No. 707,595. Patented Aug. 26, 1902.

E. KEMPSHALL.

MANUFACTURE OF PLAYING BALLS.

(Application filed June 25, 1902.)

(No Model.)

Fig. 1.

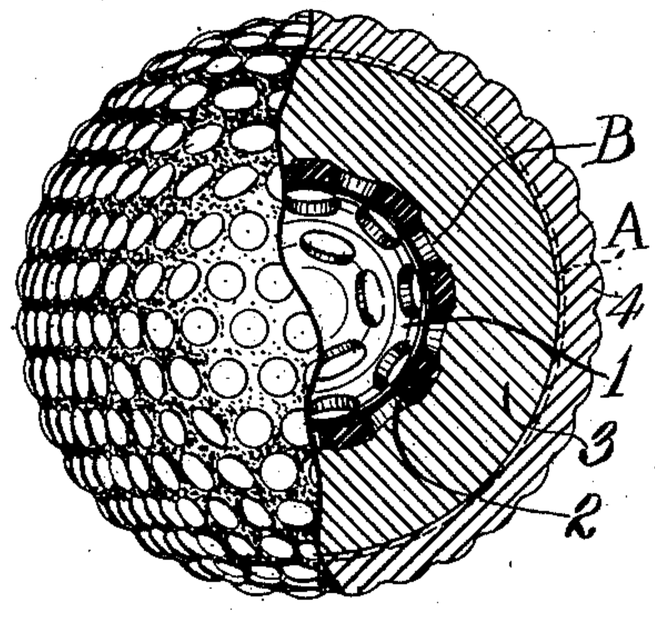


Fig. 2.

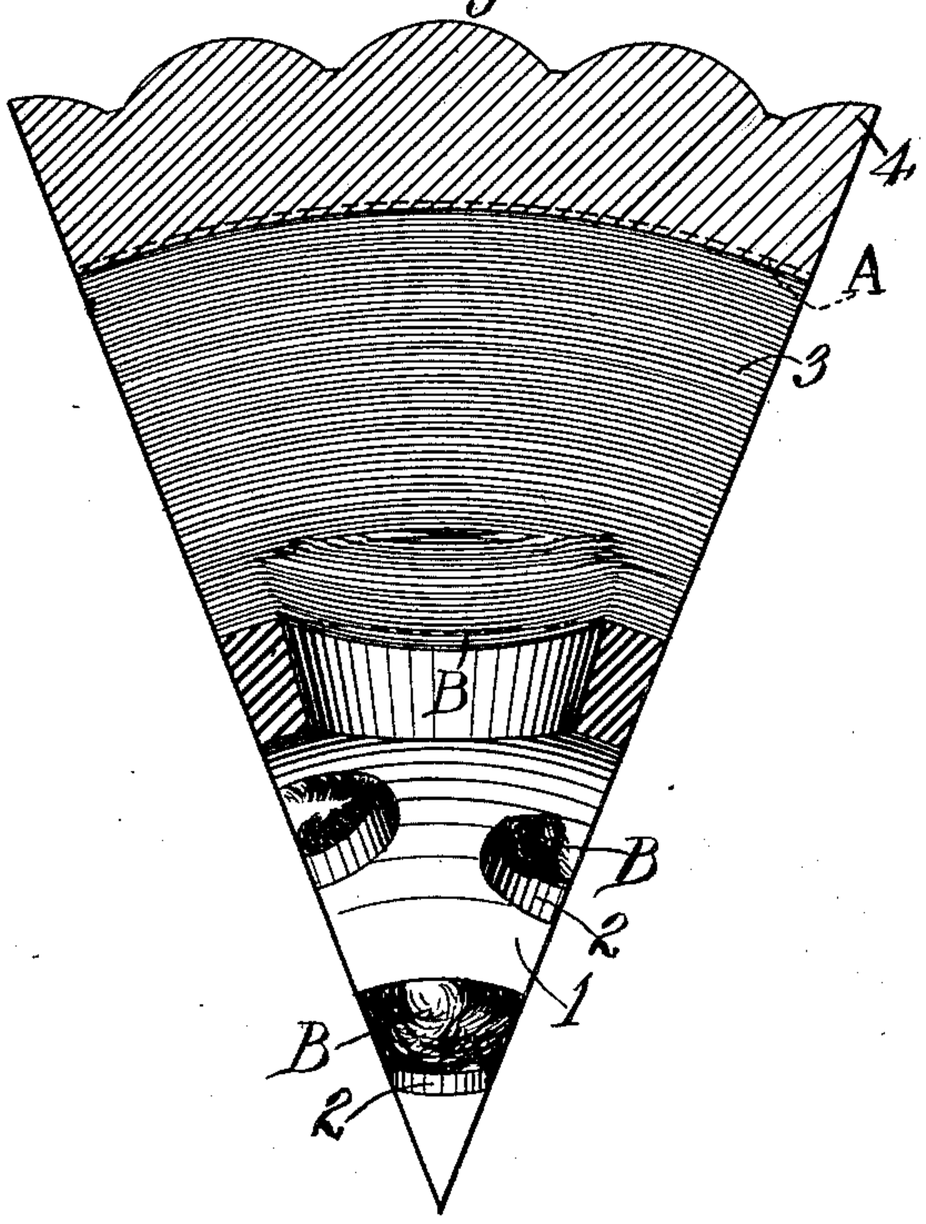
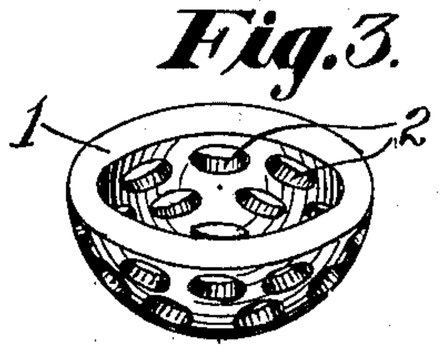


Fig. 3.



Witnesses
Herbert J. Smith.
F. E. Maynard.

Inventor:
Eleazer Kempshall.
By his Attorney F. A. Richards.

UNITED STATES PATENT OFFICE.

ELEAZER KEMPSHALL, OF BOSTON, MASSACHUSETTS.

MANUFACTURE OF PLAYING-BALLS.

SPECIFICATION forming part of Letters Patent No. 707,595, dated August 26, 1902.

Application filed June 25, 1902. Serial No. 113,057. (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 Playing-Balls, of which the following is a specification.

This invention relates to the manufacture of playing-balls, the object being to provide a ball of improved construction and quality especially adapted for use in the game of golf.

In the drawings forming part of this specification, Figure 1 illustrates a complete ball partly broken away to disclose its construction. Fig. 2 is an enlarged section of a ball. Fig. 3 is a view of a perforated section of a hollow core or center piece.

For the center piece or core I use a shell 1, preferably formed of celluloid or other hard and springy material. In this shell I make a series of perforations, as at 2, preferably of large diameter and of such number that the shell is rendered flexible. Upon this shell I apply approximately pure sheet-rubber, layer over layer, to complete the filling 3 of the ball, and upon this filling I compress a shell 4 of plastic material, preferably gutta-percha.

In winding the filling 3, which preferably forms the principal part of the body of the ball, I employ a very thin sheeting of acid-cured rubber A—that is, rubber which has been changed from the crude state to a usable state by a well-known acid process—as distinguished from the more common process of mixing raw rubber with sulfur and then subjecting the mixture to heat. Specimens of acid-cured rubber are the commercial "surgeon's rubber" or "dental rubber" or "dental dam." This contains little or no foreign or dead mixture, which would impair its strength or elasticity, and it is much stronger than rubber which is vulcanized by being first mixed with sulfur and then heated, and hence performs an important function in my improved ball, because it can be drawn extremely thin and withstands great strain, and by these combined qualities I am enabled to make a substantially solid ball all portions whereof are under high tension. This solidity is effected by the thinness to which the sheeting is drawn in connection with the hard packing action due to the tenseness of the overlying windings, which, it will be understood, pack the inner layers in a most effectual manner. It will be perceived that owing to the solidity of a ball thus formed lateral flow of the rubber sheet or strip becomes impossible—that is, such flow as would occur at the unconfined edges of an ordinary plate of rubber when subjected to pressure—and hence any further distortion of the rubber when the ball is struck can occur only in directions longitudinally of the strips, and since this is already highly tensioned the ball exhibits phenomenal flying power. Moreover, the described ball of solid windings is so hard and so highly tensioned as not to be unduly affected by a light blow, rendering the ball also excellent for "putting." This sheeting I wind continuously in miscellaneous directions, layer over layer, as indicated at A, Figs. 1 and 2. I prefer to use sheeting originally from nine one-thousandths to twelve one-thousandths of an inch in thickness and tensioned to an extent to reduce its thickness to from three one-thousandths to four one-thousandths of an inch. It will be understood that, owing to its strength, thin sheeting of acid-cured rubber may be employed and that it may be stretched until it is extremely thin, since this quality or kind of rubber stands very great stress without breaking. In this way—that is, by using extremely thin windings—I can make a substantially solid sphere of rubber which is highly tensioned in all directions, and is hence powerful when given a hard blow, while being too highly strung to be materially affected by a light blow, so that it is well adapted for the game of golf. By reason of its extraordinary thinness the rubber winds very compactly, forming a solid body—that is, a body containing no perceptible crevices.

In using the term "acid process" herein I mean to distinguish from that vulcanizing process which consists of mixing sulfur mechanically with rubber and then subjecting the mixture to heat, said acid process involving the surface treatment or immersion of the raw-rubber sheet in a suitable bath—as, for instance, in a bath consisting of a mixture of dichlorid of sulfur and carbon disulfid.

The highly-tensioned caoutchouc sheeting

has not only the advantage of being extremely elastic, and not only packs closely layer upon layer to form a solid ball, but it will also be seen that because of its thinness a great number of layers can be compacted within the allotted space, and since each layer is independently tensioned a large amount of power is thereby stored up in the ball. My filling therefore consists of a solid ball of rubber whose different portions are tensioned in miscellaneous directions, each portion being distended to many times its normal length.

By excluding foreign material from the rubber sheeting many advantages are gained in constructing a golf-ball which is of small size. Foreign material which is comparatively inelastic not only displaces its bulk of the highly-elastic caoutchouc, but by its presence also interferes with the action of the rubber. In other words, the mixing of foreign material makes more work to be done and reduces the amount of the rubber for doing the work. Moreover, by having the rubber approximately pure it is found that a very thin sheet thereof withstands a high degree of tension, so that a multitude of highly-tensioned sheets may be embodied in the allotted space, thus materially augmenting its flying power.

I apprehend that when the ball is given a blow the outer layer or envelop of tensioned caoutchouc is subjected to a still greater tension, said envelop being of spherical form and containing a solid mass, so that the only effect possible to produce by a blow is a change of shape of the ball from a true sphere, which change of shape necessarily stretches said outer layer. I apprehend, further, that the successive inner layers are also subjected to extra tension for the same reason. The flexibility of the center piece 1 is of importance in developing the described action of the rubber and also by its reaction conduces to the flying power of the ball. Since there are a multitude of these highly-tensioned caoutchouc layers and all are simultaneously given an extra tension by a blow from a club, and since their reaction is instantaneous, the ball flies from the club with phenomenal speed. One important feature of my ball is that its great store of energy cannot be brought into action except by means of a heavy blow, so that it is inactive under a light blow, and hence a good "putter." I place this filling between shell segments of well-seasoned gutta-percha or other hard and plastic material, such as celluloid, and the ball thus assembled I place between forming and heating dies, whereby I close the shell segments upon the ball and weld the edges of the former. The rubber envelop or shell 3 is preferably made oversize—that is, of a bulk somewhat too great for the capacity of the finished shell 4, as indicated by the dotted circle A, Figs. 1 and 2—and hence when said shell is compressed onto the ball the material of said rubber envelop is forced into or through the perforations 2, as at B. In other words, the center piece supports the rubber shell or layer only at certain points, and the surplus material of the soft-rubber layer is permanently forced into the apertures 2, where the rubber is left unsupported. It is also to be noted that when the ball has been dealt a blow portions of the rubber envelop or layer will squeeze or push farther into the openings of the core. Hence the rubber is not forced by said blow outwardly and powerfully against the shell at other points, thereby eliminating or minimizing the liability of bursting the shell. So far as certain features of my improvements are concerned solid molded india-rubber may be used for the layer or shell 3 instead of the windings of pure rubber.

Having described my invention, I claim—

1. A process in producing a playing-ball, consisting in inclosing a hard perforated sphere in a shell or layer of soft, resilient material, and compressing upon said layer a shell of hard plastic material, the compression being carried to an extent to force portions of said soft layer permanently into the perforations in said hard sphere.

2. A process in producing a playing-ball, consisting in providing a hard shell with perforations, enveloping said shell in soft rubber, and applying to said soft rubber under pressure plastic material which is rendered soft by heat, the pressure being carried to an extent to force portions of said soft rubber into said perforations, and being maintained while said plastic material hardens.

3. A process in producing a playing-ball, consisting in inclosing the perforated shell of hard material in an envelop of soft rubber, and welding upon said envelop by means of heat and compression a shell consisting of segments of plastic material, carrying the compression to an extent to force portions of said rubber into the perforations in said shell, and maintaining the compression until said shell hardens by cooling.

4. A process in producing a playing-ball, consisting in winding in miscellaneous directions upon a hard spherical center piece having openings, a strip of approximately pure sheet india-rubber, and then forming thereon under compression a shell of hard material, the compression carried to an extent to cause portions of said india-rubber to protrude into said openings.

5. A process in producing a playing-ball, consisting in winding under high tension in miscellaneous directions, upon a hard spherical hollow center piece having apertures, a continuous strip of thin approximately pure sheet india-rubber, and forming thereon a shell of plastic material by means of heat and compression, carrying the compression to an extent to cause portions of said india-rubber to protrude into said apertures, and maintaining the compression while the shell hardens.

6. A process in producing a playing-ball,

consisting in inclosing a hard perforated sphere in a shell or layer of soft rubber, and compressing upon said layer a shell of gutta-percha, the compression being carried to an extent to force portions of said rubber layer permanently into the perforations in said hard sphere.

7. A process in producing a playing-ball, consisting in providing a hard shell with perforations, enveloping said shell in windings of soft rubber, and applying to said windings under pressure plastic material which is rendered soft by heat, the pressure being carried to an extent to force portions of said windings into said perforations, and being maintained while said plastic material hardens.

8. A process in producing a playing-ball, consisting in inclosing the perforated shell of hard material in tense windings of soft rubber, and welding upon said envelop by means of heat and compression a shell consisting of segments of gutta-percha, carrying the compression to an extent to force portions of said windings into the perforations in said shell, and maintaining the compression until said shell hardens by cooling.

9. A process in producing a playing-ball, consisting in winding in miscellaneous directions upon a hard spherical center piece having openings, approximately pure sheet india-rubber, and then forming thereon under pressure a shell of gutta-percha, the pressure being carried to an extent to cause portions of said india-rubber to protrude into said openings.

10. A process in producing a playing-ball, consisting in winding in miscellaneous directions, upon a hard spherical hollow center piece having apertures, a continuous strip of thin approximately pure sheet india-rubber under sufficient tension to cause the windings to adhere to one another, and forming thereon a shell of gutta-percha by means of heat and compression, carrying the compression to an extent to cause portions of said windings to protrude into said apertures, and maintaining the compression while the gutta-percha shell hardens.

11. A process in producing a playing-ball, consisting in inclosing a depressible shell of rubber windings between segments of plastic material, and applying heat and compression to said segments so as to reduce said rubber sphere in bulk and also cause said segments to weld.

12. A process in producing a playing-ball, consisting in inclosing a depressible shell of tense windings of soft rubber between segments of plastic material, applying heat and compression to said segments so as to cause them to soften and weld and also to cause said rubber sphere to become reduced in diameter, and maintaining the compression while the shell cools and hardens.

13. A process in producing a playing-ball, consisting in forming a depressible shell by winding approximately pure soft rubber, the latter being wound, under sufficient tension to cause the rubber to adhere layer to layer, surrounding said sphere by heated plastic material, subjecting the whole to compression to an extent to cause said sphere to be reduced in bulk, and maintaining the compression while the plastic material hardens.

ELEAZER KEMPSHALL.

Witnesses:
B. C. STICKNEY,
JOHN O. SEIFERT.