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M. B. REACH

2,211,670

METHOD OF MAKING AN INFLATED BALL

Original Filed Oct. 10, 1936

Fig. 1.

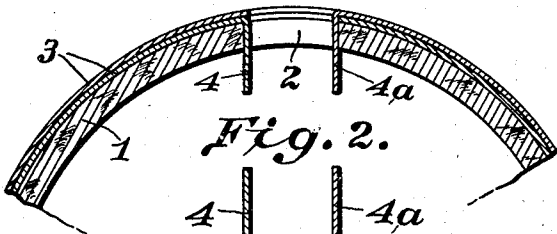


Fig. 2.

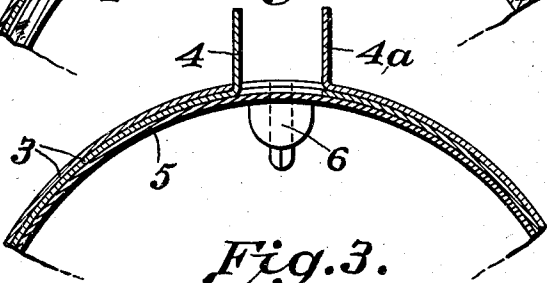


Fig. 3.

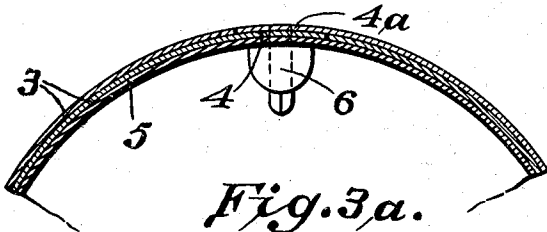


Fig. 3a.

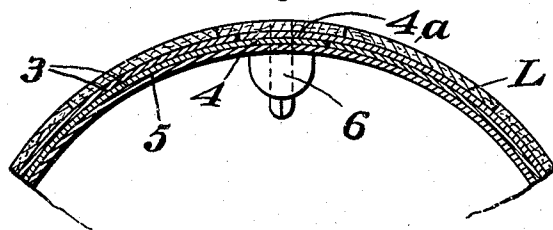


Fig. 4.

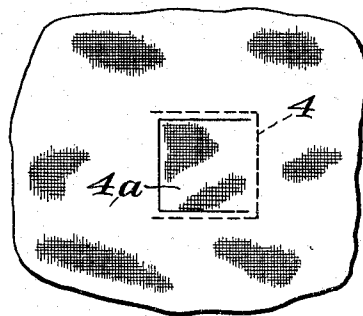


Fig. 5.

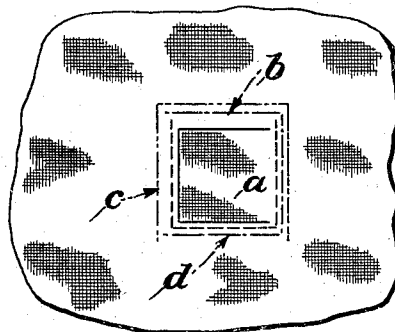


Fig. 7.

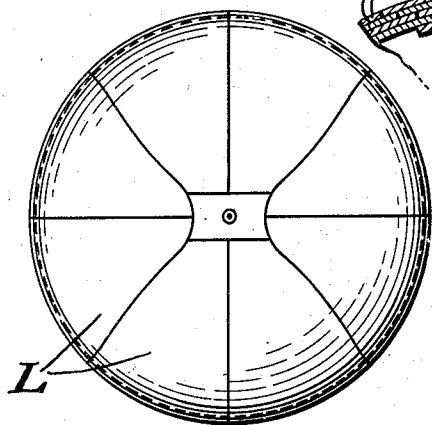
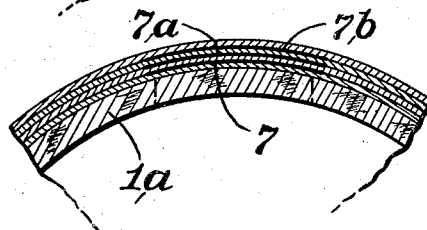


Fig. 8.



Fig. 6.



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UNITED STATES PATENT OFFICE

2,211,670

METHOD OF MAKING AN INFLATED BALL

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Original application October 10, 1936, Serial No. 105,126. Divided and this application July 20, 1937, Serial No. 154,636

34 Claims. (Cl. 154—16)

The invention relates to inflated playing balls and resides in the method of making the same, this application being a division of that filed by me October 10, 1936, Serial No. 105,126, now Patent 2,116,479. This application is a continuation in part of that filed by me April 2, 1936, Serial No. 72,397.

In the drawing:

Figures 1, 2, and 3 show in section different steps in the order in which they occur in carrying out the method in one form.

Fig. 3a is a view similar to Fig. 3 with a cover applied.

Fig. 4 is a diagram showing one assembly of closure flaps or tabs.

Fig. 5 is a diagram showing another assembly of closure flaps or tabs.

Fig. 6 illustrates another method.

Fig. 7 is a view of the ball showing the sectional cover.

Fig. 8 is a view of a modification.

In one embodiment of the invention a spherical shell, as an example, of wax indicated at 1, Fig. 1, is employed, having an opening 2 therein which is preferably rectangular in shape. On this shell which acts as a form upon which to build the ball, a plurality of layers of textile fabric 3 are laid with their respective warp threads in crossing relation. This fabric may be balloon cloth, non-extensible, and rubber coated. As an example, two layers of this fabric may be used, but more layers may be employed. After the first layer of rubber coated textile fabric is laid on the wax or other form, that part of the fabric which registers with the opening in the form is cut through on three sides and the flap or tongue thus formed is folded down into the interior space of the hollow form as shown at 4. The next layer is now laid on the first layer and affixed thereto by a cementing action. This layer is likewise cut through where it overlies the opening 2 in the form, but in such relation to the tab or flap of the first layer that whereas the first layer will have its flap 4 attached thereto at the lefthand side of the opening, the fold or flap 4a of the second layer will have its hinge or intact connection with the said layer displaced around the margin of the hole relative to the hinge or integral connection of the first tab, for instance, at the right of the opening, and if there were three layers the flap for the third layer will be foldable in a direction at an angle to the direction of folding of the first two layers, and so on with the flaps of other layers if more layers than three are employed. In other words, these flaps are in

displaced or staggered relation to each other in respect to the points where they remain hinged or connected to the main bodies of their respective layers of fabric.

After the desired number of layers of textile fabric have been laid on the wax or other form in superposed relation with their tabs or flaps folded into the interior of the wax form, and after these layers have been united with each other by a frictional rolling, the tabs or flaps 4, 10 4a, etc., are then drawn outward, through the opening in the form, while remaining connected with their respective layers of fabric as shown in Fig. 2.

The wax form is now melted out or broken up 15 and the pieces are removed through the opening in the textile fabric foundation of the ball thus far formed. The inflatable rubber bladder 5 is now inserted through the opening in the textile foundation composed of the plurality of super- 20 poser layers which have been united with each other and then the bladder is blown up to the required diameter. The tab or flap 4 belonging to the first layer of fabric is now folded down onto the surface of the bladder, and hence said flap 25 fills the opening in the first layer with its edge in the same plane with the fabric layer of which it forms a part.

In other words, the flap or tab does not overlap its main body layer, but forms a smooth surfaced 30 closure for the opening in said layer with its edge in substantially abutting relation to the edge of the main layer at the margin of the opening. This tab may be cemented to the bladder. The closure tab or flap of each succeeding layer of 35 textile fabric is cemented down upon the tab of the preceding layer, each filling the opening left by cutting the tab from the body of the layer of which it forms a part, and each making a closure flush with its own layer. 40

The tabs may be of relatively different sizes or diameters so that the joints of said tabs with the layers of fabric will not register but will be staggered relative to each other to avoid any bulkiness which might arise from having the joints 45 match in the various layers. This offset relation is indicated in the diagram Fig. 4 which shows the tab 4 in dotted lines larger than the tab 4a. Each tab is an integral part of its particular layer of balloon cloth and is strengthened thereby. 50

By reason of this construction each tab or flap makes a flush closure for its own layer and therefore the completed ball will be free from any protuberant portion or unevenness at the point where the closing of the opening in the textile 55

foundation takes place, so that the ball may be of true spherical form.

A coat or layer of rubber may be applied to the exterior of the foundation of textile material as built up according to the foregoing description, and a veneer of leather panels L may form the outside covering for the ball.

The wax form may be coated with a thin film of rubber or similar gum before applying the fabric thereto. Each textile fabric layer may be in a plurality of pieces to fit the spherical shape of the form of wax. The leather veneer may be formed of a plurality of pieces shaped like the pieces of a base ball cover, having abutting edges without stitching, said covering being cemented to the outer layer of the ball and having its abutting edges cemented together.

Any desired form of filling valve may be employed indicated generally at 6, having capacity to close automatically when the filling nozzle is withdrawn, and access to the valve may be had through an opening in the closure tabs and cover, or this valve may be located at any point removed from the tabs.

The ball before the leather veneer is applied may be placed in a mold and all parts bonded together under pressure and moderate heat. After the carcass is completely bonded the leather veneer is applied through the medium of a vulcanizing cement which requires only relatively light pressure and very little heat, so that injury to and uneven shrinkage of the leather is avoided. Instead of a wax form a sectional form of metal, or other material, may be used, the sections being held together by suitable locking means, which when properly operated will release the sections so that they may be removed one by one from within the textile foundation through the opening 2 as described above.

Where a wax form is used it may be melted out by a steam nozzle.

Where the hinged end of one of the closure tabs overlies the free edge of another tab the latter will be reinforced, strengthened and held in its flush position relative to the fabric layer to which it belongs.

An outer coating or layer of rubber may be applied to the fabric by using two sections of hemispherical shape, or otherwise.

The method may be modified as in Fig. 6. For instance, a solid walled core or form 1a initially may be employed, i. e., a hollow ball of wax without any pre-formed opening in its wall. The first layer of foundation textile fabric is laid on this hollow ball and the outline of the hole or opening later to be cut therein and in the wax form is marked or stamped on this layer. A thin piece of metal 7 of approximately the size of the hole to be formed is placed on this fabric layer within the stamped or marked area where it will be held by the adhesive surface of the fabric. The next layer of fabric is then put on and rolled down to unite with the first layer. Another metal piece 7a is placed on this layer of fabric substantially in registration with the first piece of metal. Each succeeding fabric layer is rolled down upon the preceding layer and is provided with one of the metal pieces. All the layers of fabric now will have been cemented, one to the other, throughout their surfaces, excepting where the metal separators lie. As an alternative these areas may be covered with talc powder to prevent adhesion of laminations during the frictional rolling process, the talc, by preventing cohesion acting as separators to per-

mit the cutting of the tabs in the same manner as prescribed for the metal separators. A tab is now cut out of the upper layer of fabric, the metal separator acting as a stop or shield to prevent the blade of the knife cutting through to the second layer. The tab thus formed and connected integrally at one point with its own body layer is folded outwardly and the metal piece is removed. The next layer of fabric is cut in a manner just described, but in displaced relation to the first cut so that its hinge or integral connection will be displaced relative to the integral connection of the first tab. Its tab is folded outwardly and its metal piece removed, and if more than two layers are provided the operation just described is repeated for each layer, until the wax or other form is exposed. A hole is next cut through the exposed part of the wax form so that a steam nozzle may be introduced for melting out the wax, or taking its pieces out if the wax form is broken up instead of being melted.

The bladder, if one is used, now may be inserted and blown up and the tabs may be folded down onto this bladder as previously described.

By either of the above methods the opening made in the foundation layer, or layers, of textile fabric may be repaired while still preserving uniformity in the thickness of the wall of the ball throughout its extent whether at or around the margins of the opening in the ball, or throughout all other portions thereof.

It will be observed that the closure member being integral with the layers of the foundation material and made up of tabs displaced in respect to their relative points of connection with their respective layers constitute jointly, in effect, an integral continuation of the wall overlying the wall of the bladder and resisting the internal pressure of said bladder to prevent bulging out of the bladder at this point so that the spherical formation will be preserved.

If four tabs are used displaced ninety degrees from each other, as diagram Fig. 5 shows, there will be an intact connection around the entire margin of the opening distributed throughout the composite tab or closure made up of the four individual tabs cemented or united together. These intact connections are indicated at a-b-c and d in Fig. 5. Where two layers are employed their tabs preferably would be displaced 180° from each other around the center of the opening.

The invention is not limited to the precise outline of the tabs disclosed herein.

The wall of the ball may be air-tight and employed without a rubber bladder. Such a wall would be made up of layers each having a closing tab or flap for the opening through which the form may be removed, the tabs thereafter being united by inserting a rubber foundation patch inside the wall of the case of a larger area than the opening, the rubber patch becoming a foundation member to cement the first tab to in lieu of the bladder, cementing them together and cementing the joints between them and the body of the cloth. The ball may be blown up and the cover sections of leather then may be applied. In this form of ball the textile material employed would be inextensible like in the form first described.

Under the method employed by me the textile wall is thoroughly lasted down to an exact form, after it has been patterned by removing surplus material. That is to say, in laying the textile material onto the form where surplus accumula-

tions occur in the form of pleats in the relatively inextensible fabric used by me these pleats are cut out leaving the material thus patterned with abutting edges in various extent according to the degree that these pleats occur, no stretching or tensoning of the fabric taking place. The size and form of the fabric wall is predetermined according to the size of the form on which the ball is made. The subsequent action in a mold is merely for uniting the parts.

The invention is applicable to balls other than spherically shaped.

By employing textile fabric which is relatively inextensible accuracy of the prescribed shape of the ball may be attained.

In Fig. 8 is shown a form of closure in which the tabs instead of remaining attached at one point to the main part of the layer of fabric to which they belong are in the form of separate pieces which are applied in superposed relation, and each cemented to the one next below it, each being flush with its own layer, so that the composite closure will be flush with the outer and inner surfaces of the built up wall of fabric layers. The innermost tab will be cemented to the bladder, or if the bladder is not used, then this inner closure member will be cemented to a rubber foundation patch like that previously mentioned cemented to the margin of the inner side of the innermost layer of fabric, it being of larger diameter than the opening through said innermost layer.

The reference character 5a in Fig. 8 indicates this patch, or it may be considered as representing the portion of the bladder which underlies the innermost fabric layer. The patch sections indicated at 4b may be of different diameters to fit in their respective openings in the fabric layers, so that the margins will overlap and thus break joints. These independent patches are, as stated above, each flush with the fabric layer whose opening it closes, making a flush joint therewith.

They are cemented one upon another, and make up a composite closure.

Where features of one form can be used with features of modified forms described herein, said features may be regarded as embodied in said forms, for convenience of illustration.

In the manufacture of my improved inflatable ball, an adhesive relationship is set up between the vulcanized bladder and the carcass due to the flowing of the cement in the heating operation of vulcanizing the carcass, the ball being inflated during this period and the walls of the bladder thoroughly ironed out in relation to the wall of the carcass, and permanently maintaining this relationship so that, as the ball is deflated, the bladder moves with the wall of the carcass, every part of the bladder maintaining its relationship to the carcass wall because of its adherence thereto. The above result is accomplished in view of the fact that the bladder is not removable from the carcass, but becomes an integral part of the carcass and moves therewith under all circumstances.

By reason of my method all possibility of the bladder becoming wrinkled should the ball become deflated is avoided, because of the adherence of the bladder to the carcass. Where a bladder is liable to be wrinkled there is also a liability of a pinching action developing when inflation takes place, and this may cause the bladder to become weakened and rupture.

It will be seen from the above that the form when in condition to receive the textile material

for forming the carcass is rigid, and in order to permit its removal from the carcass, it is reducible either by melting it, breaking it into small pieces, or by releasing the sections of which, in one form, it may be composed, for their removal individually through the opening in the carcass which is of much smaller size than the complete form, and too small to permit the removal of the form without reduction. It is, of course, desirable to employ as small an opening in the wall of the carcass as possible, as this limits the extent of the joint, and provides the maximum extent of imperforate carcass wall.

I claim:

1. Steps in a method of making an athletic inflatable game ball comprising building an unsewn non-stretchable flexible carcass of laminations of textile fabric upon a rigid form by cementing and lasting one lamination uniformly down upon another and upon the form, reducing and removing the material of said form through an opening in the laminated carcass, closing said opening by a patch applied within said opening of substantially equal thickness and strength as the laminated wall and flush therewith at its inner and outer faces, and applying a cover permanently and uniformly throughout on said laminated carcass, and over said patch.

2. A method according to claim 1 in which the laminations are of non-stretchable textile fabric in both the main wall and in the patch.

3. A method according to claim 1 in which before the cover is applied bonding together of the laminations takes place by a molding action under pressure and moderate heat to make a homogeneous union between them.

4. A method according to claim 1 in which, after the form is removed, and before the patch is placed in position, a foundation member is inserted through the said opening and permanently and adhesively held in place against the inner side of the innermost lamination upon which the patch in laminations is built, substantially as described.

5. A method according to claim 1 in which, after the form is removed, and before the patch is placed in position, a foundation member is inserted through the said opening and permanently and adhesively held in place against the inner side of the innermost lamination upon which the patch in laminations is built, said foundation member being in the form of a bladder inflated against the carcass.

6. A method according to claim 1 in which, after the form is removed, and before the patch is placed in position, a foundation member is inserted through the said opening and held in place against the inner side of the innermost lamination upon which the patch in laminations is built, said foundation member being a patch cemented to the inner side of the innermost lamination at the margin of the opening in said lamination and extending across said opening.

7. The steps in a method of forming an inflatable athletic game ball consisting in building a carcass of laminations of textile fabric and vulcanizable cement upon a form, reducing and removing the material of the form through an opening in the carcass and closing said opening permanently by cementing laminations of textile fabric in the opening, said laminations being substantially equal in number and strength to the laminations of the main body of the carcass, said patch being flush with the exterior of the carcass, binding the parts together by pressure and heat

in a mold, and thereafter applying a cover permanently to the carcass and patch.

8. A method according to claim 7 in which an inflatable bladder is inserted through the opening in the carcass after the form is removed, said bladder being irremovably enclosed in the carcass by the cementing of the patch in place, substantially as described.

9. Steps in a method of making an inflatable athletic game ball comprising lasting laminations of textile fabric upon a rigid form to provide a non-stretchable carcass, reducing and removing the material of the form through an opening in the carcass, and closing said opening by a patch of textile laminations in number equal to the laminations of the carcass, each patch lamination being substantially in the same plane with the carcass lamination whose opening it closes, said patch laminations being cemented in place.

10. Steps in a method of forming a hollow ball consisting in building upon a form a wall of cemented layers of material, each with an opening and an integrally connected closure tab to fill said opening, and relatively displaced in respect to and about the axis of the openings, reducing and removing the material of said form through the registered openings and closing the openings by cementing the tabs in superposed relation, then vulcanizing the wall and thereafter applying a cover.

11. The herein described method comprising building upon a form a foundation wall of layers of material each with a registering opening and an integrally connected closure tab to fill said opening and relatively displaced at different degrees about said opening, reducing and removing the material of said form through the registered openings, inserting a bladder into the space within the foundation wall through the opening therein and inflating said bladder and folding down the tabs one upon the other to fill the opening and cementing them together, substantially as described.

12. A method according to claim 10 in which the application of the cover comprises covering the foundation wall and its closure tabs by cementing another wall in place, substantially as described.

13. A method according to claim 10 in which an opening is preliminarily provided in the form and the tabs are cut at said opening, after the layers are applied to the form.

14. A method according to claim 10 in which an opening is cut in the form after the layers are applied.

15. A method according to claim 10 in which separating means are applied to the layers of fabric and the closure tabs are cut after said separating means have been associated with the layers of fabric, substantially as described.

16. Steps in a method of making a carcass of an inflatable athletic ball comprising applying textile material in layers upon a rigid form and while on said form, cutting through said layers to provide an opening, reducing and removing the form through said opening, and applying a patch within said opening, said patch being of layers of textile material to substantially restore as to thickness and strength the portion of the carcass cut out at this point flush with the outer surface of the main part of the carcass.

17. Steps in a method as herein described comprising applying textile material in layers cemented together over most of their areas upon a rigid form and isolating a certain limited area

or areas of said layers at which limited area or areas the layers are not cemented together, cutting through the layers at said limited areas to form an opening in the carcass, reducing and removing the form through said opening, and patching the carcass to close said opening and restore the carcass wall at this point of substantially the same strength, thickness and reaction as the wall of the main body of the carcass, and exteriorly substantially flush with the outer surface of the carcass, substantially as described.

18. Steps in the herein described method of making an inflatable game ball comprising cementing a lamination of textile fabric upon a rigid form, cementing a layer or layers of textile material upon the lamination previously applied to make a carcass permanently shaped to the said form, making an opening in said carcass, reducing and removing said form therethrough, closing said opening permanently by a patch made up of textile layers corresponding substantially to the layers of the main wall of the carcass, said patch being cemented to the wall of the carcass, and providing a closure having substantially the same characteristics as the wall of the carcass.

19. Steps in a method according to claim 18 in which the patch is applied to a foundation member within the carcass which was inserted therein after the removal of the rigid form.

20. Steps in a method according to claim 18 in which a bladder is inserted into the carcass after the form is removed, said bladder thereafter being inflated and thereafter the patch is applied to the opening in the carcass using the bladder as a foundation upon which to build said patch.

21. Steps in the method of making an inflatable game ball comprising building a carcass in layers of textile material over a rigid form, the first layer being applied under pressure in an adhesive relationship to the form and the subsequent layer or layers being applied to the preceding one in an adhesive relationship thereto, forming an opening in the carcass, removing the form therethrough, cementing a patch within the opening and cementing a cover onto the carcass, said carcass opening being small as compared with the diameter of the form which form is reduced for its removal.

22. Steps in a method of making an inflatable game ball comprising building a non-stretchable carcass of textile material upon a hollow rigid form of friable homogeneous material, breaking up the friable material and removing it through an opening in the carcass, closing said opening by a patch cemented in place, within the opening inflating the carcass to the limit determined by its non-stretchable character to the shape and size acquired from the rigid form, and cementing separate pieces of sheet material to the carcass to form a cover, substantially as described.

23. Steps in a method according to claim 22 in which the carcass is formed by cementing a lamination of textile fabric to the rigid form, cementing the subsequent layer to the first layer, the breaking up of the rigid form separating it from its cemented union with the carcass for its removal therefrom, substantially as described.

24. Steps in a method according to claim 22 in which an opening is initially made in the friable rigid form, the carcass is built to cover said opening and is cut in registry with said opening.

25. Steps in a method according to claim 22 in which the rigid form is initially imperforate, and is cut through after the carcass is laid there-

on, to provide an opening therein, substantially as described.

26. Steps in a method of making an inflatable game ball consisting in building a non-distensible laminated unsewn textile carcass in combination with cement alone upon a rigid form, said carcass having an opening in its wall, removing the form through said opening, inserting a bladder into said carcass, inserting a laminated patch within the opening and uniting under pressure of a molding operation said carcass, patch and bladder in a sealed enclosure providing a wall member of uniform reaction throughout its body.

27. Steps in a method according to claim 17 in which the isolated area, or areas, is produced by a piece, or pieces, of relatively hard material upon which the cutting of the textile layer, or layers, is done.

28. Steps in a method according to claim 17 in which the isolated area, or areas, is produced by a piece, or pieces, of relatively hard material upon which the cutting of the textile layer, or layers, is done, the rigid form being initially imperforate where the isolated area occurs, but cut out after the textile layers have been cut.

29. Steps in a method according to claim 17 in which the patch consists of the material cut from the layers of textile material.

30. Steps in a method according to claim 17 in which the opening cut through one layer is larger and with its edges out of registration with that of the preceding layer, so that the patch in said larger opening will overlap the edge portion of the adjacent layer of the main wall of the carcass.

31. Steps in a method of making an inflatable game ball comprising building a non-stretchable carcass of layers of textile material cemented together into a homogeneous wall upon a rigid reducible form, separators of a relatively hard material having been inserted between the layers at a predetermined point, cutting the layers at the areas over said separators to form openings of different sizes but substantially axially in line, the largest opening being in the layer outwardly of the wall in respect to the smaller opening of the layer located nearer the inner side of said wall, reducing the form and removing its material from the carcass through the opening in the wall of the carcass, inserting a bladder into the carcass, closing the opening by a patch consisting of layers of textile material substantially similar to the layers of which the main wall of

the carcass is composed, said patch layers being of sizes corresponding to the different sizes of openings in the layers of the main wall of the carcass so that the layers of the patch will overlap the edges of the layers of the main wall, and the outer layer will be flush with the outer surface of the main wall of the carcass, affixing the patch within the wall opening by cement, vulcanizing the carcass and its patch and cementing a cover in sections to the carcass and over the patch.

32. Steps in a method of making an inflatable game ball comprising building up on a rigid form, an unsewn carcass composed of textile material in layers cemented together, removing the form through an opening in the carcass, inserting an inflatable bladder through the opening in the carcass, closing said opening by layers of textile material cemented within said opening, inflating the bladder to distend the carcass, vulcanizing the carcass to unite the layers of textile material together, and thereafter cementing a cover to the carcass, said cover being in sections of sheet material, and vulcanizing said cover in place on the carcass, substantially as described.

33. Steps in a method of making an athletic game ball comprising applying textile material in layers upon a rigid form, cutting an opening through the layers while on said form and with the opening through one layer of larger size than the opening through the preceding layer, reducing and removing the form through the openings, cementing a patch within the opening of the inner layer to a foundation member within the carcass, cementing a patch within the larger opening upon the preceding patch, and to the margin of the carcass layer having the smaller opening, and cementing a cover in pieces of material upon the carcass and over the patch, said patch having its outer surface flush with the outer surface of the carcass.

34. Steps in a process of making an inflatable athletic game ball comprising building a carcass of layers of textile material upon a rigid form of homogeneous reducible material, cutting an opening through said textile carcass, reducing said form and removing the material thereof through the opening in the carcass, closing the opening by patch means of textile material cemented within the opening, and cementing sections of a cover upon the carcass and over the patch, substantially as described.

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