US 20050040181A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2005/0040181 A1**

Kurosawa et al. (43) **Pub. Date: Feb. 24, 2005**

(54) **SPOUT FOR POUCH AND PLASTIC POUCH WITH SPOUT FIXED THERETO**

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(21) Appl. No.: **10/488,302**

(22) PCT Filed: **Sep. 11, 2002**

(86) PCT No.: **PCT/JP02/09273**

(30) **Foreign Application Priority Data**

Sep. 28, 2001 (JP) 2001-299783

Publication Classification

(51) **Int. Cl.**[7] **B65D 35/00**

(52) **U.S. Cl.** **222/92**

(57) **ABSTRACT**

The invention provides a spout for a pouch, which can be reliably heat-sealed with a plastic pouch body to provide an excellent gas-shielding capability for preventing gas permeation through the spout itself, and can be simply manufactured at a low cost without requiring complicated processes and special materials.

In a spout for a pouch, comprising a tubular mouth part having a cap fitting portion and a seal part connected to a lower end portion of the mouth part for sealing with the pouch, the invention is featured in that a horizontal cross-sectional shape of the seal part is different in a height direction between an upper end portion and a lower end portion thereof, and an outer peripheral length of the horizontal cross-sectional shape is substantially equal at any position between the upper end portion and the lower end portion of the seal part.

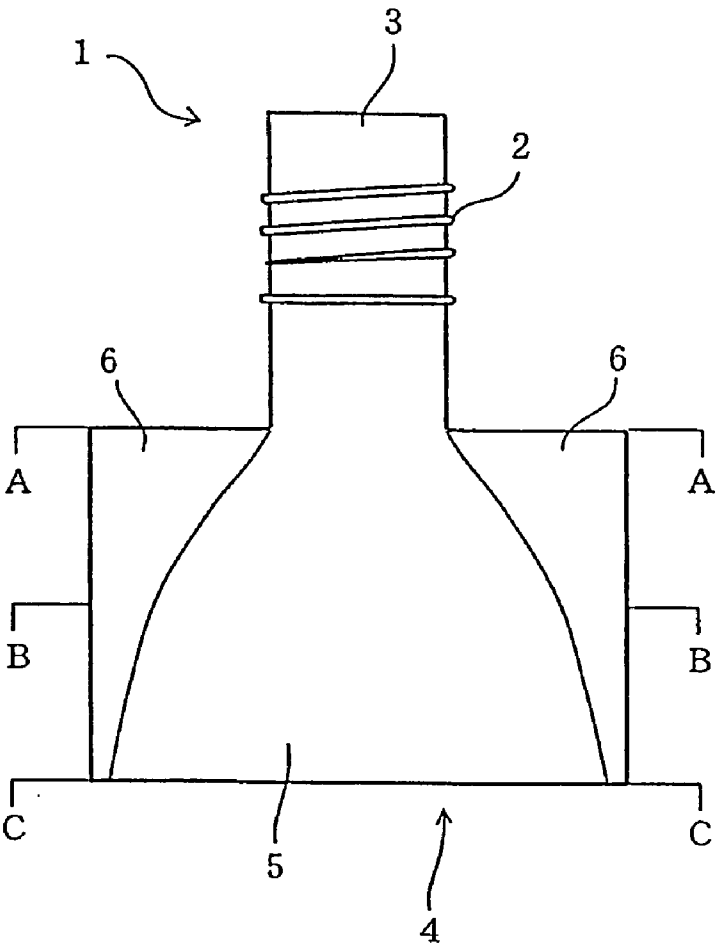


Fig. 1

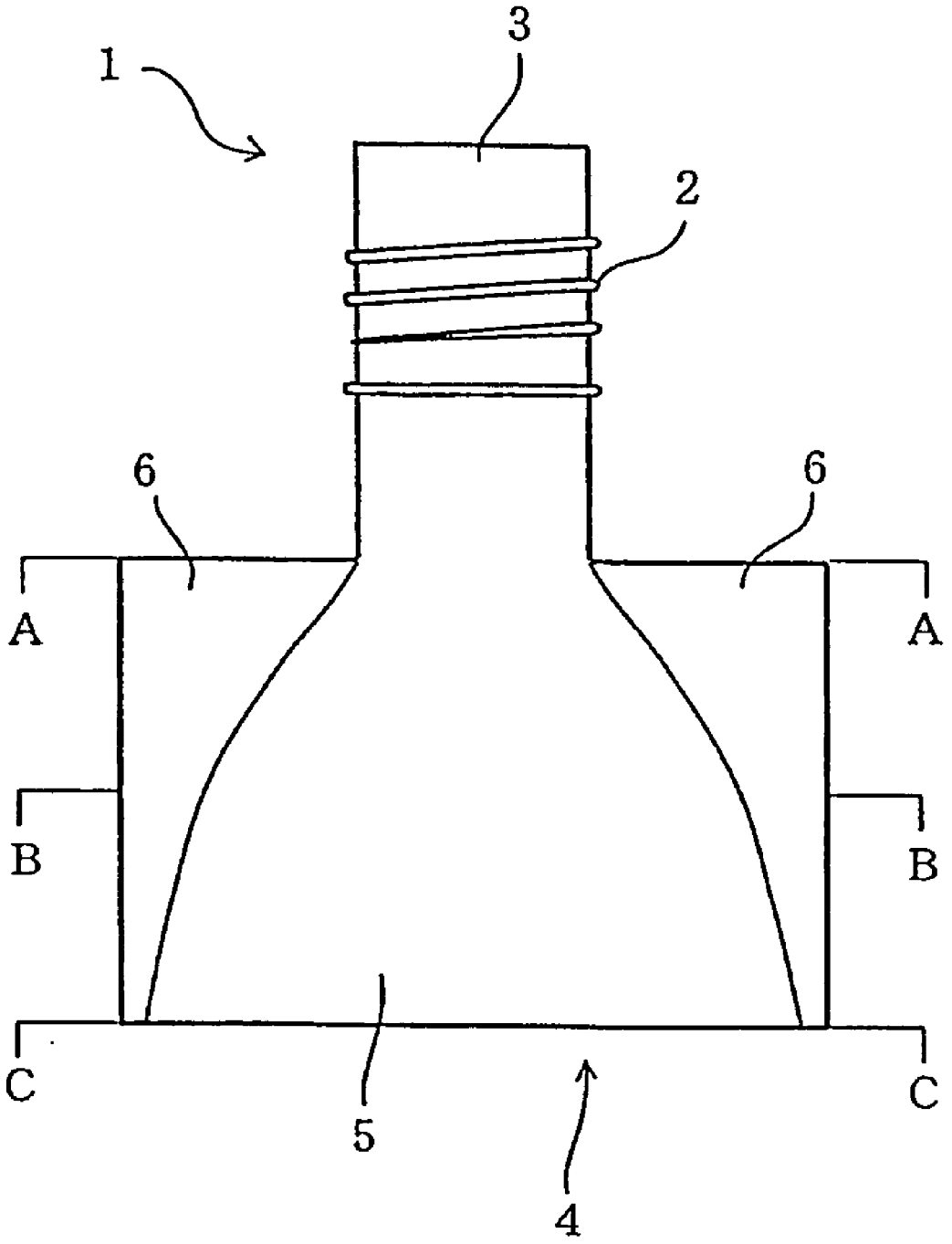


Fig. 2

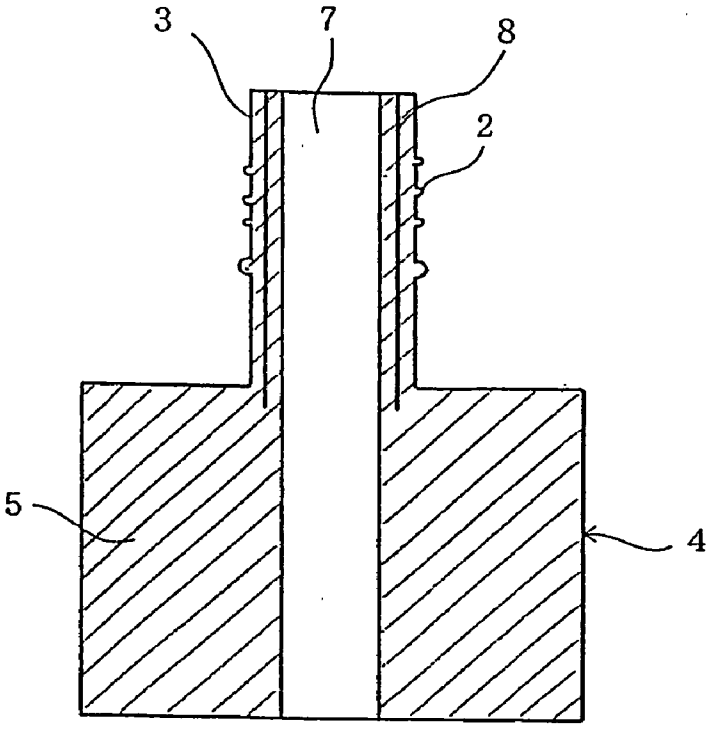


Fig. 3

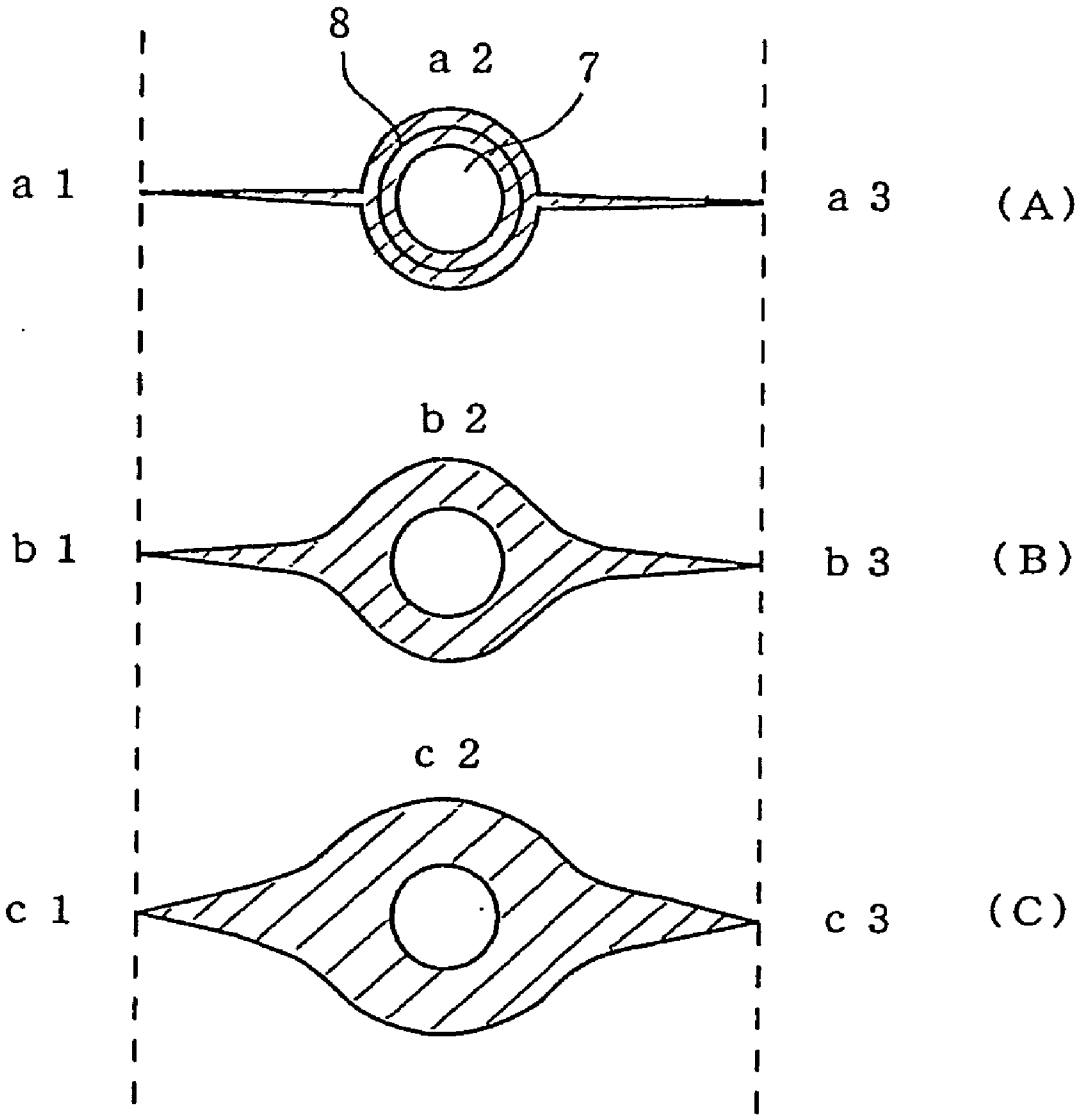


Fig. 4

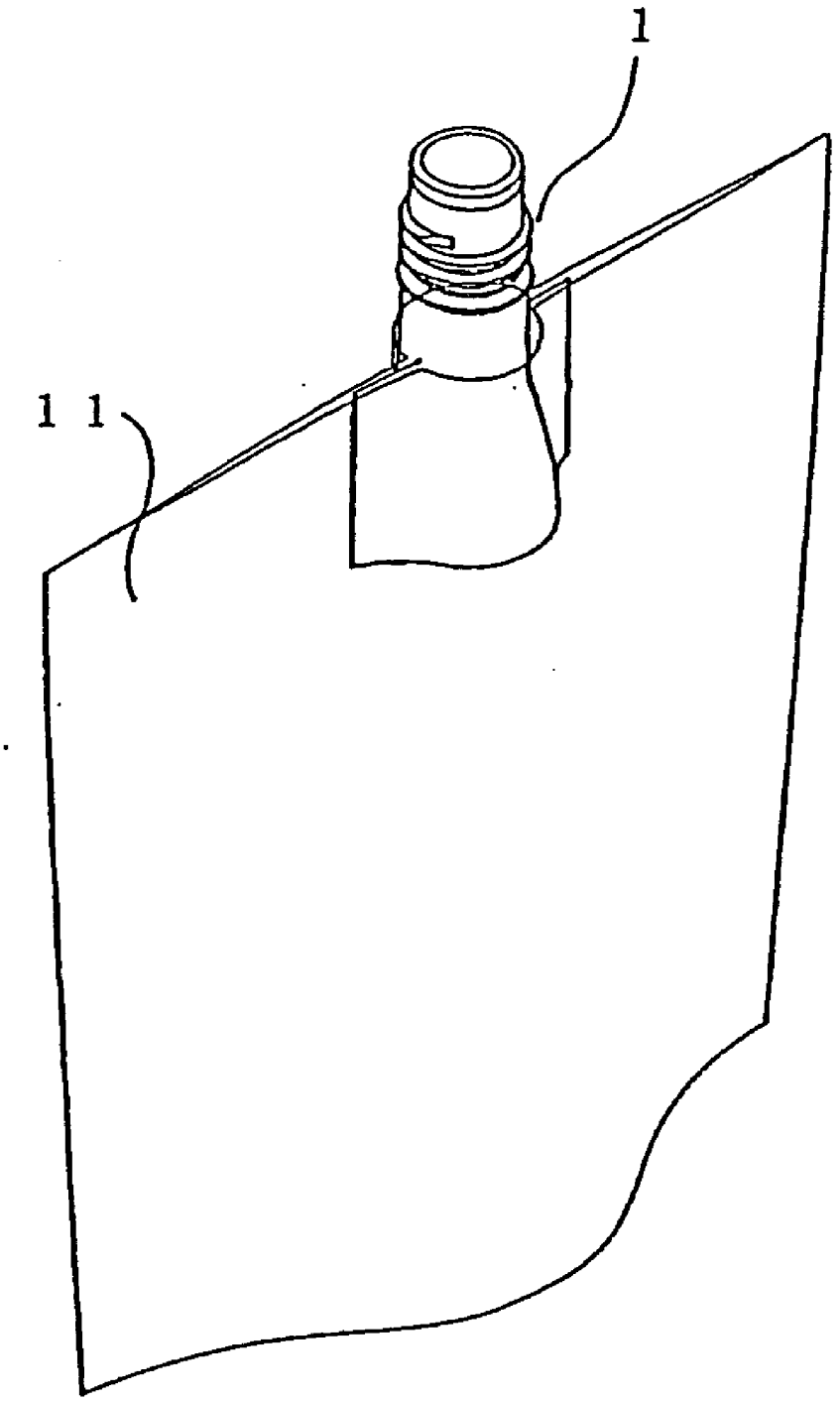


Fig. 5

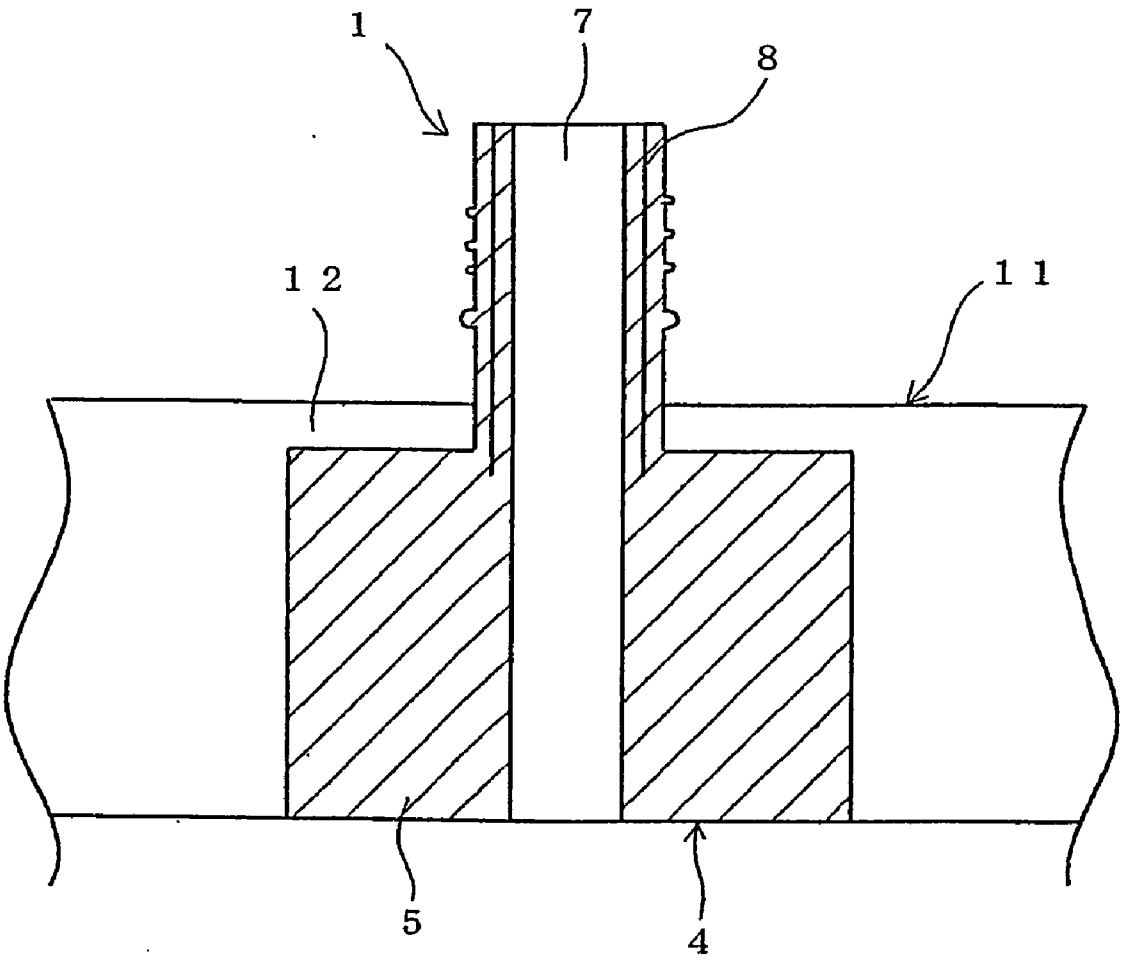


Fig. 6

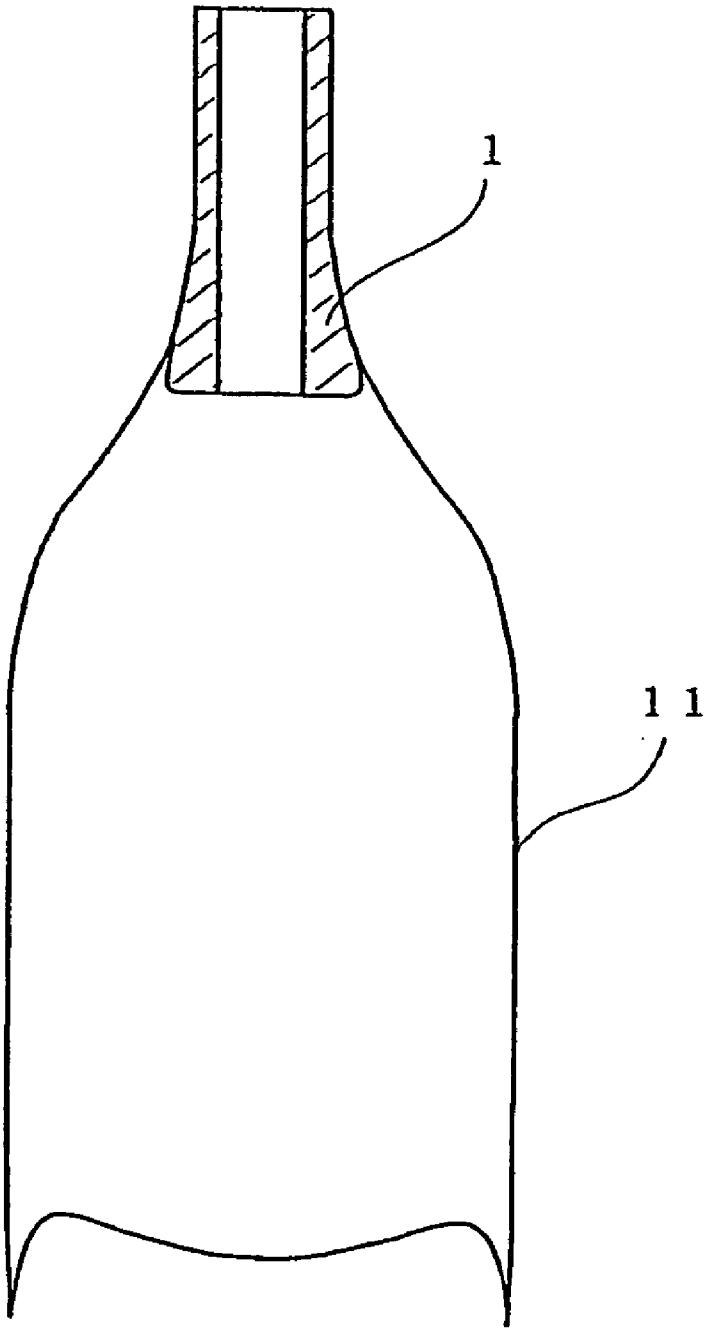
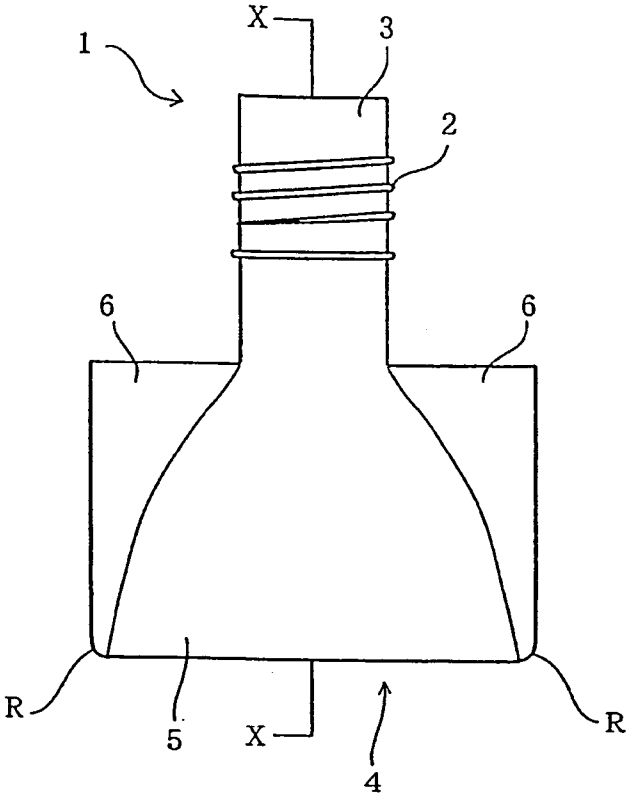
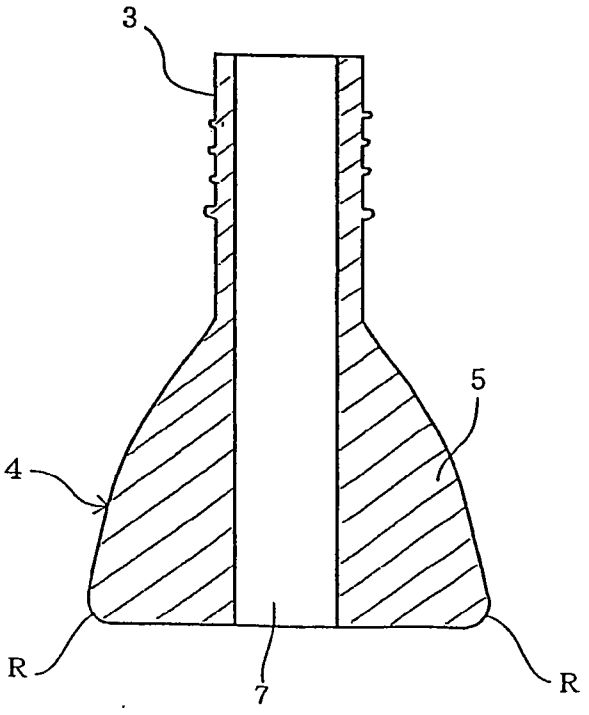


Fig. 7

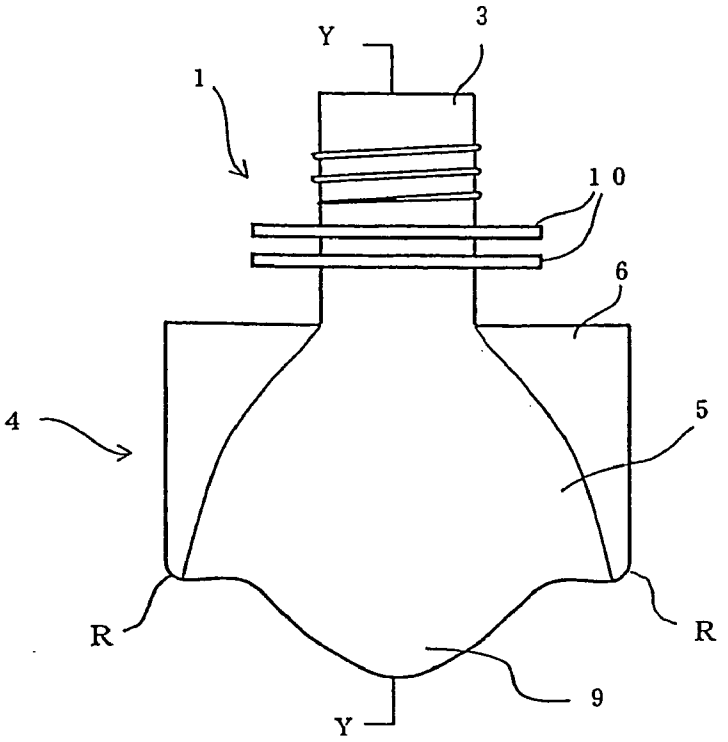


(A)

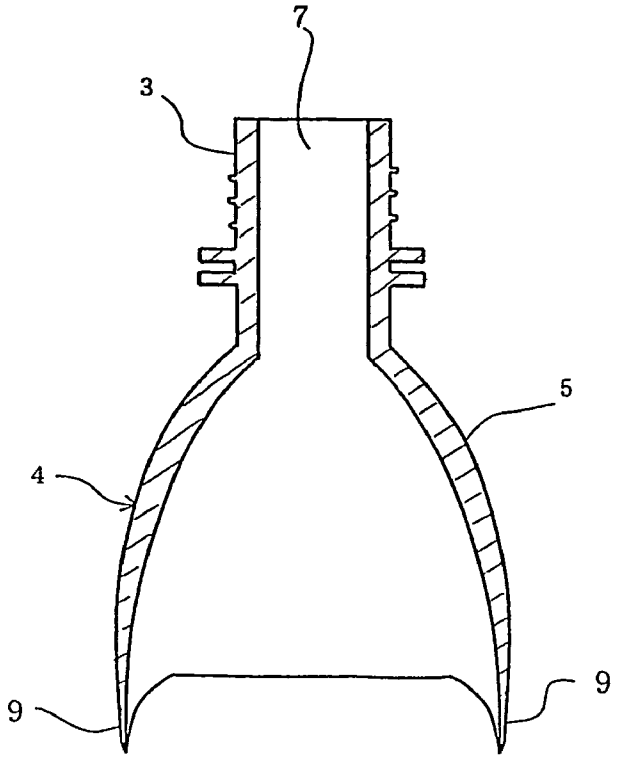


(B)

Fig. 8



(A)



(B)

Fig. 9

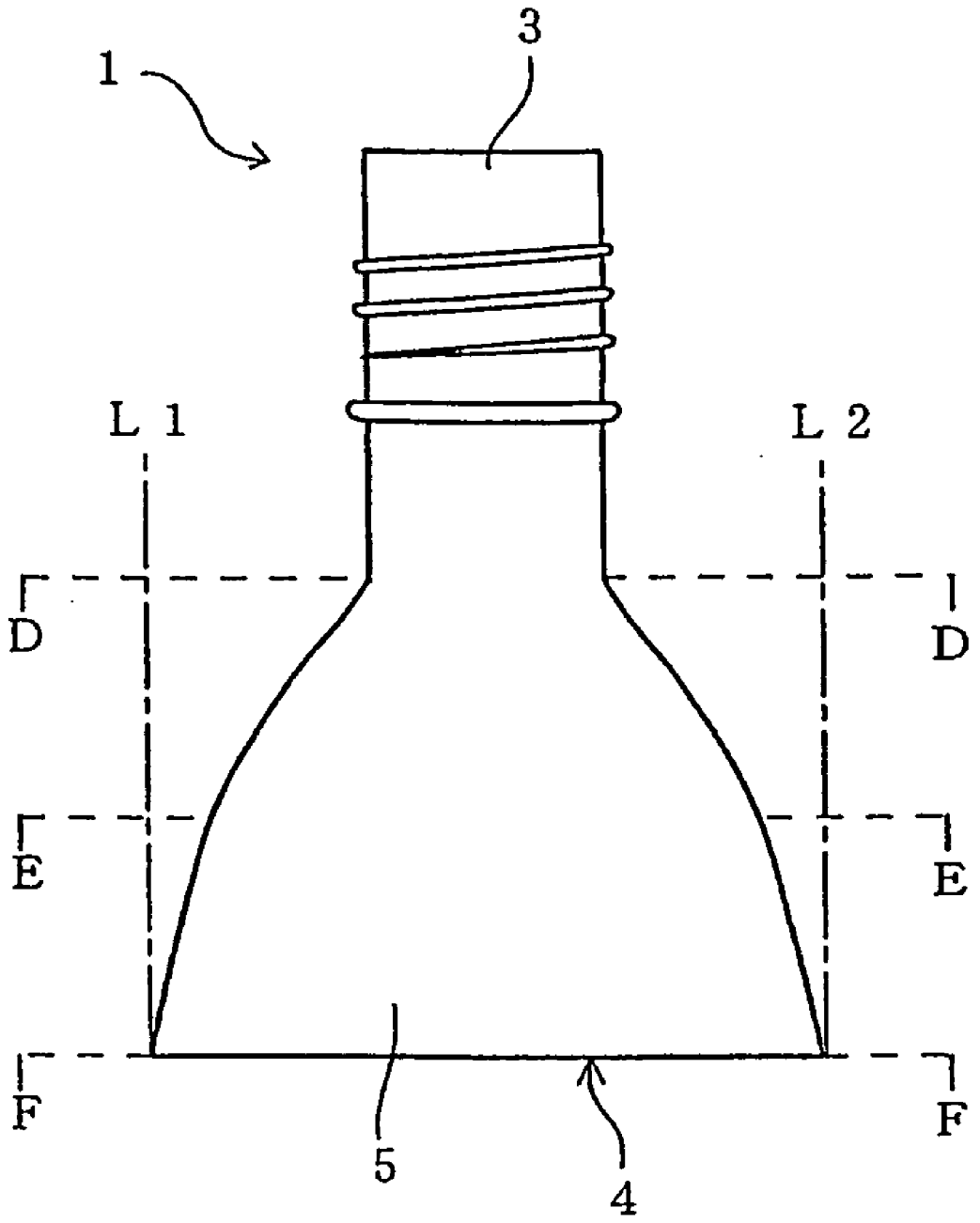


Fig.10

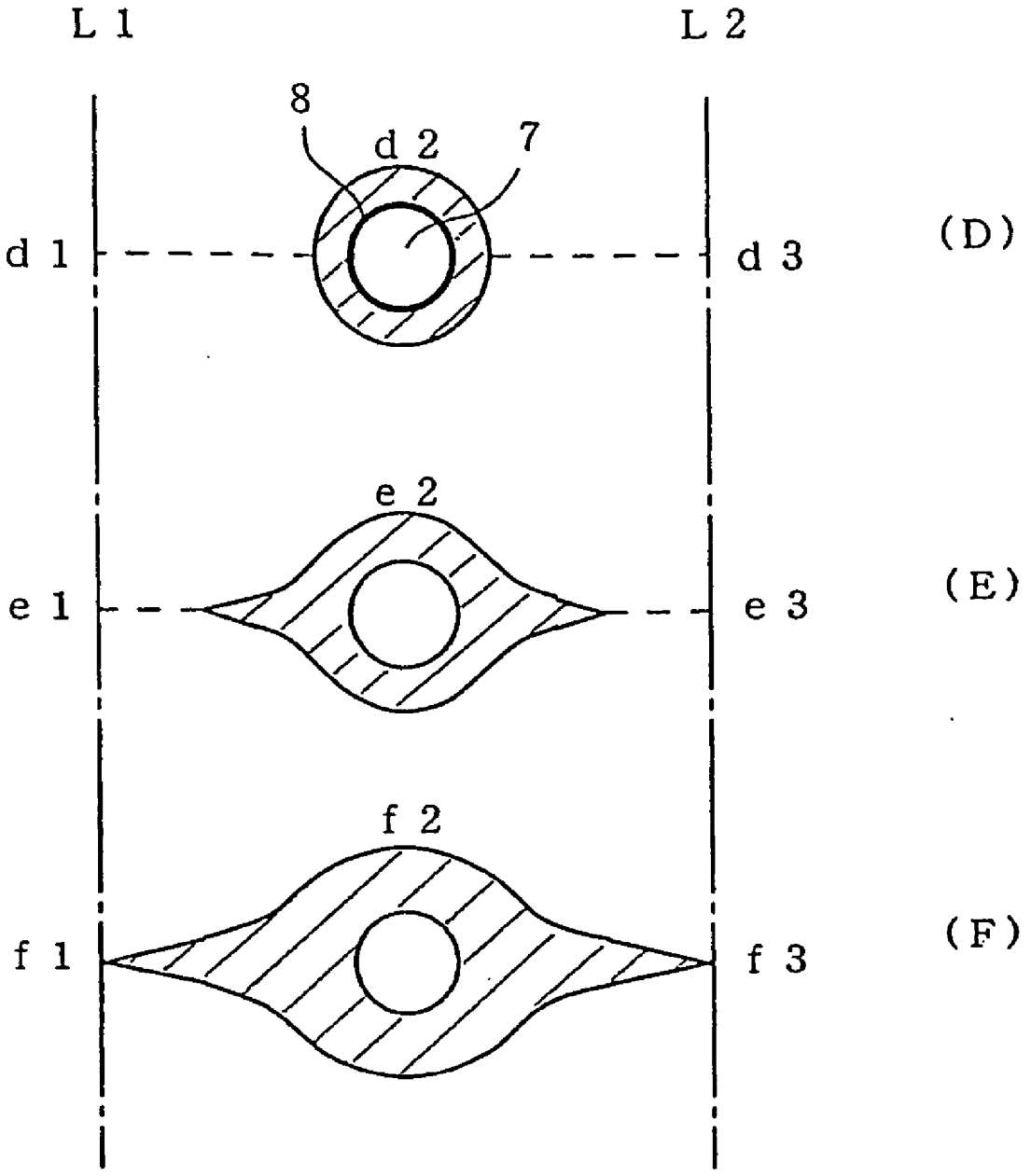


Fig.11

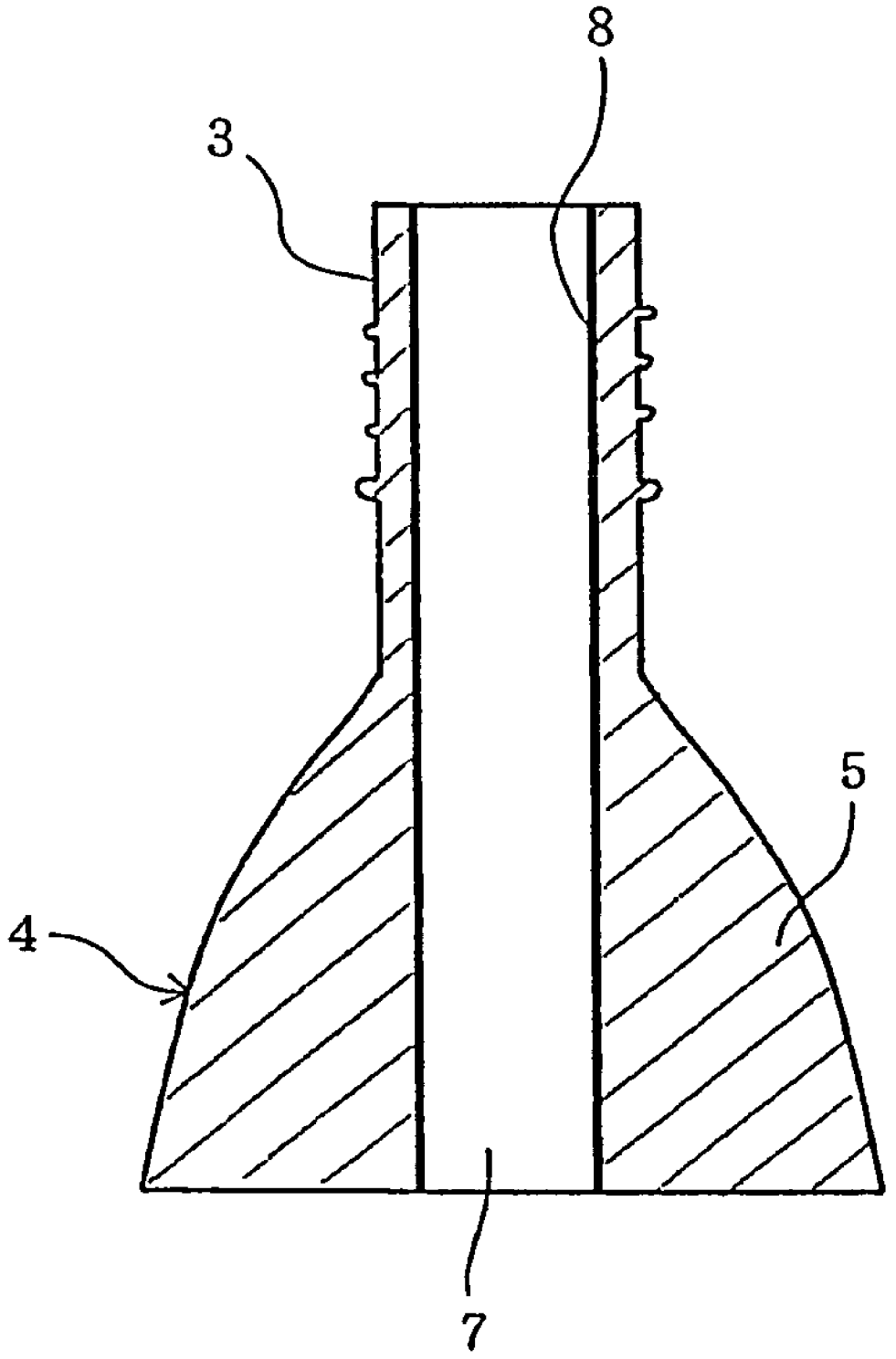
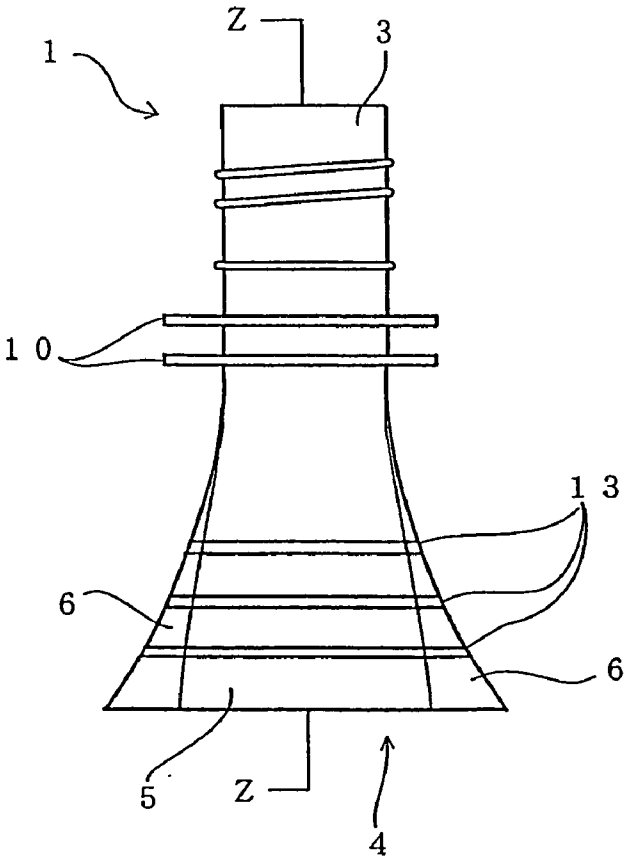
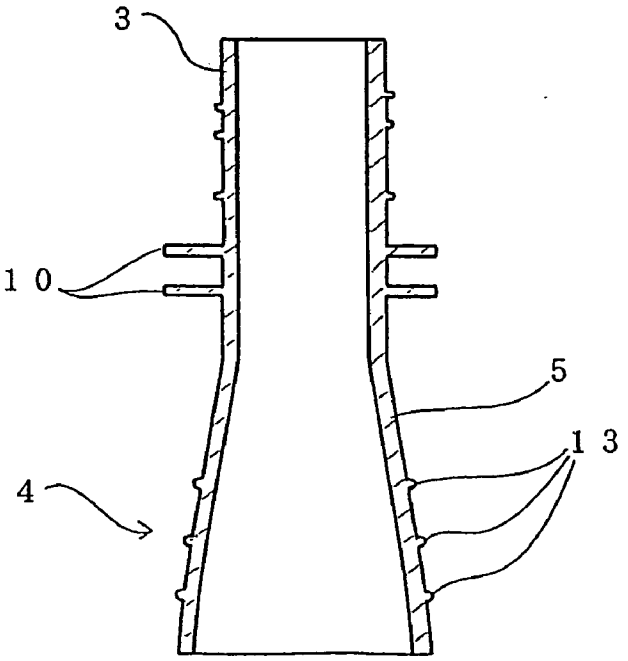


Fig.12



(A)



(B)

Fig.13

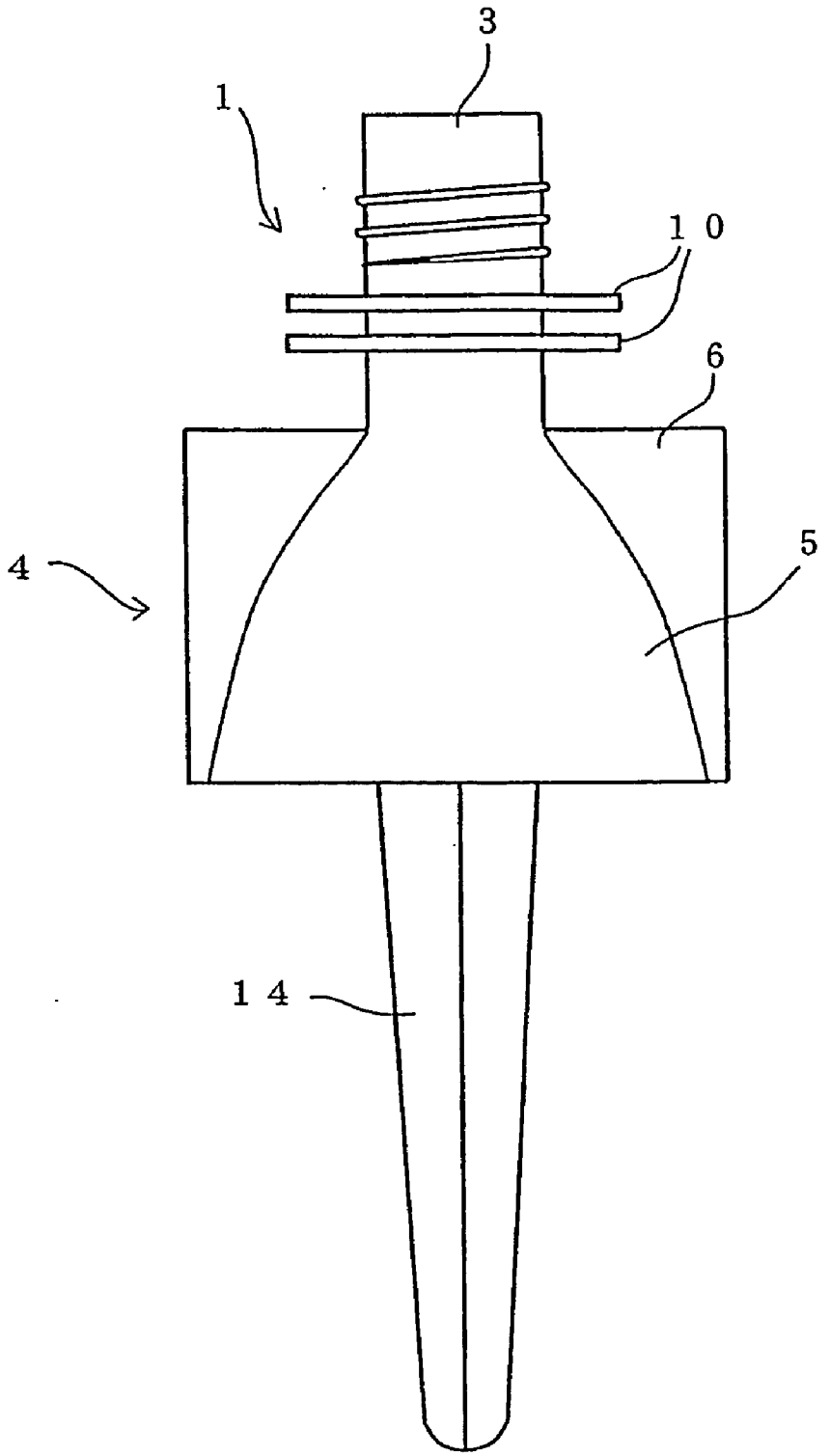


Fig.14

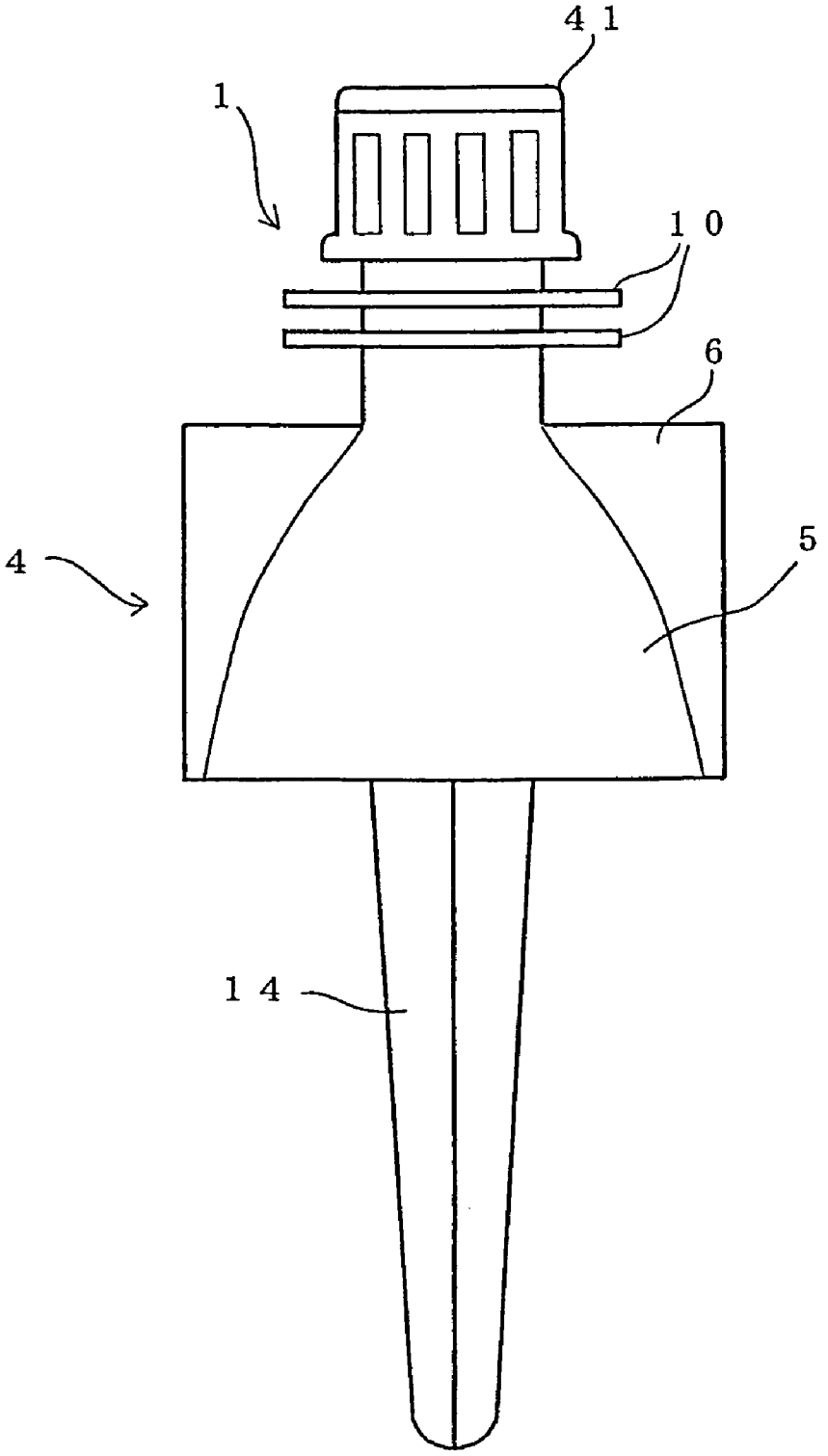


Fig.15

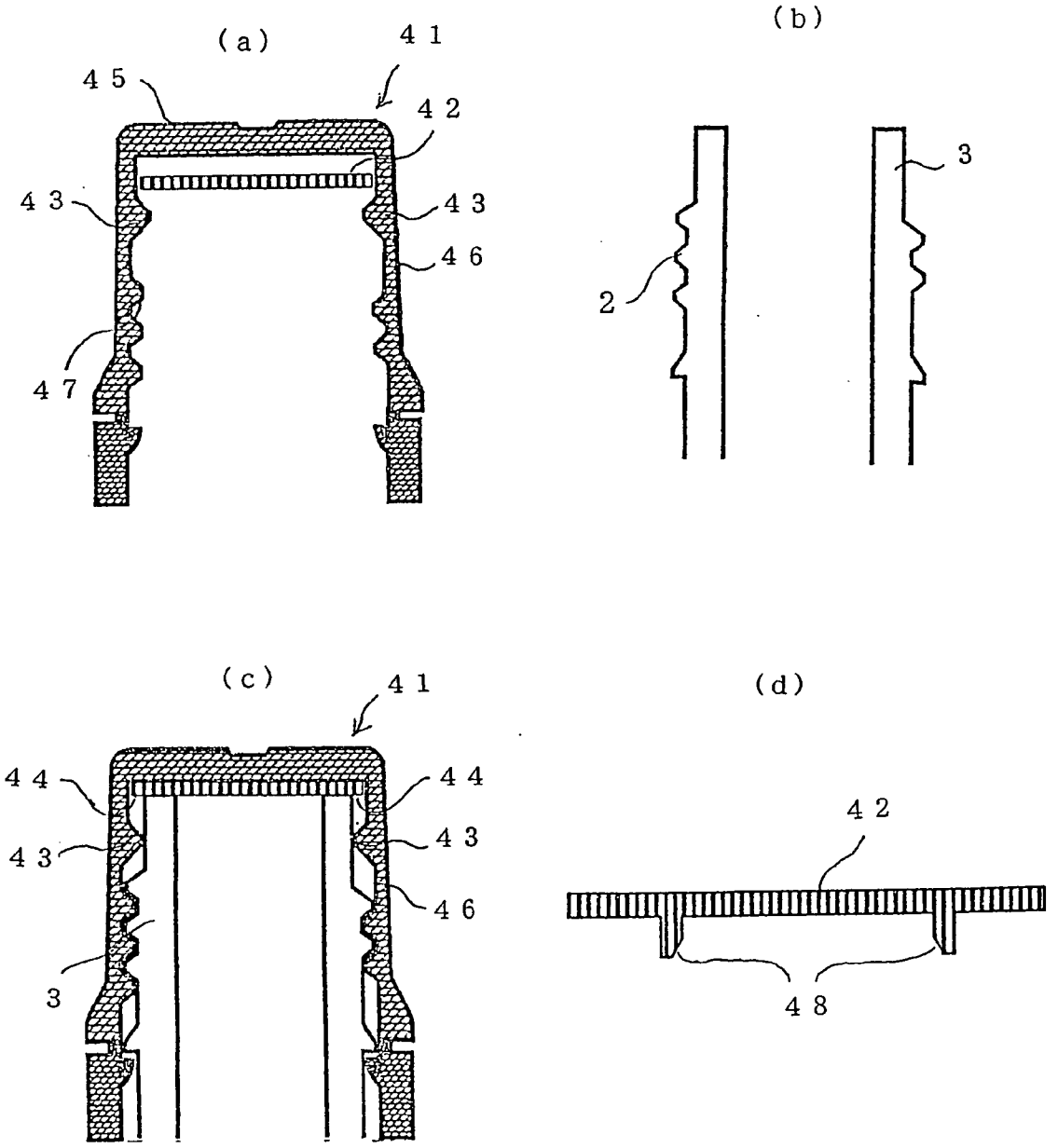


Fig.16

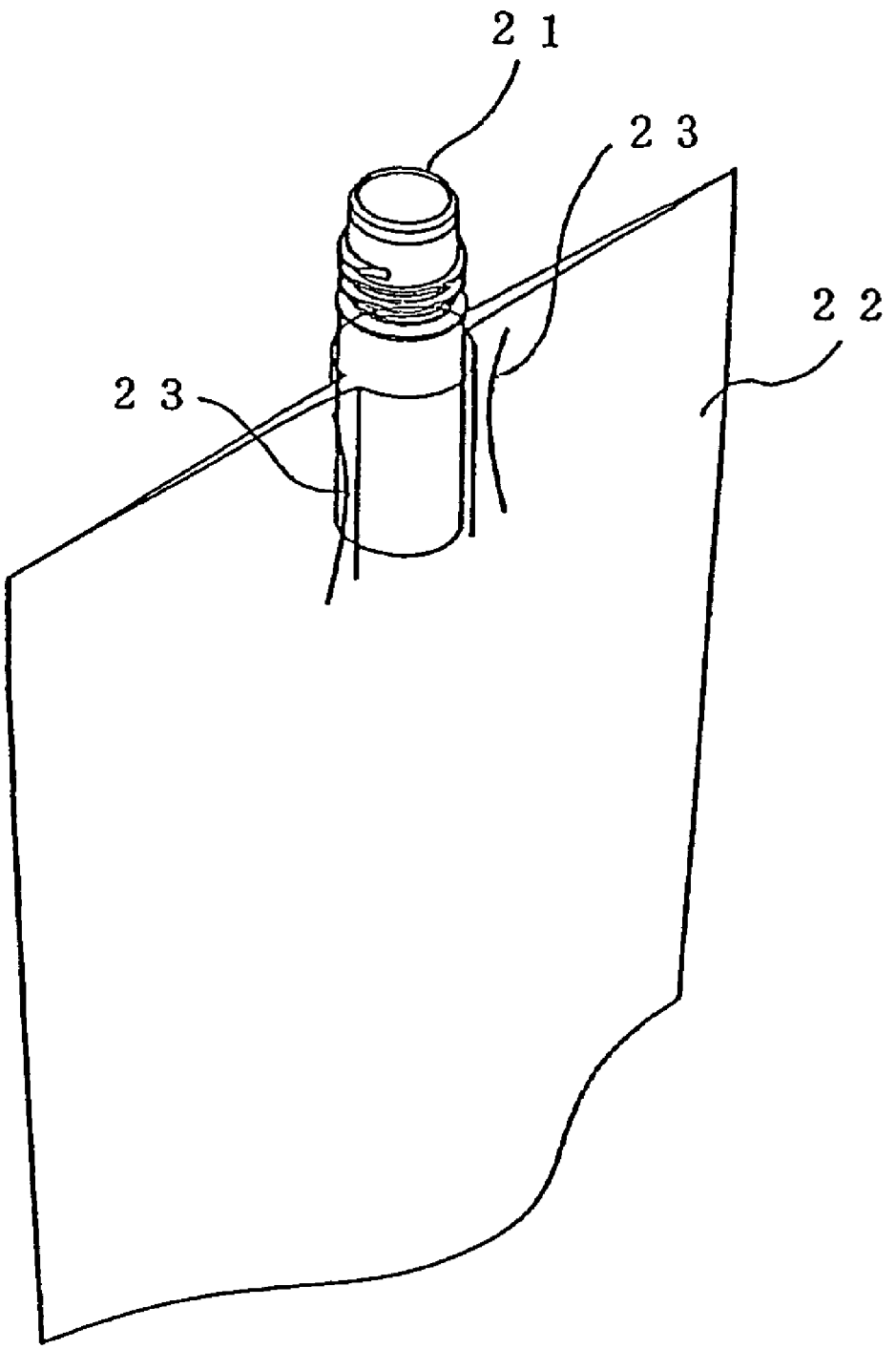


Fig.17

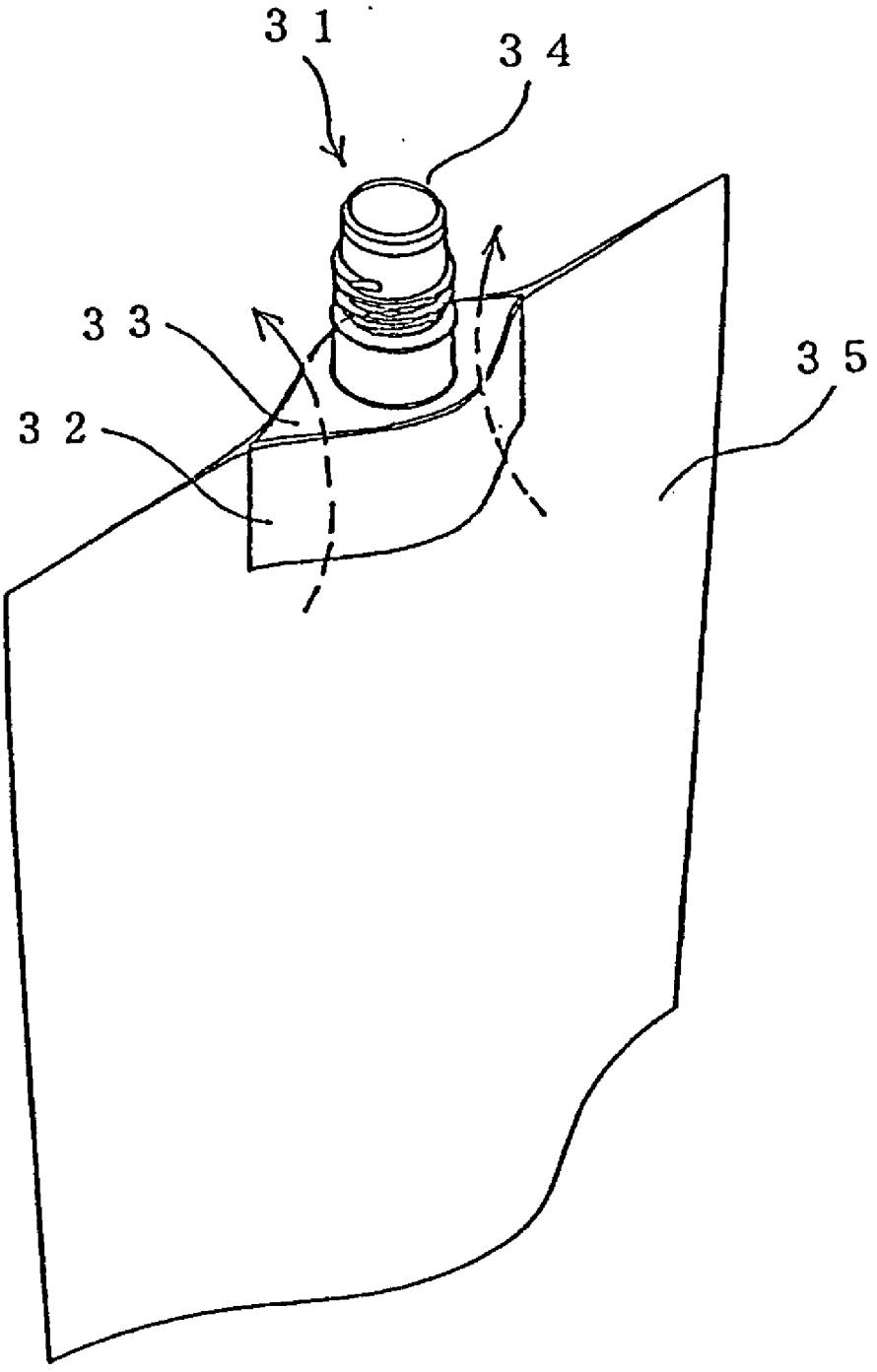
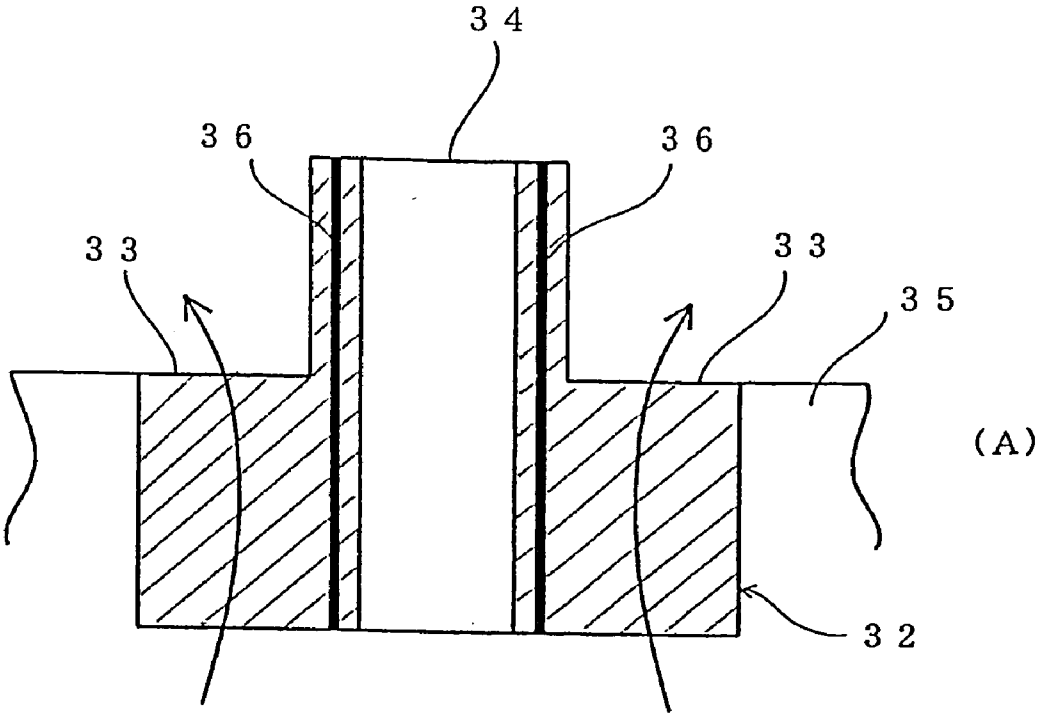
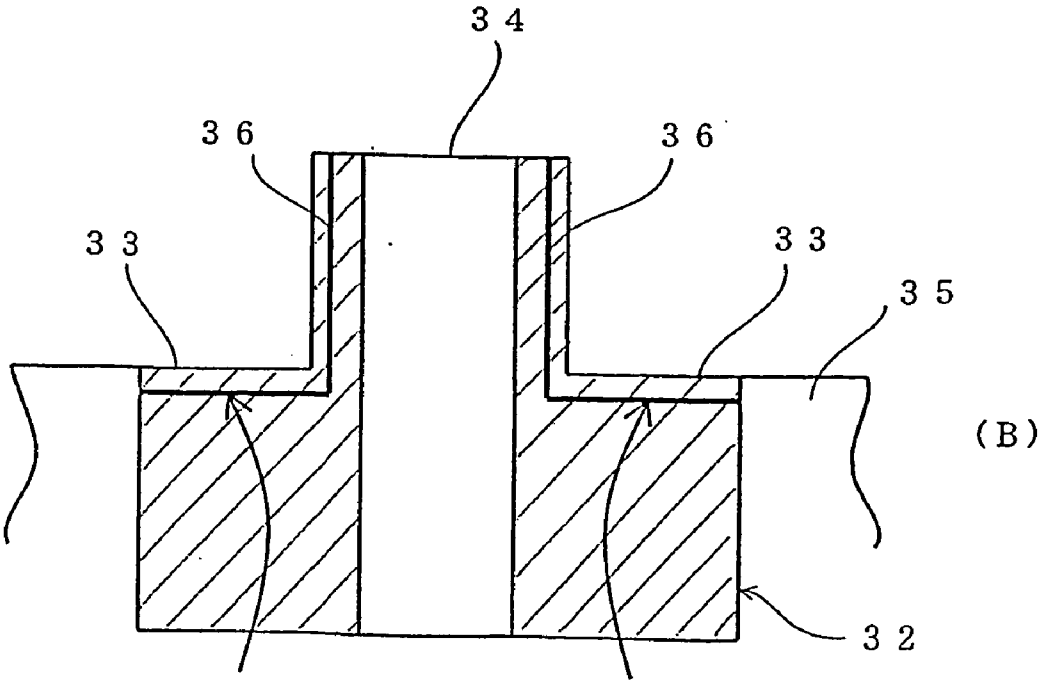


Fig.18



(A)



(B)

SPOUT FOR POUCH AND PLASTIC POUCH WITH SPOUT FIXED THERETO

FIELD OF THE INVENTION

[0001] The present invention relates to a spout for a pouch, which is fixed to a plastic pouch for containing beverages, foods, seasonings, pharmaceuticals, cosmetics, detergents, etc., and also related to a plastic pouch with the spout fixed thereto.

BACKGROUND OF THE INVENTION

[0002] A pouch with a spout, i.e., a pouch formed of a heat-sealed plastic film and having a spout fixed to the opening portion of the pouch, is widely used as means for containing beverages, foods, seasonings, pharmaceuticals, cosmetics, detergents, etc.

[0003] As a spout of such a plastic pouch, there is known a cylindrical spout as shown in **FIG. 16**. When fixing a cylindrical spout **21** to a mouth part of a plastic pouch **22** by heat sealing, however, wrinkles **23** are caused in a plastic film constituting a pouch body **22** in areas on the opposite lateral sides of the spout **21** inserted in the pouch (see **FIG. 16**), which causes much difficulty in performing the heat sealing between the spout and the pouch. Therefore, the following problems have been experienced. The spout cannot be fixed to the pouch at a desired level of heat-sealing strength. The generation of the wrinkles deteriorates an outer appearance of the pouch filled with the contents. Stresses tend to concentrate in the areas where the wrinkles have generated. Hence, in the event of the pouch with the spout being dropped, for example, in a state filled with the contents, the pouch may rupture in those areas and the contents may leak out of the pouch.

[0004] Aiming at overcoming the problems mentioned above and realizing reliable heat sealing between the spout and the body of the plastic pouch, it is proposed to form a seal part **32** of a spout **31**, which is inserted in the pouch, as a boat-shaped portion **33** symmetrical in the left and right direction, as shown in **FIG. 17**.

[0005] With a plastic pouch **35** using that type of spout **31**, the heat-sealing capability between the spout **31** and the pouch body **35** is improved. However, because a plastic material (usually a polyolefin resin, such as polyethylene and polypropylene, having a high heat-sealing capability) constituting the spout **31** has a low gas-shielding capability, the plastic pouch **35** has accompanied a drawback that gas flows between the interior and the exterior of the pouch while permeating through the boat-shaped portion **33**, as indicated by arrows in **FIG. 17**, whereby the contents filled in the pouch **35** are oxidized and hence deteriorate.

[0006] A conceivable solution for preventing such a reduction of the gas shielding capability caused by the configuration of the spout itself is to form a gas barrier layer in the spout. However, even when a cylindrical gas barrier layer **36** is formed in the spout as shown in **FIG. 18**(A), gas cannot be prevented from permeating through the boat-shaped portion **33**. Only when the gas barrier layer **36** is formed to cover a cylindrical mouth part **34** in an upper portion of the spout and an entire upper surface of the boat-shaped portion **33** as shown in **FIG. 18**(B), gas can be prevented from permeating through the spout itself.

[0007] It is, however, very difficult to form the gas barrier layer having such a complicated shape in the spout. Hence, that type of spout cannot be manufactured with practically feasible cost and processes.

[0008] Accordingly, an object of the present invention is to solve the problems set forth above and to provide a spout for a pouch, which can be reliably heat-sealed to a plastic pouch body to provide an excellent gas-shielding capability for preventing gas permeation through the spout itself, and can be simply manufactured at a low cost without requiring complicated processes and special materials.

[0009] Another object of the present invention is to provide a plastic pouch with such a spout, which has a more aesthetically pleasing outer appearance without wrinkles or the likes, an excellent gas-shielding capability, and a high heat-sealing strength.

DISCLOSURE OF THE INVENTION

[0010] As a result of conducting intensive studies, the inventors have found that the above objects can be achieved by devising the shape of a part of a spout, which is inserted in a pouch and fixed to a pouch body for sealing, and have accomplished the present invention based on the finding.

[0011] More specifically, the present invention is constituted as follows:

[0012] 1. A spout for a pouch, comprising a tubular mouth part having a cap fitting portion and a seal part connected to a lower end portion of the mouth part for sealing with the pouch, wherein a horizontal cross-sectional shape of the seal part is different in a height direction between an upper end portion and a lower end portion thereof, and an outer peripheral length of the horizontal cross-sectional shape is substantially equal at any position between the upper end portion and the lower end portion of the seal part.

[0013] 2. A spout for a pouch according to 1, wherein an area surrounded by a contour of the horizontal cross-section of the seal part continuously increases in a direction toward the lower end portion from the upper end portion of the seal part.

[0014] 3. A spout for a pouch according to 1 or 2, wherein a horizontal cross-sectional shape of the seal part is circular or elliptic in the upper end portion thereof and is boat-like symmetrical in the left and right direction in the lower end portion thereof.

[0015] 4. A spout for a pouch according to any one of 1 to 3, wherein wing pieces each having a thickness increasing in a direction toward the lower end portion from the upper end portion thereof are symmetrically provided on opposite sides of the seal part.

[0016] 5. A spout for a pouch according to any one of 1 to 4, wherein outer-peripheral lower end portions of the seal part are rounded.

[0017] 6. A spout for a pouch according to any one of 1 to 5, wherein a tongue-shaped projection is provided at a lower end portion of the seal part.

[0018] 7. A spout for a pouch according to any one of 1 to 6, wherein a gas barrier layer is provided at least in the tubular mouth part of the spout.

[0019] 8. A spout for a pouch according to any one of 1 to 7, wherein a bar-like member is provided to extend downward from the seal part.

[0020] 9. A spout for a pouch according to any one of 1 to 8, wherein a rib is provided on the seal part.

[0021] 10. A spout for a pouch according to any one of 1 to 9, wherein a cap equipped with a heat sealable lid is fitted to the mouth part of the spout, the cap having means to peel off the heat sealed lid from the mouth part of the spout when the cap is opened.

[0022] 11. A pouch with a spout, wherein a spout for a pouch according to any one of 1 to 10 is fixed to an opening portion of the pouch by heat sealing.

[0023] 12. A pouch with a spout according to 11, wherein the spout is fixed to the opening portion of the pouch such that the upper end portion of the heat-sealed part of the spout is arranged inward of the pouch from the upper end portion of the pouch body.

[0024] In the present invention, the term "outer peripheral length" of the horizontal cross-section of the seal part of the spout fixed to the pouch for sealing means a length defined as follows:

[0025] 1) When the spout has, as shown in FIGS. **1** to **3**, a pair of wing pieces **6**, **6** formed on opposite sides of a barrel **5** of a seal part **4** and having the same width from an upper end portion to a lower end portion thereof, the "outer peripheral length" means an actual length of the horizontal cross-section of the seal part **4**, i.e., a length from a1 to a3 via a2 in **FIG. 3**(A), a length from b1 to b3 via b2 in **FIG. 3**(B), and a length from c1 to c3 via c2 in **FIG. 3**(C).

[0026] 2) When the spout has, as shown in FIGS. **9** to **11**, no wing pieces **6** on opposite sides of the barrel **5** of the seal part **4**, or when the spout has wing pieces **6** in each of which the width at the upper end portion of the wing piece **6** differs from the width at the lower end portion of the wing piece **6** (usually, as shown in **FIG. 12**, the width of the wing piece **6** at the upper end portion is smaller than that at the lower end portion), the "outer peripheral length" means a length defined below. Assuming straight lines (hereinafter referred to as "imaginary lines") L**1** and L**2** drawn to vertically rise from opposite-side lower end portions of the seal part **4** as shown in **FIGS. 9 and 10**, the "outer peripheral length" means a length (hereinafter referred to as an "imaginary outer peripheral length") from the imaginary line L**1** to the imaginary line L**2** via an outer periphery of the seal part **4** of the spout **1**, i.e., a length from d1 to d3 via one side d2 of the seal part **4** in **FIG. 10**(D), a length from e1 to e3 via one side e2 of the seal part **4** in **FIG. 10**(E), and a length from f1 to f3 via one side f2 of the seal part **4** in **FIG. 10**(F).

[0027] Also, the expression that lengths are "substantially equal" means that the lengths are within the range of ±10% of an average value or so.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] **FIG. 1** shows one example of a spout for a pouch according to the present invention,

[0029] **FIG. 2** is a vertical cross-sectional view of the spout shown in **FIG. 1**, and

[0030] **FIG. 3** is a horizontal cross-sectional view of the spout shown in **FIG. 1**.

[0031] **FIG. 4** is a perspective view showing a standing pouch to which the spout shown in **FIG. 1** is fixed,

[0032] **FIG. 5** is an enlarged cross-sectional view of a portion of the standing pouch shown in **FIG. 4** to which the spout is fixed, and

[0033] **FIG. 6** is a schematic side cross-sectional view of the standing pouch shown in **FIG. 4**.

[0034] **FIG. 7** shows another example of the spout for the pouch according to the present invention.

[0035] **FIG. 8** shows still another example of the spout for the pouch according to the present invention.

[0036] **FIG. 9** shows still another example of the spout for the pouch according to the present invention,

[0037] **FIG. 10** is a horizontal cross-sectional view of the spout shown in **FIG. 9**, and

[0038] **FIG. 11** is a vertical cross-sectional view of the spout shown in **FIG. 9**.

[0039] **FIG. 12** shows still another example of the spout for the pouch according to the present invention.

[0040] **FIG. 13** shows still another example of the spout for the pouch according to the present invention.

[0041] **FIGS. 14 and 15** show still another example of the spout for the pouch according to the present invention, in which a heat-sealabe-lid equipped cap is fitted to a mouth part of the spout.

[0042] **FIGS. 16 and 17** show a conventional pouch to which a known spout for the pouch is fixed.

[0043] **FIG. 18** is a schematic view showing a state of gas permeation through the spout itself for the pouch.

BEST MODE FOR CARRYING OUT THE INVENTION

[0044] An embodiment of the present invention will be described below with reference to the drawings.

[0045] FIGS. **1** to **3** show one example of a spout for a pouch according to the present invention. **FIG. 1** is a front view of the spout, and **FIG. 2** is a vertical cross-sectional view of the spout shown in **FIG. 1**. **FIG. 3** is a horizontal cross-sectional view of the spout shown in **FIG. 1**. More specifically, (A), (B) and (C) of **FIG. 3** show horizontal cross-sections taken along the lines AA, BB and CC in **FIG. 1**, respectively.

[0046] Further, **FIG. 4** is a perspective view showing a standing pouch to which the spout shown in **FIG. 1** is fixed, and **FIG. 5** is an enlarged cross-sectional view of a portion of the standing pouch shown in **FIG. 4** to which the spout is fixed. **FIG. 6** is a schematic side cross-sectional view of the standing pouch shown in **FIG. 4**.

[0047] The spout **1** for a pouch, shown in **FIG. 1**, comprises a cylindrical mouth part **3** having a screwed portion **2** formed on its outer periphery for fitting with a cap (not shown) and a passage **7** formed therein, and a seal part **4** provided at a lower end portion of the mouth part **3** for sealing with a plastic pouch. The seal part **4** fixed to the

plastic pouch by heat sealing comprises a barrel **5** formed such that an outer cross-sectional shape of its upper end portion is circular and a cross-sectional shape of its lower end portion is boat-like symmetrical in the left and right direction, and a pair of wing pieces **6**, **6** provided on opposite sides of the barrel **5** and each having a thickness gradually increasing in a direction from the upper end portion toward the lower end portion thereof. In addition, the seal part **4** has an outer configuration formed such that a thickness of the seal part **4** gradually and continuously increases in a direction toward the lower end portion from the upper end portion thereof and, as shown in (A), (B) and (C) of **FIG. 3**, an area surrounded by a contour of its horizontal cross-section continuously increases in a direction toward the lower end portion represented by (C) from the upper end portion represented by (A). Further, the wing pieces **6** are formed in thickness gradually decreasing toward opposite side ends.

[**0048**] In the spout **1** thus constructed, an outer peripheral length of the horizontal cross-section of the seal part **4** fixed to the plastic pouch by sealing, i.e., a length from a1 to a3 via a2 in **FIG. 3**(A), a length from b1 to b3 via b2 in **FIG. 3**(B), and a length from c1 to c3 via c2 in **FIG. 3**(C), are substantially equal at any different levels of the seal part **4**. Here, the expression "substantially equal" means that the lengths are within the range of ±10% of an average value or so. In order to minimize wrinkles caused when the seal part **4** is fixed to the plastic pouch by heat sealing, however, the lengths are more preferably kept within the range of ±5% of an average value. By setting the shape and size of the spout **1** as described above, when the spout **1** is inserted in an opening portion of a pouch **11** and fixed to it by heat sealing as shown in **FIGS. 4 and 5**, the plastic film constituting the pouch **11** and the spout **1** are brought into a smoother contact with each other. It is therefore possible to prevent wrinkles from being caused upon the heat sealing, and to avoid stresses from being concentrated on near a joined portion between the plastic film and the spout **1**. In addition, by providing the seal part in the form of very thin wings, i.e., the wing pieces **6**, which extend along spout end portions, it is possible to effectively fill up small voids that tend to generate upon the heat sealing between the spout and the pouch in areas where the spout end portions and the pouch meet each other.

[**0049**] Further, as shown in **FIG. 6**, the standing pouch with the spout **1** fixed thereto has a smooth outer appearance and a much improved standing posture. As a result, a commodity value of the pouch filled with the contents is increased.

[**0050**] In the spout **1** of this example, a gas barrier layer **8** is provided as an intermediate layer inside a cylindrical mouth part **3** of the spout **1** so as to ensure a gas shielding capability of the plastic pouch **11** to which the spout **1** is fixed.

[**0051**] With the spout **1** thus constructed, the gas barrier layer **8** serves to shut off gas permiation through the mouth part **3** of the spout **1**. Further, as shown in **FIG. 3**(A), since the seal part **4** fixed to the pouch **11** by heat sealing has a very small cross-sectional area in its upper end portion, gas permeation through the spout **1** itself can be greatly reduced.

[**0052**] Further, as shown in **FIG. 5**, when fixing the spout **1** and the pouch **11** together by heat sealing, the spout **1** is arranged such that the upper end portion of the seal part **4** of the spout **1** is positioned completely inside the pouch **11** and a heat-sealed area **12** where the opposite-side plastic films constituting the pouch **11** are joined to each other by the heat sealing is formed above the seal part **4**. With such an arrangement, gas permeation through the spout **1** itself can be perfectly shut off.

[**0053**] **FIG. 7** shows another example of the spout for the pouch according to the present invention. More specifically, **FIG. 7**(A) is a front view of the spout, and **FIG. 7**(B) is a vertical cross-sectional view taken along the line XX in **FIG. 7**(A).

[**0054**] In the spout **1** of this example, the lower end portion of the seal part **4** is rounded at its outer periphery as denoted by R. The other construction of the spout **1** of this example is the same as that of the spout shown in **FIG. 1**. When a pouch fixed with the spout **1** of this example and filled with the contents is dropped, the pouch is avoided from breaking at the lower end portion of the seal part **4** of the spout **1**. Consequently, the strength of the pouch with the spout against dropping can be greatly increased.

[**0055**] **FIG. 8** shows still another example of the spout for the pouch according to the present invention. More specifically, **FIG. 8**(A) is a front view of the spout, and **FIG. 8**(B) is a vertical cross-sectional view taken along the line YY in **FIG. 8**(A).

[**0056**] In the spout **1** of this example, the lower end portion of the seal part **4** is rounded at its outer periphery as denoted by R and are provided with tongue-shaped projections **9**. Also, the passage **7** provided in the spout **1** is formed so as to gradually spread in the barrel **5** in match with the outer configuration thereof. Further, hanger flanges **10**, **10** each having a substantially rectangular plan shape are provided on an outer periphery of the mouth part **3** of the spout **1** to serve athes for carrying the pouch in a hanging state while being supported at the spout. When a pouch fixed with the spout **1** of this example and filled with the contents is dropped, the tongue-shaped projections **9** are flexed to develop a damping action, and therefore the pouch is avoided from breaking at the lower end portion of the seal part **4** of the spout **1**. Consequently, the strength of the pouch with the spout against dropping can be further increased.

[**0057**] In the illustrated example, the projections **9** are formed with a thickness gradually decreasing toward its fore end so that the tongue-shaped projections **9** are apt to more easily flex. As a matter of course, however, the thickness of the tongue-shaped projections **9** is not specifically required to be changed.

[**0058**] The tongue-shaped projection **9** develops the effects of increasing the strength of the pouch with the spout against dropping, and of preventing the plastic film constituting the pouch body from causing a blockage when the contents are poured, thereby improving a capability of pouring the contents.

[**0059**] FIGS. **9** to **11** show still another example of the spout for the pouch according to the present invention. More specifically, **FIG. 9** is a front view of the spout, **FIG. 10** is a horizontal cross-sectional view of the spout, and **FIG. 11** is a vertical cross-sectional view of the spout. (D), (E) and (F) of **FIG. 10** are horizontal cross-sectional views taken along the lines DD, EE and FF in **FIG. 9**, respectively.

[0060] In the spout **1** of this example, the seal part **4** is constituted by only the barrel **5** connected adjacent to the lower portion of the mouth part **3** without providing the wings **6** in the seal part **4** fixed to the plastic pouch by heat sealing. Further, a gas barrier layer **8** is formed by providing a vapor-deposited metal layer over an entire surface of the passage **7** extending from an upper end of the mouth part **3** of the spout to a lower end of the seal part **4** (i.e., over an entire inner peripheral surface of the spout **1**). The other construction of the spout **1** of this example is the same as that of the spout shown in **FIG. 1**.

[0061] In the spout **1** of this example, assuming straight lines (hereinafter referred to as "imaginary lines") L1 and L2 drawn to vertically rise from opposite-side lower end portions of the seal part **4**, a length (hereinafter referred to as an "imaginary outer peripheral length") from the imaginary line L1 to the imaginary line L2 via an outer periphery of the horizontal cross-section of the seal part **4** of the spout **1**, i.e., a length from d1 to d3 via one side d2 of the seal part **4** in **FIG. 10**(D), a length from e1 to e3 via one side e2 of the seal part **4** in **FIG. 10**(E), and a length from f1 to f3 via one side f2 of the seal part **4** in **FIG. 10**(F), are substantially equal at any different levels of the seal part **4**.

[0062] By setting the imaginary outer peripheral length of the spout **1** in such a manner, the heat-sealing capability between the spout **1** and the plastic pouch can be further improved. The spout **1** of this example can also provide similar advantageous effects to those obtainable with the spout shown in **FIG. 1**.

[0063] **FIG. 12** shows still another example of the spout for the pouch according to the present invention. More specifically, **FIG. 12**(A) is a front view of the spout, and **FIG. 12**(B) is a vertical cross-sectional view taken along the line ZZ in **FIG. 12**(A). In the spout **1** of this example, the seal part **4** is constructed by providing a pair of flat wings **6**, **6**, each of which has a substantially constant thickness, on opposite lateral sides of a truncated cone-shaped barrel **5** having a substantially constant thickness. Further, hanger flanges **10**, **10** each having a substantially rectangular plan shape are formed at a root of the mouth part **3** of the spout **1**, and ribs **13** are provided on an outer periphery of the barrel **5** and on the wings **6** for improving the heat-sealing capability between the spout **1** and the pouch.

[0064] While, in the illustrated example, the ribs **13** are provided to extend in the horizontal direction parallel to each other, it is needless to say that the arrangement of the ribs **13** can be modified as required. For example, the ribs **13** may be provided to extend in the vertical direction.

[0065] Comparing with the conventional spout, shown in **FIG. 17**, in which the horizontal cross-sectional shape is the same at the upper end portion and the lower end portion, the spout for the pouch according to the present invention, shown in the examples described above, has the improved effect of preventing a phenomenon that the film constituting the pouch body is bent to cause a blockage at a position just below the spout when the contents are poured.

[0066] In the conventional spout for the pouch, it is also proposed to provide a bar-like member extending downward from the spout for preventing the occurrence of a blockage and ensuring a capability of pouring the contents. With the spout for the pouch according to the present invention, however, such a bar-like member can be omitted and hence an amount of raw material for producing the spout can be cut down. Without the bar-like member, the pouch can be folded into a smaller size correspondingly. This brings about such advantages as (1) the remaining amount of the contents can be reduced (i.e., a consumer can drink the contents up to the last), and (2) because the pouch can be folded into a smaller size when discarded after the use, the volume of pouches discarded in folded states can be reduced. As a matter of course, as shown in **FIG. 13**, to ensure a more reliable capability of pouring the contents, the bar-like member may be provided to extend downward from the spout.

[0067] **FIG. 13** is a front view showing still another example of the spout according to the present invention.

[0068] In the spout **1** of this example, a bar-like member **14** is formed to extend downward from the seal part **4** and to be inserted in the pouch. Further, hanger flanges **10** each having a rectangular plan shape are provided on an outer periphery of the cylindrical mouth part **3** to serve athes for carrying the pouch in a hanging state while being supported at the spout. Although, in the illustrated example, two hanger flanges **10** are provided, three or more hanger flanges may be provided instead. The other construction of the spout **1** of this example is the same as that of the spout shown in **FIG. 1**.

[0069] With the spout **1** of this example, the capability of pouring the contents filled in the pouch is improved with the provision of the bar-like member **14**. The bar-like member **14** can be modified as desired, for example, by forming recesses, projections and/or holes therein, and its size can be selected on the case-by-case basis. The spout **1** of this example can also provide similar advantageous effects to those obtainable with the spout shown in **FIG. 1**.

[0070] In each of the examples described above, the mouth part is formed into a cylindrical shape so that a screwed cap is fitted to the mouth part of the spout. However, when fixing a cap to the spout by other means, e.g., by engaging a recess and a projection with each other instead of screwing the cap, the mouth part of the spout and the upper end portion of the seal part may be formed to have any other suitable cross-sectional shape such as an elliptic shape. Alternatively, the cap may be constituted as a hinge cap.

[0071] **FIGS. 14 and 15** show still another example of the spout for the pouch according to the present invention. Regarding this example, **FIG. 14** is an overall view showing one example in which a cap equipped with a heat sealable lid is fitted to a mouth part of the spout of the present invention. **FIG. 15**(*a*) is a cross-sectional view of the cap equipped with the heat sealable lid, **FIG. 15**(*b*) is a cross-sectional view of the mouth part of the spout when the cap equipped with the heat sealable lid is employed, **FIG. 15**(*c*) is a cross-sectional view showing a state in which the cap equipped with the heat sealable lid is fitted to the mouth part of the spout, **FIG. 15**(*d*) is a cross-sectional view showing another example of a heat sealable lid.

[0072] In the spout **1** of this example, by externally heating the spout after fitting a heat-sealable-lid equipped cap **41** to the mouth part **3** of the spout, the mouth part **3** of the spout can be enclosed by a heat sealable lid **42**. When opening the spout, it is just required to rotate a cap body. With the rotation of the cap body, a peeling-off means

constituted as an annular projection **43** provided in the cap body pushes up a portion **44** of the heat sealed lid **42** projecting out of the mouth part **3** of the spout, whereupon the heat sealed lid **42** is peeled off from the mouth part **3** of the spout, thus enabling the spout to be opened with one action. By using such an opening mechanism, the heat sealed lid **42** can be easily peeled off and the spout can be easily opened by fingers with no need of applying a large opening torque.

[**0073**] The heat-sealable-lid equipped cap **41** comprises, by way of example, a cap body made up of a top wall **45** and a skirt wall **46** which is extended downward from the top wall **45** and has a screwed portion **47** formed on its inner peripheral surface to be meshed with the screwed portion **2** of the mouth part **3** of the spout, and the heat sealable lid **42** fitted to and supported at a region between an upper end of the screwed portion on the inner side of the cap body and an inner peripheral portion of the top wall. The heat sealable lid **42** has a heat-sealable layer formed at least on its lower surface, and is made of an elastic material having the projected portion **44** which has an outer diameter larger than that of the mouth part **3** of the spout and is projected out of the outer periphery of the mouth part **3** of the spout. The peeling-off means constituted as the annular projection **43** engageable with the projected portion **44** of the heat sealable lid **42** is provided on an inner peripheral surface of the skirt wall **46**. By screwing the cap body over the mouth part **3** of the spout and heating it, the heat sealable lid **42** is sealed to a top opening end of the spout. When opening the spout, the cap body is unscrewed from the mouth part **3** of the spout, whereupon the heat sealed lid **42** is peeled off by the peeling-off means.

[**0074**] The heat sealable lid **42** can be constituted as a multilayered sheet made up of at least a support layer which is formed on its upper surface and has rigidity, and a sealing layer which is formed on its lower surface and capable of being fixed to the opening top end of the spout by heat sealing. When the heat sealable lid **42** is constituted as a multilayered sheet including a metal foil inserted between the support layer and the sealing layer, the metal layer is heated by high-frequency induction heating to produce heat so that the sealing layer can be effectively heat-sealed to the opening top end of the spout by the produced heat. The shape of the heat sealable lid **42** is not limited to a disk-like one. As shown in **FIG. 15**(*d*), by way of example, the heat sealable lid **42** may be formed into a shape having an annular intermediate leg **48** fitted to the inner peripheral surface of the mouth part **3** of the spout.

[**0075**] As the peeling-off means for peeling off the heat sealed lid **42** upon unscrewing of the cap body when the spout is opened, it is effective to form one annular projection **43** having an inner diameter smaller than the outer diameter of the heat sealed lid **42**, or to form a plurality of projections. However, the peeling-off means is not limited to those examples, and an upper end of the screwed portion formed on the inner peripheral surface of the skirt wall **46** may serve also as the peeling-off means.

[**0076**] The heat sealable lid **42** is constituted as an elastic member which has at least the sealing layer and the support layer, and which develops an adhesion strength with a material of the opening top end of the spout essentially in the range of 1 to 25 N per 15-mm width in terms of T-peeling strength. Further, a thickness t (mm) and a modulus of bending elasticity M (Mpa) of the heat-sealed layer and the support layer are set in the range of $30<t\times M<3000$. By so forming the heat sealable lid **42**, it can be satisfactorily peeled off from the opening top end of the spout when the spout is opened. The heat sealing strength must be selected so as to simultaneously provide an opening capability and a sealing capability at satisfactory levels. From this point of view, the T-peel strength of the heat-sealed portion is preferably held in the above-mentioned range. If the T-peel strength is smaller than the lower limit, there occurs a fear in the sealing capability. If the T-peel strength is larger than the upper limit, the peel strength is too high and a larger torque is required for removing the screwed cap when the spout is opened, thus resulting in deterioration of the opening capability. On the other hand, if $t\times M$ is not more than 30, the rigidity of the sealing lid is too small and the sealing lid is deformed when peeling off it, and hence a force required for breaking the sealed portion cannot be developed. Conversely, if $t\times M$ is not less than 3000, the sealing lid is hardly deformed when peeling off it, and hence a force for breaking the sealed portion must be applied to the entire sealing lid surface, whereby the unsealing strength is increased.

[**0077**] As materials of the spout of the present invention, thermoplastic resins are used to which the plastic film constituting the pouch can cohere by heat sealing.

[**0078**] Examples of such thermoplastic resins include polyolefins such as polypropylene, a propylene-ethylene copolymer, crystalline polybutene-1, crystalline poly 4-metylpentene-1, low-, medium- or high-density polyethylene, linear low-density polyethylene, an ethylene-vinyl acetate copolymer (EVA), an ethylene-acrylic acid copolymer (EAA), an ethylene-ethyl acrylate copolymer (EEA), and an ion cross-linked olefin copolymer (ionomer); aromatic vinyl polymers such as polystyrene and a styrene-butadiene copolymer; vinyl halide polymers such as polyvinyl chloride and vinylidene chloride resin; nitrile polymers such as an acrylonitrile-styrene copolymer and an acrylonitrile-styrene-butadiene copolymer; polyamides such as nylon 6, nylon 66, and para- or metaxylylene adipamide; polyesters such as polyethylene terephthalate, polybutylene terephthalate, polytetramethylene terephthalate, poly-1,4-cyclohexane dimethylene terephthalate, polyethylene naphthalate; various kinds of polycarbonates; and polyacetals such as polyoxymethylene.

[**0079**] Particularly preferable ones are, for example, polyolefin resins such as low-density polyethylene, linear low-density polyethylene, medium-density polyethylene, high-density polyethylene, polypropylene, and a propylene-ethylene copolymer. The spout of the present invention can be molded by any of known methods, for example, injection molding and compression molding.

[**0080**] The gas barrier layer formed in the spout is constituted by, e.g., a gas shielding resin layer made of polyvinylidene chloride resin, saponified EVA, nylon, or a cyclic olefin copolymer; a resin layer having a vapor-deposited film of aluminum, silicon oxide, or another metal oxide; a resin layer containing clay minerals; and a foil of a metal such as aluminum.

[**0081**] The gas barrier layer can be formed in the spout by any of known methods, for examples, co-injection molding, multi-layer compression molding, multicolor molding, and vapor deposition.

[0082] Further, as the plastic film constituting the pouch, to which the spout is fixed, a single-layer film made of thermoplastic resin having a heat-sealing capability can be used as well as a multilayered film made of two or more layers, i.e., a pouch inner layer made of such a thermoplastic resin film having a heat sealing capability and one or more other films laminated on the inner layer.

[0083] The thermoplastic resin film having a heat sealing capability can be made of thermoplastic resins, for example, polyolefins such as polypropylene, a propylene-ethylene copolymer, crystalline polybutene-1, crystalline poly 4-metylpentene-1, low-, medium- or high-density polyethylene, linear low-density polyethylene, an ethylene-vinyl acetate copolymer (EVA), an ethylene-acrylic acid copolymer (EAA), an ethylene-ethyl acrylate copolymer (EEA), and an ion cross-linked olefin copolymer (ionomer); aromatic vinyl copolymers such as polystyrene and a styrene-butadiene copolymer; vinyl halide polymers such as polyvinyl chloride and vinylidene chloride resin; nitrile polymers such as an acrylonitrile-styrene copolymer and an acrylonitrile-styrene-butadiene copolymer; polyamides such as nylon 6, nylon 66, and para- or metaxylylene adipamide; polyesters such as polyethylene terephthalate, polybutylene terephthalate, polytetramethylene terephthalate, poly-1,4-cyclohexane dimethylene terephthalate, polyethylene naphthalate; various kinds of polycarbonates; and polyacetals such as polyoxymethylene.

[0084] Particularly preferable materials are, for example, olefin-based resins such as low-density polyethylene, linear low-density polyethylene, medium-density polyethylene, high-density polyethylene, polypropylene, a propylene-ethylene copolymer, an ethylene-vinyl acetate copolymer, and olefin resins graft-modified with ethylenically unsaturated carboxylic acids or anhydrides thereof; ionomer resins; polyamide or copolyamide resins having relatively low melting points or low softening points; and polyester or copolyester resins.

[0085] In the case of employing a multilayered film as the plastic film constituting the pouch, the multilayered film is formed by using, as an inner layer of the pouch, the above-mentioned thermoplastic resin film having a heat healing capability and laminating one or more other films on it, as required, with an adhesive layer interposed between the adjacent two films.

[0086] As materials of the adhesive layer, adhesive resins are employed which are selected from among polyethylene imine resins, alkyl titanate resins, polyester-isocyanate resins, urethane resins, epoxy resins, polyether resins, and olefin-based resins to which polar groups are introduced.

[0087] The film laminated on the resin having a heat-sealing capability is not limited to a particular one, but includes any suitable one of materials usually employed for the pouch. While any of the above-mentioned materials suitable for the resin having a heat-sealing capability can be employed as a material for the laminated film, it is preferable to select a resin having a higher melting point than that of the resin used as the inner layer.

[0088] As other examples of the film, a composite film formed by laminating a foil of a metal such as aluminum, paper, or cellophane with one or more of the above-mentioned plastic film is also usable. In particular, when the contents require the pouch to have a gas shielding capability, it is preferable to employ a multilayered film including any of a resin layer made of polyvinylidene chloride resin, saponified EVA, nylon, or a cyclic olefin copolymer; a resin layer having a vapor-deposited film of aluminum, silicon oxide, or another metal oxide; a resin layer containing clay minerals; and a foil of a metal such as aluminum.

[0089] Films made of foams of various synthetic resins can be further used for the purpose of giving heat insulation, rigidity and other desired properties to the film constituting the pouch. In addition, it is also possible to use films made of various synthetic resins in which inorganic substances, such as alumina, silica, titanium oxide, calcium carbonate, carbon and talc, glass fibers, or the likes are mixed.

[0090] Layer structure of the multilayered film suitable for constituting the pouch of the present invention are, for example, biaxially oriented polyethylene terephthalate (PET: outer layer)/non-oriented linear low-density polyethylene (LLDPE: inner layer), biaxially oriented nylon (outer layer)/LLDPE (inner layer), biaxially oriented PET (outer layer)/aluminum foil (intermediate layer)/LLDPE (inner layer), biaxially oriented nylon (outer layer)/aluminum foil (intermediate layer)/LLDPE (inner layer), biaxially oriented PET (outer layer)/biaxially oriented nylon (intermediate layer)/LLDPE (inner layer), biaxially oriented PET (outer layer)/aluminum foil (intermediate layer)/biaxially oriented nylon (intermediate layer)/LLDPE (inner layer).

[0091] Also, when the pouch is employed in applications requiring high-temperature treatment such as heat treatment under high pressure, a multilayered film containing non-oriented polypropylene (PP) as an inner layer can be used, which includes, for example, biaxially oriented PET (outer layer)/aluminum foil (intermediate layer)/non-oriented polypropylene (PP: inner layer), biaxially oriented PET (outer layer)/biaxially oriented nylon (intermediate layer)/aluminum foil (intermediate layer)/non-oriented PP (inner layer), biaxially oriented PET (outer layer)/non-oriented PP (inner layer), biaxially oriented nylon (outer layer)/non-oriented PP (inner layer), biaxially oriented nylon (outer layer)/aluminum foil (intermediate layer)/non-oriented PP (inner layer), biaxially oriented PET with a vapor-deposited inorganic oxide (outer layer)/non-oriented PP (inner layer), and biaxially oriented nylon with a vapor-deposited inorganic oxide (outer layer)/non-oriented PP (inner layer).

[0092] An adhesive layer selected from among the adhesive resins mentioned above is interposed between adjacent layers of such a multilayered film.

[0093] Whether the plastic film should be formed of a single layer or not, and what kind of layer structure should be employed for the plastic film are selected depending on properties of the contents filled in the pouch. The plastic film can be manufactured by any of ordinary methods such as casting, T-dieing, calendering, and inflation. Also, the multilayered film can be manufactured by any of ordinary methods such as dry lamination of preformed films, coating on a base film, and co-extrusion.

[0094] The present invention will be described in more detail below in connection with a practical example, but the present invention is in no way restricted by the following example.

EXAMPLE 1

[0095] A spout having a shape shown in **FIG. 12** was manufactured through compression molding of polypropylene. The spout was dimensioned such that the overall height was 45 mm, the height of a seal part was 17 mm, the width of a lower end of the seal part was 24 mm, an upper end of the seal part had a circular cross-section with a diameter of 11.2 mm, the thickness of the seal part was 1.4 mm, and the thickness of a fitting portion of the cylindrical mouth part to the cap was 1.0 mm.

[0096] A multilayered film made of 12 μm-thick polyethylene terephthalate/15 μm-thick biaxially oriented nylon/7 μm-thick aluminum alloy foil/50 μm-thick polypropylene in this order from the outer layer side was used as an envelope material constituting a pouch body. The multilayered film was heat-sealed to the manufactured spout after arranging the spout, as shown in **FIGS. 4 and 5**, such that the upper end of the seal part of the spout was positioned inside an upper end of the pouch body. Thus, standing pouch with the spout was manufactured which had a height of 140 mm, a width of 90 mm, and a bottom gusset width of 25 mm.

COMPARATIVE EXAMPLE 1

[0097] A standing pouch with a spout was manufactured in the same manner as in Example 1 except for using a commercially available spout made of polypropylene and having a shape shown in **FIG. 17**. The spout having a boat-like shape was dimensioned such that the overall height was 36 mm, the height of a seal part was 8 mm, and the cross-section of the seal part was 11.3-mm long×19.5-mm wide. A liquid passage with a diameter of 8 mm was formed at the center of the spout.

[0098] After replacing atmospheres in the standing pouches with the spouts obtained in Example 1 and Comparative Example 1 by nitrogen gas, a top surface of a pouring port of each spout was enclosed by heat sealing with a multilayered film made of a 7 μm-thick aluminum alloy foil/50 μm-thick polypropylene. These pouches were preserved under conditions of 30° C.-80% R.H., and an amount of oxygen permeating into the pouch was measured with gas chromatography. Table 1 given below shows the measured results calculated in terms of the pouch with the content volume of 150 ml.

TABLE 1

	Amount of Permeating Oxygen [ml/pouch]			
	Beginning of preservation	After 1 week	After 2 weeks	After 1 month
Example 1	0	0.072	0.149	0.305
Com. Ex. 1	0	0.087	0.181	0.379

[0099] As apparent from Table 1, according to the spout of the present invention, the amount of oxygen permeating into the pouch can be minimized in comparison with that permeating into the pouch through the boat-like portion of the conventional spout. While, in Example 1 described above, a gas barrier layer is not provided in the cylindrical mouth part of the spout, the gas shielding capability of the spout can be further improved by providing such a gas barrier layer.

INDUSTRIAL APPLICABILITY

[0100] According to the spout of the present invention, since the plastic film constituting the pouch and the spout are brought into a smoother contact with each other, it is possible to prevent wrinkles from being caused upon the heat sealing, and to avoid stresses from being concentrated on near a joined portion between the plastic film and the spout. Hence, the heat sealing between the plastic pouch body and the spout can be performed with higher reliability.

[0101] In addition, the spout of the present invention is able to prevent a phenomenon that the film constituting the pouch body is bent to cause a blockage inside the pouch at a position just below the spout when the contents are poured from the pouch with the spout.

[0102] Further, merely by providing a cylindrical gas barrier layer in the mouth part of the spout, it becomes possible to prevent gas permeation through the spout itself, and to increase the gas shielding capability. Additionally, the spout of the present invention can be simply manufactured at a low cost without requiring complicated processes and special materials.

[0103] In particular, when the spout of the present invention is applied to a standing pouch, the pouch has a smoother outer appearance, a standing posture of the pouch is noticeably improved, and a commodity value of the pouch filled with the contents can be increased.

1. A spout for a pouch, comprising a tubular mouth part having a cap fitting portion and a seal part connected to a lower end portion of the mouth part for sealing with the pouch, wherein a horizontal cross-sectional shape of the seal part is different in a height direction between an upper end portion and a lower end portion thereof, and an outer peripheral length of the horizontal cross-sectional shape is substantially equal at any position between the upper end portion and the lower end portion of the seal part.

2. A spout for a pouch according to claim 1, wherein an area surrounded by a contour of the horizontal cross-section of the seal part continuously increases in a direction toward the lower end portion from the upper end portion of the seal part.

3. A spout for a pouch according to claim 1, wherein a horizontal cross-sectional shape of the seal part is circular or elliptic in the upper end portion thereof and is boat-like symmetrical in the left and right direction in the lower end portion thereof.

4. A spout for a pouch according to claim 1, wherein wing pieces each having a thickness increasing in a direction toward the lower end portion from the upper end portion thereof are symmetrically provided on opposite sides of the seal part.

5. A spout for a pouch according to claim 1, wherein outer-peripheral lower end portions of the seal part are rounded.

6. A spout for a pouch according to claim 1, wherein a tongue-shaped projection is provided at a lower end portion of the seal part.

7. A spout for a pouch according to claim 1, wherein a gas barrier layer is provided at least in the tubular mouth part of the spout.

8. A spout for a pouch according to claim 1, wherein a bar-like member is provided to extend downward from the seal part.

9. A spout for a pouch according to claim 1, wherein a rib is provided on the seal part.

10. A spout for a pouch according to claim 1, wherein a cap equipped with a heat sealable lid is fitted to the mouth part of the spout, the cap having means to peel off the heat sealed lid from the mouth part of the spout when the cap is opened.

11. A spout having an opening portion, wherein a spout for a pouch according to claim 1 is fixed to the opening portion of the pouch by heat sealing.

12. A pouch with a spout according to claim 11, wherein the spout is fixed to the opening portion of the pouch such that the upper end portion of the heat-sealed part of the spout is arranged inward of the pouch from the upper end portion of the pouch body.

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