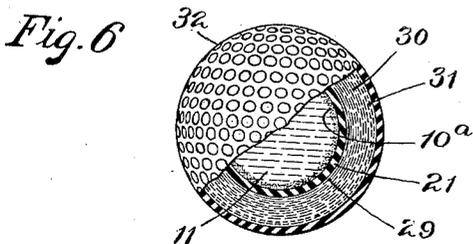
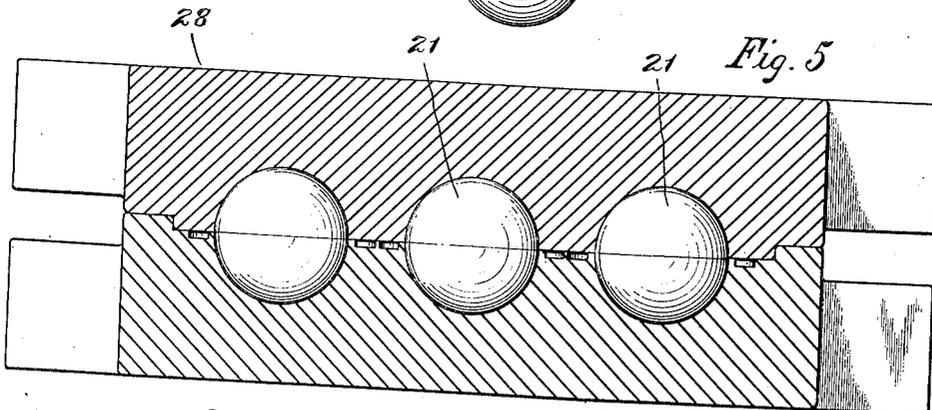
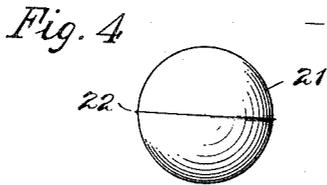
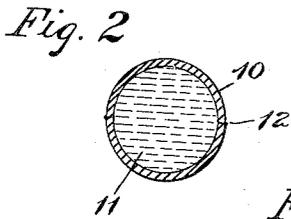
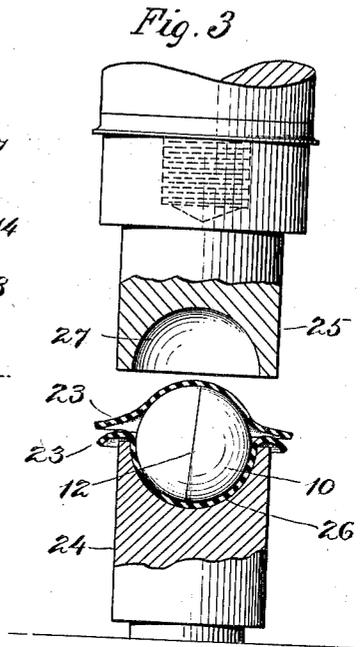
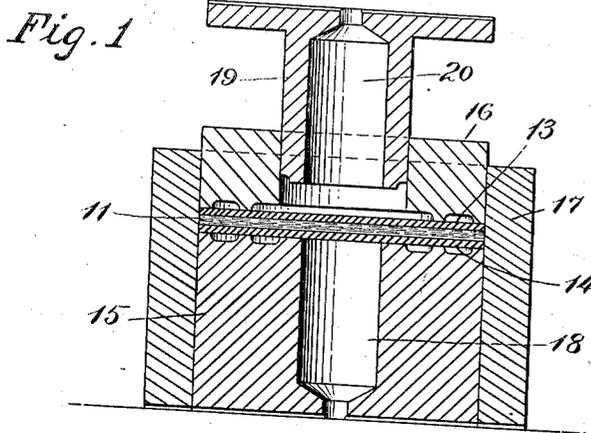


W. PEARCE.  
 GOLF BALL AND METHOD OF MAKING THE SAME.  
 APPLICATION FILED OCT. 24, 1919.

1,366,930.

Patented Feb. 1, 1921.



Inventor  
 William Pearce  
 By Robert M. Perrin  
 Atty.

# UNITED STATES PATENT OFFICE.

WILLIAM PEARCE, OF AKRON, OHIO, ASSIGNOR TO THE B. F. GOODRICH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

## GOLF-BALL AND METHOD OF MAKING THE SAME.

1,366,930.

Specification of Letters Patent.

Patented Feb. 1, 1921.

Application filed October 24, 1919. Serial No. 332,928.

To all whom it may concern:

Be it known that I, WILLIAM PEARCE, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented a certain new and useful Golf-Ball and Method of Making the Same, of which the following is a specification.

This invention relates to the construction of golf balls having a liquid or similar highly-mobile core surrounded by resilient material such as a tense rubber winding which is furnished with the usual tough cover of gutta-percha, balata, or the like; and its object is to provide a more satisfactory form and method of inclosure than has heretofore been known for the liquid in the center, whereby certain desirable results are secured in the way of advantages in manufacture as well as increased length of flight, uniformity and durability of the ball.

Of the accompanying drawings:

Figure 1 is a vertical sectional view of apparatus and materials illustrating the method of forming the liquid-containing inner envelop of my improved golf-ball core.

Fig. 2 is a section of the product of said method.

Fig. 3 is a view in vertical section and elevation showing the mode of providing the core with an outer envelop.

Fig. 4 is an elevation of the second product.

Fig. 5 is a sectional view of a vulcanizing mold with cores therein.

Fig. 6 is a view in section and elevation showing the completed ball.

It has been found that a highly-mobile core combined with an envelop of rubber tape or thread wound under high tension gives a relatively long-flying ball, and the higher the tension of the winding and the greater the mobility of the core the longer will be the flight. Also, a relatively-small and heavy ball flies farther than a larger and lighter one. Liquid cores have the greatest mobility and it is common to weight the liquid with a heavy substance such as oxid of zinc. In order to hold this substance uniformly in suspension a thick, viscous or oily liquid such as castor oil, glycerin or the like is employed. But it has heretofore proven difficult to inclose this liquid in a flexible envelop of such nature that none will escape into the rubber wind-

ings and cause deterioration and loss of tension therein, and that the envelop itself shall be of uniform shape. The most common method has been to inclose the liquid in a small vulcanized rubber bag and tie the neck of this bag, two of these bags, one within the other and with their necks opposite, being often resorted to in the effort to retain the liquid, but without complete success. The tying of the bag or bags makes an objectionable bunch on one or two sides, and furthermore, the use of such a core requires that the first of the rubber winding shall be applied by hand, for which operation it is difficult to secure and retain the necessary skilled help. These several objections are overcome by my present invention.

Referring to the drawings, which show a preferred mode of practising the invention, 10 is an envelop containing a liquid 11 such, for example, as castor oil weighted with zinc oxid or other finely-divided heavy solid. This envelop is preferably made in hemispherical segments, as shown, united in a circumferential seam 12 which is formed by pressing together the edges of said segments while the material of which they are composed is in a slightly-plastic condition. Such material is preferably gelatin, which is tough, substantially impervious to the oil, and well adapted to form a seam-protective lining for the outer core-envelop. In compounding the gelatin, it is preferably mixed with glycerin as commonly practised in the manufacture of highly-flexible drug capsules, in order to insure a proper degree of flexibility in the envelop.

Fig. 1 illustrates a suitable mode of forming the liquid-filled gelatin envelop. Two flat plates 13, 14 of gelatin heated to the necessary degree of semi-plasticity and containing between them enough of the liquid 11 to supply the core filling are located between a lower die-member 15 and an upper pressing plate 16, both of which are surrounded by a sleeve 17, said die-member having a central bore 18. 19 is an upper die member sliding in an aperture in the plate 16 and provided with a central bore 20. To form the core member or capsule, plate 16 is pressed down upon the lower die member to bring the margins of the gelatin plates together and mass the liquid inwardly toward the center, then the upper die member is pressed downwardly upon the lower

one to pinch off the two halves of the envelop and press their edges together to form the seam, the apertures 18, 20 permitting the capsule to bulge upwardly and downwardly into the dies, after which the product is removed and assumes the form shown in Fig. 2.

The next step is to apply a rubber outer envelop 21 which is also composed of hemispherical segments united by a circumferential seam 22 as indicated in Fig. 4. To do this, the core member provided with the gelatin cover 10 is placed with its seam 12 crosswise as shown in Fig. 3, between sheets or plates 23 of vulcanizable raw rubber, and the excess is pinched off between die members 24, 25 having hemispherical cavities 26, 27, thereby forming the seam 22.

In many cases it will be desirable to compound this rubber stock with a weighting material such as finely-divided metallic lead in order to avoid mixing the lead with the liquid 11 from which it tends to settle unevenly and in which it also tends to form with the zinc oxid a substance which stiffens after a time. A number of such cores with the raw rubber envelops thereon are then located in the cavities of a vulcanizing mold 28 and subjected to heat and pressure until the rubber is vulcanized both in the walls and the seams. The heat melts the gelatin on the inside, but the latter is enabled to act as a lining 10<sup>a</sup>, shown in Fig. 6, which protects the seam in the rubber envelop from the entrance of oil which would tend to spoil said seam.

The gelatin and rubber envelops 10, 21 may each be about one-sixteenth of an inch thick. This construction affords a core envelop of ample flexibility but of such firmness that the first winding of rubber tape may be applied directly to the core in the winding machine without having to resort to the usual preliminary hand-winding. In Figs. 6, 29, 30 and 31 are the usual tense windings of rubber, of which 29 is a first winding of wide tape, 30 is the principal winding of narrower tape and 31 is the outer winding of thread to increase the adhesion of the cover; all of which windings, including the first one, may be applied by suitable winding machinery. 32 is the usual tough cover composed of any suitable material such as balata, gutta percha, rubber or mixtures of two or more of these substances. The ball structure without the cover is commonly known as the "center" and the inner ball to which the tense rubber winding is applied is the "core".

My improved core, being of a firm-walled but highly-mobile character, is well adapted to the use of high tensions in the rubber winding so as to obtain a greater factor of elasticity and increased length of flight without producing a hard ball or one which

will readily cut through the cover, the walls of the ball in this case retaining in a large degree their local deformability. Permanent uniformity of distribution of material in the core and absence of early deterioration through the escape of liquid into the windings are among the benefits which I obtain, and added to this is the very great manufacturing advantage obtained by dispensing with the necessity for a preliminary hand winding of wide rubber tape upon the core envelop.

I claim:

1. A golf-ball core comprising an oily liquid inclosed in an oil-proof envelop composed of segments united by a circumferential seam.
2. A golf-ball core comprising a weighted, oily liquid inclosed in an oil-proof envelop composed of segments united by a circumferential seam.
3. A golf-ball core comprising a finely-divided, solid, weighting substance suspended in an oil, and an oil-proof envelop therefor composed of segments united by a circumferential seam.
4. A golf-ball core comprising a gelatin envelop inclosing a liquid.
5. A golf-ball core comprising a gelatin envelop inclosing an oily liquid.
6. A golf-ball core comprising a gelatin envelop inclosing an oil in which is suspended a finely-divided, solid, weighting substance.
7. A golf-ball core comprising a gelatin envelop inclosing an oil weighted with oxid of zinc.
8. A golf-ball core comprising an envelop composed of hemispheres of gelatin united by a circumferential butt seam, and an oil containing suspended, finely-divided weighting material inclosed therein.
9. A golf-ball core comprising a seamed rubber envelop containing a seam-protective lining and a liquid.
10. A golf-ball core comprising a seamed rubber envelop lined with gelatin and containing a liquid.
11. A golf-ball core comprising a seamed, vulcanized rubber envelop containing an oil in which is suspended finely-divided weighting matter.
12. A golf-ball core comprising a hollow ball composed of vulcanized rubber segments united by a vulcanized seam, and an oily liquid contained therein.
13. A golf-ball core comprising a hollow ball composed of vulcanized rubber hemispheres united by a circumferential seam, a seam-protective lining therefor, and a weighted liquid contained therein.
14. A golf-ball core comprising a liquid, a gelatin envelop therefor, and a rubber envelop inclosing said gelatin envelop.
15. A golf-ball core comprising an en-

- velop composed of hemispheres of rubber vulcanized together, a gelatin lining therein, and an oily liquid therein containing finely-divided, suspended weighting material.
- 5 16. A golf-ball core comprising a segmental, seamed, hollow ball having walls composed of weighted vulcanized rubber, a seam-protective lining therefor, and a liquid contained therein.
- 10 17. A golf-ball core comprising a segmental, seamed, hollow ball having walls composed of vulcanized rubber weighted with finely-divided metallic lead, a seam-protective lining therein, and an oily liquid
- 15 therein containing zinc oxid in suspension.
18. A golf-ball comprising a seamed rubber envelop having a seam-protective lining and containing a liquid, a tense rubber winding thereon, and a tough cover inclosing
- 20 said winding.
19. A golf-ball comprising a seamed, vulcanized rubber envelop having a gelatin lining and containing a weighted, oily liquid, a tense rubber winding thereon, and
- 25 a tough cover inclosing said winding.
20. A golf-ball comprising a vulcanized rubber envelop composed of hemispheres united by a circumferential seam, a gelatin lining therein, a weighted liquid therein,
- 30 a tense rubber winding thereon, and a tough cover inclosing said winding.
21. A golf-ball comprising an envelop composed of vulcanized rubber hemispheres containing weighted material and united by
- 35 a circumferential seam, a gelatin lining therein, a liquid therein containing weighting material in suspension, a tense rubber winding thereon, and a tough cover surrounding said winding.
- 40 22. The method of making golf-ball cores which comprises inclosing a liquid within the parts of a segmental inner envelop, uniting the segments of said envelop in a seam, inclosing said inner envelop with the segments of an outer envelop, and uniting said
- 45 outer segments with a seam.
23. The method of making golf-ball cores which comprises inclosing an oily liquid in an oil-proof inner envelop, inclosing said inner envelop between rubber segments and
- 50 uniting the edges of said segments.
24. The method of making golf-ball cores which comprises inclosing an oily liquid in an oil-proof inner envelop, inclosing said inner envelop between raw rubber segments
- 55 to form an outer envelop, uniting the edges of said segments and vulcanizing said outer envelop on the inner envelop.
25. The method of making golf-balls which comprises inclosing an oily liquid
- 60 between the segments of a gelatin envelop to form a core, uniting said segments, providing a tense rubber winding around said core, and providing a cover around said
- winding.
- 65 26. The method of making golf-ball cores which comprises inclosing a body of liquid between gelatin plates, massing the liquid inwardly toward a center by compression on the margins of the plates, cutting out
- 70 segments from said plates and uniting their edges in a liquid-filled envelop by further compression, and covering said envelop with a liquid-tight outer rubber envelop.
27. The method of making golf-ball centers
- 75 which comprises inclosing an oily liquid in a gelatin inner envelop, inclosing said inner envelop in a liquid-tight, seamed, segmental, rubber outer envelop, and applying a tense rubber winding on said outer
- 80 envelop.
28. The method of making golf balls which comprises inclosing an oily liquid in a gelatin inner envelop, vulcanizing thereon a liquid-tight, rubber outer envelop, applying
- 85 a tense rubber winding to said outer envelop, and providing a tough cover on said winding.
- In witness whereof I have hereunto set my hand this 16th day of October, 1919.

WILLIAM PEARCE.