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(71) Applicant: **Swati, Basu**
400 601 Maharashtra (IN)

(72) Inventor: **Swati, Basu**
400 601 Maharashtra (IN)

(74) Representative: **Sanger, Phillip Simon**
Vault IP Limited
Cavendish House
39 Waterloo Street
Birmingham B2 5PP (GB)

(54) AN INFLATABLE BALL BLADDER WITH TWO DUAL FUNCTION VALVES AND A WIRED RECHARGEABLE ELECTRONIC COMPONENT

(57) The invention relates to an inflatable ball bladder with two dual function valves (3) and a wired rechargeable electronic component (5). It provides an elastic cable (1) anchor mechanism to encapsulate an electronic device at the center of the bladder. The bladder includes an electrical connection in communication with the electronic device for charging the device as well as for exchanging data. The electronic device (5) comprises a sensor to sense speed, location, acceleration, and trajectory of the ball.

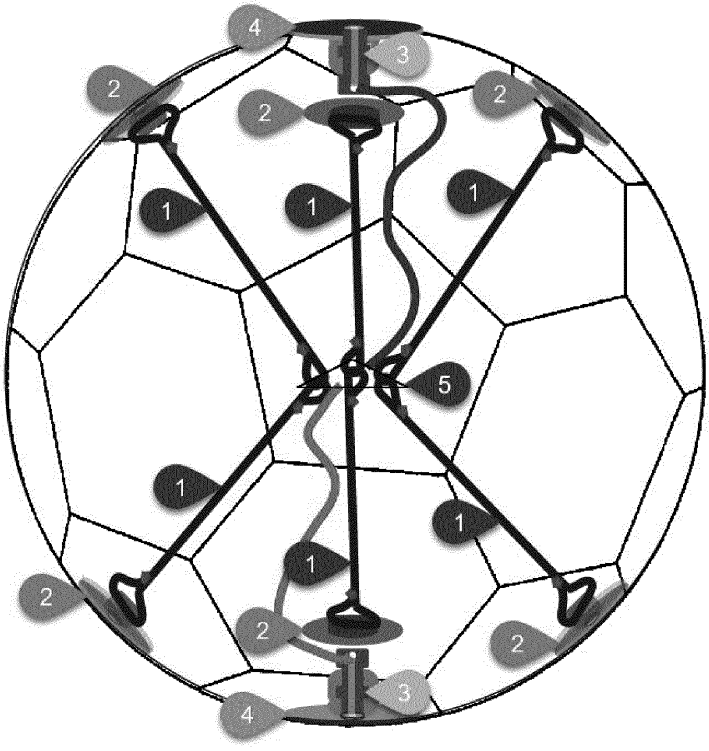

Fig. 1: Schematic Plan View of a Ball Bladder

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Description

FIELD OF THE INVENTION:

[0001] The present invention relates to a bladder for an inflatable ball, in particular a soccer ball.

[0002] More particularly, the present invention relates to encapsulation of an electronic component at the center of the bladder using an elastic cable anchor mechanism.

[0003] More particularly, the present invention relates to modified valves acting as air retention valve as well as charging connector.

BACKGROUND OF THE INVENTION:

[0004] With the advent of digital age and advancing technologies, expectations of people have increased with respect to the finer and deeper analysis of sports and various parameters of sports. For the viewers of sports such as Soccer, it is highly desirable to provide additional information in order to make them curious and to keep them engaged. This additional information and its analysis are desirable for the athletes, players, trainers and medical practitioners.

[0005] Considering the desirability, precise set of information should be obtained and hence several methods have been developed recently by way of which a sensor is introduced in the ball. This sensor emits signals which are captured by the receivers in order to provide desired information about the ball e.g. position and velocity of the ball at any random point while the game is being played.

[0006] The most critical requirement for optimal operation of such tracking system is a reliable and permanent arrangement of a sensor within the ball. Here lies a considerable technical problem, particularly in the case of balls with an inflatable bladder, such as a soccer ball. Suspension of the sensor should cushion all of the mechanical loads arising under deformations or accelerations of the ball to avoid damage to the electronic components and bladder of the ball. Furthermore, the inserted sensor should not influence the mechanical properties and the trajectory of the ball itself. Moreover, after installation of the sensor, there is another concern of charging the sensor while it is inside the ball.

[0007] So far, the solutions devised to this technical problem have focused on to the positioning of the sensor or any other electronic device within the bladder of the ball. In some of the prior arts, the electronic device is suspended within the ball with several elastic wires. Abovementioned arrangements are disclosed in the applications DE 20004174 U1 and DE 10029459 A1, and in PCT application no. WO 97/20449.

[0008] However, these already offered solutions have many disadvantages. It is very difficult and requires a multitude of manual process steps to produce the bladders and the corresponding balls. None of the prior arts teach the usage of butyl as the compound to manufacture bladder. The existing state of the art neither suggest a wired charging mechanism while the sensor remains suspended at the center nor suggest the usage of the valve for wired charging and air pumping.

[0009] Accordingly, the present invention describes an apparatus and a method for charging and air pumping of bladder of an inflatable ball.

OBJECT OF INVENTION

[0010] The primary object of the invention is to provide an apparatus for holding the electronic component within the sphere of the bladder of an inflatable ball that overcomes shortcomings of the prior arts;

[0011] Another object of the invention is to encapsulate an electronic component at the center of the bladder using an elastic cable anchor mechanism;

[0012] Further object of the invention is to provide wired charging of electronic component encapsulated within the bladder;

[0013] Another object of the invention is to provide a dual function valve which functions as an air retention valve as well as a charging connector;

[0014] Further object of the invention is to provide an electrical connection with in communication with the electronic component for exchanging data.

SUMMARY OF THE INVENTION

[0015] Accordingly, the present invention an inflatable ball bladder with a dual function valve and a wired rechargeable electronic component provides an elastic cable anchor mechanism to encapsulate an electronic component at the center of the bladder. The bladder can include an electrical connection in communication with the electronic device for charging the device and/or exchanging data. The present invention provides a well-balanced bladder of an inflatable ball owing to two valves positioned at opposite poles. The present invention does not deviate from the regular football/soccer butyl bladder manufacturing process drastically. The present invention allows wired charging and in turn helps in reducing the weight of the sensor by discounting the wireless module in the sensor. This leads to lesser weight of the sensor which allows the sensor to be placed at the center and be charged and air-pumped using both valves while the performance of the ball remains intact.

BRIEF DESCRIPTION OF DRAWINGS

[0016] In the following description, various embodiments of the present invention are described with reference to the following drawings, in which:

Fig. 1 is a schematic plan view of a bladder in accordance with one embodiment of the invention;

Fig. 2 is a schematic perspective view of cables that

are locked to the anchor plugs on one side and electronic component on the other side in accordance with one embodiment of the invention;

Fig. 3 is a schematic perspective view of an anchor plug;

Fig. 4 is a schematic front view and side view of a dual function valve;

Fig. 4(b) is a schematic side view and top view of a hollow metal pipe;

Fig. 5 is a diagrammatic description of the process of manufacture of an inflatable ball bladder with dual function valve and wired rechargeable electronic device.

DETAILED DESCRIPTION

[0017] In the following description, various embodiments of the present invention are described with reference to a soccer ball, wherein an electronic component is positioned in the center of the bladder for tracking the motion and relay the results for further analysis. However, the present invention can also be used in other balls with an inflatable bladder, such as handball, basket ball, rugby ball or volleyball.

[0018] Referring to Fig. 1 of drawings, an overall view of a bladder of a soccer ball made from butyl sheet is shown. Housing component (4) for the valve on geometrically opposite ends of the bladder; dual function valve (3) which can be used for filling air in the bladder with a pump air pin and charging mechanism with similarly shaped charging pin.

[0019] Referring to Fig. 2 of drawings, a schematic view of an anchor plug (2) is shown. The Anchor Plugs are positioned between 30mm and 70mm from the center of the valve on both poles of the butyl bladder. These anchor plugs are made of latex, rubber, or butyl which bonds homogeneously to the bladder. This anchor plug has a slot to pass the polymer cable through and lock itself to the Plug in order to restrict any movement. This structure makes the plugs light and strong which can have heavy tolerance on kicking impact on the ball.

[0020] Referring to Fig. 3 of drawings, a schematic view of a polymer/Nitrile/Butyl cable (1) is depicted which holds the electronic device from six angles inside the bladder. The cable has an exact length that is required to hold the electronic device to the inner walls of the butyl bladder. The dimensions are such that the polymer cables are full stretched but not tensed in order to maintain fully inflated state up to the limit required for a playing the game. This structure is critical to the electronic device as it does not allow the sensor to wobble around the interior of the butyl bladder. The polymer/Nitrile/Butyl cable also contains two push locks on opposite sides of the cable plane which locks itself to be held tightly between the anchor plugs (2) and electronic device (5).

[0021] Referring to Fig. 4 of drawings, a schematic front view and side view of a dual function valve (3) respectively is shown. The bottom of the valve is extended to create a slot for a metallic hollow pipe [Fig. 4(b)] with an opening at the mid-section and two sides.

[0022] Fig. 4(b) describes a schematic view of a hollow metal pipe is shown There is a pin hole of about 2 mm diameter from the top opening into the pipe's mid-section hole. This pinhole is inwards compression to block any air from going out once the air/charging Pin is pulled out. Particularly, when the air/charging pin is pulled out, the pinhole is automatically shut due to inward pressure of rubber/butyl/latex from the sides.

[0023] The metallic hollow pin with these dimensions is pushed into the hole of the valve from the side with the mid-section hole being in sync with the pinhole opening inside the valve. This arrangement serves two purposes - (i) air pin goes straight through the pinhole of the valve into the mid-section hole of the metallic pipe. Upon pumping, the air passes through to the butyl bladder and fills it up. Once the Air Pin is pulled out, the pinhole of the valve will automatically close hence retaining the air inside the bladder. (ii) Charging Pin with same cross section diameter as of the Air Pin goes inside the valve pinhole and through to the metallic pipe mid-section hole and touches the bottom part of the pipe [Fig. 4(a)]. This establishes connection with the electronic device's circuit and thus charges the battery. The dimensions of the valve & pin are precise enough to enable it to maintain balance of the bladder and performance of the ball remains intact.

[0024] Referring to Fig. 5, the process of manufacturing the bladder of an inflatable ball with dual function valve and wired rechargeable electronic device is shown.

[0025] In the preferred embodiments of the invention, the process uses butyl sheets with minimum dimensions of 640mm x 320mm in the process of manufacture of the inflatable ball bladder.

[0026] In another embodiment of the invention, the inflatable ball bladder can use latex, rubber, synthetic leather, other polymeric material or any combination of these materials.

[0027] In the conventional procedure, a folding toolset is used to structure folds on the butyl sheets, which when cut and sealed from sides produce an uncured bladder. This process also creates a hole from one side of the bladder which is used for fitting the Housing Component.

[0028] The present invention produces eight holes at pre-determined positions on the sheet that is being used to manufacture inflatable ball bladder. Fig. 5 describes the locations of these eight holes. The sheet is divided into eight equal parts. The black and white round dots are the points where the holes are created on the butyl sheets. The distance between the holes is as shown in the Fig. 5(a).

[0029] The next step involves insertion of an electronic device within the bladder at pre-determined position. The electronic device is locks up the six anchor cables which

together is be called as the 'Sensor Component'.

[0030] In one embodiment of the invention, the Sensor Component is placed inside the folds of the butyl sheet during the usual folding mechanism which is described earlier in the specification.

[0031] In an alternate embodiment of the invention, the Sensor Component is pushed into the uncured bladder through one of the eight holes after the compression and sealing of the folded sheet is completed.

[0032] The six anchor cables' (2) loose ends are pulled out of the six holes which are around the two Valve Housing holes. Two Wire ends (pre-soldered to Metallic Pipes), which are connected to the Sensor are pulled out of each of the two Valve Housing holes on two opposite poles of the bladder.

[0033] The loose ends of the anchor cable are then looped into the Anchor Plugs and locked. Two Metallic Pipes are pushed into the two Valve Holes. All valves are then patched to the outside body of the uncured bladder layer with industrial rubber bonding glue. The uncured bladder is inserted in a custom blow injection moulding machine and cured under high temperature and pressure converting it to a cured bladder.

Claims

1. An inflatable ball bladder comprising:

i. a folding sheet material;
ii. an anchor plug (2);
iii. an elastic cable (1);
iv. a housing component for the valve (4);
v. a dual function valve (3);
vi. a hollow metal pipe;
vii. an electronic device positioned at the center of the bladder (5);
viii. a battery carried by the ball;
ix. an electrical connection in communication with the electronic device.

2. The folding sheet material as claimed in Claim 1, wherein the sheet material is butyl, latex, rubber, synthetic leather, polymeric material and any combination of these materials.

3. The anchor plug (2) as claimed in Claim 1, wherein the plug is positioned between 30mm and 70mm from the center of the valve on both poles of the bladder.

4. The elastic cable (1) as claimed in Claim 1, wherein the cable has two push locks on opposite sides of the cable plane which lock itself to be held tightly between the anchor plugs and electronic device.

5. The inflatable ball bladder as claimed in Claim 1, wherein the housing component for the valve (4) is placed on geometrically opposite ends of the bladder.

6. The inflatable ball bladder as claimed in Claim 1, wherein the bottom of the valve (3) is extended to form a slot for a metallic hollow pipe with an opening at the mid-section and two sides.

7. The inflatable ball bladder as claimed in Claim 1, wherein the hollow metal pipe has an inward compression acting as a pin hole of about 2 mm diameter from the top opening into the pipe's mid-section hole.

8. The inflatable ball bladder as claimed in Claim 1, wherein the electronic device (5) locks up six anchor cables (1).

9. The inflatable ball bladder as claimed in Claim 1, wherein the electronic device (5) is configured to receive and send an electronic signal.

10. The inflatable ball bladder as claimed in Claim 1, wherein the electronic device (5) has means to establish an electrical communication for charging the electronic device and exchanging data.

11. The electronic device (5) as claimed in Claim 1, wherein the device comprises at least one sensor to sense speed, location, acceleration, and trajectory of the ball.

12. A method of production of inflatable ball bladder comprising:

i. marking folds on a butyl sheet;
ii. structuring eight holes on the butyl sheet;
iii. inserting a sensor component that is locked to six cables within the butyl sheet fold;
iv. creating the folds and heat compressing the edges to form an uncured butyl bladder;
v. pulling out the end of cables through the holes discounting the two holes on two poles of the bladder;
vi. looping the ends of the cable into an anchor plug;
vii. locking the ends of the cable into the anchor plug;
viii. pulling out the ends of a wire through each of the holes at the poles of the bladder;
ix. inserting the metallic pipes attached to the wire ends into two housing holes;
x. patching the plugs and the valves with the outside body of the uncured butyl bladder sheet with a bonding glue;
xi. inserting the uncured butyl bladder into a custom blow injection molding machine and curing at temperature between 140°C - 160°C and at pressure between 8 - 14 Pounds per Square

Inch.

13. The sensor component as claimed in Claim 12, wherein the component comprises of an electronic device (5) with one end of six anchor cables (1) locked up on it.

14. The insertion of the sensor component in the butyl sheet fold as claimed in Claim 12, wherein the sensor component is placed inside the folds of the butyl sheet before the folding process is initiated.

15. The insertion of the sensor component in the butyl sheet fold as claimed in Claim 12, wherein the sensor component is pushed into an uncured bladder through one of the eight holes after the compression and sealing of the folded sheet is completed.

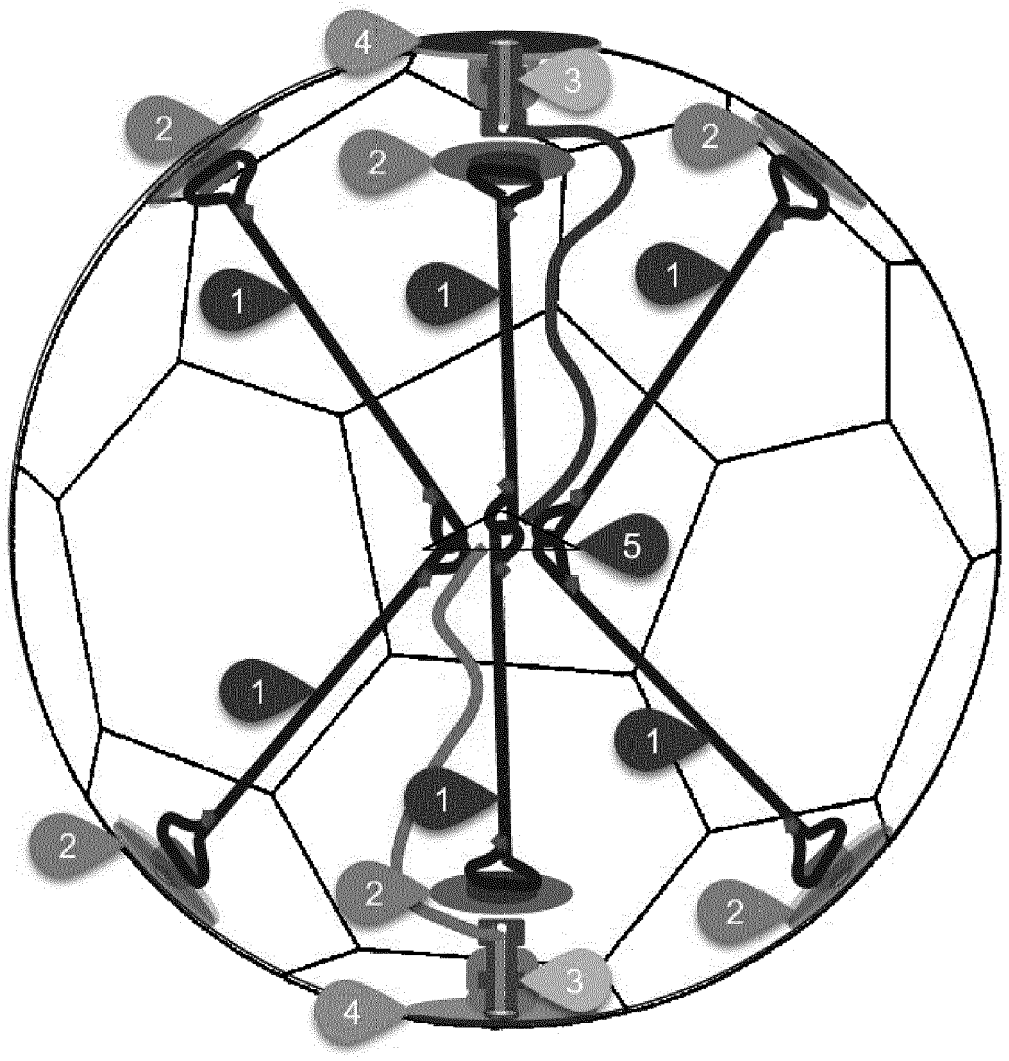

Fig. 1: Schematic Plan View of a Ball Bladder

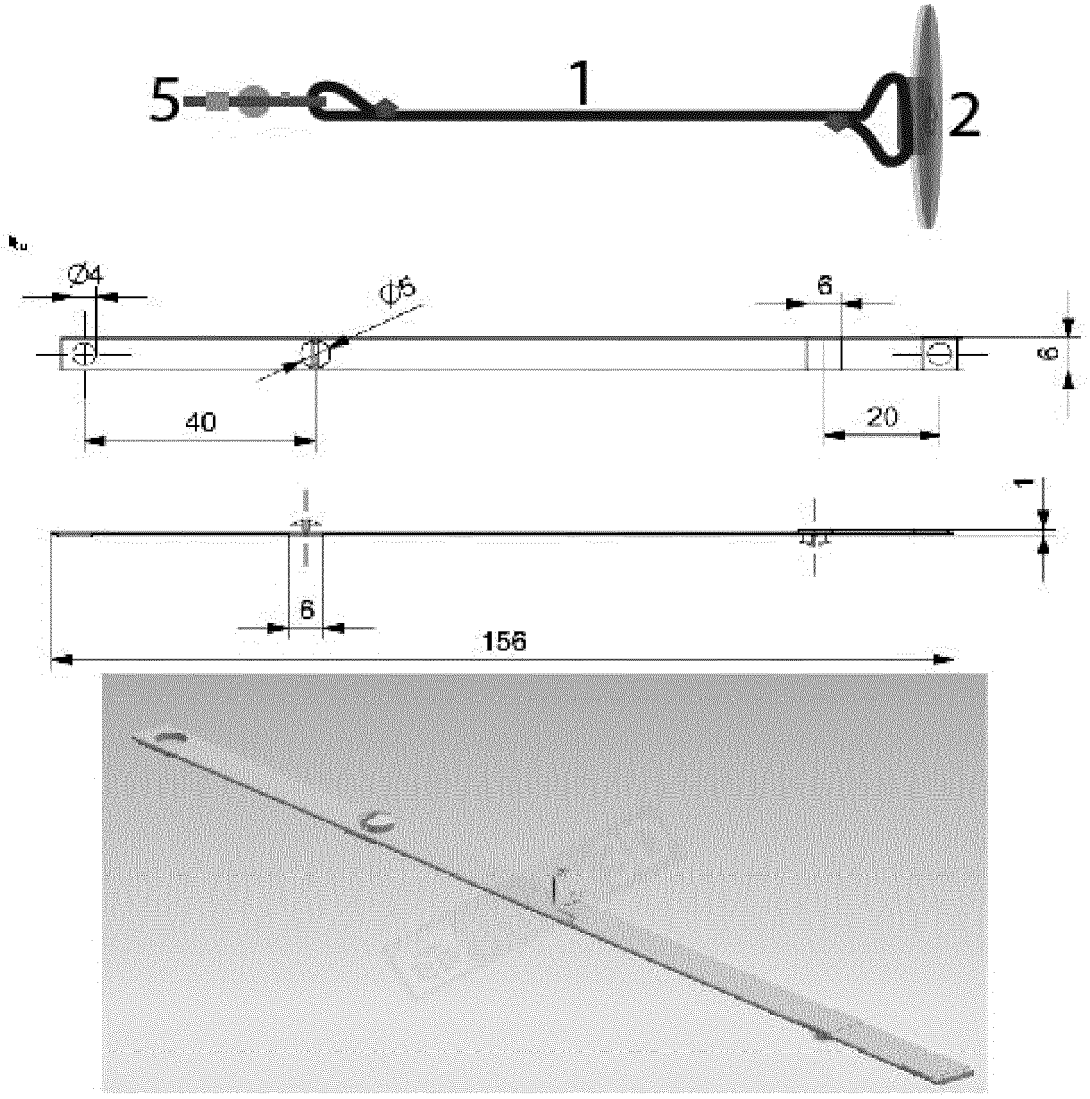

Fig. 2: Schematic Perspective View of cables that are locked to the anchor plugs on one side and electronic component on the other side

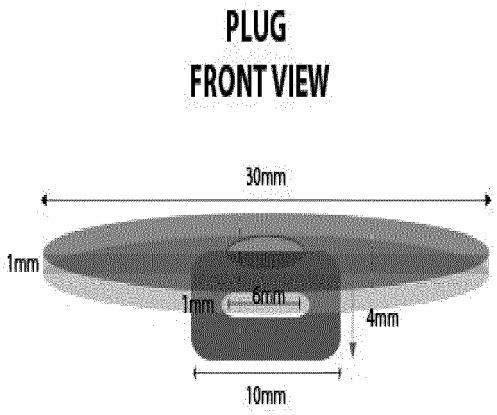

Fig. 3: Schematic Perspective Front View of an anchor plug

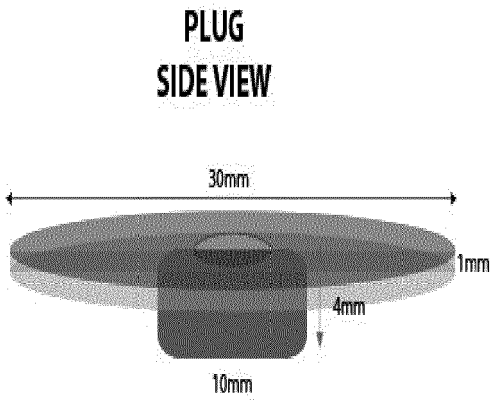

Fig. 3(a): Schematic Perspective Side View of an anchor plug

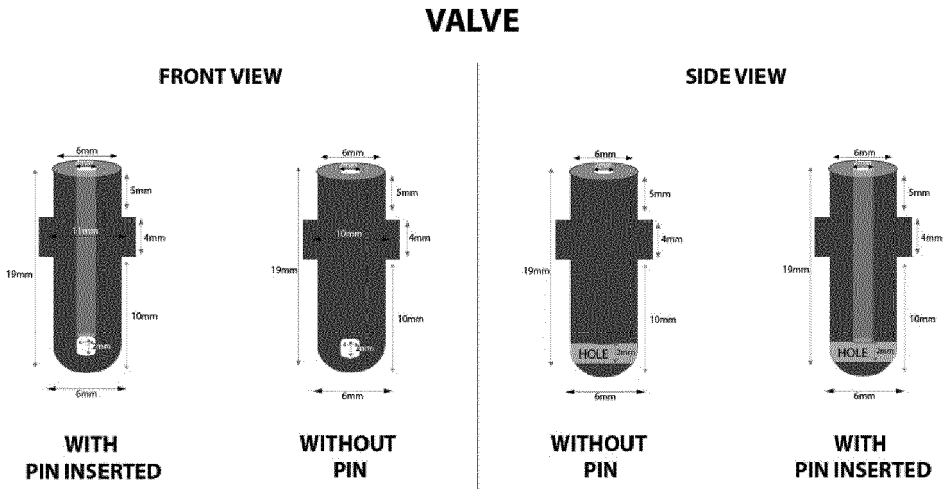

Fig. 4: Schematic Front and Side View of a Dual Function Valve with and without Inserted Pin

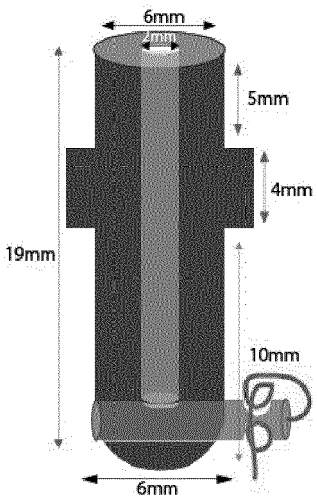

Fig. 4(a)

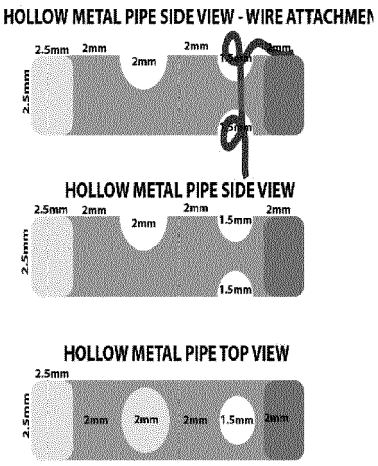

Fig. 4(b)

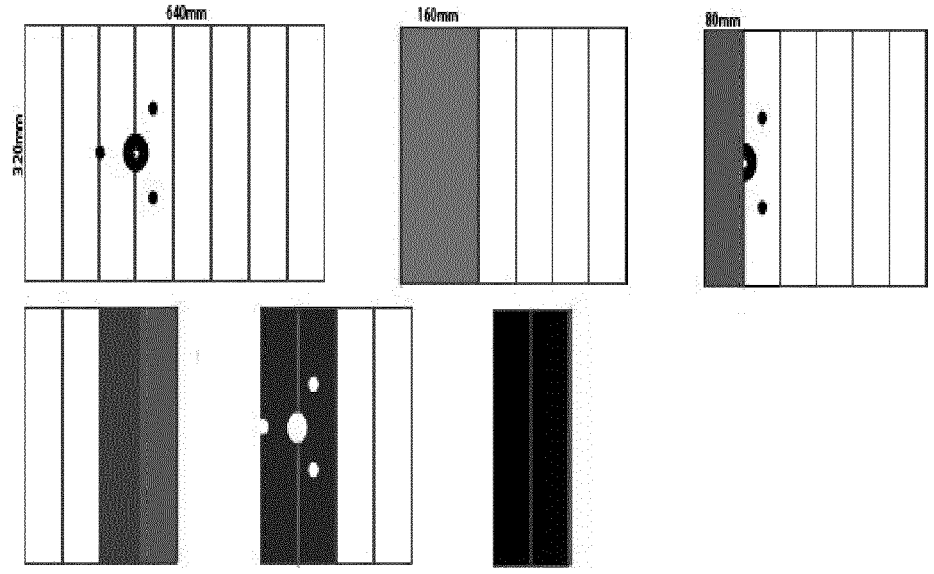

Fig. 5: Diagrammatic description of the process of manufacture of an inflatable ball bladder.

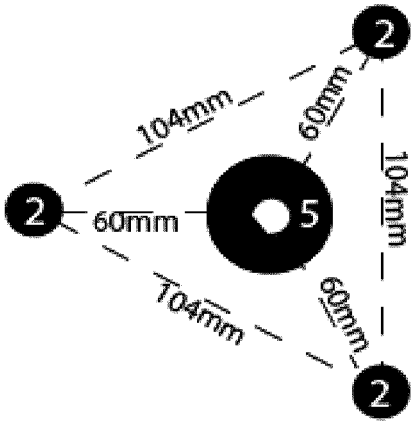

Fig. 5(a)

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Application Number
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