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(54) SMALL CAPACITY CONTAINER FOR VISCOUS SUBSTANCE

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(57) **ABSTRACT**

Provided is a small capacity container for viscous substance, which is capable of quickly discharging a viscous content at any time even when being held upside down or almost upside down. In the small capacity container of not more than 300 ml to contain a viscous substance, a region for quickly discharging the content and a region for slowly discharging the content during the container is held upside down are formed on the inner surface of the barrel portion of the container.

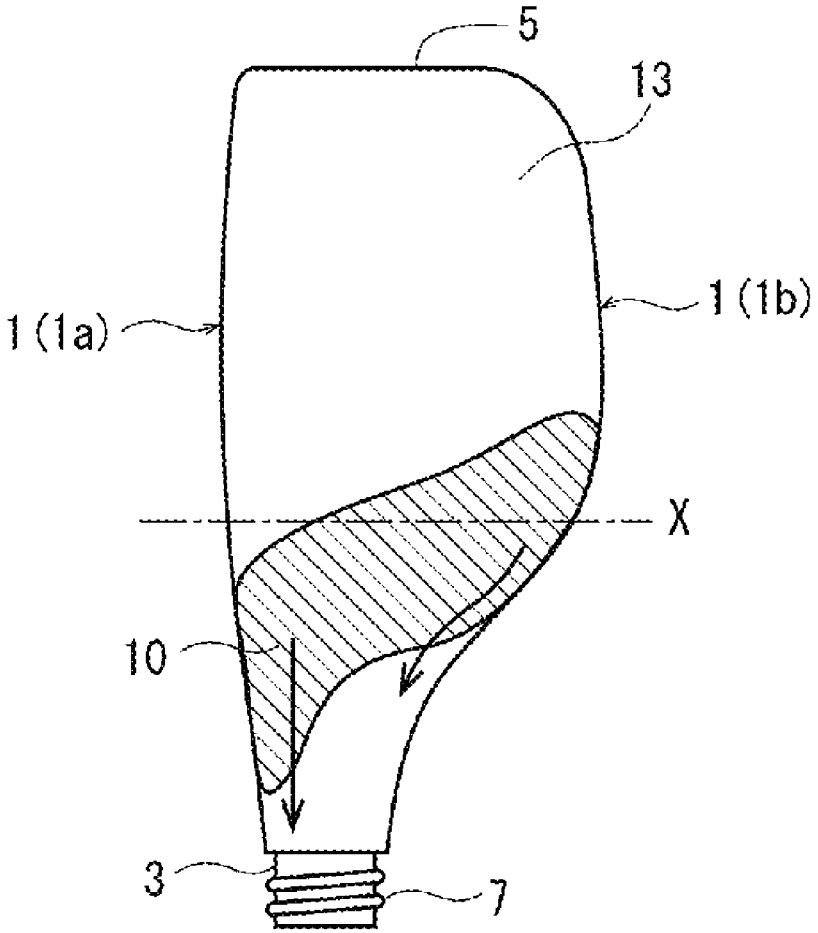


FIG. 1A

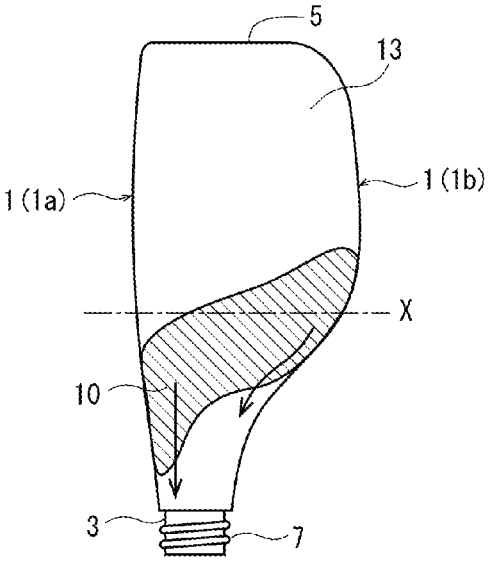
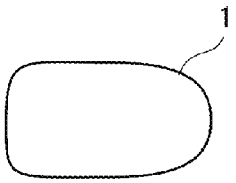


FIG. 1B



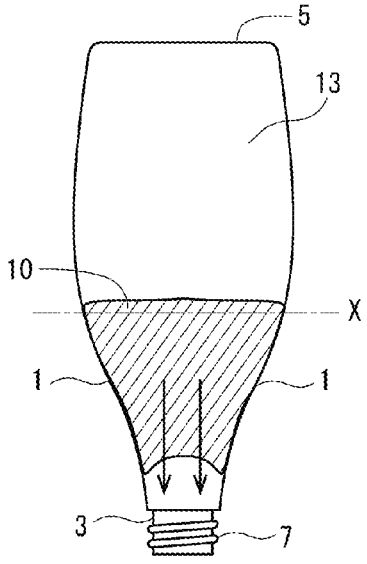


FIG. 2A

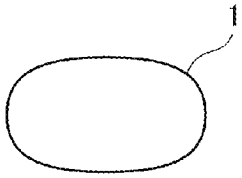


FIG. 2B

FIG. 3

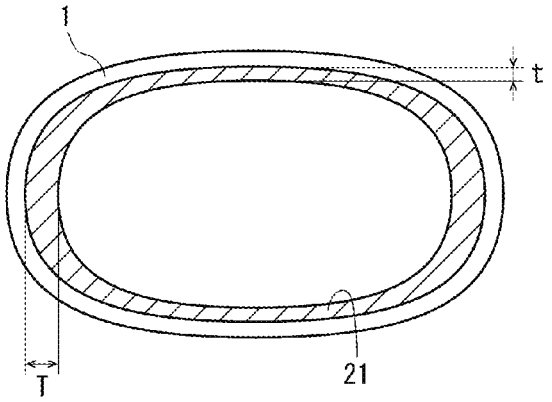


FIG. 4A

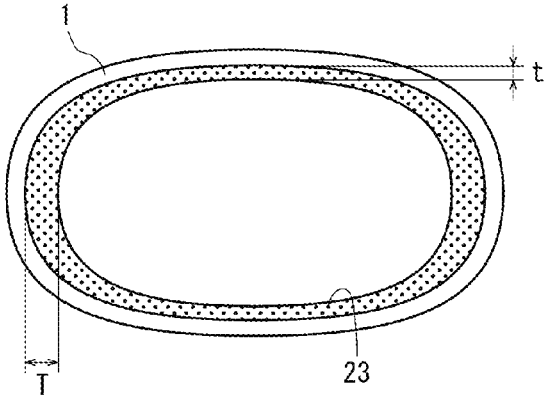
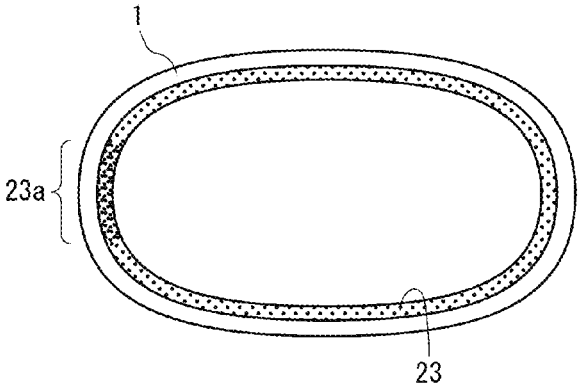


FIG. 4B



SMALL CAPACITY CONTAINER FOR VISCOUS SUBSTANCE

TECHNICAL FIELD

[0001] The present invention relates to a small capacity container for viscous substance, having a capacity of not more than 300 ml. Specifically, the present invention relates to a small capacity container for viscous substance to contain a highly viscous fluid.

BACKGROUND ART

[0002] Containers to contain liquid contents are required to have a content discharge ability, irrespective of the material of the container. In a case of containing a less viscous liquid like water, there is substantially no need to take the discharge ability into consideration. However, when the content is a viscous material like mayonnaise or ketchup, there is a demand that the contents be discharged quickly and used up without remaining in the container, whenever the container is made from plastics or glass.

[0003] Regarding the discharge ability, various measures to form an oil film on the surface of a molded body like a container have been proposed (see for example, Patent documents 1, 2). Formation of the oil film will enhance the lubricity to viscous substance and improve the discharge ability.

[0004] However, when a particularly viscous content is contained in the small capacity container, there may be difficulty in discharging the content. Specifically, when the container is held upside down for discharging the content, the content may be confined in the container before it reaches an outlet of the container.

PRIOR ART DOCUMENTS

Patent Documents

[0005] [Patent Document 1] WO2012/100099

[0006] [Patent Document 2] WO2013/022467

SUMMARY OF THE INVENTION

Problems to be Solved by the Invention

[0007] Therefore, an object of the present invention is to provide a small capacity container for viscous substance, which is capable of discharging quickly a viscous content at any time during the container is held upside down or almost upside down.

Means for Solving the Problems

[0008] The present invention provides a small capacity container for containing viscous substance, having a capacity of not more than 300 ml. The container comprises a barrel portion having an inner surface provided with a region for quickly discharging a content and a region for slowly discharging the content in the container being held upside down.

[0009] The small capacity containers for viscous substance of the present invention can be classified into an odd-shaped cross section type, a liquid film formation type and a bleeding type, depending on the measure to form, on the inner surface of the barrel portion, the region for quickly discharging the content and the region for slowly discharging the content.

[0010] (1) The odd-shaped cross section type small capacity container for viscous substance has a barrel portion, and the inner surface of the barrel portion has an odd-shaped longitudinal cross section having an asymmetrical shape to form the region for quickly discharging the content and the region for slowly discharging the content.

[0011] (2) The liquid film type small capacity container for viscous substance has a barrel portion, and the inner surface of the barrel portion has a liquid film of a lubricating liquid to improve a slide-down property with respect to the viscous substance. The liquid film has an uneven thickness in the circumferential direction when viewed on the transverse cross section of the barrel portion of the container, and the uneven thickness of the liquid film forms the region for quickly discharging the content and the region for slowly discharging the content.

[0012] (3) The bleeding type small capacity container for viscous substance has a multilayered structure including a lubricant-containing resin layer that forms the inner surface of the container, the lubricant-containing resin layer has an uneven thickness in the circumferential direction when viewed on the transverse cross section of the barrel portion of the container, and the uneven thickness of the lubricant-containing resin layer forms the region for quickly discharging the content and the region for slowly discharging the content.

[0013] (4) Alternatively, the container has a multilayered structure including a lubricant-containing resin layer that forms the inner surface of the container. The amount of the lubricant blended in the lubricant-containing resin layer is uneven in the circumferential direction when viewed on the transverse cross section of the barrel portion of the container, and the uneven blend amount of the lubricant in the lubricant-containing resin layer forms the region for quickly discharging the content and the region for slowly discharging the content.

[0014] It is preferable in the present invention that

[0015] (5) the viscous substance has a viscosity of not less than 8 Pa·s at 25° C.;

[0016] (6) the container has a capacity of more than 70 ml;

[0017] (7) the content is food, a pharmaceutical product, or toothpaste; and

[0018] (8) the container is a hollow-molded container.

Effects of the Invention

[0019] The small capacity container for viscous substance of the present invention has two regions: a region for quickly discharging content (region with a higher slide-down velocity) and a region for slowly discharging content (region with a lower slide-down velocity) in the container being held upside down. That is, the lubricity of the inner surface of the barrel portion of the container is uneven when viewed in the circumferential direction. In the container for viscous substance where the lubricity is varied in the circumferential direction on the inner surface of the barrel portion, the content is discharged quickly from a part of the barrel portion and slowly from another part when the container is turned upside down to discharge the content. The difference in the slide-down velocity facilitates discharge of the air confined on the bottom of the container by the content, whereby the content can be discharged easily at any time

without remaining inside the container irrespective of the type of the content, i.e., even if the content is a viscous paste like one having a viscosity of not less than 8 Pa·s at 25° C.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] FIG. **1**: a set of views showing a schematic structure of an example of an odd-shaped cross section type small capacity container for viscous substance and a content therein, where FIG. **1**(*a*) is a schematic longitudinal cross sectional view and FIG. **1**(*b*) is a transverse cross sectional view taken along a line X;

[0021] FIG. **2**: a set of views showing a schematic structure of a conventionally known small capacity container, where FIG. **2**(*a*) is a schematic longitudinal cross sectional view and FIG. **2**(*b*) is a transverse cross sectional view taken along a line X;

[0022] FIG. **3**: a view showing a schematic transverse cross sectional view of a barrel portion for an example of a liquid film type small capacity container for viscous substance of the present invention; and

[0023] FIG. **4**: a set of schematic transverse cross sectional views showing barrel portions for examples of a bleeding type small capacity container for viscous substance of the present invention, where FIG. **4**(*a*) shows an example where the thickness of a lubricant-containing resin layer is adjusted to form regions different in the ability for discharging a content, and FIG. **4**(*b*) shows an example where the amount of lubricant to be blended in a lubricant-containing resin layer is adjusted to form regions different in the ability for discharging a content.

MODE FOR CARRYING OUT THE INVENTION

[0024] As described above, the small capacity container for viscous substance according to the present invention can be classified into an odd-shaped cross section type, a liquid film formation type and a bleeding type, according to the measure for forming on the inner surface of a barrel portion a region for quickly discharging a content and a region for slowly discharging a content.

[0025] FIG. **1** shows an embodiment of an odd-shaped cross section type small capacity container for viscous substance of the present invention in an upside-down state. The container comprises a hollow-cylindrical barrel portion **1** with one end of a neck portion **3** as an outlet for discharging the content, while the other end is closed with a bottom portion **5**.

[0026] On the outer surface of the neck portion **3**, a screw thread **7** may be formed to seal the container with a cap, though this depends on the embodiment of the container.

[0027] The small capacity container for viscous substance has a content of 300 ml or less, in particular, 150 ml or less. Since the small capacity container is light-weighted, it may be held upside down or almost upside down to discharge the content as shown in FIG. **1**. This may often make the discharge of content difficult. On the other hand, a large capacity container is heavy and often attached with a handle, it may not be held upside down or almost upside down, and substantially no problem may be found in the content discharge ability. For this reason, the capacity for the liquid film type or bleeding type container mentioned below is here set to 300 ml or less, in particular 150 ml or less.

[0028] In the present invention, it is particularly important that the inner surface of the barrel portion **1** has an asymmetric lubricity as shown in FIG. **1**(*a*). Namely, the inner surface having an uneven lubricity differentiates the falling velocity of the content. For instance, in the example shown in FIG. **1**(*a*), the inner surface **1***a* at one side of the barrel portion **1** has a larger lubricity, while the inner surface **1***b* on the opposite side has a smaller lubricity. As a result, the content **10** falls faster on the inner surface **1***a* and slower on the inner surface **1***b*.

[0029] On the other hand, a conventionally known small capacity container usually has an even lubricity on the container inner surface in the circumferential direction.

[0030] Namely, when this container is held upside down as shown in FIG. **2** to discharge the content **10**, the content **10** falls evenly along the inner surface of the barrel portion **1**, and it may be confined inside the container before reaching the opening of the neck portion **3**. In this state, air layer **13** is trapped between the content **10** and the bottom portion **5**. Since the atmospheric pressure is greater than the pressure applied by the air layer **13**, the content **10** is confined in the container and discharge thereof will be difficult.

[0031] In contrast, in the present invention, the slide-down property is imparted asymmetrically as shown in FIG. **1**(*a*), thereby forming on the inner surface of the barrel portion **1** a site to differentiate the falling velocity of the content. This results in differences of the falling velocity of the content **10**, and thus, the air layer **13** between the content **10** and the bottom portion **5** can escape easily along the side where the thickness of the content **10** is decreased (i.e., the **1***b* side with less falling velocity). This can effectively avoid a disadvantage of difficulty in discharging the content **10** confined in the container.

[0032] In the present invention, the aforementioned embodiment with an asymmetric slide-down property is not limited particularly as long as the falling velocity of the content **10** is differentiated. That is, there is no particular limitation as long as a region on which the content **10** falls quickly (a region for quickly discharging the content **10**) and a region on which the content **10** falls slowly (a region for slowly discharging the content **10**) are formed on the inner surface of the barrel portion **1**.

[0033] In the embodiment shown in FIG. **1**(*a*), the region **1***a* on which the content **10** falls quickly and the region **1***b* on which the content **10** falls slowly are located opposite to each other. The present invention is not limited to this embodiment, but the regions **1***a* and **1***b* may be located close to each other.

[0034] The aforementioned odd-shaped cross section type small capacity container for viscous substance may be formed of any suitable material such as plastics, glass and a metal as long as it satisfies a requirement in principle that its inner surface has a variation in the lubricity. From the viewpoint of convenience of formation, it is preferred to be made of plastics.

[0035] Though there is no particular limitation on the shape of the container, preferably the container is formed to have a hollow shape. It is most preferable that the container has a shape of a bottle or a tube provided with an opening for discharging the content, and the opening has a smaller diameter than that of the cross section of the barrel portion in which the content is contained. Meanwhile, concerning a wide-open container or a cup, the opening for discharging the content has a larger cross section than that of its barrel

portion. There is substantially no necessity of considering the ability for discharging the content **10** in this type of container.

[0036] For instance, the blow-formed container shown in FIG. **1** may be replaced by a tube container.

[0037] FIG. **3** shows a schematic transverse cross sectional view of a barrel portion **1** of a liquid film type small capacity container.

[0038] Unlike the container as shown in FIG. **1**, this container in FIG. **3** has a liquid film **21** formed on the inner surface of the barrel portion **1**. This liquid film **21** imparts a slide-down property with respect to the viscous content **10** (not shown in FIG. **3**). Namely, the liquid that forms the liquid film **21** functions as a lubricating liquid to improve the slide-down property with respect to the content **10**.

[0039] As indicated in FIG. **3**, the liquid film **21** formed on the inner surface of the barrel portion **1** of the container in the present invention has a thickness uneven in the circumferential direction. Specifically, the liquid film **21** has a region with more thickness T and a region with less thickness t. The region with more thickness T and the region with thickness t each extend like a band in the axial direction of the container. As a result, in the region with thickness T, the content **10** is discharged quickly at a high slide-down velocity. On the other hand, the slide-down velocity is decreased on the region with thickness t, so that the discharge speed has a variation as shown in FIG. **1**(*a*). And thus, the viscous content **10** flows into the region that increases the slide-down velocity, and it decreases its thickness on the region that decreases the slide-down velocity. This allows the air layer **13** between the content **10** and the bottom portion **5** to easily escape from the region where the content **10** is thin (the side where the liquid film **21** has less thickness t), thereby avoiding effectively the disadvantage of difficulty in discharging the viscous content **10** confined in the container.

[0040] The liquid for forming the aforementioned liquid film **21** (lubricating liquid) is selected, depending on the type of the content **10** to be contained in the container, from liquids that are immiscible with the content **10** and that are non-volatile (for instance, having a boiling point of 200° C. or more). And the liquid is required to exhibit repellency to the content **10**. Representative examples thereof include edible oils (animal fats or vegetable oils), fatty acid triglyceride, fluorinated surfactant, liquid paraffin, and silicone oil. A lubricating liquid can be selected from these in accordance with the type of the content **10**.

[0041] The aforementioned liquid film type small capacity container is usually used as a plastic container having an inner surface of resin. By forming the container inner surface with a thermoplastic resin such as an olefin resin and polyester (in particular, an olefin resin), the liquid film **21** of the lubricating liquid can be held stably.

[0042] Preferably, the container is a bottle or a tube having an opening for discharging a content whose diameter is smaller, similarly to the odd-shaped cross section type container as shown in FIG. **1**.

[0043] The liquid film **21** having the aforementioned thickness distribution can be formed by spraying, for instance. Specifically, after forming a container, the lubricating liquid is sprayed on the inner surface of the container so as to form the liquid film **21**. At this time, the spray nozzle is directed to the region where the thickness of the liquid film **21** to be increased. In this manner, a liquid film **21** having a thickness distribution can be formed easily.

[0044] In this case, it is possible to conduct a laboratory test in advance to determine the conditions for spraying (spraying pressure and amount) in order to set the thickness distribution of the liquid film **21** and to prevent the content **10** from clogging or the like.

[0045] For the bleeding type small capacity container as described below, it is also possible to form the liquid film **21** having the thickness distribution by using the method of forming a lubricant-containing resin layer.

[0046] FIGS. **4**(*a*) and **4**(*b*) show a schematic transverse cross sectional view of the barrel portion **1** of the bleeding type small capacity container.

[0047] Unlike the containers as shown in FIGS. **1** and **3**, the container in FIG. **4** has a structure that the inner surface of the barrel portion **1** is formed of the lubricant-containing resin layer **23**. This lubricant is bled on the inner surface to get contact with the viscous content **10** (not shown in FIG. **4**), thereby imparting a slide-down property with respect to the viscous content **10**. In other words, the lubricant in the lubricant-containing resin layer **23** forming the container inner surface functions as a lubricating agent to improve the slide-down property with respect to the content **10**.

[0048] In this bleeding type small capacity container, the lubricant-containing resin layer **23** has a thickness distribution as shown in FIG. **4**(*a*) just like that of the liquid film type small capacity container as shown in FIG. **3**. That is, the lubricant-containing resin layer **23** has a region with more thickness T and a region with less thickness t. The region with more thickness T and the region with less thickness t each extend like a band in the axial direction of the container. In the region with more thickness T, a larger amount of lubricant is bled onto the surface of the resin layer, which increases the slide-down velocity with respect to the content **10**. In the region with less thickness t, a smaller amount of lubricant is bled onto the surface of the resin layer, which decreases the slide-down velocity with respect to the content **10**. When this container is turned upside down, the discharge speed distribution as shown in FIG. **1**(*a*) is formed. That is, the air present on the bottom of the container escapes easily from the region where the lubricant-containing resin layer **23** has a less thickness t. This can effectively prevent the disadvantage of difficulty in discharging the viscous content **10** confined in the container.

[0049] In FIG. **4**(*b*), the lubricant-containing resin layer **23** has an even thickness, but the amount of the lubricant blended in the resin layer **23** has a concentration distribution. For instance, a larger amount of lubricant is blended in the region **23***a*. This region **23***a* blended with a larger amount of lubricant extends like a band in the axial direction of the container. Similarly in this embodiment, the slide-down velocity with respect to the content **10** is increased on the region **23***a* where a larger amount of lubricant is blended, and thus, when the container is turned upside down, there occurs the discharge speed distribution as shown in FIG. **1**(*a*). That is, the air present on the bottom of the container escapes easily from the region where a less amount of lubricant is blended (the region other than the region **23***a*). This can effectively prevent the disadvantage of difficulty in discharging the viscous content **10** confined in the container.

[0050] In the embodiment as shown in FIG. **4**(*b*), the concentration distribution of the lubricant may be formed in the lubricant-containing resin layer **23** so as to form a

slide-down velocity distribution for allowing the air to escape from the container being held upside down. That is, the lubricant may be blended only in the region **23***a* but not in the other region.

[0051] In the present invention, the lubricant is selected depending on the type of the content, so that it can exhibit an effect in improving the slide-down property with respect to the viscous content as a result of bleeding from the resin layer **23**. Representative examples of the lubricant are described below.

[0052] (a) Hydrocarbon-based agents such as fluid- natural- or synthetic paraffin, micro wax, polyethylene wax, and chlorinated polyethylene wax;

[0053] (b) fatty acids such as stearic acid and lauric acid;

[0054] (c) fatty amides such as stearic acid amide, palmitic acid amide, oleic acid amide, erucic acid amide, methylenebisstearic acid amide, ethylenebisstearic acid amide, ethylenebisbehenic acid amide, and ethylenebisoleic acid amide;

[0055] (d) fatty acid esters such as butyl stearate, hydrogenated castor oil, and ethylene glycol monostearate;

[0056] (e) alcohols such as cetyl alcohol and stearyl alcohol;

[0057] (f) metal soaps such as zinc stearate and calcium stearate;

[0058] (g) polyorganosiloxane; and

[0059] (h) glycerin fatty acid esters such as medium-chain fatty acid triglyceride, glycerin diacetomonooleate, glycerin trioleate, and decaglycerin oleate.

[0060] The aforementioned lubricants are normally solid. Among them, a liquid substance that can be used for forming the liquid film **21**, e.g., fluid paraffin, is included. When this type of liquid lubricant is blended in a massive amount to increase the bleeding, it forms a liquid film **21** (i.e., continuous film) to make a liquid film type container. On the other hand, when the blend amount is decreased and the lubricant molecules are distributed like islands, the container is provided as a bleeding type container.

[0061] The aforementioned bleeding type small capacity container is typically used as a plastic container having an inner surface of resin. For formation of the lubricant-containing resin layer **23**, a thermoplastic resin that can be formed into the container is used. For the purpose, olefin resins, polyester and the like that can be widely used in particular in the field of packing container, are used preferably.

[0062] Since the content **10** is a viscous substance and the container is turned upside down or inclined to discharge the content **10**, this type of container is preferably a container having an opening with a small diameter to discharge the content, such as a bottle or a tube.

[0063] Representative examples of the method for forming the aforementioned thickness distribution of the lubricant-containing resin layer **23** or the concentration distribution of the lubricant are described below, though the present invention is not limited to these examples.

[0064] Specifically, for imparting a thickness distribution to the lubricant-containing resin layer **23**, the shape of a circular die for forming the inner layer of the container may be set to make the resin channel width uneven during formation of the container by extrusion, for instance.

[0065] This method further can be applied to production of a liquid film type small capacity container. Specifically, the lubricant may be blended in a resin to form the inner surface of the container and then, the extrusion is conduced as described above, so that the liquid film **21** formed by bleeding can have the thickness distribution.

[0066] For providing the concentration distribution of the lubricant, a composition blended with a larger amount of lubricant and a resin composition blended with a smaller amount of lubricant (or no lubricant is blended) are prepared for the resin to form the container inner surface, with which the concentration distribution of the lubricant can be formed on the lubricant-containing resin layer **23** by a so-called stripe extrusion.

[0067] This method can be applied also to production of a liquid film type small capacity container. Namely, for the resin to be formed on the inner surface of the container, a composition blended with a larger amount of lubricant and a composition blended with a smaller amount of lubricant (or blended with no lubricant) are prepared to conduct a stripe extrusion. As a result, the liquid film **21** becomes thicker on the region formed with the resin composition blended with a larger amount of lubricating liquid, and the liquid film **21** becomes thinner (or the liquid film **21** is not formed) on the region formed with the resin composition blended with a smaller amount of lubricating liquid (or no lubricating liquid).

[0068] Some values such as the thickness distribution or the concentration distribution of the lubricant-containing resin layer **23**, and further the thickness of the lubricant-containing resin layer **23**, can be determined by a laboratory test conducted in advance to prevent clogging or the like of the content **10** to be used.

[0069] In the aforementioned liquid film type or a bleeding type small capacity container, the barrel portion wall of the container is preferably formed to have a multilayered structure having an intermediate layer of a gas barrier resin such as an ethylene vinyl alcohol copolymer. In a case of a monolayer structure, the lubricating liquid forming the liquid film **21** on the inner surface of the container or the lubricant in the lubricant-containing resin layer **23** on the inner surface of the container may sometimes pass through the barrel portion wall so as to be bled on the outer surface of the container. The immigration of the lubricating liquid or the lubricant to the container outer surface can be blocked by providing an intermediate layer of the gas barrier resin.

[0070] In the present invention, the content **10** to be contained in the container is a viscous paste-like material having a high viscosity, more specifically, a viscous paste having a viscosity of not less than 8 Pa·s at 25° C. Such a paste content often may be provided as a gel, and it is not limited to food but it can be a pharmaceutical product, toothpaste or the like.

[0071] Further, the aforementioned small capacity container of the present invention preferably has a capacity of more than 70 ml. When the capacity is too small, the inner diameter of its mouth portion from which the content is discharged may be also decreased considerably. In that case, its cross section is required to have a relatively complicated shape to differentiate the speed for discharging the content thereby avoiding the content from clogging in the container. Furthermore, this may make it difficult to form the thickness distribution of the liquid film of the lubricating liquid, the thickness distribution of the lubricant-containing resin layer, and the distribution of the blend amount of the lubricant.

[0072] The small capacity container for viscous substance of the present invention is excellent in the ability of dis-

charging the content in the container turned upside down, and thus, the container is widely applied to various fields.

EXPLANATIONS OF LETTERS OR NUMERALS

[0073] **1**: barrel portion
[0074] **3**: neck portion
[0075] **5**: bottom portion
[0076] **10**: content
[0077] **13**: air layer
[0078] **21**: liquid film
[0079] **23**: lubricant-containing resin layer

1. A small capacity container for containing viscous substance, having a capacity of not more than 300 ml, the container includes a barrel portion having an inner surface provided with a region for quickly discharging a content and a region for slowly discharging the content in the container being held upside down.

2. The small capacity container for viscous substance according to claim **1**, wherein the inner surface of the barrel portion of the container has an odd-shaped longitudinal cross section having an asymmetrical shape to form the region for quickly discharging the content and the region for slowly discharging the content.

3. The small capacity container for viscous substance according to claim **1**, wherein a liquid film of a lubricating liquid to improve a slide-down property with respect to the viscous substance is formed on the inner surface of the barrel portion of the container, the liquid film has an uneven thickness in a circumferential direction when viewed on a transverse cross section of the barrel portion of the container, and the uneven thickness of the liquid film forms the region for quickly discharging the content and the region for slowly discharging the content.

4. The small capacity container for viscous substance according to claim **1**, wherein the container has a multilayered structure including a lubricant-containing resin layer that forms the inner surface of the container, the lubricant-containing resin layer has the uneven thickness in the circumferential direction when viewed on the transverse cross section of the barrel portion of the container, and the uneven thickness of the lubricant-containing resin layer forms the region for quickly discharging the content and the region for slowly discharging the content.

5. The small capacity container for viscous substance according to claim **1**, wherein the container has the multilayered structure with the inner surface formed of the lubricant-containing resin layer, an amount of the lubricant blended in the lubricant-containing resin layer is uneven in the circumferential direction when viewed on the transverse cross section of the barrel portion of the container, and the uneven blend amount of the lubricant in the lubricant-containing resin layer forms the region for quickly discharging the content and the region for slowly discharging the content.

6. The small capacity container for viscous substance according to claim **1**, wherein a viscous substance has a viscosity of not less than 8 Pa·s at 25° C.

7. The small capacity container for viscous substance according to claim **6**, having a capacity of more than 70 ml.

8. The small capacity container for viscous substance according to claim **6**, wherein the content is food, a pharmaceutical product or toothpaste.

9. The small capacity container for viscous substance according to claim **1**, which is a hollow molded container.

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