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(54) **BOTTLE CAP**

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(75) Inventor: **Ken-Te Chen**, Shanhua Township (TW)

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Correspondence Address:
SHOOK, HARDY & BACON LLP
INTELLECTUAL PROPERTY DEPARTMENT
2555 GRAND BLVD
KANSAS CITY, MO 64108-2613 (US)

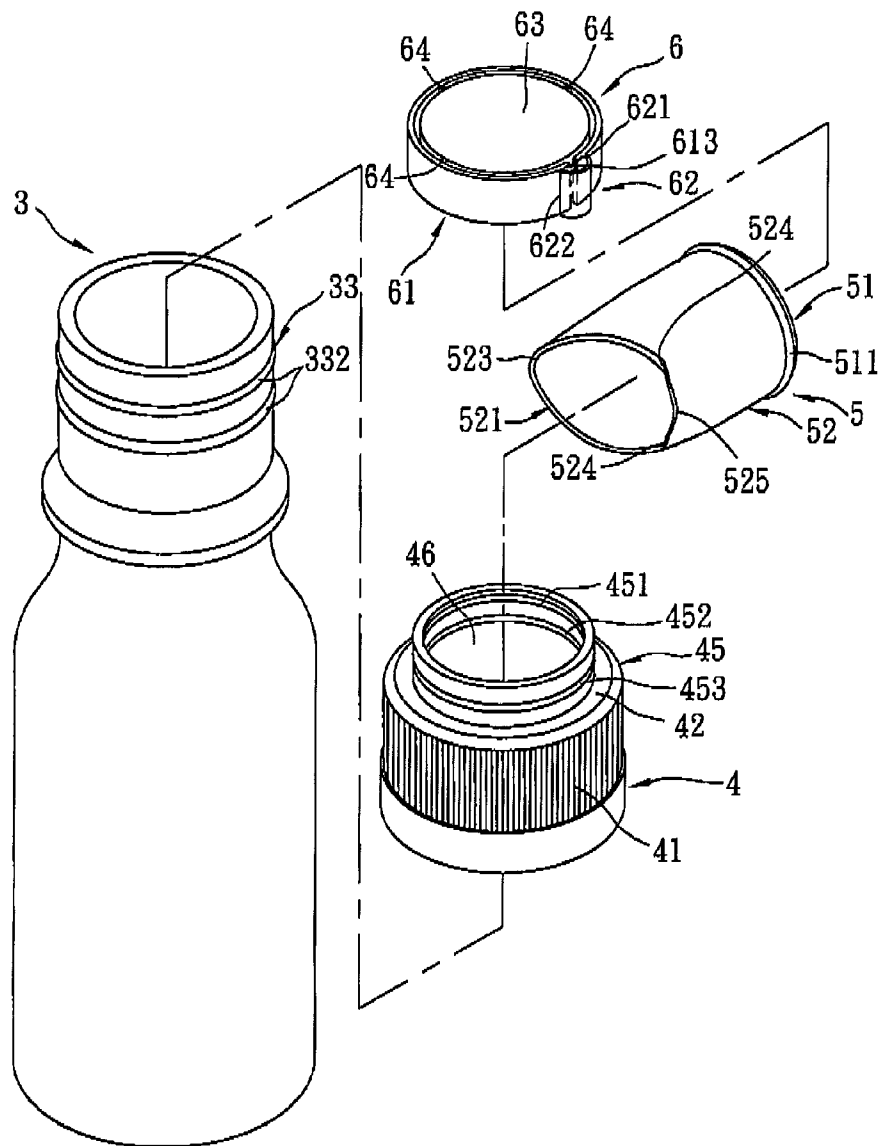
(57) **ABSTRACT**

A bottle cap includes a cap seat and a cap. The cap seat has a receiving space confined by an inner tubular wall and a bottom wall. The cap is disposed within the inner tubular wall, and has a top panel and a tubular cutter body. The tubular cutter body has a beveled bottom open end that has a cutting end and a pushing end. When the top panel is pressed, the cutting end cuts the bottom wall, and the pushing end pushes a portion of the bottom wall so that the bottom wall moves away from the cutting end. Preferably, the bottom wall and the inner tubular wall are formed as one piece.

(73) Assignee: **GenMont Biotech Incorporation**, Shanhua Township (TW)

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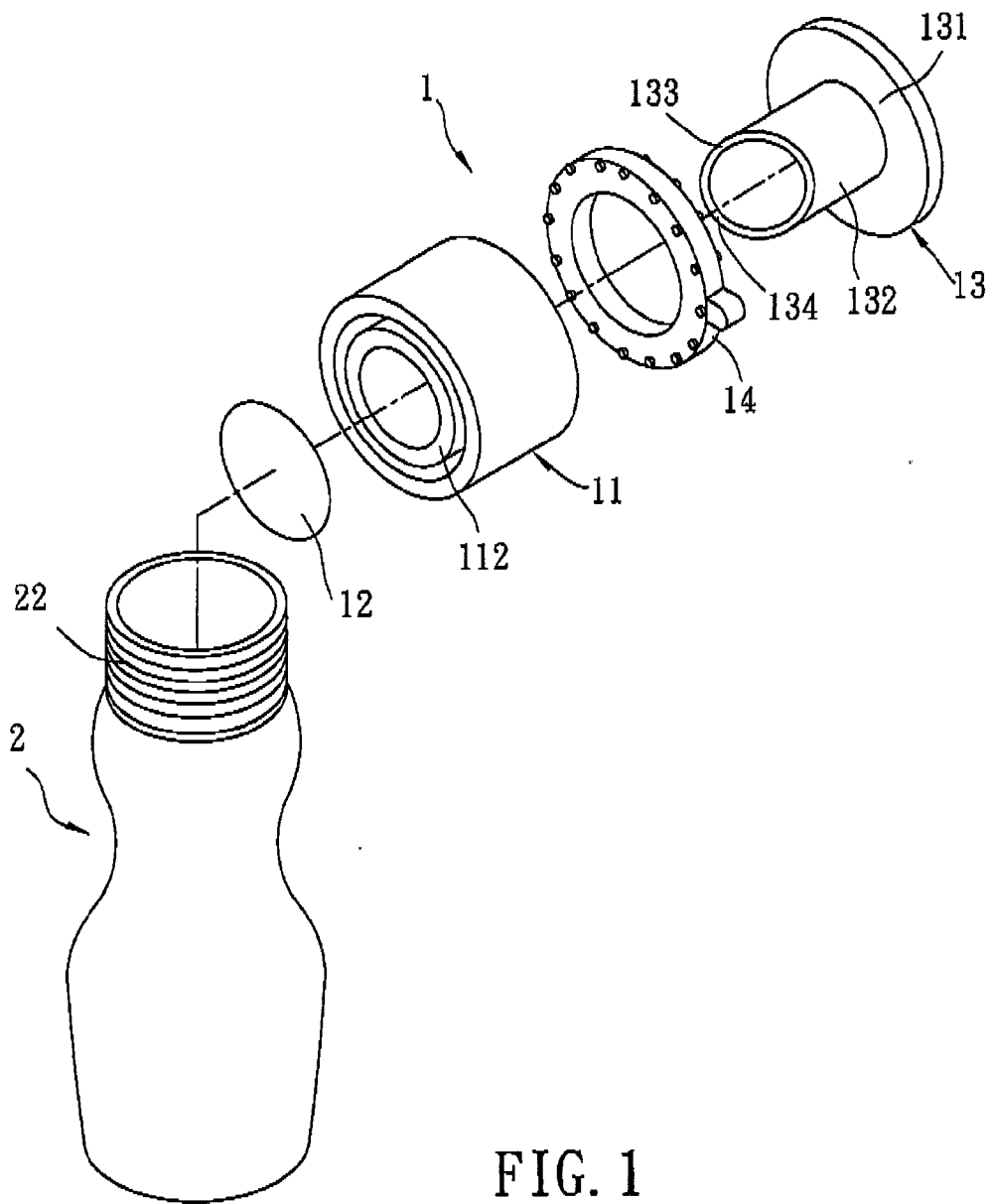


FIG. 1
PRIOR ART

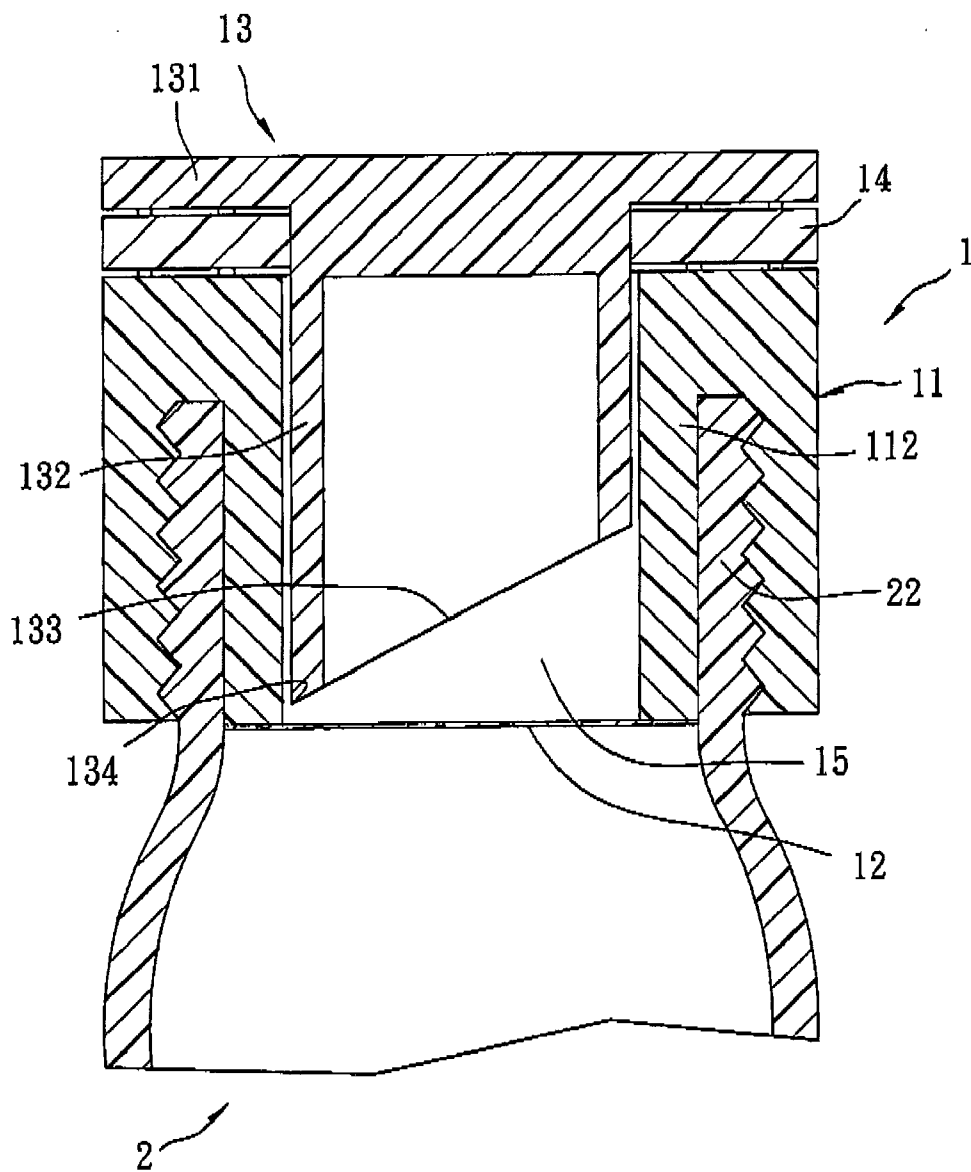


FIG. 2
PRIOR ART

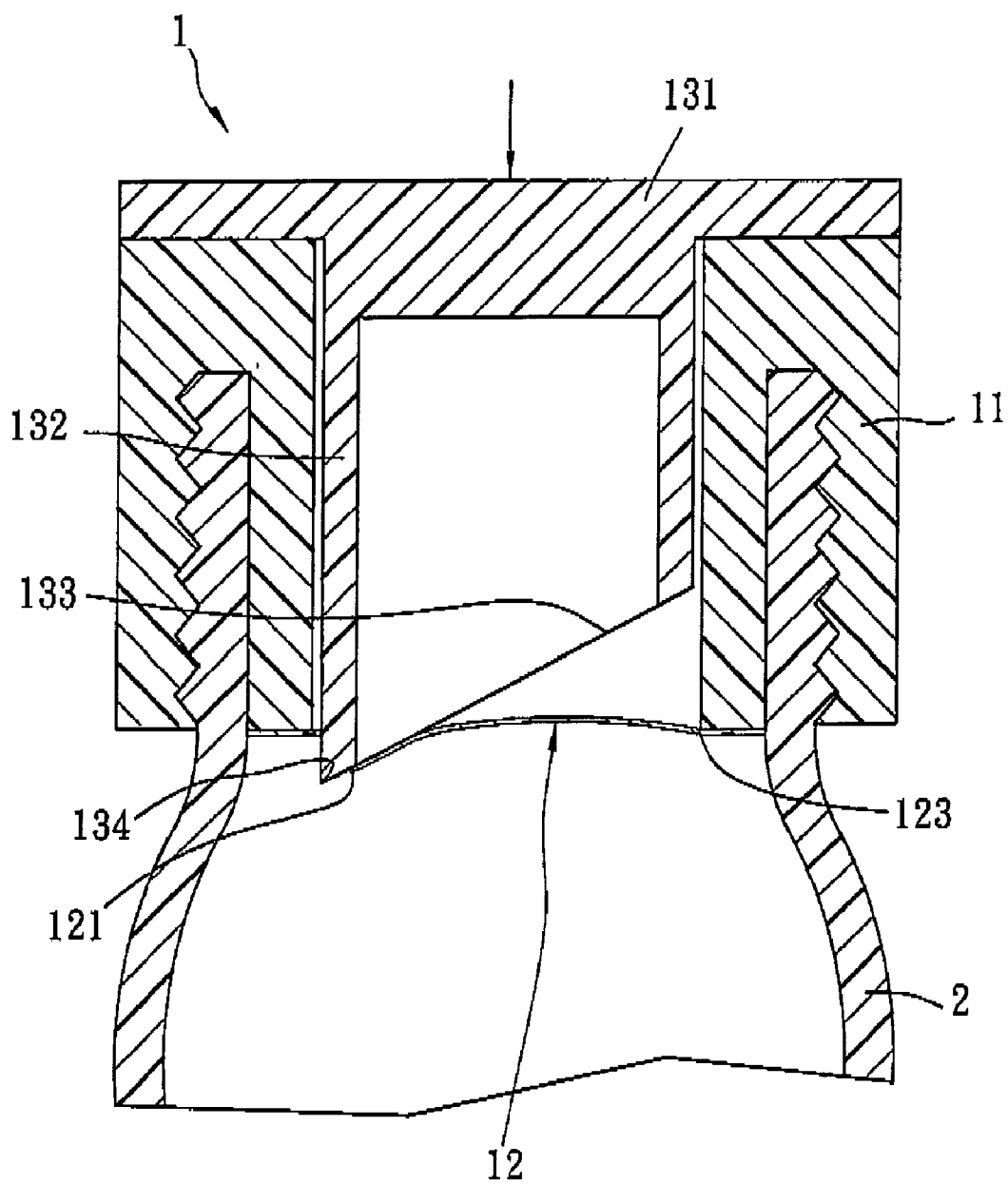


FIG. 3
PRIOR ART

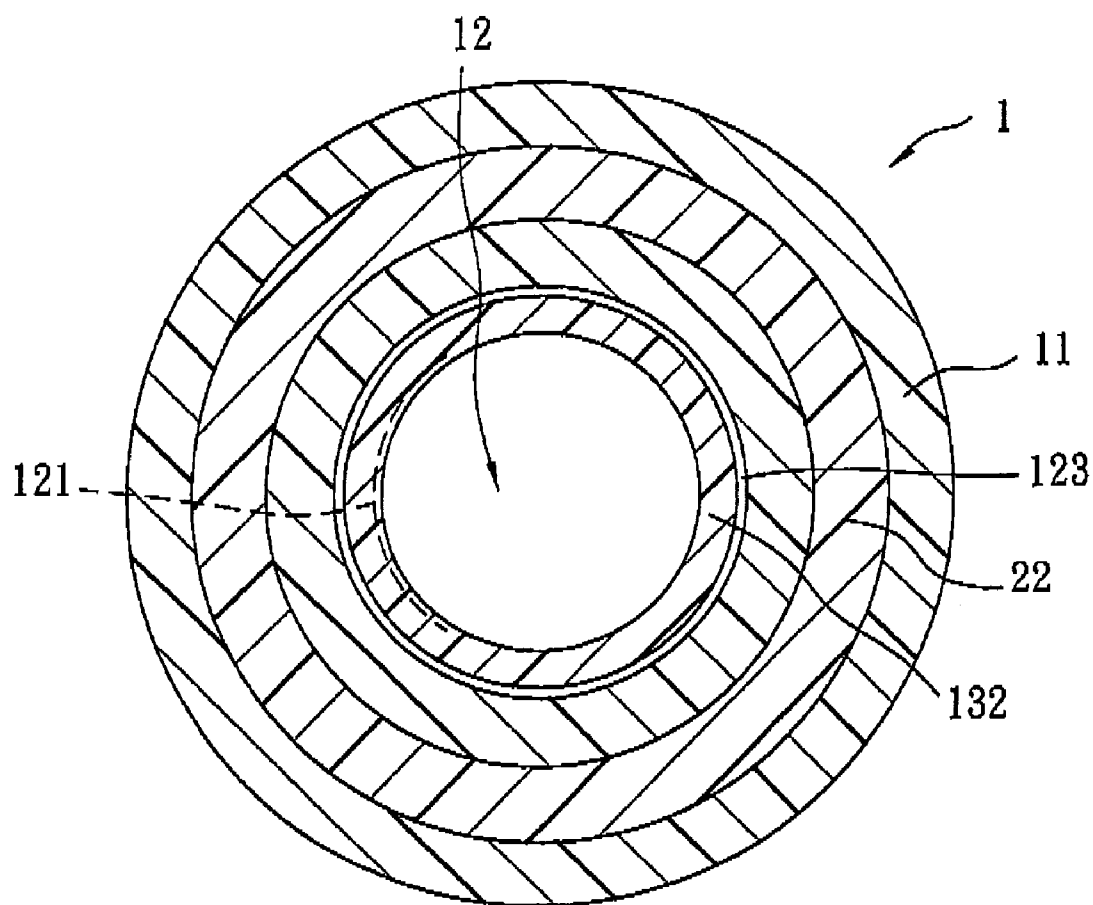


FIG. 4
PRIOR ART

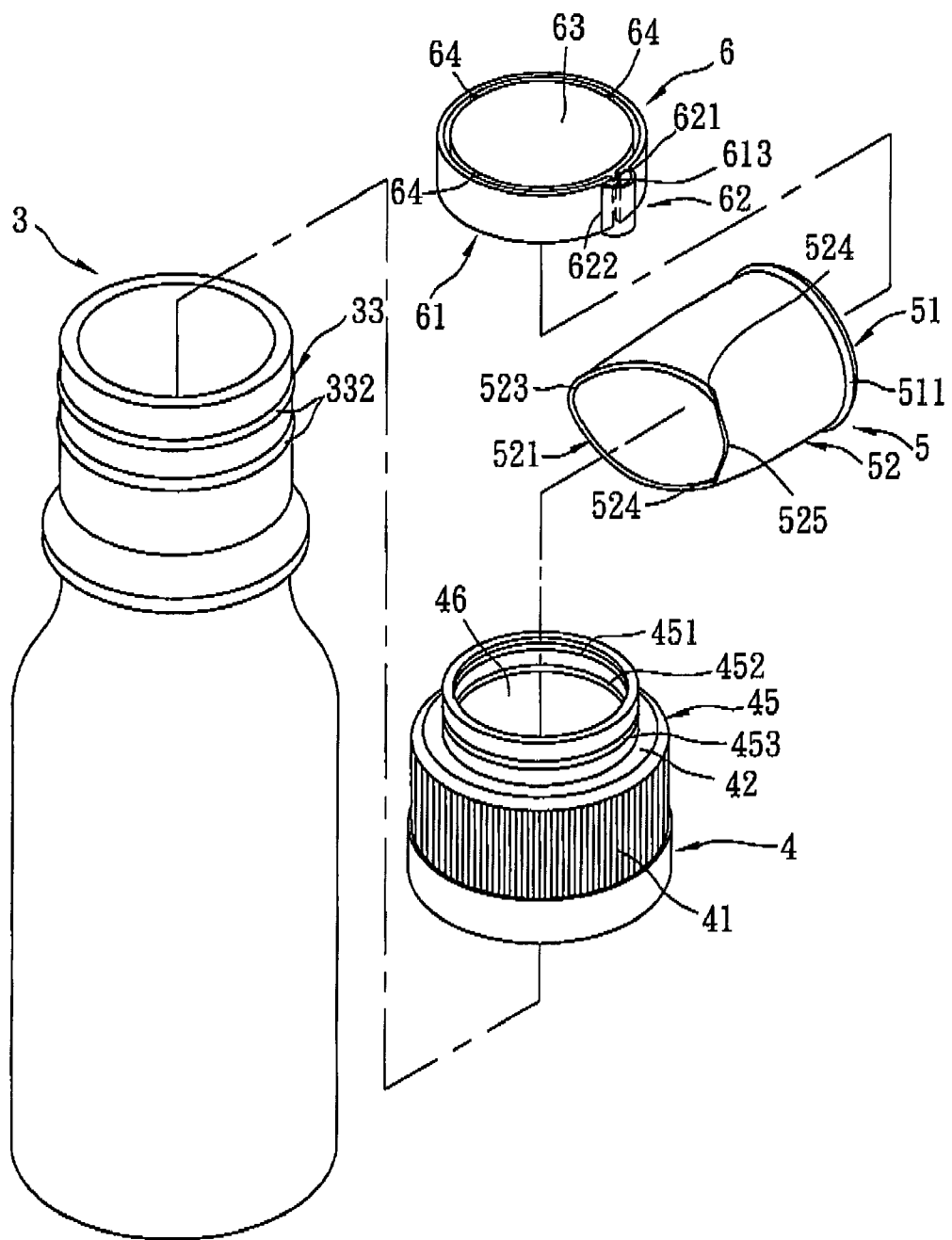


FIG. 5

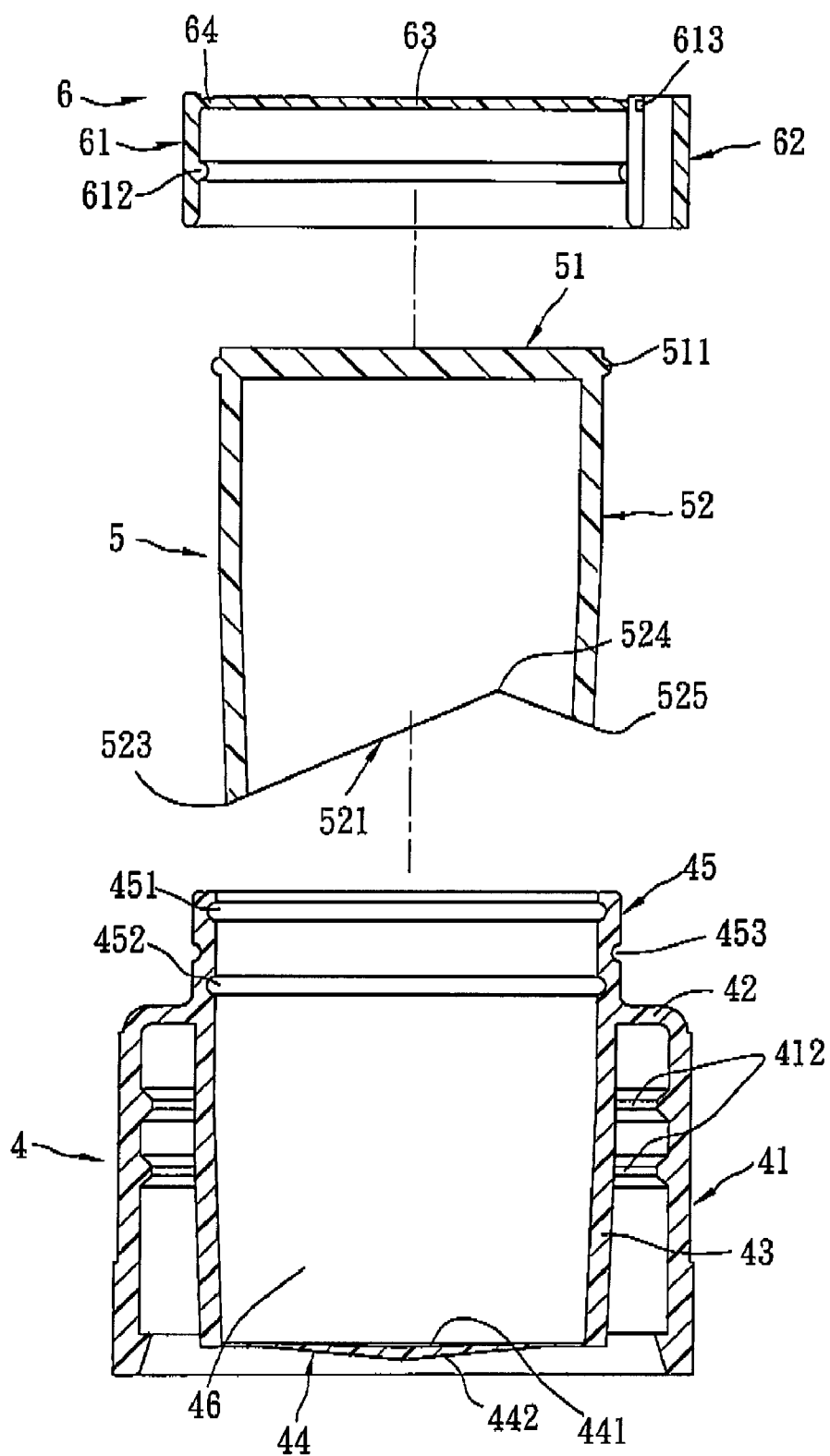


FIG. 6

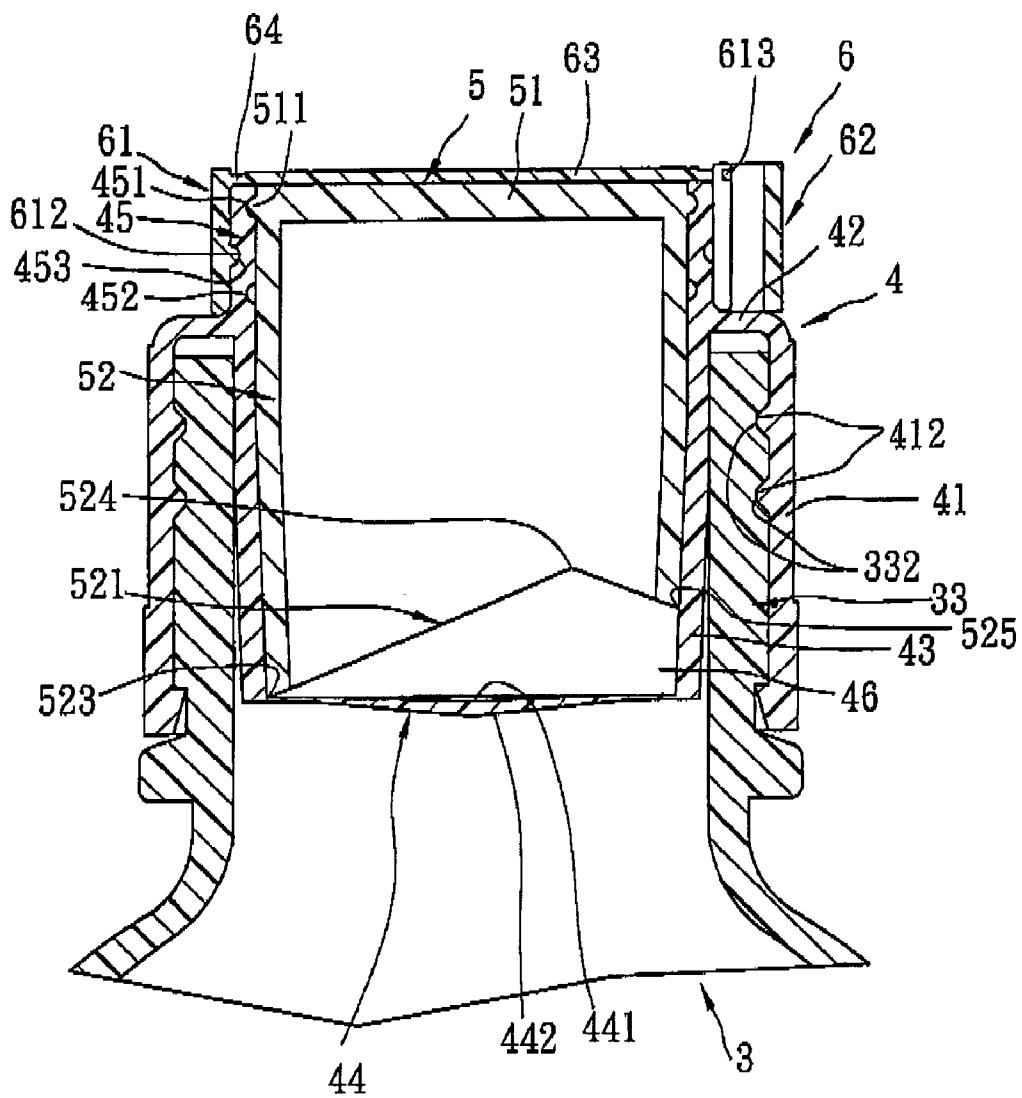


FIG. 7

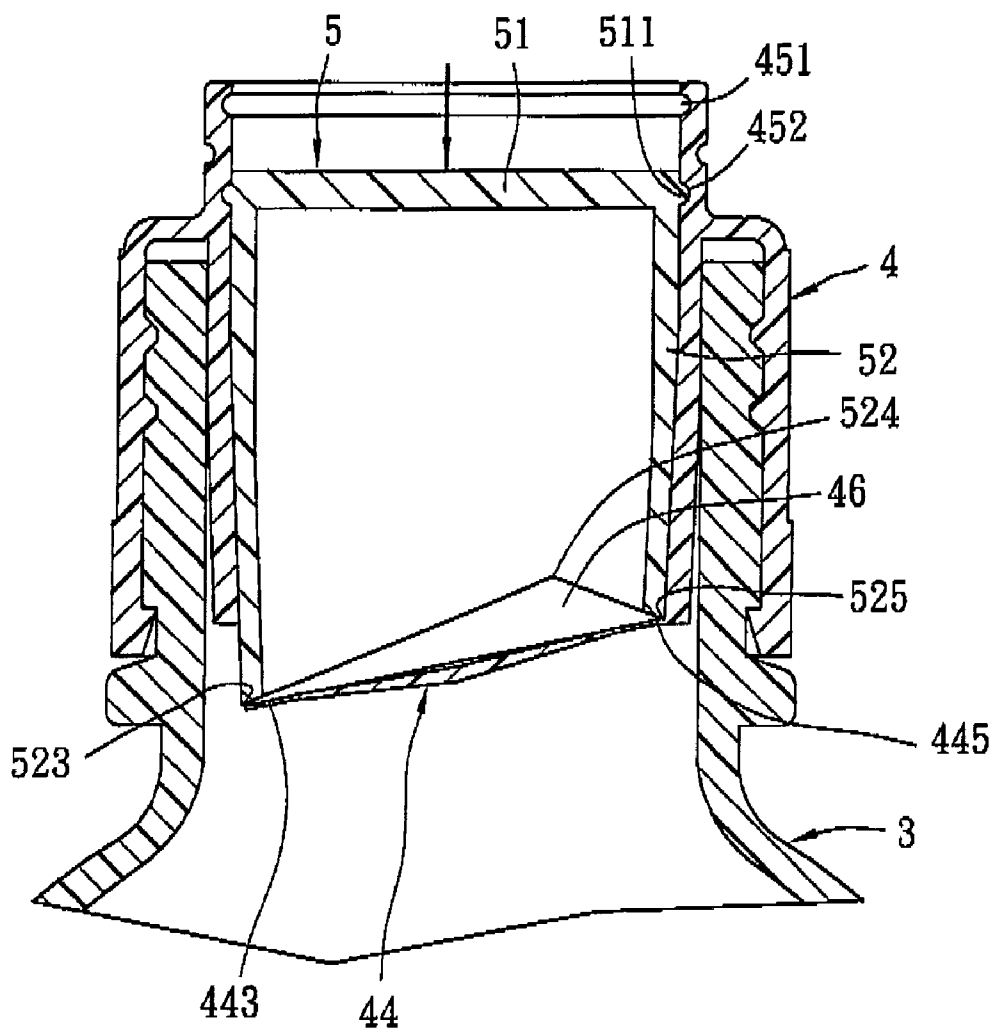


FIG. 8

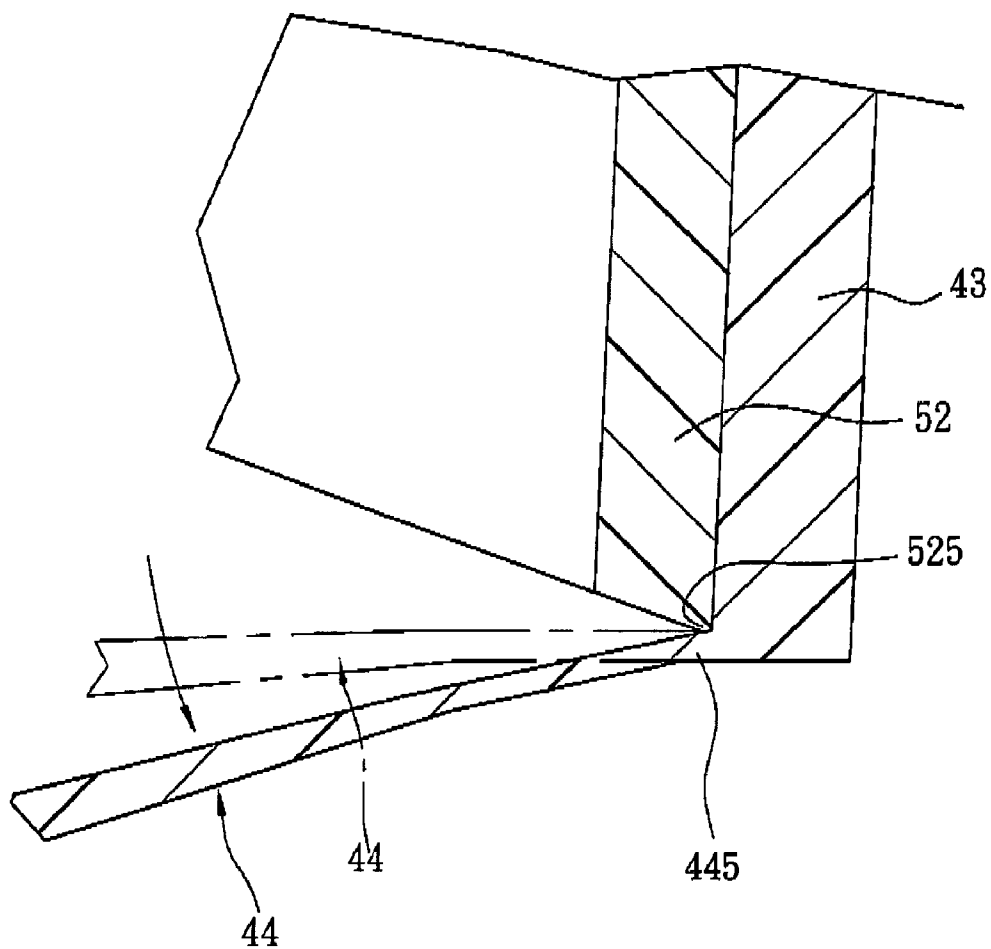


FIG. 9

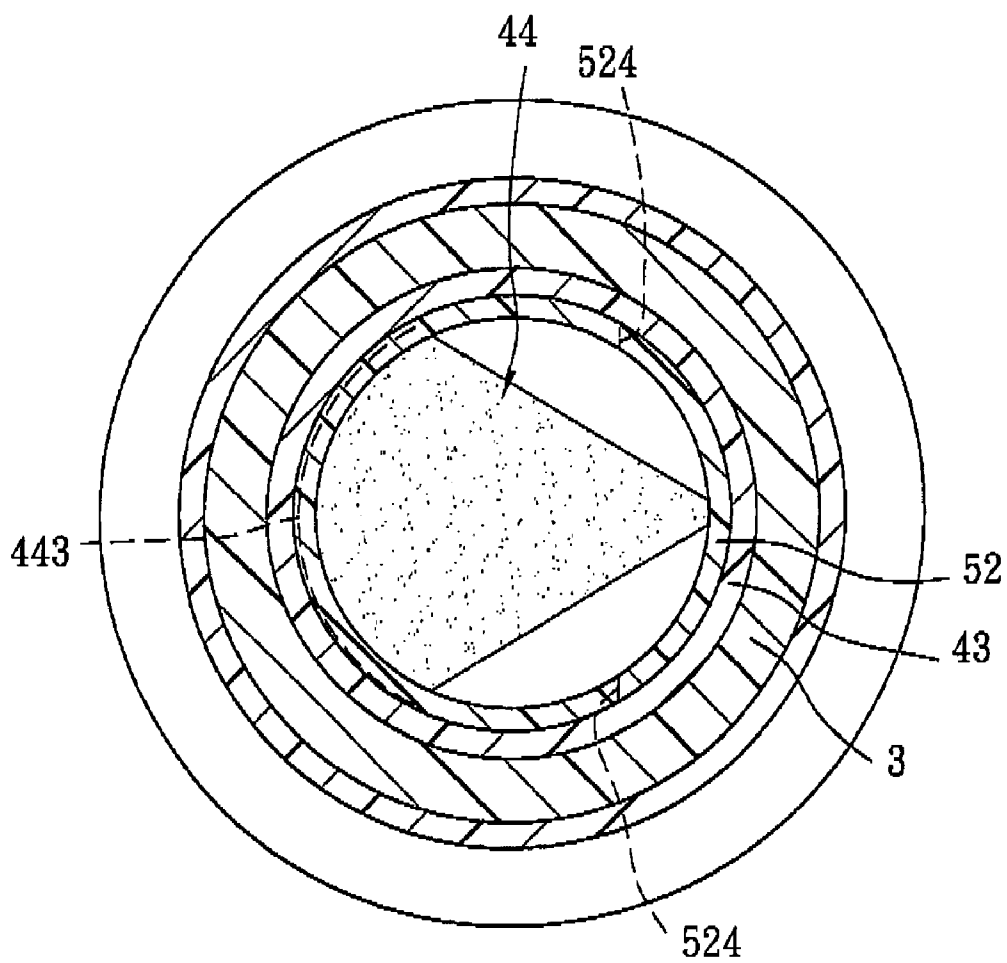


FIG. 10

BOTTLE CAP

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention relates to a cap, more particularly to a bottle cap.

[0003] 2. Description of the Related Art

[0004] Referring to FIGS. 1 and 2, a conventional bottle cap 1 includes a cap seat 11 that threadedly engages a mouth 22 of a bottle 2 and that has an inner tubular wall 112, a membrane 12 attached to a bottom end of the inner tubular wall 112 to cover a receiving space 15, a cap 13 that has a top panel 131 and a tubular cutter body 132 extending downwardly from the top panel 131, and a sealing ring 14 that detachably interconnects the top panel 131 and the cap seat 11.

[0005] In use, the sealing ring 14 is pulled outwardly away from the top panel 131 and the cap seat 11. Thereafter, referring to FIG. 3, when the top panel 131 is pressed, the tubular cutter body 132 is moved downwardly and penetrates the membrane 12 by virtue of a cutting end 134 of a beveled bottom open end 133 of the tubular cutter body 132. Referring to FIGS. 3 and 4, subsequently, the membrane 12 is cut by the bottom open end 133 and hence has a cut portion 121. An additive disposed in the receiving space 15 can fall into the bottle 2 through a gap between the bottom open end 133 and the cut portion 121, thereby mixing the additive and a substance disposed in the bottle 2.

[0006] However, when the membrane 12 is cut by the bottom open end 133, because the membrane 12 is made of aluminum foil and still has a connection portion 123 that is not cut, the cut portion 121 tends to indent upward and contact the bottom open end 133 due to residual internal stress of the membrane 12 so that the additive in the receiving space 15 (see FIG. 2) is unable to easily fall into the bottle 2. Even if half of a periphery of the membrane 12 is cut, the same phenomenon is observed. If the periphery of the membrane 12 is entirely cut, the membrane 12 may undesirably fall into the bottle 2.

[0007] In addition, the membrane 12 is attached to the cap seat 11 by an additional adhesive bonding process, thereby increasing the production cost and an incidence of contaminating the additive. When the membrane 12 is not securely attached to the cap seat 11 or is deformed on account of heat, leakage of the additive can result.

SUMMARY OF THE INVENTION

[0008] The object of the present invention is to provide a bottle cap that can overcome the aforesaid drawbacks of the prior art.

[0009] According to this invention, a bottle cap includes a cap seat and a cap. The cap seat has an inner tubular wall, a bottom wall closing a bottom end of the inner tubular wall and having a peripheral connection portion that is connected to the bottom end of the inner tubular wall, and a receiving space confined by the inner tubular wall and the bottom wall. The cap is disposed within the inner tubular wall, and has a top panel proximate to a top end of the inner tubular wall and closing the receiving space, and a tubular cutter body extending downwardly from a peripheral end of the top panel toward the bottom wall. The tubular cutter body has a beveled bottom open end slanting downwardly from a higher part to a lower part. The bottom open end has a cutting end formed at the lower part, a pushing end formed at the higher part and dia-

metrically opposite to the cutting end, and two opposite valleys formed at the higher part and between the cutting end and the pushing end. The bottom open end slants upwardly from the cutting end to the valleys and downwardly from the valleys to the pushing end. The cap is movable downwardly from a non-cutting position to a cutting position when the top panel is pressed. The pushing end pushes a part of the connection portion of the bottom wall when the cap is in the cutting position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiment of this invention, with reference to the accompanying drawings, in which:

[0011] FIG. 1 shows a conventional bottle cap for a bottle;

[0012] FIG. 2 is a sectional elevational view of the conventional bottle cap;

[0013] FIG. 3 is the same view as FIG. 2 but with a membrane of the bottle cap being cut;

[0014] FIG. 4 is a sectional plan view of the conventional bottle cap;

[0015] FIG. 5 is an exploded perspective view of the preferred embodiment of a bottle cap according to this invention;

[0016] FIG. 6 is an exploded sectional view of the preferred embodiment;

[0017] FIG. 7 is a sectional view of the preferred embodiment in an assembled state;

[0018] FIG. 8 is the same view as FIG. 7 but with a tubular cutter body in a cutting position;

[0019] FIG. 9 is a partly enlarged view of the preferred embodiment; and

[0020] FIG. 10 is a sectional plan view of the preferred embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0021] Referring to FIGS. 5, 6, and 7, the preferred embodiment of a bottle cap according to the present invention is adapted to be mounted on a bottle 3 for containing a substance (e.g., a potable drink, a medicinal liquid, a cleaning liquid, or water). The bottle 3 has a mouth 33 formed with an external screw thread 332. The bottle cap includes a cap seat 4 and a cap 5.

[0022] The cap seat 4 threadedly engages the mouth 33 and has an inner tubular wall 43, a bottom wall 44 closing a bottom end of the inner tubular wall 43 and having a peripheral connection portion 445 (see FIGS. 8 and 9) that is connected to the bottom end of the inner tubular wall 43, a receiving space 46 confined by the inner tubular wall 43 and the bottom wall 44, and an outer tubular wall 41. Preferably, the bottom wall 44, the inner tubular wall 43, and the outer tubular wall 41 are molded as one piece from a plastic material. The receiving space 46 is adapted to contain an additive, such as probiotics, a microbe, a microbial spore, food, medicine, a cleaning agent, or a dietary supplement. The additive can be in a form of powders, a liquid, or solid granules.

[0023] The inner tubular wall 43 has an upper tubular portion 45 that is proximate to a top end thereof, and that has an inner surface formed with upper and lower annular grooves 451, 452, and an outer surface formed with an outer annular groove 453. The upper and lower annular grooves 451, 452 are spaced apart from each other.

[0024] The outer tubular wall 41 surrounds and is spaced apart from the inner tubular wall 43, and has an inwardly bending top end 42 that is connected to the inner tubular wall 43 below the upper tubular portion 45, and an internal surface that is formed with an internal screw thread 412 for engaging the external screw thread 332 of the mouth 33. The inner and outer tubular walls 43,41 confine a space therebetween, which can receive the mouth 33 of the bottle 3.

[0025] The bottom wall 44 is thick at a center thereof and is thinned gradually from the center to a peripheral end thereof, which is adjacent to the bottom end of the inner tubular wall 43. The bottom wall 44 has a substantially flat top face 441, and a downwardly protruding bottom surface 442 that is opposite to the flat top face 441, that protrudes downwardly and substantially conically at the center of the bottom wall 44, that inclines upwardly and gradually from the center of the bottom wall 44 toward the peripheral end of the bottom wall 44, and that thereafter extends substantially parallel to the flat top face 441 when approaching the peripheral end of the bottom wall 44. It should be noted that the bottom wall 44 could have a uniform thickness in other embodiments.

[0026] The cap 5 is disposed within the inner tubular wall 43, has a top panel 51 that is proximate to the top end of the inner tubular wall 43, that is received in the upper tubular portion 45, that closes the receiving space 46, and that has an annular protrusion 511 engaging the upper annular groove 451 when the cap 5 is at a non-cutting position (see FIG. 7), and engaging the lower annular groove 452 when the cap 5 is at a cutting position (see FIG. 8). The cap 5 further has a tubular cutter body 52 that extends downwardly from a peripheral end of the top panel 51 toward the bottom wall 44, and is movable downwardly from the non-cutting position (see FIG. 7) to the cutting position (see FIG. 8) when the top panel 51 is pressed. Preferably, the top panel 51 and the tubular cutter body 52 are molded as one piece from a plastic material. It is noted that the annular protrusion 511 can be formed on an outer surface of the tubular cutter body 52 in other embodiments.

[0027] The tubular cutter body 52 has a beveled bottom open end 521 that slants downwardly from a higher part to a lower part. The bottom open end 521 has a cutting end 523 that is formed at the lower part, a pushing end 525 that is formed at the higher part and that is diametrically opposite to the cutting end 523, and two opposite valleys 524 that are formed at the higher part and between the cutting end 523 and the pushing end 525. The bottom open end 521 slants upwardly from the cutting end 523 to the valleys 524 and extends downwardly from the valleys 524 to the pushing end 525. A height of the pushing end 525 from a bottom most end of the cutting end 523 is substantially equal to a distance between the non-cutting position and the cutting position. In this embodiment, the height of the pushing end 525 from the bottommost end of the cutting end 523 is substantially equal to a distance between the upper and lower annular grooves 451,452. The cutting end 523 is more adjacent to the bottom wall 44 than the pushing end 525. Both of the cutting end 523 and the pushing end 525 are more adjacent to the bottom wall 44 than the valleys 524. A distance between the cutting end 523 and one of the valleys 524 is longer than a distance between the pushing end 525 and one of the valleys 524.

[0028] The bottle cap further includes a tearable lid 6 that is disposed removably around the upper tubular portion 45 and that covers the top panel 51. The tearable lid 6 has a sealing ring 61 that extends around the upper tubular portion 45, a

puller 62 that is fixed to the sealing ring 61 for being pulled by a user, a lid plate 63 that is disposed above the top panel 51, and a plurality of spaced apart tearable connectors 64 that interconnect the lid plate 63 and the sealing ring 61. The sealing ring 61 has an inner surface that is formed with an annular ridge 612 for engaging the outer annular groove 453 of the upper tubular portion 45, and a bridge 613 that bridges a discontinuation in the sealing ring 61. The puller 62 has a connection section 621 that is fixed to the sealing ring 61 adjacent to the bridge 613, and a free section 622 that is not fixed to the sealing ring 61. The tearable lid 6 serves to prevent a user from undesirably pressing the top panel 51, thereby avoiding an undesired movement of the cap 5.

[0029] An operation of the bottle cap is described as follows. Referring to FIG. 7, the cap 5 is at the non-cutting position, where the cutting end 523 is proximate to the bottom wall 44. The puller 62 is pulled outwardly so as to break the bridge 613 and disengage the annular ridge 612 from the outer annular groove 453. Therefore, the sealing ring 61 is pulled away from the upper tubular portion 45 and the lid plate 63. As a result, the tearable lid 6 is entirely removed from the upper tubular portion 45, and the top panel 51 is accessible. Thereafter, referring to FIG. 8, when the top panel 51 is pressed, the annular protrusion 511 is moved downwardly from the upper annular groove 451 until the same engages the lower annular groove 452. Thus, the cap 5 is at the cutting position, where the cutting end 523 cuts the bottom wall 44. Downward displacement of the tubular cutter body 52 is equal to the distance between the upper and lower annular grooves 451, 452.

[0030] Referring to FIGS. 8, 9, and 10, when the cap 5 is moved downwardly to the cutting position, the cutting end 523 first penetrates the bottom wall 44, and the bottom open end 521 then cuts a portion of the periphery end of the bottom wall 44. A gap is formed between a cut portion 443 of the bottom wall 44 and the bottom open end 521. Meanwhile, the pushing end 525 pushes downwardly a part of the connection portion 445 of the bottom wall 44. Thus, a portion of the bottom wall 44 inclines downwardly from the connection portion 445. The additive in the receiving space 46 is able to easily fall into the bottle 3, thereby mixing the additive and the substance in the bottle 3. In this embodiment, the substance is a low-nutrition drink, and the additive is *sporolactobacillus* or other probiotics powders. A *lactobacillus* drink is formed by virtue of the combination of the additive and the substance.

[0031] Some of the advantages of the bottle cap of this invention are as follows:

[0032] 1. Since the pushing end 525 pushes the bottom wall 44 downwardly after the bottom wall 44 is cut, the cut portion 443 can be moved away from the bottom open end 521 and can permit the additive to fall therethrough.

[0033] 2. Since the bottom wall 44 and the inner tubular wall 43 are molded as one piece, no additional process is required to attach the bottom wall 44 to the inner tubular wall 43, thereby lowering a production cost of the bottle cap of the present invention and preventing the additive from contamination. Moreover, the bottom wall 44 is securely connected to the inner tubular wall 43 even under heat or cold such that undesired leakage of the additive is prohibited. The preservation of the substance in the bottle 3 is achieved as well.

[0034] While the present invention has been described in connection with what is considered the most practical and preferred embodiment, it is understood that this invention is

not limited to the disclosed embodiment but is intended to cover various arrangements included within the spirit and scope of the broadest interpretation and equivalent arrangements.

What is claimed is:

1. A bottle cap comprising:

a cap seat having an inner tubular wall, a bottom wall closing a bottom end of said inner tubular wall and having a peripheral connection portion that is connected to said bottom end of said inner tubular wall, and a receiving space confined by said inner tubular wall and said bottom wall; and

a cap disposed within said inner tubular wall, and having a top panel proximate to a top end of said inner tubular wall and closing said receiving space, and a tubular cutter body extending downwardly from a peripheral end of said top panel toward said bottom wall, said tubular cutter body having a beveled bottom open end slanting downwardly from a higher part to a lower part, said bottom open end having a cutting end formed at said lower part, a pushing end formed at said higher part and diametrically opposite to said cutting end, and two opposite valleys formed at said higher part and between said cutting end and said pushing end, said bottom open end slanting upwardly from said cutting end to said valleys and extending downwardly from said valleys to said pushing end, said cap being movable downwardly from a non-cutting position to a cutting position when said top panel is pressed, said pushing end pushing a part of said connection portion of said bottom wall when said cap is in the cutting position.

2. The bottle cap as claimed in claim **1**, wherein said bottom wall and said inner tubular wall are molded as one piece.

3. The bottle cap as claimed in claim **1**, wherein a height of said pushing end from a bottommost end of said cutting end is substantially equal to a distance between the non-cutting position and the cutting position.

4. The bottle cap as claimed in claim **3**, wherein said inner tubular wall has an upper tubular portion that is proximate to said top end thereof, that receives said top panel, and that has an inner surface formed with upper and lower annular grooves, said cap having an annular protrusion that engages said upper annular groove when said cap is at the non-cutting position and that engages said lower annular groove when said cap is at the cutting position, said height of said pushing end from said bottommost end of said cutting end being substantially equal to a distance between said upper and lower annular grooves.

5. The bottle cap as claimed in claim **1**, wherein said bottom wall is thick at a center thereof and is thinned gradually from said center to a peripheral end thereof, which is adjacent to said bottom end of said inner tubular wall.

6. The bottle cap as claimed in claim **4**, further comprising a tearable lid disposed removably around said upper tubular portion and covering said top panel.

7. The bottle cap as claimed in claim **6**, wherein said upper tubular portion further has an outer surface formed with an outer annular groove, said tearable lid having a sealing ring extending around said upper tubular portion, a puller fixed to

said sealing ring, a lid plate disposed above said top panel, and a plurality of spaced apart tearable connectors interconnecting said lid plate and said sealing ring, said sealing ring having an inner surface formed with an annular ridge engaging said outer annular groove.

8. A bottle cap comprising:

a cap seat having an inner tubular wall, a bottom wall closing and connected to a bottom end of said inner tubular wall, and a receiving space confined by said inner tubular wall and said bottom wall, said inner tubular wall and said bottom wall being formed as one piece; and

a cap disposed within said inner tubular wall, and having a top panel proximate to a top end of said inner tubular wall and closing said receiving space, and a tubular cutter body extending downwardly from a peripheral end of said top panel toward said bottom wall, said tubular cutter body having a beveled bottom open end slanting downwardly from a higher part to a lower part, said bottom open end having a cutting end formed at said lower part.

9. The bottle cap as claimed in claim **8**, wherein said bottom wall is thick at a center thereof and is thinned gradually from said center to a peripheral end thereof, which is connected to said bottom end of said inner tubular wall.

10. A bottle cap comprising:

a cap seat having an inner tubular wall, a bottom wall closing and connected to a bottom end of said inner tubular wall, a receiving space confined by said inner tubular wall and said bottom wall, and an outer tubular wall, said inner tubular wall and said bottom wall being formed as one piece, said inner tubular wall having an upper tubular portion that is proximate to a top end of said inner tubular wall, and that has an inner surface formed with upper and lower annular grooves, and an outer surface formed with an outer annular groove, said outer tubular wall surrounding and being spaced apart from said inner tubular wall, and having an inwardly bending top end connected to said inner tubular wall below said upper tubular portion;

a cap disposed movably within said inner tubular wall, and having a top panel received in said upper tubular portion and closing said receiving space, and a tubular cutter body extending downwardly from a peripheral end of said top panel toward said bottom wall, said tubular cutter body having a beveled bottom open end slanting downwardly from a higher part to a lower part, said bottom open end having a cutting end formed at said lower part, said top panel engaging one of said upper and lower annular grooves; and

a tearable lid having a sealing ring extending around said upper tubular portion above said inwardly bending top end of said outer tubular wall, a puller fixed to said sealing ring, a lid plate disposed above said top panel, and a plurality of spaced apart tearable connectors interconnecting said lid plate and said sealing ring, said sealing ring having an inner surface engaging said outer annular groove.

* * * * *