

No. 706,758.

Patented Aug. 12, 1902.

E. KEMPSHALL.
GOLF BALL.

(Application filed June 14, 1902.)

(No Model.)

Fig. 1.

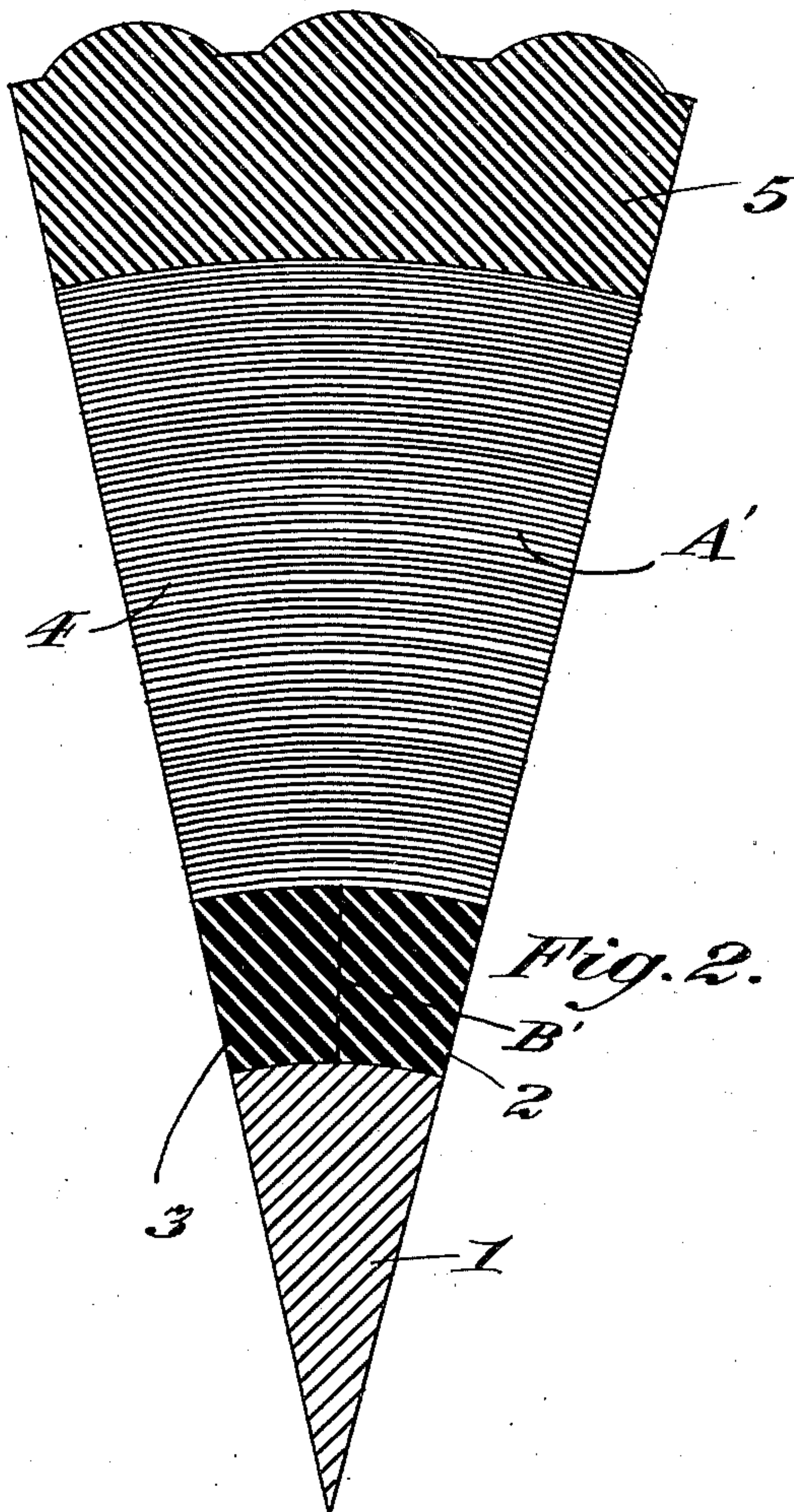
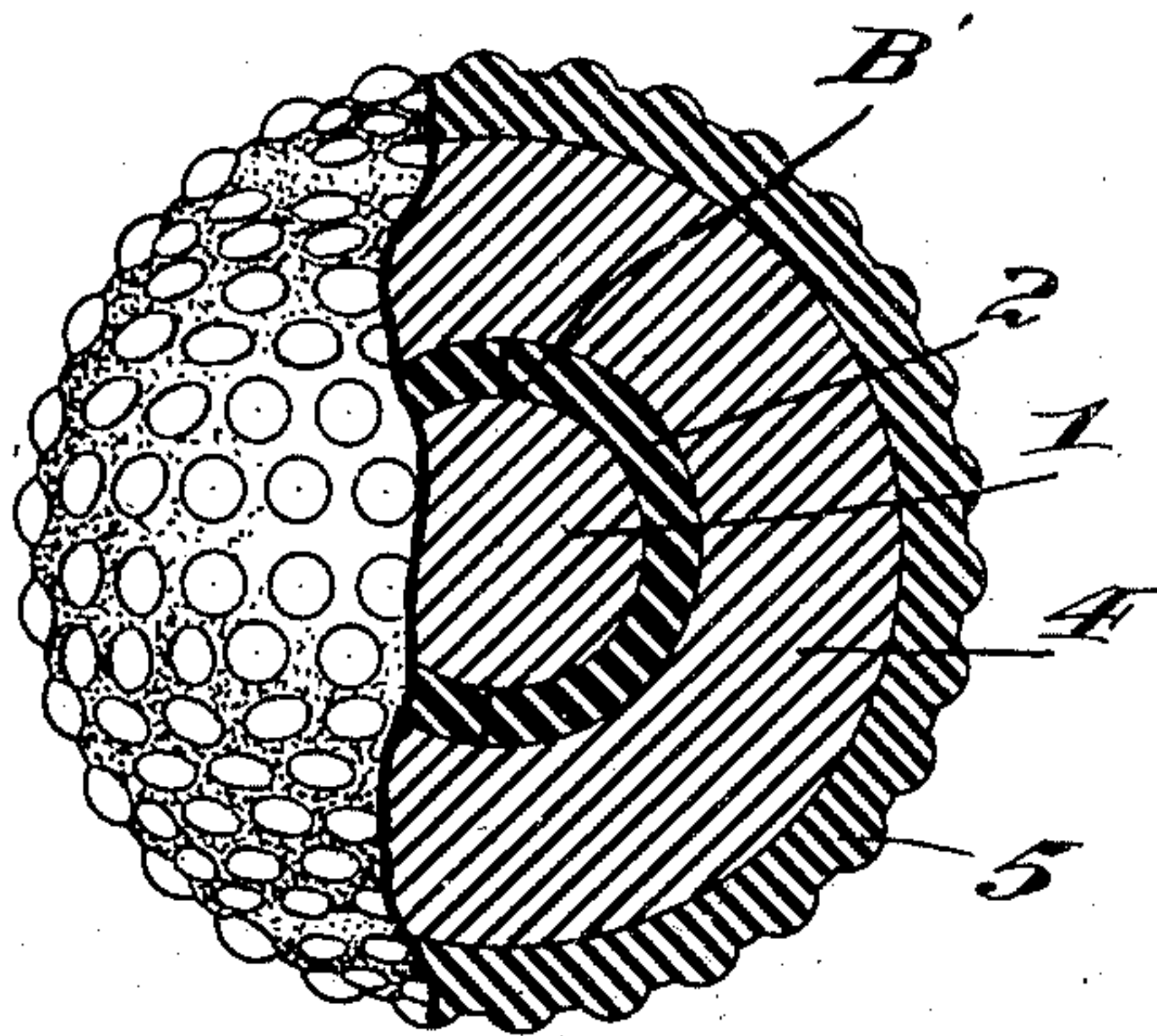


Fig. 3.

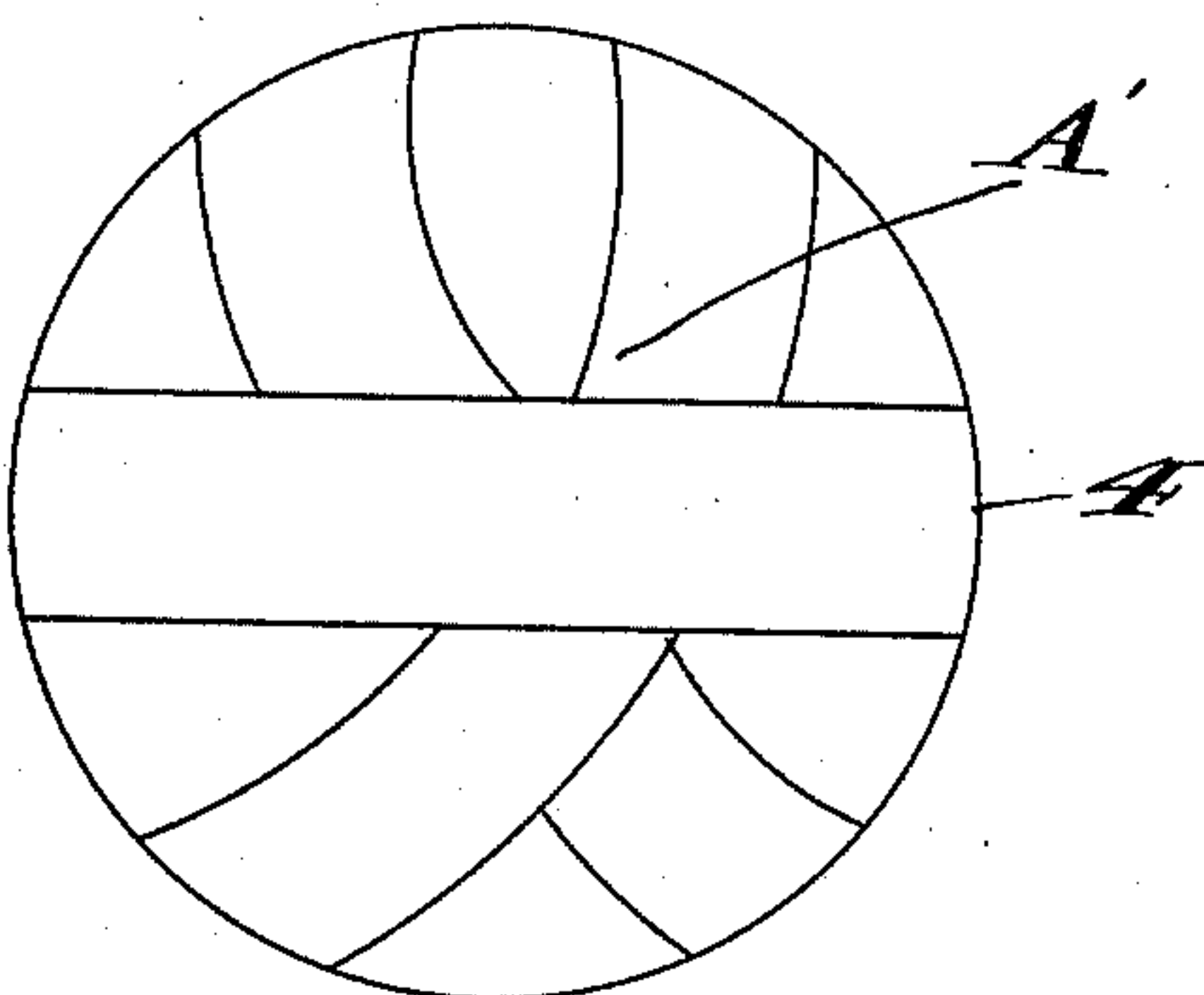


Fig. 4.

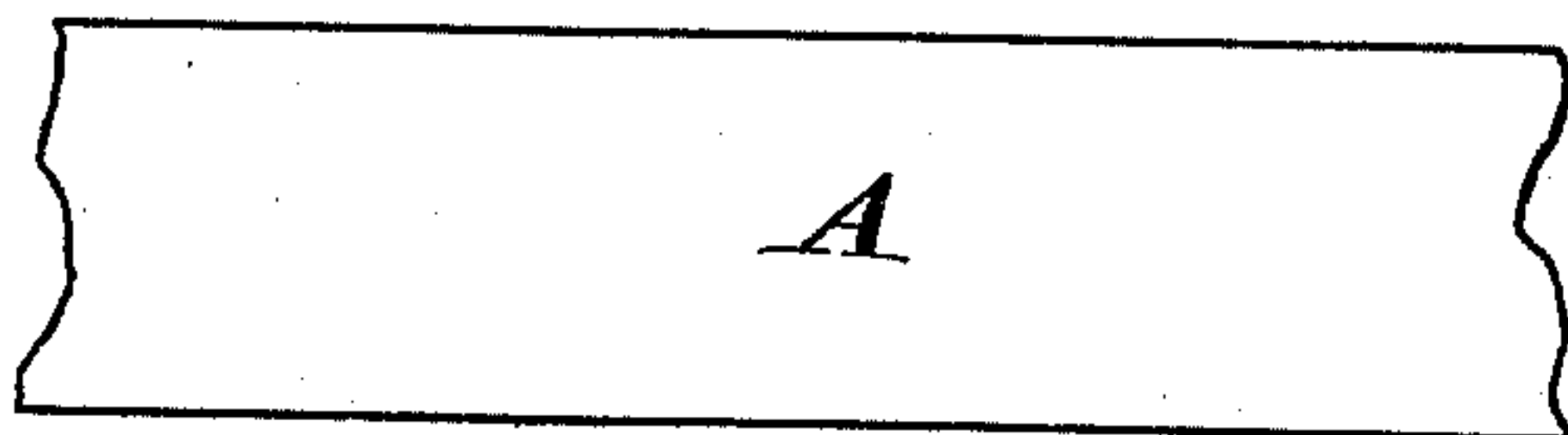
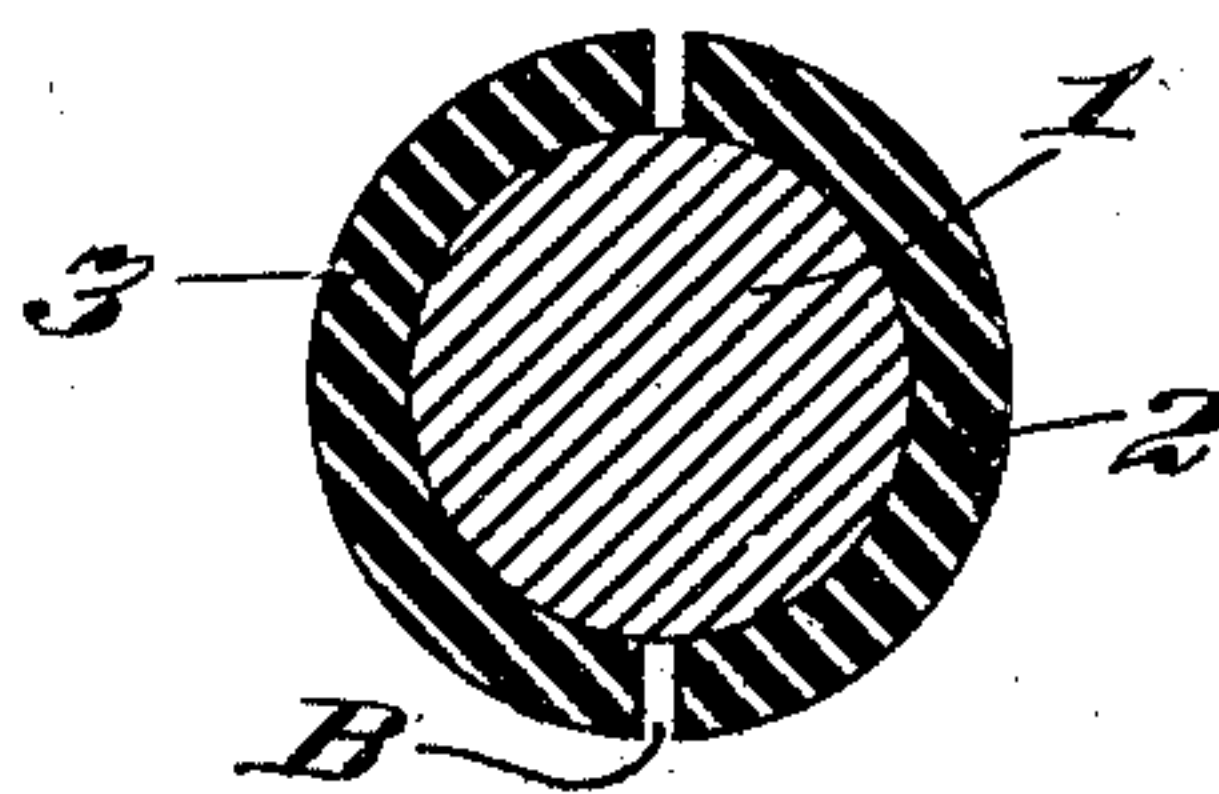


Fig. 5.



Witnesses:
H. C. Abbott
R. W. Pittman

Inventor,
Eleazer Kempshall,
By his Attorney, F. W. Richards.

UNITED STATES PATENT OFFICE.

ELEAZER KEMPSHALL, OF BOSTON, MASSACHUSETTS.

GOLF-BALL.

SPECIFICATION forming part of Letters Patent No. 706,758, dated August 12, 1902.

Application filed June 14, 1902. Serial No. 111,765. (No model.)

To all whom it may concern:

Be it known that I, ELEAZER KEMPSHALL, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Golf-Balls, of which the following is a specification.

This invention relates to playing-balls; and its objects are to increase the flying power thereof and also to render them buoyant in water.

In the accompanying drawings, Figure 1 is a part-sectional view of a golf-ball embodying my improvements. Fig. 2 is an enlarged segment of a ball. Fig. 3 illustrates the filling or body of the ball. Fig. 4 shows a piece of sheet-rubber used in forming said body, and Fig. 5 shows a compound center piece used within the filling shown at Fig. 3.

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

For the center piece of the ball I employ a small sphere 1, preferably of celluloid or other hard springy material, inclosed in undersized segments 2 3 of soft rubber. Upon this compound center piece I apply approximately pure sheet-rubber layer over layer to form the filling 4 of the ball, and upon this filling I place a shell 5, of plastic material, preferably gutta-percha, and preferably holding the filling under compression.

In winding the filling 4, which forms the principal part of the body of the ball in the illustrated construction, I do not employ crude caoutchouc or caoutchouc in an uncured condition, because it is not sufficiently strong and resilient when in an uncured condition; but 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 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. 2 and 3. 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 sheeting winds very compactly, forming a solid body—that is, a body containing no perceptible crevices. Because of its tension and compactness this body is materially harder to the touch than the soft-rubber shell-segments 2 3. The solidity of the body I regard as a feature of great im-

portance. The tension of the sheeting is sufficient to draw said segments together, closing the crevice B between them, as at B', Figs. 1 and 2, and tensioning them upon the hard sphere 1.

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 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, as at A, Fig. 2, and since each layer is independently tensioned a large amount of power is stored up in the ball. In short, my filling consists principally 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 rubber sheeting, 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 ball, thus materially augmenting its flying power. Again, by using approximately pure cured rubber in forming the body the golf-ball is rendered buoyant in water, so that if accidentally driven into a lake or stream it can be readily located and recovered.

I apprehend that when the ball is given a blow the outer layer or envelop of tensioned rubber 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. Since there are a multitude of these highly-tensioned rubber 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.

The gutta-percha shell 5 may be formed of hemispherical segments, which are preferably

welded upon the filling 4 under heat and pressure. The windings of acid-cured rubber adhere to one another, thereby improving the stability and elasticity of the ball. The heat present at the operation of welding on the gutta-percha shell improves the adhering properties of the tightly-packed acid-cured rubber. It will be noted that the heaviest portion of the structure consists of the shell, which lies at the periphery of the ball and by reason of its momentum when the ball is in rotation tends to prolong the flight thereof.

The diameter of the sphere 1 may be between twenty-five and thirty-five per cent. (preferably thirty per cent.) that of the entire ball, while the diameter of the sphere 2 3 may be between thirty-five and forty-five per cent., (preferably forty per cent.,) and that of the filling 4 between seventy and ninety per cent., (preferably eighty-five per cent.,)

Having described my invention, I claim—

1. In a playing-ball, the combination of a center piece; a multitude of windings thereon of extremely thin and highly-tensioned approximately pure acid-cured sheet-rubber, said windings forming a solid body, and a cover formed of plastic material; said cover holding said rubber under compression, and said center piece consisting of undersized segments of molded elastic material drawn together at their edges by said windings.

2. 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 sphere and a molded softer elastic shell thereon.

3. A playing-ball comprising a small hard center piece; a small sphere of solid molded soft rubber thereon; a substantially solid materially larger spherical body upon said soft-rubbersphere and consisting of windings of extremely thin and highly-tensioned acid-cured sheet-rubber; and a shell or cover of plastic material.

4. 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 comprising a celluloid sphere and a shell of solid soft rubber thereon.

5. A playing-ball comprising a hard sphere 1 of between twenty-five and thirty-five per cent. of the diameter of the ball; a sphere upon said sphere 1 and consisting of soft rubber, the diameter of said soft-rubber sphere being between thirty-five and forty-five per cent. of the diameter of the ball; a substantially solid sphere 4 upon said soft-rubber sphere and consisting of a multitude of extremely thin and highly-tensioned approxi-

mately pure acid-cured sheet-rubber, the diameter of said sphere 4 being between seventy and ninety per cent. of the ball; and a gutta-percha shell or cover.

5 6. In a playing-ball, the combination of a sphere of celluloid; a sphere of solid molded rubber tensioned thereon; a multitude of windings of extremely thin and highly-tensioned approximately pure acid-cured sheet-rubber upon said sphere, and a shell of plastic material.

10 7. In a playing-ball, a center piece compounded of celluloid and solid soft rubber, 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.

15 20 8. In a playing-ball, the combination of a solid body of spherical form and provided with a 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 thick-

ness, and a shell of gutta-percha holding said windings under compression; said center piece consisting of a hard sphere and undersized segments of solid soft rubber drawn together at their edges by said windings. 30

9. A playing-ball comprising a hard sphere 1 whose diameter is thirty per cent. of the diameter of the ball; a soft-rubber sphere upon said hard sphere, the diameter of said soft-rubber sphere being forty per cent. of the entire ball; a substantially solid sphere 4 upon said soft-rubber sphere and consisting of a multitude of windings of extremely thin and highly-tensioned approximately pure acid-cured sheet-rubber, the diameter of said sphere 4 being eighty-five per cent. of that of the entire ball and each of said windings being not more than four one-thousandths of an inch in thickness; and a gutta-percha shell holding said sphere 4 under compression; substantially as set forth. 35 40 45

ELEAZER KEMPSHALL.

Witnesses:

B. C. STICKNEY,
FRED. J. DOLE.