No. 696,887. Patented Apr. 1, 1902.

E. KEMPSHALL.

GOLF BALL.

(Application filed Nov. 23, 1901.)

(No Model.)

Fig. 1.

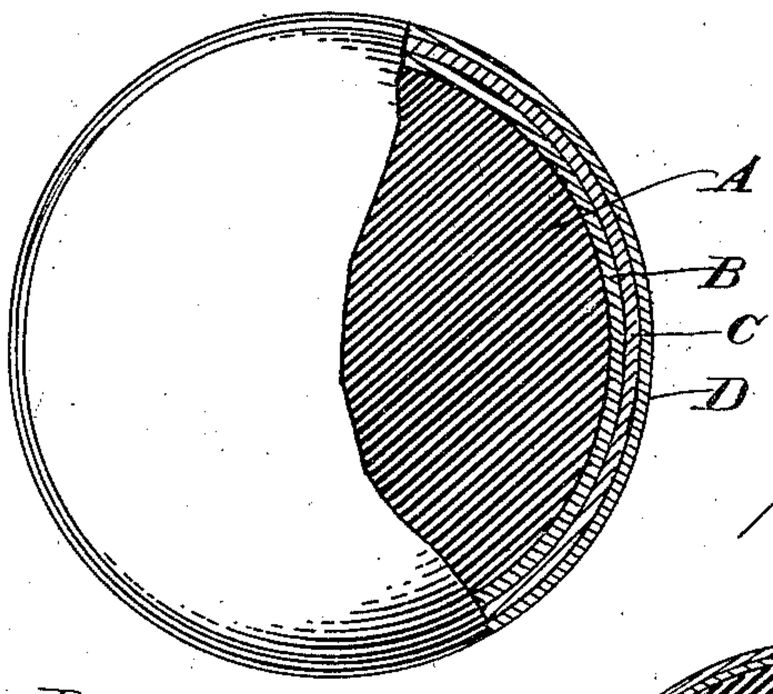


Fig. 2.

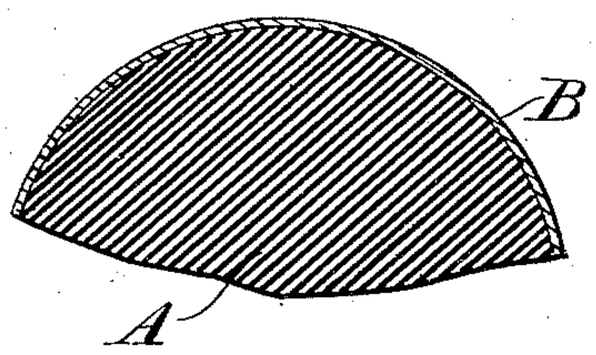


Fig. 3.

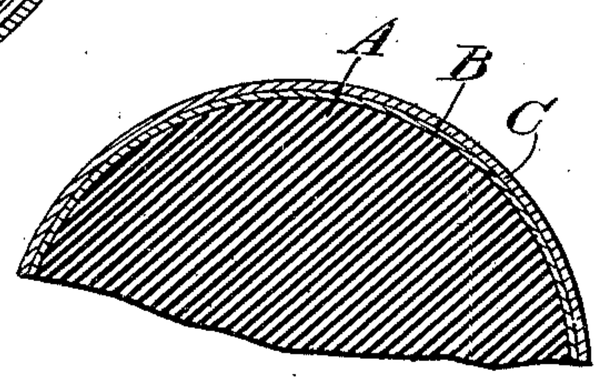
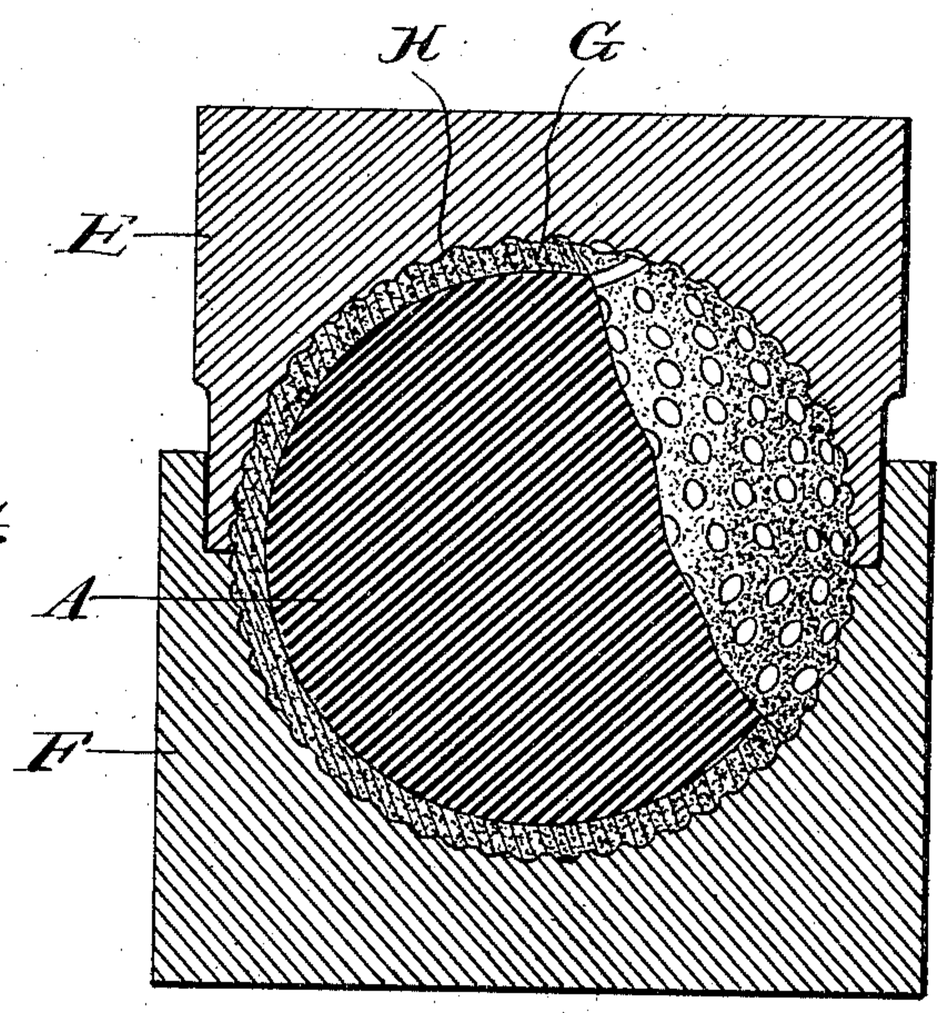


Fig. 4.



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UNITED STATES PATENT OFFICE.

ELEAZER KEMPSHALL, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE KEMPSHALL MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

GOLF-BALL.

SPECIFICATION forming part of Letters Patent No. 696,887, dated April 1, 1902.

Application filed November 23, 1901. Serial No. 83,356. (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 playing-balls, and especially to the variety thereof used in the game of golf; and its objects are to improve the construction and increase the durability of the ball and also to reduce the cost of its manufacture.

In my pending application, filed September 25, 1901, Serial No. 76,814, is illustrated a ball constructed with a celluloid shell and filled with gutta-percha, which is held under compression by the shell, the constant elastic outward pressure of the core tending to restore the spherical shape of the ball when distorted by a blow, so that the core not only affords a yielding backing for the shell, but also coöperates therewith to enhance the liveliness or flying power of the ball. In said application I illustrate the shell as made of hemispherical segments, which when hot are compressed over a core, the edges of the segments being welded or fused together and forming a complete shell, the compressing and heating operation serving a threefold purpose—viz., to weld the segments together, to solidify and toughen the celluloid, so that it becomes practically indestructible, and also to place the core under compression. In producing balls in accordance with the invention set forth in said application care is taken to form a perfect weld at the joint of the segments, so as to insure that the shell will not split open at the joint when subjected to severe usage in the game. Care is also taken to prevent the mass confined within the shell-segments from squeezing out between the edges thereof at the compressing operation, since the presence of gutta-percha upon the edges tends to interfere with the welding thereof. It is also found that the heating to which the green segments are subjected at the compressing operation tends to liberate or volatilize a portion of their substance upon the inner side of the shell, where it may subsequently react and tend to weaken or deteriorate portions of the shell itself. Moreover, the raw celluloid must first be reduced to sheet form and then cut up into sections and then formed into shell-segments, all of which operations incur expense.

One purpose of my present improvements is to make a seamless shell and not only obviate the necessity of carefully welding the thin edges of the segments together, but also producing a shell which is not liable to split open at the joint, since there is no joint. I also save the cost of first forming the raw celluloid compound into sheets, then cutting the sheets into disks, and then cupping them, so as to form segments. Moreover, I minimize the liability of any portion of the celluloid compound volatilizing within the shell, so that injury to the latter from this source is practically eliminated.

In the accompanying drawings, Figure 1 is a view, partly broken away, of an unfinished ball. Fig. 2 is a fragmentary view illustrating the condition of the ball at an early stage in its manufacture. Fig. 3 is a view similar to Fig. 2, showing the ball at a later stage, but before it arrives at the Fig. 1 condition; and Fig. 4 shows the ball compressed to size in heating and finishing dies.

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

I prefer to produce a compressed central piece or filling A of the required size and shape by means of suitable dies. This central piece is preferably somewhat too bulky for the capacity of the finished shell. Upon this center piece I apply a coating of material B, as at Fig. 2, said coating completely enveloping the core A and consisting of a thick or dense solution of celluloid or composition thereof which is in such a plastic or liquid condition that it may be spread over the core in a substantially even and somewhat thin layer. In practice I find that if this coating is one one-hundredth of an inch, more or less, in thickness it may answer the purpose. The coating is then allowed to dry to a sufficient extent, so that it can be handled safely. This drying effects a preliminary seasoning of the coating material. It will be understood that the material dried out or evaporated from this coating cannot at the subsequent heating and finishing op-

eration work into the interior of the ball to the detriment thereof. When said coating B has become sufficiently hardened, I apply a second coating C, Fig. 3, over the ball, which in turn is allowed to dry until it attains the required firmness. I then apply a third coating D, which is likewise allowed to dry. In this manner one or more additional layers may be successively applied, according to the style of ball in hand. In practice I find that three layers, or at the most four layers, produce a shell of satisfactory qualities when the ball is intended for use in the game of golf, provided that the shell so built up is supported upon a center or core of suitable material and having the proper firmness. The ball thus built up is placed in finishing-dies E and F, Fig. 4, and subjected to both heat and compression. In practice I prefer that the ball when placed in the dies shall be somewhat oversize, so that as the die-sections are brought together they compress the ball, thereby effecting a twofold purpose—first, to compress the core, so that it may always exert an outward elastic pressure upon the finished shell, and, second, to subject the material of the shell to compression as well as heat, thereby solidifying the material of the shell itself, so that it may have the qualities of resistance, firmness, indestructibility, and springiness, which are desirable in a golf-ball. The heat and pressure may be applied for a considerable period, so that the ball may be well seasoned.

The heating of the dies by softening the coatings B, C, and D not only insures the kneading or welding of such coatings into one integral shell G, but also facilitates the flowing of the material, so that the shape of the dies is imparted to the finished ball. After being removed from the press the dies may be allowed to cool before the balls are taken out, so that the latter when removed are sufficiently hardened to retain their shape. Thus it will be seen that the shell is made without any seam or joint, and hence is well adapted at all points to withstand shocks from the blow of an implement or from being driven against a stone. At the same time the ball is not subject to internal deterioration from the presence of gas or other matter escaping into the interior of the ball during the heating. Moreover, the necessity for first rolling the celluloid into sheets and then cutting the sheets into disks and cupping them is avoided, and the trouble and expense of securing a perfect weld between the shell-joints are also avoided.

One important advantage of my celluloid shell resides in its quality of retaining its original color throughout all the severe usage which it receives in a game. Another advantage resides in its springiness, so that it is of material value in imparting liveliness to the ball or increasing its flying or driving power. It imparts to the ball a solidity, stiffness, and springiness which it has heretofore been found impracticable to secure.

My compressed core gives the shell a good backing at all points and tends to prevent such indentations of the shell by an implement as would cause the shell to crack.

My celluloid shell is not only practically indestructible, but is at the same time so smooth that it offers little resistance to the air in its flight. It drives farther than any ball heretofore produced, while on account of its slipperiness it easily travels through grass, and is hence excellently adapted to the game.

My shell overcomes the defects of prior golf-balls of being easily cut by a blow from an implement. It is practically indestructible from such causes. It cannot be knocked out of shape, as is the case with former golf-balls. It does not succumb to the heat of the hottest summer day, whereas prior golf-balls are softened and spoiled by warm weather. I believe I am the first either to inclose a core in a seamless celluloid shell or to compress such shell upon the core or to make a relatively thin shell of a number of celluloid layers successively applied thereto and fused or welded together.

It will be understood that the resistance of the central mass at the compressing operation furnishes a substantial support for sustaining the relatively thin shell against the pressure of the forming-dies and coöperates with the latter in producing the desired density or firm, tough, and springy texture of the shell.

In using the term "compression" herein as applied to the core or filling I refer to the compressive tendency of the shell, which may or may not be accompanied by a condensation of the bulk of the filling, the presence or absence of such condensation depending upon the character of the material used and upon the degree of pressure employed in finishing the ball. It is to be understood that in case condensation of the bulk of the filling takes place it is due to the presence of air-space or impurities in the material. The shrinking of the celluloid shell continues for a very long time after the ball is completed and even after it goes into the hands of the player and tends to reduce further the capacity of the shell, so that the latter is still further strained by tension upon or around the ball, and hence renders the ball more effective, while the filling becomes still more cramped or compressed or is more powerfully gripped by the shell, thus further enhancing the efficiency of the ball. When using the term "seamless" herein, I mean to distinguish between my celluloid shell and one made from hemispherical or other segments which have seams extending in a radial direction, or, in other words, I mean that my said shell is radially seamless.

In using the term "celluloid" I refer to celluloid compounds generally and do not

limit myself to any particular variety of such compound nor to any particular grade or mixture of celluloid composition.

I usually pebble or score the exterior surface of golf-balls, the interior surface of the dies being provided with depressions at H for this purpose. In billiard-balls, to which some features of my invention are applicable, the outer surface should usually be a smooth and true sphere.

Variations in construction, material, method, and other particulars may be resorted to within the scope of my present improvements.

The improved method or process herein set forth is made the subject-matter of my pending application, Serial No. 83,355, filed November 23, 1901.

Having described my invention, I claim—

1. A playing-ball comprising an elastic filling, and a hard, springy, substantial seamless shell formed from plastic material and compressed upon said filling and powerfully gripping the latter.

2. A playing-ball comprising a relatively soft elastic filling and a compressed seamless substantial celluloid shell.

3. A playing-ball comprising a filling held under compression by a relatively hard, springy, substantial, seamless shell.

4. A playing-ball comprising a soft filling held under compression by a seamless, substantial celluloid shell.

5. A playing-ball having a filling consisting at least partially of gutta-percha, and a substantial seamless shell formed at least partially of plastic material and compressed upon said filling, and powerfully gripping the latter.

6. A playing-ball comprising an internal mass of gutta-percha and a compressed seamless celluloid shell thereon holding said gutta-percha under compression.

7. A playing-ball comprising an internal mass of gutta-percha and a seamless celluloid shell, said gutta-percha being held under compression by said shell.

8. A playing-ball comprising an elastic filling and a relatively thin, hard, springy shell consisting of a plurality of seamless layers and holding said filling under compression.

9. A playing-ball comprising an elastic filling and a relatively thin, hard, compressed, springy shell consisting of a plurality of layers welded or fused together and holding said filling under compression.

10. A playing-ball comprising an elastic filling and a relatively thin, springy shell consisting of a plurality of seamless layers welded or fused together, said filling being softer than said shell.

11. A playing-ball comprising a relatively soft compressed elastic filling and a relatively thin, hard, springy shell consisting of a plurality of layers formed from plastic material, said filling being held under compression by said shell.

12. A playing-ball comprising a relatively soft, springy nucleus over which is compressed a seamless celluloid shell.

13. A playing-ball consisting of a relatively soft nucleus over which is compressed a shell consisting of a plurality of seamless layers, each layer consisting at least partially of celluloid.

14. A playing-ball having an internal mass of gutta-percha and a relatively thin, seamless celluloid shell compressed upon said mass and holding the latter under compression.

15. A playing-ball having an internal mass of gutta-percha and a relatively thin shell consisting of several layers of celluloid compressed upon said mass and holding the latter under compression.

16. A playing-ball having an internal mass of yielding material and a relatively thin shell consisting of several seamless layers of celluloid compressed and welded or joined together and holding said internal mass under compression.

17. A playing-ball comprising a springy nucleus and a plurality of shell layers formed of plastic material and powerfully gripping said nucleus.

18. A playing-ball comprising a springy nucleus and a plurality of shell layers formed of plastic material and powerfully gripping said nucleus, each of said layers consisting at least partially of celluloid.

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