



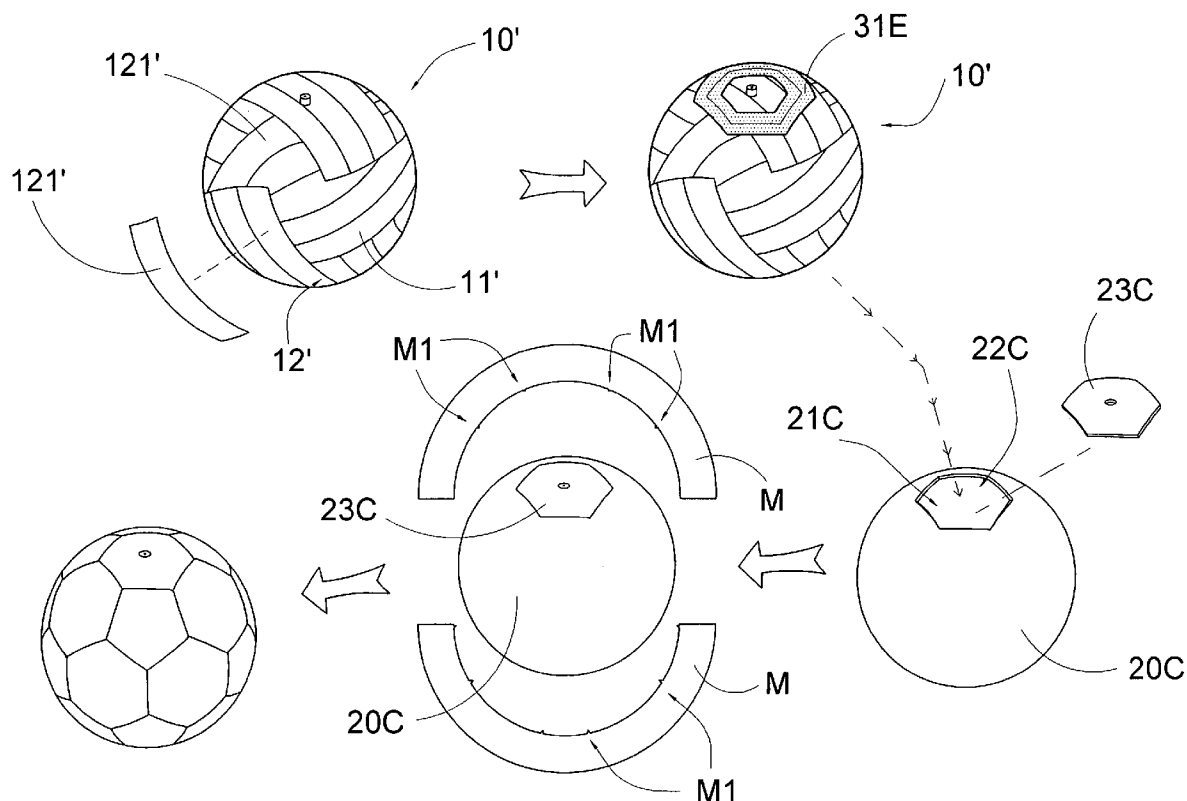
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Ou(10) **Pub. No.: US 2009/0325747 A1**(43) **Pub. Date: Dec. 31, 2009**(54) **STITCHLESS SEAM ARRANGEMENT OF
SPORTSBALL AND MANUFACTURING
METHOD THEREOF****Publication Classification**(51) **Int. Cl.**
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(52) **U.S. Cl.** **473/605; 473/604; 156/156**
(57) **ABSTRACT**(76) **Inventor: Tsung Ming Ou, Kaohsiung (TW)**

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MONTEREY PARK, CA 91754 (US)**(21) **Appl. No.: 12/290,624**(22) **Filed: Oct. 31, 2008****Related U.S. Application Data**(60) **Provisional application No. 61/133,678, filed on Jun.
30, 2008.**

A sportsball includes a ball carcass, an inflatable ball body received in a ball cavity of the ball carcass, and a stitchless seam arrangement which includes an elongated adhesive layer having a contour matching with a contour of an opening of the ball carcass, wherein after the ball body is disposed in the ball carcass, edge portions of the opening are adhered on an outer surface of the ball body via the adhesive layer, such that the opening is sealed to close the ball cavity for enclosing the ball body in the ball cavity of the ball carcass in a stitchless seam manner. Therefore, the manufacturing method of the sportsball excludes the traditional final assembling operation of hand stitching to reduce the time-consuming manufacturing procedure of the sportsball while being cost effective.



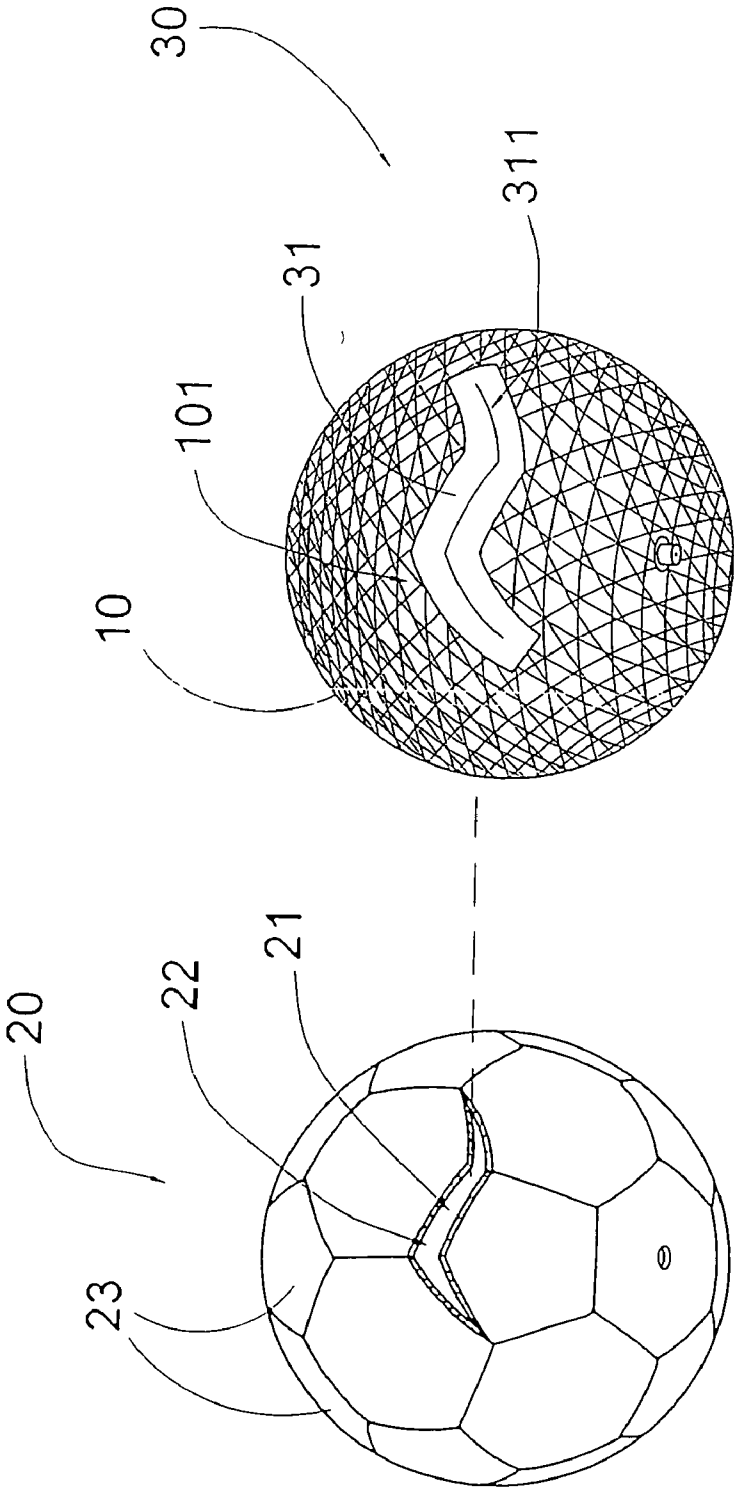


FIG.1

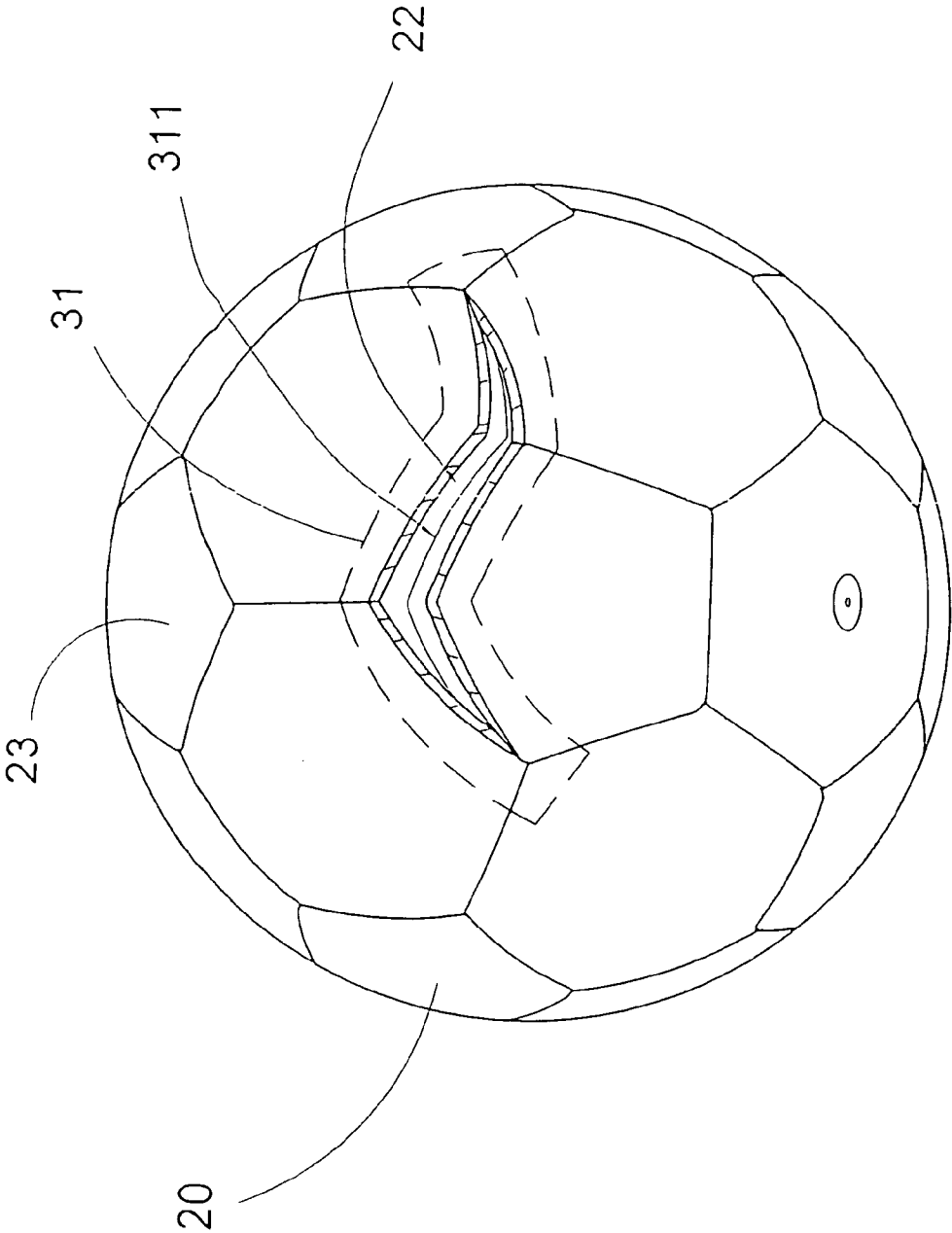


FIG.2

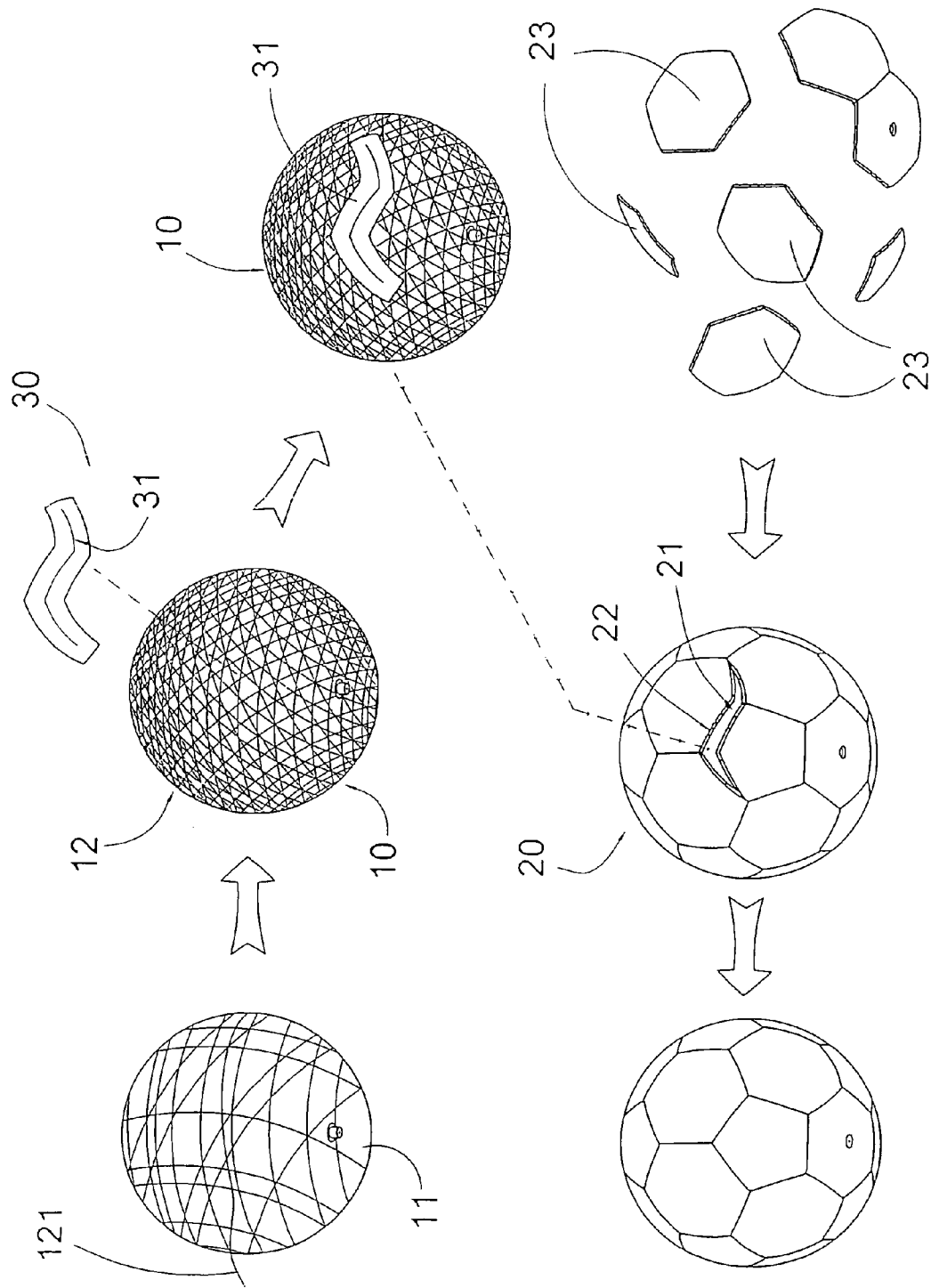


FIG.3

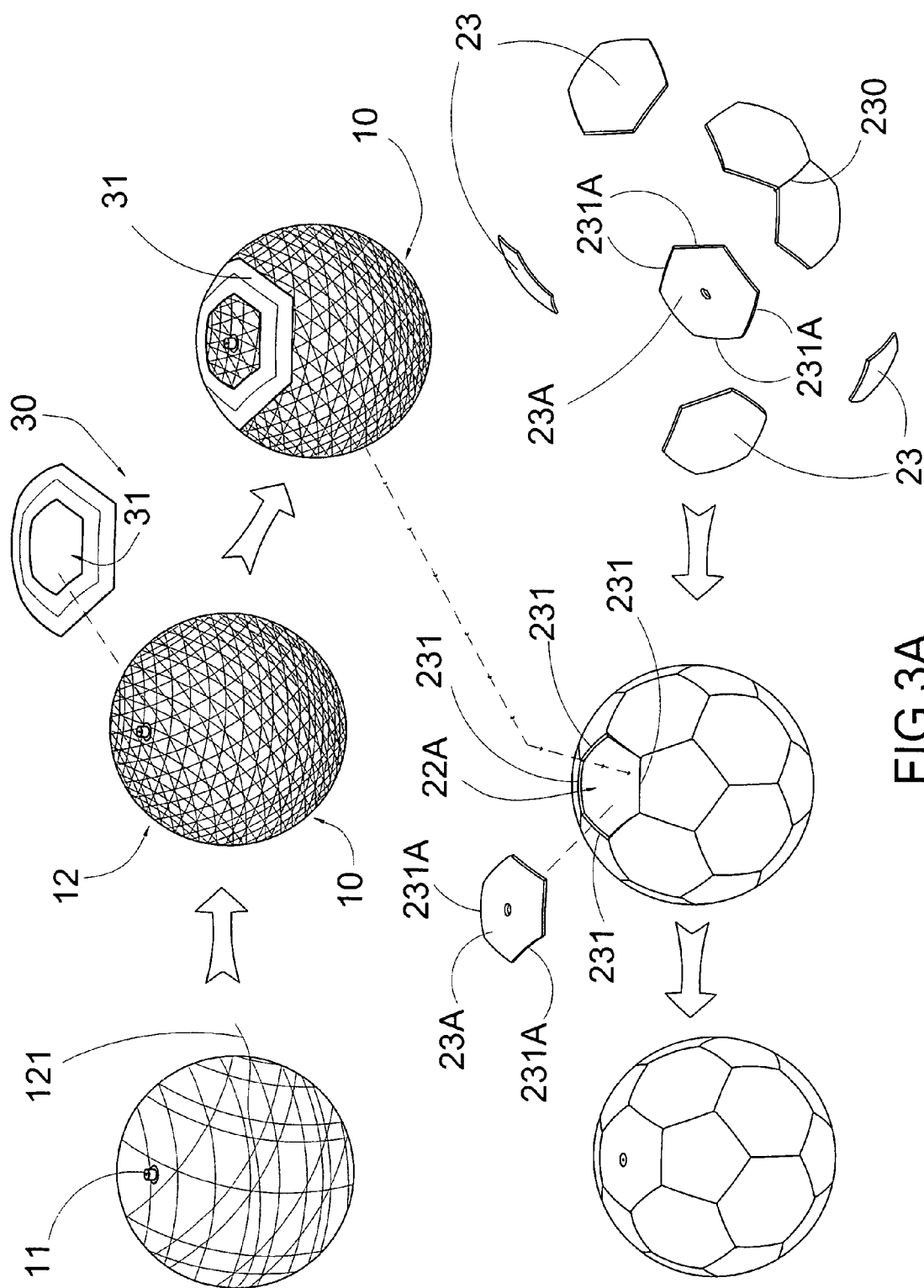


FIG. 3A

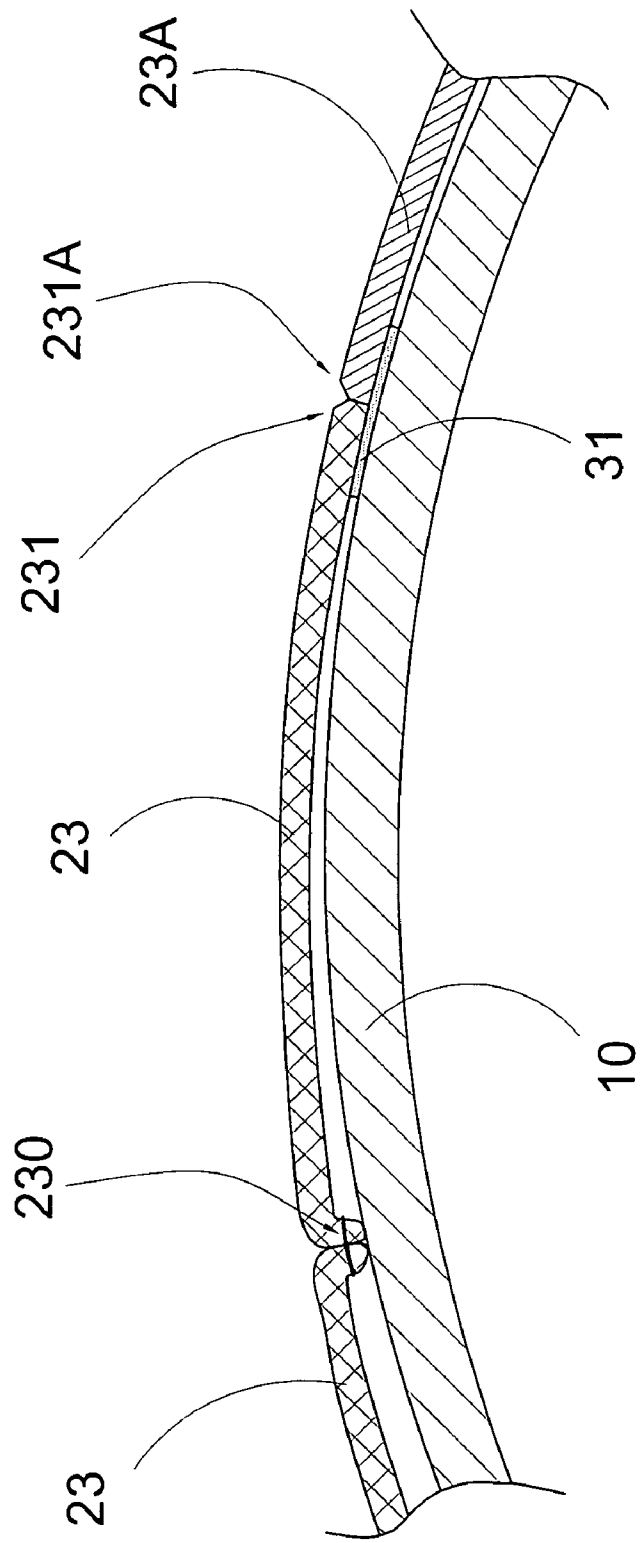


FIG.3B

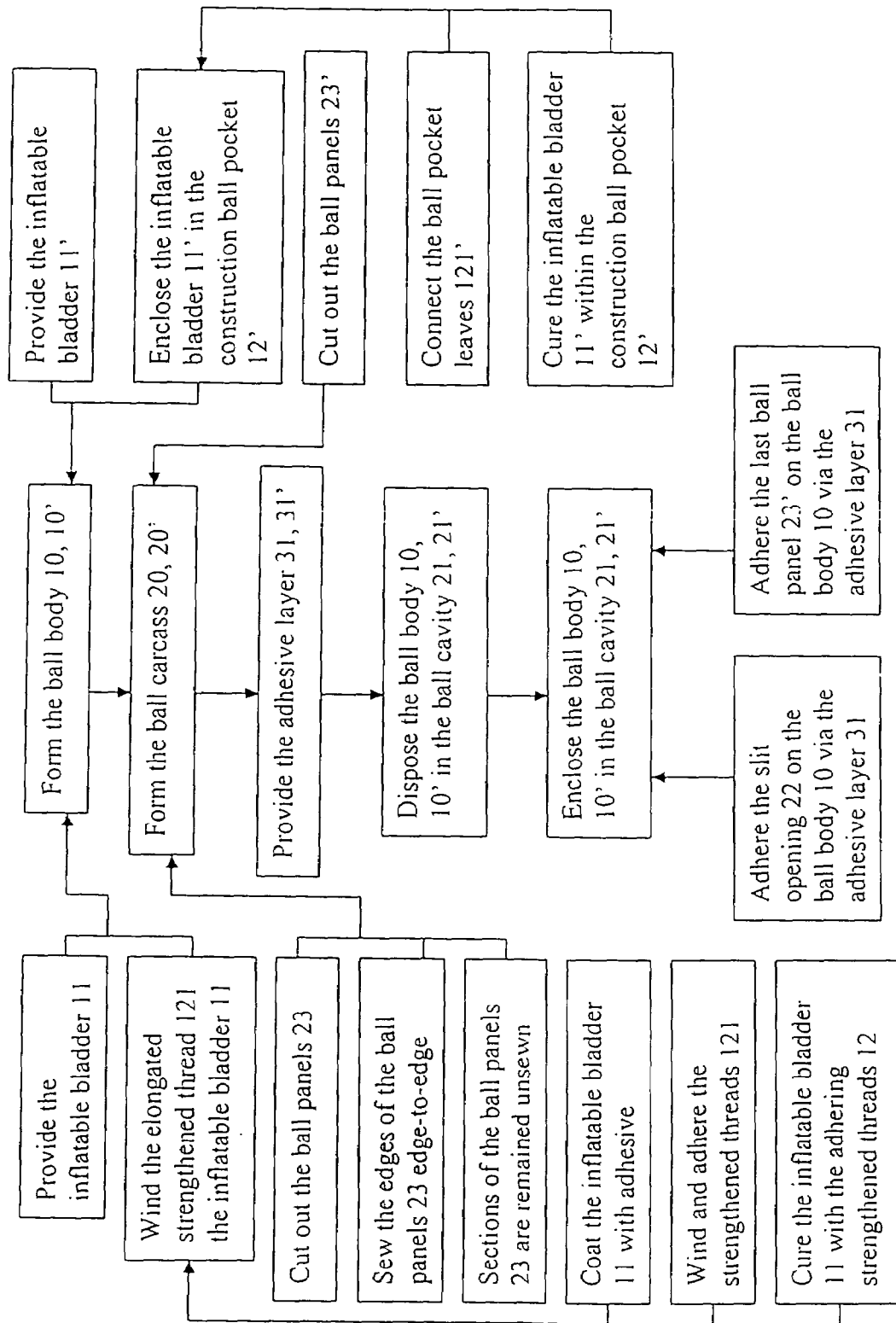


FIG. 4

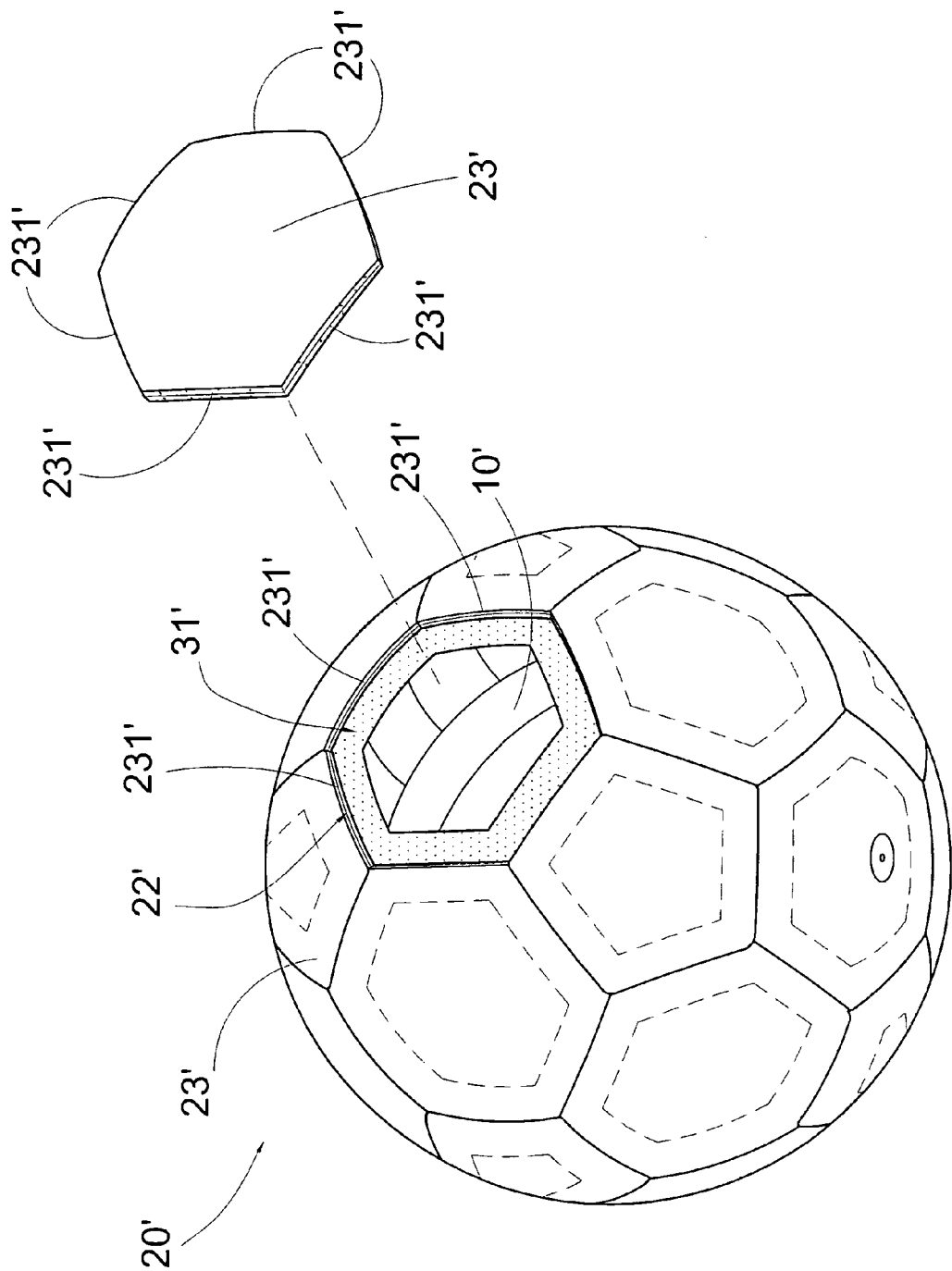


FIG. 5

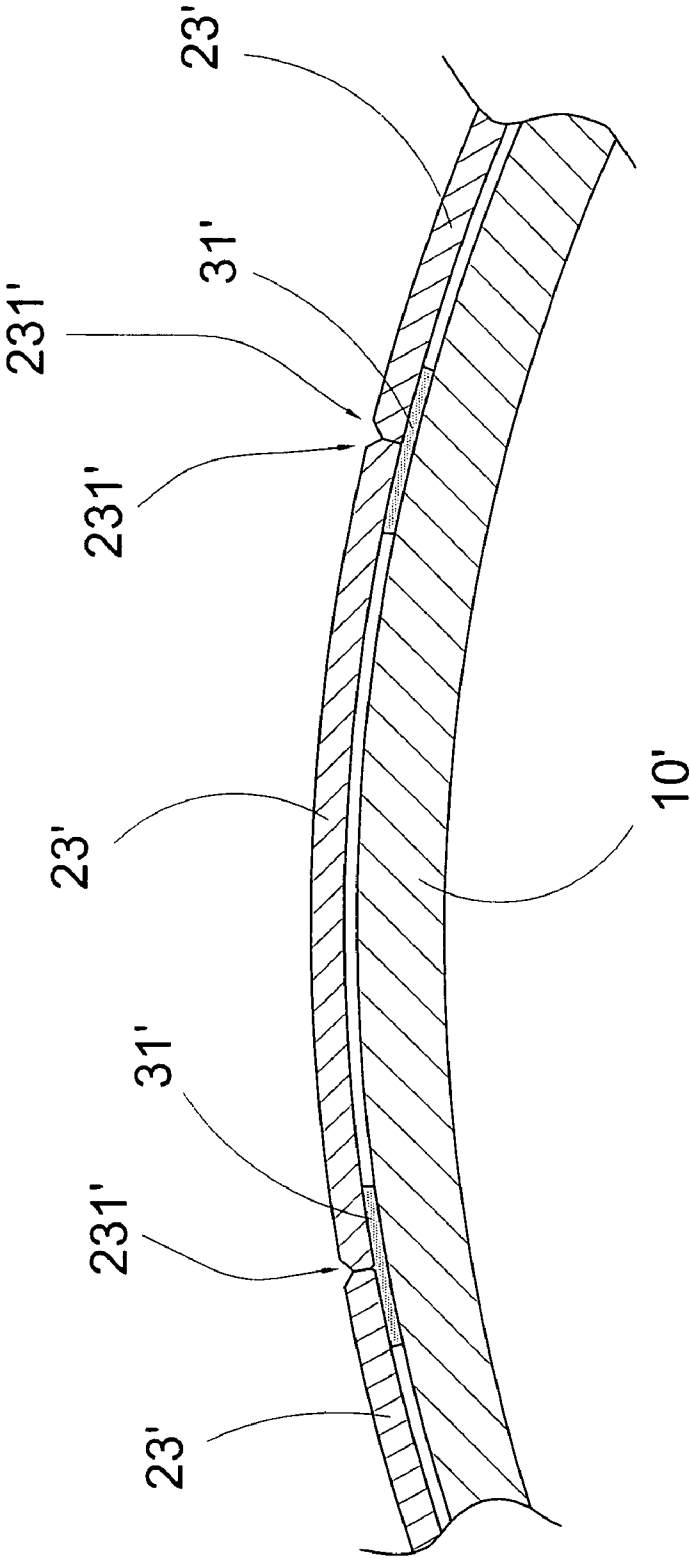


FIG.5A

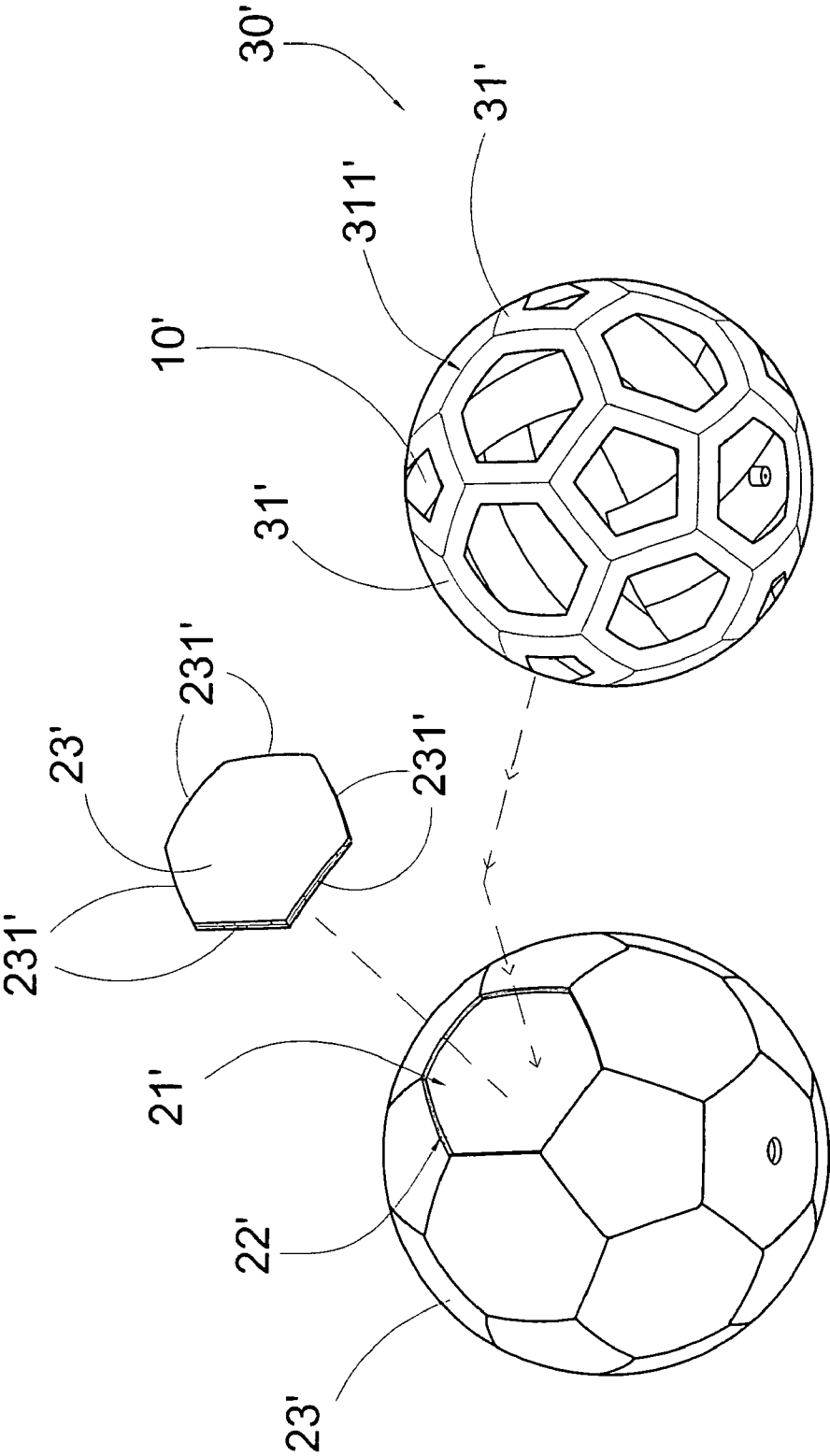


FIG.6

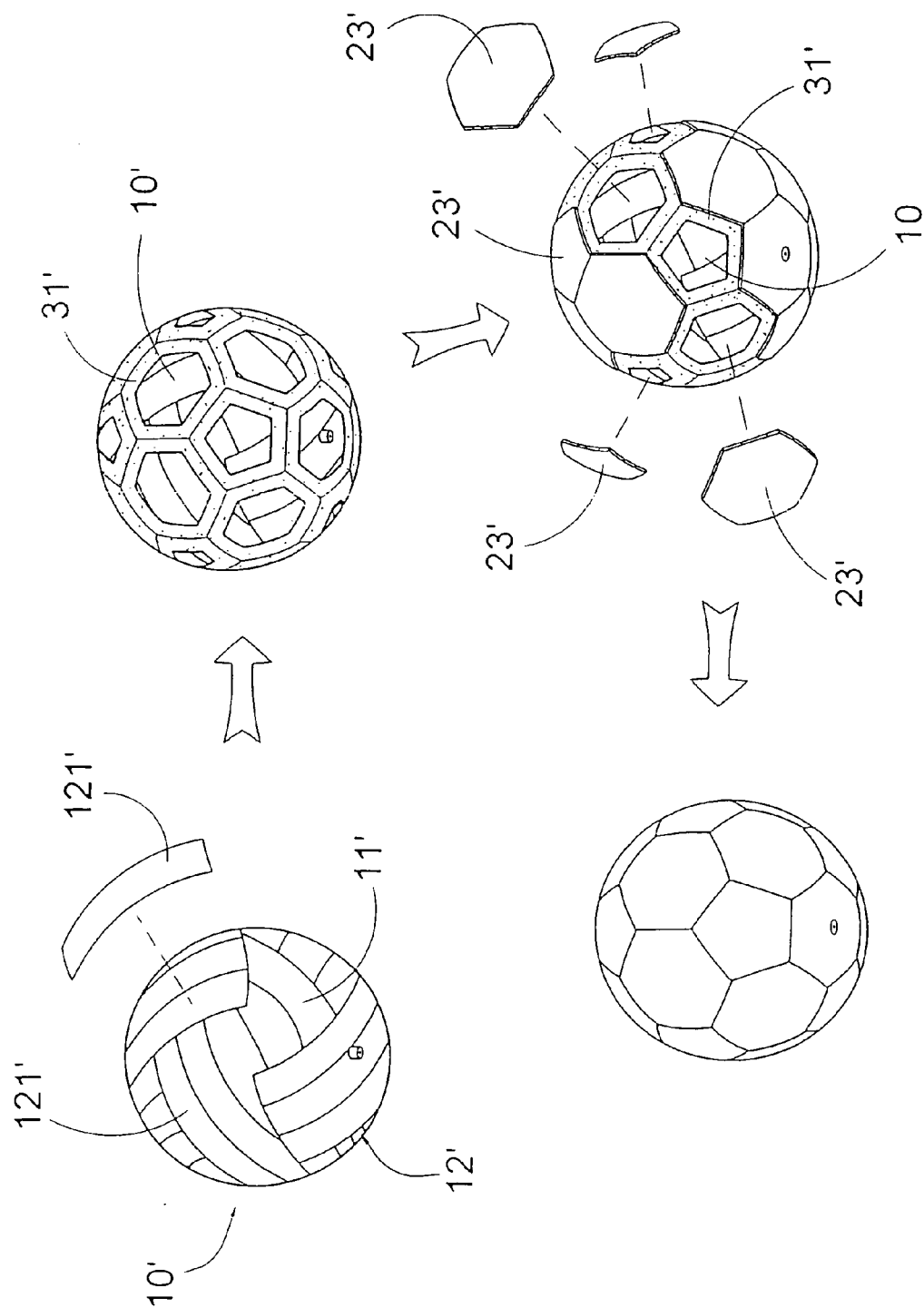


FIG.7

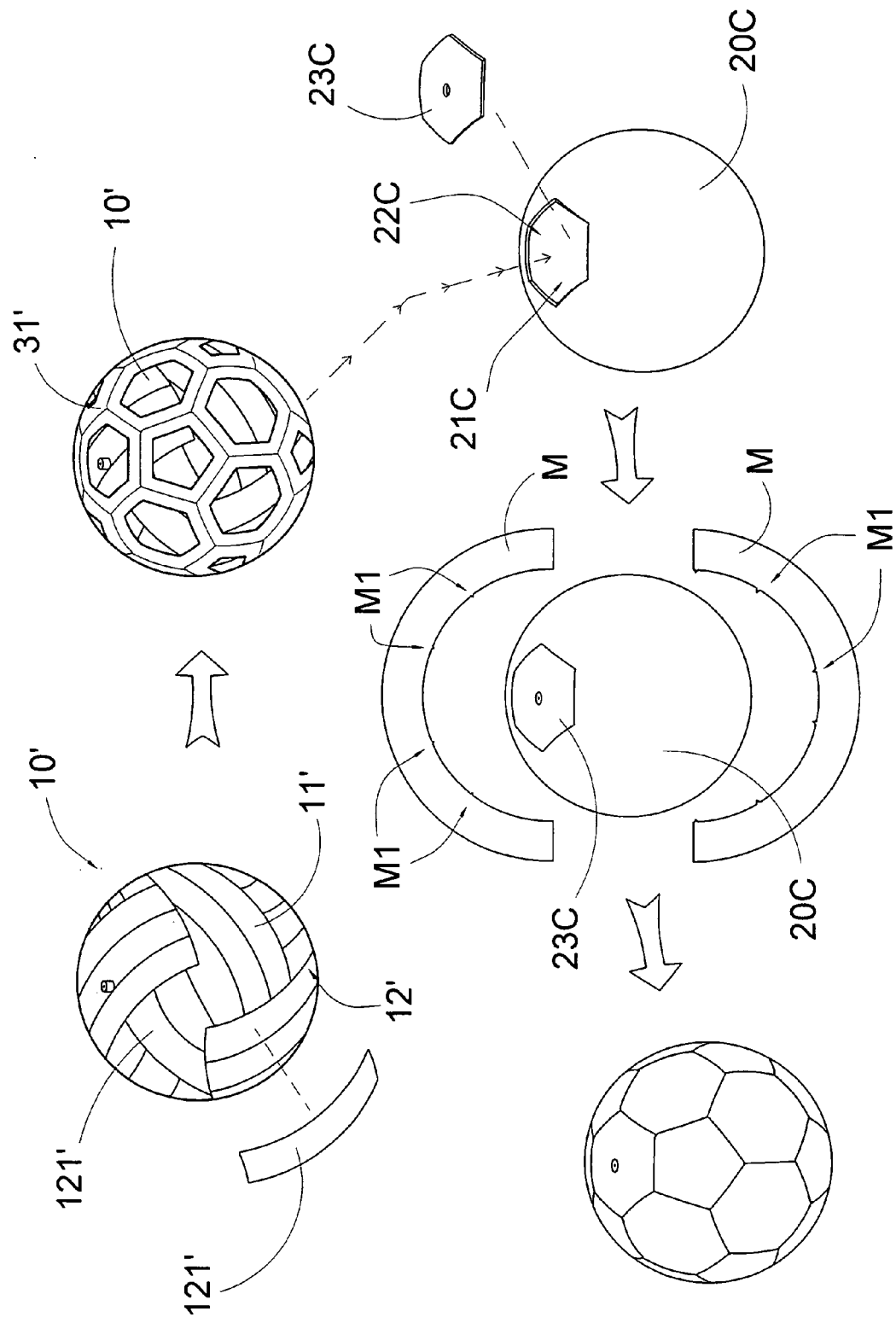


FIG.8

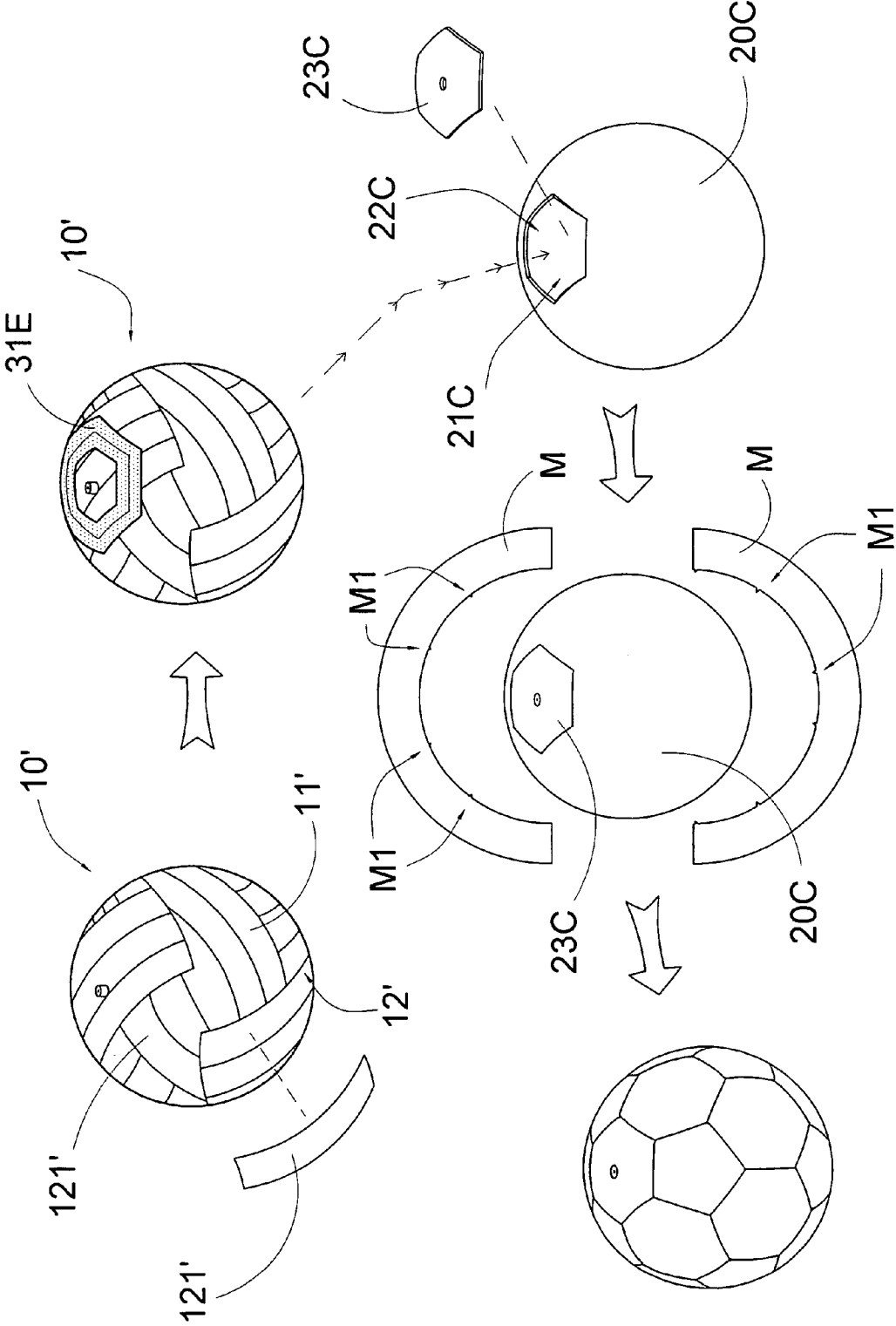
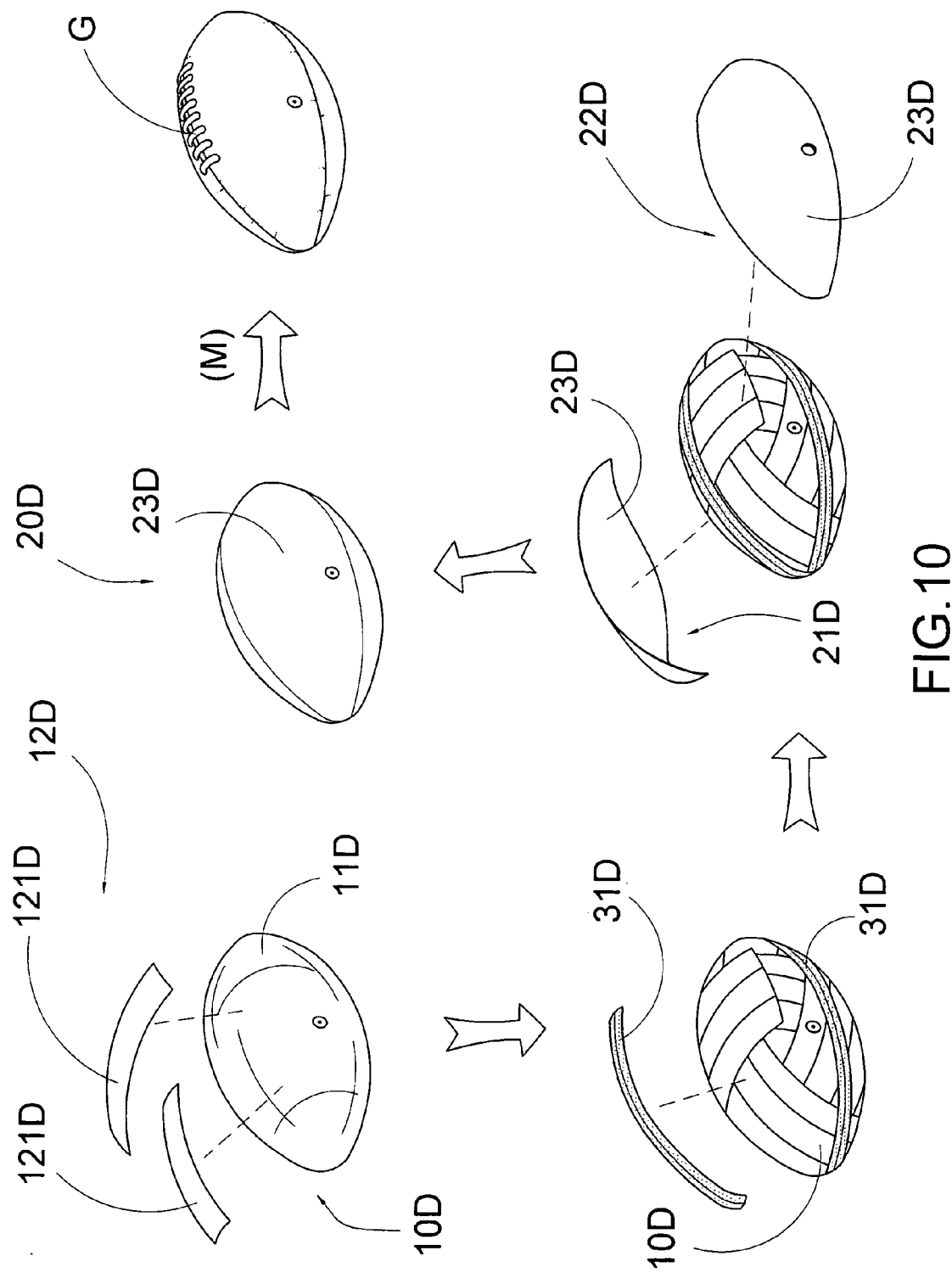


FIG.9



STITCHLESS SEAM ARRANGEMENT OF SPORTSBALL AND MANUFACTURING METHOD THEREOF

CROSS REFERENCE OF RELATED APPLICATION

[0001] This is a non-provisional application of a provisional application having an application number 61/133,678 and a filing date of Jun. 30, 2008.

BACKGROUND OF PRESENT INVENTION

[0002] 1. Field of Invention

[0003] The present invention relates to a sportsball, and more particularly to a stitchless seam arrangement of a sportsball and a manufacturing method thereof, which can simplify the final assembling operation of the sportsball by sealing the opening of the ball carcass by means of adhesive so as to reduce the time-consuming manufacturing procedure of the sportsball while being cost effective.

[0004] 2. Description of Related Arts

[0005] A conventional sportsball, such as a conventional soccer ball, America football, or volley ball, usually comprises a ball bladder and a ball casing. The ball casing comprises a plurality of casing panels attached on the ball bladder, wherein each of the casing panels is usually stitched to adjacent casing panels edge-to-edge for forming a substantially sportsball. Traditionally, much has been done in the development of the ball bladder and intermediate construction between the ball bladder and the ball casing.

[0006] In particularly, the conventional sportsball is manufactured by the following procedure. Firstly, the casing panels are sewn with each other edge-to-edge to form a ball cavity by hand or sewing machine as the initial assembling operation, wherein sections of the casing panels are remained unsewn to form an opening of the ball casing. Then, the ball bladder can be disposed in the ball cavity of the ball casing through the opening. After the ball bladder is inflated, the opening of the ball casing must be closed to enclose the ball bladder in the ball casing through the final assembling operation. Accordingly, the final assembling operation involves the unique step of sewing the unsewn edges of the ball casing by hand stitching to close the opening of the ball casing. It is worth to mention that the final assembling operation can only be operated by hand stitching that the opening of the ball casing cannot be closed by any sewing machine.

[0007] In order to speed up the manufacturing procedure, the sportsball manufacturer usually use sewing machine to sew the casing panels as in the initial assembling operation. However, the final assembling operation of the sportsball is relatively expensive and time-consuming due to the hand stitching operation. When the sportsballs are needed in large quantity, such as when the inventors or their assignees or the licensors need to meet substantial market demand, there is little chance that they could produce the sportsballs in large quantity in a relatively short period of time. This is extremely important because major soccer events, such as World Cup, are only held once in a few years.

[0008] An improved sportsball further comprises a lining providing between the outer surface of the ball bladder and an inner surface of the ball casing. The lining is used for adhering the casing panels of the ball casing onto the ball bladder. In other words, the casing panels of the ball casing are adhered on the ball casing to sandwich the lining between the ball

casing and the ball bladder. Accordingly, the manufacturing procedure of the improved sportsball is simplified and speeded up by adhering the ball casing on the ball bladder. However, another problem for such improved sportsball is that no matter how good the stitching and/or the construction of casing panels, the ball bladder and the ball casing are inherently two different components. The ball casing may be attached onto the ball bladder with the lining in between, the attachment is complicated and is not durable, so as to reduce the life span of the sportsball. In other words, when the ball bladder is deflated, the casing panels will be deformed along the edge connections thereof.

SUMMARY OF THE PRESENT INVENTION

[0009] A main object of the present invention is to provide a stitchless seam arrangement of a sportsball and a manufacturing method thereof, which can simplify the final assembling operation of the sportsball by sealing the opening of the ball carcass by means of adhesive so as to reduce the time-consuming manufacturing procedure of the sportsball while being cost effective.

[0010] Another object of the present invention is to provide a stitchless seam arrangement of a sportsball and a manufacturing method thereof, which can significantly increase the productivity along with the production quality consistency.

[0011] Another object of the present invention is to provide a stitchless seam arrangement of a sportsball and a manufacturing method thereof, wherein the stitchless seam arrangement can integrally formed with the ball body so as to completely overcome the insecure attachment disadvantage for conventional sportsball.

[0012] Another object of the present invention is to provide a stitchless seam arrangement of a sportsball and a manufacturing method thereof, which does not require to alter the original structural design of each of the ball body and the ball carcass, so as to minimize the manufacturing cost of the sportsball incorporating with the stitchless seam arrangement.

[0013] Another object of the present invention is to provide a stitchless seam arrangement of a sportsball and a manufacturing method thereof, wherein the stitchless seam arrangement can incorporate with both conventional stitching type sportsball and conventional adhering type sportsball. Therefore, the ball body and the ball carcass, as the barebone of the sportsball, can be mass-produced and can be incorporated with the stitchless seam arrangement to form the stitching type sportsball or adhering type sportsball.

[0014] Another object of the present invention is to provide a stitchless seam arrangement of a sportsball and a manufacturing method thereof, wherein the sportsball can be manufactured into a wide variety of ball types, so as to facilitate widespread applications of the present invention. For example, by using the structural configuration of the stitchless seam arrangement, the sportsball can be manufactured as a soccer ball, an America football, or even a volley ball.

[0015] Another object of the present invention is to provide a stitchless seam arrangement of a sportsball and a manufacturing method thereof, wherein no expensive or complicated structure is required to employ in the present invention in order to achieve the above mentioned objects. Therefore, the present invention successfully provides an economic and efficient solution for manufacturing a long-lasting configuration for the sportsball.

[0016] Accordingly, in order to accomplish the above objects, the present invention provides a sportsball, which comprises an inflatable ball body and a ball carcass having a ball cavity and an opening, wherein the ball body is disposed in the ball cavity through the opening for propping up the ball carcass after inflation.

[0017] The sportsball further comprises a stitchless seam arrangement which may comprises an elongated adhesive layer having a contour matching with a contour of the opening, wherein after the ball body is disposed in the ball carcass, edge portions of the opening are adhered on an outer surface of the ball body via the adhesive layer, such that the opening is sealed to close the ball cavity for enclosing the ball body in the ball cavity of the ball carcass in a stitchless seam manner.

[0018] The present invention further provides a method of manufacturing a sportsball, comprising the steps of:

[0019] (a) providing the inflatable ball body and the ball carcass;

[0020] (b) providing an elongated adhesive layer which has a contour matching with a contour of the opening of the ball body;

[0021] (c) disposing the ball body in the ball cavity of the ball carcass through the opening; and

[0022] (e) after the ball body is inflated, enclosing the ball body in the ball cavity of the ball carcass by adhering edge portions of the opening on an outer surface of the ball body via the adhesive layer such that the opening is sealed to close the ball cavity in a stitchless seam manner.

[0023] These and other objectives, features, and advantages of the present invention will become apparent from the following detailed description, the accompanying drawings, and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] FIG. 1 is an exploded perspective view of a sportsball according to a first preferred embodiment of the present invention.

[0025] FIG. 2 is a partially perspective view of the sportsball according to the above first preferred embodiment of the present invention, illustrating the opening of the ball carcass aligning with the adhesive element.

[0026] FIG. 3 is a schematic view illustrating the manufacturing method of the sportsball according to the above first preferred embodiment of the present invention.

[0027] FIG. 3A is a schematic view illustrating the alternative manufacturing method of the sportsball according to the above first preferred embodiment of the present invention.

[0028] FIG. 3B is a sectional view illustrating the slanted edge portion of the ball panel according to the above first preferred embodiment of the present invention.

[0029] FIG. 4 is a flow diagram illustrating the manufacturing method of the sportsball according to the above first preferred embodiment and a second embodiment of the present invention.

[0030] FIG. 5 is an exploded perspective view of a sportsball according to the second preferred embodiment of the present invention.

[0031] FIG. 5A is a sectional view illustrating the slanted edge portion of the ball panel according to the above second preferred embodiment of the present invention.

[0032] FIG. 6 is a partially perspective view of the sportsball according to the above second preferred embodiment of the present invention, illustrating the opening of the ball carcass aligning with the adhesive element.

[0033] FIG. 7 is a schematic view illustrating the manufacturing method of the sportsball according to the above second preferred embodiment of the present invention.

[0034] FIG. 8 is a schematic view illustrating the alternative manufacturing method of the sportsball according to the above second preferred embodiment of the present invention.

[0035] FIG. 9 is a schematic view illustrating another alternative manufacturing method of the sportsball according to the above second preferred embodiment of the present invention.

[0036] FIG. 10 is a schematic view illustrating the manufacturing method of the American football as the sportsball according to the above second preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0037] Referring to FIGS. 1 to 4 of the drawings, a sportsball and its manufacturing method according to a first embodiment of the present invention are illustrated, wherein the sportsball, such as a soccer ball, is a stitching type sportsball and comprises an inflatable ball body 10, and a ball carcass 20 having a ball cavity 21 and an opening 22.

[0038] The ball body 10 is disposed in the ball cavity 21 through the opening 22 for propping up the ball carcass 20 after inflation. As shown in FIGS. 1 and 3, the ball body 10 comprises an inflatable bladder 11 for being popped by air inflation via a valve stem and an exterior web layer 12, which is integrally attached on an outer surface of the inflatable bladder 11, comprises at least an elongated winding thread 121 evenly wound around the outer surface of the inflatable bladder 11 such that the web layer 12 embraces the inflatable bladder 11 for resisting stress and impact force applied to the inflatable bladder 11. Accordingly, the purpose of the thread 121 is also for enhancing the roundness of the ball body 10 for preventing the inflatable bladder 11 from over expanding which will result in deformation.

[0039] According to the first embodiment, the sportsball is a stitching type sportsball. The ball carcass 20 comprises a plurality of ball panels 23 sewn with each other edge-to-edge while sections of the ball panels 23 are remained unsewn to form the opening 22 as a slit opening. In other words, the unsewn edges of the ball panels 23 form the opening 22 of the ball carcass 20. As shown in FIG. 1 and 2, there are four corresponding unsewn edges of the ball panels 23 to form the opening 22 in a zigzag manner.

[0040] Accordingly, the ball carcass 20 is made of durable material such as leather, Thermoplastic Urethane (TPU), Polyurethane (PU), Polyvinyl Chloride (PVC), Thermoplastic Elastomer (TPE), Ethylene-Vinyl Acetate (EVA), rubber, or other durable fabrics.

[0041] The sportsball further comprises a stitchless seam arrangement 30 for closing the opening 22 of the ball carcass 20 in a stitchless seam manner. As shown in FIGS. 1 to 3, the stitchless seam arrangement 30 comprises an elongated adhesive layer 31 having a contour matching with a contour of the opening 22, wherein after the ball body 10 is disposed in the ball carcass 20, edge portions of the opening 22 are adhered on an outer surface of the ball body 10 via the adhesive layer 31, such that the opening 22 is sealed to close the ball cavity 21 for enclosing the ball body 10 in the ball cavity 21 of the ball carcass 20 in a stitchless seam manner.

[0042] According to the preferred embodiment, the adhesive layer 31 is provided at a closing area 101 of the ball body

10, wherein the closing area 101 is an area on the outer surface of the ball body 10 that when the ball body 10 is disposed in the ball carcass 20, the closing area 101 is facing towards the opening 22 of the ball carcass 20.

[0043] As shown in FIG. 1, the adhesive layer 31 is an elastic strip, such as a rubber strip, pre-applied on the outer surface of the ball body 10 to form a zigzag contour matching with the zigzag contour of the opening 22. After the ball body 10 is disposed in the ball carcass 20, the adhesive layer 31 is aligned with the opening 22 of the ball carcass 20. Therefore, the edge portions of the opening 22 are adhered on the outer surface of the ball body 10 through the rubber strip after heat treatment. It is appreciated that adhesive can be applied at the opening 22 to seal the opening 22 and to close the ball cavity 21 for enclosing the ball body 10 in the ball cavity 21 of the ball carcass 20 in a stitchless seam manner.

[0044] In particularly, the adhesive layer 31 is vulcanized on the ball body 10 at the closing area 101 thereof, wherein the adhesive layer 31 is provided on the ball body 10 to align along unsewn edges of the ball panels 23 after the ball body 10 is disposed in the ball carcass 20. Therefore, when the ball body 10 is inflated within the ball carcass 20, preferably not fully inflating the ball body 10, the ball body 10 can be adjusted within the ball cavity 21 until the adhesive layer 31 is aligned with the opening 22.

[0045] For better alignment, the adhesive layer 31 has an outwardly protruding line 311 radially protruded from the ball body 10 to form an edge guider to align with a connection line between two unsewn edges of the adjacent ball panels 23. Accordingly, the protruding line 311 is a centerline of the adhesive layer 31, wherein when the two edge portions of the opening 22 are adhered on the adhesive layer 31, the edges of the opening 22 should be aligned along the protruding line 311 of the adhesive layer 31.

[0046] It is worth to mention that only the closing area 101 of the ball body 10, which is a relatively close portion of the ball body 10, is adhered to the ball carcass 20 via the adhesive layer 31. Therefore, the rest of the outer surface of the ball body 10 is only popped and urged against the inner surface of the ball carcass 20 once the ball body 10 is inflated.

[0047] Accordingly, in order to manufacture the sportsball, the present invention also provides a method of manufacturing the sportsball, which comprises the following steps.

[0048] (1) Form the ball body 10 by the steps of:

[0049] (1.1) providing the inflatable bladder 11 for being popped by air inflation; and

[0050] (1.2) evenly winding the elongated winding thread 121 around the outer surface of the inflatable bladder 11 to form the exterior web layer 12, wherein the web layer 12 is then integrally attached on the outer surface of the inflatable bladder 11.

[0051] (2) Form the ball carcass 20 by the steps of:

[0052] (2.1) cutting out a plurality of ball panels 23 from a piece of panel sheet.

[0053] (2.2) sewing the edges of the ball panels 23 edge-to-edge to form the ball cavity 21, while sections of the ball panels 23 are remained unsewn to form the opening 22. Preferably, the ball panels 23 are sewn edge-to-edge by the stitching machine. As shown in FIG. 3, a stitching edge 230 is formed along two corresponding edges of the neighboring ball panels 23.

[0054] (3) Provide the adhesive layer 31 which has a contour matching with a contour of the opening 22 of the ball carcass 20.

[0055] (4) Dispose the ball body 10 in the ball cavity 21 of the ball carcass 20 through the opening 22. Accordingly, the ball body 10 is deflated and then inserted into the ball cavity 21 of the ball carcass 20 through the opening 22.

[0056] (5) After the ball body 10 is inflated, enclose the ball body 10 in the ball cavity 21 of the ball carcass 20 by adhering the edge portions of the opening 22 on the outer surface of the ball body 10 via the adhesive layer 31 such that the opening 22 is sealed to close the ball cavity 21 in a stitchless seam manner.

[0057] According to the preferred embodiment, in the step (1.2), the web layer 12 is formed by the sub-steps of:

[0058] (1.2.1) coating the outer surface of the inflatable bladder 11 with adhesive, such as Latex, wherein the inflatable bladder is vulcanized;

[0059] (1.2.2) winding the winding threads 121 on the outer surface of the inflatable bladder 11, wherein the winding threads 121 are preferably coated with adhesive, such as Latex, to prevent the winding threads 121 shifting from places to places; and

[0060] (1.2.3) curing the inflatable bladder 11 with the adhering winding threads 12 thereon are together by heating in a mold.

[0061] Accordingly, in the step (3), the adhesive layer 31 is applied on the outer surface of the ball body 10 at the closing area 101 to align the opening 22 of the ball carcass 20 with the adhesive layer 31 after the ball body 10 is disposed in the ball carcass 20. As shown in FIGS. 1 and 3, the adhesive layer 31 is provided at the closing area 101 of the ball body 10 in a zigzag manner.

[0062] In comparison with the traditional manufacturing process, the present invention excludes the hand stitching step as the final assembling operation of the sportsball. It is appreciated that the opening 22 is sealed to close the ball cavity 21 by adhering the edge portions of the opening 22 via the adhesive layer 31. Therefore, no hand stitching step is involved in the entire manufacturing process so as to reduce the time-consuming manufacturing procedure of the sportsball while being cost effective.

[0063] As it is mentioned above, the adhesive layer 31 has a zigzag contour matching with the zigzag contour of the opening 22. It is appreciated the opening 22A is formed by unsewing the last ball panel 23A after the rest of the ball panels 23 are sewn edge-to-edge. In other words, the opening 22A has a hexagon or pentagon shape, as shown in FIG. 3A.

[0064] Accordingly, after the ball panels 23 are sewn edge-to-edge, the ball panels 23 to form the ball carcass 20 such that the ball body 10 is disposed in the ball cavity 21 through the opening 22A. The last ball panel 23A forms as a ball cover to seal at the opening 22A via the adhesive layer 31 so as to enclose the ball cavity 21.

[0065] In particularly, the last ball panel 23A also forms the valve panel having a valve hole provided thereon such that when the last ball panel 23A is sealed at the opening 22A, the valve stem is extended out of the ball carcass 20 through the valve hole of the last ball panel 23A.

[0066] As shown in FIGS. 3A and 3B, the ball panel 23A has a slanted edge portion 231A extended towards the peripheral edge thereof, wherein a thickness of the slanted edge portion 231A of the ball panel 23A is gradually reducing towards the peripheral edge of the ball panels 23A. In addition, the neighboring ball panels 23 also have the slanted edge portion 231 to alignedly couple with the slanted edge portions 231A of the ball panel 23A respectively. Therefore, when the

ball panel 23A is coupled on the ball body 10, the slanted edge portions 231A of the ball panel 23A and the slanted edge portions 231 of the ball panel 23 form the channels on the sportsball.

[0067] Alternatively, after the last ball panel 23A is sealed at the opening 22A, the ball carcass 20 as the semi-finished product can be put into a final shaping mold for shaping and forming the slanted edge (stitchless seam) around the edges of the last ball panel 23A.

[0068] As shown in FIG. 5, a sportsball of a second embodiment illustrates an alternative mode of the first embodiment, wherein the sportsball according to the second embodiment is an adhering type sportsball and comprises an inflatable ball body 10', and a ball carcass 20' having a ball cavity 21' and an opening 22'.

[0069] The ball body 10' is disposed in the ball cavity 21' for propping up the ball carcass 20' after inflation. As shown in FIGS. 5 and 7, the ball body 10' comprises an inflatable bladder 11' for being popped by air inflation and a construction ball pocket 12', which is made of fabric material and constructed to have a true roundness shape, having an interior receiving cavity defined therein to sealedly receive the inflatable bladder 11', such that the construction ball pocket 12' is arranged to retain a true roundness shape of the inflatable bladder 11' after the inflatable bladder 11' is inflated. Accordingly, the inflatable bladder 11' can also be the wound bladder or latex bladder as described in the first embodiment. In other words, the ball pocket 12' can be made of winding thread or just a latex bladder.

[0070] Accordingly, the construction ball pocket 12' is constructed by a plurality of ball pocket leaves 121' integrally connected with each other to form a ball shaped pocket for enclosing the inflatable bladder 11'.

[0071] The ball carcass 20' comprises a plurality of ball panels 23' attached to the ball body 10' with each other edge-to-edge while the last ball panel 23' is remained unattached to the ball body 10' to form the opening 22'. In other words, the unattached ball panel 23' forms the opening 22' of the ball carcass 20'. As shown in FIG. 5 and 7, the unattached ball panel 23' has six edges to form the opening 22' in a hexagonal shape. Likewise, the unattached ball panel 23' can be the panel having five edges to form the opening 22' in a pentagonal shape.

[0072] Accordingly, the ball carcass 20' is made of durable material such as leather, Thermoplastic Urethane (TPU), Polyurethane (PU), Polyvinyl Chloride (PVC), Thermoplastic Elastomer (TPE), Ethylene-Vinyl Acetate (EVA), rubber, or other durable fabrics.

[0073] The sportsball further comprises a stitchless seam arrangement 30' for closing the opening 22' of the ball carcass 20' in a stitchless seam manner. As shown in FIGS. 5 to 7, the stitchless seam arrangement 30' comprises an elongated adhesive layer 31' having a contour matching with a contour of the opening 22', wherein after the ball body 10' is disposed in the ball carcass 20', edge portions of the opening 22' are adhered on an outer surface of the ball body 10' via the adhesive layer 31', such that the opening 22' is sealed to close the ball cavity 21' for enclosing the ball body 10' in the ball cavity 21' of the ball carcass 20' in a stitchless seam manner.

[0074] According to the second embodiment, the adhesive layer 31' is provided at a closing area 101' of the ball body 10', wherein the closing area 101' is an area on the outer surface of the ball body 10' that when the ball body 10' is disposed in the ball carcass 20', the closing area 101' is facing towards the

opening 22' of the ball carcass 20'. In particularly, the adhesive layer 31' is a rubber strip pre-applied on the outer surface of the ball body 10' to form a hexagonal contour matching with the hexagonal contour of the opening 22'. After the ball body 10' is disposed in the ball carcass 20', the adhesive layer 31' is aligned with the opening 22' of the ball carcass 20'. Therefore, the edge portions of the opening 22' are adhered on the outer surface of the ball body 10' through the rubber strip after heat treatment.

[0075] It is appreciated that the adhesive layer 31' is extended throughout the entire ball body 10', as shown in FIG. 5, wherein the adhesive layer 31' is provided on the ball body 10' along the edge portions of the ball panels 23' such that the edge portions of the ball panels 23' are alignedly attached along the adhesive layer 31' to form the ball carcass 20' for enclosing the ball body 10'. In other words, the adhesive layer 31' is vulcanized on the ball body 10' in a particular pattern that the edge portions of each of the ball panels 23' are adhered on the ball body 10' via the adhesive layer 31'. Therefore, only the edge portion of each of the ball panels 23' are adhered on the ball body 10' while the center portion of each of the ball panels 23' is remained unattached to the ball body 10'.

[0076] For better alignment, the adhesive layer 31' has an outwardly protruding line 311' radially protruded from the ball body 10' to form an edge guider to align with a connection line between two edges of the adjacent ball panels 23'. Accordingly, the protruding line 311' is a centerline of the adhesive layer 31', wherein when the two adjacent ball panels 23' are adhered on the adhesive layer 31', the edges of the adjacent ball panels 23' should be aligned along the protruding line 311' of the adhesive layer 31'.

[0077] As shown in FIGS. 5 to 7, each of the ball panels 23' has a slanted edge portion 231' extended towards the peripheral edge thereof, wherein a thickness of the slanted edge portion 231' of each of the ball panels 23' is gradually reducing towards the peripheral edge of the corresponding ball panels 23'. Therefore, when the ball panels 23' are coupled on the ball body 10', the slanted edge portions 231' of the ball panels 23' form the channels on the sportsball. As shown in FIG. 5A, the ball panels 23' are overlapped on the ball body 10' edge-to-edge that the slanted edge portion 231' of one of the ball panels 23' is aligned with the slanted edge portion 231' of the neighboring ball panels 23', wherein the ball panels 23' are attached to the ball body 10' via the adhesive layer 31'.

[0078] Accordingly, in order to manufacture the sportsball, the present invention also provides a method of manufacturing the sportsball, which comprises the following steps.

[0079] (1) Form the ball body 10' by the steps of:

[0080] (1.1) providing the inflatable bladder 11' for being popped by air inflation; and

[0081] (1.2) enclosing the inflatable bladder 11' in the construction ball pocket 12'.

[0082] (2) Form the ball carcass 20' by the steps of:

[0083] (2.1) cutting out a plurality of ball panels 23' from a piece of panel sheet.

[0084] (3) Provide the adhesive layer 31'.

[0085] (4) Dispose the ball body 10' in the ball cavity 21' of the ball carcass 20' by inflating the ball body 10' and then adhering the ball panel 23' on the ball body 10'.

[0086] (5) After the ball body 10' is inflated, enclose the ball body 10' in the ball cavity 21' of the ball carcass 20' by adhering the edge portions of the opening 22' on the outer

surface of the ball body 10' via the adhesive layer 31' such that the opening 31' is sealed to close the ball cavity 21' in a stitchless seam manner. Accordingly, the edge portions of the opening 22' are sealed by the last ball panel 23' on the ball body 10' via the adhesive layer 31'.

[0087] According to the preferred embodiment, in the step (1.2), the construction ball pocket 12' is formed by the sub-steps of:

[0088] (1.2.1) integrally connecting the ball pocket leaves 121' with each other to form a corresponding ball-shaped body;

[0089] (1.2.2) enclosing the inflatable body 11' in the construction ball pocket 12'; and

[0090] (1.2.3) curing the inflatable bladder 11' within the construction ball pocket 12' by heating in a mold.

[0091] Accordingly, the inflatable bladder 11' is to be firstly vulcanized prior to fabric layer application of the ball pocket leaves 121'. Once the ball pocket leaves 121' are adhered onto the inflatable bladder 11', a second time vulcanization is then performed.

[0092] In the step (3), the adhesive layer 31' is applied on the outer surface of the ball body 10' to align with the edges of the ball panels 23' such that the edge portions of the ball panels 23' are alignedly adhered to the ball body 10' along the adhesive layer 31'.

[0093] Instead of attaching each of the ball panels 23' onto the ball body 10', the ball panels 23B, as an alternative, can be attached with each other edge-to-edge by adhesive to form the ball carcass 20' before disposing the ball body 10' into the ball cavity 21'. The opening 22' is formed by unattaching the last ball panel 23' after the rest of the ball panels 23' are coupled edge-to-edge. Accordingly, the opening 22' has a hexagon shape. In other words, the ball panels 23' can be directly attached on the ball body 10' via the adhesive layer 31' or can be coupled with each other edge-to-edge to form the ball carcass 20' for the ball body 10' disposing therein.

[0094] Therefore, after the ball panels 23' are coupled edge-to-edge, the ball panels 23' to form the ball carcass 20' such that the ball body 10' is disposed in the ball cavity 21' through the opening 22'. The last ball panel 23' forms as a ball cover to seal at the opening 22' via the adhesive layer 31' so as to enclose the ball cavity 21'.

[0095] It is worth to mention that the adhesive layer 31' is formed on the ball body 11' as the "skeleton" structure. The adhesive layer 31' can be adhered and then vulcanized onto the ball body 10' such that the adhesive layer 31' is affixed on the ball body 10'.

[0096] Alternatively, the ball carcass 20C has a one piece layer structure to define the ball cavity 21C and the opening 22C, as shown in FIG. 8, wherein after the ball body 10' is disposed in the ball cavity 21C through the opening 22C. The ball panel 23C forms as a ball cover to seal at the opening 22C via the adhesive layer 31' so as to enclose the ball cavity 21C. Since the ball carcass 20C has an outer flat ball surface, the ball carcass 20C must be further treated to create the stitching seam effect. Accordingly, after the opening 22C is sealed by the ball panel 23C to enclose the ball body 10', the ball carcass 20C is treated through a final shaping process that the ball carcass 20C is disposed in a special mold M with a built-in slanted edge maker M1 at an inner molding surface. Accordingly, the slanted edge maker M1 of the mold M is pressed on the outer ball surface of the ball carcass 20C to form the channel thereon so as to create the stitching seam effect for the ball carcass 20C.

[0097] FIG. 9 illustrates another alternative mode of the adhesive layer 31D provided at a valve area of the ball body 10' to surround the valve stem. After the ball body 10' is disposed in the ball cavity 21C through the opening 22C. The ball panel 23C forms as a ball cover to seal at the opening 22C via the adhesive layer 31D so as to enclose the ball cavity 21C. In other words, only the outer surface of the ball body 10' at the valve area thereof is attached to the inner surface of the ball carcass 20C while the rest outer surface of the ball body 10' is unattached to the inner surface of the ball carcass 20C, such that the ball body 10' is adapted to be deflated to deform the roundness shape of the ball carcass 20C.

[0098] For the conventional process of manufacturing the lamination sports ball, the ball carcass is adhered to the ball body that the inner surface of the ball carcass must be bonded with the outer surface of the ball body. In other words, the overall thickness of the conventional lamination sports ball is substantially increased by the thickness of the ball carcass and the thickness of the ball body. Unlike the conventional stitching sports ball, the carcass panels are stitched edge-to-edge to form the ball carcass for the ball body receiving therein. The outer surface of the ball body is unattached to the inner surface of the ball carcass. The ball body can be inflated to pop the ball carcass and can be deflated to reduce the volume of the ball carcass.

[0099] Therefore, the conventional lamination sports ball is preferred not to be deflated because it may deform or the gaps between the panels may peel off. It is inconvenient for the conventional lamination sports ball to be stored and transported as the conventional stitching sports ball. As shown in FIG. 9, the present invention provides the lamination sports ball having the feature of the stitching sport ball that the outer surface of the ball body 10' is unattached to the inner surface of the ball carcass 20C such that the sports ball of the present invention can be deflated as the conventional stitching sports ball does. In other words, the ball body 10' can be inflated to pop the ball carcass 20C and can be deflated to deform the roundness shape of the ball carcass 20C and to reduce the volume of the ball carcass 20C. It is worth to mention that the adhesive layer 31E is provided at the valve area of the ball body 10' around the valve stem to retain the alignment of the valve stem of the ball body 10' with the valve hole of the ball carcass 20C, especially when the ball body 10' is deflated. In other words, the adhesive layer 31E can be vulcanized forming the skeleton without adhering to the ball carcass 20C to create a "floating" skeleton layer.

[0100] It is appreciated that the ball body 10' of the second embodiment can be incorporated with the ball carcass 20 of the first embodiment to form a stitching type sportsball by providing the adhesive layer 31 at the closing area of the ball body 10' to align with the opening 22 of the ball carcass 20. Likewise, the ball body 10 of the first embodiment can be incorporated with the ball carcass 20' of the second embodiment to form an adhering type sportsball by providing the adhesive layer 31' around the ball body 10 to align with the edges of the ball panels 23' of the ball carcass 20'.

[0101] It is worth to mention that the sportsball of the present invention can be manufactured as a soccer ball, a volley ball or even an American football. As it is illustrated above, the soccer ball is made by the above mentioned structure and its manufacturing process thereof as an example to incorporate with the stitchless seam arrangement 30, 30'.

[0102] FIG. 10 illustrates the method of manufacturing the American football, wherein the conventional American foot-

ball comprises an air bladder and four carcass panels stitching edge-to-edge to form a football casing for receiving the air bladder therein. Accordingly, the present invention also provides the manufacturing method the American football, as the sports ball, comprising the following steps.

[0103] (1) Form the ball body 10D by the steps of:

[0104] (1.1) providing the inflatable bladder 11D for being popped by air inflation; and

[0105] (1.2) enclosing the inflatable bladder 11D in the construction ball pocket 12D, wherein the construction ball pocket 12D is formed by the sub-steps of:

[0106] (1.2.1) integrally connecting the ball pocket leaves 121D with each other to form a corresponding ball-shaped body;

[0107] (1.2.2) enclosing the inflatable body 11D in the construction ball pocket 12D, and

[0108] (1.2.3) curing the inflatable bladder 11D within the construction ball pocket 12D by heating in a mold.

[0109] (2) Form the ball carcass 20D by the steps of:

[0110] (2.1) cutting out a plurality of ball panels 23D, preferably four ball panels 23D, from a piece of panel sheet.

[0111] (3) Provide the adhesive layer 31D.

[0112] (4) Dispose the ball body 10' in the ball cavity 21D of the ball carcass 20D by inflating the ball body 10D' and then adhering the ball panel 23D on the ball body 10D.

[0113] (5) After the ball body 10D is inflated, enclose the ball body 10D in the ball cavity 21D of the ball carcass 20D by adhering the edge portions of the opening 22D on the outer surface of the ball body 10D via the adhesive layer 31D such that the opening 31D is sealed to close the ball cavity 21D in a stitchless seam manner. Accordingly, the edge portions of the opening 22D are sealed by the last ball panel 23D on the ball body 10' via the adhesive layer 31D.

[0114] Accordingly, the inflatable bladder 11D is to be firstly vulcanized prior to fabric layer application of the ball pocket leaves 121D. Once the ball pocket leaves 121D are adhered onto the inflatable bladder 11D, a second time vulcanization is then performed.

[0115] In the step (3), the adhesive layer 31D is applied on the outer surface of the ball body 10D to align with the edges of the ball panels 23D such that the edge portions of the ball panels 23D are alignedly adhered to the ball body 10D along the adhesive layer 31D. Preferably, four adhesive layers 31D are formed on the outer surface of the body 10D.

[0116] Therefore, after the ball panels 23D are coupled edge-to-edge, the ball panels 23D to form the ball carcass 20D such that the ball body 10D is disposed in the ball cavity 21D through the opening 22D. The last ball panel 23D forms as a ball cover to seal at the opening 22D via the adhesive layer 31D so as to enclose the ball cavity 21D.

[0117] Accordingly, after the opening 22D is sealed by the final ball panel 23D to enclose the ball body 10D, the ball carcass 20D is treated through a final shaping process that the ball carcass 20D is disposed in a special mold with a built-in slanted edge maker at an inner molding surface. Accordingly, the slanted edge maker of the mold is pressed on the outer ball surface of the ball carcass 20D along the adjoining edge between two neighboring ball panels 23D to form the channel thereon so as to create the stitching seam effect for the ball carcass 20D. Accordingly, the grip G of the American football can be integrally formed at the ball carcass 20D at the time or after the channels of the American football are formed.

[0118] As a result, the present invention excludes the hand stitching step as the final assembling operation of the sports-

ball. Therefore, once the ball body 10, 10' is received in the ball carcass 20, 20', the opening 22, 22' can be simply sealed by the adhesive layer 31, 31'. Therefore, no hand stitching step is involved in the entire manufacturing process so as to reduce the time-consuming manufacturing procedure of the sportsball while being cost effective.

[0119] One skilled in the art will understand that the embodiment of the present invention as shown in the drawings and described above is exemplary only and not intended to be limiting.

[0120] It will thus be seen that the objects of the present invention have been fully and effectively accomplished. The embodiments have been shown and described for the purposes of illustrating the functional and structural principles of the present invention and is subject to change without departure from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.

What is claimed is:

1. A sportsball, comprising:

an inflatable ball body; and

a ball carcass having a ball cavity and an opening, wherein said ball body is received in said ball cavity for propping up said ball carcass after inflation; and

a stitchless seam arrangement aligned with said opening of said ball carcass, wherein after said ball body is disposed in said ball carcass, edge portions of said opening are adhered on an outer surface of said ball body, such that said opening is sealed to close said ball cavity for enclosing said ball body in said ball cavity of said ball carcass in a stitchless seam manner.

2. The sportsball, as recited in claim 1, wherein said stitchless seam arrangement comprises an elongated adhesive layer having a contour matching with a contour of said opening, wherein after said ball body is disposed in said ball carcass, edge portions of said opening are adhered on an outer surface of said ball body via said adhesive layer to seal said opening and to close said ball cavity for enclosing said ball body in said ball cavity of said ball carcass in a stitchless seam manner.

3. The sportsball, as recited in claim 2, wherein said adhesive layer is an elastic strip pre-applied on said outer surface of said ball body to align said opening of said ball carcass with said adhesive layer after said ball body is disposed in said ball carcass, such that said edge portions of said opening are adhered on said outer surface of said ball body through said rubber strip after heat treatment.

4. The sportsball, as recited in claim 1, wherein said ball carcass comprises a plurality of ball panels sewn with each other edge-to-edge while sections of said ball panels are remained unsewn to form said opening.

5. The sportsball, as recited in claim 3, wherein said ball carcass comprises a plurality of ball panels sewn with each other edge-to-edge while sections of said ball panels are remained unsewn to form said opening.

6. The sportsball, as recited in claim 3, wherein said adhesive layer is provided on said ball body to align along unsewn edges of said ball panels after said ball body is disposed in said ball carcass.

7. The sportsball, as recited in claim 5, wherein said adhesive layer is provided on said ball body to align along unsewn edges of said ball panels after said ball body is disposed in said ball carcass.

8. The sportsball, as recited in claim 2, wherein said ball carcass comprises a plurality of ball panels alignedly attaching on said ball body in an edge-to-edge manner, wherein said adhesive layer is provided on said ball body along edge portions of said ball panels such that said edge portions of said ball panels are alignedly attached along said adhesive layer to form said ball carcass for enclosing said ball body.

9. The sportsball, as recited in claim 3, wherein said ball carcass comprises a plurality of ball panels alignedly attaching on said ball body in an edge-to-edge manner, wherein said adhesive layer is provided on said ball body along edge portions of said ball panels such that said edge portions of said ball panels are alignedly attached along said adhesive layer to form said ball carcass for enclosing said ball body.

10. The sportsball, as recited in claim 8, wherein said adhesive layer has an outwardly protruding line radially protruded from said ball body to form an edge guider to align with a connection line between two edges of said adjacent ball panels.

11. The sportsball, as recited in claim 9, wherein said adhesive layer has an outwardly protruding line radially protruded from said ball body to form an edge guider to align with a connection line between two edges of said adjacent ball panels.

12. The sportsball, as recited in claim 1, wherein said ball carcass is made of durable material selected from the group consisting of leather, TPU, PU, PVC, TPE, EVA, rubber, and fabrics.

13. The sportsball, as recited in claim 7, wherein said ball carcass is made of durable material selected from the group consisting of leather, TPU, PU, PVC, TPE, EVA, rubber, and fabrics.

14. The sportsball, as recited in claim 11, wherein said ball carcass is made of durable material selected from the group consisting of leather, TPU, PU, PVC, TPE, EVA, rubber, and fabrics.

15. The sportsball, as recited in claim 1, wherein said ball body comprises an inflatable bladder for being popped by air inflation and an exterior web layer, which is integrally attached on an outer surface of said inflatable bladder, comprises at least an elongated winding thread evenly wound around said outer surface of said inflatable bladder such that said web layer embraces said inflatable bladder for resisting stress and impact force applied to said inflatable bladder.

16. The sportsball, as recited in claim 7, wherein said ball body comprises an inflatable bladder for being popped by air inflation and an exterior web layer, which is integrally attached on an outer surface of said inflatable bladder, comprises at least an elongated winding thread evenly wound around said outer surface of said inflatable bladder such that said web layer embraces said inflatable bladder for resisting stress and impact force applied to said inflatable bladder.

17. The sportsball, as recited in claim 11, wherein said ball body comprises an inflatable bladder for being popped by air inflation and an exterior web layer, which is integrally attached on an outer surface of said inflatable bladder, comprises at least an elongated winding thread evenly wound around said outer surface of said inflatable bladder such that said web layer embraces said inflatable bladder for resisting stress and impact force applied to said inflatable bladder.

18. The sportsball, as recited in claim 1, wherein said ball body comprises an inflatable bladder for being popped by air inflation and a construction ball pocket, which is made of fabric material and constructed to have a true roundness

shape, having an interior receiving cavity defined therein to sealedly receive said inflatable bladder, such that said construction ball pocket is arranged to retain a true roundness shape of said inflatable bladder after said inflatable bladder is inflated.

19. The sportsball, as recited in claim 7, wherein said ball body comprises an inflatable bladder for being popped by air inflation and a construction ball pocket, which is made of fabric material and constructed to have a true roundness shape, having an interior receiving cavity defined therein to sealedly receive said inflatable bladder, such that said construction ball pocket is arranged to retain a true roundness shape of said inflatable bladder after said inflatable bladder is inflated.

20. The sportsball, as recited in claim 11, wherein said ball body comprises an inflatable bladder for being popped by air inflation and a construction ball pocket, which is made of fabric material and constructed to have a true roundness shape, having an interior receiving cavity defined therein to sealedly receive said inflatable bladder, such that said construction ball pocket is arranged to retain a true roundness shape of said inflatable bladder after said inflatable bladder is inflated.

21. A method of manufacturing a sportsball, comprising the steps of:

- (a) providing an inflatable ball body and a ball carcass which has a ball cavity and an opening;
- (b) providing a stitchless seam arrangement at said opening of said ball carcass;
- (c) disposing said ball body in said ball cavity of said ball carcass; and
- (e) after said ball body is inflated, enclosing said ball body in said ball cavity of said ball carcass by adhering edge portions of said opening on an outer surface of said ball body via said stitchless seam arrangement such that said opening is sealed to close said ball cavity in a stitchless seam manner.

22. The method, as recited in claim 21, wherein said stitchless seam arrangement comprises an elongated adhesive layer which has a contour matching with a contour of said opening of said ball carcass.

23. The method as recited in claim 22 wherein, in the step (b), said adhesive layer is applied on said outer surface of said ball body to align said opening of said ball carcass with said adhesive layer after said ball body is disposed in said ball carcass.

24. The method as recited in claim 22 wherein, in the step (a), said ball carcass is made by the steps of:

- providing a plurality of ball panels; and
- sewing said ball panels with each other edge-to-edge while sections of said ball panels are remained unsewn to form said opening, such that said ball body is disposed in said ball carcass through said unsewn edges of said ball panels.

25. The method as recited in claim 23 wherein, in the step (a), said ball carcass is made by the steps of:

- providing a plurality of ball panels; and
- sewing said ball panels with each other edge-to-edge while sections of said ball panels are remained unsewn to form said opening, such that said ball body is disposed in said ball carcass through said unsewn edges of said ball panels.

26. The method, as recited in claim **24**, wherein said adhesive layer is provided on said ball body to align along said unsewn edges of said ball panels after said ball body is disposed in said ball carcass.

27. The method, as recited in claim **25**, wherein said adhesive layer is provided on said ball body to align along said unsewn edges of said ball panels after said ball body is disposed in said ball carcass.

28. The method as recited in claim **22** wherein, in the step (a), said ball carcass is made by the steps of:

providing a plurality of ball panels; and
adhering said ball panels on said outer surface of said ball body edge-to-edge, wherein said adhesive layer is provided on said ball body along edge portions of said ball panels such that said edge portions of said ball panels are alignedly attached along said adhesive layer to form said ball carcass for enclosing said ball body.

29. The method as recited in claim **23** wherein, in the step (a), said ball carcass is made by the steps of:

providing a plurality of ball panels; and
adhering said ball panels on said outer surface of said ball body edge-to-edge, wherein said adhesive layer is provided on said ball body along edge portions of said ball panels such that said edge portions of said ball panels are alignedly attached along said adhesive layer to form said ball carcass for enclosing said ball body.

30. The method, as recited in claim **28**, wherein said adhesive layer has an outwardly protruding line radially protruded from said ball body to form an edge guider to align with a connection line between two edges of said adjacent ball panels.

31. The method, as recited in claim **29**, wherein said adhesive layer has an outwardly protruding line radially protruded from said ball body to form an edge guider to align with a connection line between two edges of said adjacent ball panels.

32. The method, as recited in claim **21**, wherein said ball carcass is made of durable material selected from the group consisting of leather, TPU, PU, PVC, TPE, EVA, rubber, and fabrics.

33. The method, as recited in claim **27**, wherein said ball carcass is made of durable material selected from the group consisting of leather, TPU, PU, PVC, TPE, EVA, rubber, and fabrics.

34. The method, as recited in claim **31**, wherein said ball carcass is made of durable material selected from the group consisting of leather, TPU, PU, PVC, TPE, EVA, rubber, and fabrics.

35. The method as recited in claim **21** wherein, in the step (a), said ball body is made by the steps of:

providing an inflatable bladder for being popped by air inflation; and
evenly winding at least an elongated winding thread around an outer surface of said inflatable bladder to form an exterior web layer integrally attached on said outer surface of said inflatable bladder, such that said web

layer embraces said inflatable bladder for resisting stress and impact force applied to said inflatable bladder.

36. The method as recited in claim **27** wherein, in the step (a), said ball body is made by the steps of:

providing an inflatable bladder for being popped by air inflation; and

evenly winding at least an elongated winding thread around an outer surface of said inflatable bladder to form an exterior web layer integrally attached on said outer surface of said inflatable bladder, such that said web layer embraces said inflatable bladder for resisting stress and impact force applied to said inflatable bladder.

37. The method as recited in claim **31** wherein, in the step (a), said ball body is made by the steps of:

providing an inflatable bladder for being popped by air inflation; and

evenly winding at least an elongated winding thread around an outer surface of said inflatable bladder to form an exterior web layer integrally attached on said outer surface of said inflatable bladder, such that said web layer embraces said inflatable bladder for resisting stress and impact force applied to said inflatable bladder.

38. The method as recited in claim **21** wherein, in the step (a), said ball body is made by the steps of:

providing an inflatable bladder for being popped by air inflation; and

forming a construction ball pocket, which is made of fabric material and constructed to have a true roundness shape, having an interior receiving cavity defined therein to sealedly receive said inflatable bladder, such that said construction ball pocket is arranged to retain a true roundness shape of said inflatable bladder after said inflatable bladder is inflated.

39. The method as recited in claim **27** wherein, in the step (a), said ball body is made by the steps of:

providing an inflatable bladder for being popped by air inflation; and

forming a construction ball pocket, which is made of fabric material and constructed to have a true roundness shape, having an interior receiving cavity defined therein to sealedly receive said inflatable bladder, such that said construction ball pocket is arranged to retain a true roundness shape of said inflatable bladder after said inflatable bladder is inflated.

40. The method as recited in claim **31** wherein, in the step (a), said ball body is made by the steps of:

providing an inflatable bladder for being popped by air inflation; and

forming a construction ball pocket, which is made of fabric material and lo constructed to have a true roundness shape, having an interior receiving cavity defined therein to sealedly receive said inflatable bladder, such that said construction ball pocket is arranged to retain a true roundness shape of said inflatable bladder after said inflatable bladder is inflated.

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