

May 3, 1938.

M. B. REACH

2,116,479

INFLATED BALL

Filed Oct. 10, 1936

Fig. 1.

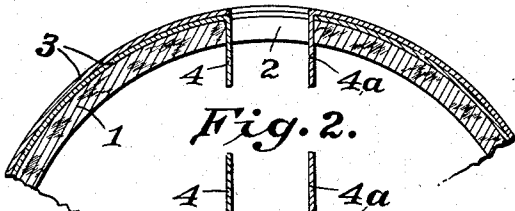


Fig. 2.

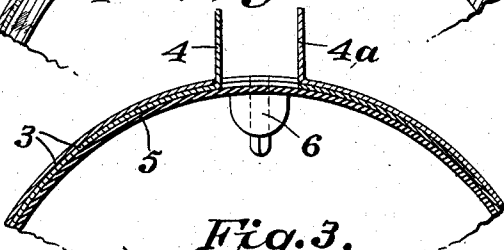


Fig. 3.

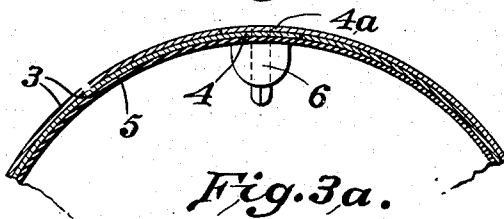


Fig. 3a.

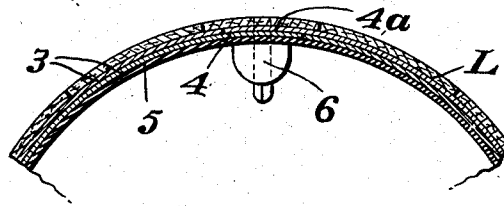


Fig. 4.

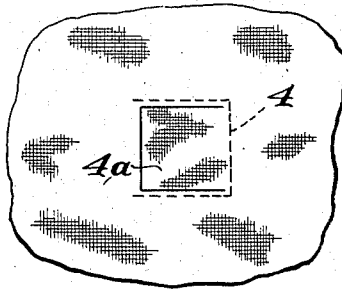


Fig. 5.

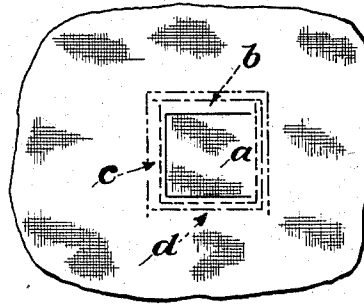


Fig. 7.

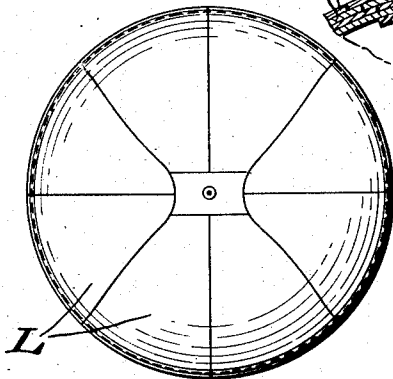
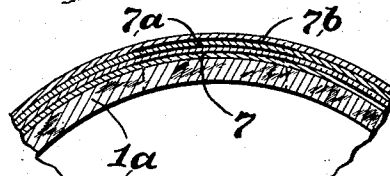


Fig. 8.



Fig. 6.



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UNITED STATES PATENT OFFICE

2,116,479

INFLATED BALL

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Application October 10, 1936, Serial No. 105,126

31 Claims. (Cl. 273—65)

The invention is an improvement upon inflated playing balls. This application is a continuation in part of that filed by me April 2, 1936, Serial Number 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 5 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, 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 and the pieces are removed through the opening in the textile fabric foundation of the ball 15 thus far formed. The inflatable rubber bladder 5 is now inserted through the opening in the textile foundation composed of the plurality of superposed 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 20 to the first layer of fabric is now folded down onto the surface of the bladder, and hence said flap fills the opening in the first layer with its edge in the same plane with the fabric layer of 25 which it forms a part.

In other words, the flap or tab does not overlap its main body layer, but forms a smooth surfaced closure for the opening in said layer with its edge in substantially abutting relation 30 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 textile fabric is cemented down upon the tab of the preceding layer, each filling 35 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.

The tabs may be of relatively different sizes or diameters so that the joints of said tabs with 40 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 match in the various layers. This offset relation is indicated in the diagram Fig. 4 which 45 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.

By reason of this construction each tab or flap 50 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 55

textile 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 cover 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 permit 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 extents according to the degree that these pleats occur, no stretching or tensioning of the fabric taking place. The size and form of the fabric wall is pre-determined 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.

Claims pertaining to the method of making the ball disclosed herein are embodied in my pending application Ser. No. 72,397, filed April 2, 1936, and divisional application Ser. No. 154,636, filed July 20, 1937.

I claim:

1. A hollow ball comprising a wall composed of layers of material superposed one on another, and closure means for an opening in said laminated wall consisting of a plurality of tabs, each forming an integral continuation of its own layer, said tabs being displaced relative to their points of connection with their respective layers around the opening, filling said opening flush with the outer surface of said wall and with their edges substantially in abutting relation to the edge of the opening to make a flush joint at said opening.

2. An inflatable ball comprising a wall composed of layers superposed one on another, said wall having an opening, a bladder within the ball, inserted through said opening, and closure means for the opening consisting of a plurality of tabs, each forming an integral continuation of its own layer and said tabs being displaced relative to their points of connection with their respective layers around the opening, filling said opening

in the wall flush with the outer surface of said wall and with their edges in abutting relation to the edge of the opening to make a flush joint and sustaining the bladder against bulging at said opening, substantially as described.

3. A ball according to claim 1 in which the tabs forming the composite closure are of a number to provide substantially an intact connection between said composite closure and the entire margin of the opening.

4. A ball according to claim 1 in which the closure tabs are united with each other.

5. A ball according to claim 1 in which a layer of material encloses the fabric layers and is united thereto and to the closure tabs, substantially as described.

6. A ball according to claim 1 in which the opening through the wall is rectangular and the tabs are integrally connected respectively with different sides of said rectangular opening.

7. A ball according to claim 1 in which the closure tabs are of different diameters and the holes in their corresponding fabric layers are of different diameters to correspond with the diameters of the respective tabs.

8. An athletic game ball comprising an air retaining member, a wall composed of laminations of textile fabric surrounding the air retaining member, having a patch filling and sealing air tight an opening therein through which the air retaining member was inserted, said patch being flush with the outer surface of said wall substantially as described.

9. An athletic ball according to claim 8 in which a covering of sections of material with edges abutting encloses said wall.

10. An athletic game ball comprising an air retaining member, a surrounding textile form-shaped unsewn member of relatively non-stretching character, said textile member being of a size prefixed by its shaping to the form in respect to the application of a cover, and a cover cohesively applied to the textile member in homogeneous relationship, substantially as described.

11. An athletic game ball having a carcass comprising a wall of layers of textile fabric having laminated means similar to said wall sealing air tight an opening through which a form was removed.

12. An athletic ball according to claim 11 in which the means for sealing the opening in the laminated wall is flush with the inner and outer surfaces of said wall.

13. An athletic ball according to claim 11 in which the means for sealing the opening in the laminated wall is flush with the inner and outer surfaces of said wall and its laminations are in overlapping relation with different laminations of said wall and cemented thereto.

14. An athletic game ball comprising a wall of layers of textile fabric having means sealing air tight an opening through which a form was removed, said sealing means being laminated, each lamination being substantially flush with the layer of fabric whose opening it closes, and composed of a separate piece, substantially as described.

15. An inflatable athletic game ball comprising an unstretchable carcass of textile material having an opening through its wall, an inner member cemented to the inner side of said carcass and extending across the said opening, and patch means closing said opening and bearing on the said inner member, said patch means being sub-

stantially flush with the inner and outer surfaces of the carcass.

16. An inflatable athletic ball according to claim 15 in which the inner member is in sheet form with its edge portions overlapping the margin of the opening through the carcass.
17. An inflatable athletic ball according to claim 14 in which laminations of the sealing means are of different diameters from each other and overlap the margin of the body laminations.
18. An inflatable game ball comprising a non-stretchable, flexible carcass of contacting textile fabric laminations in homogeneous union having a limited patched area and providing a wall which is of substantially uniform thickness and strength throughout, and is substantially permanently closed, and a substantially inelastic cover for the ball consisting of pieces of sheet material meeting edge to edge and cemented on said wall and its patched area, said carcass being determinative, when inflated, of the size and shape of the ball, and relieving the cover of stress of the internal pressure, and means whereby the ball may be inflated.
19. An inflatable athletic game ball having a non-stretchable, flexible carcass of textile fabric laminations in homogeneous union, the wall of which is of uniform thickness and strength throughout, and a cover on said carcass of pieces of sheet material cemented in place, having their edges abutting, said carcass being determinative, when inflated, of the size and shape of the ball, and relieving the cover of stress of the internal pressure.
20. An inflatable athletic game ball having a carcass, non-stretchable and flexible, of textile fabric laminations in homogeneous union, with an inflatable bladder permanently inserted therein, the laminated textile wall being substantially continuous and uniform in thickness and strength throughout to produce like reactions at all points, and a cover of sheet material in sections cemented on said carcass, said carcass being determinative of the size and shape of the ball independently of the bladder.
21. An inflatable athletic game ball having a carcass, non-stretchable and flexible, of textile fabric laminations in homogeneous union, the laminated textile wall being substantially continuous and uniform in thickness and strength throughout to produce like reactions at all points, and a cover of sheet material in sections cemented on said carcass, said carcass being determinative of the size and shape of the ball, and means inserted in the carcass to prevent the escape of air therethrough.
22. An inflatable game ball having a stitchless carcass of form-shaped laminations of textile fabric cemented together, said carcass being non-stretchable, flexible, and having an opening through its wall with a patch filling said opening and resisting distortion of the wall at this point against internal pressure, similarly to the main wall of the carcass, and a cover layer on said carcass and patch and made up of stitchless pieces cemented to the carcass, substantially as described.
23. An inflatable ball according to claim 22 in which a bladder is inserted within the non-stretchable flexible carcass and is restrained by said patch from unduly distending at this point, substantially as described.
24. A game ball according to claim 22 in which the textile fabric is non-stretchable.
25. A game ball according to claim 22 in which the textile fabric laminations are bonded together by vulcanizable material.
26. An inflatable game ball comprising a stitchless non-stretchable flexible carcass, of form-shaped laminations having a patch filling and sealing an opening in the carcass wall, said patch being of approximately the same thickness, flexibility, non-stretchable character and strength as the carcass wall and flush with the outer surface thereof and a cover of pieces of material cemented to the carcass and to the patch, substantially as described.
27. An inflatable game ball having a non-stretchable carcass composed of textile laminations, provided with an opening in its wall, a member extending across the said opening on the inner side of the carcass, and textile laminations closing the opening, and sustained by said member.
28. An inflatable ball according to claim 27 in which the closing laminations form substantially continuations of the main wall laminations, substantially as described.
29. An athletic inflatable game ball having a non-stretchable carcass of laminations of textile fabric with an opening in its laminated wall closed by a patch, the edges of the openings in said laminations being out of registration with each other, said patch being composed of laminations, the edges of which are out of registration to accord with the non-registering edges of the main wall laminations and cemented thereto.
30. An inflatable athletic game ball comprising a non-stretchable, flexible carcass of textile fabric having an opening through its wall, closed by a patch, and a cover of sheet material enveloping the carcass and its patch, substantially as described.
31. An inflatable ball according to claim 30 in which the cover is in pieces freed from internal pressure by the non-stretchable carcass, substantially as described.

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