No. 711,229. Patented Oct. 14, 1902.

F. H. RICHARDS.

PLAYING BALL.

(Application filed June 27, 1902.)

(No Model.)

Fig. 1.

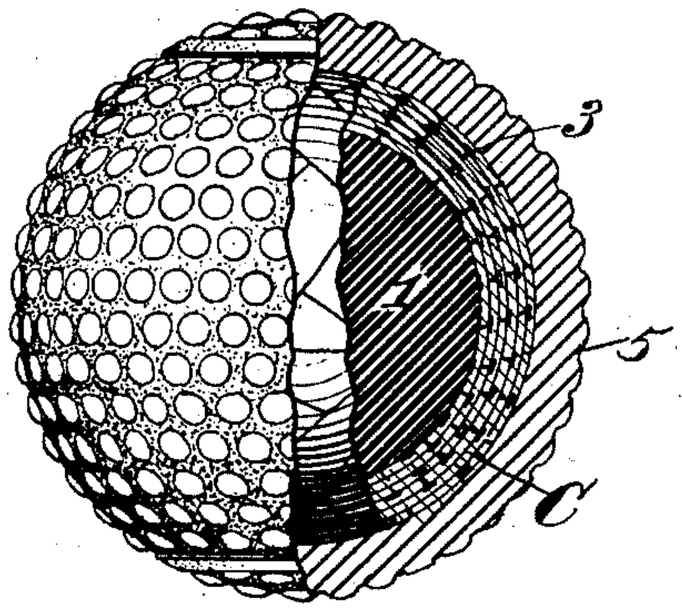

Fig. 2.

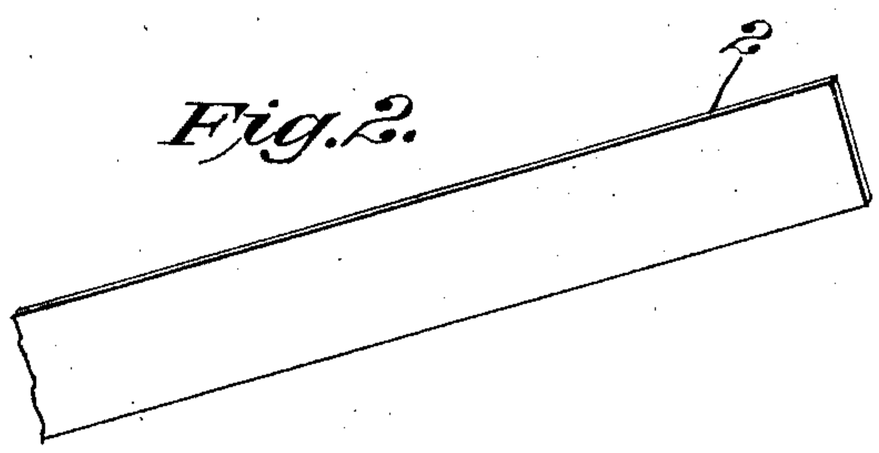

Fig. 3.

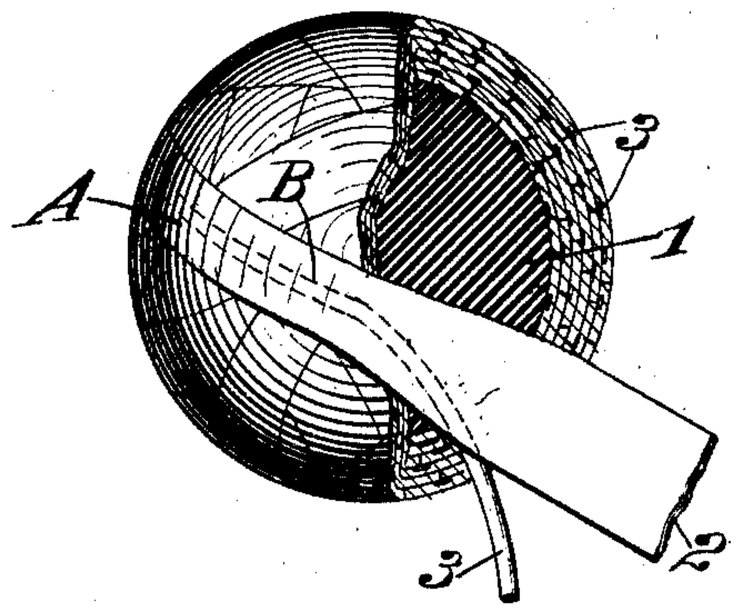

Fig. 4.

Witnesses:
H. Jacobs.
F. E. Haynard.

Inventor:
F. H. Richards

UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE KEMPSHALL MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

PLAYING-BALL.

SPECIFICATION forming part of Letters Patent No. 711,229, dated October 14, 1902.

Application filed June 27, 1902. Serial No. 113,415. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Playing-Balls, of which the following is a specification.

This invention relates to playing-balls, especially those used in golf; and its object is to provide a ball of superior qualities.

My improvements relate especially to the filling, which I so construct that the ball is rendered highly resilient in proportion to its size and weight.

In the drawings forming part of this specification, Figure 1 is a part-sectional view of one form of ball made in accordance with my present improvements. Fig. 2 shows a fragment of a rubber strip used in forming the filling. Fig. 3 is a part-sectional view of the filling of the ball and is illustrative of the manner of winding the same. Fig. 4 shows a fragment of spring-wire used in winding the filling.

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

At the center of the ball is a sphere 1, which consists, preferably, of soft rubber and is preferably large in proportion to the size of the completed ball. Preferably said sphere 1 consists of a solid mass of molded rubber, although it may be otherwise constructed within the scope of my present improvements and may, if desired, have a center piece of hard material. Upon this sphere 1 I apply under great tension a sheet or strip 2, Fig. 2, which may consist of either sulfur-cured rubber or acid-cured dental dam, the latter being preferred principally because it is acid-cured and practically free from foreign mixture, which would impair its elasticity, and also because it can be drawn tight without liability to rupture and is not liable to become cut when wrapped upon wire. In practice I use with good results strips originally from one-half to three-fourths of an inch in width and from two one-hundredths to three one-hundredths of an inch in thickness, so that when tightly tensioned upon the ball the width is reduced to from one-fourth to one-half of an inch, as at A, Fig. 3, and its thinness in due proportion. A further advantage of the dental dam is its lightness, whereby the weight of other parts of the ball may be to some extent compensated.

Simultaneously with winding the rubber strips I wind continuously in miscellaneous directions a length of tempered steel-wire spring 3, which is preferably flat or oblong in cross-section, as illustrated, and wound flatwise upon the ball. This wire before winding may be substantially straight, and hence flexed or sprung at each winding, thereby making a tension in the wire, whereby each band or convolution tends constantly to recover its normal straight condition, so that every part thereof is in a state of high initial tension. Moreover, since each portion of the wire is wound upon the ball under great longitudinal tension it holds the inclosed central portion of the ball under high compression. The structure hence comprises a sphere of soft rubber which is bound tightly within windings of highly-tensioned sheet-rubber and windings of longitudinally unyielding wire, said wire itself being highly tensioned by the bending, so that a ball of phenomenal energy is produced. Preferably the wire and rubber are wound on together, as illustrated at Fig. 3, so that the longitudinal axis of the wire substantially coincides with that of the windings of rubber; but this relative arrangement is not essential in all cases so long as windings of rubber alternate with windings of spring-wire. As illustrated, the wire is wound within the rubber, as at B, Fig. 3; but this arrangement may be reversed and many variations in windings of wire and rubber may be resorted to.

It will be seen that the convolutions of spring-wire are of different diameters and wound in different directions and also that each of said convolutions is bound tightly by the conjoint action of the superposed highly-tensioned rubber and wire, whereby the spring action of the wire is considerably modified, the same being rendered far more resisting than would be the case if unsupported, as at Fig. 4. The effect of overwinding a spring-wire in this manner is to render it extremely stiff, so that a light blow from a club upon a ball fails to flex the wire to such an

extent as to render the ball unduly active. The outer windings of wire and rubber hold all within in a powerful grip, and the rubber sphere 1 is in like manner gripped by all of the wire and rubber windings, so that the tendency upon the part of all of the members is to preserve a spherical form. When the ball is given a hard blow with a club, the wire convolutions directly affected by the club are flexed, while the ball as a whole is changed from its spherical form, this change being instantly resisted by the springy spherical core 1, which is confined under great tension by the windings of rubber and spring-wire, so that the ball has prodigious flying-power. It will also be seen that each winding of the wire is packed or embedded within the rubber, so as to form a perfectly-acting resilient member, which can withstand considerable deformation under a blow and recover its form completely and instantly. Upon the filling thus formed I provide a shell 5 of wear-resisting material, preferably gutta-percha, and preferably holding said filling under a high degree of compression. Since the windings of the wire and rubber are very effective in maintaining the spherical form of the filling, the shell, although in a tense condition thereon, is not subjected to undue additional strain by reason of the change of the filling from its normal spherical form under a blow, so that liability of the shell to burst under a heavy blow is minimized. It will also be understood that the layer, which is formed of windings of rubber and wire and which is designated as C, furnishes a peculiar local resiliency under the action of a blow and makes a very effective distribution of the force of the blow throughout a large portion of the ball.

A ball made in accordance with my present improvements may, if desired, contain a larger core 1 of solid soft rubber than heretofore found desirable in a high-class golf-ball, and hence less wound rubber may be employed in the layer C, thus maintaining or even increasing the efficiency of the ball, while decreasing the expense of its production, since the solid molded rubber core 1 is less costly than the windings. However, my invention is not limited in all cases to the use of soft rubber for the inner part of the filling.

By the term "wire" I mean to include any hard springy extremely-elongated body adapted to coöperate with the rubber windings in the manner herein set forth, and for this purpose I prefer to employ steel, which is preferably spring-tempered and flat.

Having described my invention, I claim—

1. A playing-ball comprising a sphere of soft rubber, windings thereon of tensioned rubber mixed with tight windings of wire, and a cover.

2. A playing-ball comprising a sphere and a cover; said sphere comprising layers of soft rubber and tight windings of wire upon the several layers.

3. A playing-ball comprising a rubber sphere, mingled windings thereon of both wire and tensioned rubber, and a cover.

4. A playing-ball comprising a core, windings thereon of tensioned rubber alternating with winding of spring-wire, and a cover.

5. A playing-ball comprising a sphere and a cover thereon, said sphere consisting at least partially of windings of rubber mixed with windings of spring-wire.

6. A playing-ball comprising a distinct sphere of rubber, windings thereon of tensioned rubber mixed with windings of tempered spring-wire in a tense condition, and a hard cover formed of plastic material.

7. A playing-ball comprising a distinct sphere of soft material throughout which are embedded convolutions of spring-wire, and a cover.

8. A playing-ball comprising a sphere of soft rubber throughout which are embedded convolutions of tempered spring-wire in a tense condition, and a cover formed of plastic material and holding said sphere under compression.

9. A playing-ball at least a portion whereof consists of a length of wire and a strip of rubber wound coincidently, one within the other, in miscellaneous directions.

10. A playing-ball at least a portion whereof consists of a length of flat tempered wire and a strip of tensioned rubber wound coincidently.

11. A playing-ball at least a portion whereof consists of windings of tempered steel wire in a tense condition interspersed with windings of tensioned approximately pure rubber strips, said wire and said strips being wound with substantial coincidence, one within the other, in miscellaneous directions.

12. A playing-ball at least a portion whereof consists of windings of tempered steel wire in a tense condition interspersed with windings of tensioned approximately pure rubber strips; said wire and said strips being wound with substantial coincidence, one within the other, in miscellaneous directions; and a rubber sphere within said winding.

13. A playing-ball at least a portion whereof consists of windings of tempered steel wire in a tense condition interspered with windings of tensioned approximately pure rubber strips; said wire and said strips being wound with substantial coincidence, one within the other, in miscellaneous directions; a rubber sphere within said windings; and a shell of gutta-percha holding said windings under compression.

14. A playing-ball at least a portion whereof consists of a thick spherical body of soft, elastic material, throughout which are interspersed convolutions of tempered wire, said convolutions beginning at the inner surface of said body and extending in miscellaneous

directions and increasing in diameter to the outer surface of said body.

15. A playing-ball at least a portion whereof consists of a thick spherical body of soft rubber, throughout which are interspersed tempered springs.

16. A playing-ball at least a portion whereof consists of a thick spherical body of tense soft rubber, throughout which are interspersed tempered steel springs in a tense condition; said body being held under compression by a gutta-percha cover.

17. A playing-ball whereof at least a portion consists of windings of flat spring-tempered wire interspersed with windings of tensioned rubber strips.

18. A playing-ball having a hard shell and a core, and a layer between said shell and core; said layer consisting of windings in miscellaneous directions of tempered spring metal mingling with rubber.

FRANCIS H. RICHARDS.

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