No. 695,813. Patented Mar. 18, 1902.

E. KEMPSHALL.

MANUFACTURE OF GOLF BALLS.

(Application filed Dec. 18, 1901.)

(No Model.)

Fig. 1.

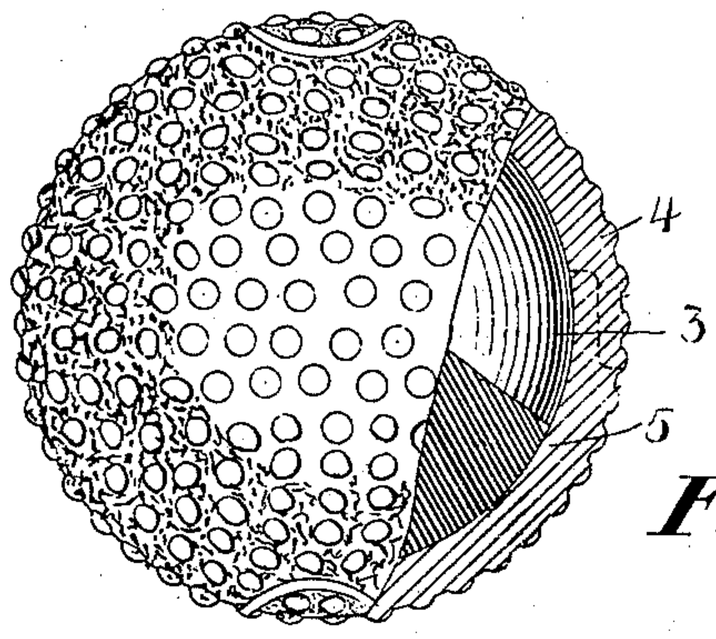


Fig. 3.

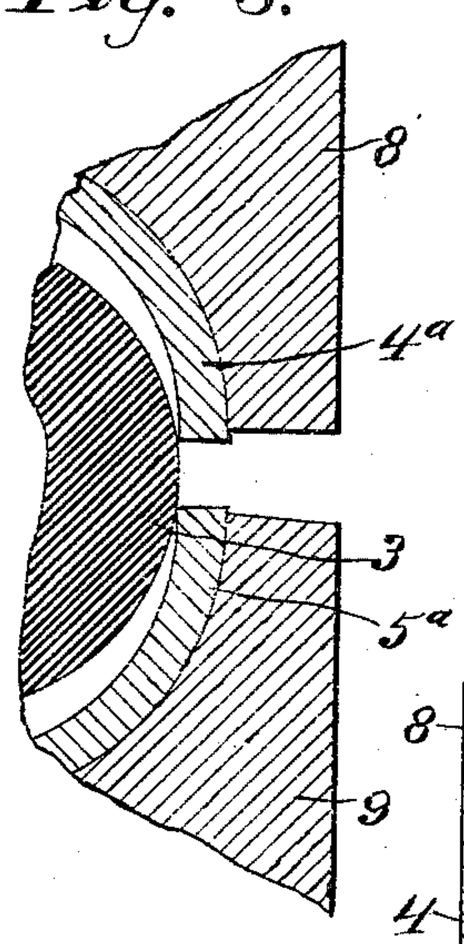


Fig. 4.

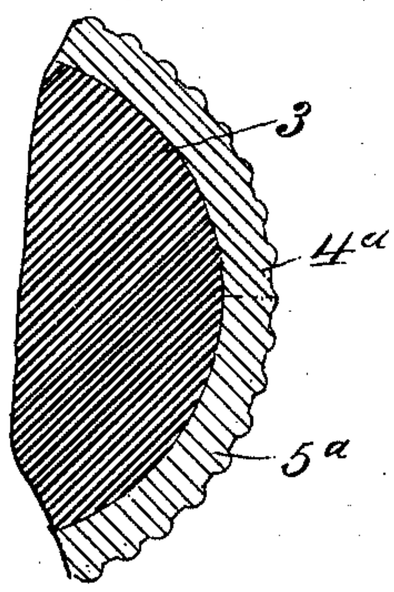
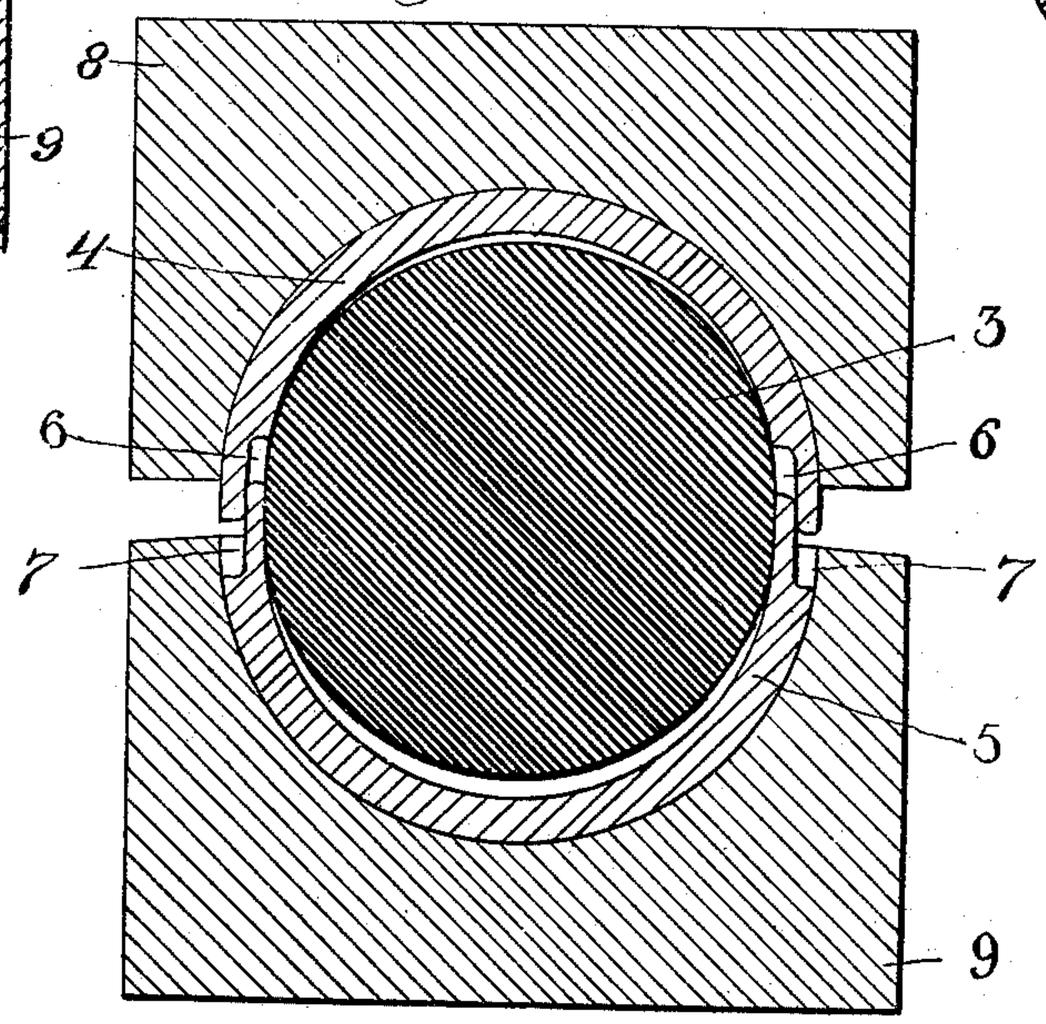


Fig. 2.



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ELEAZER KEMPSHALL, OF BOSTON, MASSACHUSETTS.

MANUFACTURE OF GOLF-BALLS.

SPECIFICATION forming part of Letters Patent No. 695,813, dated March 18, 1902.

Application filed December 18, 1901. Serial No. 86,348. (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 the Manufacture of Golf-Balls, of which the following is a specification.

This invention relates to balls such as used in golf and certain other games.

I construct a ball with a relatively hard or stiff but springy shell, which is filled with an elastic substance that is held under compression by the shell, whereby the latter is supported against distortion produced by a blow, the constant elastic outward pressure of the core tending to maintain the shell in spherical shape and coöperating with the natural springiness of the shell to enhance the efficiency of the ball. The material of the core is preferably gutta-percha and that of the shell preferably celluloid, and in manufacturing such balls I preferably make the core oversize, compress the shell-segments thereover, and cause the latter to adhere to each other. In the preferred manner of practicing my invention the sections of the shell are lap-jointed, thus enabling one section to close over the opposing section before pressure is exerted upon the inner body or core of the ball, thereby opposing or counteracting the tendency of the core to squeeze out under some conditions between the edges of the shell-sections when the pressure is applied. Moreover, the shell-sections present large meeting surfaces to each other and a strong joint is made.

Referring to the accompanying drawings, Figure 1 is a view, partly in section, of a ball made according to my present improvements. Fig. 2 illustrates the preferred method of manufacturing the balls. Fig. 3 illustrates shell-segments provided with butt edges, and Fig. 4 shows a fragment of a ball completed according to Fig. 3.

Similar characters of reference designate like parts in the figures.

The shell of the ball consists of a relatively hard but springy material, such as celluloid, 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.

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 too bulky for the capacity of the finished shell. The shell I preferably form of two semispherical segments. (Designated in Fig. 2 by 4 and 5, respectively.) Along its bottom edge the upper segment 4 is internally recessed at 6, the top edge of the lower segment 5 being externally recessed at 7 to match, so that the upper segment fits upon the lower like a lid upon a box, the recessed edges thus forming a lap-joint. The previously-formed center piece 3 is placed between said segments, and these assembled parts are placed between forming-dies—as, for instance, 8 and 9—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 edges may be cemented or the material of the segments may be otherwise put in proper condition for the adherence of said 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. As will be observed at Fig. 2, the edges of the shell preferably lap before pressure is put upon the core, so that the latter is prevented from squeezing out during the compressing action of the dies. The parts may be so proportioned that by the time the shell is fully closed the core will have been given the requisite compression, and the cement previously applied to the edges may be relied upon in some cases to hold the shell-segments together. Preferably, however, the lapping edges of the segments are made somewhat full, thereby to furnish material for properly forming the 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 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 central piece 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 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 a mere 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. By the provision of lap-joints a large increase in the area of welding-surface is secured, so that the segments are more securely knit together at the compressing operation and the liability of the joint opening at the impact of a playing implement is minimized.

At Fig. 3 I illustrate shell-segments 4^a and 5^a, similar to those shown at Fig. 2, except that they have plain or butt edges, and at Fig. 4 is shown a completed ball whose shell is made from the segments shown at Fig. 3. Shell-joints may be made in this and other ways, and in some instances the shell may be otherwise formed within the scope of my invention; but I prefer to use segments, especially those having lap-joints, and particularly the kind of lap-joint illustrated at Fig. 2. It will be understood that by proper attention to sizing the center piece and shell the ball illustrated at Figs. 3 and 4 may be formed without undue trouble arising from the tendency of the filling to squeeze out between the approaching edges of the segments. The compression of the ball is maintained while the shell cools and hardens, so that the latter may hold the core under permanent compression.

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. The balls are represented in Fig. 1 as furnished on the exterior surface with relatively slight elevations of a spherical conformation. 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 great 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. 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 3 is of such a coarse quality as to be perceptibly condensed in bulk by reason of the compressive tendency 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.

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.

The form and number of the segments may be varied within the scope of the present invention.

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 pressure and also is itself compressed by the dies and thereafter held under permanent compression 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 novel method or process consists in compressing a hard

wear-resisting shell, which may be relatively thin, upon a highly-resisting elastic 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.

The herein-described lap-jointed playing-ball is made specifically the subject of my pending application, Serial No. 79,774, filed October 24, 1901. In my other pending application, Serial No. 76,814, filed September 27, 1901, broad claims are made to all variations of my improved ball, including those illustrated in the several figures herein.

Having described my invention, I claim—

1. A process in producing playing-balls, consisting in forcing lap-jointed shell-segments together over a filling whose original bulk exceeds the capacity of the shell, so as to compress said filling.

2. A process in producing playing-balls, consisting in forcing lap-jointed shell-segments over a filling whose original bulk exceeds the capacity of the shell, so as to compress said filling.

3. A process in producing playing-balls, consisting of inserting within lap-jointed shell-segments an elastic mass whose original bulk exceeds the capacity of the finished shell, forcing the segments together, and causing their contacting portions to adhere.

4. A process in producing playing-balls, consisting of inserting within lap-jointed shell-segments an elastic mass whose original bulk exceeds the capacity of the finished shell, forcing the segments together, causing their contacting portions to adhere, and compressing the shell to size.

5. A process in producing playing-balls, consisting in inserting within lap-jointed shell-segments an elastic mass whose original bulk exceeds the capacity of the finished shell, forcing the segments together, and heating the contacting edges of the segments.

6. A process in making playing-balls, consisting in making a filling of elastic material formed oversize, making a shell in lap-jointed segments, uniting the shell-segments, and compressing them together upon the filling so as also to compress the latter, so that said filling may resist distortion of the shell when the ball is in use.

7. A process in making playing-balls, consisting of making a filling of gutta-percha whose original bulk is too great for the capacity of the finished shell, making lap-jointed spherical celluloid segments, pressing the segments together over the filling so as to compress the latter, and uniting the edges of the segments.

8. The method of producing playing-balls, consisting in forcing previously-formed shell-segments together over a filling whose original bulk exceeds the capacity of the shell, so as to compress said filling, and uniting the segments.

9. The method of producing playing-balls, consisting in forcing previously-formed shell-segments over a filling whose original bulk exceeds the capacity of the shell, so as to compress said filling, and pressing the segments together so as to cause their edges to adhere.

10. The method of producing playing-balls, consisting of inserting within shell-segments an elastic mass whose original bulk exceeds the capacity of the finished shell, forcing the segments together, causing their contacting portions to adhere, and compressing the shell to size.

11. The method of producing playing-balls, consisting in inserting within shell-segments an elastic mass whose original bulk exceeds the capacity of the finished shell, forcing the segments together, and heating the contacting edges of the segments.

12. The method of producing playing-balls, consisting in inserting within shell-segments an elastic mass whose original bulk exceeds the capacity of the finished shell, forcing the segments together, heating the segments, and compressing the shell to size.

13. The method of making playing-balls, consisting in making a filling of elastic material formed oversize, making a shell in segments which approximate their final form, uniting the shell-segments, and compressing them to final form upon the filling so as also to compress the latter, so that said filling may resist distortion of the shell when the ball is in use.

14. The method of making playing-balls, consisting of making a filling of gutta-percha whose original bulk is too great for the capacity of the finished shell, making spherical celluloid segments, pressing the segments together over the filling so as to compress the latter, and uniting the edges of the segments.

15. The method of making playing-balls, consisting in making a filling of gutta-percha whose original bulk is too great for the capacity of the finished shell, making hemispherical celluloid segments, and pressing the segments together over the filling so as both to compress the latter and also to cause the edges of the segments to adhere.

16. The method of making playing-balls, consisting of making by compression a filling of gutta-percha whose bulk is too great for the capacity of the finished shell, making hemispherical celluloid segments, and pressing the segments together over the filling so as both to further compress the latter and also to cause the edges of the segments to adhere.

17. The method of making playing-balls, consisting of making a filling of gutta-percha whose original bulk is too great for the capacity of the finished shell, making hemispherical celluloid segments, and pressing the segments together over the filling so as to compress the latter, cause the edges of the segments to adhere, and also compress the ball to final size.

18. The method of making playing-balls, consisting of making a filling of gutta-percha

whose original bulk is too great for the capacity of the finished ball, making hemispherical celluloid segments, preparing the edges of the segments for adhesion, and pressing the segments together over the filling, so as both to compress the latter and also to cause the edges of the segments to join.

19. The method of producing playing-balls, consisting in reducing in bulk under heat and compression a ball comprising a hard, wear-resisting, relatively thin springy shell and a relatively bulky elastic filling, the bulk of the filling being somewhat reduced by means of the compression, and in consequence tending thereafter by its expanding power to preserve the spherical form of the ball.

20. The method of producing playing-balls, consisting in reducing in bulk, under heat and compression, a previously assembled or formed ball comprising a relatively thin celluloid shell and a relatively massive yielding core, the celluloid shell being compressed and toughened and the filling being also somewhat reduced in bulk by the compression, so that the filling may, by tending to expand the thin shell, constantly resist distortion of the shell by a blow.

21. The method of producing a playing-ball, consisting in reducing in bulk, under heat and compression, a previously assembled or formed ball, comprising a shell consisting largely or wholly of celluloid and a core consisting largely or wholly of gutta-percha; the celluloid of the shell being compressed and toughened and the core being reduced in bulk by the pressure, so that the latter may by reason of its expanding tendency constantly resist distortion of the shell by a blow.

22. The method of completing a playing-ball, consisting in rendering a celluloid shell plastic by heat, compressing the plastic shell upon a resisting core, and maintaining the ball in a compressed condition until the shell hardens.

23. The method or process of making playing-balls, consisting in forming shell-segments which approximate their final form, placing them upon a previously-formed filling of springy material, heating the segments, subjecting them to compression so as both to weld them together and also to cramp or compress the core, and maintaining the compression while the shell hardens, so that the shell may thereafter hold the filling under compression.

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