No. 695,867. Patented Mar. 18, 1902.

E. KEMPSHALL.

MANUFACTURE OF PLAYING BALLS.

(Application filed Dec. 31, 1901.)

(No Model.)

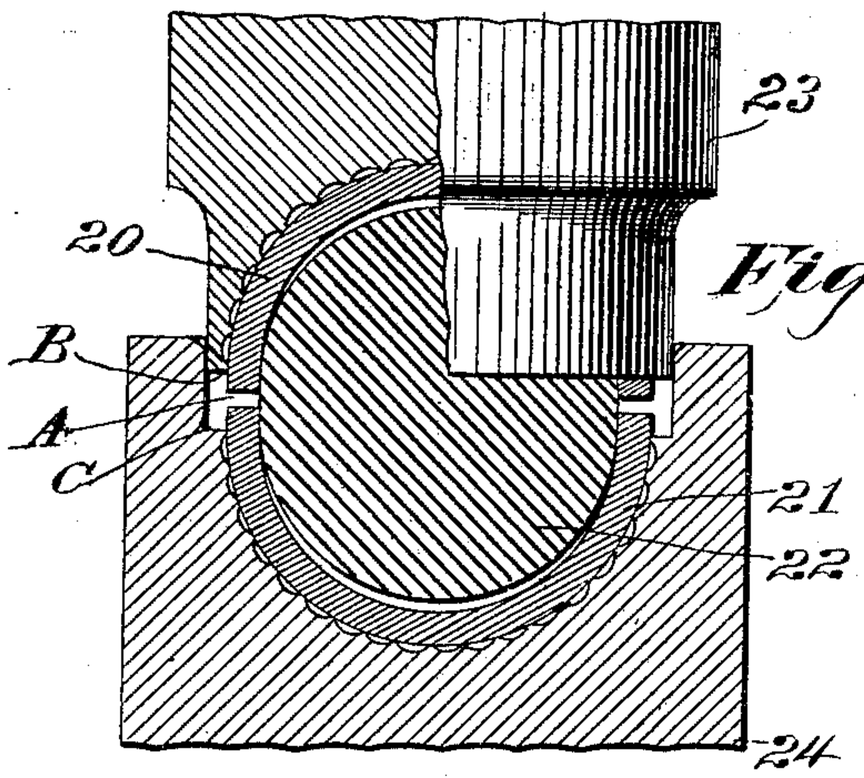

Fig. 1.

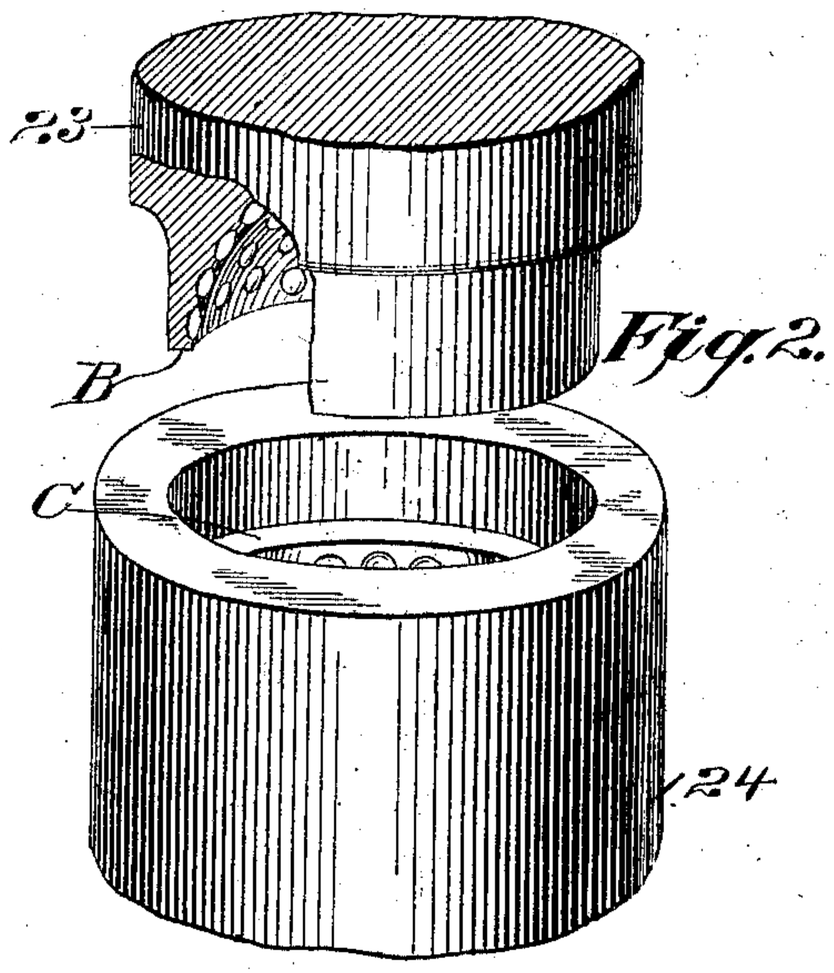

Fig. 2.

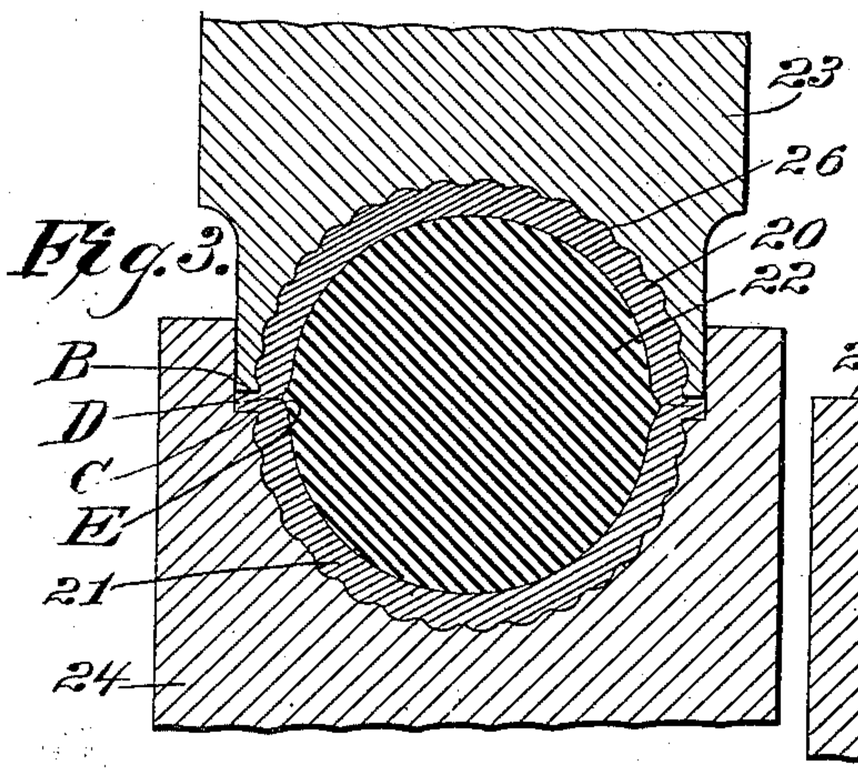

Fig. 3.

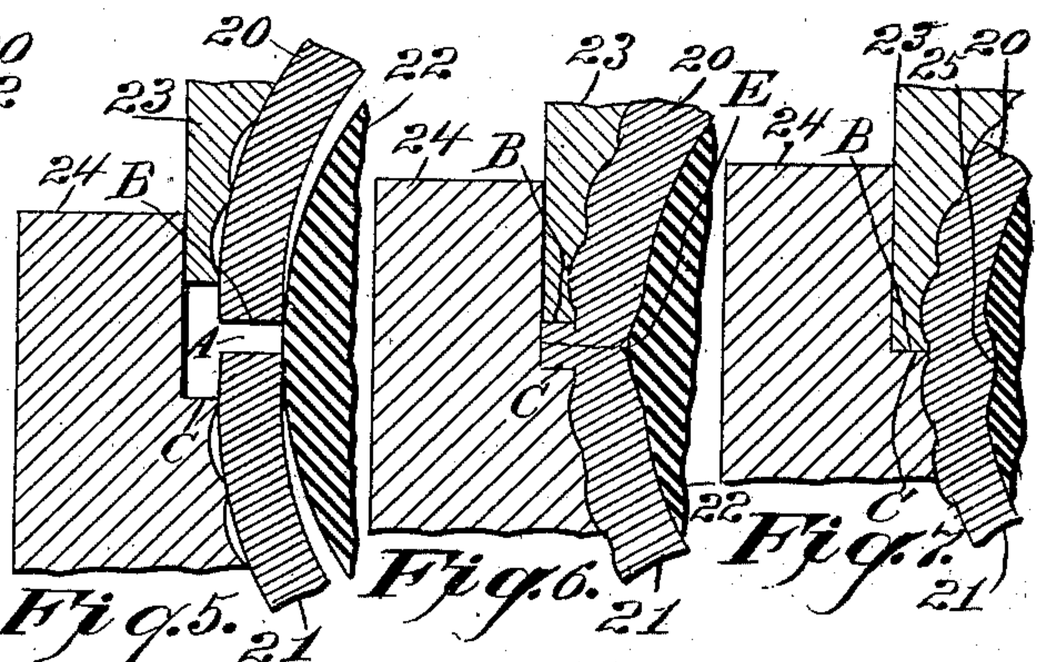

Fig. 5. Fig. 6. Fig. 7.

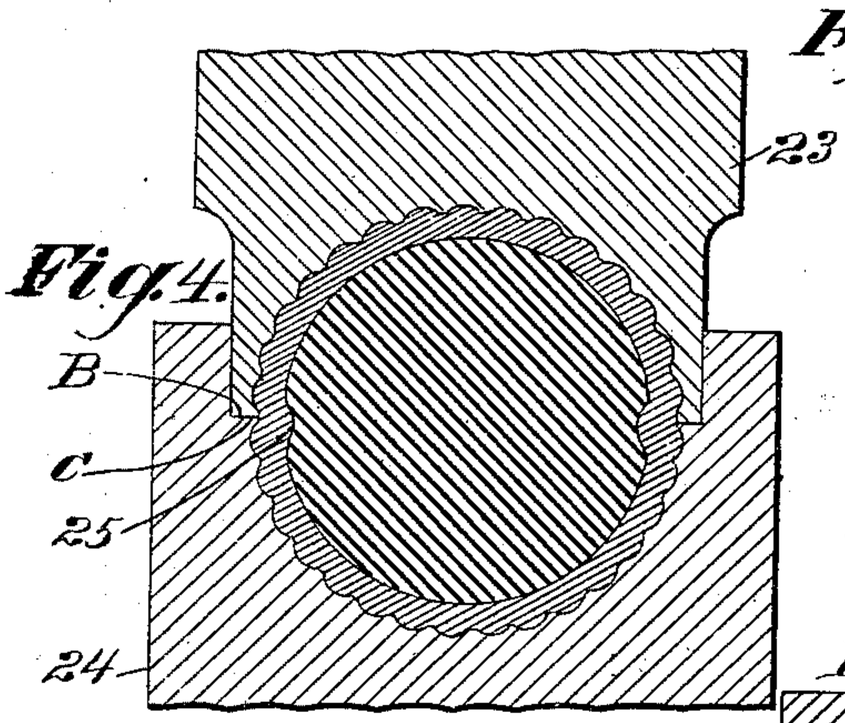

Fig. 4.

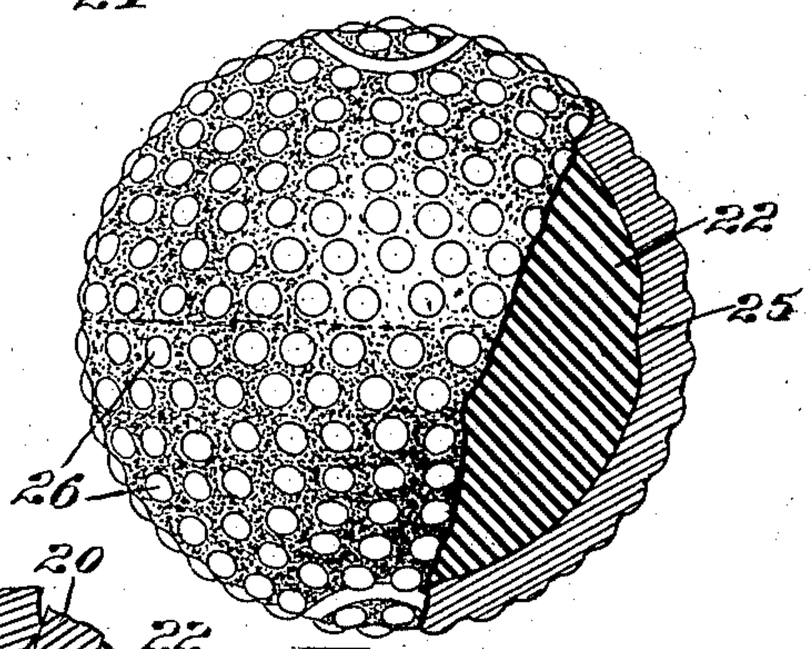

Fig. 9.

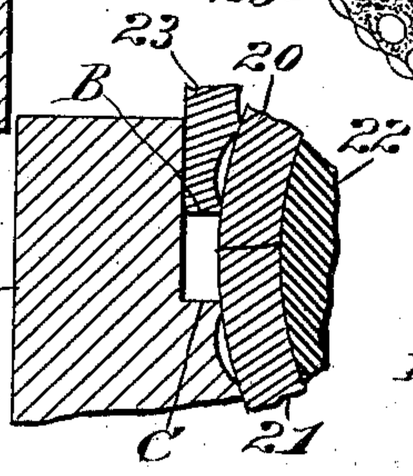

Fig. 8.

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UNITED STATES PATENT OFFICE.

ELEAZER KEMPSHALL, OF BOSTON, MASSACHUSETTS.

MANUFACTURE OF PLAYING-BALLS.

SPECIFICATION forming part of Letters Patent No. 695,867, dated March 18, 1902.

Application filed December 31, 1901. Serial No. 87,976. (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 playing-balls; and its chief object is to improve the process of welding shell-segments together upon a filling or core. I compress the shell upon the core, so as to place the latter under permanent compression by the shell. The pressure to which the shell is subjected tends to improve the quality thereof. I also provide for thickening the ball at the weld, so as to improve the joint, and preferably I make the extra thickness so great as to amount to a welt on the inside of the shell, whereby shell and core may be anchored together.

In forming shells of golf-balls the contacting surfaces of the shell-segments when pressed together have a tendency to preserve their integrality or continuity, and so prevent an effective weld or joining together of the segments.

An important object of the present improvements is to overcome the objection referred to. The components of the ball or other article may be previously prepared in dense and compact form, and these parts may be so united as to secure an integrality of the completed article.

In the drawings forming part of this specification, Figure 1 shows the ball parts placed in a telescoping die. Fig. 2 is a perspective view of the die members. Fig. 3 is similar to Fig. 1, but illustrates a later stage in the process. Fig. 4 is a view similar to Fig. 3, but showing the ball completed. Figs. 5, 6, and 7 are sectional fragmentary views drawn upon a larger scale, so as to illustrate the action of the dies upon the shell and filling. Fig. 8 illustrates a stage in the process between the Fig. 5 and Fig. 6 operations. Fig. 9 is a completed ball.

In practicing my invention I preferably employ hemispherical segments 20 and 21 to form a shell or cover for a filling or core 22. The material of the shell (preferably gutta-percha) is generally harder than that of the filling and is also relatively stiff, while the filling is relatively soft and may possess elasticity. The shell material may be rendered plastic, as by means of heat, and may be subsequently converted to a hardened condition, as by means of cold, while the filling is preferably of material (preferably well-vulcanized soft rubber) which is not injuriously affected or changed in condition by a degree of heat which is sufficient to reduce the shell to a plastic condition. The center piece 22 may first be formed of the required size and shape by means of suitable dies and presses and is too bulky for the capacity of the finished shell. The latter is also by preference previously formed, so that the shell and filling may be assembled between the upper and lower telescoping and heating dies 23 and 24, as in Fig. 1. The gutta-percha may be treated or put in proper condition for the adherence of its edges under pressure, and the dies may be heated by steam or otherwise for bringing the gutta-percha into suitable condition and consistency for uniting them and completing the shell. The inner surface of the shell or outer surface of the filling, or both, may be treated, so as to cause the rubber to adhere to the gutta-percha.

The abutting edges of the segments at A are made somewhat full, whereby when these edges meet the shell is oversize, and the center piece 22 may be so large as to wholly fill the interior of the shell when or just before said edges abut, as illustrated diagrammatically, Fig. 8. Upon the closing action of the dies both the center piece 22 and the shell-segments are compressed, and the material of the shell, which is rendered plastic, preferably by heating, is squeezed out between the approaching edges or steps B and C of the dies, as at D, Fig. 3, completely filling the annular space between said steps. It will be understood that said material is urged outwardly not only by the forcing action of the dies directly upon the shell itself, but also by reason of the compression of the core 22, which tends also to expand and force the material of the shell edges outwardly, as at E, Fig. 3. Preferably the edges contact before much, if any, compression of the core is effected, so as

to avoid undue squeezing out of the rubber between said edges. The thickness of the inner member of the telescoping die at the edge portion B thereof is thin, and the annular open space surrounding the ball-shell at Fig. 8 is preferably thinner than said shell, so as to prevent too much outflow of shell material. Upon further closing of the dies the shell material at D, being unable to escape between the closely-fitting die-sections, is forced or squeezed by the approaching steps B and C back toward the interior of the ball, forming an annular welt upon the inner surface of the shell, as at 25. Since the material of the shell is preferably capable of welding, the process produces a reinforced weld—that is, a weld of extra thickness—since the welt 25 is formed directly in line with the point at which the welding takes place. In other words, the abutting edges of the segments are lipped or given an extra width, thus forming a stronger joint. Moreover, the kneading of the material from the stage indicated at Fig. 8 to that indicated at Fig. 4 has a beneficial effect upon the weld, causing the material of the segments to knit firmly. After the shells meet, as at Fig. 8, the edges thereof tend to break down and flow outward until finally the space between the die edges B and C becomes filled with the material which has been so dislodged or broken away, breaking up and destroying the continuity of the shell edges and causing an intermingling or mixing of the material of the edge portions of the two half-shells, with the result of producing an integrality of the entire shell of the ball. It will be observed that the process of breaking down the edges of the shell, whereby some of the material is driven outward, is reversed by the further advance of the dies or molds toward each other, whereby the said outflowing material flows back into the shell itself, thus restoring to its approximately original position that portion of the substance of the shell first subjected to the outward flow. Thus by first forcing the material outward and then reversing the action and forcing the same material inwardly the two half-shells become a complete perfectly-welded shell. By the movement of the dies the filling is reduced in bulk, and the welt 25 by its pinching or creasing action serves to give extra compression to the filling, thus rendering the ball highly desirable for certain games. The welt also anchors the filling to the shell, thus reducing the liability of disruption of the latter from the filling under impact of an implement.

It will be seen that my invention is of value also in cases where segments do not weld, but are intended to be held together by cement, since the thickening or lipping effected by my invention gives an extra breadth of surface for cement action. It will further be understood that the invention is of value in cases where the center and shell have been previously completely formed, since the dies now operate further to solidify the material of the shell and also compress the filling and, further, to produce the anchoring-welt 25. The shell being of hard, wear-resisting, springy material, and the core being of elastic material held under compression by the shell, and the shell being thus solidified and strengthened or reinforced a ball of exceptionally effective and durable quality is produced.

In case heating-dies are used they may be allowed to cool before the ball is taken out, so that the shell may become sufficiently hardened.

In practice the balls made by the present process are found to have a high degree of uniformity, and by reason of the dense and uniform character of the material in the different parts of the completed shell the ball is able to withstand the heavy blows to which it is subjected with substantial equality wherever it may be struck. The original half-shells may be made very dense or compact.

Owing to the provision of the compressed-rubber core, the liability to permanent distortion of the ball, which is a fault of solid gutta-percha balls, is avoided. By using highly-vulcanized soft rubber for the filling it is enabled to withstand without injury the heating to which the gutta-percha is subjected at the compressing operation. The compressed core gives an even resistance at all portions of the shell, so that a reliable and uniform action of the ball is secured. The core maintains its true central position, thereby minimizing the tendency to erratic flight or movement. If desired, the rubber may have considerable weight, thereby rendering the ball heavier than a solid gutta-percha ball of the same diameter. The rubber is relatively inexpensive, thereby reducing the cost of the ball. By making gutta-percha in a shell form it is given a resiliency not possessed by a solid gutta-percha ball. By backing the gutta-percha with rubber cutting, denting, or nicking of the ball is prevented.

I usually make the exterior surface of golf-balls pebbled or brambled, as at 26, Fig. 9; but in billiard and other balls the surface is smooth and spherical.

Certain improvements disclosed herein are made the subject of my application, Serial No. 76,814, filed September 27, 1901, and Serial No. 82,358, filed November 15, 1901, and also of other pending applications, this case being limited to the process of compressing and finishing the ball to shape, welding the edges of shell-segments, and forming an interior welt.

The improved ball structure herein described is made the subject of my pending application, Serial No. 86,347, filed December 18, 1901.

Variations may be resorted to within the scope of my invention and portions of my improvements may be used without others.

Having described my invention, I claim—

1. A process in producing a ball, consisting in subjecting to pressure a filled shell so as to cause the material of the shell to squeeze or flow outwardly, confining the outflowing material, and by further pressure forcing said confined material to flow inwardly, and simultaneously placing the filling of the shell under compression.

2. A process in producing a ball, consisting in subjecting to heat and pressure a filled shell so as to cause the material of the shell to squeeze or flow outwardly, confining the outflowing material, and by further pressure forcing said confined material to flow inwardly, and simultaneously placing the filling of the shell under compression.

3. A process in producing a ball, consisting in forming an annular flange thereon and forcing the material of said flange inward until substantially flush with the surface of the ball.

4. A process in producing a filled ball, consisting in forming the ball with a projecting portion and forcing the material of said projecting portion inwardly.

5. A process in producing a ball, consisting in providing a yielding core with a shell, forming a protuberance upon said shell, and forcing said protuberance inwardly so as to form upon the inner side of the shell a protuberance indenting said core.

6. A process in producing a ball, consisting in providing a yielding core with a shell, forming an encircling flange upon said shell, and forcing the material of said flange inwardly so as to form upon the inner side of the shell a welt which creases the core.

7. A process in producing a ball, consisting in applying a hard shell to a yielding filling, heating the shell, compressing the same so as to form an encircling flange thereon, and further compressing the shell and forcing the material of the flange inwardly.

8. A process in producing a ball, consisting in applying a hard shell to a yielding filling which will withstand a degree of heat sufficient to soften the shell, heating the shell, compressing the same upon the filling and causing the material of the shell to squeeze outwardly, and then forcing said material inwardly so as to form an inner protuberance upon the shell.

9. A process in producing a ball, consisting in placing shell-segments upon a filling, pressing said segments together and squeezing outwardly the material at their edges, and then forcing said material inwardly so as to form an extra thick weld.

10. A process in producing a ball, consisting in placing hard shell-segments upon a filling, heating said segments, pressing them together and squeezing outwardly the material at their edges, and then forcing said material inwardly so as to form an extra thick weld and simultaneously compress the filling.

11. A process in producing a filled ball, consisting in forming an annular flange thereon and forcing the material of said flange, while rendered plastic by heat, inwardly until substantially flush with the surface of the ball, thereby producing a welt upon the inner side of the shell.

12. A process in producing a filled ball, consisting in forming the ball with a projecting portion and forcing the material of said projecting portion, while rendered plastic by heat, inwardly until it is substantially flush with the surface of the ball, thereby producing a protuberance upon the inner side of the shell.

13. A process in producing a ball, consisting in incasing a yielding core in a shell and forming from the material of the shell a welt which pinches or creases the core.

14. A process in producing a ball, consisting in inserting a yielding core within a shell made of segments, and joining the segments and also forming the material of the shell at the edges of the segments, while rendered plastic by heat, into a welt which pinches or creases the core.

15. A process in producing playing-balls consisting in softening a gutta-percha shell, compressing it upon a filling consisting largely or wholly of soft rubber, to the extent of compressing said soft rubber, and causing the shell to harden while the compression is maintained, so that said shell may hold the filling permanently under compression.

16. A process in producing playing-balls, consisting in heating a gutta-percha shell, compressing it upon a filling of well-vulcanized soft rubber, to the extent of compressing said soft rubber, and maintaining the compression until the shell cools and hardens.

17. A process in making playing-balls, consisting in heating and pressing gutta-percha segments together over soft rubber so as to compress the latter and also to cause the edges of the segments to weld.

18. A process in making playing-balls, consisting of making a filling of soft rubber whose original bulk is too great for the capacity of the finished shell, and pressing gutta-percha segments together over said filling so as to cause the edges of the segments to unite and so also to compress the filling and reduce the shell to final size.

19. A process in making playing-balls, consisting of making a filling of highly-vulcanized soft rubber whose original bulk is too great for the capacity of the finished shell, making hemispherical gutta-percha segments, and heating and compressing the segments over the filling, so as both to compress the latter and also to cause the edges of the segments to weld.

20. A process in making playing-balls, consisting of making a filling of highly-vulcanized soft rubber whose original bulk is too great for the capacity of the finished shell,

making hemispherical gutta-percha segments, heating and compressing the segments over the filling, so as both to compress the latter and also to cause the edges of the segments to weld, and hardening the shell while the compression is maintained.

21. A process of making playing-balls, consisting of making a filling of highly-vulcanized soft rubber whose original bulk is too great for the capacity of the finished shell, making hemispherical gutta-percha segments, and heating and compressing the segments over the filling, so as both to compress the latter and also to cause the edges of the segments to weld and form a thickening of the shell.

22. A process in making playing-balls, consisting of making a filling of highly-vulcanized soft rubber whose original bulk is too great for the capacity of the finished shell, making hemispherical gutta-percha segments, heating and compressing the segments over the filling, so as both to compress the latter and also to cause the edges of the segments to weld and form a thickening of the shell, and cooling the shell while the compression is maintained.

23. A process in producing a ball, consisting in subjecting to pressure a filled shell so as to cause the material of the shell to squeeze or flow outwardly, confining the outflowing material, and by further pressure forcing said confined material to flow inwardly, and simultaneously placing the filling of the shell under compression, and then causing the shell to harden while the compression is maintained.

24. A process in producing a ball, consisting in subjecting to heat and pressure a filled shell so as to cause the material of the shell to squeeze or flow outwardly, confining the outflowing material, and by further pressure forcing said confined material to flow inwardly, and simultaneously placing the filling of the shell under compression, and then cooling the shell while compression is maintained.

25. A process in producing a ball, consisting in applying a hard shell to a yielding filling which will withstand a degree of heat sufficient to soften the shell, compressing the same upon the filling and causing the material of the shell to squeeze outwardly, then forcing said material inwardly so as to thicken the shell, and then hardening the shell under compression.

26. A process in producing a ball, consisting in placing hard-shell segments upon a filling, heating said segments, pressing them together and squeezing outwardly the material at their edges, then forcing said material inwardly so as to form an extra-thick weld and simultaneously compress the filling, and then cooling the shell while compressed.

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