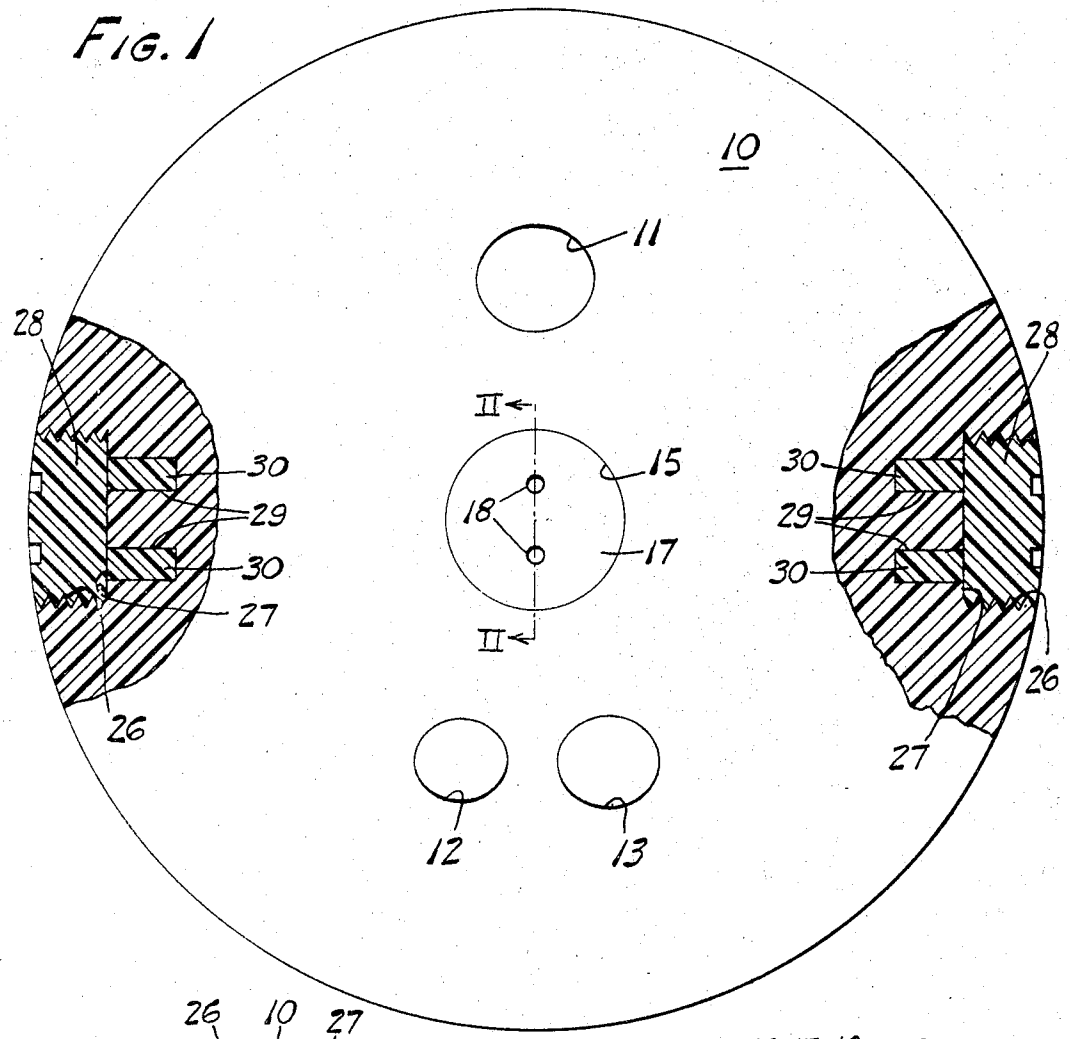
April 29, 1969 J. W. COLLINS 3,441,274

BOWLING BALL

Filed June 17, 1965

FIG. 1



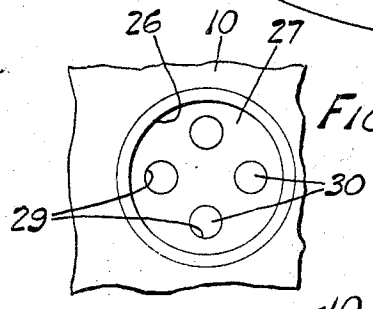


FIG. 3.

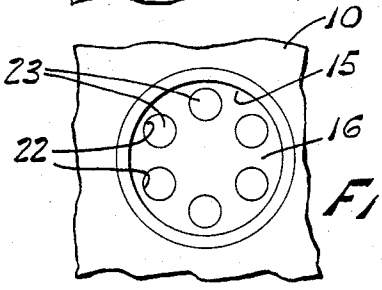


FIG. 4.

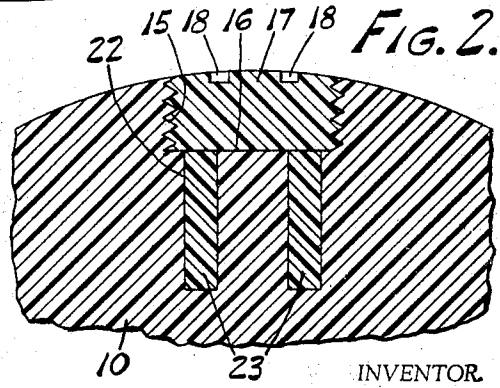


FIG. 2.

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BOWLING BALL

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ABSTRACT OF THE DISCLOSURE

A bowling ball weight and weight distribution adjustment arrangement having a threaded generally cylindrical opening in the surface of the ball and a threaded plug of the same material as the ball proper which completely fills such opening, together with a plurality of cylindrical openings extending into the ball from the bottom of the threaded opening, such openings having cylindrical members slip-fitted into the cylindrical openings, such cylindrical slip-fitted members being also of the same material as the bowling ball proper. Weight and balance adjustments are made by selectively removing one or more of the cylindrical members from their receiving openings. Each ball has a plurality of such threaded plug arrangements at various points on the periphery of the ball.

This invention relates to bowling balls and particularly to novel means incorporated in the structure of a bowling ball for regulating the balance and weight of the ball.

Bowling balls vary in overall weight and also in weight distribution or "balance." Certain variations in weight and balance occur inevitably in the manufacture of bowling balls and in the subsequent drilling of finger holes therein. Since boring finger holes in a bowling ball at one side would ordinarily make that side of the ball much lighter than the other, it is usual, in the manufacture of bowling balls, to densify the material at one side of the ball so that such side, in an undrilled bowling ball, is substantially heavier than the other. The denser side is marked during manufacture of the ball so that finger holes may subsequently be drilled at the denser side to tend to produce a balanced ball.

At best this method merely approximates a balanced condition. Bowling rules establish minimum and maximum ball weights and also limit the degree of imbalance which is permissible. Bowling balls are inspected for weight and balance before important tournaments or matches and are frequently rejected for too much imbalance.

Numerous mechanical arrangements involving metal weights and adjustable internal metal weight arrangements for balancing bowling balls have been proposed in the prior patented art but these proposals have no practical merit or usefuless. Bowling rules generally preclude the use of extraneous materials such as metal for weighting or balancing purposes. Furthermore, adjustable metal weight arrangements inevitably involve differences in thermal expansion and contraction of the bowling ball proper and the metal components which lead to looseness and generally unsatisfactory performance, even if bowling rules did permit such devices.

From this it will be seen that the possibilities of correcting bowling ball weight and balance are extremely circumscribed. In extreme cases, where imbalance is found to exit, an open hole is drilled in the ball at the heavy side (in addition to the usual finger holes). This is obviously an unsatisfactory makeshift.

The present invention provides a method of correcting the weight and balance of a bowling ball without the use of extraneous materials and without the use of adjustable or moving internal parts. The weight and balance adjusting method of the present invention fully complies with bowling rules and regulations since no extraneous materials or movable or adjustable internal parts are involved. The means provided herein for accomplishing these ends will be clearly understood from a consideration of the following specification and the accompanying drawing.

While a single specific embodiment of the principles of the present invention is illustrated in the accompanying drawing and described in detail in the following specification, it is to be understood that such embodiment is by way of example only and that various mechanical modifications may be made without departing from the spirit of the invention, the scope of which is limited only as defined in the appended claims.

FIG. 1 is a general elevational view of one form of the bowling ball of the present invention showing the side containing the finger holes, which side will be referred to herein as the top of the ball, portions being broken away for clearer illustration;

FIG. 2 is a cross sectional view on the line II—II of FIG. 1;

FIG. 3 is a fragmentary view of one side of the bowling ball of FIG. 1 with a screw plug thereof removed; and

FIG. 4 is a fragmentary view of the top or bottom of the ball of FIG. 1, likewise with a screw plug removed.

Like characters of reference denote like parts in the several figures of the drawing. FIG. 1 shows a bowling ball **10** having a thumb hole **11** and finger holes **12** and **13**. This much of the construction is entirely conventional. In the form of the invention illustrated herein there are two identical side weight adjusting arrangements, both shown in cross section in FIG. 1. There is also a top weight adjusting arrangement, shown in the center of FIG. 1, and a bottom weight adjusting arrangement which is diametrically opposite to the top weight adjustment. The top and bottom weight adjustments are also identical in the present example, so that a description of the top weight adjustment and one of the side weight adjustments will suffice for all four.

Referring to FIGS. 1, 2 and 4, the top weight adjustment arrangement comprises a threaded hole **15** having a flat bottom **16** and a threaded plug **17** which securely and completely fills and closes the hole **15** when the plug **17** is in the assembled position shown in FIG. 2. Plug **17** is of the same material as that of the body of the bowling ball **10**. A pair of spanner holes **18** in plug **17** receive pins of a spanner wrench of any desired type.

Referring to FIGS. 2 and 4, a plurality of cylindrical openings **22** extend inwardly from the bottom **16** of threaded hole **15** and receive, in fairly close slip fit relationship, a plurality of pins **23** of the same material as that of plug **17** and the bowling ball proper. It will be noted from FIG. 2 that, with pins **23** in each opening **22** and with plug **17** in place, the result is that the weight adjustment arrangement of FIG. 2 presents a condition the same as if it were not present at all, that is, as if the ball were solid in this area.

The materials of the plug **17** and pins **23** have the same specific gravity as the material of the ball proper and the same thermal coefficient of expansion, so that close fitting of the parts is not affected by temperature changes. Furthermore, there is no lack of compliance with bowling ball standards and regulations. In the illustrated instance six pins **23** engage openings in bottom wall **16** and these pins may be proportioned to weigh one half ounce each. Thus the ball may be made lighter in the region of plug **17** by one half ounce increments up to a total of three

ounces by successive removal of one or more or all of the pins **23** of this group.

It is to be understood that, in the present example, an identical plug **17** and pin members **23** are provided at the bottom of ball **10** as viewed in FIG. 1, diametrically opposite to the plug **17** shown in FIG. 1. By removing equal numbers of pins **23** at opposite sides of the ball the total weight may be reduced without changing the balance and, by removing pins from only one of foregoing arrangements or by removing unequal numbers of pins the balance may be varied as desired.

Similar weight and balance arrangements are provided at opposite sides of the ball, with respect to a plane through the plugs **17**, as shown in cross section in FIG. 1. A pair of threaded holes **26** are provided at opposite sides of the ball **10** having flat bottoms **27**. Threaded plugs **28** closely fit the holes **26** as in the case of holes **15** and plugs **17**. Likewise, holes **26** have flat bottoms formed with cylindrical openings **29**, in the present instance four in number.

Here again cylindrical pin members **30** slip fit into the openings **29** to completely fill the same. In the instance set forth herein by way of example it is desired that the total weight of pins **30** at either side of the ball total one ounce, the maximum lateral imbalance permitted by current bowling rules and regulations. Accordingly the pin members **30** are proportioned so that each one weighs one quarter of an ounce, this being accomplished in the present instance by making the pins **30** and their corresponding openings **29** one half as long as the pins **23**.

What is claimed is:

1. In a bowling ball, weight and weight distribution adjustment means comprising a threaded opening in the surface of the ball, a threaded plug proportioned to substantially fill said opening when assembled therein, a plurality of openings extending into said ball from the bottom of said threaded opening, and members shaped to conform with said last mentioned openings and adapted to slip fit thereinto, said members substantially filling said openings when assembled therein whereby said members and said plug render the ball substantially solid at said adjustment means when in assembled position, said plug and said members being of a material similar to that of the bowling ball proper whereby they have substantially the same specific gravity and thermal coefficient of expansion as the bowling ball proper, said members being selectively removable by removal of said plug to create predetermined voids in said ball to adjust the weight and weight distribution thereof.

2. In a bowling ball, weight and weight distribution adjustment means comprising a threaded opening in the surface of the ball, a threaded plug proportioned to substantially fill said opening when assembled therein, a plurality of openings extending into said ball from the bottom of said threaded opening, and members shaped to conform with said last mentioned openings and adapted to slip fit thereinto, said members substantially filling said openings when assembled therein whereby said members and said plug render the ball substantially solid at said adjustment means when in assembled position, said members being selectively removable by removal of said plug to create predetermined voids in said ball to adjust the weight and weight distribution thereof.

3. In a bowling ball, a plurality of weight and weight distribution adjustment means at spaced points about said ball, each such means comprising a threaded opening in the surface of the ball, a threaded plug proportioned to substantially fill said opening when assembled therein, a plurality of openings extending into said ball from a bottom of said threaded opening, and members shaped to conform with said last mentioned openings and adapted to slip fit hereinto, said members substantially filling said openings when assembled therein whereby said members and said plug render the ball substantially solid at said adjustment means when in assembled position, said plug and said members being of a material similar to that of the bowling ball proper whereby they have substantially the same specific gravity and thermal coefficient of expansion as the bowling ball proper, said members being selectively removable by removal of said plug to create predetermined voids in said ball to adjust the weight and weight distribution thereof.

4. In a bowling ball, a plurality of weight and weight distribution adjustment means at spaced points about said ball, each such means comprising a threaded opening in the surface of the ball, a threaded plug proportioned to substantially fill said opening when assembled therein, a plurality of openings extending into said ball from the bottom of said threaded opening, and members shaped to conform with said last mentioned openings and adapted to slip fit thereinto, said members substantially filling said openings when assembled therein whereby said members and said plug render the ball substantially solid at said adjustment means when in assembled position, said members being selectively removable by removal of said plug to create predetermined voids in said ball to adjust the weight and weight distribution thereof.

5. In a bowling ball, weight and weight distribution adjustment means comprising a threaded opening in the surface of the ball, a threaded plug proportioned to substantially fill said opening when assembled therein, a plurality of bored holes extending into said ball from the bottom of said threaded opening and pin members shaped to conform with said bored holes and adapted to slip fit thereinto, said pin members substantially filling said bored holes when assembled therein whereby said pin members and said plug render the ball substantially solid at said adjustment means when in position, said threaded plug and said pin members being of a material similar to that of the bowling ball proper whereby they have substantially the same specific gravity and thermal coefficient of expansion as the bowling ball proper, said pin members being selectively removable from said bored holes to create predetermined voids in said ball to adjust the weight and weight distribution thereof.

6. In a bowling ball, a plurality of weight and weight distribution adjustment means at spaced points about said ball, each such means comprising a threaded opening in the surface of the ball, a threaded plug proportioned to substantially fill said opening when assembled therein, a plurality of bored holes extending into said ball from the bottom of said threaded opening, and pin members shaped to conform with said bored holes and adapted to slip fit thereinto, said pin members substantially filling said bored holes when assembled therein whereby said pin members and said plug render the ball substantially solid at said adjustment means when in position, said threaded plug and said pin members being of a material similar to that of the bowling ball proper whereby they have substantially the same specific gravity and thermal coefficient of expansion as the bowling ball proper, said pin members being selectively removable from said bored holes to create predetermined voids in said ball to adjust the weight and weight distribution thereof.

7. In a bowling ball, weight and weight distribution adjustment means comprising a threaded opening in the surface of the ball, a threaded plug proportioned to substantially fill said opening when assembled therein, a plurality of bored holes extending into said ball from the bottom of said threaded opening, and pin members adapted to conform with said bored holes and adapted to slip fit thereinto, said pin members substantially filling said bored holes when assembled therein whereby said pin members and said plug render the ball substantially solid at said adjustment means when in position, said pin members being selectively removable from said bored holes to create predetermined voids in said ball to adjust the weight and weight distribution thereof.

8. In a bowling ball, a plurality of weight and weight distribution adjustment means at spaced points about said ball, each such means comprising a threaded opening in

the surface of the ball, a threaded plug proportioned to substantially fill said opening when assembled therein, a plurality of bored holes extending into said ball from the bottom of said threaded opening, and pin members shaped to conform with said bored holes and adapted to slip fit thereinto, said pin members substantially filling said bored holes when assembled therein whereby said pin members and said plug render the ball substantially solid at said adjustment means when in position, said pin members being selectively removable from said bored holes to create predetermined voids in said ball to adjust the weight and weight distribution thereof.

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