

[54] **METHOD OF MANUFACTURING
PLASTIC BOWLING PIN**

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[22] Filed: **Sept. 17, 1970**

[21] Appl. No.: **73,131**

Related U.S. Application Data

[62] Division of Ser. Nos. 836,518, June 25, 1969, and Ser.
No. 882,036, Dec. 4, 1969, Pat. No. 3,572,710.

[52] U.S. Cl. 29/417, 29/445, 29/526,
29/455

[51] Int. Cl. **B23p 17/00**

[58] Field of Search 29/417, 445, 526, 455;
273/82 R

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[57]

ABSTRACT

This specification discloses a bowling pin of plastic that has the appearance of a wooden pin, sounds like a wooden pin, and scores like a wooden pin. These properties are imparted by the structure comprising a hollow main body, a hollow core with a space between the core and the body, a removable and replaceable cap plug for the upper end of the core, and a removable and replaceable base plug for the lower end of the core; and method of manufacturing the pin of this construction.

The present invention relates to bowling pins, and is concurred primarily with a bowling pin of plastic that has all the properties that are of vital interest to a bowler, of a wooden pin and which properties are imparted to the pin by the structural characteristics thereof.

4 Claims, 8 Drawing Figures

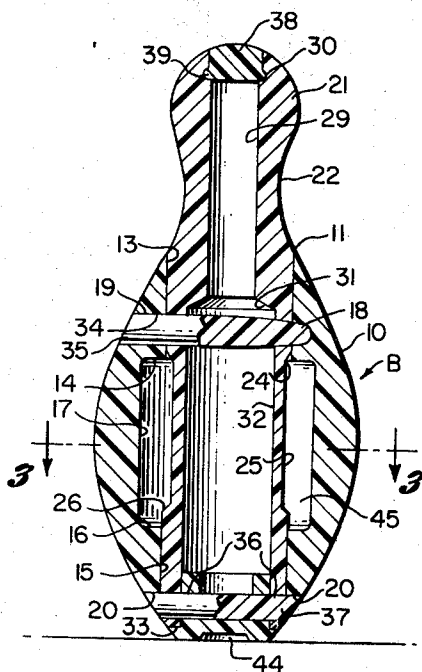


Fig. 1.

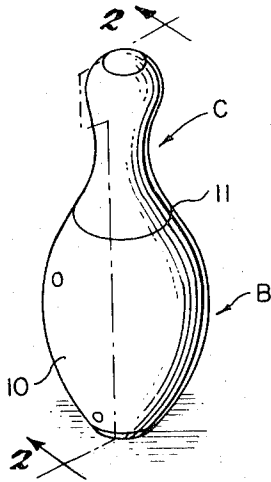


Fig. 2.

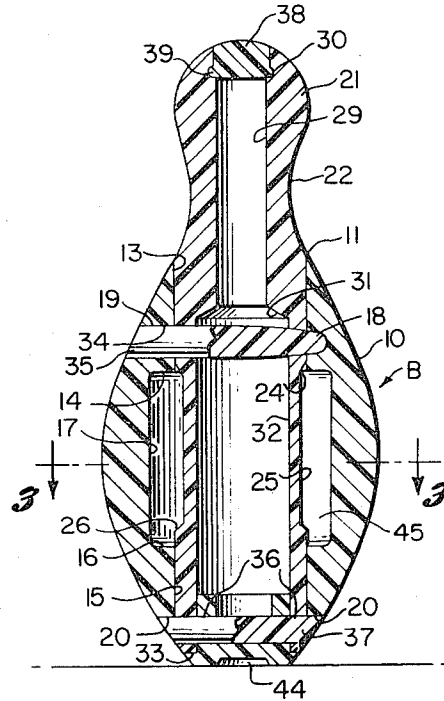
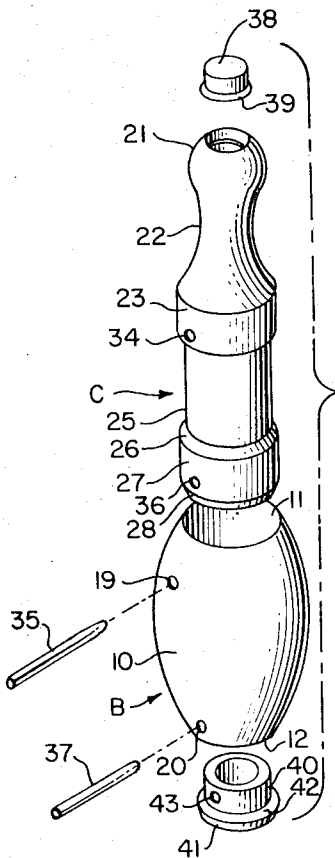
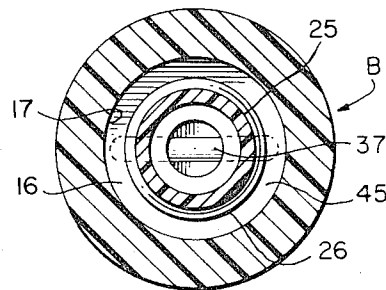


Fig. 3.



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Fig. 5.

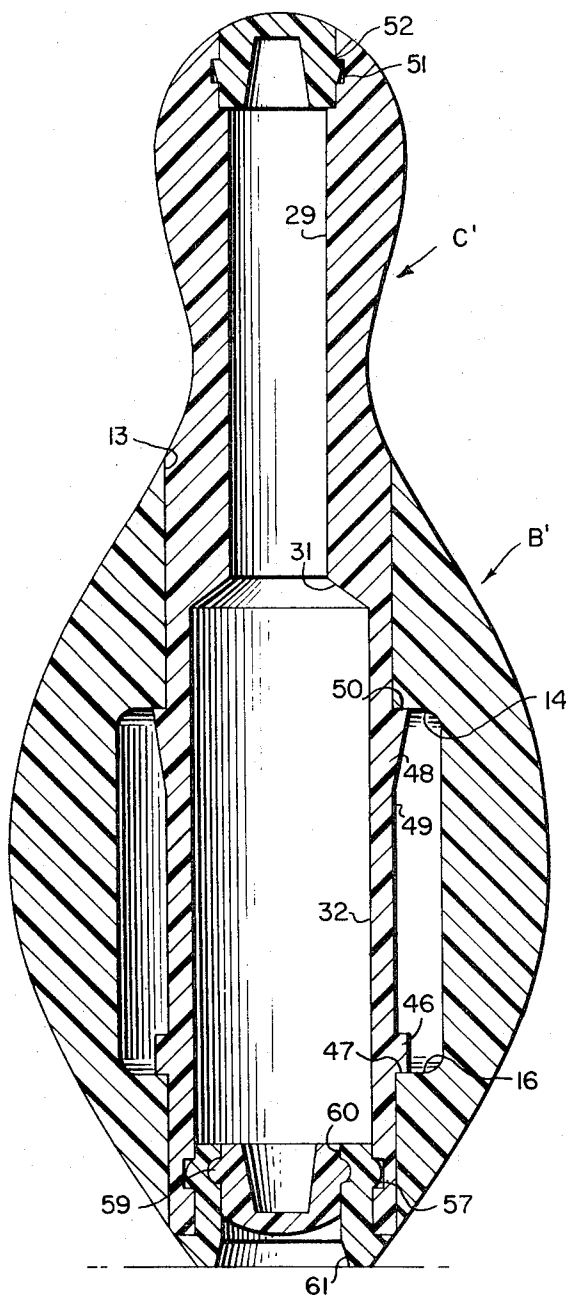


Fig. 6.

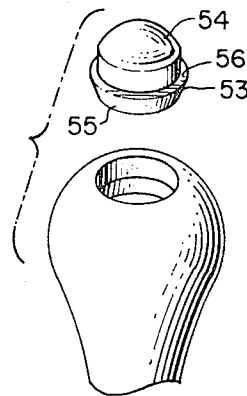
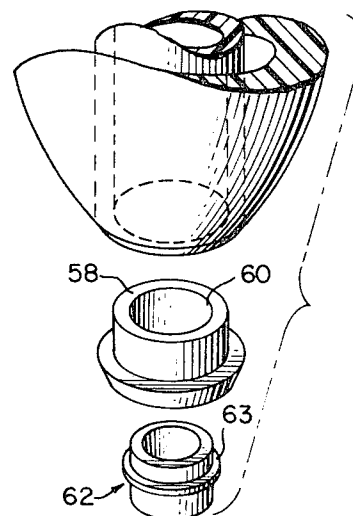


Fig. 7.

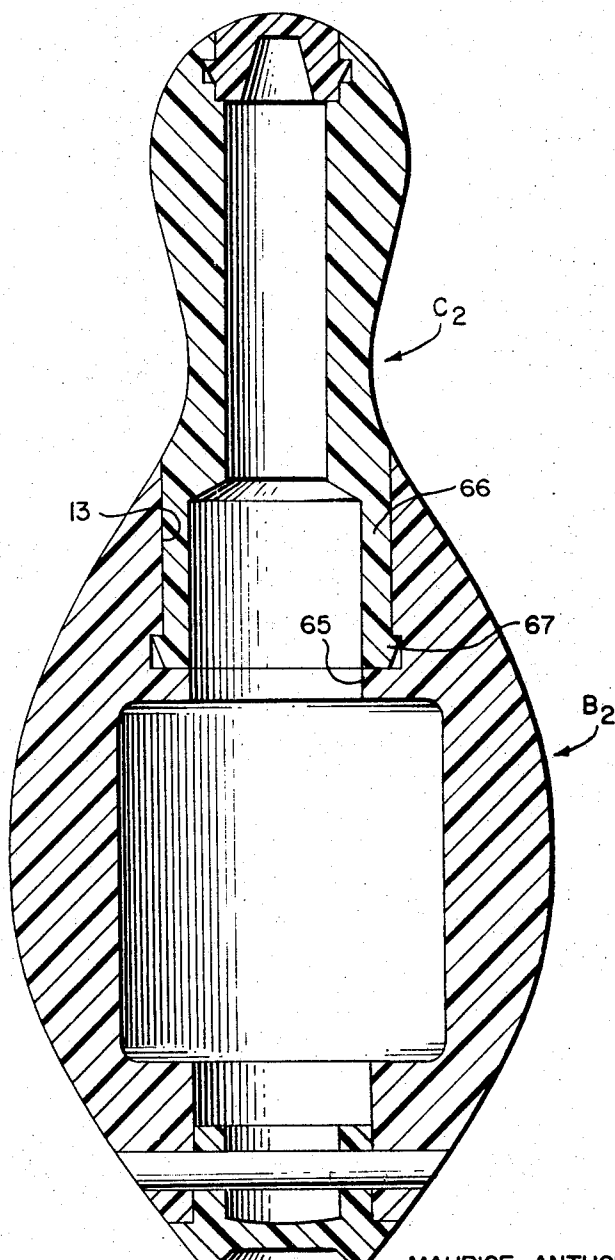


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Fig. 8.



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METHOD OF MANUFACTURING PLASTIC BOWLING PIN

This application is a division of Ser. No. 836,518 filed June 25, 1969 and of Ser. No. 882,036 filed Dec. 4, 1969, now U.S. Pat. No. 3,572,710.

BACKGROUND OF THE INVENTION

Bowling is a sport now meeting with widespread acceptance. Bowlers, by virtue of years of experience properties is wooden pins, now expect certain properties of the pins with which they play. Perhaps the most important of these properties the sound which comes from impact with a ball, impact with each other as they fly about, and engagement with adjacent alley structure. If a plastic pin is to meet with public acceptance, it is believed it must sound like a wooden pin.

The manner in which one pin affects another as it engages therewith after being forcibly removed from its position of rest by impact with a ball or other pin is also of importance from the aspect of scoring. The total number of pins which are felled by the delivery of a ball depends on the reaction of the pins with each other and with environmental alley equipment. All such reactions should be the same as those derived from wooden pins.

All the pins of any set, whether duck pins, candle pins, or ten pins should be of uniform standard weight. Wooden pins are now produced in which this standardization of weight is achieved to a degree that is now acceptable. However, it is believed a more perfect attainment is desirable.

The part of a bowling pin which is subject to the greatest amount of wear is the base on which the pin rests in erected position. Next in wear reception is the cap or upper end. It is important that these elements be easily removable and replaceable.

While plastic bowling pins have been proposed, it is believed that none of the now available pins accommodate the above outlined factors to the degree necessary to accord to the pins the widespread acceptance with which wooden pins meet.

OBJECTS OF THE INVENTION

The present invention has, as its foremost objective, the provision of a plastic bowling pin which has the properties of a wooden pin so far as sound and scoring are concerned and which may be accurately produced in a standard weight.

Another object is to provide a plastic bowling pin having a cap and a base which are easily removable and replaceable.

A more detailed object is to provide, in a plastic bowling pin, a structure which affords, in effect, a sound box.

SUMMARY OF THE INVENTION

The foregoing objects are achieved by the plastic bowling pin of this invention. This pin comprises two main elements. These are: a main body and a hollow core. The body has an outer contour corresponding to that of a conventional pin and an inner cylindrical surface terminating in a shoulder at each end. Extending from each of these shoulders is a cylindrical surface of a diameter smaller than that between the shoulders, and which provides two bore sections of the same diameter and in alignment. These bore sections receive the core with an empty space or chamber being defined by the core, shoulders, and cylindrical surface therebetween.

Means are provided for maintaining the core assembled with the body. This means may take either of two forms. In one form transverse locking pins are employed. In the other embodiment the core is formed with outstanding ribs which engage the shoulders on the body to maintain the assembled relation.

The core has two bore sections of different radii with the larger in that portion within the body. A cap plug having an external locking flange is fitted into the free end of the smaller bore section with the flange being received in a groove. A base plug is removably fitted in the lower end of the larger bore section.

The method of manufacture consists essentially of extruding an appropriate plastic into a strip of a required cross section, cutting a block of appropriate length from the strip, initially machining the outer surface of the block to approximate the contour of the finished pin, drilling a central passage through the block, milling the interior of the block from the passage to form the passage to form the inner cylindrical surface, shoulders and bore sections and after assembly of the core finishing the outer contour.

Various other more detailed objects and advantages of the invention such as arise in connection with carrying out the above noted ideas in a practical embodiment will in part become apparent and in part be hereinafter stated as the description of the invention proceeds.

For a full and more complete understanding of the invention reference may be had to the following description and accompanying drawings wherein:

FIG. 1 is a perspective of a bowling pin embodying the present invention.

FIG. 2 is a vertical section through the pin being taken about on the plane represented by the line 2—2 of FIG. 1.

FIG. 3 is a horizontal section taken about on the plane represented by the line 3—3 of FIG. 2.

FIG. 4 is a perspective illustrating the elements of the pin in exploded relation.

FIG. 5 is a vertical section through a modification.

FIG. 6 is a detailed perspective depicting the elements at the upper end in exploded relation.

FIG. 7 is a detailed exploded perspective of the lower end.

FIG. 8 is an axial section through another modification.

Before referring to the drawings it is noted that the subject pin may be made of any of the now known plastics having the required properties of strength, resilience and machinability. However, polystyrene may be taken as the preferred material. Also while a duck pin is illustrated, the invention is applicable to other types of pins such as ten pins or candle pins.

Referring now to the drawings, and first more particularly to FIGS. 1 to 4 inclusive, the bowling pin of this invention is shown as comprising a body identified in its entirety as B and a core designated generally at C. Body B has an outer contour of a curvature corresponding to that of a conventional pin. The outer surface is designated 10 and terminates at an upper edge 11 and a lower edge 12. Extending inwardly from edge 11 is an upper bore section 13 (FIG. 2) which terminates in a shoulder 14.

Extending inwardly from edge 12 is a lower bore section 15 terminating in a shoulder 16. Between shoulders 14 and 16 is a cylindrical surface 17. Entering body B from bore section 13 is a closed end recess or socket 18. Diametrically opposed and in alignment with socket 18 is a passage 19 that extends from outer surface 10 to bore section 13. Spaced inwardly from lower edge 12 are two passages 20 in alignment. Each passage 20 extends from surface 10 to bore section 15.

Core C has an outer contour comprising a convex surface 21 and a concave surface 22 at its upper end. These surfaces 21 and 22 have a curvature that imparts a contour to the upper portion of the core similar to that of the corresponding part of a conventional pin.

Joining concave surface 22 at its lower edge is a cylindrical surface 23 (FIG. 4) of a diameter near enough to that of bore section 13 to provide a close fit therewithin when the core C is assembled in body B. Cylindrical surface 23 terminates at a conical surface 24 (FIG. 2). Extending below conical surface 24 is a cylindrical surface 25 that stops at a lower conical surface 26. From the latter a cylindrical surface 27 extends to a conical surface 28 at the end of core C.

Core C is hollow with the hollow structure being provided by an upper bore 29 into which opens a groove 30. Bore 29 extends inwardly to a conical seat 31. From the wide end of the latter a lower bore 32 extends to the lower end of core C as defined by a flat ring like surface 33.

That portion of core C encompassed by cylindrical surface 23 is formed with two aligned passages 34 which also align

with socket 18 and passage 19 when core C is assembled with body B. A locking pin 35 passes through these aligned passages and enters into maintaining the assembled relation. That portion of core C defined by cylindrical surface 27 is also formed with aligned passages 36 which also align passages 20. A locking pin 37 passes through these passages and complete the means for maintaining core C assembled in Body B.

A cap plug 38, preferably of nylon, has an external flange 39 at its lower end and this plug is received in the upper end of bore 29 with flange 39 seating in groove 30 to maintain the assembled relation. Plug 38 is removable and replaceable. A base plug, also of nylon, comprises a tubular portion 40 and a conical end portion 41 separated from tubular portion 40 by a flat shoulder 42. Tubular portion 41 is formed with aligned passages 43 which also align with passages 20 and 36 and pin 37 passes therethrough to maintain the base plug assembled with the core and body.

End portion 41 of the base plug has a recess 44 in its lower flat bore which is conventional.

It is notable that cylindrical surface 17 and shoulders 14 and 16 of body B, together with cylindrical surface 25 of core C define an empty space or chamber 45 that functions much in the manner of a sound box in determining the sound generated by a ball striking the pin, and pins engaging each other and alley equipment.

In the manufacture of the pin above described, the plastic (polystyrene) is extruded into a strip of appropriate cross section. A block of a length corresponding to body C is cut from this strip. This block is machined to achieve an outer contour approximately that of surface 10. It is then drilled to form a central passage which ultimately provides bore sections 13 and 15. It is then milled internally from this passage to form shoulders 14 and 16 and inner cylindrical surface 17. Socket 18 and passages 19 and 20 are then formed by drilling.

Core C is preferably also formed from an extruded strip with a block of proper length being cut therefrom. Outer surfaces 21 and 22 are then rough finished after which the block is drilled from its opposite ends to form bores 29 and 32. Shoulder 24 and 26 cylindrical surface 25 are then formed by milling. Passages 34 and 36 are then drilled.

Cap plug 38 and the base plug are extruded and finished. After the parts are assembled as above described all of the outer surfaces are finally finished. This finishing also enters into accurately achieving the standard weight.

Referring now to FIGS. 5, 6 and 7 a modified form of invention will be described. Body B' of FIG. 5 is substantially the same as body B with the exception of the omission of the passages which receive the locking pins. There are, however, some important distinctions between core C of FIGS. 1 to 4 and core C' of FIG. 5.

Core C' has the same upper bore 29 terminating in shoulder 31 of core C. However, throughout the extent of lower bore 32 core C' is of uniform wall thickness with the exception of a lower external rib 46 which presents a shoulder 47 that is in abutting engagement with shoulder 16 of body B'. Core C' also has an upper rib 48 defined by a conical surface 49 of small pitch and an upper flat shoulder 50 which engages shoulder 14 of body B' after assembly.

In assembling core C' with body B' the core is inserted from the top in the usual way. Due to the hollow construction of the core and the elastic and resilient nature of the plastic form which it is made ribs 46 and 48 will ride past bore section 13. At the time shoulder 16 and 47 abut shoulder 50 is disposed opposite to shoulder 14 and will snap out into the expanded holding position illustrated in FIG. 5.

Considering FIG. 6 along with FIG. 5 it will be noted groove 51 in core C' has a sharp or abrupt upper shoulder 52. Flange 53 in cap plug 54 has lower conical surface 55 and an upper flat ring like shoulder 56. As the plug 54 is inserted conical

surface 55 aids in flange 53 riding down bore 29 until shoulder 56 comes opposite to shoulder 52. Flange 53 then expands into groove 51 to achieve its holding position.

FIG. 5 shows the lower end of core C' formed with a groove 57 opening into bore 32. As depicted in FIG. 7, a base plug includes a tubular portion 58 which before complete assembly has an uninterrupted outer cylindrical contour. It also is formed with a smooth bore 60.

Bore 60 terminates in a lower flared end 61. A locking plug 62, which like plug 58 is of nylon, has an external flange 63.

In assembly base plug 58 is first inserted into bore 32. Locking plug 62 is now inserted in bore 60. Flange 63 will ride along bore 60 until it comes opposite to the groove 57. Due to the flexible and yieldable properties of the nylon from which plug 58 is made, and the more solid construction of the locking plug 62, flange 63 will distort plug 58 to force a portion thereof into groove 57 and thus form retaining flange 59 as shown in FIG. 5.

As an alternative this flange 59 may be initially formed on base plug 58 and a groove there opposite opening into bore 60.

Base B' and core C' may be manufactured in the same way as as described in conjunction with base B and core C with the exception that the transverse passages are not drilled.

In modification of FIG. 8, the body B2 is, in nearly all respects, the same as body B of FIG. 1 to 4 inclusive with the only difference residing in a groove 65 that is milled in the bore 13.

Core C2 is also generally similar to core C with the difference between the two resulting from terminating the core C2 short of the sound box. Thus cylindrical portion 66 is formed with an external flange 67 at its lower end and this flange 67 is received in groove 65 with a snap fit.

While preferred specific embodiments of the invention are hereinbefore set forth, it is to be clearly understood that the invention, is not to be limited to the exact construction, materials and steps illustrated and described because various modifications of these details may be provided in putting the invention into practice.

What is claimed is:

1. In the manufacture of a plastic bowling pin, the method comprising the steps of:

- extruding a plastic into a strip of a required cross section;
- cutting a block of appropriate length from said strip;
- machining the outer surface of said block to provide a contour approximately that of the finished pin;
- drilling a longitudinal passage in said block to provide bore sections;
- milling said block internally from said passage to provide shoulders and an enlarged cylindrical surface between the shoulders;
- assembling a hollow core in said bore passages by insertion therein leaving a hollow portion therebetween formed by said enlarged surface;
- fixing the assembled relation of the body and core; and
- finally finishing the outer contour of said body and core.

2. The method of claim 1 together with making the hollow core by the following steps:

- extruding a plastic into a strip of required cross section;
- drilling an upper bore in said core strip from the upper end, and
- drilling a lower bore into said core strip from the lower end.

3. The method of claim 2 together with the step of machining the outer surface of the core in the zone of the lower bore to provide a desired contour thereon.

4. The method of claim 3 in which external ribs are formed on said core by the milling of the outer surface thereof.

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