No. 696,888. Patented Apr. 1, 1902.

E. KEMPSHALL.

PROCESS OF MAKING GOLF BALLS.

(Application filed Dec. 12, 1901.)

(No Model.)

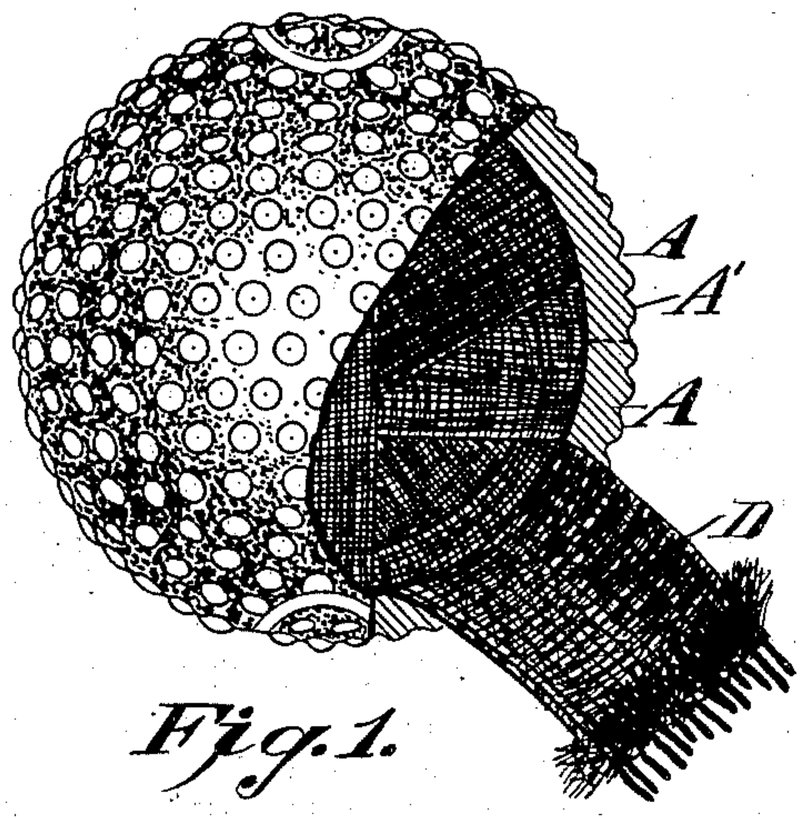


Fig. 1.

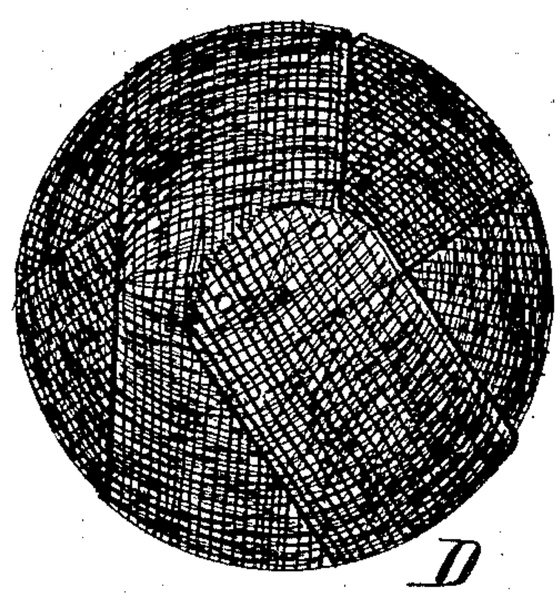


Fig. 2.

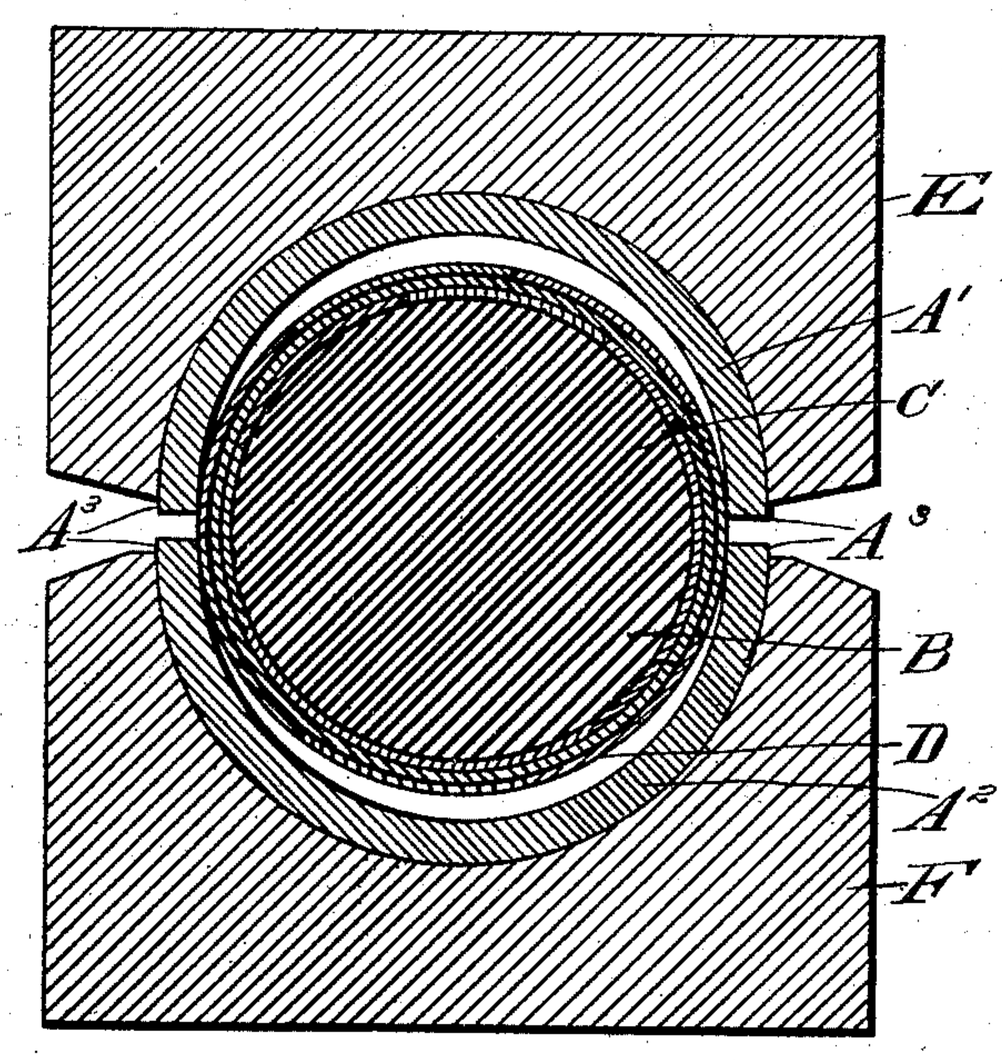
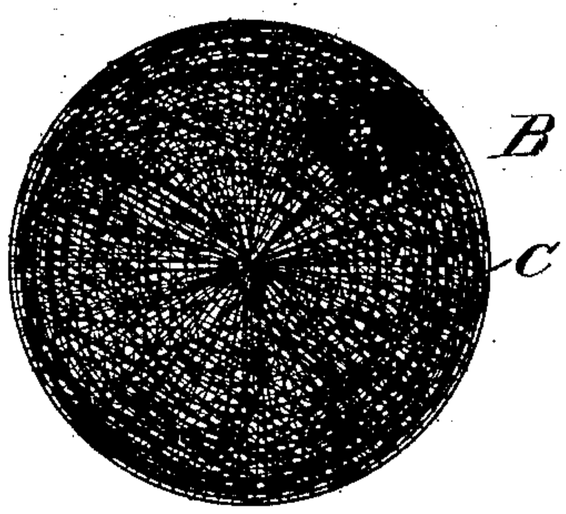


Fig. 3.

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.

PROCESS OF MAKING GOLF-BALLS.

SPECIFICATION forming part of Letters Patent No. 696,888, dated April 1, 1902

Original application filed November 8, 1901, Serial No. 81,565. Divided and this application filed December 12, 1901. Serial No. 85,568. (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 Processes of Making 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 objects are to improve the quality, efficiency, and stanchness of the balls and also to improve the method of producing them.

In my pending application, filed September 27, 1901, Serial No. 76,814, is illustrated a ball constructed 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.

In another pending application, filed September 30, 1901, Serial No. 76,951, the relatively soft material of the core is first provided with a jacket by winding twine layer over layer around the same, the ball thus preliminarily formed being oversize, the shell-segments being then placed over such ball and the whole subjected to compression under the action of heat, so as to enable the shell to contract more readily to its finished size.

The principal object of the present invention is to improve the qualities of the inner ball, so as to produce a superior-finished ball. I provide the inner core with a firmly-fitting tension-envelop, which compresses the core, prevents the material of which the nucleus is composed from escaping between the edges of the projecting shell-segments as they are compressed thereover, and also possesses qualities which increase the elasticity and effectiveness of the finished ball.

In the drawings accompanying and forming part of this specification, Figure 1 is a view, partly broken away, of a ball made in accordance with my present improvements. Fig. 2 is a view of a jacketed inner ball. Fig. 3 illustrates a method of compressing the shell-segments over the inner ball, and Fig. 4 is a view of an elastic core.

Similar parts are designated by similar letters of reference in the several drawings.

The shell (designated as A) may consist of segments of a relatively hard but springy material, such as celluloid or hard rubber, while the nucleus B may consist of any suitable material, such as rubber of suitable consistency or gutta-percha; but preferably I form the nucleus in this instance by winding rubber threads into the form of a ball, as at C, Fig. 4. I inclose this nucleus-ball in an envelop consisting of one or more layers of elastic belting D, which may be woven of a suitable width—say three-quarters of an inch—or may be produced by cutting elastic webbing or fabric into strips. This elastic belting I put under tension while winding it around the nucleus, so that it firmly fits and compresses the core whatever may be the substance or form of the latter, although the elastic belting is especially effective when the core is of the kind illustrated at Fig. 4. A characteristic of elastic belting when used for this purpose is that it draws right down into a spherical form or clings closely for its entire width to the core, thus not only holding the same under compression, but also making a practically smooth and uniform jacket or blanket around the latter, whereby an inner ball of improved quality is produced in a simple manner and at low cost. In its original shape the inner ball is substantially round, although it may depart from the spherical form within the scope of the invention; but I prefer that its bulk shall be a little too large for the final capacity of the shell.

The shell I preferably form in two hemispherical segments A' and A^2, Figs. 1 and 2, between which the nucleus-ball is placed. The parts thus assembled are placed between forming-dies—as, for instance, E and F—whereupon the latter are pressed together by means of suitable mechanism, thus forcing the shells together, so as to bring their edges into intimate contact. To said edges cement

is previously applied, so that when they are forced together they adhere, although the invention is not limited to this particular method of effecting adhesion. When required, the dies may be heated by steam or otherwise for bringing the material of the shell-segments into suitable condition and consistency both for uniting them and also for facilitating the compressing and shaping action of the dies. When celluloid is employed, the heating of the dies effects a softening of the shell, so that it may be more readily pressed from its original to its finished or final size, and the dies may be then allowed to cool before the balls are taken out, so as to give the shells an opportunity to reharden, whereby they are enabled to retain their shape when removed. The abutting edges of the original segments A^3 may be made somewhat full, thereby to furnish material for properly forming the joint between them as they are subjected to the final compression. The elastic belting being wound under tension upon the nucleus serves to effectually confine the same at the shell-compressing operation, so that none of the material may squeeze out between the approaching edges of the segments. The fibrous portion of the jacket also serves to prevent the heat of the dies from escaping into the nucleus, whereby injury of the latter is prevented and whereby also the shells may be united without the employment of an undue amount of heat.

It will be understood that the material of the shell is compressed between the dies and the resisting mass of the ball contained therein, and since said inner ball is first prepared somewhat oversize the resistance thereof while under such compression furnishes a substantial support for sustaining the relatively thin shell against the pressure of the forming-dies. By properly proportioning the size of the inner ball the shells when being finished may be sustained against any necessary degree of pressure of the dies. The jacket of elastic belting may be first treated with an application of cellulose or cement, which may permeate the fibers of the belting, so that it becomes at the finishing operation firmly incorporated with the shell.

For a golf-ball the shell is preferably made of celluloid, which is stiff and springy, and hence well adapted for use in this game. The elasticity of the inner ball coöperates with the springiness of the shell, so as to instantly restore the latter to its normal shape after distortion by a blow, and thus enhances the resiliency of the ball as a whole. The elasticity of the filling is greatly enhanced by having it constantly under compression, since the outward pressure thereof in all directions tends constantly to assume and maintain a spherical shape or, in other words, an 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 with greater speed and to cover a greater distance when struck by an implement.

It will be understood that the jacket covering the soft nucleus is of importance in manufacture in cases where the shell is compressed over the nucleus, whether or not the parts are heated at the pressing operation, since even if the parts are cold the tendency of the nucleus when subject to pressure is to squeeze out between the approaching edges of the shell, which tendency is entirely overcome by the confining action of the jacket, and in cases where heat is employed and where the nucleus is of material which is liable to flow the jacket becomes of still greater importance.

From the foregoing it will be seen that the finished ball comprises a relatively soft elastic nucleus, a relatively hard springy shell, and an intermediate layer of tensioned elastic belting or fabric. This layer, it will be seen, forms a fibrous reinforcement for the shell itself and is of great value, since when the ball is given a knock the force thereof is diffused, and hence the ball is generally altered from its true spherical shape, whereby the elasticity of the inner ball acts over a large area with greatly-increased effectiveness. It will be understood that when the ball is given a sharp knock with a corner or small end of an implement the normal tendency of the shell, especially when the latter is made of celluloid and has thin walls, is to dent in sharply, thus affecting only the part of the nucleus which is right behind the area of impact and compacting only a small portion of the nucleus, without tending generally to alter the entire conformation thereof, so that only this small portion of the nucleus would be materially effective in returning the shell to its original shape, whereas by placing a jacket of elastic fabric under tension over the nucleus sharp indentation of the shell is prevented, since if the jacket is pushed inwardly anywhere a large area thereof is, owing to its longitudinal tension, necessarily affected and dragged inwardly to a slight extent, so that instead of a deep indentation being produced in the nucleus over a small area the latter is slightly flattened over a large area, and thereby the entire shape of the nucleus, as well as the shell, is a little distorted, and in consequence the whole energy of the imprisoned mass, added to the natural resiliency of the elastic belting, is called upon, and the ball is restored instantly to its normal position. Moreover, said elastic belting to a material extent relieves the shell from the stress due to the outward or expanding pressure of the compressed elastic nucleus, so that the shell is less liable to deteriorate or crack, and its life is greatly prolonged. In this connection it will be perceived that the compression of the inner ball at the finishing operation does not materially reduce the longitudinal tension of the elastic belting at any part, so that the same

is effective to restrain the nucleus after the ball is finished. Thus it will be seen that the elastic fabric forms an excellent backing or base for the shell, particularly when the latter is of celluloid, and especially since the presence of such backing prevents undue indentation of the shell, as just explained.

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

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 player. In this instance the ball is represented as finished with relatively slight elevations of a spherical conformation; but in billiard-balls, of course, the outer surface should usually be a smooth and true spherical surface.

I believe that I am the first to incase a core of rubber cord in a celluloid shell, thereby producing a highly-effective playing-ball. In manufacturing the tendency of the rubber to squeeze out between the edges of the shell, and thereby prevent the edges of the same from uniting or welding, is overcome by means of my invention. The elastic belting successfully confines the mass of rubber during the shell-compressing operation, and, moreover, the fiber of the belting offers a material to which cellulose or other suitable cement readily adheres, so that the shell and the fiber are firmly united, thus forming an effective backing or reënforcement for the shell. The celluloid is practically proof against deterioration in the heat of summer.

Variations may be resorted to within the scope of my present invention.

The herein-described playing-ball is made the subject of my pending application, Serial No. 81,565, of which this is a division.

Having described my invention I claim—

1. A process in producing playing-balls, consisting in compressing shell-segments over a filling previously prepared with a tensioned elastic compression-jacket.

2. A process in producing playing-balls, consisting of inserting within shell-segments an elastic mass having a compression-jacket under tension, the jacketed mass exceeding in bulk the capacity of the finished shell, forcing the segments together, causing their contracting portions to adhere, and compressing the shell to final size.

3. A process in producing playing-balls, consisting in inserting within shell-segments an elastic mass having a compression-jacket under tension, the jacketed mass exceeding in bulk the capacity of the finished shell, heating the segments, and forcing them together.

4. A process in producing playing-balls, consisting in enveloping an elastic mass with elastic fabric under tension, inserting the same within shell-segments, and forcing the segments together.

5. A process in making playing-balls, consisting in winding elastic belting around a nucleus of elastic material, making a shell in segments which approximate their final form, and compressing the segments to final form upon the prepared nucleus.

6. A process in making playing-balls, consisting of winding several layers of elastic belting around a filling of rubber, making spherical celluloid segments, pressing the segments together over the prepared filling so as to compress the same, and uniting the edges of the segments.

7. A process in making playing-balls, consisting of winding elastic belting under tension around a filling of rubber, treating the belting with cement, making spherical celluloid segments, subjecting them to heat, pressing them together over the prepared filling so as to compress the same, and uniting the edges of the segments.

8. A process in making playing-balls, consisting of making a filling of rubber, providing the same with a retaining-jacket, making hemispherical celluloid segments, and compressing the segments over the prepared filling.

9. A method in producing cores for playing-balls, consisting of winding elastic belting under tension upon an elastic nucleus.

10. A method in producing cores for playing-balls, consisting in winding rubber thread to form a nucleus, and overwinding said nucleus with elastic belting under tension.

11. A process in producing playing-balls, consisting of winding rubber thread to form a nucleus, and compressing celluloid segments over said nucleus.

12. A process in producing playing-balls, consisting of compressing celluloid segments over a nucleus of soft rubber and causing the edges to unite or weld.

13. A process in producing playing-balls, consisting of winding elastic belting upon a nucleus of rubber, and compressing celluloid shell-segments thereover.

14. A process in producing playing-balls, consisting of winding rubber thread into the form of a ball, winding elastic belting under tension upon said ball, and compressing celluloid shell-segments thereover.

15. A process in producing playing-balls, consisting of winding rubber thread into the form of a ball, jacketing said ball with fabric or fibrous material and compressing celluloid shell-segments thereover.

16. A process in producing playing-balls, consisting of winding rubber thread into the

form of a ball, jacketing said ball, treating the jacket with an adherent material, and compressing celluloid segments thereover.

17. A process in producing playing-balls, consisting of winding rubber thread into the form of a ball, winding elastic belting thereover to form a jacket, treating the jacket with adherent material, and compressing celluloid segments thereover.

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