No. 701,617. Patented June 3, 1902.

F. H. RICHARDS.

GOLF BALL.

(Application filed Mar. 12, 1902.)

(No Model.)

Fig. 1.

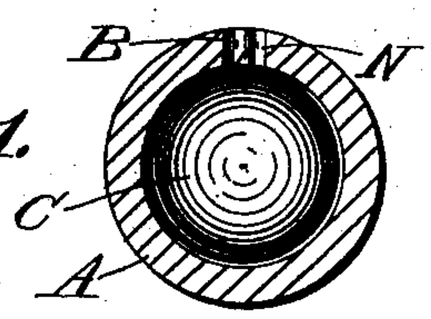


Fig. 2

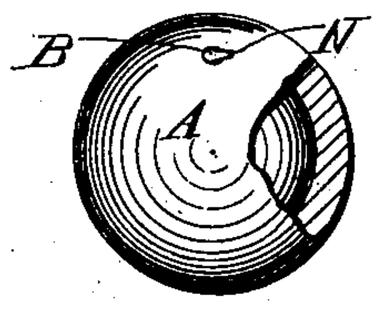


Fig. 3.

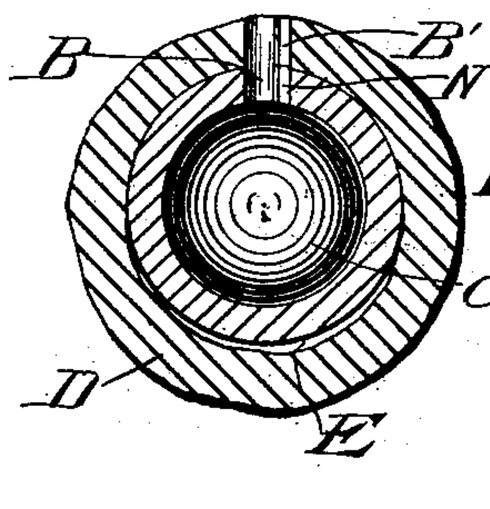


Fig. 4.

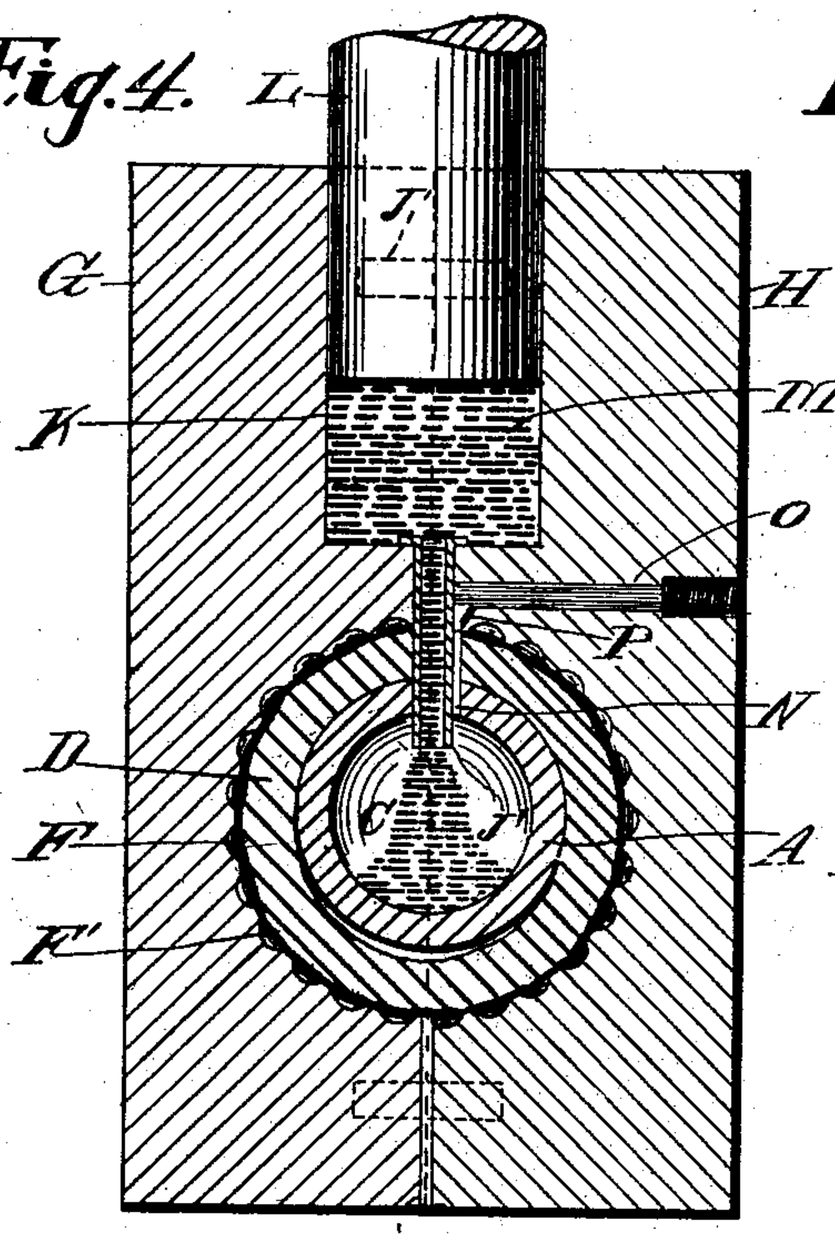


Fig. 5

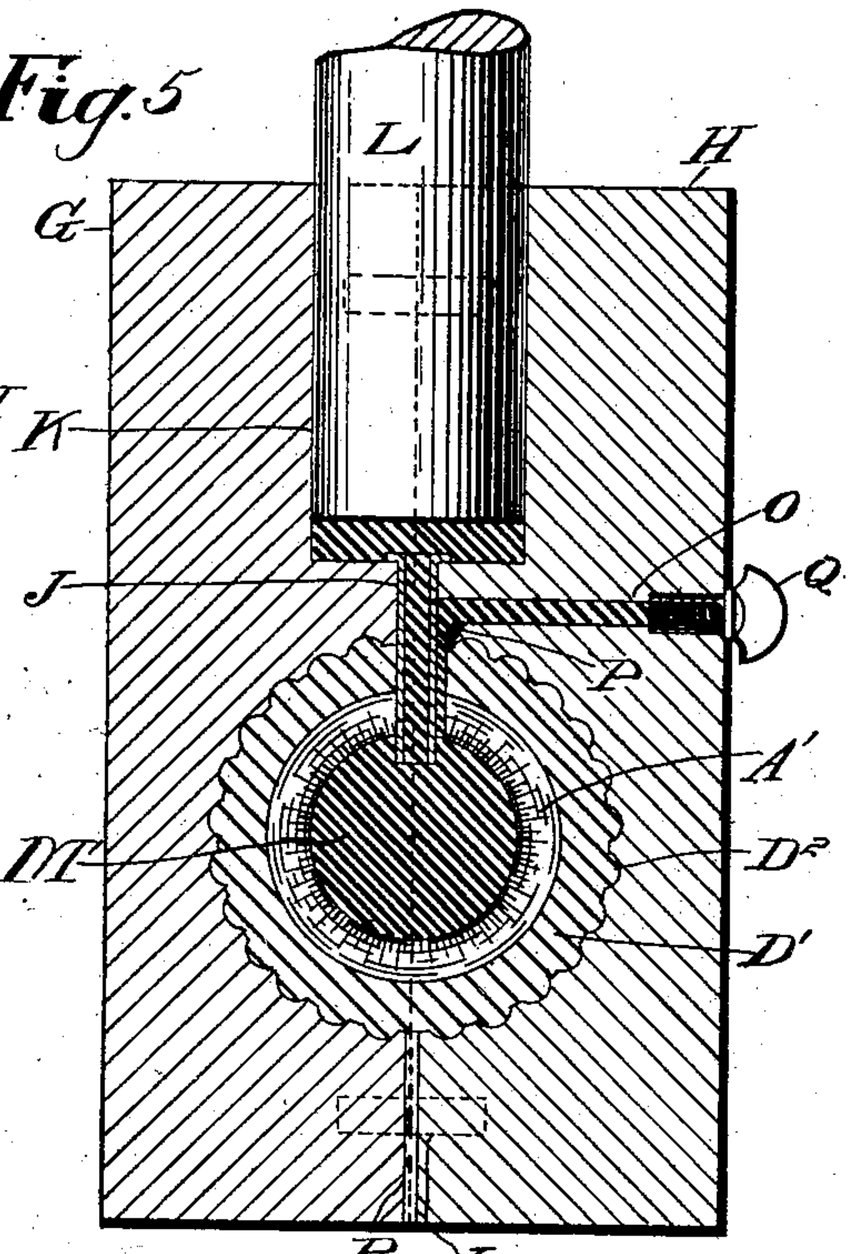
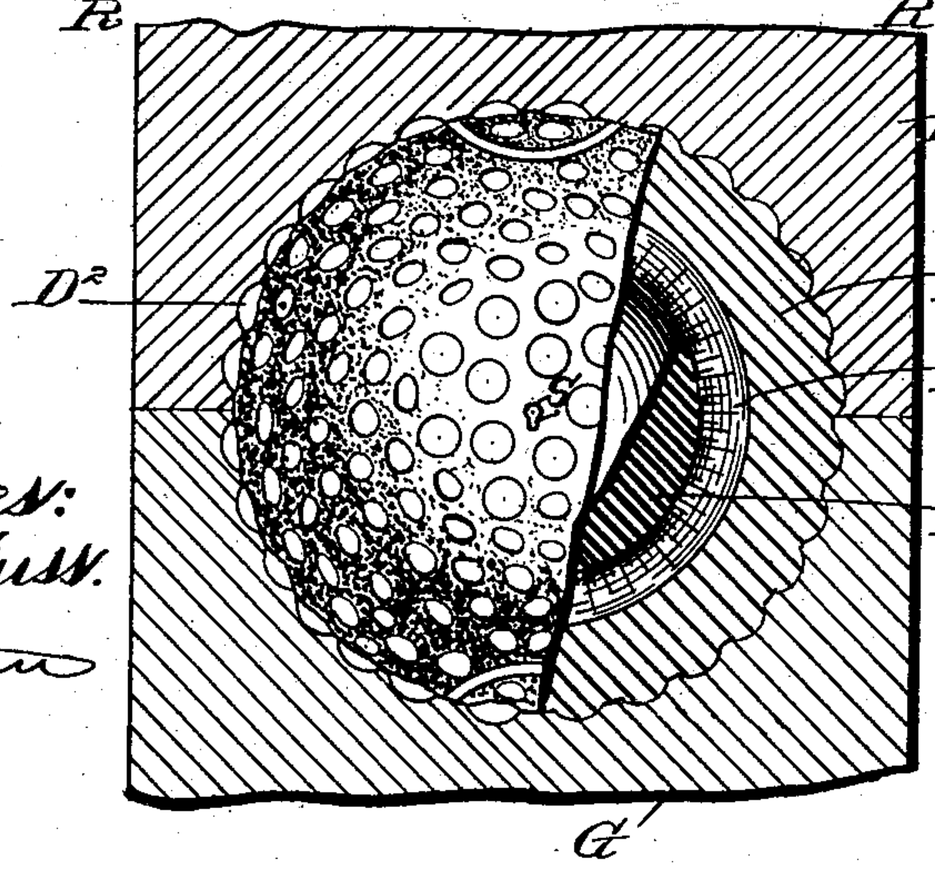


Fig. 6.



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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE KEMPSHALL MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

GOLF-BALL.

SPECIFICATION forming part of Letters Patent No. 701,617, dated June 3, 1902.

Application filed March 12, 1902. Serial No. 97,889. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Golf-Balls, of which the following is a specification.

This invention relates to balls such as used in golf and other games; and its object is to produce a ball which is capable of absorbing from an implement a great momentum and in which there is an improved and more uniform coöperative action between the several portions of the ball.

In Patent No. 696,353, granted to me March 25, 1902, a hard shell is formed upon a springy filling, the latter consisting of a rubber sphere expanded by gutta-percha, and the shell being preferably made of celluloid, which is tough, smooth, moisture-proof, springy, and durable, while the gutta-percha gives the ball the property of flying a great distance when struck a hard blow by an implement. In said patent the shell is illustrated as made in sections and while hot and plastic is compressed upon the core, causing the segments to weld, the shell being hardened under pressure and holding the core under compression, so that the condition of the ball throughout is tense, thus augmenting its effectiveness. In finishing the ball according to said patent the material of the shell works into the bramble marks or pits in the dies before the latter completely close, so that during the final portion of the die-closing action the brambles of the shell are shifted, particularly at the equatorial portion of the ball, there being thus a tendency to draw and tear the shell. Moreover, it is found difficult to properly close the dies which compress the shell upon the previously-formed core, owing to the tendency of the shell material to squeeze out between the approaching edges the dies, thus forming a flash or fin, and tending to interfere with the completion of the die action, especially if the die is made in more than two parts. By my present improvements these difficulties are overcome and the necessity of always making a shell in segments is avoided and the expense of production is decreased.

In the accompanying drawings, Figure 1 is a cross-section, and Fig. 2 a perspective, partly broken away, of one form of a rubber shell-blank. Fig. 3 illustrates a stage in the production of a ball. Figs. 4 and 5 illustrate later stages. Fig. 6 is a finished ball made in accordance with my present improvements and partly broken away so as to exhibit its construction.

In the several views similar parts are designated by similar characters of reference.

Preferably I employ a hollow sphere A, made of soft india-rubber, preferably a compound having firmness or toughness and highly vulcanized. An opening B may communicate with the hollow C of the sphere, which may be made either integral or otherwise. Upon this sphere I form loosely a thick coating or shell D of plastic material, such as gutta-percha or celluloid, preferably the latter. The shell D should be slightly undersize or smaller than the ball as subsequently completed. The more elastic sphere A may be still smaller in proportion, leaving an air-space at E between A and D. The latter may also have an opening B′ registering with B. I place the ball thus formed in a spherical chamber F, formed in a mold consisting of opposing halves G and H, having registering dowels J and clamped together by any suitable means. Each of said members G and H may have one-half of the chamber F, which is preferably somewhat larger than the celluloid ball D. The chamber is suitably figured, in this instance having bramble pits F′. Into the openings B B′, I insert the mouth of a funnel J′, which is shown as penetrating into the hollow C, although this is not important in all cases. By means of said funnel the interior C of the ball is placed in communication with a vessel or receptacle K, formed or provided in the apparatus above the chamber F, said receptacle preferably being round and having a closely-fitting plunger L. The blanks may be formed without the openings B and B′, and a pointed injector may be forced thereinto. I place in the recepta-

cle K a quantity of material, preferably gutta-percha, which may by the action of heat be reduced to a plastic or fluid condition, as at M, Fig. 4. This material flows down the funnel J′ into the hollow of the sphere A and drives out the air through a vent N, which in this instance is illustrated as a groove formed in the side wall of the main openings B and B′ and lying without the funnel J′. In the portion H of the mold there may be provided a vent O, communicating at P with the ball-vent N, so the air escaping from the ball may be conducted out of the apparatus. The fluid or plastic gutta-percha may therefore settle or be forced by the plunger L through the funnel J′, so as to completely fill the interior of the ball A, whereupon the vent O in the mold may be closed by a screw-plug Q, Fig. 5, the overflow of the material into or through said vent indicating to the workman that the hollow C has been filled. By means of suitable appliances the plunger L may be pressed still farther down, so as to force more of the filling material into the interior of the ball, causing the walls thereof to yield and expanding the shell until it not only fills the celluloid shell D, but also causes the latter to expand until it completely fills the chamber F in the mold. The heat of the mold renders the cellulold plastic, and it works into the bramble marks in the mold, and thus becomes embossed, as at Figs. 5 and 6. The air may escape from the chamber through a vent R. Sufficient force may be applied to the plunger L to subject the entire ball to great pressure, thereby compacting and improving the celluloid shell and subjecting the expanded rubber sphere to high compression. The gutta-percha or other filling material is allowed to pass from a liquid into a dry or hard condition while the plunger is still pressed down with great force, so that the expanded condition of both the rubber sphere and the celluloid shell is made permanent, as indicated at Figs. 5 and 6, the core being closely joined to the rubber and the latter to the shell. The mold may then be taken apart and the ball removed, the funnel J being withdrawn and the hole left thereby in the ball being filled with a celluloid or other plug S, Fig. 6. During the described operation the celluloid shell is expanded in all directions and caused to conform to the surface of the chamber F, and the brambles or other figures D^2 are gradually formed upon the periphery of the ball, and since there is no movement of the dies there is no tendency to tear any of the brambles from the shell, nor is the material of the shell itself likely to be torn or unduly thinned at any point. On the contrary, the pressure of the fluent mass is uniform in all directions throughout the interior of the shell, while owing to its elasticity the rubber tends to compensate for any unevenness or irregularity in the form of any of the parts. Since great pressure may be produced by said plunger, the shell may be thoroughly compacted, thereby conducing to its toughness, durability, and springy properties, which are of great value in golf-balls. By reason of the fluent mass of gutta-percha being maintained at high pressure while the portion thereof within the shell, as well as the shell itself, cools or hardens the quality of the ball is improved. The core M′ differs from a gutta-percha core which is compressed by dies in that it is in a more nearly uniform condition throughout, while the celluloid of the shell is compacted in radial directions all over the ball, and hence possesses an evenness of texture not present in externally-compressed shells, in finishing which all the pressure is applied in a single direction only, as in said patent, whereby some portions of the shell, as at the poles, are more highly compacted than other portions, as at the equator or weld-line.

Preferably the gutta-percha in the receptacle K is kept hot as well as under great pressure during the hardening of all or the principal portion of the celluloid shell and also during the hardening of the major portion of the core, the latter cooling first at its exterior and then gradually hardening toward the center. By this means the core is not only solidified, but also put in a condition of permanent compression, in which condition it is held by the hardened celluloid shell. Not only is a ball thus produced extremely compact or solid, but it will also be understood that the shell D′ powerfully grips the filling and that the material of the ball from center to periphery is in an abnormal condition. The compressed core effectually maintains the shell in a true spherical form and immediately and powerfully resists distortion thereof by a blow and by reaction aids in speeding the ball when struck by an implement. Thus an extremely active and powerful ball is produced. Moreover, the ball is not unduly sensitive to a light touch from an implement, which renders it even more desirable for the game of golf. The original celluloid shell-blank D may be either jointed or seamless.

The material of the shell may be of any desired compound of celluloid or kindred material or of any other suitable plastic material, and it is not necessary in all ways of practicing my invention that the shell consist wholly of plastic material.

Other modifications and variations may be resorted to within the scope of my invention.

The herein-described process is made the subject-matter of my pending application, Serial No. 98,557, filed March 17, 1902.

Having described my invention, I claim—

1. A playing-ball comprising a shell of hard, wear-resisting material distended by a mobile mass of solid material injected thereinto; a layer of solid rubber intervening between said shell and said injected mass.

2. In a playing-ball, a spherical shell consisting at least partially of celluloid and dis-

tended by plastic material injected thereinto; a layer of tensioned solid rubber intervening between said shell and said injected mass.

3. In a playing-ball, a shell formed of hard wear-resisting material and distended by a core of gutta-percha injected thereinto; a seamless layer of solid rubber intervening between said shell and said injected mass.

4. In a playing-ball, a shell formed at least partially of celluloid and distended by a core of gutta-percha injected thereinto; a layer of solid rubber intervening between said shell and said injected mass.

5. In a playing-ball, a shell formed of plastic material and distended by a core of plastic material injected thereinto; a layer of solid rubber intervening between said shell and said injected mass.

6. In a playing-ball, an embossed shell formed of celluloid and distended by a gutta-percha core injected thereinto; a layer of solid rubber intervening between said shell and said injected mass; and a plug filling the injection-hole in the shell and rubber layer.

7. A playing-ball comprising a seamless or continuous embossed shell of plastic material distended by a core of plastic material injected thereinto; a layer of solid rubber intervening between said shell and said injected mass.

8. In a playing-ball, a seamless or continuous shell of celluloid distended by a mass of mobile material injected thereinto; a layer of tensioned solid rubber intervening between said shell and said injected mass.

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