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(71) Applicant: **Molten Corporation**
Hiroshima-shi, Hiroshima 733-0013 (JP)

(72) Inventor: **NAGAO, Yukinori**
Hiroshima-shi
Hiroshima 733-0013 (JP)

(74) Representative: **advotec.**
Patent- und Rechtsanwälte
Widenmayerstrasse 4
80538 München (DE)

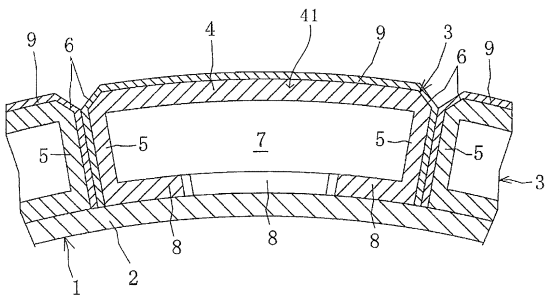
(54) **BALL**

(57) [Problem] To provide a ball which is easy to grip, throw and catch due to an easily adhering surface of a ball body.

[Solution] This ball (1) has: a ball body (41) and at least one self-adhesive member (9) disposed on the surface side thereof. The at least one self-adhesive member includes a self-adhesive material and a reinforcing member supporting the self-adhesive material. When a user catches the ball (1), the user's fingers easily adhere to the self-adhesive member (9), allowing the surface of the ball (1) to be easily gripped, thrown or caught eliminating the need for any strong force in order for the person to hold the ball (1).

According to the structure of the self-adhesive member (9) in which the reinforcing member supports the self-adhesive material, the reinforcing member prevents the self-adhesive material from becoming damaged in order to increase the durability of the self-adhesive member (9). The reinforcing member may be formed in a thin, generally planar-like shape and may be formed from various types of objects including but not limited to nonwoven fabrics; woven fabrics; knitted fabrics; perforated bodies provided with a large number of holes in thin generally planar objects, e.g. sheets or films; mesh-like bodies; forms which include a base and fibers such as artificial turf, mohair, carpet or the like which are attached to a base; forms in which many warp threads and many weft threads are woven together; forms in which weft threads are arranged in a stacked manner; and forms in which warp threads are arranged next to each other.

FIG.1



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Description

TECHNICAL FIELD

[0001] The invention relates to a ball which is easy to grasp due to an easily adhering surface which facilitates holding, throwing, and catching.

BACKGROUND ART

[0002] With reference to FIG. 21, the golf ball 101 disclosed in Patent Document 1 will be described. In the golf ball 101 illustrated in FIG. 21, an outer skin member 103 covering an internal sphere acting as a core 102 is made of silicone gel. However, when the structure of the golf ball 101 is adapted into balls used for ball games in which a ball is caught by a hand such as in a handball ball game, because the entire surface of the inner sphere is covered with silicone gel and the silicone gel is subjected to a large amount of deformation, the durability of the ball degrades and the structure has difficulty with adapting readily.

Citation List

Patent Literature

[0003] Patent Document 1: Japanese Utility Model Publication No. S64 (1989)-43956

SUMMARY OF INVENTION

Technical Problem

[0004] To solve the above problems, an object of the present invention is to provide a ball having an easily adhering surface which facilitates being held, thrown or caught, even if the hand of a user is sweaty.

Solution to the Problem

[0005] The ball comprises a ball body; and at least one self-adhesive member disposed on the surface side of the ball body, wherein the at least one of self-adhesive member includes a self-adhesive material and a reinforcing member supporting the self-adhesive material. Advantageous Effects of Invention

[0006] According to the present invention, the ball has a self-adhesive member which enables the surface of the ball to easily adhere to the fingers of users; accordingly, users are able to easily catch the ball even if their hands are sweaty because the ball is able to facilitate being held, thrown or caught.

Because the self-adhesive member supports the self-adhesive material by means of the reinforcing member, the reinforcing member prevents the self-adhesive material from becoming damaged which increases the durability of the self-adhesive member.

If the ball of the present invention further comprises at least one mounting area for the self-adhesive member, in which the self-adhesive member is able to be mounted on the surface of the ball body, and the mounting area for the self-adhesive member is formed as a recess or a segmented area in which the segmented area has at least one protrusion protruding from the surface of the ball body, then the edges of the self-adhesive material in the mounting area are able to be supported and protected; when the ball experiences an impact force because the surface of the outer skin member surrounding the self-adhesive member and/or the at least one protrusion bears the deformation of the self-adhesive member, which maintains the bounceability of the ball.

If the self-adhesive material of the present invention is made of gel, the adhesive effect is longer-lasting. Further, when a user holds the ball and the fingers touch the self-adhesive member, the self-adhesive material contours to the shapes of the fingers enlarging the contact area between the self-adhesive portion and the fingers, thus, enhancing the adhesive effect.

BRIEF DESCRIPTION OF DRAWINGS

[0007]

FIG. 1 is a sectional view showing a portion of a ball according to a first embodiment as seen along one of the diameters.

FIG. 2 is a perspective view showing the first embodiment of the ball in an exploded manner.

FIG.3 is a sectional view showing a portion of a ball according to a second embodiment as seen along one of the diameters.

FIG. 4 is a sectional view showing a portion of a ball according to a third embodiment as seen along one of the diameters.

FIG. 5 is an electron microscope image showing a non-woven fabric for a ball according to a fourth embodiment.

FIG. 6 is a schematic diagram showing a three dimensional network structure of the non-woven fabric of FIG. 5

FIG. 7 is a sectional view showing resin fibers of the non-woven fabric of FIG. 5

FIG. 8 is a sectional view showing a portion of a ball according to a fifth embodiment as seen along one of the diameters.

FIG. 9 is a sectional view showing a portion of a ball according to a sixth embodiment as seen along one of the diameters.

FIG. 10 is a sectional view showing a portion of a ball according to a seventh embodiment as seen along one of the diameters.

FIG. 11 is a sectional view showing a portion of a ball according to an eighth embodiment as seen along one of the diameters.

FIG. 12 is a sectional view showing a portion of a

ball according to a ninth embodiment as seen along one of the diameters.

FIG. 13 is a sectional view showing a portion of a ball according to a tenth embodiment as seen along one of the diameters.

FIG. 14 is a sectional view showing a portion of a ball according to an eleventh embodiment as seen along one of the diameters.

FIG. 15 is a sectional view showing a portion of a ball according to a twelfth embodiment as seen along one of the diameters.

FIG. 16 is a sectional view showing a portion of a ball according to a thirteenth embodiment as seen along one of the diameters.

FIG. 17 is a sectional view showing a portion of a ball according to a fourteenth embodiment as seen along one of the diameters.

FIG. 18 is a sectional view showing a portion of a ball according to a fifteenth embodiment as seen along one of the diameters.

FIG. 19 is a sectional view showing a portion of a ball according to a sixteenth embodiment as seen along one of the diameters.

FIG. 20 is a sectional view showing a portion of a ball according to a seventeenth embodiment as seen along one of the diameters.

FIG. 21 is a sectional view showing one of the golf ball disclosed in patent document 1.

DESCRIPTION OF EMBODIMENTS

[0008] With reference to FIGS. 1 and 2, the ball 1 according to the first embodiment of the present invention is described. As illustrated in FIGS. 1 and 2, the ball 1 has a ball body and a plurality of self-adhesive members disposed on the surface side of the ball body. The self-adhesive members each include a self-adhesive material and a reinforcing member which supports the self-adhesive material. When this ball is used for ball games in which a ball is caught by a hand such as in a handball game, the self-adhesive member 9 is able to easily adhere to the fingers of a user as the user is catching the ball 1; thus, this configuration allows the ball not to have a slippery surface and to be firmly held.

[0009] FIGS. 1 and 2 show an example of the ball body 41 which has an internal sphere 2 covered with an outer skin member 3. The ball body 41 can also be constructed in such a manner that the internal sphere 2 and the outer skin member 3 are not operatively distinguishable and are in continuous communication without differences in the boundaries within the ball body as seen from a cross-sectional perspective; the ball body 41 can be constituted of only the outer skin member 3 without a physical internal sphere 2; or the ball body 41 can be constituted of only the internal sphere 2 without a separate outer skin member 3.

[0010] That is, any structure in which an outer skin member 3 covers an internal sphere 2, a structure in which the internal sphere 2 and the outer skin member 3 are formed integrally without differences in the boundary, a structure constituted by only the outer skin member 3 without an internal sphere 2, or a structure constituted by only an internal sphere 2 without a separate outer skin member 3 can each be uniquely considered as the ball body 41.

[0011] In FIGS. 1 and 2, the self-adhesive members 9 are provided on the surface side of the outer skin body 3. Therefore, the fingers of a user are able to easily grip the self-adhesive members 9 and the user's hands do not slip on the surface of the ball 1 while a user is catching the ball 1 even if the hands are sweaty. Consequently, this configuration allows the surface of the ball 1 to facilitate being held, thrown or caught minimizing the need for users using the ball 1 to firmly grasp the ball 1.

Moreover, each self-adhesive member 9 has a structure such that the reinforcing member supports the self-adhesive material; thus, this configuration prevents the self-adhesive material from becoming damaged which increases the durability of the self-adhesive member 9.

In contrast, if the self-adhesive material being of a soft material is provided on the surface side of the outer skin member 3 and is not supported by a reinforcing member, scratches and damage are likely to occur to the self-adhesive material.

The self-adhesive material used for the self-adhesive member 9 has to be able to adhere to the hands of a user and also be able to have the adhesive effect restored when washed with water or a cleaner such as an abrasive agent so as to remove dirt or the like, and wherein the adhesive effect returns after being dried.

[0012] FIGS. 1 and 2 show a structure in which each self-adhesive member 9 is disposed on the surface of a surface portion 4, the surface of a beveled portion 6 and the surface of the peripheral wall 5. However, the self-adhesive member 9 can also be partially or entirely arranged on the surface portion 4, or the self-adhesive member 9 can be arranged on both the surface of the surface portion 4 and the surface of the beveled portion 6. As illustrated in FIGS. 1 and 2, if the self-adhesive member 9 is disposed on the surface portion 4, the surface of the beveled portion 6, and the surface of the peripheral wall 5, then the self-adhesive member 9 is able to be prevented from curling up.

[0013] The reinforcing member may be formed in a thin, generally planar-like shape and may be formed from various types of objects including but not limited to non-woven fabrics; woven fabrics; knitted fabrics; perforated bodies provided with a large number of holes in thin generally planar objects, e.g. sheets or films; mesh-like bodies; forms which include a base and fibers such as artificial turf, mohair, carpet or the like which are attached to a base; forms in which many warp threads and many weft threads are woven together; forms in which weft threads are arranged in a stacked manner; and forms in which warp threads are arranged next to each other.

For example, if a non-woven fabric impregnated with the

self-adhesive material is used as the reinforcing member, the non-woven fabric covered with the self-adhesive material supports the self-adhesive material, and the self-adhesive member 9 is configured such that the self-adhesive material is supported by the reinforcing member. In other words, because the non-woven fabric is covered by the self-adhesive material so as to support the self-adhesive material, the self-adhesive member 9 is configured in such a manner that the self-adhesive material is supported with a reinforcing member.

[0014] The self-adhesive material can utilize gels including urethane gel, silicone gel, or styrene gel; the self-adhesive material can be formed by being applied; the self-adhesive material can also be formed as double-sided tapes. With respect to the self-adhesive material, because gels maintain the adhesive effect longer; when applying gels, the gels are highly adaptable allowing for various designs and processes as well as a high productivity. The double-sided tape also has good working properties. In order to secure the self-adhesive member 9 on the surface side of the outer skin member 3, an adhesive agent, a double-faced tape or potting can be utilized, but it is not limited them. In any case, when a user throws the ball 1 with the hand having contact with the self-adhesive member 9, the self-adhesive member 9 is characterized in that the self-adhesive member does not peel off of the ball body 41. In addition, when the outer skin member 3 and the self-adhesive member 9 are made of thermoplastic resins that are similar to each other, the outer skin member 3 and the self-adhesive member 9 are able to be fused together and firmly fixed.

[0015] As illustrated in FIGS. 1 and 2, in the structure of a ball in which a plurality of outer skin members 3 are bonded together, the outer wall surfaces of the peripheral walls 5 are fixed to each other by means of welding or adhesive agents. Therefore, moisture permeation, such as from water and perspiration, from the boundaries of the outer skin member 3 toward the inner sphere 2 is minimized which means that the likelihood of the outer skin member 3 becoming separated from the inner sphere 2 is reduced. The ball 1 having troughs formed by the beveled portion 6 in the boundaries of the adjacent outer skin member 3 enable users to touch the troughs of the ball with the hand and to easily catch the ball 1. Further, the ball can be made to appear as if the ball were hand-sewn by using the troughs formed by the beveled portions 6. In addition to fixing the peripheral walls 5 by means of welding or adhesive agents, the back surface of the peripheral walls 5 can also be fixed to the surface of the internal sphere 2 by means of welding or adhesive agents. Alternatively, the peripheral walls 5 can merely be in contact with each other without being fixed to each other by means of welding or adhesive agents, and only the back surface of the peripheral wall 5 is fixed to the surface of the internal sphere 2 by means of the welding or adhesive agents.

[0016] The internal sphere 2 is made of a soft material such as resin or rubber. The internal sphere 2 can has a spherical shape, an ellipsoidal shape, or a shape similar thereto; these general shapes also include any spherical shapes, ellipsoidal shapes or other similar shapes which have any planar portions such as a truncated icosahedron. The internal sphere 2 can be configured in a variety of ways including having at least one thread wound on the surface, or having no threads wound on the surface. The inside of the internal sphere 2 can be a hollow structure so that air is able to be introduced or removed from the inside allowing for the internal sphere to be expanded; the inside of the internal sphere 2 can also be a hollow structure in which air is not able to be introduced or removed; or the inside of the internal sphere 2 can be a solid structure filled with a cushioning material.

[0017] FIG. 2 shows an outer skin member 3 having a hexagonal shape, however, the outer skin member 3 can have a shape other than that of a hexagon shape. The outer skin member 3, comprising the surface portion 4, the peripheral wall 5, the beveled portion 6, the cavity 7 and the projecting portion 8, is integrally formed by a soft material such as a resin or rubber in at least one mold, for example, by injection molding, press molding, vacuum molding or blow molding, or the like.

[0018] The surface portion 4 forms the surface of the ball body 41 and is on the side touched by the user's hands. The beveled portion 6 is formed in such a manner that the sharp edge portion formed where the surface portion 4 and the peripheral wall 5 come together has been removed so as to form a planar surface or a curved surface. Note that the beveled portion 6 can also be formed so as to extend to the back surface of the outer skin member 3, or the beveled portion 6 may not be formed. In the specification, the back side of the outer skin member 3 means the side which is in contact with the internal sphere 2, the surface side of the outer skin member 3 means the side which a user is able to touch.

[0019] The projecting portion 8 extends from the peripheral wall 5 towards the center of the outer skin member 3 and is arranged so as to be spaced apart from the surface portion 4. That is, because the projecting portion 8 is disposed on the back side of the outer skin member 3, when the projecting portion 8 is bonded to the internal sphere 2, the bonded area between the outer skin member 3 and the internal sphere 2 is enlarged and increases the connecting strength as show in FIG. 2.

[0020] The self-adhesive member 9 of FIGS. 1 and 2 can be replaced with a self-adhesive material 28 supported by a reinforcing member as illustrated in FIGS. 9 through 17. If the self-adhesive member 9 is replaced with the self-adhesive material 28, the self-adhesive material 28 is impregnated into the surface side of the outer skin member 3, and at least one portion of outer skin member3 functions as the reinforcing member for the self-adhesive material 28.

[0021] With reference to FIG. 3, the ball 1 according to a second embodiment of the present invention is described. In the ball 1 as illustrated in FIG. 3, the mounting areas 10 for the self-adhesive members 9 are arranged

as recessed areas with respect to the surface of the outer skin member 3 on the surface side of the outer skin member 3. Each self-adhesive member 9, in which a reinforcing member supports the self-adhesive material, is arranged in each mounting area 10. In this configuration, the periphery of the self-adhesive member 9 is covered with the surface of the outer skin member 3, minimizing the self-adhesive member from becoming peeled off. The mounting area 10 for the self-adhesive member can be formed as a region segmented by at least one protrusion protruding from the surface of the outer skin member 3 on the surface side of the outer skin member 3. In the case where the mounting area 10 for the self-adhesive member is formed as a region segmented by at least one protrusion protruding from the surface of the outer skin member 3 on the surface side of the outer skin member 3, the self-adhesive member 9 arranged in the mounting area 10 for the self-adhesive member is covered by the protrusions, minimizing the self-adhesive member from becoming peeled off.

[0022] The surface of the self-adhesive member 9 may extend beyond the surface of the outer skin member 3 around the mounting area 10 or the protrusions. However, if the surface of the self-adhesive member 9 does not extend beyond the surface of the outer skin member 3 around the mounting area 10 or the protrusions, the edges of the self-adhesive member 9 will not be able to easily curl up which minimizes the self-adhesive member 9 from becoming peeled off.

[0023] Instead of forming a cavity 7 as illustrated in FIG. 3, the ball can be adapted to a structure in which the cavity 7 is able to be filled with the surface portion 4, the peripheral wall 5 and the projecting portion 8; the mounting area 10 for the self-adhesive member is able to penetrate from the surface portion 4 to the back surface portion of the outer skin member 3, the mounting area 10 for the self-adhesive member accommodates the self-adhesive member 9; and the self-adhesive member 9 is fixed to at least one of either the internal sphere 2 and the outer skin member 3 by means of at least one adhesive agent, a double-faced tape, potting, or the like.

[0024] The outer skin member 3 is not limited to the configuration as illustrated in FIGS. 1 and 3, the outer skin member 3 may have one or more cushions arranged in the cavity 7 so as to provide the user with a better feeling when the user catches the ball 1. The cushion is made of a cushioning material such as a flexible foam, a nonwoven fabric, or the like and is arranged within a predetermined area in the cavity 7. The cushion need not be fixed in the cavity 7 or the internal sphere 2 with an adhesive agent; however, when the cushion is fixed in one or both of either the cavity 7 and/or the internal sphere 2, the strength of the connection is increased. The outer skin member 3 can also be applied to a simple structure without a cavity 7. One or several kind shapes can be adapted to form the outer skin member 3, as long as the outer skin member 3 covers the entire surface of the internal sphere 2. Further, the number of self-adhesive members 9 is not limited to one, a plurality of self-adhesive members 9 may be utilized for the ball. The plurality of self-adhesive members can be installed in various appropriate manners.

[0025] The self-adhesive member 9 of FIG. 3 can be replaced with a self-adhesive material 28 supported by a reinforcing member as illustrated in FIGS. 9 through 17. If the self-adhesive member 9 is replaced with the self-adhesive material 28, the self-adhesive material 28 is impregnated into the surface side of the outer skin member 3, and at least one portion of outer skin member3 functions as the reinforcing member for the self-adhesive material 28.

[0026] With reference to FIG. 4, the ball 1 according to a third embodiment of the present invention is described. In the ball 1 as illustrated in FIG. 4, periphery covers 12, having the outer skin members 3 and the self-adhesive members 9 contained therein, cover the internal sphere 2, and the periphery covers 12 prevent the self-adhesive members 9 from peeling off from the edge of the self-adhesive members 9.

Specifically, each outer skin member 3 has a planer-like shape in which a surface portion 4 having a planer-like shape and a cushion 11 having a planer-like shape are layered.

Each periphery cover 12 secures the layered planer-like outer skin members 3 and the self-adhesive member 9, covering the surface and the side surface of the outer skin members 3. The periphery cover 12 comprises an upper portion 15, a lower portion 15, and a side portion 16; The upper portion 14, the lower portion 15 and the side portion 16 determine a space 13 which secures the outer skin member 3 and the self-adhesive member 9. The periphery cover 12 further comprises an upper opening 17 and a lower opening 18 where the upper opening 17 is determined by the upper portion 14 and the lower opening 18 is determined by the lower portion 15.

The assembly of the outer skin member 3 and the self-adhesive member 9 is arranged in the space 13 between the upper opening 17 and the lower opening 18 of the periphery cover 12; the periphery cover 12 supports the assembly of the outer skin member 3 and the self-adhesive member 9 on the upper side, the lower side and the peripheral side thereof to prevent the self-adhesive members 9 from the curling up at the ends. The self-adhesive member 9 needs not cover the sides of the outer skin member 3. As illustrated in FIG. 4, when the self-adhesive member 9 covers the sides of the outer skin member 3, the end of the self-adhesive member 9 is preferably held so as to prevent curling. Moreover, while the periphery cover 12 is not limited to a hexagonal shape such as that illustrated in FIG. 2, the periphery cover 12 should be configured to have openings which have a shape similar to the shape of the surface portion 4 of the outer skin member 3.

[0027] The self-adhesive member 9 of FIG. 4 can be replaced with a self-adhesive material 28 supported by a reinforcing member as illustrated in FIGS. 9 through

17. If the self-adhesive member 9 is replaced with the self-adhesive material 28, the self-adhesive material 28 is impregnated into the surface side of the outer skin member 3, and at least one portion of outer skin member3 functions as the reinforcing member for the self-adhesive material 28.

[0028] Regarding the ball 1 in accordance with a fourth embodiment of the present invention, a non-woven fabric 21 as the reinforcing member used for the self-adhesive members 9 of the ball 1 is described with reference to FIGS. 5 through 7. In the electron microscopic image as illustrated in FIG. 5, numerous resin fibers 22 constituting the non-woven fabric 21 are fused by heating the coats of the resin fibers 22 so that the resin fibers 22 are not able to move with respect to one another. FIG. 5 shows a fusion point 23 where resin fibers 22 are fusion bonded. FIG. 6 schematically illustrates the state of FIG. 5, lines represent the resin fibers 22, circles represents the fusion points where the coats of the resin fibers 22 are fused, they constitute a three dimensional network structure in which the fusion points are uniformly arranged three-dimensionally. Each resin fiber 22, as illustrated in FIG. 7, has a rod-shape with a core 24 of polyethylene terephthalate resin (PET resin), and a coat 25 of ethylene-vinyl alcohol copolymer resin (EVOH resin) which covers the core 24; this configuration has high wettability.

[0029] The non-woven fabric 21 of FIG. 5 is produced using the resin fibers 22 illustrated in FIG. 7 by means of at least one heating process, i.e. the intersection points of the numerous coats 25 of the resin fibers 22 of FIG. 7 are heated and bonded becoming the fusion points 23 illustrated in FIG. 6. The resulting structure of non-woven fabric 21 as illustrated in FIG. 5 has a high absorbency, a high absorption rate, a low change in volume due to swelling, a stable rigidity with minimal changes due to swelling, and adjustable air gaps making the non-woven fabric 21 suitable for use as a liquid absorber. If the non-woven fabric 21 of FIG. 5 being suitable for use as a liquid absorber is used as the reinforcing member for the self-adhesive member 9 as illustrated in FIGS. 1 through 4, the self-adhesive material, which may be made of a gel such as urethane, silicone or styrene, etc., is impregnated into the non-woven fabric 21; the self-adhesive material approaches the resin fibers 22 having a high absorbency, deeply permeates into the air gaps of the non-woven fabric 21 as illustrated in FIG. 5 and attaches to the resin fibers 22 as well as being supported by the resin fibers 22. The water absorption amount (CC/m^2:cm^3/m^2) of the non-woven fabric 21 illustrated in FIG. 5 is about 9 times the water absorption amount (CC/m^2:cm^3/m^2) of the urethane sponge.

[0030] With reference to FIG. 8, the ball 1 in accordance with a fifth embodiment of the present invention is described. The ball 1 as illustrated in FIG. 8 has a sewn structure in which a plurality of the outer skin members 3 are sewn together with sewing threads 26. Because the plurality of the outer skin members 3 as well as self-adhesive members 9 are sewn together, this configuration increases the connecting strength between the plurality of the outer skin members 3 and the self-adhesive members 9 more than the connecting strength of those of bonded balls, and prevents the outer skin member 3 and the self-adhesive member 9 from peeling off. Further, the ball 1 has a high connecting strength because the outer skin members 3 are not able to peel off unless any of the sewn outer skin members 3 or the stitches 26 break. In FIG. 8, the plurality of outer skin members 3 were each cut out from a raw fabric with a die so as to have a predetermined shape; the self-adhesive member 9 is arranged on the surface portion of the outer skin member 3; and the outer skin member 3 and the self-adhesive member 9 constitute a sheet-like shape. In this state, the ends of the self-adhesive members 9 arranged on the outer skin members 3 are overlapped with each other; the overlapped ends of the outer skin members 3 are sewn together with sewing threads 26; and then the outer skin members 3 are spread and arranged on the internal sphere 2 such that the self-adhesive members 9 faces outward and the outer skin members 3 covers the internal sphere 2. This configuration is exemplified in FIG. 8.

[0031] When the outer skin members 3 cover the internal sphere 2 in the above manner, the ends of the outer skin member 3 sewn with the sewing thread 26 constitute the peripheral walls 5 of the outer skin member 3, and the ends of the self-adhesive member 9 sewn with the sewing thread 26 constitute the peripheral wall portions 5 of the self-adhesive members 9. Each outer skin member 3 can constitute a single layer or multiple layers. The self-adhesive members 9 are adhered to the outer skin member 3 with an adhesive agent which are not illustrated. At least one printing layer, which is not illustrated, can be arranged between the outer skin member 3 and the self-adhesive member 9. The printing layer can represents a logo of a manufacturer or a design of the ball 1.

When a printing layer is arranged between the outer skin member 3 and the self-adhesive member 9, the printing layer representing a logo of a manufacturer, a design of the ball 1, or the like can be disposed on the surface of the outer skin member 3 before adhering the outer skin member 3 and the self-adhesive member 9 with adhesive agents. Subsequently, the self-adhesive member 9 is adhered to the surface side of the outer skin member 3.

[0032] The self-adhesive member 9 of FIG. 8 can be replaced with a self-adhesive material 28 supported by a reinforcing member as illustrated in FIGS. 9 through 17. If the self-adhesive member 9 is replaced with the self-adhesive material 28, the self-adhesive material 28 is impregnated into the surface side of the outer skin member 3, and at least one portion of outer skin member3 functions as the reinforcing member for the self-adhesive material 28.

[0033] With reference to FIG. 9, the ball 1 in accordance with a sixth embodiment of the present invention is described. In the ball 1 as illustrated in FIG. 9, each self-adhesive member 9 arranged on the surface side of each

outer skin member 3, is comprised of a reinforcing member 27, which is made of a non-woven fabric and arranged on the side of the outer skin members 3, and a self-adhesive material 28, which is arranged on the surface side of the reinforcing member 27.

This configuration, wherein the reinforcing member 27 is arranged on the side of the outer skin member 3 and the self-adhesive material 28 is arranged on the surface side of the reinforcing member 27, the adhesive effect is maintained longer than when the reinforcing members made of a non-woven fabric are arranged on the entire self-adhesive material in the direction of the thickness thereof, or when the reinforcing members made of non-woven fabric are arranged on the surface side of the self-adhesive material.

For example, in the configuration that the reinforcing members are arranged on the surface side of the self-adhesive materials, when the self-adhesive materials becomes worn out, the reinforcing member made of the non-woven fabric becomes exposed. This causes the exposed fibers of the non-woven fabric to catch foreign matter, such as dirt lowering the adhesive effect of self-adhesive materials. In the non-woven fabric constituting the reinforcing member 27, fibers of polypropylene are entangled without being fused, this is different from the non-woven fabric in which the fibers are fusion bonded as illustrated in FIG. 5. Further, in this embodiment, the reinforcing member 27 and the self-adhesive material 28 are not distinctly separated into layers even though FIG. 9 does not show this in detail; at least one portion of the self-adhesive material 28 permeates into the reinforcing member 27 and sticks to the fibers of the non-woven fabric constituting the reinforcing member 27.

[0034] In the ball 1 as illustrated in FIG. 9 by eliminating the inner spherical body 2, the self-adhesive members 9, which are formed by supporting the self-adhesive materials 28 with the reinforcing members 27, can be conceptually and uniquely contemplated from the structure provided on the surface side of the ball body 41 which is composed only of the outer skin members 3.

In the ball 1 as illustrated in FIG. 9 by eliminating the outer skin member 3, the self-adhesive members 9 in which the self-adhesive materials 28 are supported by the reinforcing members 27 can be conceptually and uniquely contemplated from the structure provided on the surface side of the ball body 41 which is constituted only by the internal spherical body 2.

[0035] The reinforcing members 27 can be adapted into a thin planar shape such as a sheet, a film, or the like made of thermoplastic polyurethane. The surface of these thin planar reinforcing members 27 are roughened by means of solvents or sand paper, and a two-pack material which become the self-adhesive material 28 which is applied to the roughened surface, the two-pack material is applied and fixed using heat so that the two-pack material adheres to the thermoplastic polyurethane utilizing the curing property of the two-pack material. Please note that the materials of the reinforcing members 27 and the methods of bonding between the reinforcing member and the self-adhesive material 28 are not limited to this description.

[0036] With reference to FIG. 10, the ball 1in accordance with a seventh embodiment of the present invention is described.

In the ball 1 illustrated in FIG. 10, the outer skin member 3 has a reinforcing portion which is saturated with the self-adhesive material 28 on the side of the surface 29 of the outer skin member 3, and the self-adhesive material 28 is layered on the side of the surface 29. Thereby a portion on the side of the surface 29 of the outer skin member 3 can function as the aforementioned reinforcing member 27 or the aforementioned non-woven fabric 21; thus, the reinforcing member, which is not illustrated, can be constituted by the non-woven fabric 21 or the reinforcing member 27, therefore, eliminating the reinforcing member in the figure.

In the ball 1 illustrated in FIG. 10, the reinforcement portion for supporting the self-adhesive material 28 on the side of the surface 29 is integrated with the outer skin member 3.The unevenness of the reinforcement portion on the surface 29 side of the outer skin member 3 is formed by a physical method such as sandpapering or the like or a chemical method such as using adhesives, thermal welding or primers, etc. Therefore, the outer skin member 3 and the self-adhesive material 28 are able to be integrated by a physical method and a chemical method, or the outer skin member 3 and the self-adhesive material 28 are able to be integrated by only a chemical method.

[0037] The ball 1 as illustrated in FIG. 10 can eliminate the inner spherical body 2. In this case, it can be conceptually and uniquely contemplated from that the self-adhesive member 9, which is formed by supporting the self-adhesive material 28 with the reinforcing member 27, constitute a structure which is disposed on the surface side of the ball body 41 constituted by the outer skin member 3 excluding its surface 29 side portions functioning as the reinforcing member.

The ball 1 as illustrated in FIG. 10 can eliminate an outer skin member 3 excluding its surface 29 side portions functioning as the reinforcing member. In this case, it can be conceptually and uniquely contemplated from that the self-adhesive member 9, which is formed by supporting the self-adhesive material 28 with the reinforcing member 27, constitute a structure which is disposed on the surface side of the ball body 41 constituted only by only the internal sphere 2. Further, the configuration of the self-adhesive member 9 disposed on the surface side of the ball body 41 is able to be modified so as to have at least one thread wound carcass or at least one printing layer between the internal sphere 2 and self-adhesive member 9.

[0038] With reference to FIG. 11, the ball 1 according to an eighth embodiment of the present invention is described.

In the ball 1 illustrated in FIG. 11, the ball body 41 is

constituted only by the inner sphere 2, the self-adhesive member 9 is constituted by the self-adhesive material 28 and the reinforcing member 30. The surface 31 portion of the reinforcing member 30 is configured so as to be able to be saturated with the self-adhesive material 28 and the self-adhesive material 28 is then layered on the surface 31 side of the reinforcing member 30, i.e. the ball 1 does not include the outer skin member 3 illustrated in FIGS. 1 through 4, 8 or 9. That is, in the ball 1 illustrated in FIG. 11, the self-adhesive member 9, which supports the self-adhesive material 28 with the reinforcing member 30, is conceptually and uniquely defined as the structure such that covers the surface of the ball body 41 on the surface side of the ball body 41 constituted only by the internal sphere 2.

[0039] With reference to FIG. 12, the ball 1 according to a ninth embodiment of the present invention is described.

In the ball 1 illustrated in FIG. 12, a mesh-like reinforcing member 32 is made of a soft material made such as resin or rubber and is provided on the surface side of a self-adhesive material 28. Thus, the self-adhesive material 28 is supported with the reinforcing member 32, and the portions of the self-adhesive material 28 accessible from the mesh spaces 33 of the mesh-like reinforcing member 32 are able to adhere to the fingers of a user while a user is catching the ball 1. Consequently, the surface of the ball 1 does not easy slip and is easy to grip; thus, the reinforcing member 32 catches the fingers of a user preventing the ball 1 from slipping due to the perspiration of the user. Further, the surface of the reinforcing members 32 protrudes beyond the self-adhesive material 28. This configuration prevents the self-adhesive material 28 from touching areas such as the ground or walls, even if the ball 1 touches them, which improves the durability of the self-adhesive material 28 and reduces the amount of dirt on the self-adhesive material 28.

The reinforcing member 32 is able to cover the surface and the sides of the self-adhesive material 28. This configuration allows for the reduction of fraying of the peripheral edge portions of the reinforcing member 32 and enhances the durability of the reinforcing member 32. The reinforcing member 32 may be modified to protrude inward, toward the self-adhesive material 28, and the surface side portion of the self-adhesive material 28 is positioned so as to be surrounded by the mesh space 33. The reinforcing members 32 can be made of a sheet-like member having a plurality of openings, a planar-shaped member having a plurality of openings, or a knitted fabric having a plurality of openings.

These sheet-shaped or planer-like members or knitted fabrics can be made of non-slippery materials such as natural rubber or elastomers which enables the ball 1 to be more easily gripped.

[0040] In FIG. 12, the ball body 41 may be constituted by the inner sphere 2, the ball body 41 may be constituted by the inner sphere 2 and the outer skin member 3, or the ball body 41 may be constituted only by the outer skin member 3. The self-adhesive material 28 may be replaced with the self-adhesive member 9 as illustrated in FIGS. 1 through 4, 8 or 9. Further, any of the structure of the bonded balls illustrated in FIGS. 1 to 4 and the structure of the sewn ball illustrated in FIG. 8 may be adopted. The reinforcing member 32 may also have at least one opening or at least one recess within the reinforcing member 32 surrounding the mesh space 33.

[0041] With reference to FIG. 13, the ball 1 according to a tenth embodiment of the present invention is described.

The ball 1 as illustrated in FIG. 13 has a plurality of outer skin members 3, in which each outer skin members 3 is comprised of a recessed surface 34, which is arranged on the surface side of each outer skin member 3 and is created by pressing inward from the outer skin member 3, and several protrusions 35 each of which protrudes outward from the bottom of each recessed surface 34. Moreover, because the self-adhesive material 28 is disposed in the recessed surface 34 and around the protrusions 35, the self-adhesive material 28 is supported with the reinforcing member functioning as the outer skin member 3, and the self-adhesive material 28 is able to easily adhere to the fingers of a user while a user is catching the ball 1. Consequently, the surface of the ball 1 does not easily slip and is easy to grip.

In addition, a user's fingers make contact with the protrusions 35 and the portions arranged around each recessed surface 34, which also functions the outer skin member 3, when catching the ball 1 and prevents the ball from slipping due to the perspiration of the user.

Further, the outer skin member 3 has the portions of protrude outward from the self-adhesive materials 28. This configuration prevents the self-adhesive material 28 from touching areas such as to the ground or walls, even if the ball 1 touches them, which improves the durability of and reduces the amount of dirt on the self-adhesive material 28.

[0042] In FIG. 13, each outer skin member 3 may be replaced with a planar-like reinforcing member, which is made of a soft material made such as resin or rubber, and has a recessed surface 34 and protrusions 35. The ball body 41 may be constituted by only the internal sphere 2, the ball body 41 may be constituted by the internal sphere 2 and the outer skin member 3, or the ball body 41 may be constituted by only the outer skin member 3. The self-adhesive materials 28 may be replaced with the self-adhesive members 9 as illustrated in FIGS. 1 through 4, 8 or 9. Any structure of the bonded balls illustrated in FIGS. 1 to 4 or the structure of the sewn ball illustrated in FIG. 8 can be adopted to this form.

FIG.13 shows the structure that the surface portions arranged around each recessed surface 34 of each outer skin member 3 and the surfaces of the protrusions 35 extend further than the self-adhesive material 28. However, all of the surface portions arranged around each recessed surface 34 of each outer skin member 3, the surfaces of the protrusions 35, and the surface of the

self-adhesive material 28 may be aligned so as to form one continuous surface.

The structure in which the surface portions arranged around the recessed surface 34 of the outer skin member 3 and the surfaces of the protrusions 35 protrude outward from the surface of the self-adhesive material 28, as illustrated in FIG. 13, allows a user's fingers to easily grip the portions arranged around the recessed surface 34 of each of the outer skin members 3 and the protrusions 35. The self-adhesive materials 28 as illustrated in FIG. 13 may be replaced with the self-adhesive member 9 as illustrated in FIGS. 1 through 4, 8, or 9.

[0043] With reference to FIG. 14, the ball 1 according to an eleventh embodiment of the present invention is described.

In the ball 1 as illustrated in FIG. 14, the outer skin member 3 comprises a plurality of recesses 37 which are arranged on the surface side of the outer skin member 3 and the self-adhesive materials 28 are respectively arranged in each of the recesses 37. The self-adhesive materials 28 are disposed on the surface side of the ball body 41 which is comprised of the internal sphere 2 and the outer skin member 3, and the self-adhesive materials 28 are supported by the reinforcing portions which functions as the outer skin member 3. Thereby, the self-adhesive materials 28 are able to easily adhere to the fingers of a user while a user is catching the ball 1. Consequently, the surface of the ball 1 does not easily slip and is easy to grip. In addition, the portions of the outer skin member 3 arranged around the recesses 37, which also functions as the outer skin member 3, allow the user's fingers to easily grip the ball and prevent the ball 1 from slipping due to the perspiration of the user.

Further, the portions of the outer skin member 3 protrude outward from the self-adhesive materials 28. This configuration prevents the self-adhesive materials 28 from touching areas such as the ground or walls, even if the ball 1 touches them which improves the durability of and reduces the amount of dirt on the self-adhesive materials 28.

[0044] In FIG. 14, the outer skin member 3 can be replaced with a planar-like reinforcing member, which is made of a soft material made such as resin or rubber, and has a plurality of recesses 37.

Any structure of the bonded balls illustrated in FIGS. 1 to 4 or the structure of the sewn ball illustrated in FIG. 8 can be adopted into this form. FIG.14 shows a structure in which the surface portions arranged around the recesses 37 of the outer skin member 3 in such a manner that they extend further than the self-adhesive material 28. However, both the surface portions arranged around the recesses 37 of the outer skin member 3 and the self-adhesive material 28 can also be aligned so as to form one continuous surface. The structure in which the surface portions arranged around the recesses 37 of the outer skin member 3 protrude outward from the self-adhesive material 28, as illustrated in FIG. 14, allows a user's fingers to easily grip the portions arranged around the recess 37 of the outer skin member 3.The self-adhesive material 28 as illustrated in FIG. 14 can be replaced with the self-adhesive member 9 as illustrated in FIGS. 1 through 4, 8, or 9.

[0045] With reference to FIG. 15, the ball 1 according to a twelfth embodiment of the present invention is described.

In the ball as illustrated in FIG. 15, the outer skin member 3 has a plurality of openings 38 which pass through the outer skin member 3 in a front-back direction, the self-adhesive materials 28 are arranged in the opening portions 38. The self-adhesive material 28 is arranged on the surface side of the ball body 41 and is comprised of the internal sphere 2 and the outer skin member 3; the self-adhesive material 28 is supported by a reinforcing member which functions as the outer skin member 3. Thereby, the self-adhesive material 28 is able to adhere to a user's fingers while a user is catching the ball 1. Consequently, the surface of the ball 1 does not easily slip and is easy to grip.

In addition, the surface portions arranged around the openings 38 make contact with a user's fingers preventing the ball 1 from slipping due to the perspiration of the user. The configuration minimizes deformations of the self-adhesive material 28 when the ball 1 touches surfaces such as the ground or walls and accordingly the self-adhesive material 28 is not easily damaged in order to enhance the durability of the self-adhesive material 28. Further, a reinforcing member 39 made of a non-woven fabric is arranged between the internal sphere 2 and self-adhesive material 28 as well as between the internal sphere 2 and the outer skin member 3. Thereby, the self-adhesive material 28 is supported by the reinforcing members 39 in order to prevent the self-adhesive material 28 from curling up.

[0046] The self-adhesive material 28 as illustrated in FIG. 15 can be replaced with the self-adhesive member 9 as illustrated in FIGS. 1 through 4, 8, or 9. Any structure of the bonded balls illustrated in FIGS. 1 to 4 or the structure of the sewn ball illustrated in FIG. 8 can be adopted to this form.

[0047] An example of a method for disposing the self-adhesive materials 28 in the opening portions 38 as illustrated in FIG. 15 is described.

First, a release paper is disposed within a molding recess which is a depressed portion from the surface of the mold; the reinforcing member 39 is arranged in the molding recess; a self-adhesive material 28 made of gel is poured into the molding recess; the outer skin member 3 having the opening portions 38 is disposed in the self-adhesive material 28 which was poured into the molding recess so that the outer skin member 3 and the self-adhesive material 28 are combined into a preliminary assembly. Next, this assembly of the outer skin member 3 and the self-adhesive material 28 is released from the mold; the released assembly of the outer skin member 3 and the self-adhesive material 28 is cut into a predetermined shape; the cut assembly of the outer skin member 3 and

the self-adhesive material 28 become integrated by means of heat welding or adhesive agents; in this integration process, a portion of the self-adhesive material 28 permeates into the reinforcing member 39 reaching the internal sphere 2. Consequently, the outer skin member 3 and self-adhesive material 28 become integrated so as to support the self-adhesive material 28 with the reinforcing member 39.

The method for disposing the self-adhesive material 28 in the opening portions 38 as illustrated in FIG. 15 is not limited to the above example. However the above method provides an easy manufacturing method for the above configuration.

[0048] With reference to FIG. 16, the ball 1 according to a thirteenth embodiment of the present invention is described.

In the ball as illustrated in FIG. 16, the outer skin member 3 comprises a plurality of opening portions 38 which pass through the outer skin member 3 in a front-back direction, and the self-adhesive material 28 is arranged in the opening portions 38. That is, the self-adhesive materials 28 are arranged on the surface side of the ball body 41, which is comprised of the internal sphere 2 and the outer skin member 3, and the self-adhesive materials 28 are supported by a reinforcing member which also functions as the outer skin member 3. Thereby, the self-adhesive material 28 is able to adhere to a user's fingers while a user is catching the ball 1. Consequently, the surface of the ball 1 does not easily slip and is easy to grip. In addition, a user's fingers are in contact with the portions arranged within the openings 38 which prevents the ball 1 from slipping due to the perspiration of the user. The configuration minimizes deformations of the self-adhesive material 28 when the ball 1 touches surfaces such as the ground or walls; and accordingly, the self-adhesive material 28 is not easily damaged and the durability of the self-adhesive material 28 is improved.

Further, in this embodiment a first portion of the self-adhesive material 28 is arranged between the internal sphere 2 and the outer skin member 3 and a second portion of the self-adhesive material 28 is arranged between the internal sphere 2 and a third portion of the self-adhesive material 28 which is arranged within the opening portions 38 of the outer skin member 3. This configuration allows the first portion, second portion, and third portion to be seamlessly connected to each other which prevents the self-adhesive material 28 from curling up.

[0049] The self-adhesive materials 28 as illustrated in FIG. 16 can be replaced with the self-adhesive member 9 as illustrated in FIGS. 1 through 4, 8, or 9. Any structure of the bonded balls illustrated in FIGS. 1 to 4 or the structure of the sewn ball illustrated in FIG. 8 can be adopted.

[0050] With reference to FIG. 17, the ball 1 according to a fourteenth embodiment of the present invention is described.

In the ball as illustrated in FIG. 17, particulate reinforcing members 40 are arranged within a self-adhesive material 28; the self-adhesive material 28 is arranged on the surface side of the ball body 41 which is constituted by the internal sphere 2 and the outer skin member 3, and the self-adhesive material 28 is supported by the reinforcing members 40. Thereby, the self-adhesive material 28 is able to adhere to a user's fingers while a user is catching the ball 1. Consequently, the surface of the ball 1 does not easily slip and is easy to grip; in addition, a user's fingers are in contact with the portions of the reinforcing member 40 which protrude outward from the self-adhesive material 28 preventing the ball 1 from slipping due to the perspiration of the user. The self-adhesive material 28 as illustrated in FIG. 17 can be replaced with the self-adhesive member 9 as illustrated in FIGS. 1 through 4, 8, or 9. Any structure of the bonded balls illustrated in FIGS. 1 to 4 or the structure of the sewn ball illustrated in FIG. 8 can be adopted.

[0051] With reference to FIG. 18, the ball 1 according to a fifteenth embodiment of the present invention is described.

In the ball 1 of FIG. 18, the self-adhesive member 9, which is constituted by the self-adhesive material and the reinforcing member supported by the self-adhesive material, is arranged on the surface side of the ball body 41, which is constituted by the internal sphere 2 and the outer skin member 3; moreover, the ball 1 is a sewn ball which is formed by stitching the self-adhesive materials 9 on the outer skin member 3 and the outer skin members 3 together with sewing threads 26; thereby, the self-adhesive members 9 is able to adhere to a user's fingers while a user is catching the ball 1. Consequently, the surface of the ball 1 does not easily slip and is easy to grip. Moreover, the internal sphere 2 made of soft materials such as resin or rubber is covered with a carcass 42 made of threads, cotton tissue or the like; the outer skin members 3 has spaces 43 and cushions 44; each cushion 44 is arranged in each space 43 which is defined by the carcass 42, the surface portion 4 of the outer skin member 3, and the peripheral wall 5 of the outer skin member 3. This configuration prevents a user from experiencing a hard feeling when grasping the ball 1.

The cushion 44 is made of a cushioning material such as a flexible foam or non-woven fabric and the flexible foam can be made of a rubber sponge, polyurethane foam or the like. The cushion 44 can be bonded with either or both of the surface portion 4 of the outer skin member 3 and the carcass 42; the cushion 44 may also be unbonded with any of the surface portion 4 of the outer skin member 3 and the carcass 42. If the cushion 44 is bonded to either or both of the surface portion 4 of the outer skin member 3 and the carcass 42, the adhesive effect is increased.

[0052] The self-adhesive member 9 of FIG. 18 can be replaced with a self-adhesive material 28 supported by a reinforcing member as illustrated in FIGS. 9 through 17. If the self-adhesive member 9 is replaced with the self-adhesive material 28, the self-adhesive material 28 is impregnated into the surface side of the outer skin member 3, and at least one portion of outer skin member

3 functions as the reinforcing member for the self-adhesive material 28.

[0053] With reference to FIG. 19, the ball 1 according to a sixteenth embodiment of the present invention is described.

The ball 1 of FIG.19 is different from the ball of FIG. 18 in that the self-adhesive members 9 are arranged in such a manner so as to not be sewn together by the sewing threads 26, which are sewing together the adjacent outer skin members 3, but arranged in such a manner that the self-adhesive members 9 are in contact with the sewing threads 26 or in the near vicinity of the sewing threads 26 so as to be almost in contact with the sewing threads 26. Such a configuration with the self-adhesive members 9 arranged in the near vicinity of the outside portions of the sewing thread 26 prevents the ends of the self-adhesive members 9 from easily curling up and allow the self-adhesive members 9 to not peel off easily.

[0054] The self-adhesive member 9 of FIG. 19 can be replaced with a self-adhesive material 28 supported by a reinforcing member as illustrated in FIGS. 9 through 17. If the self-adhesive member 9 is replaced with the self-adhesive material 28, the self-adhesive material 28 is impregnated into the surface side of the outer skin member 3, and at least one portion of outer skin member 3 functions as the reinforcing member for the self-adhesive material 28.

[0055] With reference to FIG. 20, the ball 1 according to a seventeenth embodiment of the present invention is described.

The ball 1 of FIG.20 is different from the balls of FIGS. 18 and 19 in that each of the self-adhesive members 9 is configured such that each self-adhesive member 9 covers the beveled portions 6 of an outer skin member 3 with the end portions of the self-adhesive member 9. Such a configuration in which each self-adhesive member 9 has at least one portion extending to the recesses formed by the adjacent beveled portions 6 prevents the ends of the self-adhesive members 9 from easily curling up and allow the self-adhesive members 9 to not peel off easily. Moreover, if the configuration in which each self-adhesive member 9 has at least one portion extending to the recesses formed by the adjacent beveled portions 6 is able to be adapted to the processes such that a plurality of adjacent outer skin members 3 can be sewn with the sewing threads 26, the sewn plurality of adjacent outer skin members 3 are spread and then the self-adhesive members 9 are arranged such that each self-adhesive member 9 covers each surface portion 4 of the outer skin member 3 and each beveled portion 6 of the outer skin member 3.

[0056] The self-adhesive member 9 of FIG. 20 can be replaced with a self-adhesive material 28 supported by a reinforcing member as illustrated in FIGS. 9 through 17. If the self-adhesive member 9 is replaced with the self-adhesive material 28, the self-adhesive material 28 is impregnated into the surface side of the outer skin member 3, and at least one portion of outer skin member3 functions as the reinforcing member for the self-adhesive material 28.

REFERENCE SIGNS LIST

[0057]

1	ball
2	internal sphere
3	outer skin member
4	surface portion
5	peripheral wall
6	beveled portion
7	cavity
8	projecting portion
9	self-adhesive member
10	mounting area for the self-adhesive member
11	cushion
12	periphery cover
13	space
14	upper portion
15	lower portion
16	side portion
17	upper opening
18	lower opening
21	non-woven fabric
22	resin fiber
23	fusion point
24	core
25	coat
26	sewing thread
27	reinforcing member
28	self-adhesive material
29	surface of outer skin member 3
30	reinforcing member
31	surface of reinforcing member 30
32	reinforcing member
33	mesh spaces
34	recessed surfaces
35	protrusion
37	recess
38	opening portion
39	reinforcing member
40	reinforcing member
41	ball body
42	carcass
43	space
44	cushion

Claims

1. A ball, comprising:

a ball body; and
at least one self-adhesive member disposed on the surface side of the ball body,
wherein the at least one of self-adhesive mem-

ber includes a self-adhesive material and a reinforcing member supporting the self-adhesive material.

2. The ball according to claim 1 or 2, further comprising:

at least one mounting area for the at least one of self-adhesive member, where the at least one self-adhesive member is mounted on the surface side of the ball body, and
wherein the at least one mounting area is formed as a recess or a segmented area which is segmented by at least one protrusion protruding from the surface of the ball body.

3. The ball according to claims 1, wherein the self-adhesive material is made of gel.

FIG.1

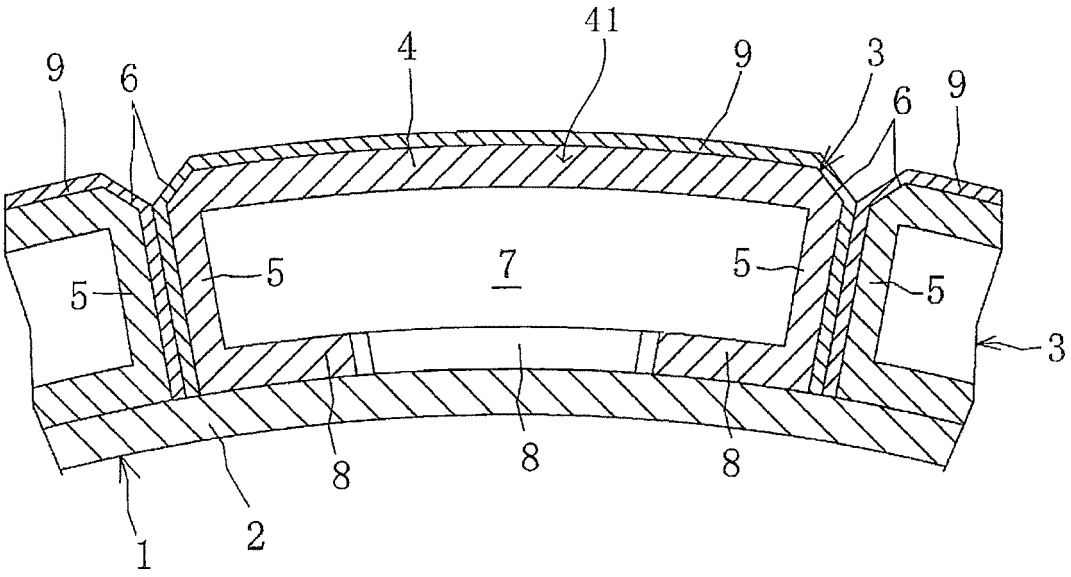


FIG.2

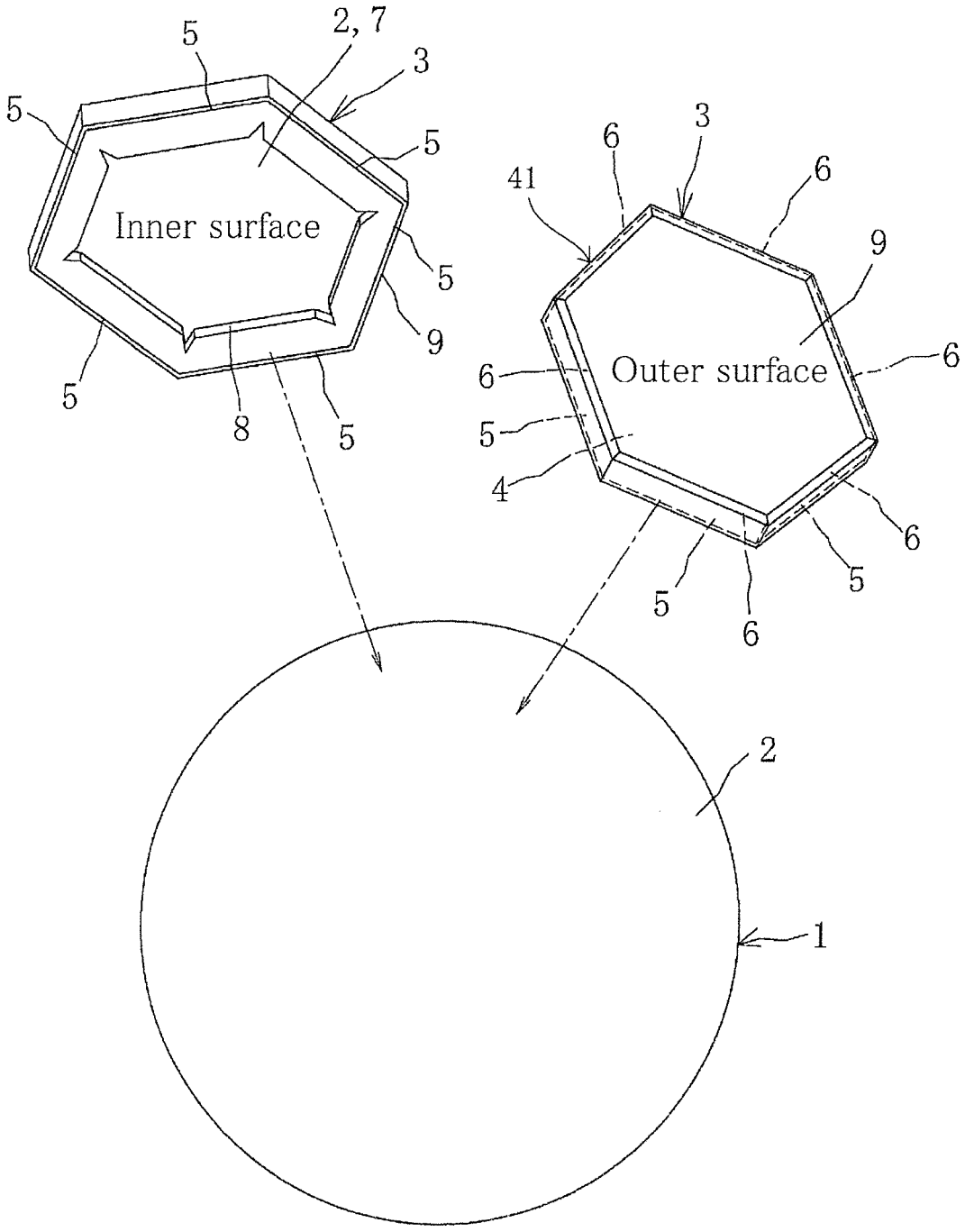

5
2, 7
3
5
5
Inner surface
5
9
5
8
5
41
6
3
6
9
6
Outer surface
6
5
4
6
5
6
5
2
1

FIG.3

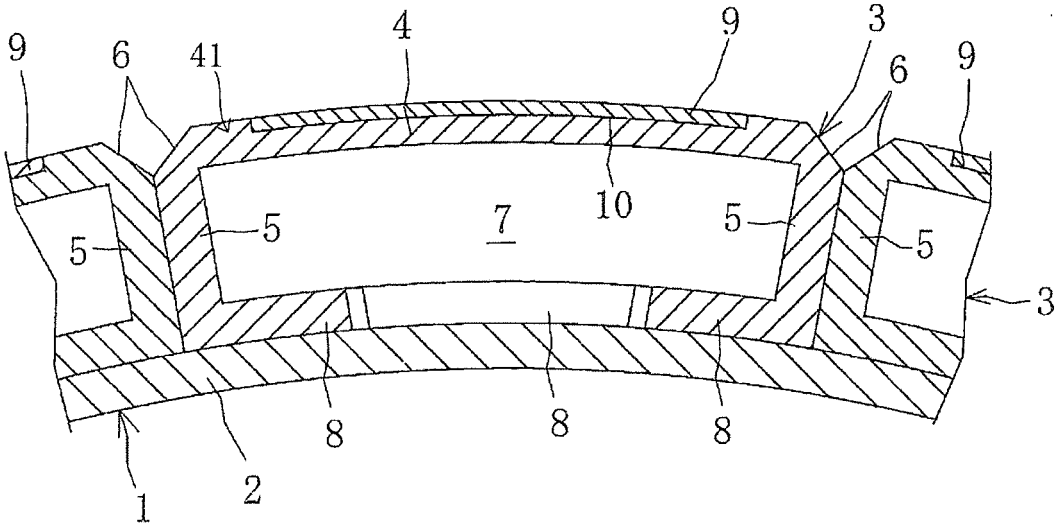


FIG.4

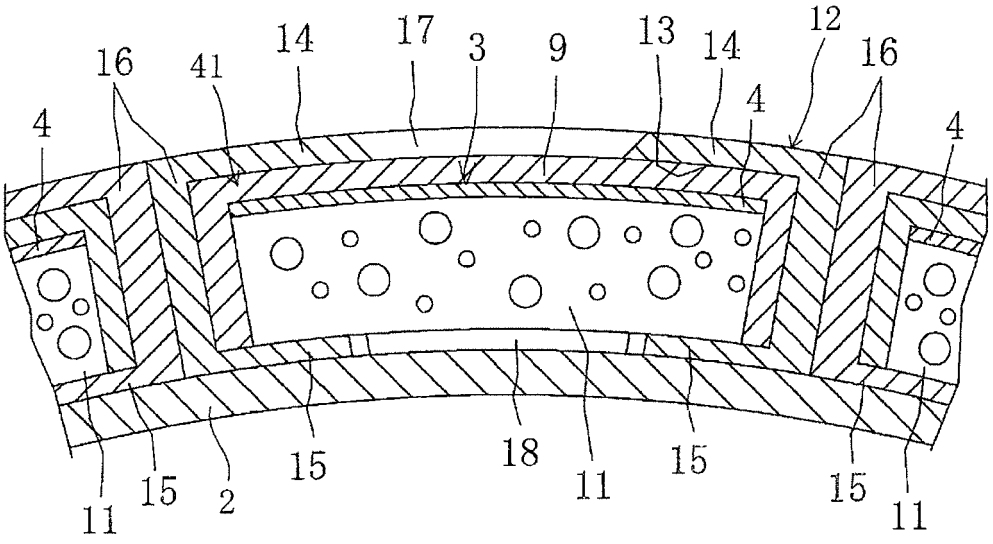


FIG.5

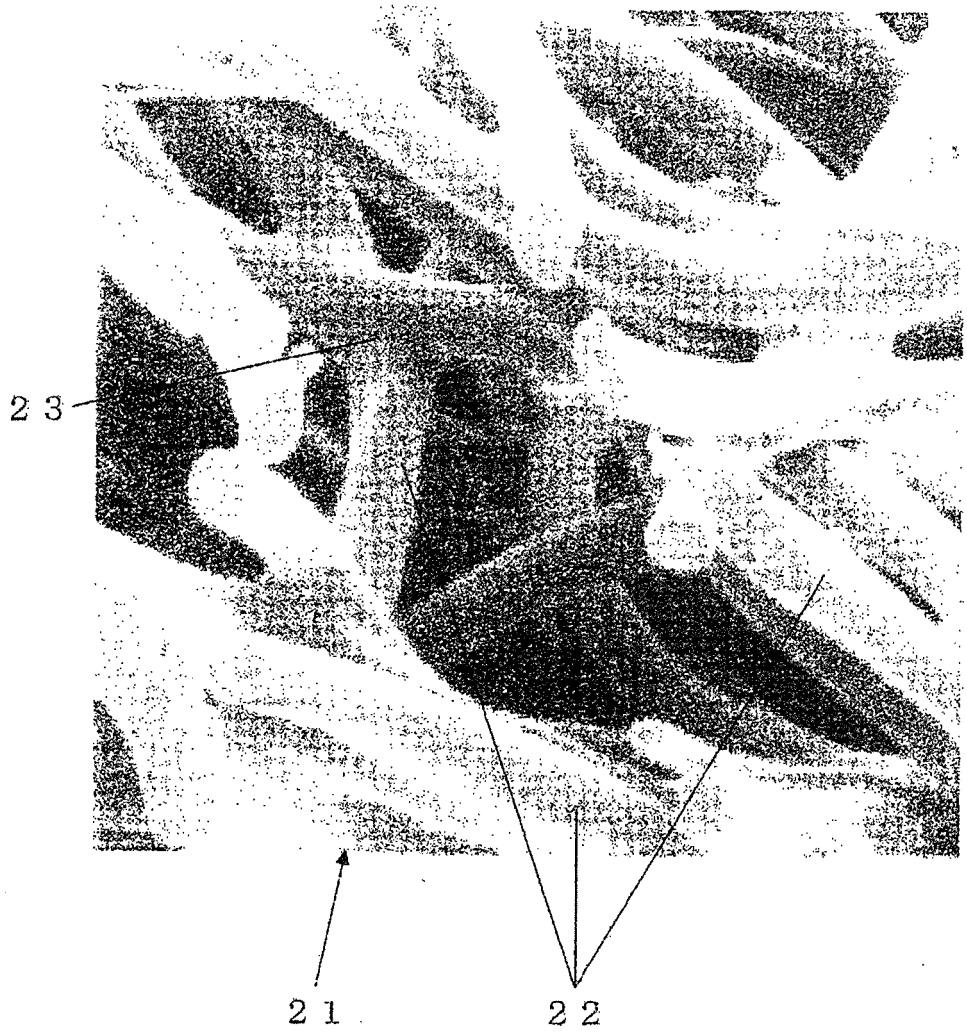


FIG.6

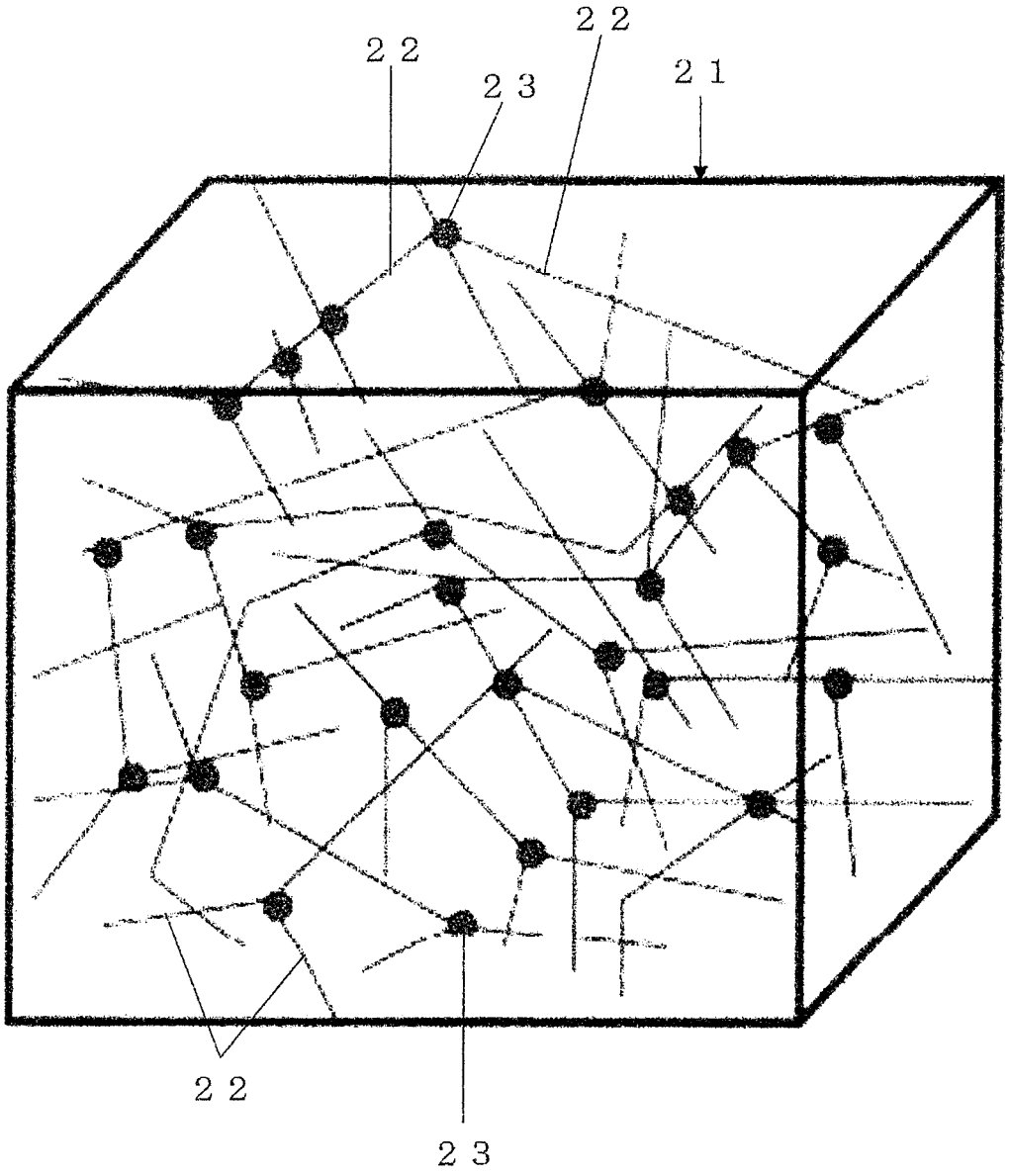


FIG.7

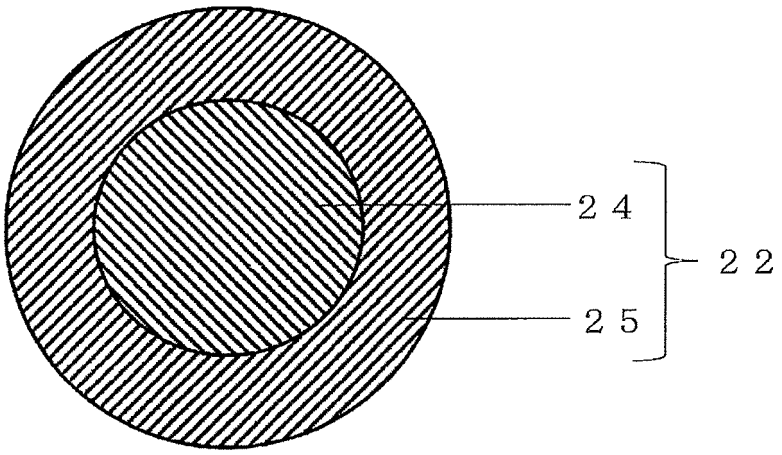


FIG.8

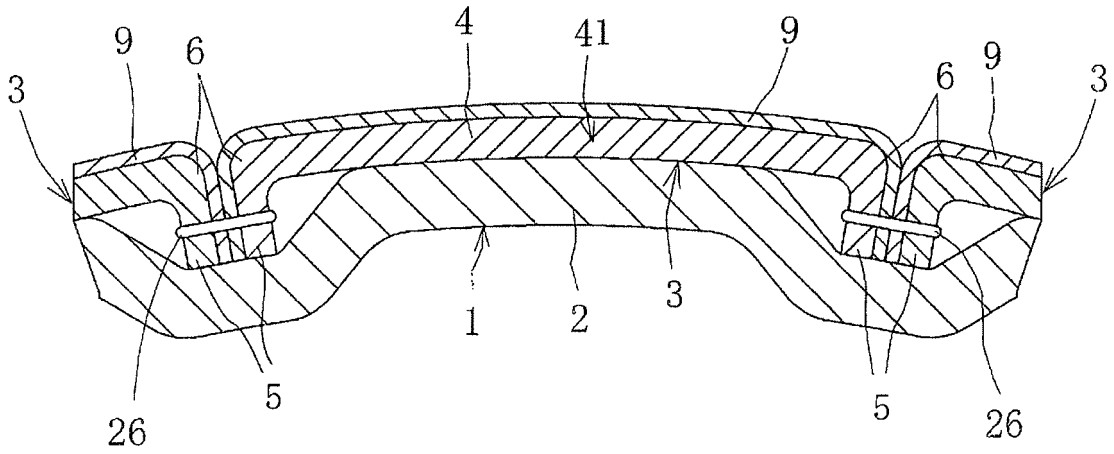


FIG.9

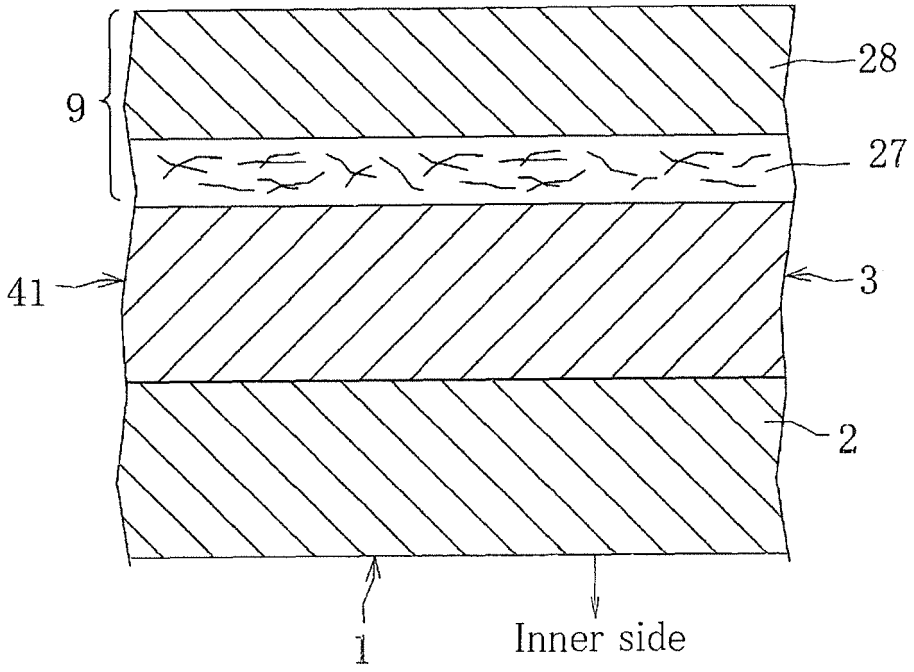


FIG.10

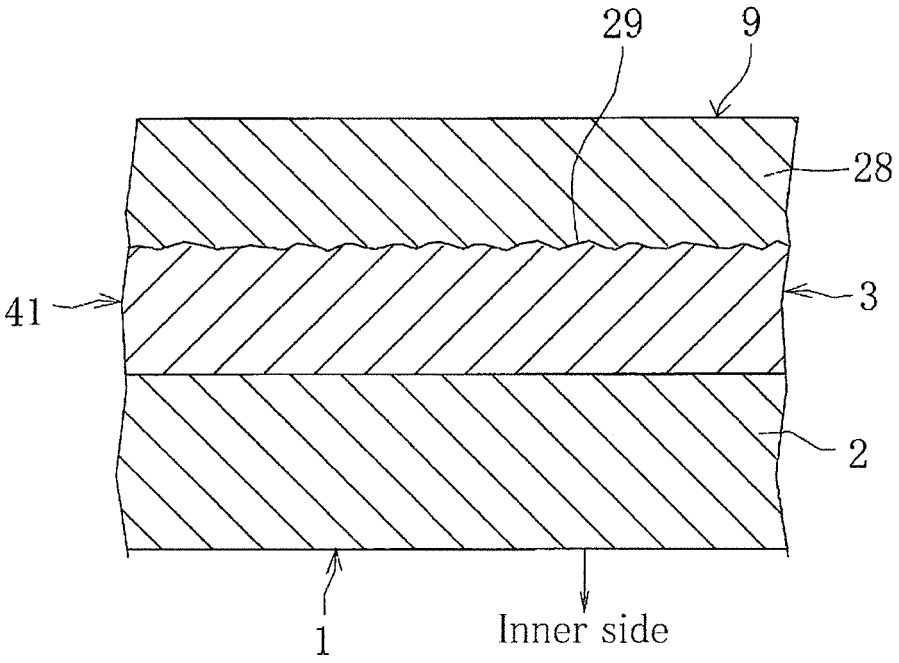


FIG.11

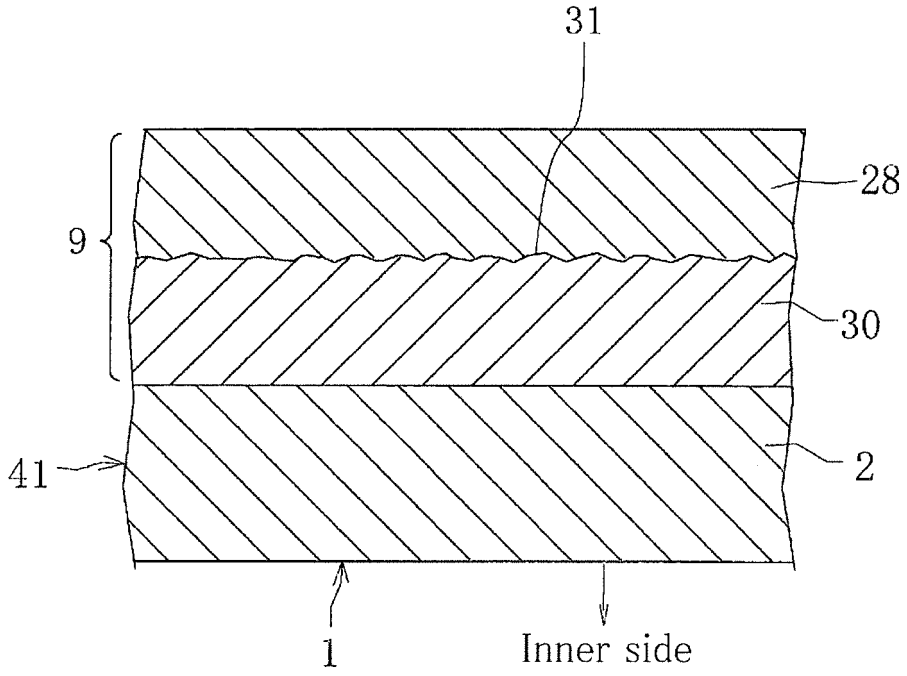


FIG.12

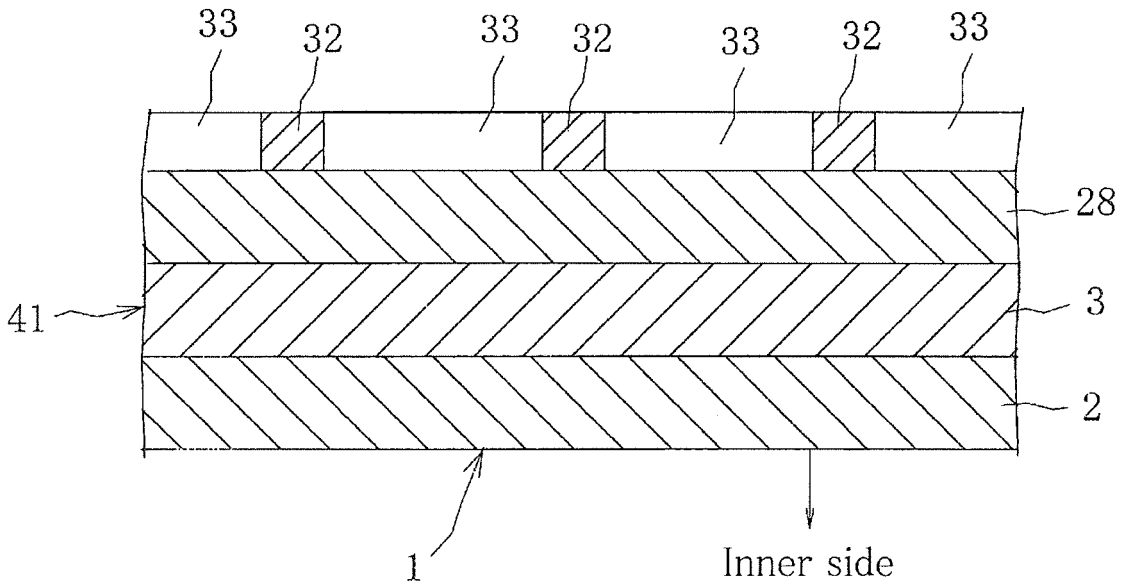


FIG.13

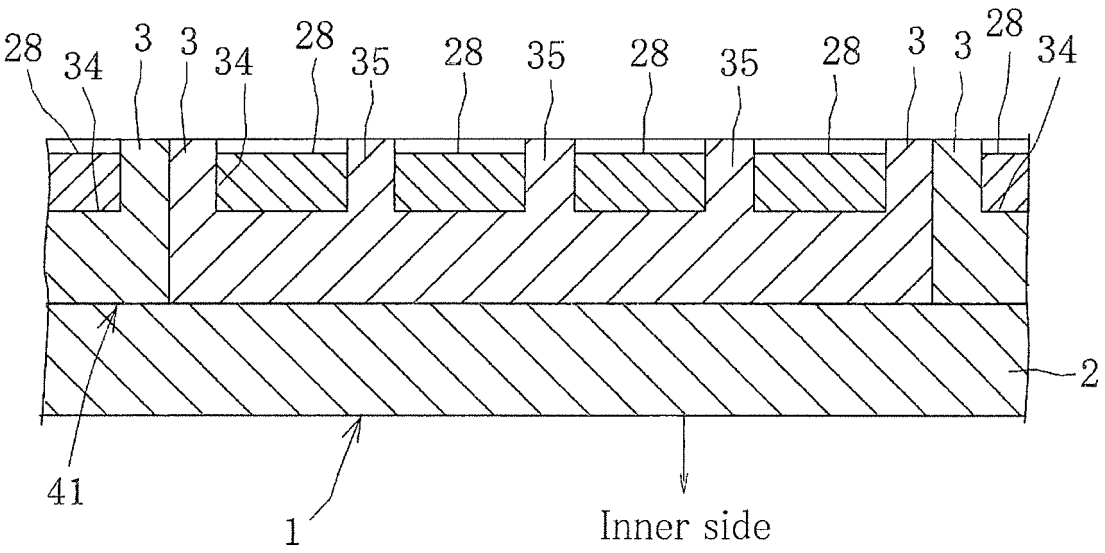


FIG.14

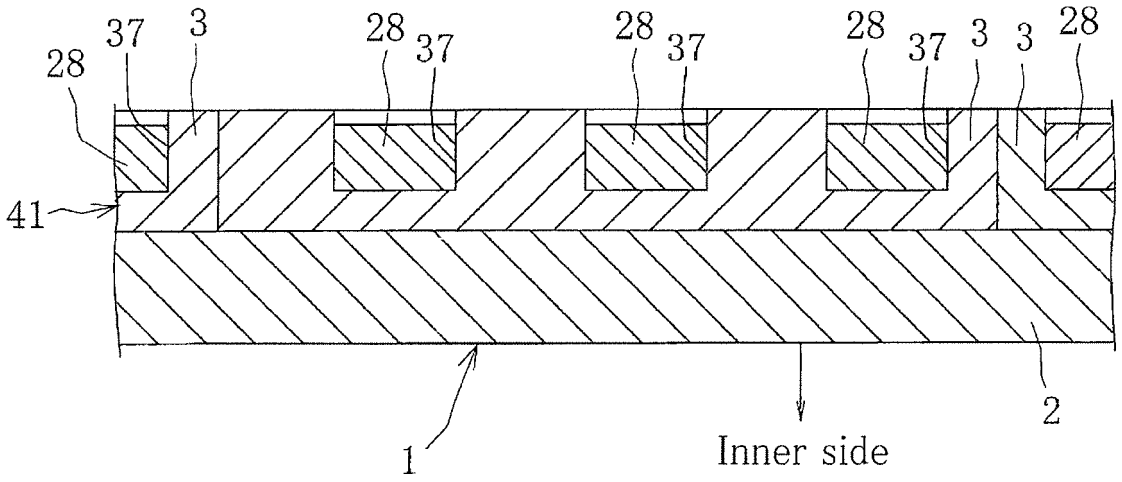


FIG.15

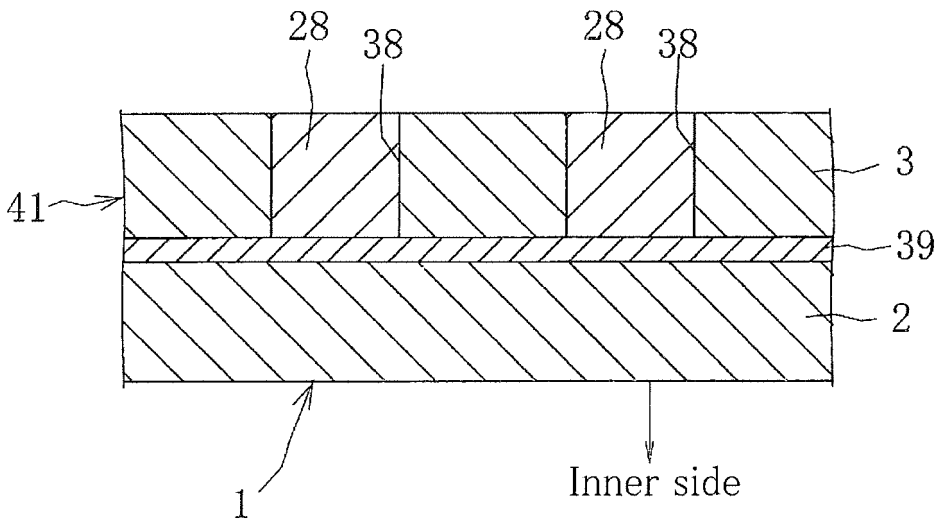


FIG.16

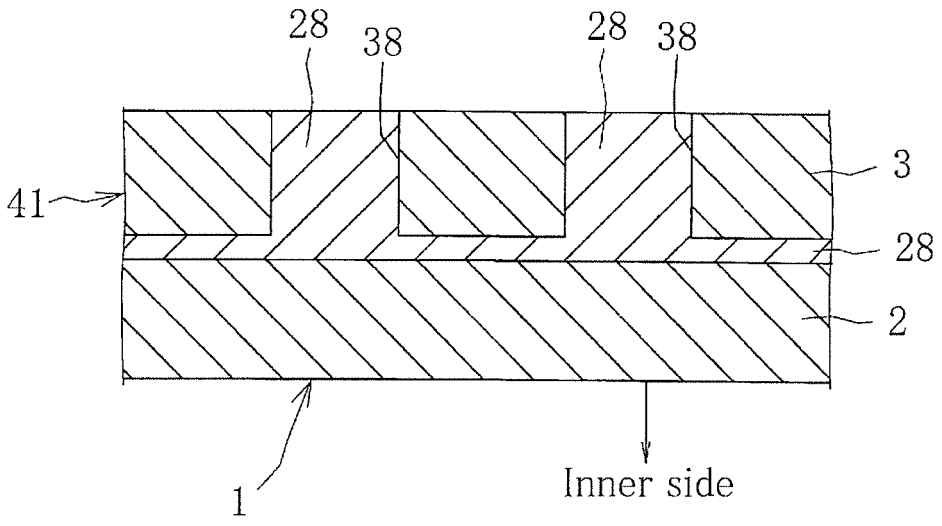


FIG.17

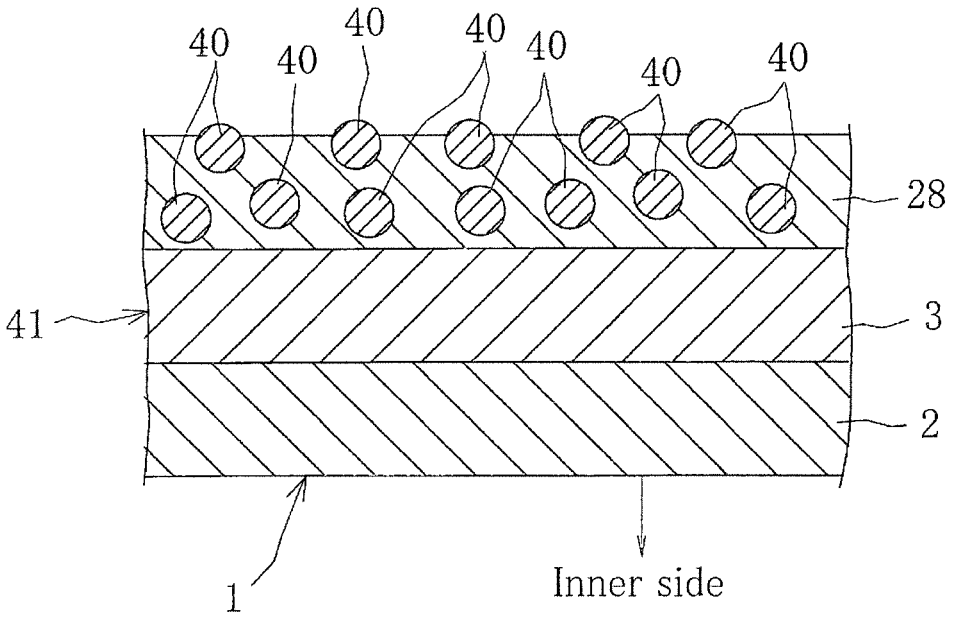


FIG.18

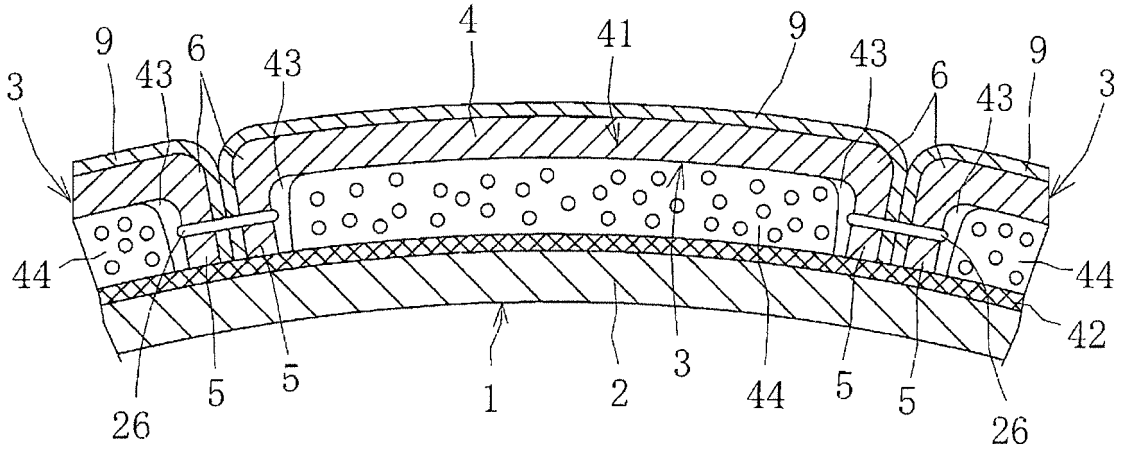


FIG.19

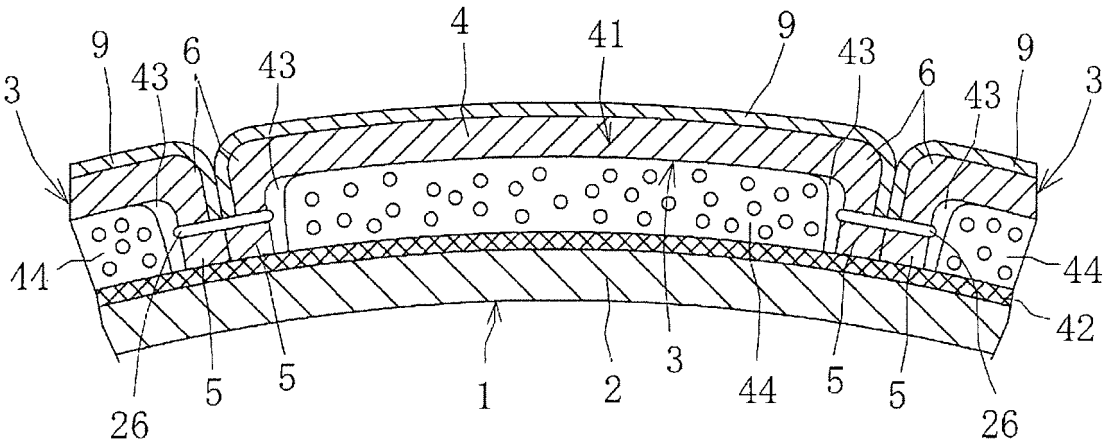


FIG.20

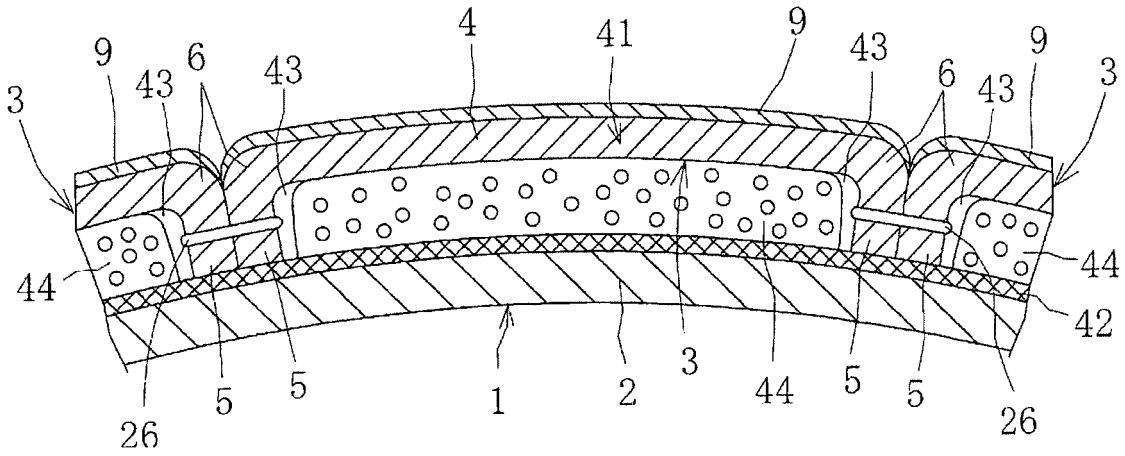
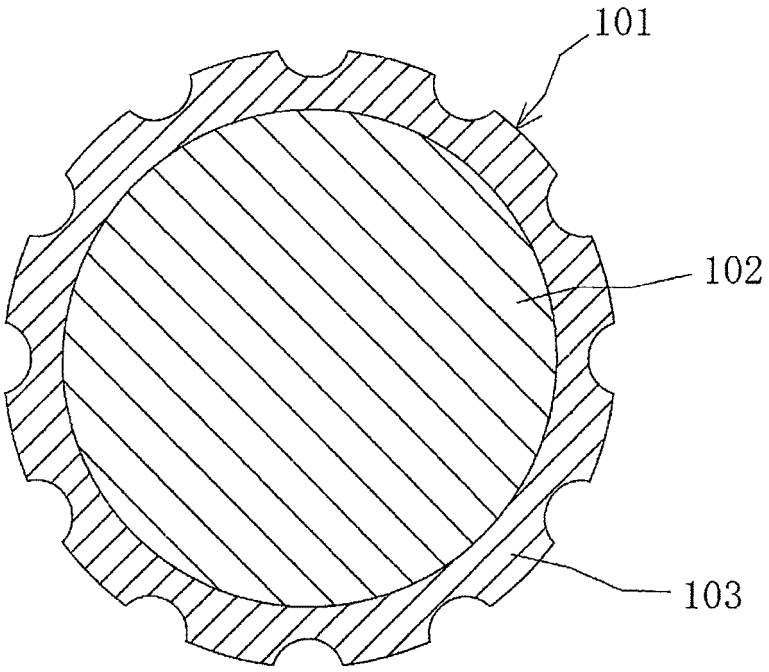


FIG.21



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2016/061628

A. CLASSIFICATION OF SUBJECT MATTER
A63B41/00(2006.01)i, *A63B37/00*(2006.01)i, *A63B39/00*(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A63B41/00, A63B37/00, A63B39/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2016
Kokai Jitsuyo Shinan Koho 1971-2016 Toroku Jitsuyo Shinan Koho 1994-2016

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2005/097269 A1 (Kuraray Co., Ltd.), 28 February 2008 (28.02.2008), paragraphs [0001], [0010] to [0011], [0020] to [0022], [0029] to [0031], [0035], [0037] & EP 1738806 A1 paragraphs [0001], [0010] to [0011], [0020] to [0022], [0029] to [0031], [0035], [0037]	1-2
X Y	JP 2006-89863 A (Teijin Cordley Ltd.), 06 April 2006 (06.04.2006), paragraphs [0002] to [0006], [0011], [0014], [0017], [0020], [0023] to [0024], [0043] & US 2010/0151133 A1 paragraphs [0004] to [0008], [0011], [0014], [0017], [0020], [0023] to [0024], [0044]	1,3 2

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
21 June 2016 (21.06.16)	05 July 2016 (05.07.16)
Name and mailing address of the ISA/ Japan Patent Office 3-4-3,Kasumigaseki,Chiyoda-ku, Tokyo 100-8915,Japan	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2016/061628

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2012-139453 A (Morten Corp.), 26 July 2012 (26.07.2012), paragraphs [0007], [0027] to [0035], [0040], [0068]; fig. 2, 4 (Family: none)	2

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP S64198943956 B **[0003]**