No. 695,866. Patented Mar. 18, 1902.

E. KEMPSHALL.

GOLF BALL.

(Application filed Sept. 25, 1901.)

(No Model.)

Fig. 1.

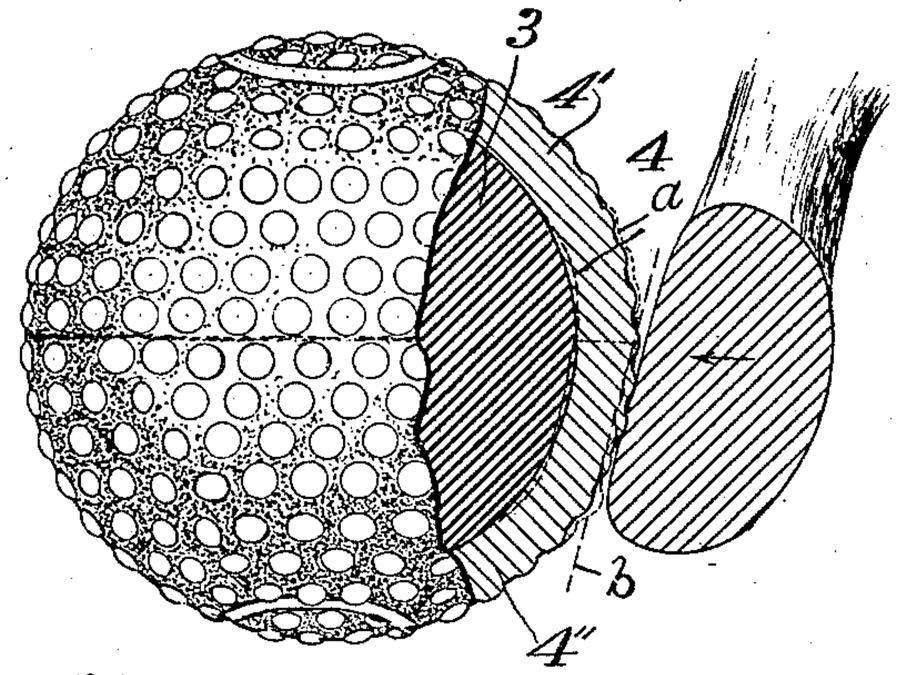


Fig. 3.

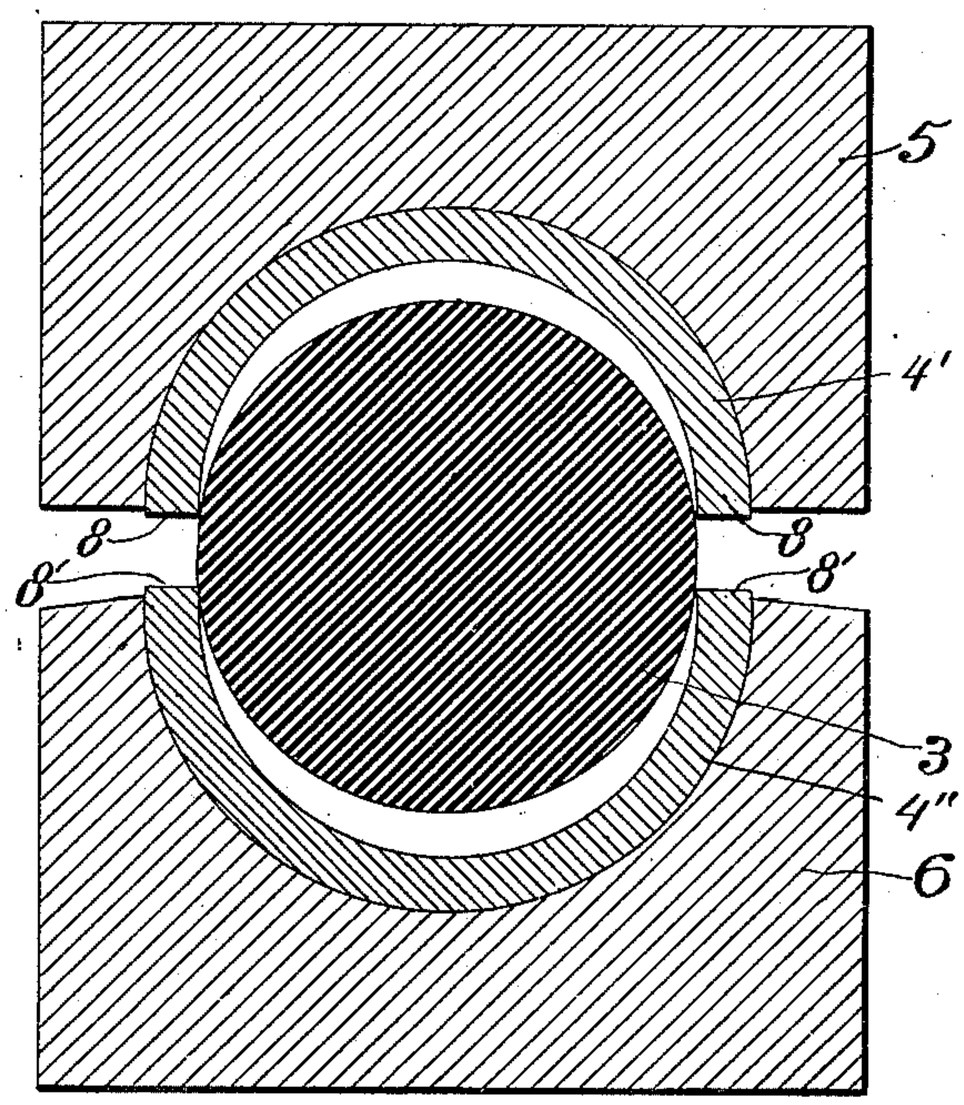
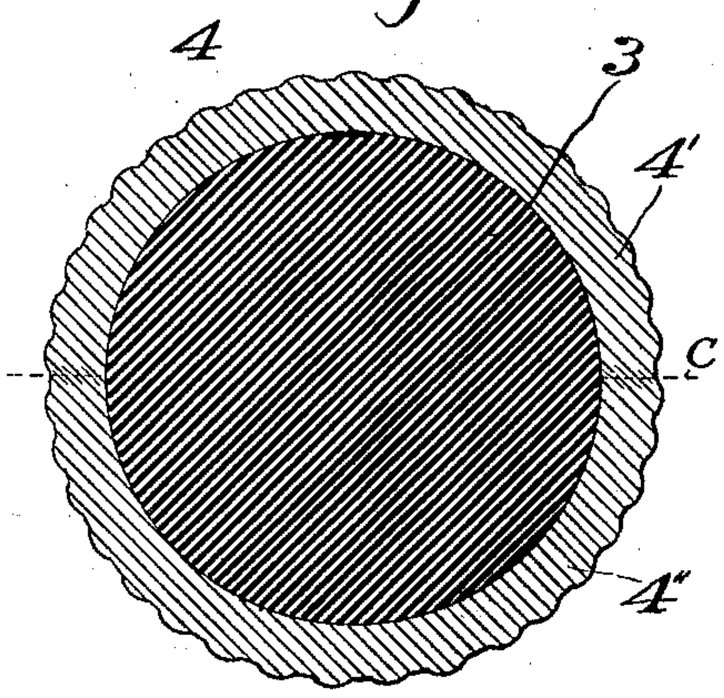


Fig. 2.



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UNITED STATES PATENT OFFICE.

ELEAZER KEMPSHALL, OF BOSTON, MASSACHUSETTS.

GOLF-BALL.

SPECIFICATION forming part of Letters Patent No. 695,866, dated March 18, 1902.

Application filed September 25, 1901. Serial No. 76,814. (No model.)

To all whom it may concern:

Be it known that I, ELEAZER KEMPSHALL, a citizen of the United States, residing in Boston, in the county of Suffolk and State of Massachusetts, 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 certain other games; and its object is to produce uniformly and at low cost balls of improved quality, durability, and efficiency.

According to my present improvements the ball is constructed with a relatively hard or stiff but springy shell, which is molded and compressed upon an elastic substance and grips or holds the latter under compression, whereby the shell is elastically supported against distortion produced by a blow.

Referring to the accompanying drawings, Figure 1 is a view, partly in section, of a ball made according to my present improvements and by diagrammatic lines illustrating the distorting effect of a blow. Fig. 2 is a sectional view of the ball, and Fig. 3 illustrates the preferred method of manufacturing the balls.

Similar characters of reference designate like parts in the figures.

The shell of the ball consists of a relatively hard but springy material, while the center or filling consists of a relatively soft substance, elastic in all directions. For the filling I employ any suitable material, such as rubber of suitable consistency, but preferably gutta-percha or one of its substitutes.

I prefer to produce a center piece (designated by 3) of the required size and shape by means of suitable dies operated by sufficiently powerful presses. This center piece or filling is preferably somewhat too bulky for the capacity of the finished shell. The shell 4 I preferably form in two semispherical segments, (designated in Fig. 3 by 4′ and 4″, respectively.) The previously-formed center piece 3 is placed between said segments, and these assembled parts are placed between forming-dies—as, for instance, 5 and 6—whereupon the dies are brought together by means of suitable mechanism, whereby the shells are forced together until their edges are in intimate contact. The material of the half-shells is in proper condition for the adherence of their edges under pressure, and when required the dies may be heated by steam or otherwise for bringing the material of the segments into suitable condition and consistency for uniting them and completing the shell. The abutting edges of the original segments at 8 and 8′ may be made somewhat full, thereby to furnish material for properly forming the weld or joint between them as they are subjected to the final compression, at which operation the ball is finally shaped, and at the same time the material of the shell is compressed between the dies and the resisting mass 3 within the shell. Since this central portion is first prepared somewhat oversize and the shell is compressed over the same, as explained, the resistance of said central portion while under such compression furnishes a substantial support for sustaining the relatively thin shell against the pressure of the forming-dies. By properly sizing the center pieces the shells when being finished may be sustained against any necessary degree of pressure of the dies, and to this end the original bulk of the filling should be such as to exceed or tax the capacity of the finished shell, although it is obviously immaterial, so long as the filling of the finished ball is in the requisite cramped or compressed condition, how its bulk compares with its original bulk, the condensation of the filling being an incident in the process of putting the filling under compression and its extent depending upon the presence or absence of porosity or other qualities of the material used for the filling.

I prefer to subject the heated and softened celluloid to great pressure by means of the dies, thereby to solidify and toughen the shell. The inner mass or filling prevents collapse of the shell under such great pressure, and also is itself compressed by the dies and thereafter held under permanent compression or gripped by the toughened shell. A ball thus produced is not only waterproof, fast color, and practically indestructible, but also drives a phenomenal distance and is excellently adapted to the game of golf. I overcome the defect of prior golf-balls of being easily cut

by a blow from an implement. The ball cannot be easily knocked out of shape, as is the case with former golf-balls.

An important feature of my improvement consists in compressing a hard wear-resisting shell, which may be relatively thin, upon a softer but highly-resisting core, so as to reduce somewhat the bulk of the ball, solidify the material of the shell, and put the core under compression by the shell. Preferably the core forms the larger portion of the bulk of the ball. The compression of the ball is maintained while the shell cools and hardens, so that the latter may hold the core under permanent compression. The shrinking of the celluloid, which continues for a very long time after the ball is completed and even after it goes into the hands of the player, tends to reduce the capacity of the shell, so that the latter is still further strained or tensioned upon the filling, and hence rendered still more effective, while the filling is still further cramped or compressed, thus further enhancing the efficiency of this portion of the ball. So long as both shell and core are in a tense condition important objects of my invention are attained, whether or not the filling material is of such a coarse quality as to be perceptibly condensed in bulk by reason of the compressive tendency or grip of the shell, the efficiency of the ball arising not from mere condensation of bulk of the core, but depending rather upon the tense condition of core and shell, which is due to the compression or to the grip of the latter upon the former. It is to be understood that in case condensation of the bulk of the core takes place at the operation of compressing the shell upon the core it is due to the presence of air-spaces or impurities in the material. It is not essential in all cases that the core be condensed in bulk so long as when the ball is finished the core is gripped by the shell.

My present improvements in construction and method are applicable not only to golf-balls, but also to balls for use in playing billiards and analogous games, and it will be understood that the thickness of the shell and also the firmness and relative size of the center pieces may be varied in accordance with the requirements of any particular game or use for which the balls may be employed.

I usually make the exterior surface of golf-balls pebbled or corrugated to any design or configuration which may be preferred by the players. In Figs. 1 and 2 the balls are represented as furnished on the exterior surface with relatively slight elevations of a spherical conformation. In Fig. 3 these undulations have been omitted, and in billiard-balls of course the outer surface should usually be a smooth and true spherical surface.

For a golf-ball the shell is preferably made of celluloid, which is stiff and springy, and hence highly desirable for use in this game, while the interior is preferably made of gutta-percha. The object of such a combination is to produce a twofold springiness in the ball, or, in other words, to enable the elasticity of the filling to coöperate with the springiness of the shell, so as to instantly restore the latter to its normal shape after distortion by a blow. The elasticity of the filling or its promptness in recovering from a blow is greatly augmented by having it under compression, since the outward pressure thereof tends constantly to cause the shell to assume a spherical shape, or, in other words, outward pressure, such as caused by compression, is of material assistance in enabling the ball to spring instantly back to its original shape, and hence rebound when thrown against an object, as well as to fly more rapidly and for a greater distance when struck by an implement. It will thus be seen that one of the important features of the invention consists in causing the springiness of the shell and the elasticity of the filling to coöperate in producing a ball of greatly-increased efficiency.

In using the term "celluloid" I refer to celluloid compounds generally and do not limit myself to any particular variety of such compound or to any particular grade or mixture of celluloid composition.

Many variations in material, construction, arrangement, and method may be resorted to within the scope of my invention.

The improved method or process herein described is made the subject-matter of my divisional application filed November 15, 1901, Serial No. 82,358.

Having described my invention, I claim—

1. A playing-ball comprising a relatively stiff, springy, substantial shell of compressed plastic material, and a core of solid, elastic material strongly gripped thereby.

2. A playing-ball comprising a stiff, springy shell of compressed plastic material, and a filling consisting wholly or largely of gutta-percha and held under compression by said shell.

3. A playing-ball comprising a stiff, springy shell of compressed plastic material, and a filling consisting wholly or largely of gutta-percha and held under compression by said shell; said core forming the larger portion of the bulk of the ball.

4. A playing-ball comprising a shell of compressed hardened plastic material and a springy core held under compression thereby.

5. A playing-ball comprising a shell and a filling, said shell consisting of welded segments of stiff, springy material, and said core consisting of softer springy material held under compression by said shell.

6. A playing-ball comprising a shell consisting largely or wholly of celluloid, and a filling consisting largely or wholly of gutta-percha held under compression by said shell.

7. A playing-ball comprising a springy, solid, relatively soft core and a shell consisting largely or wholly of celluloid compressed upon the core.

8. A playing-ball comprising celluloid shell-segments welded together and a core of solid, elastic material gripped or held under compression thereby.

9. A playing-ball comprising a shell consisting of welded segments of celluloid, and a core consisting largely or wholly of gutta-percha and held under compression by said shell.

10. A playing-ball comprising a shell consisting of hemispherical welded segments of celluloid, and a core consisting largely or wholly of gutta-percha and held under compression by said shell.

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