Aug. 4, 1942. H. J. LUTH ET AL 2,291,738

BOWLING BALL

Filed Nov. 25, 1940

Fig. 1

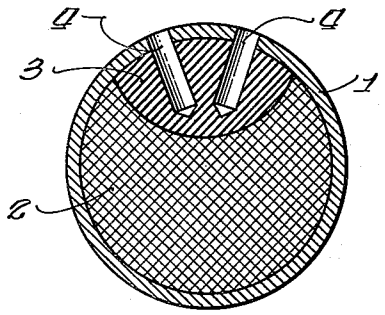


Fig. 2

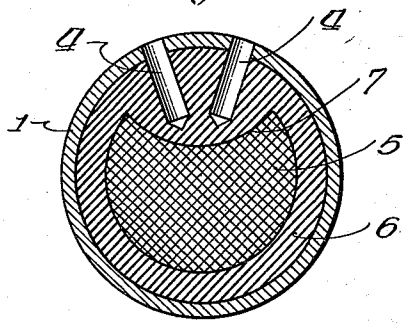


Fig. 3

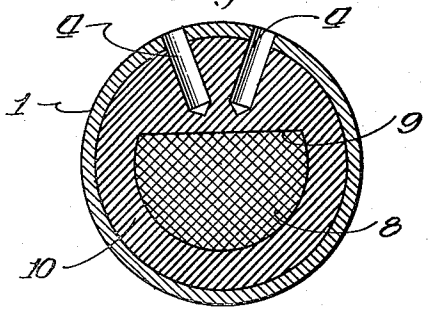


Fig. 4

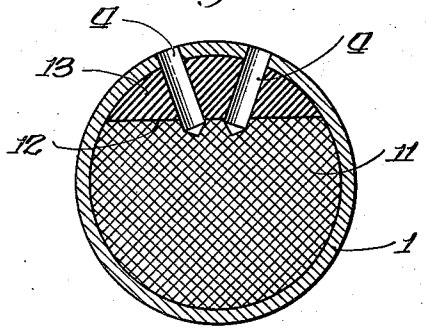


Fig. 5

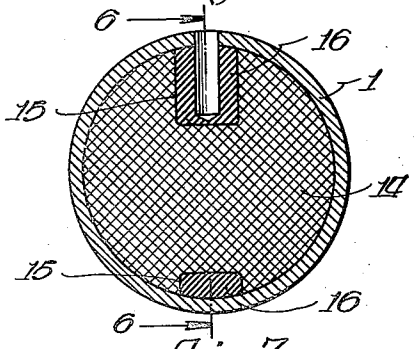


Fig. 6

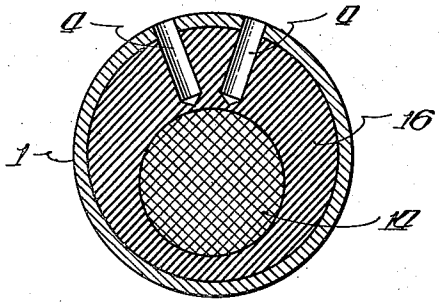
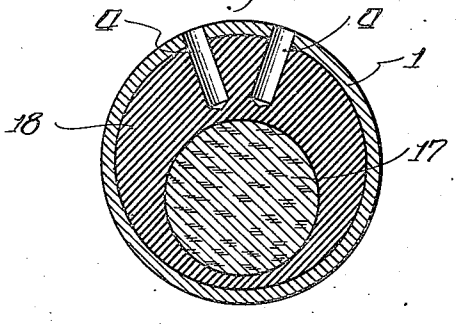


Fig. 7



Inventors:
Harold J. Luth
Herman B. Scheidemantel.
By: [illegible]
their Attorney.

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UNITED STATES PATENT OFFICE

2,291,738

BOWLING BALL

Harold J. Luth, Muskegon Heights, and Herman B. Scheidemantel, Muskegon, Mich., assignors to The Brunswick-Balke-Collender Company, Chicago, Ill., a corporation of Delaware

Application November 25, 1940, Serial No. 367,044

9 Claims. (Cl. 273—63)

This invention relates to a bowling ball structure designed to combine light weight and reasonable accuracy of balance.

One object of the invention is to provide a bowling ball in which the center of gravity of the core is eccentric with respect to the exterior outline of the ball in order to offset the absence of material at the usual finger-holes and thus maintain the ball substantially in balance.

Another object of the invention is to provide a bowling ball having an outer shell of material adapted to take a smooth, hard finish, and a core or filler of material of relatively low specific gravity as compared with the shell, together with means included within the shell tending to compensate for the absence of material in the usual finger-hole or holes so as to maintain the ball in correct balance.

A further object of the invention is to provide a bowling ball composed essentially of hard rubber but having an outer shell presenting a smooth outer surface and having a core of porous hard rubber, together with a provision to offset the absence of material at the finger-holes of the ball.

More specifically, it is an object of the invention to provide a bowling ball composed entirely of hard rubber but having different portions of different specific gravities and including an outer shell or cover of comparatively rich, unloaded rubber stock and a core composed mainly of "sponge" or cellular stock but including a portion of more dense material, such as a hard rubber loaded with mineral filler, in which the finger-holes are located. Other objects and advantages will appear from the following description taken in conjunction with the drawing in which:

Figure 1 is a diametral sectional view of a bowling ball made in accordance with this invention.

Figures 2, 3 and 4 are diametral sectional views each showing a different modification of the invention.

Figure 5 is a diametral section showing a further modification in which the core of the ball is composed mainly of light-weight material in spherical form, with a channel formed in the sphere and occupied by a ring of heavier material.

Figure 6 is a transverse diametral section taken as indicated at line 6—6 on Figure 5.

Figure 7 is a diametral section of an additional modification in which a spherical core of light-weight material is eccentrically located within a spherical core of heavier material.

While we have shown in the drawing, and shall herein describe in detail certain preferred forms of our invention as embodied in a bowling ball, it is to be understood that we do not intend to limit the invention to the specific forms disclosed, but aim to cover all modifications and alternative constructions falling within the spirit and scope of the invention, as expressed in the appended claims.

Bowling balls have been constructed of various materials, and there have been some attempts to employ constructions or designs which would result in a comparatively light-weight ball better adapted for use by women and young people than the heavier ball regularly employed. When the ball is composed of hard rubber the cover or shell is preferably composed of a rich, hard rubber stock of fairly low specific gravity, made up of crude rubber, hard rubber dust and the necessary chemicals for vu'canization. This produces a stock having satisfactory tensile strength and elongation, and thus affording the necessary resiliency for use in a bowling ball and presenting a surface adapted to take a smooth, hard finish. For the core of the ball, however, a composition of higher specific gravity is frequently employed in which fillers, such as clay, alba whiting, and the like, may be added to the usual ingredients of the hard rubber stock to reduce the cost. But this core stock, having a high specific gravity in itself, may be greatly lightened by mixing with the composition in plastic form a material which breaks down chemically under the influence of heat employed in curing the rubber, and gives off a gas which permeates the mass so as to produce a honey-combed or cellular formation similar to that of so-called "sponge" rubber, except that for the purpose of a bowling ball the sponge is hardened by the curing process. Sodium bicarbonate is frequently employed for this purpose, and the method of securing this type of rubber, either in the elastic stage or in the hardened form, is generally understood by those skilled in the art.

Thus, to produce a ball of lighter weight than would result from using a solid core of loaded stock, it is only necessary to substitute for all or a part of this core a quantity of hard rubber of the honey-combed or cellular structure. However, when this is done, it is found that the finger-holes customarily formed in one side of the ball will extend into this core, and that their surfaces will be rough and broken by reason of

the porous formation of the hard rubber core. Furthermore, the formation of the finger-holes tends to unbalance the ball by reason of the total absence of material at the finger-holes.

Both of these disadvantages are overcome by the present invention which provides a ball having an outer shell or cover of hard, smooth-surfaced material such as the unloaded rubber composition just mentioned, with a porous or cellular core cured to a suitable degree of hardness, but with its center of gravity eccentrically located within the spherical shell and supplemented by a quantity of heavier core stock positioned to provide smooth walls for the finger-holes. The higher specific gravity of the latter material serves to offset the absence of material at the finger-holes and to maintain the ball substantially in balance about its center. The quantity of the heavier core stock can be accurately calculated and weighed in proportion to the weight of the cellular stock which is employed in building up the total core in the process of molding the ball. After the composite core, consisting of the light and heavy portions, has been molded and cured, it may be machined, if necessary, to bring it to substantially accurate form. It is then re-cured with an outer wall of cover stock to form a hard, smooth shell approximately five-eighths of an inch thick. The finger-holes are then bored in the portion of the ball which includes the more dense core material, and when this operation has been completed the ball is left in substantially correct balance.

Various designs or arrangement may be employed for distributing the lighter and heavier core stocks. Figure 1 represents a ball having a cover 1 which is nearly filled with a light-weight core 2, cross-hatched to represent conventionally a cellular formation. The portion 2 is mainly spherical but has a pocket formed at one side which is occupied by a quantity of heavier core stock 3 which completes the spherical form of the core and affords a suitable material in which the finger-holes 4, 4 may be formed. Figure 2 likewise shows a combination of light and heavy materials forming the core, but in this case the partially spherical light-weight core 5, of cellular formation, is entirely surrounded by a layer of heavier stock 6 The formation of a pocket 7 at one side of the light-weight core 5 requires that the heavy stock 6 be thicker in this vicinity, and the finger-holes 4, 4 are formed in this thicker portion of the denser material.

Figure 3 illustrates an arrangement quite similar to that of Figure 2, except that the light-weight inner core 8 of porous or cellular formation is formed with a flat face at 9 so that the encompassing material 10 of heavier core stock fills in the space between this flat face 9 and the inner surface of the cover 1, providing a thicker portion of the heavier core material in which the finger-holes 4, 4 are formed.

Figure 4 shows the interior of a lighter weight ball in which a larger portion of the core consists of the cellular or "sponge" stock 11. In this case the light-weight core nearly fills the cover 1 and fits against the inner surface of the cover, except at one side. Here the portion 11 is formed with a flat face 12 and a correspondingly shaped section 13 of heavier core stock fills the space between the cover 1 and the flat surface 12. The finger-holes 4, 4 are shown located in this heavier portion of the core.

It will be noted that in each of these structures the center of gravity of the light-weight porous core material at 2, 5, 8 or 11 will be located eccentrically with respect to the center of the ball and at the opposite side of the center from that at which the finger-holes are disposed. This location of the light-weight portion of the core thus compensates for the absence of material at the finger-holes, providing, of course, that the quantity and eccentricity of the light-weight portion is correctly calculated.

Figures 5 and 6 illustrate a further modification in which the light-weight cellular core 14 is made of substantially spherical form dimensioned to just fill the cover 1, but with the channel 15 encompassing this spherical core 14 and filled with a quantity of a heavier stock 16. Although the channel 15 is generally annular in form, it is eccentric with respect to the center of the ball, as clearly shown in Figure 6. The ring 16 of heavier stock which fills the channel is thus considerably thicker at one side than at the other side, and the finger-holes 4 are located in this thicker portion of the ring so that the absence of material at the finger-holes offsets the extra depth of the ring at this side and results in a substantially balanced structure. It may be noted that this type of construction is better suited to the style of ball having one or two finger-holes, whereas the other forms herein shown may be easily arranged to accommodate three finger-holes.

In some cases, instead of lightening the core stock by making it porous or cellular in structure, a composite stock may be employed, consisting of a mixture of cork and rubber. Figure 7 illustrates a further modification in the interior design of a bowling ball, and incidentally shows the light-weight material at 17 as a composition of this nature. This light-weight core may be understood as spherical, but is located eccentrically of the center of the ball so as to offset the absence of material at the finger-holes, 4, 4. A heavier stock, indicated at 18, completely surrounds the inner light-weight core 17 and combines with it to fill the space inside the cover 1.

We claim as our invention:

1. A bowling ball comprising an outer shell of hard, smooth-surfaced material with a finger-hole placed in the ball at one side, a core composed principally of light-weight material mainly spherical in form but having a flat face disposed in a plane at the same side of the center of the ball as said finger-hole, with material of greater specific gravity completing the spherical form of the core between said flat face and the outer shell, the finger-hole extending into said heavier material.

2. A bowling ball comprising an outer shell of hard, smooth-surfaced material with a finger-hole placed in the ball at one side, a core composed principally of light-weight material of spherical form with a circumferentially disposed channel, and a ring of greater density than the spherical portion filling said channel, the inner circumference of the channel and of the ring being eccentric to the center of the sphere, and the said finger-hole extending into the thicker portion of said ring.

3. A bowling ball comprising an outer shell of hard rubber and of uniform thickness and a core composed largely of hard sponge rubber with a finger-hole placed in the ball at one side and extending into the core, the sponge rubber portion of the core being of generally spherical shape but with a portion of the sphere omitted and

said portion being filled with hard rubber into which the finger-hole extends, said hard rubber being of greater density than the sponge rubber and providing a substantially smooth surface for the finger-hole.

4. A bowling ball comprising an outer shell of hard rubber and a core of hard sponge rubber with a finger-hole placed in the ball at one side and extending into the core, and means forming the wall of the finger-hole composed of material having a greater specific gravity than the sponge rubber of the core, the weight of said means being substantially sufficient to compensate for the absence of material in the finger-hole.

5. A light-weight bowling ball consisting of an outer shell of hardened plastic material having a smooth external surface and a two-part core in which one part is made of a hardened cellular plastic material of relatively low specific gravity, and the remainder is composed of a relatively dense, hardened plastic material with a finger-hole in one side of the ball extending into said dense portion of the core, the greater density of said portion compensating for the absence of material in the finger-hole in maintaining the ball in balance, said shell and the parts of the core being all molded together in a unitary structure.

6. A light-weight bowling ball consisting of an outer shell of hard, smooth-surfaced material and a two-part core in which one part is made of a hard, cellular material and the remainder is composed of a relatively more dense material, the ball having a finger-hole extending through the shell into the more dense material of the core whereby said material provides a substantially smooth surface for the finger-hole.

7. A light-weight bowling ball consisting of an outer shell of hardened, plastic material having a smooth external surface and a two-part core composed of a portion of light-weight material having its center of gravity located eccentrically within the shell and a quantity of relatively dense, hardened plastic material encircling the light-weight material and filling the remainder of the space in the shell, said ball having a finger-hole extending through the shell at one side and into said dense material of the core, said shell and the two parts of the core constituting the entire structure of the ball.

8. A light-weight bowling ball in which a portion of the body of the ball is made of relatively hard, dense material with a finger-hole contained therein at one side of the ball and the remainder consists of a core of light-weight material disposed with its own center of gravity eccentrically located in the ball and at the side of the center thereof opposite that at which the finger-hole is located.

9. A light-weight bowling ball consisting of an outer shell of hard, smooth-surfaced material with a finger-hole placed in the ball at one side and a core composed principally of light-weight plastic material generally spherical in form and concentric with the shell but with a portion of the spherical form omitted adjacent the finger-hole, and a single unitary plastic material of greater specific gravity completing said spherical form of the core around the finger-hole.

HAROLD J. LUTH.
HERMAN B. SCHEIDEMANTEL.