Jan. 4, 1966 L. E. EINFALT 3,227,451

WEIGHT-COMPENSATED BOWLING PIN

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FIG. 1.

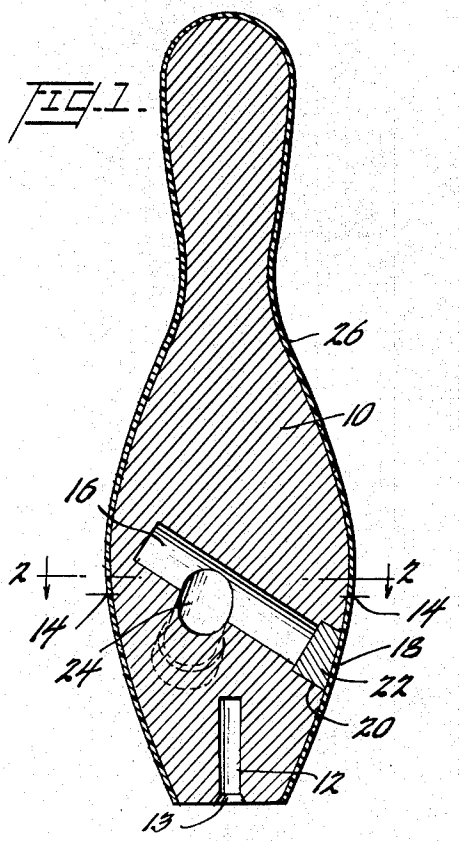


FIG. 2.

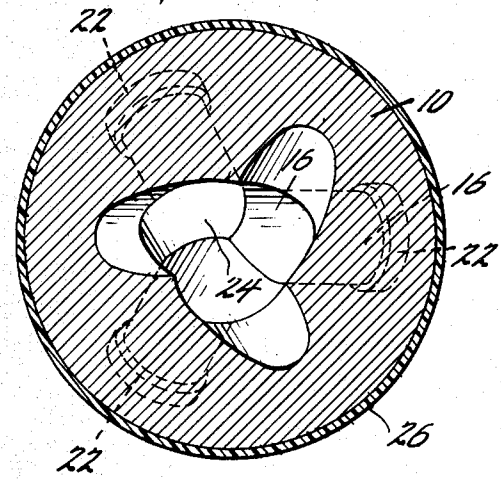


FIG. 3.

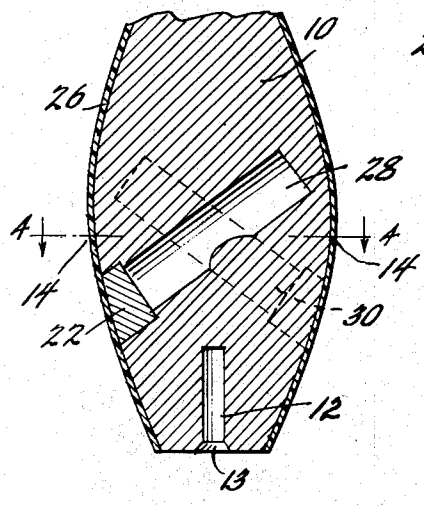
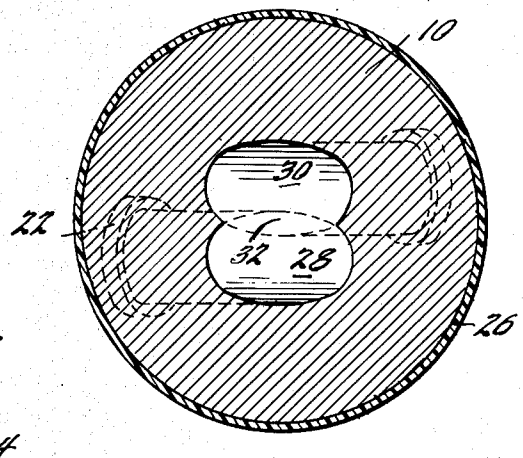


FIG. 4.



INVENTOR

Loyal E. Einfalt,

BY Parker and Wahlstrom

ATTORNEYS.

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FIG. 7.

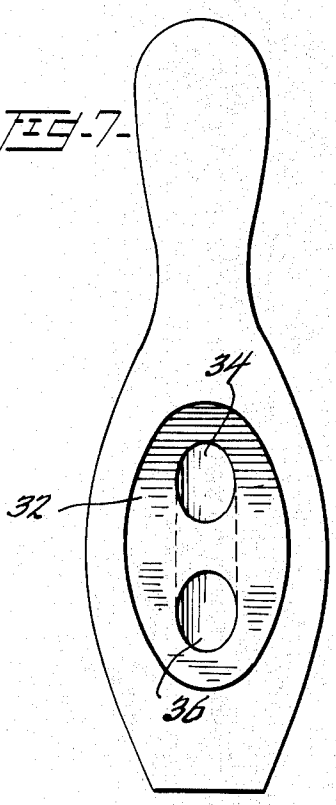


FIG. 8.

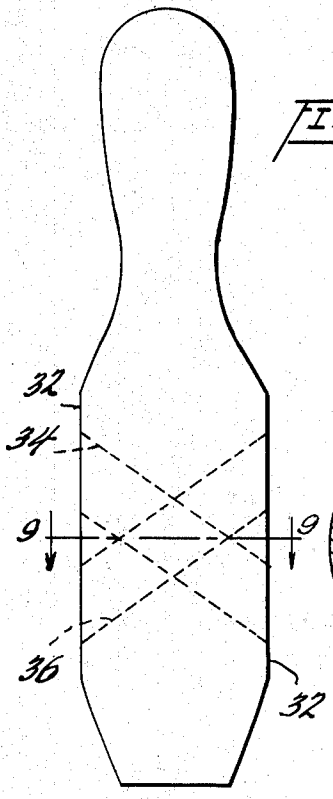


FIG. 9.

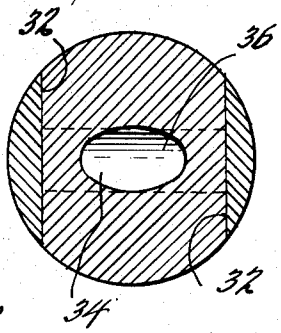


FIG. 6.

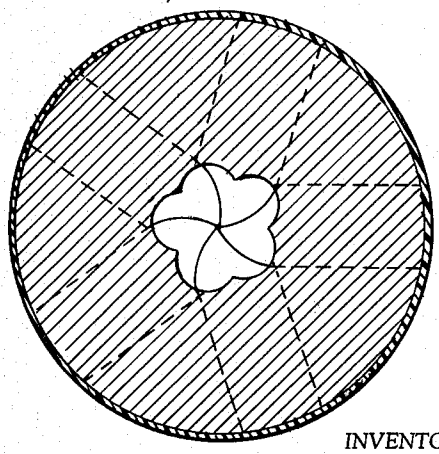
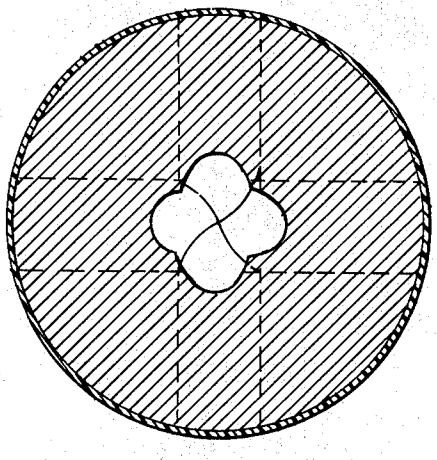


FIG. 5.



INVENTOR

Loyal E. Einfalt,

BY Misegades & Douglas

ATTORNEYS

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WEIGHT-COMPENSATED BOWLING PIN

Loyal E. Einfalt, 309 E. 19th St., South Sioux City, Nebr.

Filed Apr. 23, 1964, Ser. No. 363,669
17 Claims. (Cl. 273—82)

This application is a continuation-in-part of my application Serial No. 64,014, filed October 21, 1960 and since abandoned.

This invention relates to bowling pins, and in particular to a manner of compensating pins which are overweight. This problem has always been present in the art of bowling pins, due to the considerable variation in density of the wood from which they are fabricated, as discussed for instance, in U.S. Patent No. 2,775,456, wherein the problem is dealt with, as in various other proposals, by removing part of the interior of the pin by boring. In that particular instance, the boring is effected axially of the pin, from both top and bottom, which is objectionable as weakening the pin at the base and at the neck where it is already extremely vulnerable to the shocks encountered in use. Other proposed solutions currently employed include cutting the pin in two on a plane perpendicular to the pin axis, removing material and gluing the parts back together, and also cutting slabs off the sides of the pin along vertical planes, drilling radial holes and gluing the slabs back in place. These methods are also objectionable as weakening the pin and shortening its life.

A further development which has aggravated the problem of excessive pin weight is the practice of coating the pins with a plastic to render them tougher and therefore better able to stand up under usage. Since the plastic is much denser than the wood, and the outer dimensions of the pin must conform to official specifications, this presents a problem of weight compensation which is superimposed upon the problem as affected by wood density. Considering that plastic-coated pins have almost supplanted the naked wooden pin, the problem becomes one of paramount importance.

I have found that an altogether satisfactory solution of the problem is achieved by a novel location of the compensating bores which removes them, in optimum degree, from the more vulnerable regions of the pin, while permitting removal of the necessary amount of material up to an anticipated maximum. In particular, the most vulnerable regions of a pin are at the neck, at the ball line and at the heel. By the present invention I have achieved favorable results by effecting the boring in the region of maximum diameter of the pin, where the pin may best sustain the loss from the standpoint of strength, and at the same time I have attained three distinct results of merit, namely, avoiding weakening of the ball line, preserving balance, and increasing the amount of removable material, by boring from a point below the ball line, angularly upward to a point above the ball line.

It is, therefore, an object of the invention to provide weight reduction in bowling pins which minimizes or eliminates weakening of the pin in inherently vulnerable regions. A further and related object is to so effect weight reduction without detriment to balance of the pin. A still further object is to achieve either or both of the foregoing objects while providing for a maximum degree of possible compensation.

These and other ends are attained by the present invention, certain preferred forms of which are described in the following specification and illustrated in the drawing, in which:

FIGURE 1 is an axial, sectional view of a coated bowling pin, showing two of three compensating bores;

FIGURE 2 is a sectional view on a plane perpendicular to the axis of the pin, taken on the line 2—2 of FIGURE 1, at the widest diameter of the pin;

FIGURE 3 is a fragmental view similar to FIGURE 1, showing a pin with two bores;

FIGURE 4 is a view similar to FIGURE 2, but taken on the line 4—4 of FIGURE 3, on a plane which includes the ball line, somewhat below the plane of maximum diameter;

FIGURES 5 and 6 are views similar to FIGURE 2, showing four bores, and five bores, respectively;

FIGURE 7 is an elevational view of a bowling pin showing a modification;

FIGURE 8 is another elevational view of the pin of FIGURE 7, taken at right angles to the pin of FIGURE 7; and

FIGURE 9 is a transverse sectional view through the pin of FIGURES 7 and 8, taken on the plane of line 9—9 of FIGURE 8, and showing the bore-covering slabs in place.

Referring to the drawings by characters of reference, there is shown, in FIGURE 1, a tenpin of conventional shape having a body **10** of hard maple wood, with the usual axial bore **12** with bevelled opening **13** in its base. The so-called ball line is an imaginary circle which includes the points **14** indicated at each side of the pin, and lies somewhat below the line of maximum diameter, where section line **2—2** is indicated. In this embodiment, the compensating bores are three in number and are arranged symmetrically about the axis of the pin. For greatest clarity, attention is directed to the bore **16** in FIGURE 1, which is exposed, undistorted, throughout its length in that figure. It will be seen that the axis of the bore commences in the surface of the pin at a point **18** which is sufficiently distant below the ball line **14** to ensure that all elements of the compensating bore are satisfactorily out of range of that more vulnerable region. It will be further observed that the axis of the bore is inclined at an acute angle to the axis of the pin, which enables removal of material in maximum amount without bringing the bore unduly near to the outer surface of the pin.

A counterbore **20** is drilled prior to the main bore **16**, to provide a seat for a wooden closure plug **22**, of hard maple similar to that of the main pin body **10**. The depth of this counterbore will be such that for any given volume of a bore, such as bore **16**, half of the volume will lie below, and half above, the plane of the ball line. This preserves balance in the pin structure.

As another, and optional, feature in the practice of the invention, it will be noted, from the forwardly opening bore **24** in FIGURE 1, that the axes of the bores do not intersect the axis of the pin, but are offset therefrom. By thus avoiding duplication where the bores would otherwise intersect in a common opening, the removal of additional material is made possible. This offsetting of the bore axes may be viewed as an angular disposition of the bore axes away from a diameter of a circle as projected on a plane perpendicular to the pin axis, and this angle may be varied in some degrees within a possible range of 0 to 50 degrees. In other words, the bores could all be located left of center, or all to right of center. Likewise, the inclination with respect to the axis of the pin may be varied within a range from 30 to 75 degrees. The bores may be made narrower as the latter angle is reduced (consistent with the requirement that the bore be equally disposed above and below the ball line). Narrowing of the bore as the horizontal angle is increased may be mandatory to avoid weakening the pin and, therefore, there will be little to be gained by moving these beyond the point of mutual tangency of the bores.

Following the boring operation and insertion of the closure plugs, the pins are finished in a turning operation, in which about 3/16 inch of radius is removed, and the

pin then covered with a plastic coating 26 of ethyl cellulose or other suitable material, in a dipping operation.

The foregoing description and discussion will apply equally well to the pin of FIGURES 3 and 4, which shows a system of two bores, 28, 30 with axes arranged parallel to chordal lines of the peripheral circle of the pin section, offset from the pin axis, and the bores having a common volume 32 where they intersect.

In practice, it is contemplated that the bores may vary in number from two to five, and of course they will be equally spaced about the pin axis in all cases to preserve balance.

The point 18, representing the outer terminus of a bore axis, may be located anywhere from a point one inch from the bottom of the pin to a point one-quarter inch below the ball line, depending upon the magnitude of the required weight correction and the desired width of the bore. The bores will vary in length from 2 to 4½ inches. It is contemplated that the bores should not exceed 1½ inches in diameter, with 1⅛ inches as a preferable working figure.

FIGURES 5 and 6 show pins with compensating bores located on radial planes through the axis of the pin with four bores in the pin of FIGURE 5, the bores being arranged 90° apart, and with five bores in the pin of FIGURE 6.

In FIGURES 7–9 there is shown a pin with a modified form of closure for the transverse bores, in the form of an outer segment of the bulge of the pin. Thus there is shown in FIGURES 7 and 8 a partial pin, truncated on diametrically opposite sides in mutually parallel, flat regions 32. The bores 34, 36 are drilled at this stage, passing through both flat surfaces. In this form the bores are shown as in a common radial plane through the axis of the pin and, therefore intersecting at the center of the pin. The flat sides may be accomplished in any convenient way, including machining of a completed pin, but preferably the partial pin of FIGURES 7 and 8 will be turned from flat stock having a thickness equal to the distance between the flat faces 32. In either case, the pin is completed, after drilling, by gluing slabs to flat regions 32, and effecting a final turning operation, in which the slabs assume a rounded form, in conformity with the normal pin surface, the bores being thus covered by plugs in the form of outer segments of the pin in the region of bulge. Preferably, the grain of the segment will run transversely to the grain of the pin, which is axially directed, because this reduces the tendency of the plug to be deformed and forced into the bores. As in the other described forms, the bores run from below the ball line to a location above the line of maximum girth. Also, the bores may be spaced laterally of the pin axis, as in the other forms.

Although the drawing, for purposes of illustration, shows a pin having the configuration and proportions of a large bowling pin or so-called tenpin, it will be understood that the broad principles of the invention are equally applicable to pins of different sizes and proportions, such as the considerably smaller and squat duckpins, for example, with suitable variation in the range of design of the bores to comport with changes in proportion and with scale effects.

While certain preferred embodiments have been shown and described and certain figures suggested as working values, these are mainly intended for illustrative purposes, and whereas many modifications will be apparent to those skilled in the art, in the light of this disclosure, the invention should not be deemed as limited except insofar as shall appear from the spirit and scope of the appended claims.

I claim:

1. A weight-compensated bowling pin comprising a main body having a plurality of transverse bores equiangularly spaced about the axis of said pin, each arranged at a common, acute angle to the said axis and axially offset and parallel to an axial plane through said pin, said bores having counterbores opening into the outer face of said main body, a closure plug in each said counterbore and having an outer surface conforming to the outer surface of said main body, said bores, exclusive of said counterbores, each having a volume substantially equally disposed above and below a plane including the ball line of the pin, and an outer plastic coating on said pin.

2. A weight-compensated bowling pin comprising a main body having a plurality of transverse bores equiangularly spaced about the axis of said pin, each arranged at a common, acute angle to the said axis and axially offset and parallel to an axial plane through said pin, said bores having counterbores opening into the outer face of said main body, a closure plug in each said counterbore and having an outer surface conforming to the outer surface of said main body, said bores, exclusive of said counterbores, each having a volume substantially equally disposed above and below a plane including the ball line of the pin.

3. A device as in claim 2, said bores being two in number.

4. A device as in claim 2, said bores being three in number.

5. A device as in claim 2, said bores being four in number.

6. A device as in claim 2, said bores being five in number.

7. A weight-compensated bowling pin comprising a main body having a plurality of transverse bores equidistantly spaced about the axis of said pin, each arranged at a common, acute angle to the said axis, said bores having counterbores opening into the outer face of said main body, a closure plug in each said counterbore and having an outer surface conforming to the outer surface of said main body, said bores, exclusive of said counterbores, each having a volume disposed in substantially equal parts above and below a plane including the ball line, and an outer, plastic coating on said pin.

8. A weight-compensated bowling pin comprising a main body having a plurality of transverse bores equidistantly spaced about the axis of said pin, each arranged at a common, acute angle to the said axis, said bores having counterbores opening into the outer face of said main body, a closure plug in each said counterbore and having an outer surface conforming to the outer surface of said main body, said bores, exclusive of said counterbores, each having a volume disposed in substantially equal parts above and below a plane including the ball line.

9. A weight-compensated bowling pin comprising a main body having a plurality of transverse hollow bores equi-distantly arranged about the axis of said pin, each arranged at a common, acute angle to said axis and axially offset and parallel to an axial plane through said pin, said bores each having a volume substantially equally disposed above and below a plane including the ball line of the pin, and an outer plastic coating on said pin.

10. A weight-compensating bowling pin comprising a main body having a plurality of transverse hollow bores equi-distantly arranged about the axis of said pin, each arranged at a common, acute angle to said axis and axially offset and parallel to an axial plane through said pin, said bores each having a volume substantially equally disposed above and below a plane including the ball line of the pin and closure members for said bores, said members conforming to the surface of the main body.

11. A weight-compensated bowling pin comprising a main body having a plurality of transverse hollow bores equi-distantly arranged about the axis of said pin, each arranged at a common, acute angle to said axis, said bores each having a volume equally disposed above and below a plane including the ball line of the pin, and an outer plastic coating on said pin.

12. A weight-compensated bowling pin comprising a main body having a plurality of transverse hollow bores equidistantly arranged about the axis of said pin, each arranged at a common, acute angle to said axis, said bores each having a volume substantially equally disposed above and below a plane including the ball line of the pin and closure members for said bores, said members conforming to the surface of the main body.

13. A weight-compensated bowling pin comprising a main body having a plurality of transverse hollow bores equidistantly arranged about the axis of said pin, each arranged at a common, acute angle to said axis within a range of about 30 degrees to about 75 degrees, and each arranged at an angle to a diameter of said pin in a range of from 0 degrees to about 50 degrees, said bores each having a volume substantially equally disposed above and below a plane including the ball line of the pin, and an outer plastic coating on said pin.

14. A weight-compensated bowling pin comprising a main body having a plurality of transverse hollow bores equi-distantly arranged about the axis of said pin, each arranged at a common, acute angle to said axis within a range of about 30 degrees to about 75 degrees and each arranged at an angle to a diameter of said pin in a range of from 0 degrees to about 50 degrees, said bores each having a volume substantially equally disposed above and below a plane including the ball line of the pin and closure members for said bores, said members conforming to the surface of the main body.

15. A weight-compensated wood bowling pin comprising a main body having a plurality of transverse hollow bores equidistantly arranged about the axis of said pin, each arranged at a common, acute angle to said axis within a range of about 30 degrees to about 75 degrees, and each arranged at an angle to a diameter of said pin in a range of from 0 degrees to about 50 degrees, said body having a plurality of flat vertical surfaces from which the bores enter said body and plurality of flat, solid, imperforate slabs having their grain generally parallel to that of the main body covering the flat faces of the body and turned to present a smooth outer surface conforming to standard dimensions.

16. A weight-compensated bowling pin comprising a main body having a plurality of transverse, hollow bores arranged at angles to the pin axis, with equal volumes of each of said bores extending above and below the ball line of the pin, and end closure means for said bores comprising plugs having outer surfaces conforming to the outer surface of the pin.

17. A device as in claim 16, said pin having opposite, flat surfaces in its bulge position, limiting said bores, and sad plugs comprising segments of the outer portion of said pin, superimposed on said flat surfaces, and having an outer, curved surface conforming to that of said pin.

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RICHARD C. PINKHAM, *Primary Examiner.*