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(54) **ELASTIC SOLID BALL STRUCTURE**

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(57) **ABSTRACT**

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An elastic solid ball structure disclosed in the present invention consists of at least a thermoplastic polyurethane foam sphere center formed from thermoplastic polyurethane foam; and a first adhesive layer, a first spherical lamina, a second adhesive layer, and a second spherical lamina sequentially disposed on the external surface of the thermoplastic polyurethane foam sphere center; wherein the overall diameter of the elastic solid ball structure is 8 cm~26 cm. Moreover, at least one surface of the second spherical lamina can be additionally provided with printed layers. Accordingly, the aforementioned structural design provides the present invention with advantages including design originality, good elasticity, a long serviceable life, permanently dispensing with the need to inflate, and eliminating the need to re-inflate, as well as saving on the need to purchase an inflating device.

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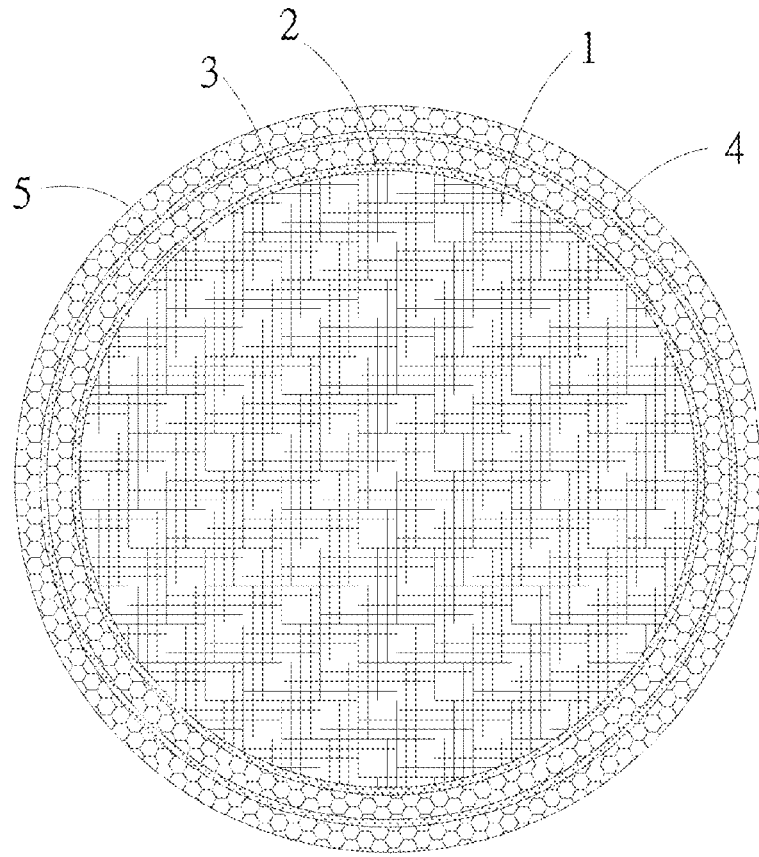
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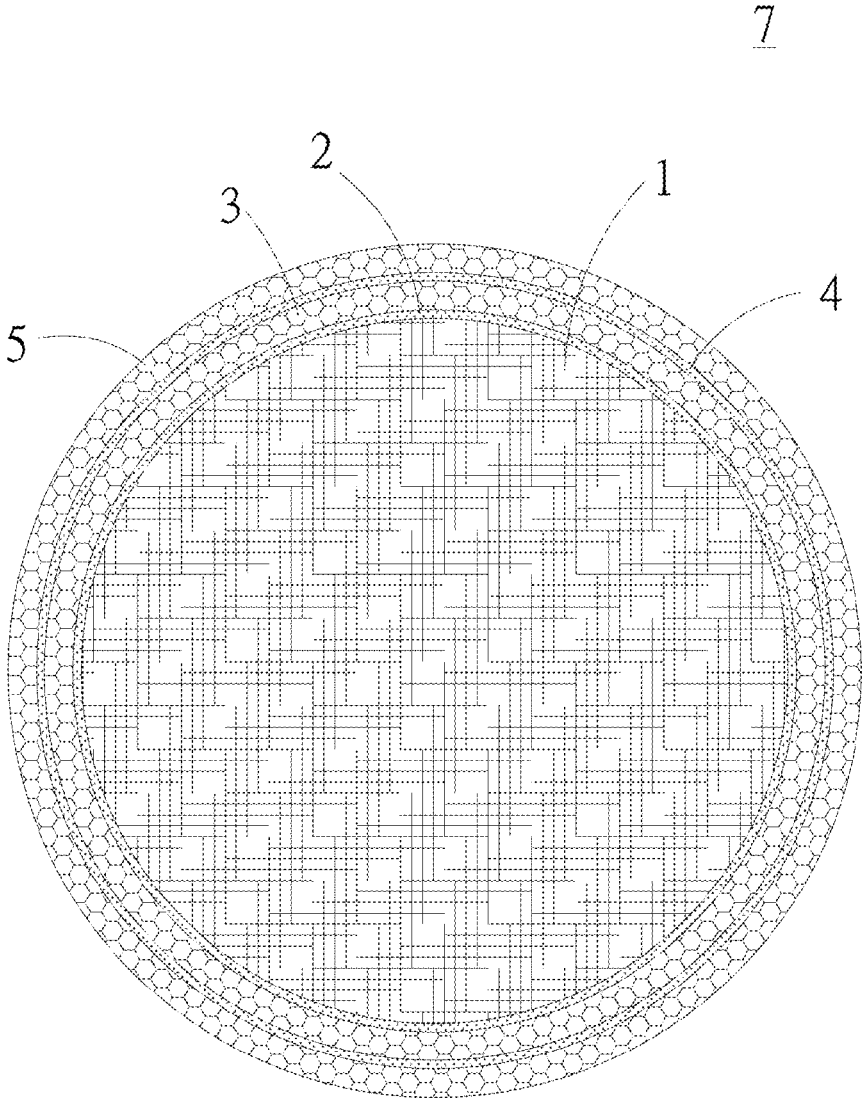


FIG.1

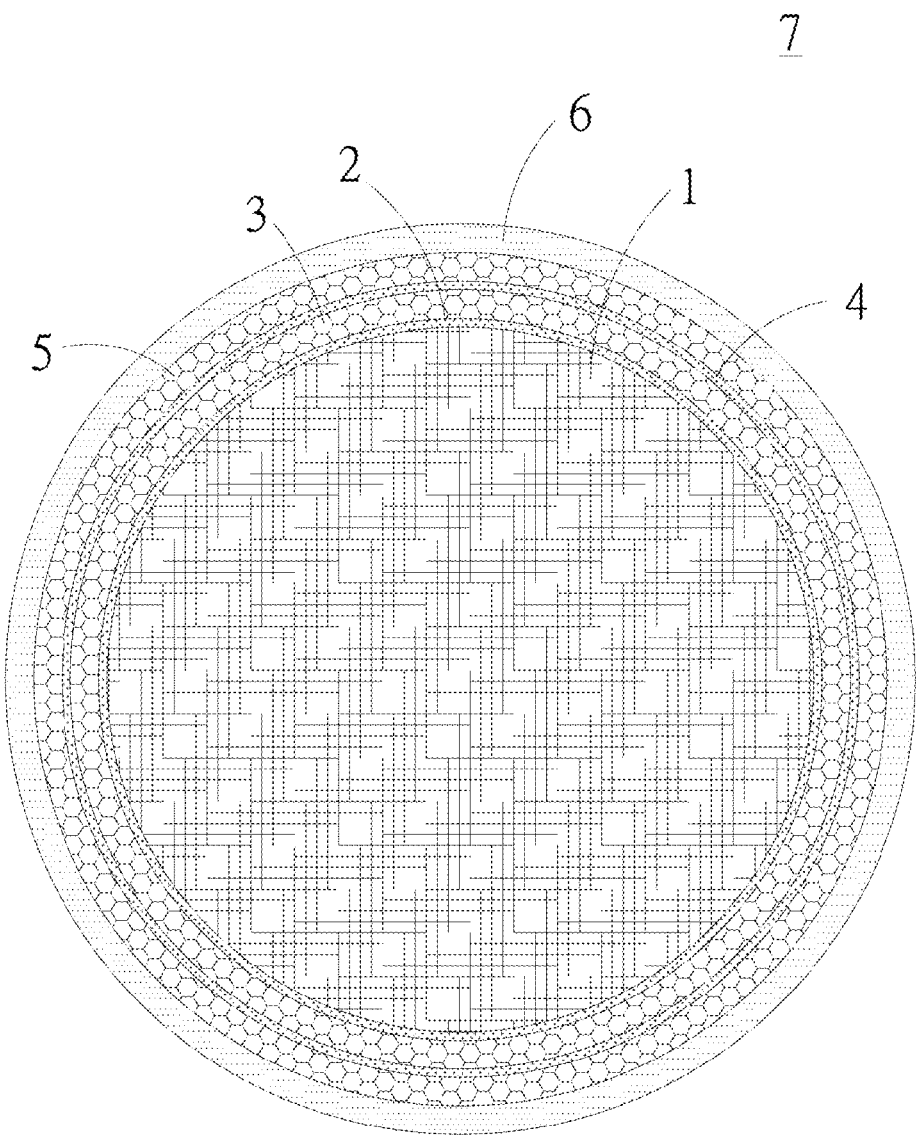


FIG.2

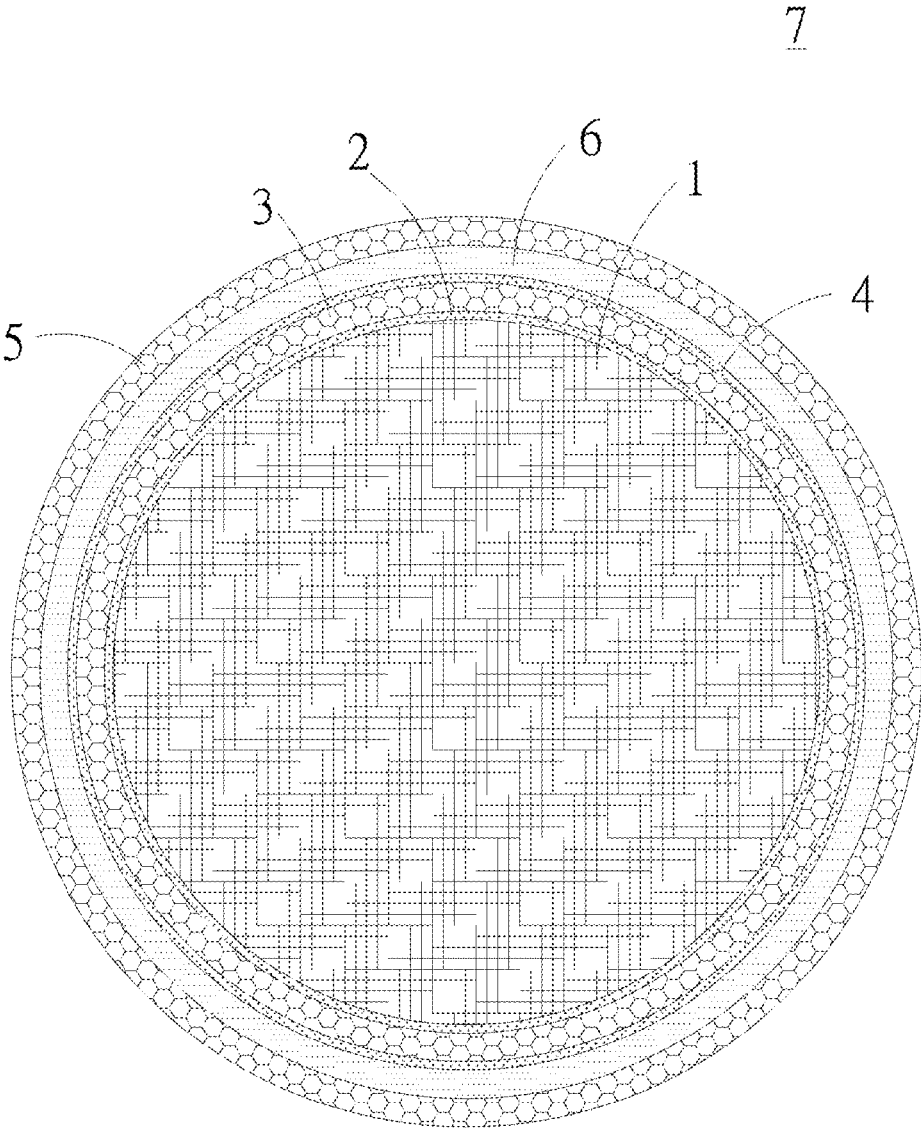


FIG.3

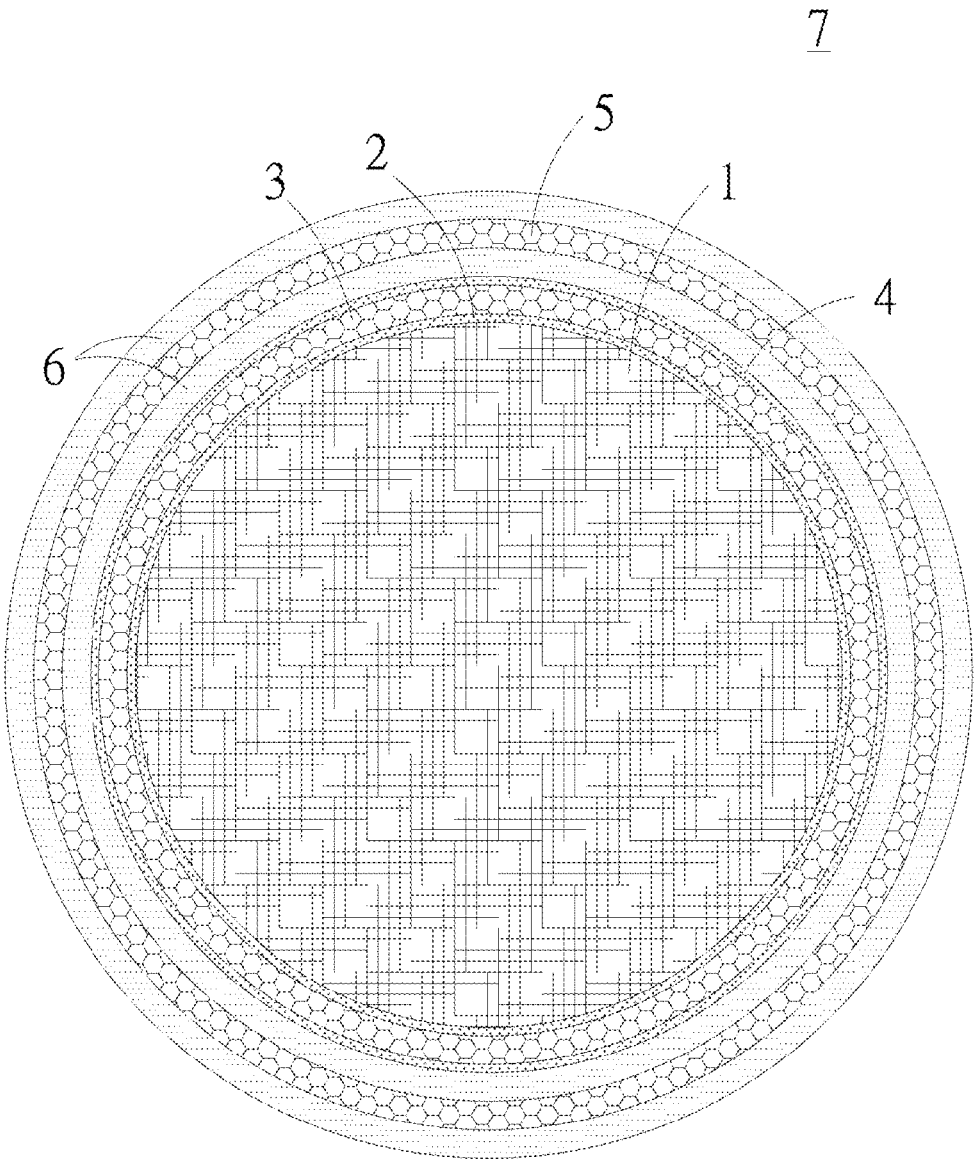


FIG.4

ELASTIC SOLID BALL STRUCTURE

BACKGROUND OF THE INVENTION

[0001] (a) Field of the Invention

[0002] The structure of the present invention relates to an elastic solid ball structure, and more particularly relates to an elastic solid ball structure having advantages including good elasticity, a long serviceable life, permanently dispensing with the need to inflate, and eliminating the need to re-inflate.

[0003] (b) Description of the Prior Art

[0004] The various types of inflatable spherical bodies, such as volleyballs, footballs, and basketballs, usually comprise a laminated structure that combines a body case, a limiting structure, and a bladder. The body case forms the outer layer of the spherical body, and is generally formed from durable, wear resistant material. The limiting structure forms the middle layer of the spherical body, and is fixedly positioned between a bladder and the body case to limit expansion of the bladder. In general, the bladder has an inflatable spherical body that is positioned inside the limiting structure to provide an inner layer of the spherical body. In order to facilitate inflation (i.e., inflating with air), the bladder usually includes a one-way inflation valve that extends through the limiting structure and the body case, thereby enabling inflation of the bladder from the exterior of the spherical body.

[0005] The aforementioned characteristics of inflatable hollow spherical bodies are formed at the same time during production of the entire spherical body. The inflation nozzle is a relatively complex one-way inflation valve structure, which causes the entire cost of the inflatable spherical body to be relatively high. Moreover, because such inflatable spherical bodies are hollow, they have high resilience when struck, as well as being resistant to wear. However, after being used for a period of time, the air inside will naturally leak out, resulting in the spherical body losing its elasticity, and thus requiring the need for an inflating tool to regularly repeat inflation of the spherical body. Accordingly, inflatable spherical bodies of the prior art are inconvenient in use.

SUMMARY OF THE INVENTION

[0006] The technical problems resolved by the structure of the present invention enable providing an elastic solid ball structure having advantages including good elasticity, a long serviceable life, permanently dispensing with the need to inflate, and eliminating the need to re-inflate.

[0007] The technological means adopted in the present invention are as described below.

[0008] According to the object of the structure of the present invention, an elastic solid ball structure is provided that comprises at least: a thermoplastic polyurethane foam sphere center formed from thermoplastic polyurethane foam; and a first adhesive layer, a first spherical lamina, a second adhesive layer, and a second spherical lamina sequentially disposed on the external surface of the thermoplastic polyurethane foam sphere center.

[0009] According to the object of the structure of the present invention, an elastic solid ball structure is provided that comprises at least: a thermoplastic polyurethane foam sphere center formed from thermoplastic polyurethane foam; and a first adhesive layer, a first spherical lamina, a second adhesive layer, and a second spherical lamina

sequentially disposed on the external surface of the thermoplastic polyurethane foam sphere center; wherein the diameter of the thermoplastic polyurethane foam sphere center is 11 cm~25 cm, the thickness of the first spherical lamina is 1 mm~5 mm, the thickness of the second spherical lamina is 0.1 mm~0.25 mm, and the overall diameter of the elastic solid ball structure is 8 cm~26 cm. Moreover, at least one surface of the second spherical lamina can be additionally provided with printed layers.

[0010] Through the aforementioned structural design, the structure of the present invention is provided with advantages including design originality, good elasticity, a long serviceable life, permanently dispensing with the need to inflate, and eliminating the need to re-inflate, as well as saving on the need to purchase an inflating device.

[0011] It is preferable that the aforementioned first spherical lamina is an EVA (Ethylene Vinyl Acetate) foam spherical lamina, TPE (Thermoplastic elastomer) foam spherical lamina, SBR (styrene butadiene rubber) foam spherical lamina, NBR (nitrile butadiene rubber) foam spherical lamina, EPDM (ethylene propylene diene M-class rubber) foam spherical lamina, SBL (styrene butadiene latex) foam spherical lamina, POE (polyolefin elastomer) foam spherical lamina, PE (Polyethylene) foam spherical lamina, or a TPR (thermoplastic rubber) foam spherical lamina.

[0012] It is preferable that the aforementioned second spherical lamina is a transparent TPU (thermoplastic polyurethane) thin film, transparent PVC (polyvinyl chloride) thin film, transparent PC (polycarbonate) thin film, transparent TPE (thermoplastic elastomer) thin film, transparent TPR (thermoplastic rubber) thin film, transparent PET (Polyethylene terephthalate) thin film, or a transparent EVA (Ethylene vinyl acetate) thin film.

[0013] It is preferable that the aforementioned elastic solid ball structure is provided with a printed layer, which is disposed on the internal surface of the second spherical lamina.

[0014] It is preferable that the aforementioned elastic solid ball structure is provided with a printed layer, which is disposed on the external surface of the second spherical lamina.

[0015] It is preferable that the aforementioned elastic solid ball structure is provided with two of the printed layers, which are respectively disposed on the internal surface of the second spherical lamina and the external surface of the second spherical lamina.

[0016] The beneficial effects of the structure of the present invention include good elasticity, a long serviceable life, permanently dispensing with the need to inflate, and eliminating the need to re-inflate.

[0017] To enable a further understanding of said objectives and the technological methods of the invention herein, a brief description of the drawings is provided below followed by a detailed description of the preferred embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. 1 is a first structural schematic view of an elastic solid ball of the present invention.

[0019] FIG. 2 is a second structural schematic view of the elastic solid ball of the present invention.

[0020] FIG. 3 is a third structural schematic view of the elastic solid ball of the present invention.

[0021] FIG. 4 is a fourth structural schematic view of the elastic solid ball of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] Referring to FIG. 1, which is a structural schematic view of an elastic solid ball of the present invention, and an elastic solid ball structure 7 of the present invention comprises at least a thermoplastic polyurethane foam sphere center 1 formed from thermoplastic polyurethane foam; and a first adhesive layer 2, a first spherical lamina 3, a second adhesive layer 4, and a second spherical lamina 5 sequentially disposed on the external surface of the thermoplastic polyurethane foam sphere center 1.

[0023] Wherein the diameter of the aforementioned thermoplastic polyurethane foam sphere center 1 is 11 cm~25 cm.

[0024] The first spherical lamina 3 covers the external surface of the thermoplastic polyurethane foam sphere center 1. The thickness of the first spherical lamina 3 is 1 mm~5 mm, and the first spherical lamina 3 can be an EVA (Ethylene vinyl acetate) foam spherical lamina, TPE (thermoplastic elastomer) foam spherical lamina, SBR (styrene butadiene rubber) foam spherical lamina, NBR (nitrile butadiene rubber) foam spherical lamina, EPDM (ethylene diene M-class rubber) foam spherical lamina, SBL (styrene butadiene latex) foam spherical lamina, POE (polyolefin elastomer) foam spherical lamina, PE (polyethylene) foam spherical lamina, or a TPR (thermoplastic rubber) foam spherical lamina.

[0025] The first adhesive layer 2 is disposed between the external surface of the thermoplastic polyurethane foam sphere center 1 and the internal surface of the first spherical lamina 3, thereby enabling the first spherical lamina 3 to be bonded onto the external surface of the thermoplastic polyurethane foam sphere center 1 using the first adhesive layer 2.

[0026] The second spherical lamina 5 covers the external surface of the first spherical lamina 3. The thickness of the second spherical lamina 5 is 0.1 mm~0.25 mm, and the second spherical lamina 5 can be a transparent TPU (thermoplastic polyurethane) thin film, transparent PVC (polyvinyl chloride) thin film, transparent PC (polycarbonate) thin film, transparent TPE (thermoplastic elastomer) thin film, transparent TPR (thermoplastic rubber) thin film, transparent PET (Polyethylene terephthalate) thin film, or a transparent EVA (Ethylene vinyl acetate) thin film.

[0027] The second adhesive layer 4 is disposed between the first spherical lamina 3 and the second spherical lamina 5, thereby enabling the second spherical lamina 5 to be bonded onto the external surface of the first spherical lamina 3 using the second adhesive layer 4.

[0028] The following specific technical steps together provide a more detailed description of the preparation manufacturing procedure of the present invention. Specifically:

[0029] 1. Pour thermoplastic polyurethane foam into a sphere center mold and carry out foaming to complete processing of the thermoplastic polyurethane foam sphere center 1;

[0030] 2. Process and prepare the first spherical lamina 3 through a cold pressing, heat pressing method;

[0031] 3. Process and prepare the second spherical lamina 5 through a cold pressing, heat pressing method;

[0032] 4. Coat with glue the external surface of the first spherical lamina 3, or the internal surface of the second spherical lamina 5, to form the second adhesive layer 4, and complete bonding and laminating of the first spherical lamina 3 and the second spherical lamina 5 through lamination molding;

[0033] 5. Coat with glue the external surface of the thermoplastic polyurethane foam sphere center 1, or the internal surface of the first spherical lamina 3, to form the first adhesive layer 2, and complete bonding and laminating of the first spherical lamina 3 and the thermoplastic polyurethane foam sphere center 1 through lamination molding.

[0034] The aforementioned multilayer laminated structure forms the elastic solid ball structure 7, and the overall diameter of the elastic solid ball structure 7 is 8 cm~26 cm. The first spherical lamina 3 and the second spherical lamina 5 are used to cover the periphery of the thermoplastic polyurethane foam sphere center 1, thereby effectively protecting the thermoplastic polyurethane foam sphere center 1 to prolong the serviceable life of the elastic solid ball 7 of the present invention. Furthermore, the aforementioned structural design of the elastic solid ball 7 of the present invention not only has good flexibility, a long serviceable life, but is also further provided with advantages including permanently dispensing with the need to inflate, and eliminating the need to re-inflate, as well as saving on the cost to purchase an inflating device.

[0035] In addition, referring to FIG. 2, which shows the elastic solid ball 7 further configured with a printed layer 6 on at least one surface of the second spherical lamina 5, and in the embodiment depicted in the drawing, the elastic solid ball structure is provided with the printed layer 6 disposed on the external surface of the second spherical lamina 5. And, according to needs, the printed layer 6 can be printed with different patterns or trademarks on the surface of the second spherical lamina 5.

[0036] Furthermore, referring to FIG. 3, the printed layer 6 can also be applied on the internal surface of the second spherical lamina 5, then the second spherical lamina 5 printed with the printed layer 6 is fixedly bonded onto the external surface of the first spherical lamina 3 using the second adhesive layer 4; or referring to FIG. 4, which shows the elastic solid ball structure 7 provided with two of the printed layers 6, which are respectively disposed on the internal surface of the second spherical lamina 5 and the external surface of the second spherical lamina 5. And, similarly, the second spherical lamina 5 printed with the printed layers 6 is fixedly bonded onto the external surface of the first spherical lamina 3 using the second adhesive layer 4, thereby completing the elastic solid ball structure 7.

[0037] It is of course to be understood that the embodiments described herein are merely illustrative of the principles of the invention and that a wide variety of modifications thereto may be effected by persons skilled in the art without departing from the spirit and scope of the invention as set forth in the following claims.

What is claimed is:

1. An elastic solid ball structure, characterized in that: the structure comprises:

a thermoplastic polyurethane foam sphere center formed from thermoplastic polyurethane foam;

a first spherical lamina, the first spherical lamina covers the external surface of the thermoplastic polyurethane foam sphere center;

a first adhesive layer, the first adhesive layer is disposed between the external surface of the thermoplastic polyurethane foam sphere center and the internal surface of the first spherical lamina;

a second spherical lamina, the second spherical lamina covers the external surface of the first spherical lamina;

a second adhesive layer, the second adhesive layer is disposed between the first spherical lamina and the second spherical lamina.

2. The elastic solid ball structure according to claim 1, characterized in that: the first spherical lamina is an EVA (Ethylene vinyl acetate) foam spherical lamina, TPE (thermoplastic elastomer) foam spherical lamina, SBR (styrene butadiene rubber) foam spherical lamina, NBR (nitrile butadiene rubber) foam spherical lamina, EPDM (ethylene propylene diene M-class rubber) foam spherical lamina, SBL (styrene butadiene latex) foam spherical lamina, POE (polyolefin elastomer) foam spherical lamina, PE (polyethylene) foam spherical lamina, or a TPR (thermoplastic rubber) foam spherical lamina.

3. The elastic solid ball structure according to claim 1, characterized in that: the second spherical lamina is a transparent TPU (thermoplastic polyurethane) thin film, transparent PVC (polyvinyl chloride) thin film, transparent PC (polycarbonate) thin film, transparent TPE (thermoplastic elastomer) thin film, transparent TPR (thermoplastic rubber) thin film, transparent PET (Polyethylene terephthalate) thin film, or a transparent EVA (Ethylene vinyl acetate) thin film.

4. An elastic solid ball structure, characterized in that, the structure comprises at least:

a thermoplastic polyurethane foam sphere center formed from thermoplastic polyurethane foam, the diameter of the thermoplastic polyurethane foam sphere center is 11 cm~25 cm;

a first spherical lamina, the first spherical lamina covers the external surface of the thermoplastic polyurethane foam sphere center, the thickness of the first spherical lamina is 1 mm~5 mm;

a first adhesive layer, the first adhesive layer is disposed between the external surface of the thermoplastic polyurethane foam sphere center and the internal surface of the first spherical lamina;

a second spherical lamina, the second spherical lamina covers the external surface of the first spherical lamina, the thickness of the second spherical lamina is 0.1 mm~0.25 mm;

a second adhesive layer, the second adhesive layer is disposed between the first spherical lamina and the second spherical lamina;

a printed layer, the printed layer is disposed on at least one surface of the second spherical lamina;

wherein the overall diameter of the elastic solid ball structure is 8 cm~26 cm.

5. The elastic solid ball structure according to claim 4, characterized in that: the first spherical lamina is an EVA (Ethylene vinyl acetate) foam spherical lamina, TPE (thermoplastic elastomer) foam spherical lamina, SBR (styrene butadiene rubber) foam spherical lamina, NBR (nitrile butadiene rubber) foam spherical lamina, EPDM (ethylene propylene diene M-class rubber) foam spherical lamina, SBL (styrene butadiene latex) foam spherical lamina, POE (polyolefin elastomer) foam spherical lamina, PE (polyethylene) foam spherical lamina, or a TPR (thermoplastic rubber) foam spherical lamina.

6. The elastic solid ball structure according to claim 4, characterized in that: the second spherical lamina is a transparent TPU (thermoplastic polyurethane) thin film, transparent PVC (polyvinyl chloride) thin film, transparent PC (polycarbonate) thin film, transparent TPE (thermoplastic elastomer) thin film, transparent TPR (thermoplastic rubber) thin film, transparent PET (Polyethylene terephthalate) thin film, or a transparent EVA (Ethylene vinyl acetate) thin film.

7. The elastic solid ball structure according to claim 4, characterized in that: the elastic solid ball structure is provided with a printed layer, the printed layer is disposed on the internal surface of the second spherical lamina.

8. The elastic solid ball structure according to claim 4, characterized in that: the elastic solid ball structure is provided with the printed layer, the printed layer is disposed on the external surface of the second spherical lamina.

9. The elastic solid ball structure according to claim 4, characterized in that: the elastic solid ball structure is provided with two of the printed layers, the printed layers are respectively disposed on the internal surface of the second spherical lamina and the external surface of the second spherical lamina.

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