March 8, 1966 G. MASON 3,239,223

BOWLING BALL HAVING ADJUSTABLE SELF-LOCKING FINGER HOLE PLUG

Filed April 19, 1963

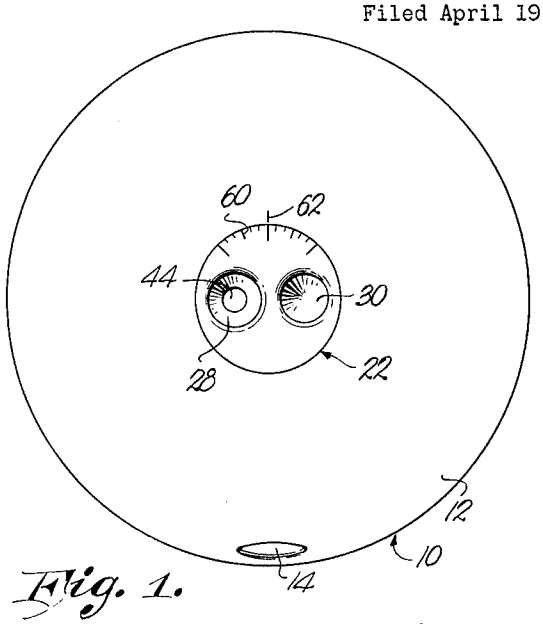


Fig. 1.

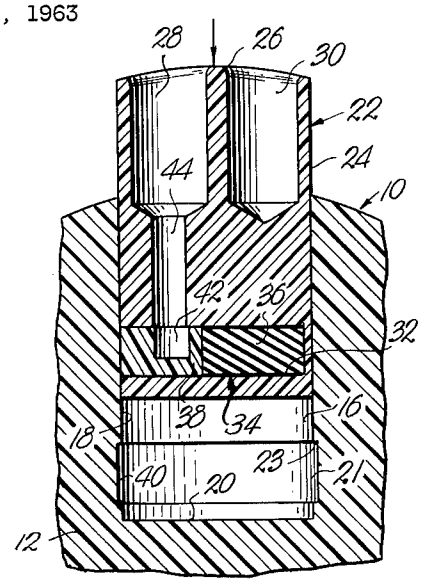


Fig. 2.

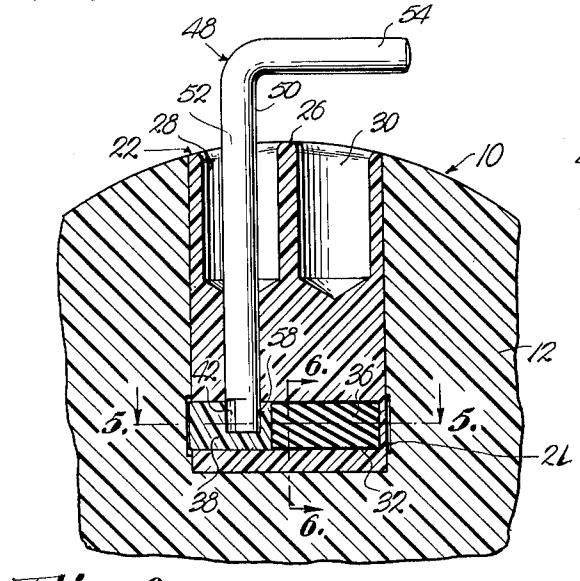


Fig. 3.

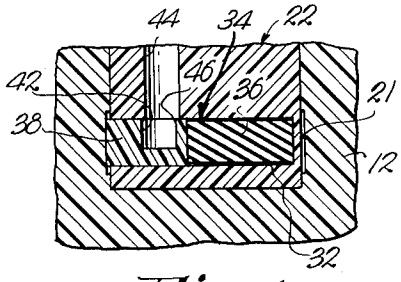


Fig. 4.

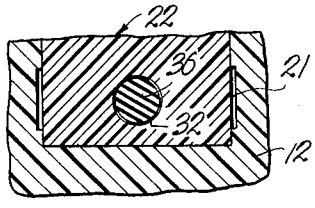


Fig. 6.

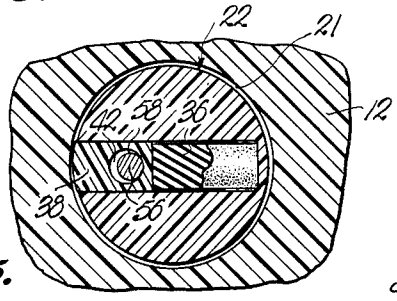


Fig. 5.

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BOWLING BALL HAVING ADJUSTABLE SELF-LOCKING FINGER HOLE PLUG

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This invention relates to novel bowling ball construction, and particularly to a ball having a normally locked, selectively rotatable plug therein containing at least one one of the finger-receiving holes normally provided in the ball, so that the disposition of the finger hole in the plug may be changed relative to another finger-receiving passage in the body of the ball. Thus, the bowler using the ball may adjust the disposition of one or more of the finger holes of the ball relative to another finger hole as necessary to compensate for the particular conditions under which the ball is being used and which change from time to time.

The conventional bowling ball has one thumb-receiving passage in the outer surface thereof, and one or more finger-receiving passages in predetermined spaced relationship from the thumb hole so that the ball may be gripped with the thumb and fingers of one hand. The direction which the ball travels down an alley after being released by the bowler is dependent upon the position of the bowler's fingers at the instant of release of the ball. A straight ball results from release with the thumb forwardly of the fingers, while a hook ball is rolled by positioning the thumb to the side of the fingers at the time the fingers are removed from the holes therefor in the outer surface of the ball. Under different alley conditions or other factors that affect the way in which the ball rolls down the alley, it is oftentimes desirable that the relative disposition of the finger holes with respect to the thumb hole, be altered so that the bowler can more accurately control the path of travel of the ball as the same rolls down the alley toward the bowling pins. Since the finger-receiving passages in the outer surface of the bowling ball are normally permanent, it is impossible for the bowler to adjust the disposition of his fingers in the holes of the bowling ball, and it is therefore, necessary that the bowler attempt to compensate for different bowling conditions by altering the way in which he throws the ball. It is, of course, well known that for consistently good scoring, it is desirable that the bowler perfect a proper arm swing and then maintain such swing at all times, but varying alley conditions necessitate alterations in the swing to cause the ball to roll into the proper pocket of the bowling pins during use of a particular ball.

The present invention provides an effective solution in many instances to the problems set forth above in that the bowler may readily adjust the disposition of the finger holes of the ball with respect to the thumb-receiving passage therein, so that the bowler may adequately compensate for different conditions encountered during use of a particular ball. Although bowling balls having adjustable finger holes have been previously provided, all of the same have suffered from major defects and disadvantages militating against any significant commercial usage thereof. In most instances, these balls have also completely failed to meet the strict requirements of the American Bowling Congress relating to modification of conventional balls.

It is, therefore, the primary object of the present invention to provide a bowling ball having novel structure permitting the finger holes in the ball to be adjusted as desired with respect to the thumb hole in the ball, and with the adjustable structure being simple to operate,

in no way affecting normal use of the ball or scoring with the same, and fully complying with all of the requirements and specifications of the American Bowling Congress.

It is another very important object of the invention to provide a bowling ball wherein at least one finger-receiving passage normally provided in the ball, is formed in a plug rotatably positioned in the outer portion of the ball, and with the plug including novel self-locking structure thereon so that the rotatable plug is normally locked against rotation, but may readily be released and shifted as desired, through employment of a simple actuating tool that the bowler may carry with him at all times.

A still further important object of the invention is to provide a bowling ball having an adjustable finger hole plug therein, wherein the plug is not removable by the bowler during normal use of the ball, but such plug can be removed from the ball by a bowling ball dealer or workshop, if it is necessary to replace the plug for any reason such as boring of new finger holes, or other repair operations. It should be noted in this respect that a further important aim of the invention is to provide a bowling ball wherein reboring of finger holes or plugging of finger passages can be obviated by the simple expedient of exchanging removable plugs which can be bored to the bowlers specifications or having prebored finger holes therein.

An especially important object of the invention is to provide bowling ball construction as described above wherein the adjustable finger hole plug is normally locked against rotation at all times during use of the ball, and requiring the insertion of a special tool in the locking structure to permit alteration of the disposition of the finger holes in the plug with respect to the thumb hole conventionally provided in the ball. It is also to be pointed out that a further object in this respect is to provide a bowling ball having an adjustable finger hole plug wherein the adjusting tool is inserted into the locking structure through one of the finger-receiving passages in the plug so that the locking structure does not in any way interfere with the appearance of the ball, or rolling of the same along the alley.

Still another important object of the invention is to provide a bowling ball having an adjustable finger hole plug received within a bore in the ball wherein the plug may be shifted to any one of an infinite number of positions with respect to the thumb hole in the body of the bowling ball, and with the plug remaining in such adjusted position at all times because of novel locking structure on the plug and receivable within and frictionally engageable with the inner surface of a recess formed in the bore of the bowling ball, whereby the plug absolutely cannot be rotated without movement of the structure out of engagement with the surface of the recess.

Also an important aim of the invention is to provide a bowling ball wherein the adjustable finger hole plug is constructed of material permitting ready variation of the density of the plug so that the balance of the ball may be adjusted to the user's requirements without going outside of the strict specifications set down by the American Bowling Congress.

Also an important object of the invention is to provide a bowling ball having an adjustable finger hole plug wherein existing balls may be modified if desired to provide for adjustment of the finger holes with respect to the thumb hole of the ball, or the adjustable structure may be provided at the time of original manufacture of the ball.

Other important objects and details of construction of the present bowling ball unit will become obvious or be

described in greater detail as the following specification progresses.

In the drawing:

FIGURE 1 is a plan view of a bowling ball having an adjustable finger-receiving plug therein embodying the preferred concepts of the present invention;

FIG. 2 is a cross-sectional view similar to FIG. 3 and showing the relative positions of the plug and locking means as the plug is being inserted into the ball in a bore provided therefor;

FIG. 3 is an enlarged, fragmentary, cross-sectional view of the ball and the plug therein, and illustrating the means for locking the plug against rotation relative to the ball and the tool for effecting the release of said locking means, the locking means being disposed to permit rotation of the plug relative to the ball;

FIG. 4 is a view similar to FIG. 3 but illustrating the disposition of the locking means when said plug is locked against rotation within the bore;

FIG. 5 is a cross-sectional view on line 5—5 of FIG. 3; and

FIG. 6 is a cross-sectional view taken along line 6—6 of FIG. 3.

A bowling ball embodying the preferred components of the present invention is broadly designated by the numeral **10** in the drawing and includes a spherical body **12** of conventional construction having a hard rubber outer covering, or constructed entirely of synthetic resin material, and provided with a thumb-receiving passage **14** in the outer portion thereof in generally radially extending relationship to the center of body **12**. It is to be understood that passage **14** is normally not provided in body **12** at the time of manufacture thereof, but is drilled in the ball by the seller thereof to meet the specifications of the purchaser of the ball.

Body **12** is also provided with a relatively large, radially disposed, cylindrical bore **16** therein defined by an aperture in the outer surface thereof, by the inner cylindrical wall **18** of body **12** and by the inner circular bottom wall **20** adjacent to but spaced radially outwardly from the center of body **12**. Bore **16** may either be drilled in body **12** subsequent to molding thereof, or may be formed in the bowling ball at the time of initial construction thereof. Ball **12** is further provided with an annular recess **21** in wall **18** thereof, recess **21** being disposed in close proximity to but spaced from wall **20**, as is clear in FIG. 2. The radially outer peripheral margin of recess **21** presents an inwardly facing, annular shoulder **23** in surrounding relationship to bore **16**.

Bore **16** of body **12** rotatably receives a generally cylindrical plug broadly designated **22** having an outer cylindrical surface **24** complementally engaging the wall **18** of body **12**, and an outer semispherical face **26** flush with the outer surface of body **12** as indicated in FIGS. 2 and 3. Plug **22** may be provided with one or more finger-receiving holes therein, and for purposes of illustration, the plug shown in the drawing has a pair of finger-receiving passages **28** and **30** therein in generally radially extending relationship to body **12** and opening outwardly through face **26**. At least one finger-receiving pilot passage is normally provided in plug **22** at the time of manufacture thereof, and it is to be understood that the passages **28** and **30** may be drilled to any desired size depending upon the ball purchaser's finger size and his requirements.

Although the plug **22** is normally constructed of the same material as that area of body **12** having bore **16** therein, it is to be appreciated that the plug **22** may be made of various synthetic resin materials and then loaded with sufficient high or low density components to cause the plug to be of the same or a different weight than an equivalent volume of the outer portion of the bowling ball. For example, the plug **22** can be made of hard rubber having the same composition as the hard rubber cover or body **12**, or the plug can be constructed of a synthetic resin such as epoxy and loaded with additional material, such as barium sulphate, to cause the plug **22** to have the same density as the major portion of ball **10**. In this manner therefore, the balance of the ball can be readily adjusted to a particular bowler's requirements.

Plug **22** is provided with a transversely extending, cylindrical passage **32** adjacent to the normally innermost end of plug **22**, cylindrical passage **32** being substantially centrally disposed in plug **22** as is clear in FIG. 6. Passage **32** is normally aligned with recess **21** in wall **18** when plug **22** is completely inserted within bore **16**, as is clear in FIGS. 3 and 4.

Self-locking structure broadly denoted by the numeral **34** is carried by plug **22** within passage **32** thereof and cooperates with recess **21** to maintain plug **22** within bore **16**, while at the same time permitting rotation of plug **22** relative to body **12** when structure **34** is shifted in one direction by means to be described.

Structure **34** includes a resilient, cylindrical element **36** within passage **32** and substantially engaging the innermost surface defining the innermost extremity of passage **32**, as is clear in FIGS. 3 and 4. Element **36** is of a diameter slightly less than the inside diameter of passage **32** so as to permit element **36** to be compressed and to expand radially within passage **32**.

An elongated insert member **38** of substantially rigid material is disposed within cylindrical passage **32** adjacent to and normally engaging the proximal end of element **36**. Member **38** is of such length that the same extends outwardly from plug **22** and into recess **21**. Element **36** is of a nature and in a disposition to bias member **38** into frictional engagement with the annular surface **40** on body **12** within bore **16** and defining recess **21**. The frictional engagement of the end face of member **38** against surface **40** prevents any rotation of plug **22** within bore **16**.

Member **38** is provided with a cylindrical cavity **42** therein intermediate the ends thereof which is alignable with a cylindrical bore **44** extending through plug **22** and intercommunicating passages **28** and **32**. Cavity **42** and bore **44** are of substantially the same diameter and the length of member **38** and the depth of recess **21** are so chosen that cavity **42** is slightly out of complete alignment with bore **44** when the end face of member **38** frictionally engages surface **40**, as is clear in FIG. 4.

When plug **22** is inserted within bore **16**, member **38** may be shifted out of frictional engagement with surface **40** through the medium of actuating means broadly denoted by the numeral **48** removably and rotatably receivable within cylindrical bore **44** as is shown in FIG. 3. Means **48** includes an L-shaped tool **50** having a cylindrical stem **52** receivable in bore **44** and integral with a handle **54** at one end thereof. An eccentrically mounted projection **56** is rigid to stem **52** at the opposite end thereof to present a cam surface **58** engageable with the continuous surface of member **38** forming cavity **42** when projection **56** is disposed in cavity **42**.

Surface **58** is continuous with the outer surface of stem **52** only at one tangential point as is clear in FIG. 5 so that rotation of stem **52** within bore **44** is sufficient to rotate projection **56** about the continuous surface defining cylindrical recess **42**.

When stem **52** is inserted within bore **44**, projection **56** is moved into cavity **42** with the portion of surface **58** tangential to the outer surface of stem **52** in a direction facing the outer end of member **38**. Rotation of stem **52** 180 degrees by handle **54** is sufficient to move surface **58** into engagement with the surface of member **38** defining cavity **42** so as to shift member **38** against element **36** and in a direction so as to move member **38** out of recess **21**. Such movement of member **38** aligns cavity **42** directly with bore **44**, but the movement is insufficient to completely draw member **38** into passage **32**. Thus, a small portion of member **38** continues to project outwardly from passage **32** so as to prevent axial movement of plug **22** out of bore **16**. However, when member **38** is in

the position shown in FIG. 3, the end face thereof is out of frictional engagement with surface **40** so that plug **22** may be rotated within bore **16** relative to body **12**.

Plug **22** is provided with graduated indicia **60** on face **26** thereof alignable with an index mark **62** etched in the outer surface of body **12** adjacent bore **16** thereof. Indicia **60** cooperate with mark **62** to dispose plug **22** in any one of a number of selective positions.

In operation, element **36** is initially placed within passage **32** and then member **38** is placed thereinto against element **36** so that the outermost end of member **38** does not project outwardly from passage **32**. Plug **22** is then inserted within bore **16** in the manner shown in FIG. 2 until passage **32** is aligned with recess **21**. The restoring force of element **36**, due to the compression thereof, forces member **38** into recess **21** and into frictional engagement with surface **40**. Cavity **42** then assumes the position relative to bore **44** as is shown in FIG. 4, and plug **22** is precluded from rotating relative to body **12**.

When it is desired to rotate plug **22** within bore **16**, tool **50** is utilized and stem **52** is inserted within bore **44** until projection **56** enters cavity **42**. It is clear that projection **56** will enter the cavity **42** only along a path which permits clearance between projection **56** and portion **46** which underlies bore **44** as shown in FIG. 4. Rotation of handle **54** in either direction to in turn rotate stem **52**, causes cam surface **58** to engage the member **38** defining cavity **42** so as to shift member **38** toward element **36** and out of frictional engagement with surface **40**. As mentioned above, the movement of member **38** toward element **36** by cam surface **58**, is not sufficient to move member **38** completely into passage **32**. The outwardly extending portion of member **38** will engage shoulder **23** if an attempt is made to remove plug **22** from bore **16**. To completely remove plug **22** from bore **16**, special tools are required other than tool **50**, which special tools are retained by an agency authorized to remove plug **22** from body **12**.

After plug **22** has been rotated to the desired location as indicated by the relative positions of indicia **60** and mark **62**, tool **50** is manipulated so that stem **52** is rotated in the opposite direction to permit the restoring force of element **36** to bias member **38** into frictional engagement with surface **40** once again. Plug **22** is, therefore, rendered immovable and tool **50** may then be removed from body **12**.

In practice, the depth of recess **21** might well be of the order of .025 inch and the distance through which member **38** moves under the influence of cam surface **58** might well be of the order of .010 inch. Thus, member **38** will continue to extend outwardly from plug **22** a distance of .015 inch when plug **22** is permitted to rotate so that shoulder **23** will effectively preclude removal of plug **22** from bore **16**.

Tool **50** is incapable of shifting member **38** through a distance sufficient to permit removal of plug **22** from bore **16** since stem **52** may not shift laterally relative to its own axis, but is permitted only to rotate about such axis.

It is also to be understood that a removal plug such as the plug **22**, may be provided in ball **10** for the thumb-receiving passage **14**, either in conjunction with adjustable plug **22** or as a separate plug with the finger-receiving passages **28** and **30** drilled directly in the body **12** of ball **10**. By providing two adjustable plugs, the bowler has an extremely wide range of choices as to the relative positions of the passages for his fingers under all conditions of use of the ball. Certain bowlers, however, may prefer

only an adjustable thumb-receiving plug while others would find the plug **22** alone to better meet their requirements. In this respect, it is pointed out that when the term finger-receiving passages is used in the claims hereof, this terminology is meant to include all digits on a person's hands including those commonly referred to as fingers as well as the thumb.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A bowling ball comprising:

a spherical body provided with an aperture in the outer surface thereof and a radially disposed bore communicating with said aperture;

a plug rotatably positioned in said bore for movement about the axis of the bore and provided with an outer face generally flush with said outer surface of the body, said plug being provided with at least one finger-receiving passage therein opening outwardly of the plug through said face thereof;

means on the body within said bore defining an annular, inwardly facing shoulder generally coaxial with the bore and spaced from the innermost extremity of the bore, said plug being provided with a transverse passage therein in alignment with said shoulder defining means when said plug is disposed in said bore; and

locking means within the passage of said plug and engageable with the surface of the body at said shoulder defining means for normally maintaining the plug in a fixed position in the bore and for precluding rotation of the plug relative to the body, said locking means including a member movable in said passage and normally disposed to extend outwardly from said plug into engagement with said body, said member having means thereon forming the bottom surface of a cavity communicating and aligned with a finger-receiving opening for permitting access thereto from a location exteriorly of the body to permit movement of the member out of engagement with the body, said member being disposed for engaging said shoulder to normally prevent the removal of said plug from said bore without precluding rotation of said plug relative to said body when said member is out of engagement with the body.

2. A bowling ball as set forth in claim **1** including an elongated resilient element within the passage of said plug engaging said member therein and normally biasing said member in a direction to cause the portion thereof remote from said element to frictionally engage the proximal surface of said spherical body within said bore.

3. A bowling ball as set forth in claim **2** including manually manipulate actuating means removably positionable in said cavity in the member and extending outwardly of said finger receiving passage in the plug, said actuating means being engageable with the member for shifting the latter to move the same out of engagement with said proximal bore surface of the body upon rotation of the actuating means to permit selective rotation of the plug in the bore.

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DELBERT B. LOWE, *Primary Examiner.*