June 30, 1970 E. S. MALKIN 3,517,933

GAME BALL

Original Filed April 25, 1967

Fig. 1.

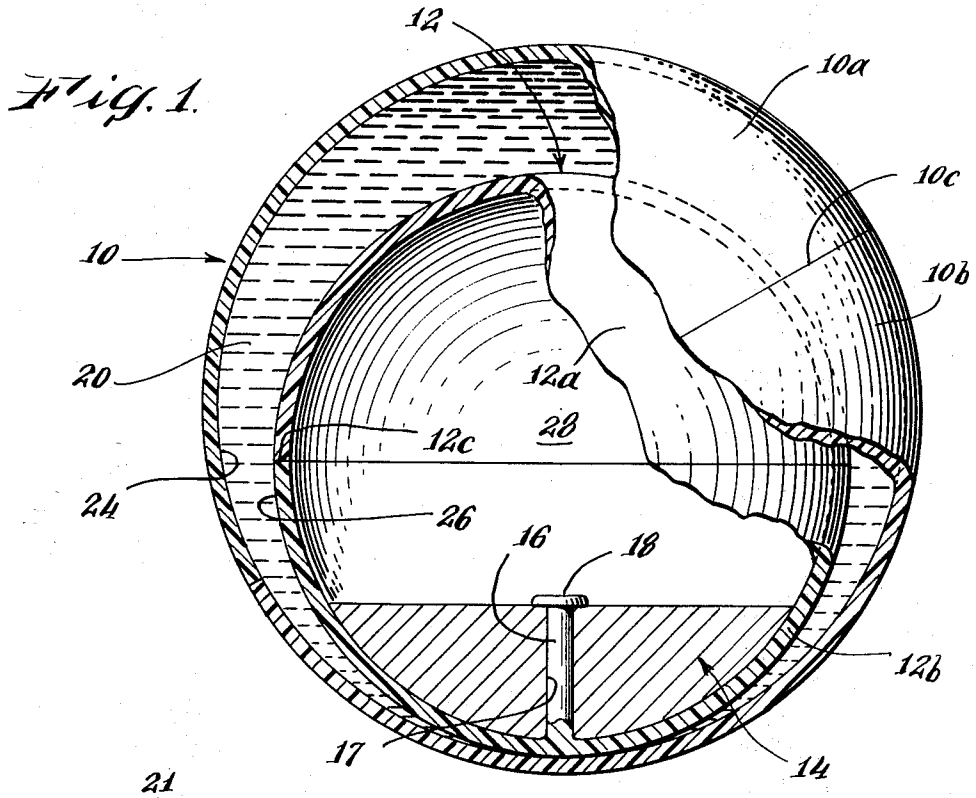
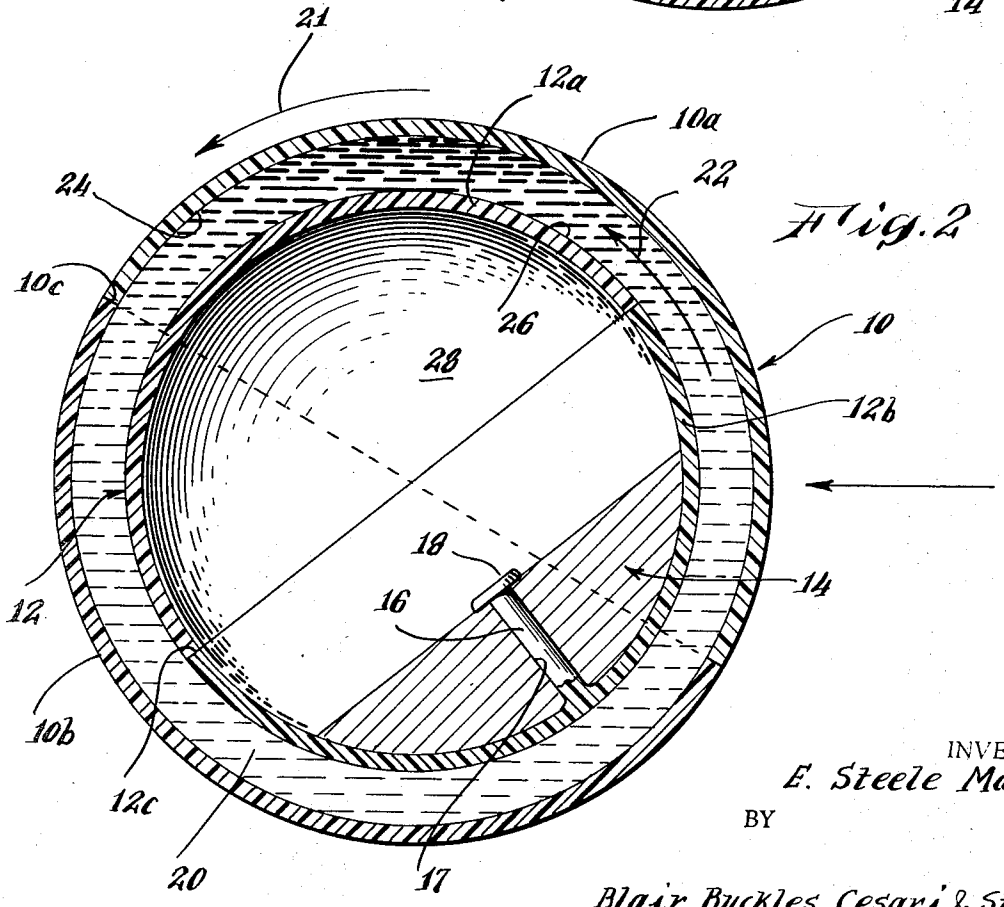


Fig. 2



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GAME BALL

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Continuation of application Ser. No. 633,513, Apr. 25, 1967. This application June 26, 1969, Ser. No. 841,678

Int. Cl. A63b *43/04, 37/10*

U.S. Cl. 273—63 6 Claims

ABSTRACT OF THE DISCLOSURE

A ball having an outer and an inner shell with a liquid filling the space between the two shells. The inner shell is provided with a fixed weight at a point on its inner periphery to provide drag as the ball is rolled. This is accomplished by friction between the exterior of the inner shell against the liquid and the interior of the outer shell against the liquid as the weight of the inner shell tends to resist rotation of the inner shell against the rotational movement of the liquid when the ball is rolled. The liquid preferably has a substantially constant viscosity over a wide range of temperature so that the braking action is fairly uniform under indoor or outdoor conditions for games such as lawn bowling or "bocce" in which such a ball may be employed. The ball will roll on hard surfaces distances comparable to those of conventional lawn bowling balls rolled on grass at the same bowling force.

This application is a continuation of application Ser. No. 633,513, filed Apr. 25, 1967.

BACKGROUND OF THE INVENTION

Games such as lawn bowling or "bocce" employ a fairly heavy ball that is rolled on grass with a number of such balls being used by players of the game. The grass surface impedes the travel of the ball and creates enough friction so that these games may be played in an area of practical size. When such balls however, are rolled on hard surfaces such as wood or tile floors, or on concrete or asphalt, there is very little friction on the balls and accordingly, the game balls roll for great distances with very little initial force applied to them. Accordingly, it is impractical to play such games as lawn bowling, bocce, or the like on floors indoors, or on other hard surfaces indoors or outdoors.

My game ball with built-in frictional drag permits the playing of such games on any hard, fast surface. The provision of a bottom weighted inner shell inside an outer shell with liquid between the two balls simulates the braking action of the grass on such present game balls when my ball is rolled on hard, fast surfaces such as wood, tile, or concrete.

SUMMARY OF THE INVENTION

I have found that my game ball may be rolled on very hard fast surfaces with approximately the same force that prior art game balls are rolled on grass and that my ball will slow and stop rolling at distances comparable to those experienced by prior art balls on grass. A prior art game ball when rolled on such hard surfaces has been found to keep rolling with very little friction impeding it until it strikes a wall or other object.

The game ball of my invention comprises an outer shell having an inner shell spaced from the interior wall of the outer shell with a liquid in the space between the two shells. The inner shell has a weight fixed at a point on its inner periphery to impede the rolling of the outer shell as the weight of the inner shell tends to come to rest at the bottom of the game ball, thus creating a frictional drag against the liquid between the shells as the ball is rolled, tending to rotate the liquid with the rolling ball. Thus, frictional forces are created around the interior of the outer shell and on the exterior of the inner shell to provide the proper frictional drag on my game ball.

The total weight of the inside shell approximates the weight of the liquid that it displaces, being preferably slightly heavier than the displaced liquid so that when the game ball is at rest the weighted inner shell settles to the bottom of the outer shell. When the game ball is rolled the movement of the liquid between the inner and outer shells tend to center the inner shell within the outer shell so that there are substantially equal frictional forces created around the ball interior.

Accordingly, it is an object of the invention to provide a game ball which has a built-in frictional drag when rolled on hard, fast surfaces.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

FIG. 1 is a side view of the game ball in partial section when the game ball is at rest.

FIG. 2 is a side sectional view of my game ball showing the relationship of the outer and inner shells when the game ball is rotating.

DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

The game ball of my invention has an outer shell **10** which may be made of rubber, plastic, or like polymeric material. Inside the outer shell **10** is an inner shell **12** which may be made of the same or similar material and which has a weight **14** positioned at its inner periphery. The weight **14** may be held by an integral pin **16** having a deformable top **18** for securing the weight in position. The weight is preferably made of lead or other heavy metal. In some applications it may be made of solid polymeric material wherein the inner shell and the weight may be molded of the same substance.

A liquid **20** fills the space between the two shells to provide frictional drag on the shells when the ball is rotated as the weight **14** attempts to settle the inner shell within the outer shell with the axis of the pin **16** in a vertical position.

As shown in FIG. 2, when the outer shell **10** is rolling in the direction of arrow **21** the liquid **20** between the two shells tends to rotate therewith in the direction of the arrow **22**. The weight **14** of the inner shell **12**, however, tends to return the inner shell to a position wherein the pin **16** is in a vertical position. Thus the fluid moving between the two shells of the rolling ball frictionally engages the inner surface **24** of outer shell **10** and the outer surface **26** of inner shell **12** to frictionally impede the rolling of the ball. When the ball is rolled at the proper speed for games such as lawn bowling or "bocce," the weight **14** does not revolve, but tends to maintain a position aproximating that shown in FIG. 2, the inner shell **12** assuming an approximately central position within the outer shell **10**. Since the remainder **28** of the inner shell is air filled, the weight **14** will slowly settle with pin **16** vertical when the ball comes to rest. The total weight of the inner shell including the weight **14**

preferably slightly exceeds the liquid that it displaces so that it will settle to the bottom when the ball comes to rest as shown in FIG. 1.

The viscosity of the liquid **20** should be substantially uniform over a range of temperatures of from about 40° to 100° so that if the game is played indoors or outdoors the frictional drag created by the liquid will be approximately the same. It should be understood of course, that the viscosity may vary with temperature changes in which case the test of skill will necessitate the player familiarizing himself with the increased or decreased frictional drag of the liquid with each successive roll of the ball under the given temperature condition.

I have found good results with a game ball of my invention having about a five inch diameter for the outer shell **10** and an inner shell **12** of four inches diameter to provide about 3/8 of an inch of liquid surrounding the inner shell when the ball is rolling. The shell walls were approximately 1/8 inch thick. With the weight of the inner shell slightly exceeding that of the liquid displaced, a liquid of about one thousand centipoises at 70° F. stopped the rolling action of the game ball over a hard surface within about 30 feet when the ball was properly rolled with a force approximating that used in outdoor lawn bowling.

The viscosity of the liquid should not be so great that the inner shell will make complete revolutions when the ball is rolled at proper playing speed. If the inner shell rotates in complete revolutions the weight will impart an irregular roll to the ball. The viscosity of the liquid however, must not be so low that the frictional forces created between the inner and outer shells is so small that the ball will not stop within a reasonable distance when the ball is rolled at playing speeds on hard, fast surfaces.

Accordingly, the diameter of the outer and inner shells, the spacing of the inner shell from the outer shell, the size of the inner shell weight and the viscosity of the liquid are all variables which will affect the rolling distance of the ball. Of these factors however, the principal ones for consideration are the viscosity of the liquid **20** and the weight **14** in the inner shell.

A polymeric material, such as polyethylene, is preferred for the shells. A silicone fluid is preferred for the liquid between the shells. Silicone fluids have relatively flat viscosity curves in the pertinent temperature range, are stable, and generally do not react with the polymeric materials of the shells.

For assembly, the weight **14** is shaped to fit the contour of shell **12** and has a hole **17** for receiving pin **16**. The top of pin **16** is then deformed into the flanged retainer **18**. Both the inner and outer shells may be formed of hemispheres **12***a*, **12***b*, and **10***a*, **10***b*, sealed along lines **12***c* and **10***c* respectively. The liquid **20** is then injected into the space between the two shells and the injection opening sealed against leakage.

It should also be understood that the inner or outer shells or both may be made slightly out of round for special rolling effects, such as for lawn bowling.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above article without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention, which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A game ball comprising:

(A) a hollow shell capable of a rolling motion on a surface, said shell having an outer surface, an inner surface, and defining an imaginary point at the center of said shell;

(B) a stabilizing element having an outer surface, and defining an imaginary point at the center of said element, with

(1) the center of gravity of said element being displaced from said imaginary point at the center of said element, and

(2) said element being located inside said hollow shell and free to rotate fully with respect thereto;

(C) a liquid substantially filling the space between said outer surface of said element and said inner surface of said hollow shell, said liquid being of such density that the weight of said element is related to the weight of liquid that is displaced thereby in a manner to permit the outer surface of said element to count said hollow shell inner surface when said hollow shell is at rest, and;

(D) said hollow shell, said element and said liquid cooperating in such a manner that when said hollow shell is rolled on said surface by a force as applied to a ball in lawn bowling,

(1) the imaginary point at the center of said element tends to coincide with the imaginary point at the center of said hollow shell, thereby centering said element, and

(2) said element assumes a position such that a line passing from the imaginary center of said element through the center of gravity of said element tends to be directed

(a) toward the surface upon which the hollow shell rolls and

(b) opposite from the direction in which the shell is rolling,

thereby stabilizing and precluding rolling motion of said element, and

(3) said liquid has sufficient viscosity to create a frictional drag on said rolling hollow shell as the motion of said liquid is retarded by interaction with said stabilized element so that the rolling motion of said hollow shell is retarded to an extent such that said shell will stop rolling on hard fast surfaces at distances comparable to those experienced by conventional lawn bowling balls rolled on grass-like surfaces at the same bowling force.

2. A game ball as defined in claim **1**, wherein said element sinks toward said surface when said hollow shell is at rest.

3. A game ball as defined in claim **1**, wherein the center of gravity of said element is displaced from said imaginary point at the center of said element with a weight positioned within said element and adjacent to said outer surface of said element.

4. A game ball as defined in claim **3**, wherein said element is hollow.

5. A game ball as defined in claim **4**, wherein said weight is fixed to the inner surface of said hollow element by a flanged pin passing therethrough and integral with at least a portion of said element.

6. A game ball comprising:

(A) a spherical hollow outer shell member capable of rolling on a surface and defining an enclosed volume;

(B) a spherical stabilizing element located within said enclosed volume and free to rotate in unencumbered fashion with respect to said shell member, the entire outer spherical surface of said element being free to contact any point on the inner surface of said shell member, the center of gravity of said element being displaced from the geometric center thereof such that when said ball is at rest said center of gravity is posi-

tioned beneath said geometric center and along a vertical line passing through said geometric center and said center of gravity;

(C) a liquid substantially filling the said enclosed volume not occupied by said sttabilizing element, said liquid being of such density that the volume thereof displaced by said stabilizing element has a weight slightly different from the weight of said stabilizing element and such viscosity that, when said hollow outer shell member is rolled upon a horizontal surface with a force as applied to a ball in lawn bowling, the frictional drag exerted by said fluid upon said stabilizing element tends to rotate said stabilizing element to an orientation within said hollow outer shell member wherein the center of gravity of said stabilizing element is displaced from said position and the geometric center of said spherical element tends to coincide with the geometric center of said

spherical shell member but wherein said center of gravity remains below a horizontal plane passing through said geometric center of said stabilizing element.

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GEORGE J. MARLO, Primary Examiner

U.S. Cl. X.R.

46—100, 211

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,517,933 Dated June 30, 1970

Inventor(s) Edwin Steele Malkin

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 19, change "count" to --contact-.

Column 5, line 4, change "sttabilizing" to --stabilizing-.

SIGNED AND
SEALED
OCT 6 - 1970

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents

FORM PO-1050 (10-69)

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