Nov. 2, 1954 L. H. WATSON 2,693,034

BOWLING BALL GRIP DEVICE

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Fig. 1.

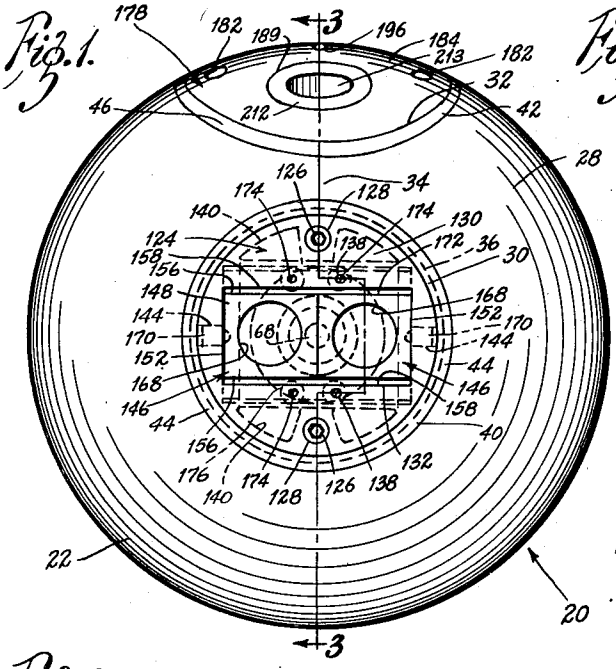


Fig. 2.

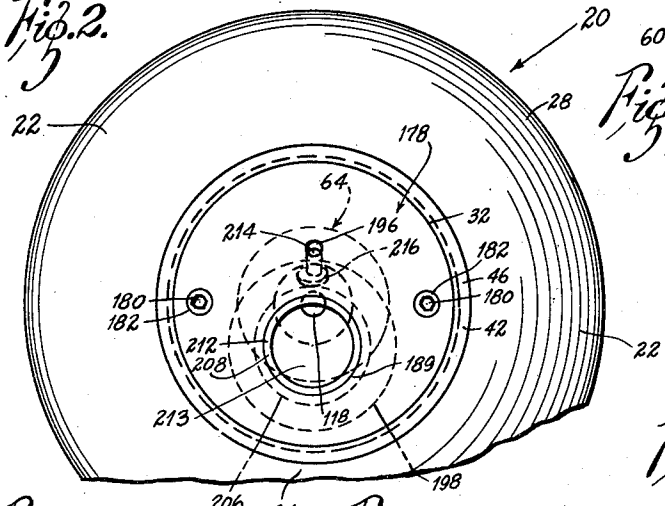


Fig. 5.

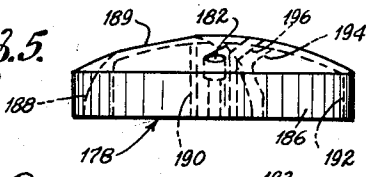


Fig. 6.

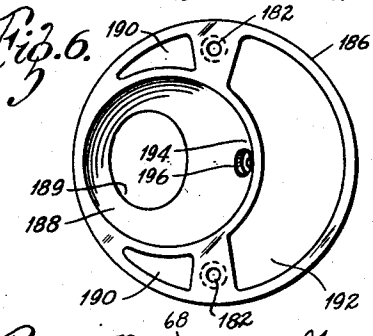


Fig. 7.

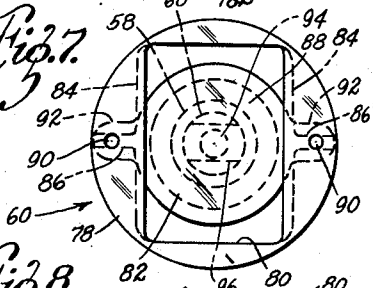


Fig. 8.

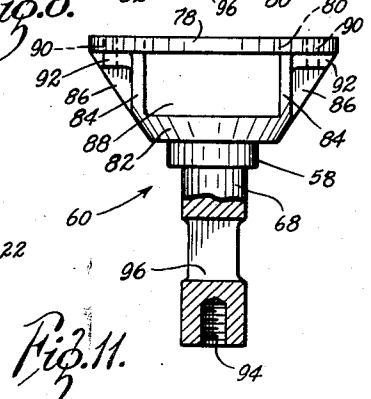


Fig. 9.

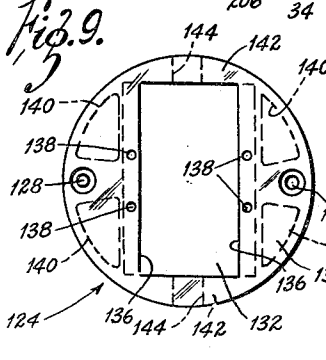


Fig. 10.

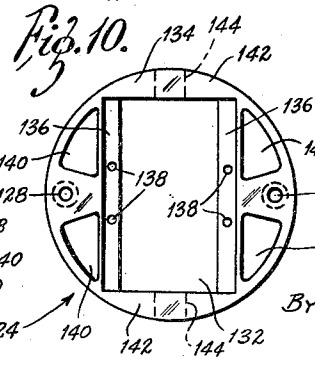
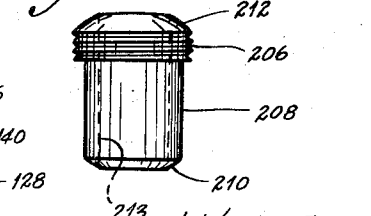


Fig. 11.



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Fig. 3.

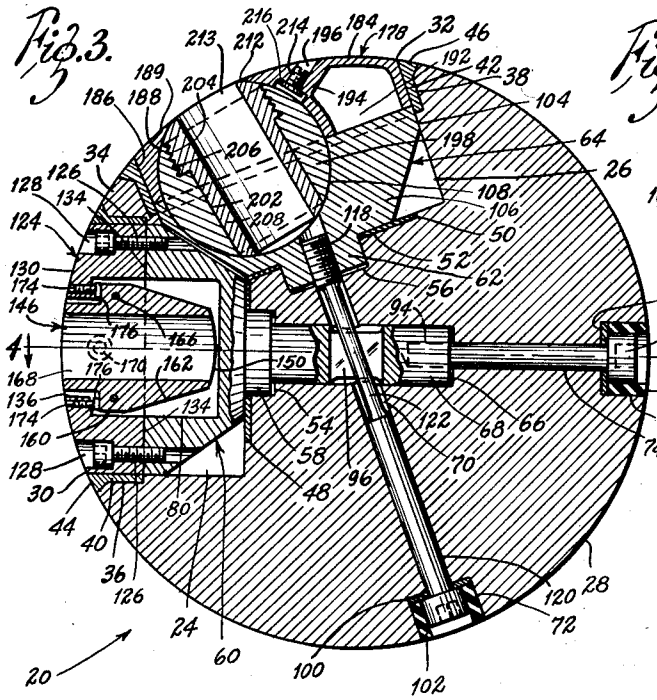


Fig. 12.

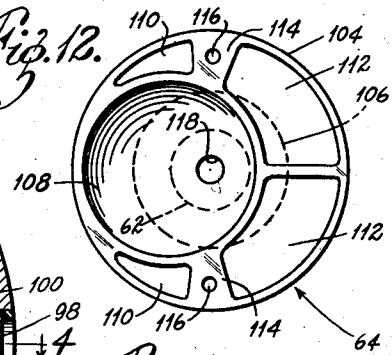


Fig. 13.

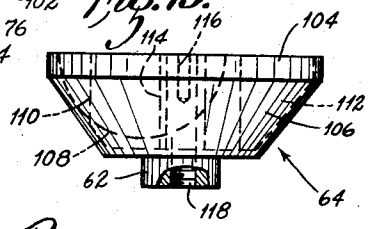


Fig. 14.

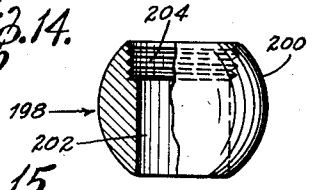


Fig. 15.

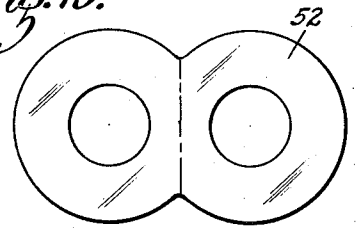


Fig. 4.

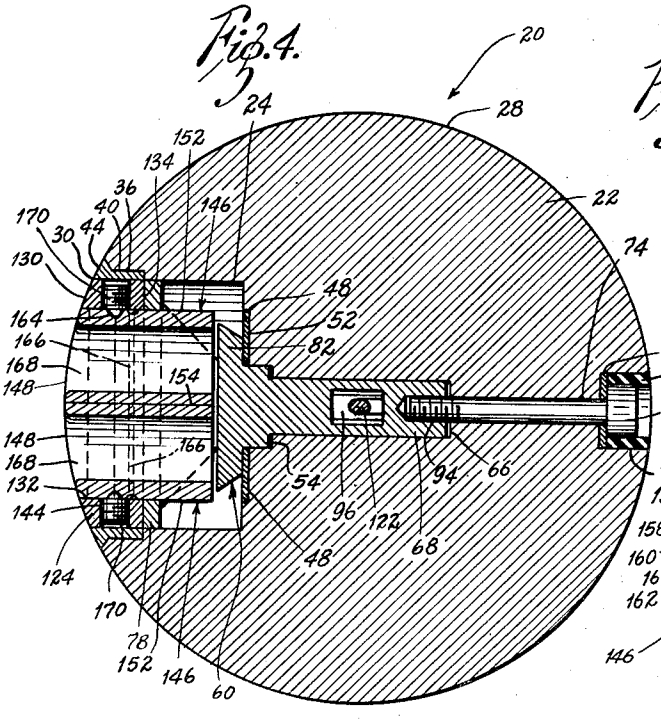


Fig. 16.

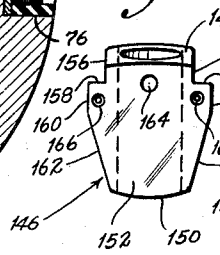
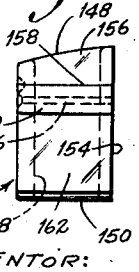


Fig. 17.



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2,693,034

BOWLING BALL GRIP DEVICE

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Application August 18, 1950, Serial No. 180,112

4 Claims. (Cl. 33—174)

The present invention relates to bowling balls, and more particularly to a bowling ball grip device having replaceable and adjustable finger holes, and to a method for determining the suitability of a bowl ball grip.

Briefly, the invention contemplates a novel bowling ball grip device in the form of a ball having replaceable finger hole inserts which are adjustable both with respect to relative placement at the periphery of the ball and with respect to angle of entrance into the ball, thereby to provide a ball having finger holes of any reasonable size or combination of sizes and which are infinitely adjustable to any reasonable position relative one to another. Means are provided to retain the finger hold inserts in their adjusted positions so that the ball may be rolled on a bowling alley to determine the suitability of the experimental combination of hole sizes and relative placement. The invention also contemplates a method whereby a desirable combination of hole sizes and placement may be ascertained, thereby to provide for custom drilling of a bowling ball.

It is an object of the present invention to provide a bowling ball into which various sized finger holes may be removably inserted for experimental determination of a demonstrable preferred combination of finger hole sizes.

It is another object of the present invention to provide a bowling ball in which finger holes are infinitely adjustable within reasonable limits for experimental determination of a demonstrable preferred disposition of finger holes relative one to another.

It is another object of the present invention to provide a ball in which various sized finger hole inserts may be both removably and adjustably disposed for experimental determination of a demonstrable preferred combination of finger hole sizes and relative positions.

It is another object of the present invention to provide a method whereby a preferred combination of finger hole sizes and relative positions may be experimentally determined for the purpose of drilling a bowling ball in accordance with demonstrable preferences of a bowler.

Other objects and advantages will be obvious from the following description taken with the drawings, in which:

Fig. 1 is a view of a bowling ball grip device constructed in accordance with the teachings of the present invention, the view being taken normal to the axis of a finger well;

Fig. 2 is a fragmentary view of the device of Fig. 1 taken normal to the axis of a thumb well;

Fig. 3 is a sectional view of the ball taken generally along the line 3—3 of Fig. 1;

Fig. 4 is a sectional view of the device taken generally along the line 4—4 of Fig. 3;

Fig. 5 is a side elevation of an upper thumb ball socket;

Fig. 6 is a bottom plan of the socket of Fig. 5;

Fig. 7 is a top plan of a lower finger hole insert socket;

Fig. 8 is an elevation of the socket of Fig. 7;

Fig. 9 is a bottom plan of an upper finger hole insert socket;

Fig. 10 is a top plan of the socket of Fig. 9;

Fig. 11 is an elevation of a thumb hole insert;

Fig. 12 is a top plan of a lower thumb ball socket;

Fig. 13 is an elevation of the socket of Fig. 12;

Fig. 14 is an elevation, partially in section, of a thumb ball;

Fig. 15 is a plan of a double washer before being bent for installation;

Fig. 16 is an elevation of a finger hole insert; and

Fig. 17 is an elevation of the insert of Fig. 16 as viewed from the right of that figure.

Referring to the drawings more particularly by means of reference numerals, 20 indicates a bowling ball grip device constructed in accordance with the teachings of the present invention.

The device 20 comprises a spherical body 22 having a radius equal to that of a standard bowling ball and which may be of any appropriate material or composition of materials such, for example, as has been used heretofore for standard bowling balls. A cylindrical finger well 24 and a cylindrical thumb well 26 are formed or machined in the body 22 so that the respective axes of the two wells 24 and 26 lie in the plane of a great circle of the spherical body 22. The intersections of the two wells 24 and 26 with a spherical surface 28 of the body 22 form small circles 30 and 32, respectively, on the spherical surface 28, the small circles being displaced one from the other so as to leave a bridge 34 of the body 22 therebetween, as best shown in Figs. 1 and 3. The two wells 24 and 26 may be formed with counterbores 36 and 38 at their intersections with the spherical surface 28 therein to receive flanged rings 40 and 42, of any suitable material, such, for example, as aluminum, for protection of the edges of the wells 24 and 26. These rings 40 and 42 may be pressed into the body 22 or otherwise appropriately secured therein and preferably have exposed faces 44 and 46 formed to the sperical radius of the surface 28 so as to effect a continuation thereof to the small circles 30 and 32 defining the edges of the wells 24 and 26.

It will be noted from the drawings that the axes of the wells 24 and 26 may form an acute angle, that the wells 24 and 26 may, themselves, intersect within the body 22, and, further, that the wells 24 and 26 may be of equal diameter and equal depth. While each of these characteristics constitutes a preferred arrangement of the inventive concept, none are requisite thereto.

In the floors of the two wells 24 and 26 are circular recesses 48 and 50 which may also intersect with each other to accommodate a double washer 52. The washer 52 is shown flat in Fig. 16, but is bent about a transverse centerline so as to be disposed in the recesses 48 and 50 as shown in Fig. 3. Obviously, the washer 52 could be separated instead of bent on the aforementioned centerline, so that, where necessary, separate washers of different thickness may be employed to effect a precise disposition of parts within the body 22.

Coextensive also with the axes of the two wells 24 and 26 are cylindrical recesses 54 and 56 which respectively receive a boss 58 of a lower finger hole insert socket 60 and a boss 62 of a lower thumb ball socket 64. An additional cylindrical recess 66 coextensive with the axis of the finger well 24 is provided which receives an extension 68 of the lower finger hole insert socket 60. A hole 70 extends concentrically with the axis of the thumb well 26 from the recess 56 to intersect the recess 66 and therebeyond to a counterbore 72 which is also concentric with the same axis. A hole 74 extends concentrically with the axis of the finger well 24 from the recess 66 to a counterbore 76 which is also concentric with the same axis.

The lower finger hole insert socket 60 may be formed of any suitable material, for example, metal, such as aluminum, wood, plastic, or compounded material, and, as shown in Figs. 7 and 8, has an upper circular flange 78 containing a rectangular opening 80, the flange 78 being disposed above a frusto-conical base 82 and supported by vertical side walls 84 and webs 86 to provide a chamber or socket 88. Threaded holes 90 extend vertically through the flange 78 and through bosses 92 depending therefrom and joining the webs 86. The boss 58 and the extension 68 depend successively from the bottom of the base 82. The extension 68 has a threaded hole 94 at its lower end and has a flared transverse aperture 96 intermediate its ends.

The lower finger hole insert socket 60 is disposed rotatably in the finger well 24 of the body 22 and is secured by a hollow-headed bolt 98 inserted through the counterbore 76, as shown in Figs. 3 and 4. A washer 100 may be placed under the head of the bolt 98 and a

sleeve 102 of suitable material, such as hard rubber, may be inserted in the counterbore 76 to protect the outer edges thereof against chipping. When the lower finger hole insert socket 60 is properly disposed in the finger well 24, the axis of the transverse aperture 96 passes through the approximate center of the body 22 and lies approximately in the plane formed by the axis of the two wells 24 and 26.

The lower thumb ball socket 64, like the lower finger hole insert socket 60, may be formed of any suitable material, and has an upper circular portion 104 coaxial with a frusto-conical portion 106. A hemispherical chamber or socket 108 is formed eccentrically of the center of the circular portion 104 as clearly shown in Figs. 3, 12 and 13. Additionally, recesses such as 110 and 112 may be formed for the purpose of lightening the construction, leaving, however, solid portions such as 114 to receive threaded vertical holes 116. The boss 62 depends coaxially from the frusto-conical portion and has a threaded hole 118 concentric therewith.

The lower thumb ball socket 64 is disposed rotatably in the thumb well 26 of the body 22 and is secured by a hollow-headed bolt 120 inserted through the counterbore 72 as shown in Fig. 3. The bolt 120 has a reduced portion 122 which, upon assembly, extends through the aperture 96 in the extension 68 of the lower finger hole insert socket 60. A washer 100 and a sleeve 102 may also be employed in conjunction with the bolt 120.

It will be noted that the respective included angles of the frusto-conical portions of both the lower finger hole insert socket 60 and the lower thumb ball socket 64 are preferably related one to the other and to the angle between the axes of the two wells 24 and 26 so that the sum of the included angles equals twice the angle between the axes. It is further preferable for the respective vertices of the frusto-conical portions to coincide with the center of the body 22. It is to be understood, however, that none of the above mentioned preferred characteristics are requisite to the invention herein described.

An upper finger hole insert socket 124 is adapted to fit rotatably in the finger well 24 and is removably secured to the lower finger hole insert socket 60 by means of hollow-headed bolts 126 inserted through counterbored holes 128 and engaging the threaded holes 90 in the socket 60. When thus secured, a spherical surface 130 of the upper finger hole insert socket 124 conforms as a continuation of the spherical surface 28. A rectangular opening 132 in the spherical surface 130 extends coaxially with the spherical surface 130 partly through the upper finger hole insert socket 124. The length of the opening 132 is substantially equal to the length of the rectangular socket 88 in the lower finger hole insert socket 60, but the width of the opening 132 is somewhat less than that of the socket 60. Intermediate the spherical surface 130 and a plane surface 134, the rectangular opening 132 is expanded to have a width equal to that of the socket 88 in the lower finger hole insert socket 60, the length of the opening 132 remaining constant. The upper finger hole insert socket 124 thus serves to increase the depth of the socket 88, and, at the same time, provides overhanging portions 136 extending along the two opposite long sides of the rectangular opening 132, as shown in Figs. 3, 4, 9 and 10. Each of the overhanging portions 136 contains one or more threaded holes 138. Recesses, such as 140, may be formed in the upper finger hole insert socket 60 for the purpose of lightening the construction, leaving, however, solid portions 142 at the ends of the rectangular opening 132 to receive coaxial threaded holes 144.

The upper and lower finger hole insert sockets 60 and 124, when disposed in cooperation one with the other as above described, are adapted to contain two similar finger hole inserts 146. These finger hole inserts 146 may be constructed of any suitable material and, as shown in Figs. 3, 4, 16 and 17, may have an upper spherical surface 148, a lower arcuate surface 150, two parallel plane side surfaces 152 and 154, and two similar discontinuous side surfaces, each of the latter comprising a plane surface 156, descending vertically from the spherical surface 148, a horizontal ledge 158, a second vertical surface 160, and an inwardly inclined plane surface 162. The spherical surface 148 has a radius substantially equal to that of the spherical surface 28 of the body 22 and is so disposed with respect to the vertical centerline of the surface 154 as to effect coincidence of a radial line of the spherical surface 148 with the vertical centerline of the surface 154. The arcuate surface 150 is concentric with a line normal to the surfaces 152 and 154 passing through a conical indentation 164 formed in the surface 152 on a vertical centerline thereof.

Countersunk holes 166 extend horizontally from the surface 152 to the surface 154, being countersunk at the former surface. A finger hole 168 of any appropriate diameter extends from the spherical surface 148 to the arcuate surface 150.

Two finger hole inserts 146, which are preferably identical in their external configuration, but which may contain finger holes 168 of different sizes or inclinations are placed with their respective surfaces 164 together and may be thus secured one to the other by countersunk bolt and nut assemblies through the holes 166. The assembly of two finger hole inserts 146 (it is obvious, of course, that the two inserts 146 could be replaced by a single integral element having the same external dimensions of the assembly) is pivotally mounted within the upper finger hole insert socket 124 by means of two conical pointed setscrews 170 inserted in the coaxial holes 144 so as to engage the conical indentations 164. Thus mounted, the spherical surfaces 148 of the finger hole inserts 146 are disposed approximately to conform with the spherical surface 28 of the body 22, leaving, however, a small clearance or gap 172 between the respective surfaces 156 and the rectangular opening 132. Similarly, the ledges 158 are disposed with clearance below the overhanging portions 136, and the surfaces 160 and 162, as well as the arcuate surfaces 150, and are all substantially clear and inwardly of the interior surfaces of the socket 88. The surfaces 152 of the finger hole inserts 146 may, however, slidably abut with the interior end surfaces of the rectangular openings 80 and 132. Adjusting screws 174 having feet 176 disposed to rest against the respective ledges 158, serve adjustably to maintain the finger hole inserts against inadvertent pivotal movement.

An upper thumb ball socket 178 is adapted to fit rotatably in the thumb well 26 and is removably secured to the lower thumb ball socket 64 by means of hollow-headed bolts 180 inserted through counterbored holes 182 and engaging the threaded holes 116 in the socket 64. When thus secured, a spherical surface 184 of the upper thumb ball socket 178 conforms as a continuation of the spherical surface 28. A circular portion 186 is formed coaxially with the spherical surface 184 and a hemispherical chamber or socket 188 is formed eccentrically of the center of the circular portion 186 so as to intersect the spherical surface 184, thereby to provide a circular opening 189, as clearly shown in Figs. 3, 5 and 6. Additionally, recesses such as 190 and 192 may be formed for the purpose of lightening the construction, leaving, however, a solid portion such as 194 to receive a counterbored threaded hole 196.

The upper and lower thumb ball sockets 64 and 178, when disposed in cooperation one with the other as above described, are adapted to contain a thumb ball 198. This thumb ball 198, as shown in Figs. 3 and 14, has a spherical exterior surface 200 and a diametric hole 202. The hole 202 has threads 204 to engage a threaded portion 206 of a thumb hole insert 208. The thumb hole insert 208 is a sleeve-like member, as shown in Figs. 3 and 11, and is adapted removably to fit within the thumb ball 198. A lower end 210 and an upper end 212 of the thumb hole insert 208 are spherically shaped to conform as continuations of the spherical surface 200. A thumb hole 213 of any appropriate diameter and inclination extends through the finger hole insert 208 from the surface 212 to the surface 210.

The thumb ball 198 with an appropriate thumb hole insert 208 inserted therein as described is adapted to fit rotatably within the two adjoining hemispherical sockets 108 and 188, as shown in Fig. 3. A setscrew 214 having a foot 216 which may frictionally engage the spherical surface 200 is disposed in the threaded hole 196 to maintain the thumb ball 198 against inadvertent rotation.

In using the bowling ball grip device 20, it will be understood that a plurality of finger hole inserts 146 and thumb hole inserts 208 having variously sized and inclined finger holes 168 and thumb holes 210, respectively, may be available, whereupon a selection of two finger hole inserts 146 and a thumb hole insert 208 may

be made and the various parts assembled as above described and as clearly depicted in Figs. 1 through 4. The assembled bowling ball grip device **20** may then be rolled experimentally on a bowling alley to test the suitability of the grip provided. If it is desired to change the character of the grip while retaining the original sizes of the holes **168** and **210**, the following basic adjustments may be made without dismantling the assembly: (1) the angle at which the finger holes **168** descend into the body **22** may be altered, within limits, either way with respect to a radial plane of the spherical surface **28** by adjustment of the screws **174**; (2) the finger holes **168** may be rotated, within limits, either way about a radial line of the spherical surface **28** by loosening the bolt **98**; (3) the angle at which the thumb hole **210** descends into the body **22** may be altered, within limits, universally with respect to a radial line of the spherical surface **28** by loosening the screw **214**; and (4) the thumb hole **210** may be rotated completely about a radical line of the spherical surface **28** by loosening the bolt **120**.

It is obvious that each of the four basic adjustments above described provides an infinite series of intermediate positions, within obvious limits inherent to the construction, which limits themselves may be predetermined so as to embrace any reasonable disposition of the finger holes **168** and the thumb hole **210** relative to each other and relative to the center of the spherical surface **28**.

If it is desired to experiment with different sized or differently inclined finger holes **168** or thumb hole **210**, appropriate substitution of the finger hole inserts **146** or the thumb hole insert **208** may be made by removing the respective upper socket **124** or **178** as required to disengage the part to be replaced.

Having ascertained a suitable combination and disposition of grip holes by experimentation including actual use of the device **20** on a bowling alley, measurements may be taken by well known means to provide a similar grip arrangement in a standard bowling ball.

It is apparent that there have been provided a novel bowling ball grip device and a method of determining the suitability of different bowling ball grip arrangements, which together fulfill the objects and advantages sought therefor.

It is to be understood that the foregoing description and the accompanying drawings have been given by way of illustration and example. It is also to be understood that changes in the form of the elements, rearrangement of parts or steps, and substitution of equivalent elements or steps, which will be obvious to those skilled in the art, are contemplated as within the scope of the present invention, which is limited only by the claims which follow.

What is claimed is:

1. In a bowling ball grip device, a ball suited for experimental rolling on a bowling alley having a cylindrical finger well and a cylindrical thumb well having their central axes lying in the plane of a great circle of the ball, a finger hole socket rotatably disposed in said finger well and having an outer surface conforming to the spherical surface of the ball, a thumb hole socket rotatably disposed in said thumb well and having an outer surface conforming to the spherical surface of the ball, a pair of finger hole inserts in said finger hole socket, a ball-shaped member movably mounted in said thumb hole socket, a thumb hole insert in said ball-shaped member, means in said finger hole socket mounting said finger hole inserts for pivotal movement about an axis normally extending transversely to said plane to vary the angle with respect to the surface of the ball at which said finger hole inserts descend into the body of said ball, means for pivotally adjusting said finger hole inserts about said axis of pivotal movement, means mounting said finger hole socket in said finger well for rotation about an axis substantially radial of the ball to vary the relationship between said axis of pivotal movement for the finger hole inserts with respect to said plane, releasable means holding the finger hole socket in a predetermined rotative position, means in said thumb hole socket for mounting said ball-shaped member for universal movement to vary the angle at which the thumb hole socket descends into the body of the ball and means permitting the rotatable adjustment of the thumb hole socket to vary the distance between said ball-shaped member and the finger hole inserts and to vary the position of said ball-shaped member with respect to said plane.

2. A bowling ball grip device as defined in claim 1 and wherein the means in the finger hole socket for mounting the finger hole inserts for pivotal movement comprises a pair of conical pointed set screws extending laterally through said finger hole socket and engageable with said inserts, and the means for pivotally adjusting said finger hole inserts comprises screws in said finger hole socket and extending from adjacent the surface of said socket into engagement with said finger hole inserts at points offset from the pivotal axis of said inserts, said adjusting screws being manually adjustable externally of the ball.

3. A bowling ball grip device as defined in claim 1 and wherein the releasable means holding the finger hole socket in a predetermined rotative position comprises, a bore extending from the finger well through the ball to the opposite side thereof, an extension on the finger hole socket fitted in said bore and having a threaded hole, and a manually adjustable bolt in the bore threaded in said hole and extending out to said opposite side of the ball for adjustment externally of the ball, and said means permitting the rotatable adjustment of the thumb hole socket includes a second bore extending from the thumb well through the ball to the opposite side thereof, said second bore intersecting the first bore, an extension on said thumb hole socket fitted in said second bore and having a threaded hole therein, and a second manually adjustable bolt in said second bore threaded in the hole in said thumb hole socket extension and extending through the ball to the side thereof opposite said thumb hole socket for adjustment externally of the ball, and an aperture in said extension of the finger hole socket through which said second bolt passes.

4. In a bowling ball grip device, a ball suited for experimental rolling on a bowling alley and having a substantially cylindrical finger well and a substantially cylindrical thumb well with their centerlines lying in the plane of a great circle of the ball, a finger hole socket having inner and outer parts rotatably disposed in said finger well, said outer part having an outer surface conforming generally to the spherical surface of the ball, means releasably securing the inner and outer parts of said finger hole socket together, a thumb hole socket rotatably disposed in said thumb well and having an outer surface conforming generally to the spherical surface of the ball, finger hole insert means in said finger hole socket, a ball-shaped member movably mounted in said thumb hole socket, a thumb hole insert in said ball-shaped member, means mounting said finger hole socket in said finger well for rotation about an axis substantially radial of the ball to vary the relationship of the finger hole insert means with respect to said plane, releasable means connected to the inner part of said finger hole socket for holding the finger hole socket in a predetermined rotative position, means in the outer part of said finger hole socket mounting said finger hole insert means for pivotal movement about an axis extending normal to said rotational axis of the finger hole socket to vary the pitch of said finger hole insert means, means in the outer part of said finger hole socket for pivotally adjusting said finger hole inserts about said axis of pivotal movement, means in said thumb hole socket for mounting said ball-shaped member for universal movement to vary the angle at which the thumb hole socket descends into the body of the ball and means permitting the rotatable adjustment of the thumb hole socket to vary the distance between said ball-shaped member and the finger hole insert means and to vary the position of said ball-shaped member with respect to said plane.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,080,307	Sondheimer	Dec. 2, 1913
2,188,868	Shepard	Jan. 30, 1940
2,314,811	Akin	Mar. 23, 1943
2,372,958	Keith	Apr. 3, 1945
2,372,959	Keith	Apr. 3, 1945
2,503,324	Collins	Apr. 11, 1950
2,539,918	McLaren	Jan. 30, 1951
2,566,511	Bassi	Sept. 4, 1951