No. 711,508. Patented Oct. 21, 1902.

E. KEMPSHALL.

PLAYING BALL.

(Application filed June 17, 1902.)

(No Model.)

Fig. 1.

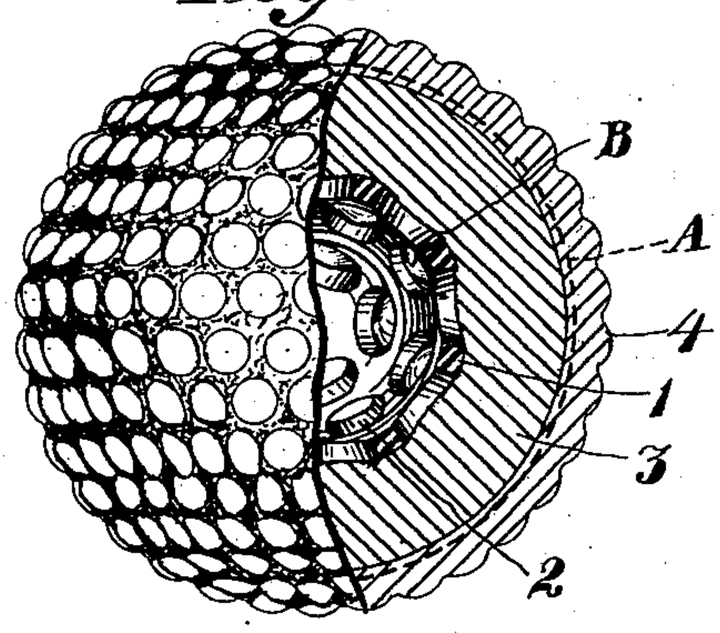


Fig. 2.

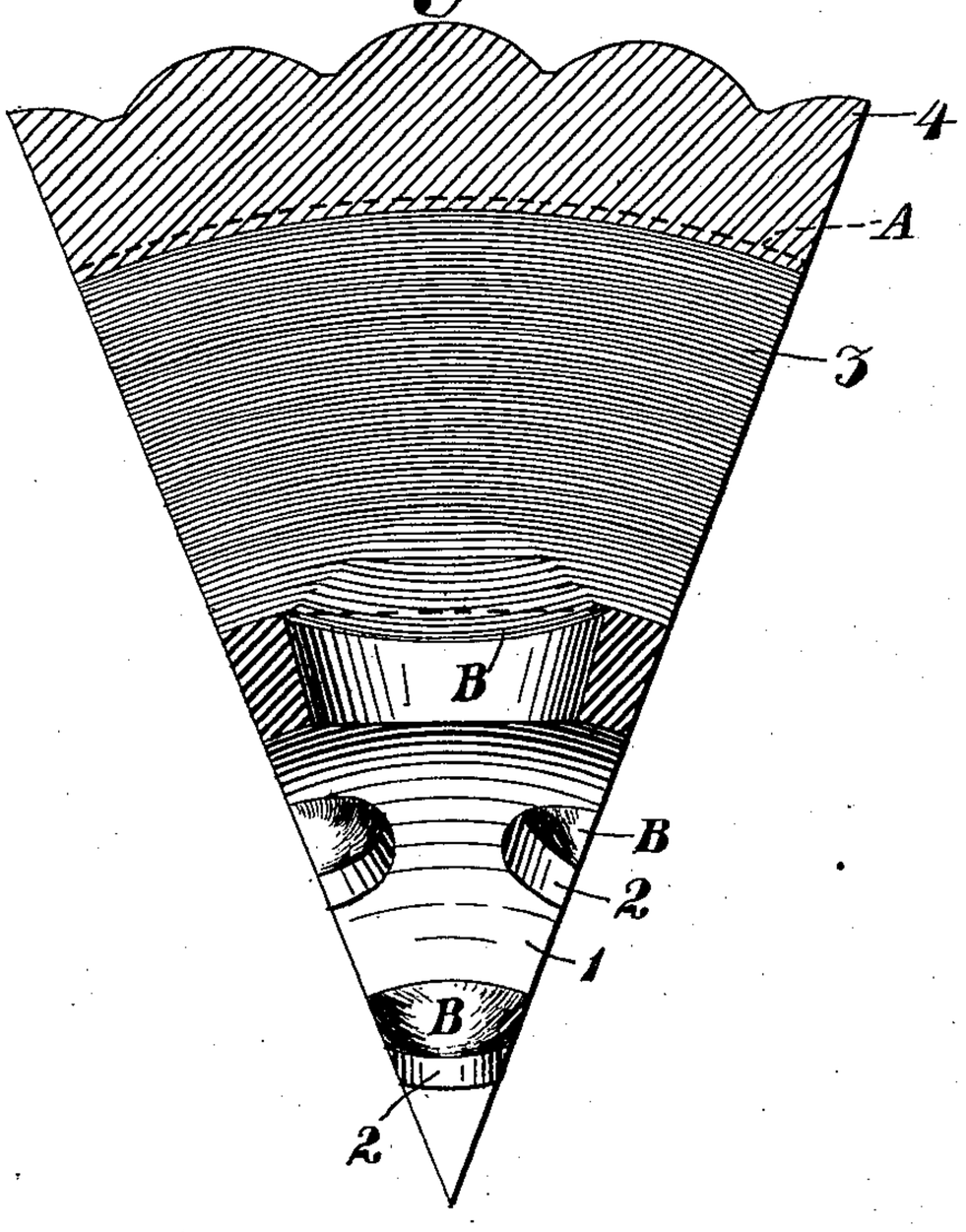
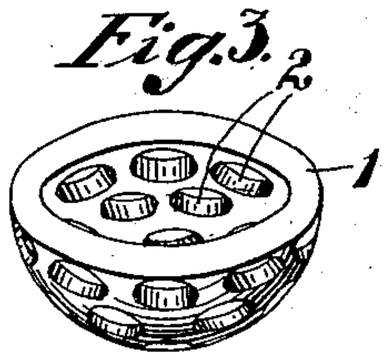


Fig. 3.



Witnesses:

J. E. Davidson.

F. C. Fliedner.

Inventor:

Eleazer Kempshall:

By his Attorney:

F. A. Richards.

UNITED STATES PATENT OFFICE.

ELEAZER KEMPSHALL, OF BOSTON, MASSACHUSETTS.

PLAYING-BALL.

SPECIFICATION forming part of Letters Patent No. 711,508, dated October 21, 1902.

Application filed June 17, 1902. Serial No. 112,104. (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 Playing-Balls, of which the following is a specification.

This invention relates to 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 place 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 dam." This contains little or no foreign 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. 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 alreadyhighly 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 winding—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 in 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 rubber 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 and all portions having substantially uniform tension, being thus distinguished from a ball in which the rubber windings are severed after being tightly wound.

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 perforations 2, where the rubber is left unsupported, form outlets into the interior of the core, into which the surplus material of the soft-rubber layer flows or protrudes. By regulating the proportions of the various members of the complete ball any desired resistance or support may be provided for the outer hard shell 4 while being compressed during the process of completing the ball. 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.

Having described my invention, I claim—

1. A playing-ball comprising a soft-rubber shell, a hard shell thereon, and a center piece supporting said rubber shell at some points and leaving it unsupported at other points, so that when struck the hard shell may yield and the rubber where unsupported may flow inwardly toward the center of the ball; said soft-rubber shell consisting of continuous windings having substantially uniform tension.

2. A playing-ball comprising a hard hollow center piece provided with perforations, a soft-rubber shell thereon, and a shell holding said rubber shell in a state of compression, portions of said rubber shell protruding into said perforations by reason of the compressed state of the rubber; said soft-rubber shell consisting of tense windings.

3. A playing-ball comprising a hard shell, an oversize soft-rubber shell confined under compression within said hard shell, and a spherical center piece of hard material within said soft-rubber shell; said soft-rubber shell consisting of tense windings, portions of said center piece being cut away, and said windings protruding into said cut-away portions.

4. A playing-ball comprising a shell consisting of welded segments of gutta-percha, an oversize soft-rubber shell confined under compression within said gutta-percha shell, and a center piece of hard material within said soft-rubber shell; said center piece being provided with openings and said soft-rubber shell consisting of tense windings, portions whereof protrude into said openings.

5. A playing-ball comprising a hard core provided with openings, an oversize thick soft-rubber shell thereon, and a shell of plastic material compressed upon said envelop and said soft-rubber shell consisting of tense windings, a portion thereof protruding into said openings.

6. A playing-ball comprising a hard core

provided with openings, an oversize thick soft-rubber shell thereon; and a gutta-percha shell holding said envelop under compression, said soft-rubber shell consisting of tense windings and protruding into said openings.

7. A playing-ball comprising a springy core having openings, and continuous windings of soft rubber closing said openings and forming a complete and substantial layer upon said core, said windings having substantially uniform tension.

8. A playing-ball comprising a rigid hollow core having perforations, tense soft-rubber windings thereon, and means for holding said envelop under compression, portions of the windings protruding into said openings.

9. A playing-ball comprising a hard perforated shell, thin windings thereon of approximately pure acid-cured rubber and means for holding said windings under compression.

10. A playing-ball comprising a hard perforated shell, and a plurality of layers thereon, the material of the inner of said layers protruding into said openings.

11. A playing-ball comprising a perforated hollow celluloid core, a thick solid envelop thereon, consisting of windings of thin sheet-rubber, said windings having substantially uniform tension, and a gutta-percha shell.

12. In a playing-ball, the combination of a perforated center piece; a multitude of windings thereon of extremely thin and highly-tensioned approximately pure acid-cured sheet-rubber, said windings having substantially uniform tension and forming a solid body, and a cover formed of plastic material; said cover holding said rubber under compression.

13. In a playing-ball, the combination of a center piece, a multitude of windings thereon of extremely-thin and highly-tensioned acid-cured sheet-rubber, said windings forming a solid body of spherical form and adhering to one another; and a shell of gutta-percha holding said body under compression, said center piece consisting of a hard perforated hollow sphere.

14. A playing-ball comprising a perforated celluloid center piece, a body upon said center piece consisting of highly and uniformly tensioned acid-cured sheet-rubber, and a plastic shell holding said body under compression.

15. In a playing-ball, the combination of a center piece; adherent windings thereon of thin and highly-tensioned acid-cured sheet-rubber, and a cover of gutta-percha upon said rubber; said windings forming such a proportion of the ball as to enable it to float in water, and said center piece consisting of a perforated celluloid shell.

16. In a playing-ball, the combination of a perforated sphere of celluloid; a multitude of windings of extremely-thin and highly and uniformly tensioned approximately pure acid-cured sheet-rubber upon said sphere, and a shell of plastic material.

17. In a playing-ball, a hollow center piece, a solid body thereon consisting of windings in miscellaneous directions of highly-tensioned acid-cured sheet-rubber, each of said windings being not more than four one-thousandths of an inch in thickness; and a cover of wear-resisting material upon said body.

18. In a playing-ball, the combination of a solid body of spherical form and provided with a hollow perforated center piece, and consisting of miscellaneous adherent windings of highly-tensioned approximately pure acid-cured sheet-rubber, each of said windings being not more than four one-thousandths of an inch in thickness, and a shell of gutta-percha holding said windings under compression.

19. A playing-ball comprising a hollow sphere of celluloid, acid-cured sheet-rubber wound thereon under tension and forming a materially larger sphere, and a shell of gutta-percha holding said sphere under compression.

20. In a playing-ball, the combination of a perforated celluloid sphere, windings of tensioned rubber thereon, said windings having substantially uniform tension throughout their length, and a cover of gutta-percha.

21. A playing-ball comprising spheres of gutta-percha, celluloid and rubber, said rubber consisting of windings having substantially uniform tension throughout their length, and said celluloid sphere being provided with openings.

ELEAZER KEMPSHALL.

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