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Patented Apr. 1, 1902.

E. KEMPSHALL.
GOLF BALL.

(Application filed Jan. 4, 1902.)

(No Model.)

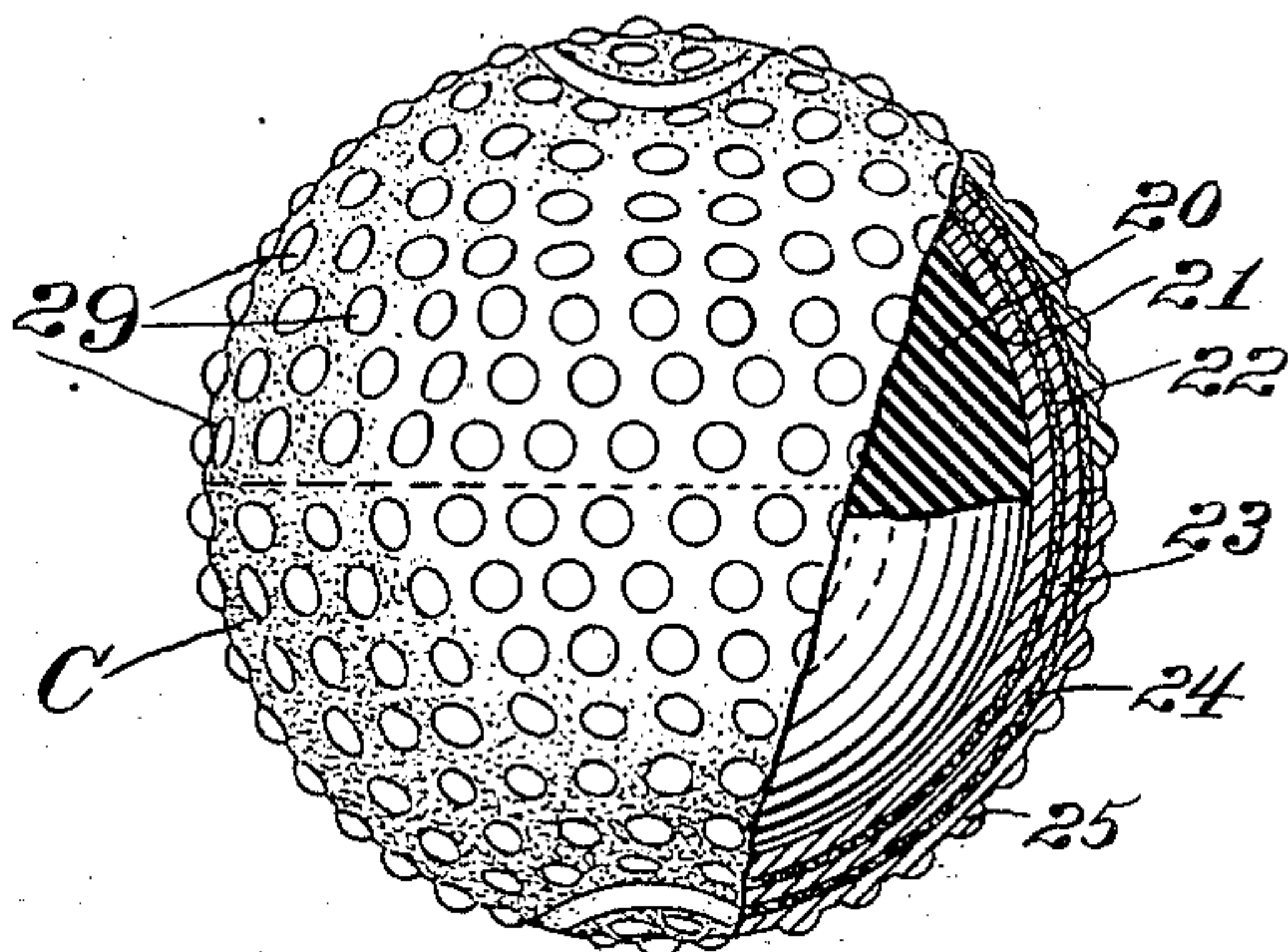


Fig. 1.

Fig. 2.

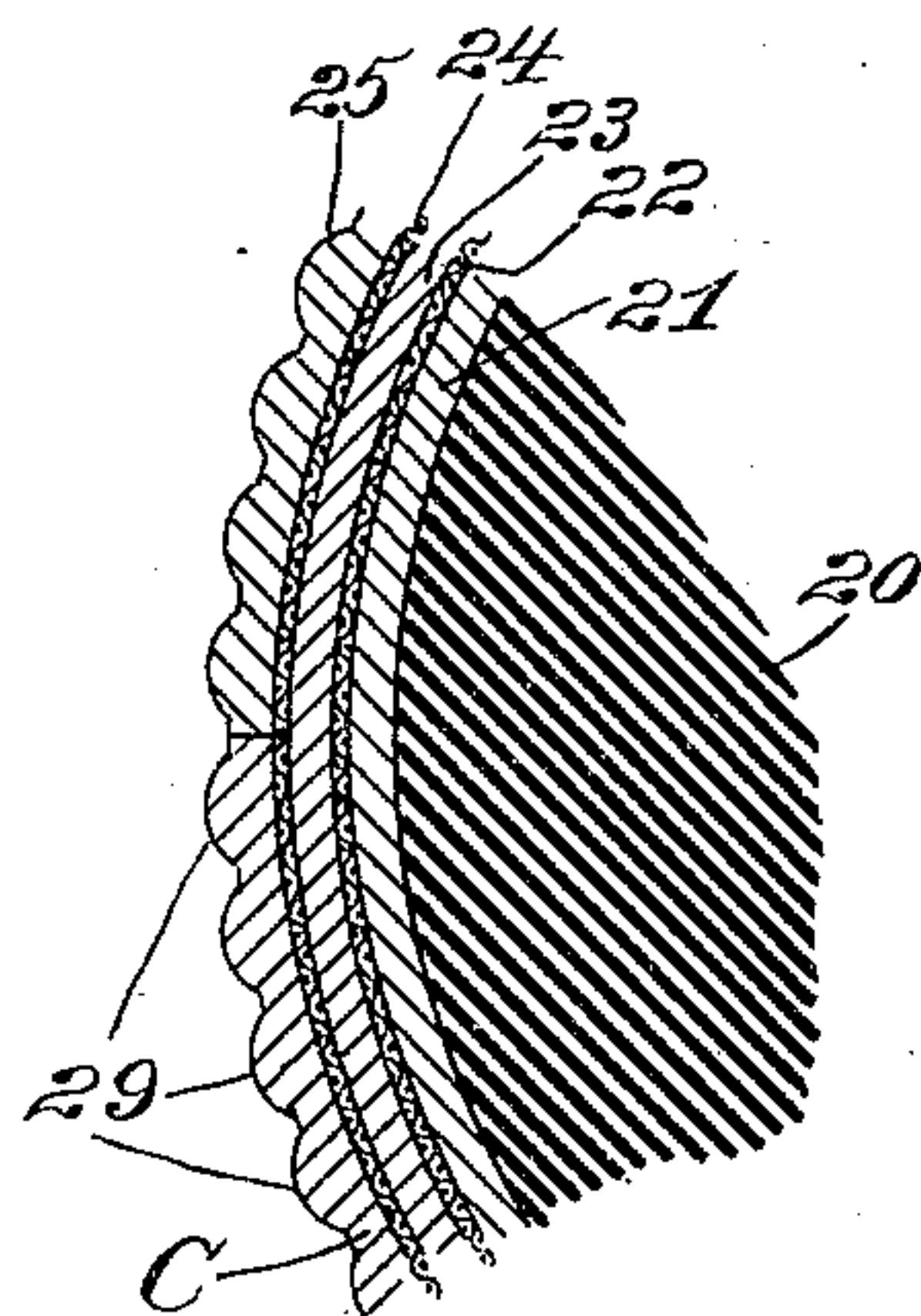
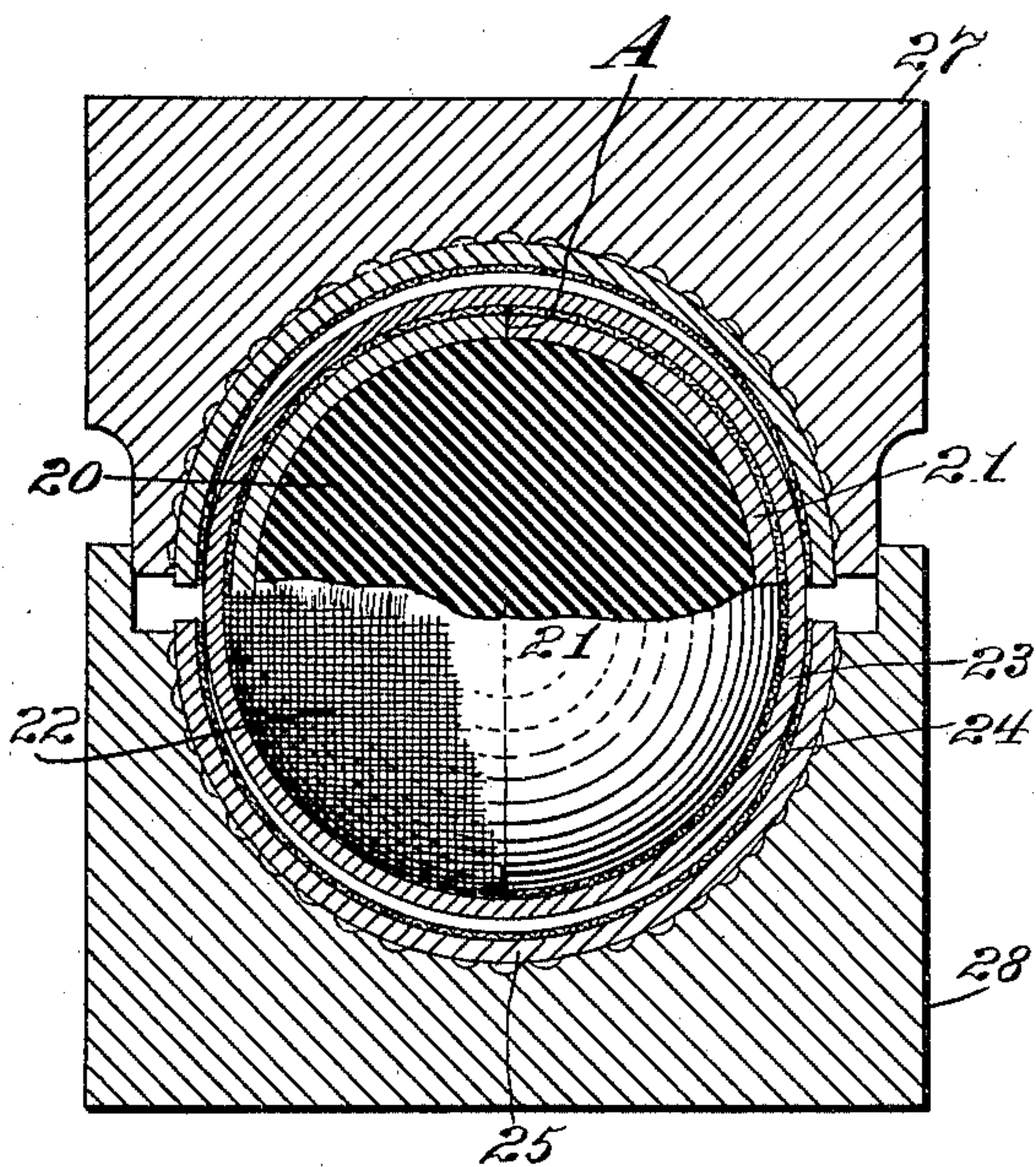


Fig. 3.

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UNITED STATES PATENT OFFICE.

ELEAZER KEMPSHALL, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE KEMPSHALL MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

GOLF-BALL.

SPECIFICATION forming part of Letters Patent No. 696,891, dated April 1, 1902.

Application filed January 4, 1902. Serial No. 88,411. (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 Golf-Balls, of which the following is a specification.

This invention relates to playing-balls such as used in golf and certain other games; and its object is to increase the efficiency and durability of the ball, my improvements affecting more particularly the shell, which I form of a hard wear-resisting springy material—such, for instance, as celluloid, which, however, I render extremely tough and otherwise superior to a simple celluloid shell of the same thickness.

In the accompanying drawings, Figure 1 shows a ball made in accordance with my present improvements and partly broken away, so as to exhibit the construction. Fig. 2 illustrates one stage in the process of making a ball, and Fig. 3 is a fragmentary enlarged view illustrating the ball components.

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

I form a center piece 20 of suitable material, such as gutta-percha or soft rubber, which may be a solid sphere or built up of different materials, being springy, so as to afford an elastic backing for the shell, and also being of sufficient weight to enable the ball to carry well. This filling or core I incase first with a shell or layer composed of a ply of celluloid and a ply of fabric, preferably woven. This two-ply shell may be formed of hemispherical segments, as indicated at Fig. 2, the celluloid being indicated at 21, the fabric at 22, and the joint between the segments at A. In forming the original shell segments or blanks I preferably combine the celluloid and fabric under heat and pressure, so that the celluloid permeates the meshes of the fabric, thereby making a very firm and tough blank. This shell celluloid-treated fabric I coat or incase in celluloid 23, this coating being preferably somewhat green or uncured. It may be applied either in the form of hemispherical segments or as a plastic coating, and in the latter case it may be dried after

application. I then apply an outer shell or layer made of plies of fabric 24 and celluloid 25, the fabric being inside and the facing of celluloid thereon being intended to form the peripheral surface of the ball. The cloth and celluloid of this layer or blank may also be combined under heat and pressure, preferably so as to form hemispherical segments, Fig. 2, which are so placed that the joint or seam of the outer segments crosses, preferably at right angles, the seam A of the inner segments, thereby breaking joints and eliminating all liability of the shell bursting, since the joint of each layer is reinforced by the body of the other layer. The intermediate material or coating 23 may be applied, if desired, wholly or partially upon the inner surface of the outer shell or layer, one of its principal functions being to unite the layers, although it may be made of sufficient thickness to form a substantial and effectual part of the shell itself. The ball thus assembled is placed between forming and heating dies 27 and 28, which are then forced together, thereby joining intimately the edges of all of the segments, which, if desired, may be cemented. I prefer, however, to unite the segment edges by welding, and in order to do this effectually I make the original shell-blanks somewhat too bulky to fit in the closed dies, so that when the latter are brought together the shell is compressed, the heat rendering the celluloid sufficiently plastic to form the welds and finish the shell, as indicated at C, Fig. 1.

The intermediate coating or material 23 may be somewhat green, so that the solvent contained therein may become active when heated and permeate or affect the more thoroughly-seasoned material 21 and 25, thereby rendering the latter more plastic. However, all of the celluloid used in the shell may be, if desired, in a somewhat green condition within the scope of my invention, or all of the celluloid, including the portion 23, may be in a substantially uniform condition, if desired, so long as by the action of heat it may be rendered sufficiently plastic to enable it to mold under the pressure of the dies.

The mass 20, forming the body of the ball, is highly resisting and prevents the thin com-

posite from collapsing under the great pressure of the dies, and it will be understood that by reason of the compression of the shell between said dies and said resisting mass the material of the shell itself is highly solidified, the celluloid becoming hardened or tempered and toughened, so as to be adapted to withstand the rough usage to which the ball is subsequently exposed. By the same operation the celluloid is thoroughly incorporated with the fibers of the fabric, thus making a springy phenomenally-strong celluloid-and-fabric shell.

It will further be understood that by the compressing action of the dies the material of the shell itself is not only solidified, but the bulk of the elastic filling 20 is also somewhat reduced, so that said filling is placed under permanent compression by the shell, the latter being retained in the dies until sufficiently cool to hold its shape in spite of the expansive action of the core, which constantly tends to recover its original bulk. The expansive tendency of the core aids in preserving the true spherical form of the shell and also in restoring the shape of the same instantly when distorted by a blow, thus increasing the carrying power of the ball.

One of the important features of the improvement lies in building up a shell by means of thin layers of celluloid alternating with fabric, whereby owing partly to the permeation of the celluloid through the meshes of the fabric I get the advantage of a simple thick celluloid shell. Further, since a thin plate is superior in quality to a thick plate of celluloid it will be seen that by combining in a practical manner a plurality of thin celluloid plates I give a relatively thick shell the advantages of thin plates as to temper, toughness, durability, &c.

The layers of fabric, especially when woven, compensate for or overcome the usual brittleness of the celluloid, a composite shell of the kind herein described not being easily cracked or chipped. In fact, if the outer layer of celluloid be very thin and well incorporated into the fabric chipping becomes practically impossible. The presence of the fabric does not impair the springiness of the shell, since the fabric itself is yielding and also since there is a large amount of celluloid in the composite shell as compared with the amount of fabric. In fact, the presence of the fabric conduces to the springiness of the shell, since it tends to prevent the latter from being indented sharply at any point, so that when the ball is struck by an implement not only the point of contact but also the portion of the shell surrounding said point is flexed, thereby affecting a large area of the resisting springy mass within the shell. Hence neither the shell nor the inner mass is unduly distorted by a blow, so that little force is absorbed in changing and restoring the shape of the ball, while owing to the large proportion of the

core affected great energy is brought to bear in restoring the shape of the ball, thereby causing it to spring from the implement with phenomenal speed.

The ball possesses the further advantage that it is not injuriously affected by either hot or cold weather, the celluloid being subjected at the finishing operation to a heat far in excess of that of the hottest summer day and the incorporation of fabric in the shell insuring the same against cracking by reason of cold weather, especially since the fabric is near to the surface of the shell. It will further be understood that the shell is sufficiently resisting to enable the ball to be driven a short distance by a light blow without affecting the resilient core, giving the action of a dead ball, while under a heavier blow the shell is flexed and the energy of the imprisoned mass is brought into play, with the result that the ball flies a long distance.

My improvements may, however, be applied in building up a shell of other material than celluloid in combination with a ply or plies of tough material, especially where one or more of the layers or blanks consist of joined segments.

I usually make the surface of golf-balls pebbled or brambled, as at 29, Fig. 1, although balls intended for other games may be otherwise finished.

In using herein the term "celluloid" I do not limit myself to any particular compound of the celluloid or pyroxylin class. It is not essential always that all or any of the plies or layers whereof the shell is built up be applied in the form of segments.

Having described my invention, I claim—

1. In a playing-ball, a shell comprising at least three plies, the outer ply being formed of hard, springy, wear-resisting plastic material, an intermediate ply being of fabric, and an inner ply being of hard, springy material.

2. In a playing-ball, a thin shell comprising an outer ply of celluloid, a ply of fabric near the outer surface of the ball, and an inner ply of hard, springy, material; in combination with a yielding backing for said shell.

3. In a playing-ball, a shell consisting of hard, springy material having separate plies of fabric incorporated therein.

4. A playing-ball comprising a shell having a plurality of thin plies or plates of celluloid and a ply or layer of tough material between said celluloid plies.

5. In a playing-ball, a shell comprising woven fabric faced upon both its inner and outer sides with celluloid.

6. In a playing-ball, a shell comprising a plurality of plies of fabric alternating with plies of celluloid.

7. In a playing-ball, a shell comprising outer and inner plies of celluloid, intervening plies of fabric, and celluloid between the plies of fabric.

8. In a playing-ball, a shell comprising outer and inner plies of celluloid and a plurality of intervening plies of woven fabric.

9. In a playing-ball, a shell consisting of a thin outer ply of well-cured celluloid backed by cloth and an inner thin ply of well-cured celluloid also backed by cloth; said plies and said cloth being closely compacted.

10. In a playing-ball, a shell consisting of a thin outer ply of well-cured celluloid backed by cloth, a thin inner layer of celluloid; and an intervening incompletely-cured layer of celluloid; said layers and cloth being closely compacted.

11. In a playing-ball, a celluloid shell provided with a layer of tough material; the celluloid providing an outer and inner facing for said tough material and being closely compacted therewith.

12. In a playing-ball, a shell consisting of welded segments of hard, springy material reinforced by tough material, the latter being in the form of a ply placed between outer and inner plies of said hard, springy material, and all of said plies being closely compacted.

13. In a playing-ball, a shell comprising outer and inner layers, each of said layers consisting of hard, springy material reinforced by tough material, and being formed of segments, the inner layer breaking joints with the outer layer, thereby to prevent bursting of the shell at either joint.

14. In a playing-ball, the combination of an outer and an inner shell layer, each of said layers consisting of hemispherical segments of cloth faced with celluloid and joined at their edges, and the joint of one of said layers crossing the joint of the other of said layers.

15. In a playing-ball, the combination of an outer and an inner shell layer, the inner layer being jointed or welded, and the other layer closing or covering the joint or weld of the inner layer so as to form a reinforcement therefor; at least one of said layers being lined with fabric.

16. A playing-ball consisting of a yielding core and a shell holding said core under compression; said shell comprising alternate plies of celluloid and fabric closely compacted; and said plies being at least three in number.

17. A playing-ball consisting of a solid sphere of yielding material or materials, and a shell holding said core under compression; said shell comprising closely-compacted plies of cloth alternating with one or more layers of hard, wear-resisting material.

18. A playing-ball consisting of a solid yielding core held under compression by a shell consisting of layers each composed of a ply of fabric faced with hard, wear-resisting material; such composite layers being formed of segments welded or joined together at their edges.

19. A playing-ball consisting of a yielding

core held under compression by a closely-compacted shell consisting of a plurality of layers, at least one of said layers consisting of spherical segments of combined fabric and celluloid.

20. A playing-ball consisting of a yielding core held under compression by a closely-compacted thin shell consisting of a plurality of layers, each layer consisting of a plurality of joined fabric and celluloid segments, and the joint or seam in one layer crossing the joint or seam in another layer.

21. A playing-ball consisting of a yielding core held under compression by a relatively thin closely-compacted shell consisting of a plurality of layers, each layer consisting of joined hemispherical fabric and celluloid segments, the joint or seam in one layer extending crosswise of the joint or seam in the other layer.

22. In a playing-ball, the combination with a core of a shell or covering consisting of segments welded or joined at their edges, each segment comprising a ply of fabric and a layer of hard, wear-resisting, plastic springy material closely compacted with said fabric.

23. In a playing-ball, the combination of a hemispherical cover, segments joined at their edges, each segment comprising a layer of woven fabric and a layer of celluloid; and a reinforcing-cover for the joint or seam.

24. In a playing-ball, the combination of a core; spherical segments, each comprising a layer of woven fabric and a layer of celluloid, said segments incasing the core and being welded at their edges; and a fabric reinforcement for the weld.

25. In a playing-ball, the combination of a relatively massive solid core, and a relatively thin shell consisting of an inner layer, an outer layer, and an intervening layer; said inner and outer layers consisting of cloth having celluloid embedded therein, and each being formed of segments welded at their edges, the welds crossing; said intervening layer being also of celluloid and firmly uniting said outer and inner layers; and said shell being compacted upon said core and holding the latter under compression.

26. In a playing-ball, the combination with a yielding core of a shell consisting of fabric and hard, wear-resisting material in alternate layers; said layers being welded into the form of a concrete substance and holding said core under compression.

27. In a playing-ball, the combination of celluloid segments or plates joined at their edges, to form a cover, and a fabric reinforcement covering the joints.

28. A playing-ball having a casing comprising an outer substantial layer of celluloid lined with fabric, said layer being formed in spherical segments which are welded together at their edges.

29. A playing-ball having a filling and a shell holding said filling under compression; said

shell including an outer substantial layer of celluloid lined with fabric, said layer being formed in hemispherical segments which are welded together at their edges.

5 30. A playing-ball comprising a yielding filling and a shell, said shell being compounded of fabric and celluloid.

31. A playing-ball comprising a spherical body which consists of layers of fabric and
10 layers of celluloid.

32. A playing-ball comprising a yielding filling and a shell, said shell being compounded of a plurality of layers of celluloid and at least one layer of woven fabric.

15 33. A playing-ball comprising a yielding filling and a shell holding the filling under compression, said shell being formed from hemispherical segments welded together at their edges, and the shell including a plurality of
20 layers of celluloid and at least one layer of woven fabric.

34. A playing-ball comprising a yielding filling and a shell, said shell being compounded

of a plurality of layers of fabric and at least one layer of celluloid.

25 35. A ball incased in united hemispherical cups formed from celluloid in which fabric is embedded.

36. A ball incased in united spherical segments formed from celluloid which is united
30 to woven fabric.

37. A playing-ball having a yielding filling and a shell consisting of fabric and celluloid; said shell holding said filling under compression.

35 38. A playing-ball having a yielding filling and a substantial shell consisting of celluloid and fabric in layers; said shell being formed in spherical segments which are welded together at their edges upon said filling; and
40 said shell holding said filling under compression.

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