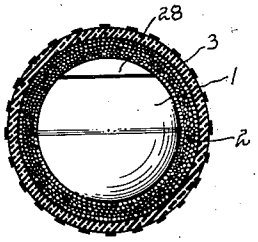
April 18, 1933. W. E. REICHARD 1,904,012

GOLF BALL

Filed Nov. 7, 1929

Fig. 1



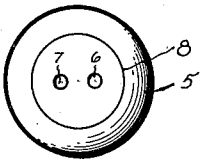


Fig. 3

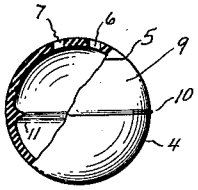


Fig. 4

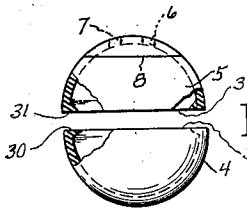


Fig. 2

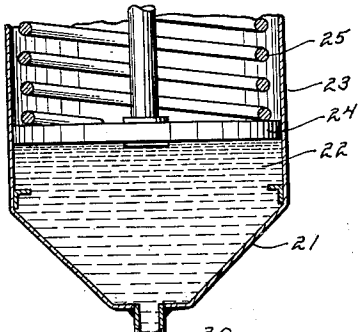


Fig. 5

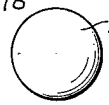


Fig. 6

Fig. 7

Fig. 8

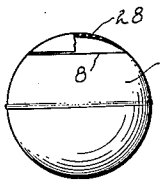


Fig. 9

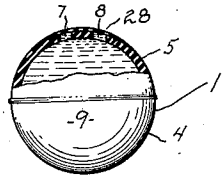


Fig. 10

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UNITED STATES PATENT OFFICE

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GOLF BALL

Application filed November 7, 1929. Serial No. 405,508.

This invention relates to golf balls and to processes for making golf balls.

One of the objects of this invention is to provide a golf ball of improved construction and having improved playing qualities.

Another object of my invention is to provide a golf ball admitting of uniform production in quantities.

Another object is to provide, in a golf ball of the type having a liquid or semi-liquid filled core, in which the filling material is contained in a spherical shell, and improved construction for the shell.

Another object is to provide an improved process for the making of golf balls.

Another object is to provide, in the manufacture of golf balls of the liquid or semi-liquid core type, an improved process or method of introducing the core into the ball.

Another object is to provide, in the manufacture of golf balls of the liquid or semi-liquid type, an improved method of introducing the liquid or semi-liquid into the core and of assembling the other parts of the ball around the core, which may be carried out rapidly and uniformly in the manufacture of balls in quantities, and by which a ball of improved balance and playing qualities may be produced.

Other objects will be apparent to those skilled in the art to which my invention pertains.

My invention is fully disclosed in the following description taken in connection with the accompanying drawing, in which:—

Fig. 1 is a cross sectional view of a golf ball embodying my invention, with the center or core thereof in elevation.

Fig. 2 is a view showing the two shell-like halves from which a spherical core shell, which I may employ, is constructed.

Fig. 3 is a plan view taken from above of one of the core shell halves, shown in Fig. 2.

Fig. 4 is a cross sectional view of the completed core shell.

Fig. 5 is a view, in some respects diagrammatic, illustrating an apparatus for introducing into the core shell of Fig. 4, a liquid or semi-liquid filling material.

Figs. 6, 7 and 8 are respectively plan, side elevational and side sectional views of a cap which I may employ for the filled core shell.

Fig. 9 is a view of the filled core shell with the cap of Figs. 6, 7 and 8 applied thereto, with part of the cap shown in section.

Fig. 10 is a view of the completed and filled core with parts in section to show the internal construction thereof.

The complete golf ball of my invention, illustrated in Fig. 1, comprises a central core or ball center 1, which will be described in more detail later. Around the core is wrapped a layer of rubber threads or bands 2, stretched to produce constricting tension, the wrapping being carried on to produce a layer of suitable thickness around and enclosing the core 1.

Finally, a balata rubber covering 3 is molded on and around the layer of rubber threads 2, this covering preferably being made by first forming two hemispherical shells of the material thereof and then enclosing the core 1 and wrapped layer 2 within the shells, and then joining the shells at their annular edges by heat and pressure. Any fin or other irregularity occuring at the joint or union of the hemispherical shells is thereafter removed in any suitable manner. The center or core 1 will now be described.

The core 1 is of the type comprising an outer casing or shell and a filling of plastic, liquid or semi-liquid material therein. I am aware that cores of this general class have been employed heretofore, but the construction thereof and the methods employed to fill the casing of the core with the filling material have produced cores which have been out-of-round and out of balance with a resulting detriment to the playing qualities of the finished ball.

A characteristic example of these constructions and methods is that in which a bag or the like is filled with the liquid or plastic material, and the open end of the bag closed by gathering together and tying it, leaving an unsymmetrical or an out-of-balance protuberance on the side of the core.

Another characteristic example of cores of this general class made heretofore, is that

in which the filling material is formed into a ball or pellet of plastic consistency in order that it may be manipulated, and a shell formed therearound. In some of these constructions and methods, the filling material is thereafter converted into a liquid or semi-liquid, by heat treatment.

The core of the golf ball of my invention comprises a spherical shell of thin, soft, resilient rubber, so constructed as to be truly spherical to a relatively high degree of accuracy and completely filled, by an improved method, with a liquid or semi-liquid material; and thus when employed as the core of a golf ball, it provides a ball the material of which is disposed symmetrically around its center and accurately balanced, upon which qualities, as is well known, depend the playing qualities of the golf ball.

In constructing the spherical core shell, I first provide a pair of substantially hemispherical shells 4 and 5, as shown in Fig. 2, molding them from soft thin rubber. The upper of the two shells 5, as they appear in the drawing, Fig. 2, is provided with two spaced perforations 6 and 7 in the wall thereof and symmetrically disposed with respect to the axis of symmetry of the hemispherical shell. The shell 5 is also provided with a circular line 8 inscribed or molded in the exterior surface of the shell and having its center on the said axis of symmetry, and being disposed in a plane at right angles thereto, the purpose of which will be described.

The annular edges of the shells 4 and 5 are formed with inwardly directed annular flanges 30 and 31 respectively, outwardly formed to planular faces 32 and 33 respectively, at right angles to the hemispherical axes thereof. The two hemispherical shells 4 and 5 thus provided are next joined along the planes 32—33 of the flanges 30 and 31, by cementing and vulcanizing, and thus producing a complete spherical core shell 9, shown in Fig. 4.

By means of the flanges 30—31 and their planular faces 32—33, a very strong joint between the hemispherical shells may be had with shells the hemispherical walls of which are relatively thin, the flanges 30 and 31 providing large annular joining areas.

The core shell thus produced is next filled with the liquid or semi-liquid filling material by the process indicated generally in Fig. 5. A nozzle 12 is inserted in one of the perforations, say the perforation 6 of the shell, as a means of admitting the filling material to the interior of the core shell. The nozzle 12 communicates, by means of a duct 13, with the interior of a cylinder 14, in which a piston 15 is mounted, and adapted to be reciprocated by a rod 16.

In the line of the duct 13 is a spring pressed ball valve 17 and seat 18 by which the duct is normally closed. The cylinder has a lateral port 19 to which is connected a duct 20 leading to a reservoir 21 in which a quantity of the filling material to be used, 22, is stored. To maintain the material 22 under pressure, the reservoir 21 has a cylindrical portion 23 in which a piston 24 is reciprocatively mounted and the piston is held in the pressure producing direction by a compression spring 25.

To reciprocate the piston 15 in the cylinder 14, the rod 16 may be connected to any suitable hand or foot operated mechanism. To operate the apparatus thus described, with the core shell 9 in position on the nozzle 12, the operator retracts the piston 15 from the position shown, thus creating a partial vacuum in the clearance space 26 of the cylinder.

When the piston has passed outwardly sufficiently to open the port 19, the combined action of the pressure producing parts 24 and 25, and of the partial vacuum, will cause filling material from the reservoir 22 to flow quickly into the clearance space 26, filling it. When the piston is moved inwardly, the ball valve 17 will be displaced and the filling material will be forced through the duct 13 into the core shell 9 and when it is completely filled, this fact will be indicated by the exudation of the material from the other perforation 7 of the shell, as shown at 27.

The shell thus filled is removed from the nozzle 12, and the surplus filling material, such as the portion 27, is removed in any suitable manner, as by wiping with a cloth.

The next operation is to seal the filling material in the shell 9 by sealing the perforations 6 and 7, and this is done by means of a cap 28, illustrated separately in Figs. 6, 7 and 8. The cap 28 is preferably made of soft rubber similar to or like that composing the shell 9. It is of concavo convex form, as shown in Figs. 7 and 8, and in circular plan as shown in Fig. 6, the radius of the concave surface thereof being substantially the same as the outer spherical radius of the shell 9, and the diameter thereof, as viewed in Figs. 6, is substantially the same or slightly smaller than the diameter of the inscribed circle 8 of the shell 9. The cap 28 is applied to the outer surface of the shell 9, covering the perforations 6 and 7 and secured thereto in any suitable manner, as by rubber cement, and its position on the shell 9 is predetermined by the inscribed circle 8, the circle serving as a positioning gage or guide for the operator in attaching the cap 28.

The disposition of the cap 28 on the shell 9 with relation to the inscribed line or circle 8, is indicated in Fig. 9.

The ball core 1, or center, is now complete and its construction is clearly illustrated in Fig. 10, wherein it is shown that the filling material entirely fills the spherical shell and the material of the core is substantially symmetrically disposed around the center thereof, producing a spherical and balanced core.

When the completed core 1 has been embodied in a golf ball as hereinbefore referred to in connection with the description of Fig. 1, a complete golf ball having a liquid or semi-liquid core is provided, all of the parts of which are either spherical, as for instance the filling material of the core, or lie in spherical layers symmetrically disposed around the center of the ball, and thus a ball of the liquid or semi-liquid core type is provided with superior playing qualities.

My invention is not limited to the exact details of construction shown and described, nor to the exact details of the process for filling the spherical shell with filling material, nor to the details of apparatus or mechanism shown and described, as used in connection with that process, inasmuch as many changes in and modifications thereof may be made within the scope of my invention, without departing from the spirit thereof or sacrificing its advantages.

As will now be clear, one of the advantages of my invention is that it permits the employment of a filling material of any degree of fluidity from very thin freely flowing materials to semi-liquid, viscous or even plastic materials, and therefore my invention is in no sense limited to any particular filling material or degree of fluidity thereof.

I have described the filling material as liquid or semi-liquid because materials which I employ in the preferred practice of my invention are of this character.

In the claims, the term "fluid" will, therefore, be understood to apply to all such materials.

I claim:

1. A casing for the fluid material of a golf ball of the fluid core type, constructed from a pair of substantially hemispherical shells of resilient rubber or like material, joined together at their annular edges, one of the hemispherical shells being provided with a pair of substantially adjacent spaced perforations, one of the perforations being formed to resiliently constrictingly seal a filling tube when forcibly inserted thereinto.

2. A casing for the fluid material of a golf ball of the fluid core type, constructed from a pair of substantially hemispherical shells of resilient rubber or like material, joined together at their annular edges, one of the hemispherical shells being provided with a pair of spaced perforations, one of the perforations being formed to resiliently, constrictingly seal a filling tube when forcibly inserted thereinto, and an inscribed line on the exterior surface of said shell enclosing the said perforations.

3. A casing for the fluid material of a golf ball of the fluid core type, constructed from a pair of substantially hemispherical shells of resilient rubber or like material, joined together at their annular edges, one of the hemispherical shells being provided with a pair of spaced perforations, and an inscribed line on the exterior surface of said shell enclosing the said perforations.

4. A shell-like casing for the fluid material of a golf ball of the fluid core type, comprising a thin-walled hollow sphere of rubber or like resilient material, and a pair of spaced substantially adjacent perforations in the wall through one of which the fluid materials may be admitted to the interior of the shell, and out of the other of which the air contents of the shell may escape, and one of the perforations being formed to resiliently, constrictingly seal a filling tube when forcibly inserted thereinto.

5. A shell-like casing for the fluid material of a golf ball of the fluid core type, comprising a thin-walled hollow sphere of rubber or like resilient material, and a pair of spaced perforations in the wall through one of which the fluid materials may be admitted to the interior of the shell, and out of the other of which the air contents of the shell may escape, one of the perforations being formed to resiliently, constrictingly seal a filling tube when forcibly inserted thereinto, and a line inscribed on the exterior surface of the shell and enclosing said perforations.

6. A casing for the fluid material of a golf ball of the fluid core type, constructed from a pair of substantially hemispherical shells of resilient rubber or like material, joined together at their annular edges, the casing thus formed being provided with a pair of spaced perforations, one of the perforations being formed to resiliently, constrictingly seal a filling tube when forcibly inserted thereinto, and an inscribed line on the exterior surface of said shell enclosing the said perforations.

7. A casing for the fluid material of a golf ball of the fluid core type, constructed from a pair of substantially hemispherical shells of resilient rubber or like material, joined together at their annular edges, one of the hemispherical shells being provided with a pair of spaced perforations, and a predetermined area of the exterior surface of the shell and containing the two perforations being distinctively indicated.

8. A shell-like casing for the fluid material of a golf ball of the fluid core type, comprising a thin-walled hollow sphere of rubber or like resilient material, and a pair of spaced perforations in the wall through one of which the fluid material may be admitted to the interior of the shell, and out of the other of which the air contents of the shell may escape, and a predetermined area of the exterior surface of the shell and containing the two perforations being distinctly indicated.

9. A casing for the fluid material of a golf ball of the fluid core type, constructed from a pair of substantially hemispherical shells

of resilient rubber or like material, joined together at their annular edges, one of the hemispherical shells being provided with a pair of spaced perforations, one of the perforations being formed to resiliently, constrictingly seal a filling tube when forcibly inserted thereinto and a predetermined area of the exterior surface of the shell and containing the two perforations being distinctively indicated.

10. A center or core for golf balls comprising a hollow spherical shell, a pair of spaced perforations in the wall of the shell and a predetermined area of the exterior surface of the shell and containing the two perforations being distinctively indicated, a filler of fluid material entirely filling the shell and the perforations, and a sealing cap of substantially the size and shape of said area and of the form of a section of a hollow sphere and cemented to the exterior surface of the sphere and sealing the said perforations.

11. A shell-like casing for the fluid material of a golf ball of the fluid core type, comprising a thin-walled hollow sphere of rubber or like resilient material, and a pair of spaced perforations in the wall through one of which the fluid material may be admitted to the interior of the shell, and out of the other of which the air contents of the shell may escape, and a line inscribed on the exterior surface of the shell and enclosing said perforations.

12. A core or center for golf balls comprising a hollow sphere of rubber or like elastic material, completely filled with fluid material, a perforation in the wall of the sphere adapted to admit fluid material to the interior of the sphere, and the perforation exteriorly sealed with an overlapping cap secured to the external surface of the sphere.

13. A core or center for golf balls comprising a hollow sphere of rubber or like elastic material, completely filled with fluid material, a pair of spaced perforations in the wall of the sphere, one of which is adapted to admit the fluid material to the interior of this sphere and being formed to resiliently constrictingly seal a filling tube when forcibly inserted thereinto, and through the other of which the air content of the sphere may escape during the process of filling the sphere, a sealing cap of sheet rubber or like material of concave-convex sectional form, covering the apertures and sealed to the external surface of the sphere.

14. The method of producing a golf ball of symmetrical balanced construction which includes producing a hollow spherical shell of rubber or like resilient material provided with a perforation in the wall thereof, entirely filling the shell with fluid material, sealing the perforation with a cap having the general form of a section of a hollow sphere and secured to the outer surface of the shell and overlapping the perforation, and wrapping a layer of rubber threads on the filled shell and over the cap under tension, and applying an external cover of balata or the like over the threads.

15. A center or core for golf balls comprising a hollow spherical shell, a pair of spaced perforations in the wall of the shell, a circular line inscribed in the external surface of the shell symmetrically disposed around the perforations, a filler of fluid material entirely filling the shell and the perforations, and a sealing cap substantially of the form of a circular section of a hollow sphere and of outside diameter substantially the same as said inscribed circular line, and cemented to the exterior surface of the sphere and sealing the said perforations.

16. A golf ball of symmetrical balanced construction comprising an internal core composed generally of a hollow spherical shell of rubber or like resilient material, a perforation in the wall of the shell, the shell and perforation being entirely filled with fluid or liquid material, and a sealing cap having the general form of a section of a hollow sphere covering and sealing the perforation and secured to the outer surface of the shell, a layer of rubber threads wrapped on the core and over the cap under tension, and a balata or like rubber covering for the threads.

17. The method of producing a fluid type core for golf balls which includes forming a pair of hemispherical shells, joining them together at their open ends, to form a hollow sphere, filling the sphere with fluid material through a perforation in the wall of the sphere, and exteriorly sealing the perforation with a cap cemented to the surface of the sphere and overlapping the perforation.

18. The method of producing a fluid type core for golf balls which includes producing a pair of hemispherical shells, joining the shells along their open edges to form a hollow sphere, the sphere wall being provided with a pair of spaced perforations, introducing a fluid material into the interior of the hollow sphere thus formed through one perforation and concurrently forcing the air contents out of the sphere through the other perforation, and sealing the two perforations by a single cap cemented to the surface of the sphere.

19. The method of producing a fluid type core for golf balls which includes producing a pair of hemispherical shells of rubber or like resilient material, perforating one of the shells in two spaced places, joining the shells together at their open edges to produce therefrom a hollow sphere, forcibly inserting into one of the perforations a filling nozzle, injecting liquid material through the nozzle into the interior of the sphere, and concurrently expelling from the shell the air contents

thereof through the other perforation, and continuing the filling operation until the liquid material exudes from the said other perforation, removing the nozzle, wiping off the surplus filling material, from both perforations, and exteriorly sealing the two perforations with an overlapping cap secured to the outer surface of the sphere.

20. The method of producing a core for golf balls which includes producing a pair of hemispherical shells, having flanges at their annular edges, joining the shells along the flanges, introducing a fluid material into the hollow sphere thus formed through a perforation in the wall thereof, and sealing the perforations with a cap cemented to the external surface of the sphere and overlapping the perforation.

In testimony whereof I hereunto affix my signature this 30th day of October, 1929.

WILLIS E. REICHARD.