March 13, 1962 J. M. ERNST ET AL 3,025,061

BOWLING PINS

Filed March 20, 1958

FIG. 1

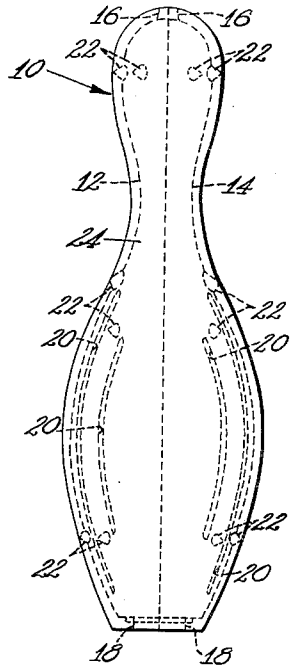


FIG. 2

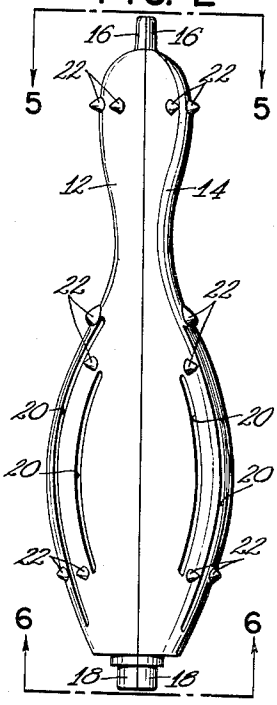


FIG. 3

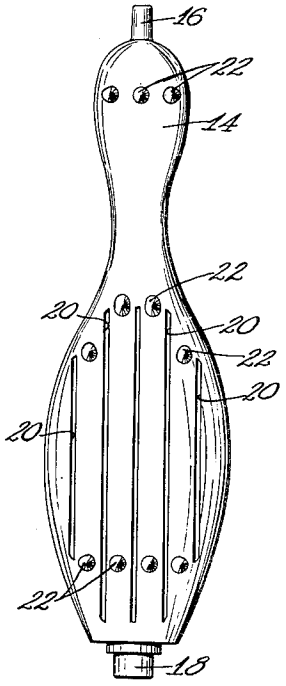


FIG. 4

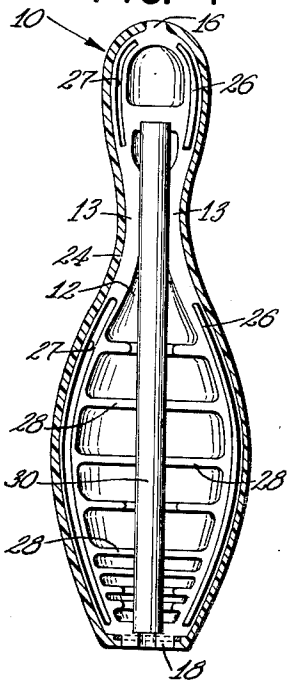


FIG. 5

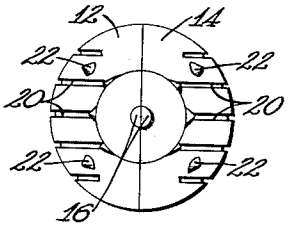


FIG. 6

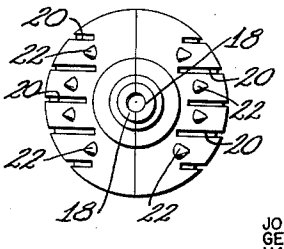
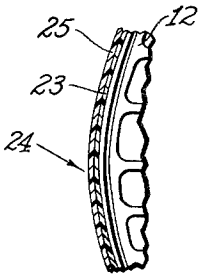


FIG. 7



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BOWLING PINS

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The present invention relates to bowling pins and more particularly to a composition bowling pin having improved wear and impact resisting characteristics.

Most pins heretofore generally employed in the game of bowling have been basically of wood construction. However, with adequate sources of suitable wood stock becoming increasingly more difficult to secure and with the demand for bowling pins becoming increasingly greater due to the widening popularity of the game, the industry has been exploring possible new materials for the construction of bowling pins. Of the possible new materials, one or more of the family of known plastics have given satisfactory results. Heretofore, the main drawbacks to plastic pins were that such pins did not sound like the traditional wooden pins and more important, the bowling scores obtained using plastic pins were not comparable to the scores which wooden pins yielded. Such plastic pins, when struck by a bowling ball, exhibited different impact characteristics than wooden pins.

The present invention is characterized by the provision of two juxtaposed and locked plastic core halves in the general shape of a conventional bowling pin. If desired, core halves may be suitably ribbed for increased structural rigidity. Further, if desired, one or more plastic covers may be molded over the interlocked core halves. In addition, in a modified form of the invention, means can be provided for strengthening such a plastic pin at the section found most susceptible to fracture; namely, the neck area of the pin.

A bowling pin embodying the present invention not only sounds like the traditional wooden pin in play but bowling scores recorded using such plastic pins are substantially identical with scores recorded using wooden pins. Further, a pin embodying the present invention is stronger and more durable, outlasting conventional wooden pins.

It is therefore an object of this invention to provide plastic pins which in play, simulate wooden pins with regard to sound and scoring, and have equal or longer useful life.

It is a further object of the present invention to provide a plastic pin with a reinforced neck section to prolong pin life.

An added object of this invention is to provide a bowling pin comprised of two juxtaposed and joined plastic core halves.

Another object of the present invention is to provide a bowling pin comprised of opposed plastic core halves covered wtih one or more layers of plastic material.

It is an object of this invention to provide a bowling pin comprised of opposed plastic core halves having a longitudinal center reinforcing member.

Other objects and features of the invention will appear as the description of the particular physical embodiment selected to illustrate the invention progresses. In the accompanying drawings, which form a part of this specification, like characters of reference have been applied to corresponding parts throughout the several views which make up the drawings.

FIG. 1 is a side elevation of a bowling pin embodying the preferred form of the invention.

FIG. 2 is a side elevation of the preferred form of the invention with the outer covering removed.

FIG. 3 is a front elevation of the preferred form of the invention with the outer covering removed.

FIG. 4 is a sectional front elevation of the modified form of the invention.

FIG. 5 is a view taken along line 5—5, FIG. 2.

FIG. 6 is a view taken along line 6—6, FIG. 2.

FIG. 7 is a partial sectional front elevation of a bowling pin embodying the preferred form of the invention.

Referring to FIGURES 1, 2 and 3, a bowling pin 10 embodying the preferred form of the present invention is comprised of opposed semi-circular core halves 12 and 14. Core halves 12 and 14 are formed preferably of plastic using any suitable process. We have found that either the compression molding or injection molding process is satisfactory. We have further found that of the plastics, the following materials yield satisfactory results: a pre-mixed material containing polyester resin and glass fiber; cellulose acetate; cellulose acetate butyrate; thermoplastic cellulose propionate and plasticizers; thermoplastic styrene resin; and an elastomeric copolymer mixed with plasticizers, especially phenolaldehyde resin as shown in Groten and Reid Patent No. 2,459,739.

Core halves 12 and 14 are each molded into approximately opposing halves of a conventional bowling pin shape with matching marginal edges or rims 13, only one of which is shown (FIG. 4), and are each provided with half-round cylindrical longitudinally extending core print 16 at one end and 18 at the other. Also core halves 12 and 14 are provided with score lines 20 and knobs 22 in their outer shells to provide anchoring for outer cover 24. To facilitate joining, core halves 12 and 14 are provided, on their opposed abutting faces, with interlocking tongues 26 and grooves 27 as shown in FIG. 4. Further the interior of the core halves 12 and 14 preferably is provided with transverse rib sections 28 to furnish rigidity (FIG. 4).

To construct a bowling pin embodying the present invention, core halves 12 and 14 are produced as described hereinabove. Core halves 12 and 14 are then brought face to face as shown in FIG. 2 with the tongues 26 of one core half interlocking with grooves 27 of the other. To bond core halves 12 and 14 together, each abutting face, has previously been coated with an adhesive or bonding agent; such as a plastic of the type which has the tendency to effect an intimate bond between core halves 12 and 14 over their entire abutting surfaces; for example, an epoxy resin.

To finish the pin, bonded core halves 12 and 14 are placed in any suitable investing mold to apply outer plastic cover 24. Core prints 16 and 18 operate to center core halves 12 and 14 in such investing mold to ensure a uniform application of cover 24. Cover 24 may be of any suitable plastic material having characteristics of durability, toughness and ease of application. Several such plastic materials may be found from among the following: polyethylene; thermoplastic styrene resin, thermoplastic cellulose propionate with plasticizers, and elastomeric copolymer mixed with plasticizers, especially phenolaldehyde resin as shown in Groten and Reid Patent No. 2,459,739.

Cover 24 is molded by any suitable process to the surfaces of core halves 12 and 14. Score lines 20 and knobs 22 operate to anchor cover 24 to core halves 12 and 14, ensuring positive adhesion therebetween. Cover 24 is applied to core halves 12 and 14 to the exact dimensions of the standard bowling pin. As shown best in FIG. 2, knobs 22 are produced with a generally conical shape. In this manner, knobs 22 offer the maximum anchoring surface for cover 24 while providing minimum penetration of the outer surface of cover 24 (see FIG. 1). Further, while preferably there need be no chemical

affinity between cover **24** and core bonded halves **12** and **14**, it will be understood that the high molding pressure used in applying cover **24** operates to secure cover **24** to core halves **12** and **14**. In addition, since cover **24** is applied to core halves **12** and **14** in a molten state, upon cooling, the contraction of cover **24** about core halves **12** and **14** ensures an over-all anchoring of cover **24** to core halves **12** and **14**, preventing any relative movement therebetween.

After the covered pin is removed from the investing mold, the ends of core prints **16** and **18** are cut off flush with the top and bottom of cover **24** to produce a finished plastic bowling pin embodying the invention.

It wil be understood that cover **24** may be applied as a single layer or may be made up of a plurality of layers. In fact, as shown in FIG. 7, it has been found most satisfactory to fabricate cover **24** of two layers of different plastic materials, such as an inner layer of a thermoplastic styrene resin **23** and an outer layer of polyethylene **25**.

FIGURE 4 discloses a modified form of the invention wherein a reinforcing member **30** preferably of rod-like construction, is positioned along the longitudinal axis inside pin **10**. Pin **10**, excepted as modified above, is formed in the same general manner as the preferred embodiment disclosed in FIGS. 1, 2 and 3. All like members function in like manner. Reinforcing member **30** is placed between core halves **12** and **14** before they are bonded together as described hereinabove. Member **30** extends from substantially the base of pin **10** through and past the neck section thereof, terminating in the head portion of pin **10**. Member **30** may terminate at approximately the middle of the head as shown in FIG. 4 or may extend to the top of pin **10**. Further, member **30** may be constructed of any suitable rigid material; such as glass fibers bonded by a resin, plastic, wood or other similar material or combinations thereof, and may be of solid or tubular construction.

What we claim is:

1. A composite bowling pin comprising a hollow core having the shape of a bowling pin and including an enlarged base portion, a neck portion of smaller diameter than said base portion, and a top portion of larger diameter than said neck portion, each section having edge portions abutting the edge portions of another section, said edge portions provided with spaced interlocking

tongue and groove means for aligning said sections, the surface of said core being provided with a plurality of grooves extending lengthwise of the pin and spaced apart generally transversely of the pin, said grooves extending at least in said enlarged base portion of said core, said core also being provided with a plurality of outwardly directed projections spaced in at least one series extending generally transversely of the pin with each projection of such series disposed between a different adjacent pair of said grooves, and a continuous, integral covering of synthetic resinous material extending over and bonded to the surface of said core, the material of said covering filling said grooves, said projections being embedded in the material of said covering, and said covering extending over substantially the entire surface areas of said base, neck and top portions of said core.

2. A composite bowling pin in accordance with claim 1 and further comprising a centrally disposed elongated reinforcing member contained within said hollow core, one end portion of said reinforcing member being connected to the base end of said core, said reinforcing member extending through the neck portion of said core, the wall of the neck portion of said core embracing and directly engaging said reinforcing member.

3. A composite bowling pin in accordance with claim 1 and wherein the base portion of said core is provided with a plurality of internal, transversely extending reinforcing webs through which said reinforcing member extends.

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