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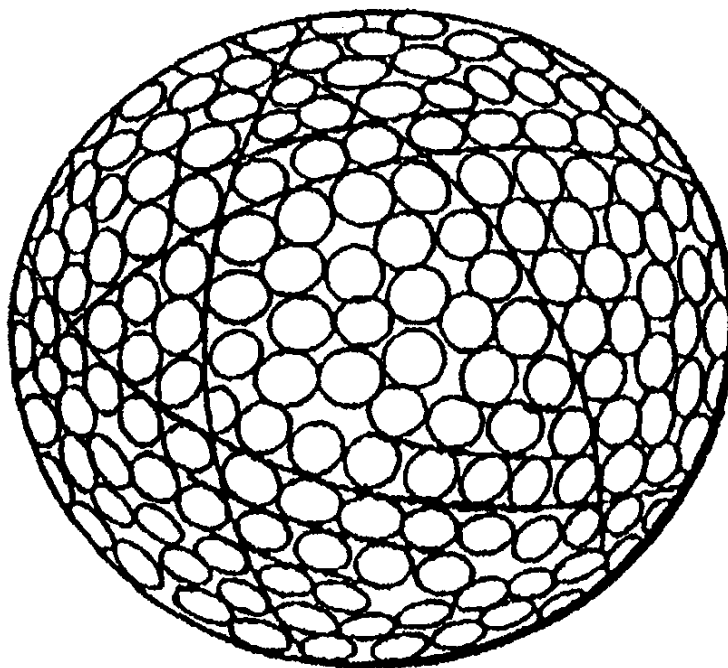
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(54) **Uniformly weighted golf ball**

(57) A golf ball in which the core is made from one material and the cover from a different material yet the density of the core and the density of the cover material are essentially identical.

**FIG. 1**



## Description

**[0001]** At the present time, golf balls are manufactured using various materials for cores, inner cores, outer covers and covers. These materials are each of a different density and thus, if they are not perfectly centered about one another, there can be a heavy side and a light side to the ball. If a straight line is drawn between the light and heavy points in a golf ball, and this line is parallel to the desired direction of travel, then when striking the ball towards the target, the ball's travel will be true and straight to the target. If this imaginary line is perpendicular to the target and the ball is struck towards that target, then the ball's travel will veer slightly in the direction of the heavy side of the ball.

**[0002]** Golf balls currently are usually made of a core comprised of polybutadiene and a zinc monomer material with a total typical density of 1.18 grams per cubic centimeter. The golf ball core thus formed is centerless ground to achieve near perfect roundness.

**[0003]** Centerless grinding is a well known process wherein spheres are suspended against a work blade between two grooved grinding wheels (and/or a regulating wheel) whose axis are slightly cocked and spinning in opposite directions. These actions continually rotate and remove material from the sphere to achieve near perfect spherical shape.

**[0004]** The next is the most difficult step and that is to center this core in the final mold and keep it centered while the cover material is injection molded around the core. This is usually done by using retractable steel pins in the mold. The extremely high injection pressure and viscosity of the cover material creates very high pressures on the core and even with steel pins, movement is almost impossible to avoid. Thus, it is not unusual to see differences of cover thickness of 0.005 inches to 0.020 inches from one side of the ball to another. In fact a standard inspection method in golf ball production is to x-ray or cross section balls to note differences in cover thickness. This produces a heavy side and a light side to the ball with the attendant disadvantages mentioned above.

**[0005]** Low-cost, one-piece balls have long been manufactured for driving ranges and these are thought to be weight balanced. However, compromises are made to the material of construction and thus the balls distance performance and "feel" is generally recognized as inferior. Because of the poor performance, these balls are not generally sold to the general public. Around the turn of the century, one piece balls were also manufactured but again their performance did not compete with multi-material constructed balls introduced later.

**[0006]** This invention involves (1) making one or more covering layers of the golf ball of the same density as the "standard" core material (1.18gm/cc) - resulting in a ball that is heavier than the standard, but weight balanced; (2) making the cover heavier and the core lighter (for example, both 1.13gm/cc) - resulting in a ball of the

desired weight and properly weight balanced; and (3) making the core lighter, matching the density of a typical cover material (0.99 gm/cc) resulting in a ball that is lighter than the standard, but properly weight balanced.

Thus, if there are variations of thickness of the layer or layers of materials surrounding the core because of the difficulties of injection molding, such thickness differences will have no effect on the balance of the golf ball.

**[0007]** Satisfactory cover materials are urethane, balata and an ionomer resin or any combination of these materials which have been modified with density altering constituents such that the density of the core, the one or more layers and the complete ball will be essentially the same.

**[0008]** It is therefore an object of this invention to provide a multi-layer golf ball which will have improved characteristics and it is a further object of this invention to provide a multi-layer golf ball which has uniform density throughout.

**[0009]** This, together with other objects of the invention, will become apparent from the following detailed description of the invention and the accompanying drawings.

Figure 1. A perspective view of conventional golf ball.

Figure 2. A cross section of a conventional golf ball in which the core 10 and the outer layer 11 are perfectly centered.

Figure 3 A cross section of a typical golf ball in which the core 10 has an outer layer 11 which is thicker on the right side of the core than the left side.

Figure 4. A cross section of a typical multi-layer golf ball in which the core 10 has outer layers 11 and 12 which are thicker on the right side than on the left side.

**[0010]** Figure 1 is a perspective view of a conventional golf ball. Figure 2 is a cross section of a conventional golf ball in which the core 10 and the outer layer 11 are perfectly centered. Figure 3 is a cross section of a typical golf ball in which the core 10 has an outer layer 11 which is thicker on the right side of the core than the left side. Figure 4 is a multi-layer golf ball wherein the layers 11 and 12 are thicker on the right side than on the left side.

**[0011]** Applicants invention preferably involves making the density of the core material and the density of the cover materials the same, and having these made from different materials. For example, utilizing a core having a density of 1.13 gm/cc, the initial layer and each succeeding layer can be constructed of suitable materials that have been formulated with constituents that bring the density of the layer to exactly match the 1.13 gm/cc of the core. In this manner, assuming the finished ball is perfectly spherical, it is not critical that the cover and core be concentric since the ball will always be perfectly balanced. If desired, the core may be made from the polybutadiene and a zinc monomer as is the current

practice.

**[0012]** Currently, golf balls with off center weight as a result of the difficulties of manufacturing are the norm. Applicant recently tested over 12 dozen balls from reading domestic manufacturers. There was not one ball that was perfectly centered. A putting robot was used and as many as 49 out of 50 twelve foot robotic putts missed the hole due to rolling off line caused by lack of weight centering. Based on the putting tests that had been concluded, it is projected that a 250 yard drive would be effected by as much as 36 feet deviation from the intended target.

**[0013]** In contrast utilizing golf balls based on Applicant's invention and using a robotic putter at the same 12 foot distance, 43 out of 50 putts were sunk in the hole. Furthermore, it is reasonable to expect that similar results are to be realized using drivers and irons hitting balls a much greater distance.

**[0014]** In addition, in manufacturing a golf ball according to Applicant's invention, it is not necessary to utilize the centerless grinding operation and this results in lower cost.

**[0015]** While this invention has been shown and described with respect to a detailed embodiment thereof, it will be understood by those skilled in the art that various changes in form and detail thereof may be made without departing from the scope of the claims of the invention.

omer resin or any combination of these materials, which have been modified with density altering constituents such that the density of the core, said one or more layers, and the complete ball will be essentially the same.

## Claims

### 1. A golf ball comprising

a spherical core made from a first material,  
at least one layer of a second different material  
completely covering said core wherein the density of said core and the density of said one layer surrounding said core are essentially identical and wherein any additional layer surrounding said core and said one layer has a density essentially identical to the density of said core.

2. The golf ball of Claim 1 wherein said core has been prepared by centerless grinding.

3. The golf ball of Claim 1 wherein said core is a blend of polybutadiene and a zinc monomer.

4. The golf ball of Claim 1 wherein said core is completely covered by at least one layer of a suitable material which contains density altering constituents so that its density is essentially identical to the density of said core.

5. The golf ball of Claim 1 wherein said core is covered by one or more layers of a material selected from the group consisting of urethane, balata, and an ion-

FIG. 1

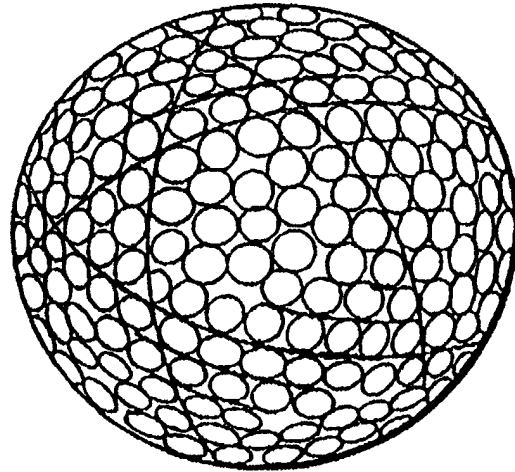


FIG. 2

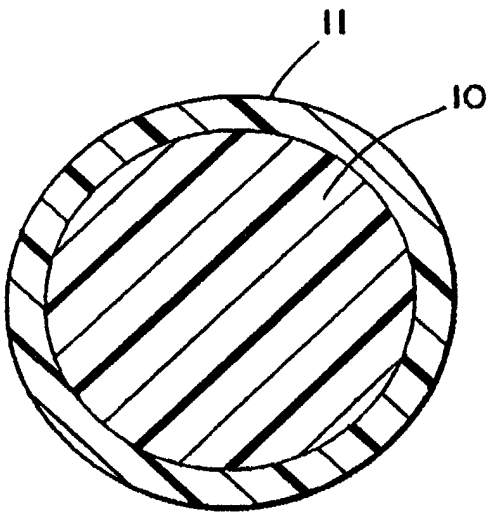


FIG. 3

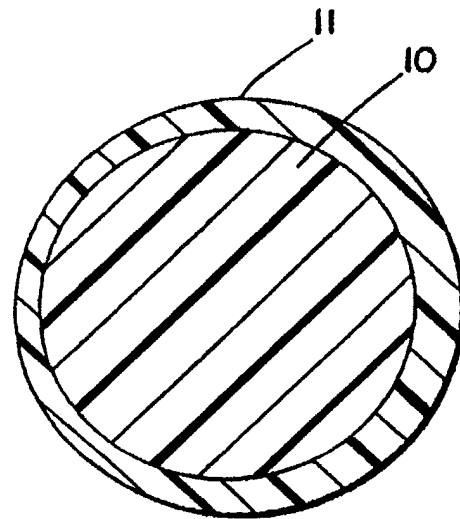


FIG. 4

