of the cylindrical portion, the reduction being greater at the place of greatest diameter of the pin, and thereafter applying a reinforcing band of nylon to said compressed cylindrical midportion of the pin.

2. The method of claim 1 in which, prior to the compression, a groove with an axially convex bottom surface is formed around the midportion of the pin which is to be compressed, whereby after the compression a shoulder extends outwardly at each end of the densified cylindrical portion.

3. A wooden bowling pin having a groove completely around its midportion, shoulders having radial surfaces at the upper and lower edges of said groove, the bottom of said groove being a smooth, unbroken surface substantially parallel with the axis of said pin, a band of molded nylon seated in and completely filling said groove, the outer surfaces of said band being convex and forming with the surfaces of the pin adjacent the edges of the band a continuous smooth surface and a film of nylon covering the curved surface of the pin including the head and neck.

4. The bowling pin of claim 3 wherein the film contains titanium oxide and is substantially opaque.

5. The method of making the bowling pin of claim 3 wherein the diameter of the pin at one shoulder is less than at the other shoulder and also less than the internal diameter of the band when heated to a temperature substantially above room temperature, but insufficient to soften the band, which consists in heating the band to a temperature sufficient to increase its internal diameter at least equal to the smaller of said shoulders, but insufficient to soften the nylon, pushing the band over said shoulders into position to shrink into the groove and thereafter repeatedly dipping the pin into a solution of nylon in methanol until a film is built up on the pin.

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