(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 883 809 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
17.06.2015 Bulletin 2015/25

(51) Int Cl.:
B65D 39/00 *(2006.01)*

(21) Application number: **14197571.4**

(22) Date of filing: **12.12.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **13.12.2013 JP 2013257810**

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(54) Cork stopper coated with resin layer

(57) A cork stopper (1) coated with a resin layer having a columnar cork stopper body (2) formed by a compression molding of a cork granule with a binder resin, and a resin coating layer (3) covering an outer circumferential surface of the cork stopper (1) from an end side to another end of the cork stopper body (2) along an axial direction. The cork stopper body (2) and the resin coating layer (3) constitute a core portion (4), and the core portion (4), when being pressed in a hollow tubular portion with a tightening allowance of 1.5 mm, experiencing a compression stress of 100 N to 300 N in case of a moisture content ratio of the core portion (4) being 6 weight percent and experiencing a compression stress smaller by 100 N to 150 N than that in case of a moisture content ratio of the core portion (4) being 2 weight percent.

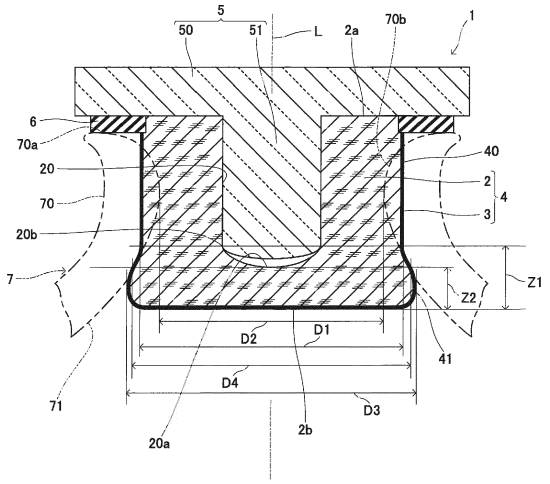

Fig.1

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Description

Technical Field

[0001] The present invention relates to a cork stopper coated with a resin layer for blocking up the mouth portion of a container for beverages like whisky or wine.

Background Art

[0002] A cork stopper coated with a resin (rubber) layer integrated at one end with a flange portion doubling as a handle is widely used as a cork stopper for blocking up the mouth portion of a container for beverage like whisky or wine, referring to Patent Literatures 1 to 4.

[0003] A cork stopper body of the cork stopper coated with a resin layer is formed in a columnar shape by the compression molding process of a cork granule and a binder resin or formed in a columnar shape by boring natural cork bark. A coating layer of resin is formed for preventing a corky smell from diffusing into beverage in the container, preventing cork dust from falling in the container, preventing a color change on the cork surface caused by invasion of beverage into a cork layer, and the like.

[0004] Stable open-ability of the cork stopper regardless of a storage condition and a usage condition of the container is demanded when the cork stopper is coated with a layer made of resin. In the Patent Literatures, the friction coefficient of the surface of the coated layer is appropriately determined by executing a silicone treatment or a roughening treatment on the coated layer surface.

[0005] In a production method of a cork stopper in Patent Literature 5 proposed by the applicant of the present application, a cork granule is pressed in a direction orthogonal to the longitudinal direction, i.e. the axial direction, of the columnar body, namely in the centripetal direction when the columnar cork stopper is molded under compression with a binder resin.

[0006] The cork stopper obtained by such a compression molding, having a coating layer of resin, has excellent flexibility in the diametrical direction and the sealing ability is improved by followability to the container mouth. Thereby, good features such as easy open-ability and prevention of damages at the time of opening are obtained.

List of Citations

Patent Literature

[0007]

PTL 1 JP S63-147 456 U1
PTL 2 WO 2004/020300 A
PTL 3 JP 2004-231 244 A
PTL 4 WO 2011/155515 A
PTL 5 JP 2010-099 909 A

Summary of the Invention

Technical Problem

[0008] In case of the above-mentioned cork stopper coated with a resin layer, the friction coefficient is optimized for improving the open-ability of the cork stopper by a silicone treatment or a roughening treatment on the surface of the coating layer. However, such treatment for optimizing the friction coefficient increases the production procedures and the production cost.

[0009] When the stress of cork changes, the open-ability of the cork stopper is not stably kept even if the friction coefficient is controlled. It is difficult to simultaneously achieve improvement of the open-ability and prevention of popping of the cork stopper. In addition, when the cork stopper coated with a resin layer is used for a container for a beverage such as whisky or wine, the moisture content ratio of the core portion varies from two weight percent to six weight percent depending on change of seasons.

[0010] When the moisture content ratio is low, the compression stress of the cork stopper pressed into the mouth of the beverage container becomes large, thereby deteriorating open-ability. Therefore, it is desired to maintain good open-ability in which variation of the compression stress is less regardless of change of seasons.

[0011] As a result of verification by the inventors of the present application, the cork stopper disclosed in Patent Literature 5 is superior in the stability of the stress at the time of closing the container mouth to the cork stopper molded under pressure along the axial direction.

[0012] The present invention is proposed in view of the above-mentioned problems and has an object to provide a new cork stopper coated with a resin layer having a stable open-ability while keeping the unique sealing ability of the cork stopper. In addition, as a result of examinations in which the present invention is applied to a cork stopper coated with a resin layer, the cork stopper coated with a resin layer which has stable open-ability and is hardly popping out is easily obtained. Thus, the object of the present invention is to provide such a new cork stopper in view of the verification results.

Solution to the Problem

[0013] In one embodiment of the present invention, the cork stopper coated with a resin layer comprises a columnar cork stopper body formed by a compression molding of a cork granule with a binder resin and a resin coating layer covering an outer circumferential surface of the cork stopper from an end side to another end of the cork stopper body along an axial direction.

[0014] The cork stopper body and the resin coating layer constitute a core portion, and the core portion, when being pressed in a hollow tubular portion with a tightening

allowance of 1.5 mm, experiences a compression stress of 100 N to 300 N in case of a moisture content ratio of the core portion being 6 weight percent, and experiences a compression stress smaller by 100 N to 150 N than that in case of a moisture content ratio of the core portion being 2 weight percent.

[0015] Generally, when the cork stopper coated with a resin layer is used for a container for beverages such as whisky or wine, the moisture content ratio of the core portion varies from two weight percent to six weight percent depending on change of seasons. When the moisture content ratio is low, the compression stress of the cork stopper pressed into the mouth of the beverage container becomes large, thereby deteriorating open-ability.

[0016] In the case of a cork stopper coated with a resin layer of the embodiment of the present invention, the compression stress is as small as 100 N to 300 N when the moisture content ratio of the core portion is 6 weight percent, and the difference from the case when the moisture content ratio of the core portion is 2 weight percent is as small as 100 N to 150 N.

[0017] Therefore, open-ability is stably kept regardless of change of season. If the compression stress at 6 weight percent of moisture content ratio in the core portion is smaller than 100 N, the sealing ability becomes deteriorated. If the compression stress at 6 weight percent of moisture content ratio in the core portion is larger than 300 N, the compression stress becomes large when the moisture content ratio changes to 2 weight percent, thereby deteriorating the open-ability.

[0018] In the cork stopper coated with a resin layer as mentioned above, the cork stopper body can be formed by a compression molding executed in a centrifugal direction.

[0019] In the cork stopper coated with a resin layer of the embodiment of the present invention, the cork stopper body is molded under compression in the centripetal direction, thereby having a superior flexibility in the diametrical direction.

[0020] When such a cork stopper coated with a resin layer is pressed to block up the container mouth portion, the cork stopper elastically contacts the inside of the mouth portion by flexibility and is elastically compressed with the resin coating layer interposed between the cork stopper and the inside of the mouth portion, thereby obtaining a stable sealing ability.

[0021] The strength in the longitudinal direction (in the axial direction) of the cork stopper body, coupled with the binding force of binder resin, becomes large, thereby preventing breakage of the cork stopper at the time of opening or closing.

[0022] In the cork stopper coated with a resin layer as mentioned above, the cork stopper body can have an attachment hole configured to attach a flange portion, the attachment hole extending from the one end side toward the other end side of the cork stopper body along an axial direction.

[0023] In the cork stopper of the embodiment, the flange portion is attached to the attachment hole and the cork stopper is easily closed or opened using the flange portion as a handle.

[0024] In such a case, the cork stopper coated with a resin layer can comprise an expanding portion with a diameter larger than an outer diameter of an other portion of the core portion, the expanding portion extending from a region corresponding to a bottom of the attachment hole to the other end of the cork stopper.

[0025] In such a configuration, the expanding portion prevents popping out of the stopper.

[0026] Further, the expanding portion can be formed by heating the core portion. When the core portion is heated, the cork stopper body thermally expands. In the embodiment of the present invention, the core portion from the region corresponding to the bottom of the attachment hole to the other end is solid and the cork stopper body is molded under compression in the centripetal direction, thereby the thermal expansion enlarges the diameter of the core portion. Therefore, the expanding portion is easily formed by heating.

[0027] In the cork stopper coated with a resin layer as mentioned above, the resin coating layer can be made of a polyethylene terephthalate. When the cork stopper coated with a resin layer is used for a beverage container, the resin coating layer contacts liquid. The resin coating layer is made of a polyethylene terephthalate with high barrier property, so that a corky smell is prevented from diffusing into a beverage in the container. Polyethylene terephthalate is harmless and hygienic, thereby being suitable for a resin layer of a cork stopper for beverages.

[0028] In the cork stopper coated with a resin layer as mentioned above, the resin of the coating layer can include a lubricant.

[0029] In the above-mentioned embodiment, the resin of the coating layer includes a lubricant, so that the friction coefficient of the coating layer surface is easily controlled and a stable open-ability is obtained.

Advantageous Effects of the Invention

[0030] The present invention is able to provide a cork stopper coated with a resin layer with stable open-ability while keeping the unique sealing ability of the cork stopper.

Brief Description of Drawings

[0031]

FIG. 1 is a diagrammatical longitudinal section showing one embodiment of the cork stopper coated with a resin layer of the embodiment of the present invention.

FIG. 2 is a flow chart diagrammatically showing a production process of the above-mentioned cork stopper.

FIG. 3 is a table showing the measurement results of

the compression stress depending on the moisture content ratio when the stopper coated with a resin layer of the embodiment of the present invention is pressed in a hollow tubular part with a tightening allowance of 1.5 mm, compared with that of the conventional stopper coated with a resin layer.

Description of Embodiments

[0032] The embodiment of the present invention is explained referring to the attached drawings. FIG. 1 is a diagrammatical longitudinal section showing one embodiment of the cork stopper coated with a resin layer of the embodiment of the present invention.

[0033] A cork stopper 1 coated with a resin layer comprises a columnar cork stopper body 2 obtained by a compression molding of a cork granule and a binder resin, a resin coating layer 3 coated on the outer circumferential surface of the cork stopper body 2 from an end 2a side (in the vicinity of the end 2a) to the other end 2b in the direction of the axis L, and a flange portion 5 integrally formed with the end 2a of the cork stopper body 2.

[0034] The cork stopper body 2 and the resin coating layer 3 constitute a core portion 4. The cork stopper body 2 is formed by molding under pressure in the centripetal direction and has an attachment hole 20 for attaching the flange portion 5 formed from the end 2a side to the other end 2b side along the direction of the axis L.

[0035] An expanding portion 41 having an outer diameter larger than that of other portions is formed from the region corresponding to a bottom portion 20a of the attachment hole 20 to the other end 2b of the core portion 4. The bottom portion 20a of the attachment hole 20 is concavely curved.

[0036] The reference numeral 20b in the figure shows the start point of the concave bottom portion 20a. The expanding portion 41 is formed from the region corresponding to the start point 20b to the other end 2b of the core portion 4.

[0037] The flange portion 5 is made of glass and comprises a disk-like flange body 50 and a columnar projecting portion 51 projecting downward from the center of the flange body 50. The projecting portion 51 is pressed into the attachment hole 20 of the cork stopper body 2 in such a manner that the lower surface of the flange body 50 abuts against the upper surface of the cork stopper body 2.

[0038] The abutting surface and the pressed surface are coated with an adhesive agent, thus the cork stopper body 2 and the flange portion 5 are integrally fixed. A washer 6 made of polyethylene is fitted around the outer circumference of the cork stopper body 2 so as to contact the lower surface of the flange portion 50. A part of the cork stopper body 2 to which the washer 6 is provided is not coated with the resin coating layer 3.

[0039] The washer 6 is provided between an upper open edge portion 70a of a mouth portion 70 and the lower surface of the flange portion 50. The washer 6 prevents a direct contact of the open edge portion 70a and the lower surface of the flange body 50 when the stopper coated with a resin layer of this embodiment is pressed into the mouth portion 70 (hollow tubular portion) of a container 7 for whisky (two-dotted line) for closing. In this specification the term "close" means to block up the mouth portion 70 of the container 7 with the cork stopper coated with a resin layer 1.

[0040] The container 70 made of glass does not contact the flange portion 5 made of glass and a consumer is able to block up the mouth portion without having an unpleasant feeling.

[0041] In the explanation referring to FIG. 1, the end 2a side is an upper end and the other end 2b side is the lower end. The flange portion 5 is made of glass in the above-mentioned embodiment; however, the flange portion 5 can also be made of another hard resin or metal. In FIG. 1 the shapes of the expanding portion 41 and the mouth portion 70 of the container 7 are enlarged for easy explanation.

[0042] The production method of a cork stopper 1 coated with a resin layer is explained further referring to FIG. 2. In a step S1, a mixture of a cork granule and binder is produced. The cork granule is made by crushing natural cork bark and granulating the crushed cork.

[0043] The binder is a resin adhesive agent. In a step S2, the cork stopper body 2 is manufactured in such a manner that the mixture obtained in the step S1 is molded under compression in the centripetal direction (in the direction perpendicular to the axis L of the cork stopper body 2) based on the method disclosed in Patent Literature 5.

[0044] The obtained cork stopper body 2 is compressed in the centripetal direction, so that an excellent flexibility in the diametrical direction is obtained as mentioned above and a large strength along the axis L, coupled with the binding force of binder resin, is obtained. In a step S3, the attachment hole 20 is formed in the cork stopper body 2. The attachment hole 20 is formed by making a boring in the cork stopper body 2 from the end 2a side (the upper side in FIG. 1) to the other end 2b side along the axis L.

[0045] In a step S4, the resin coating layer 3 is formed on the outer circumferential surface (referred to as the circumferential surface hereinafter) of the cork stopper body 2 from the end 2a side to the other end 2b. For providing the resin coating layer 3, a urethane adhesive agent is applied on the circumferential surface of the cork stopper body 2.

[0046] Then, the circumferential surface of the cork stopper body 2 is covered with a heated polyethylene terephthalate film and then is pressed into a mold. The polyethylene terephthalate film in an extended condition is thermally attached on the circumferential surface of the cork stopper body 2.

[0047] Thus, the resin coating layer 3 is formed by a polyethylene terephthalate bonded on the entire circum-

ferential surface of the cork stopper body 2 and the core portion 4 is formed with the cork stopper body 2 and the resin coated layer 3.

[0048] Polyethylene terephthalate is preferably used for the resin of the resin coating layer for a beverage container because polyethylene terephthalate is harmless, hygienic and excellent in preventing diffusion of a corky smell into a beverage in the container. However, the resin is not limited to polyethylene terephthalate.

[0049] Polyethylene, nylon, polybutylene terephthalate, ethylene-vinyl acetate copolymer, or the like can be selectively used depending on usage. The resin of the resin coating layer 3 desirably includes a lubricant. The lubricant can be a resin lubricant such as a spherical silicone resin and a spherical polyethylene resin, or an inorganic lubricant such as silica, clay and talc.

[0050] In a step S5, silicone is applied and heated on the circumferential surface (zone 1 in FIG. 1) of the core portion 4 on the side of the other end 2b, from the start point 20b of the bottom 20a of the attachment hole 20 to the other end 2b. A coating layer of silicone is formed on the zone Z1 of the core portion 4 by heating. A region of the cork stopper body 2 corresponding to the zone Z1 axially expands by such heating.

[0051] The region is solid and the cork stopper body 2 is formed by a compression molding in the centripetal direction, so that the region expands in the diametrical direction by the thermal expansion and the expanding portion 41 is formed at the region of the core portion 4 corresponding to the zone Z1 as shown in FIG. 1. In a step S6, the washer 6 is fitted at a predetermined position and the flange portion 5 is attached after forming the expanding portion 41 along with the silicone film.

[0052] The end (the upper end) 2a of the cork stopper body 2 and the circumferential surface of the projecting portion 51 of the flange portion 5 are applied with an adhesive agent, then the projecting portion 51 is pressed into the attachment hole 20 as mentioned above, and the adhesive agent is hardened, thereby attaching the flange portion 5. Thus, the production procedure of the resin cork stopper 1 is finished.

[0053] In the step S5, heating is executed after silicone has been applied; however, heating can also be executed without applying silicone.

[0054] In manufacturing of the resin cork stopper 1, the tightening allowance is generally required for the cork stopper of a container for beverages such as whisky, so that an outer diameter D1 of a columnar portion 40 of the core portion 4 other than the expanding portion 41 is set larger by 1.5 mm than the smallest inner diameter of an inner diametrical face 70b of the mouth portion 70 of the container 7.

[0055] Namely, when the cork stopper 1 coated with a resin layer is pressed into the mouth portion 70 of the container 7 shown in FIG. 1 for blocking up the mouth portion 70, the columnar portion 40 is elastically deformed by compression along the shape of the inner diametrical face 70b of the mouth portion 70 shown with two-dotted lines.

[0056] The inner diametrical face 70b of the mouth portion 70 and the columnar portion 40 elastically contact with each other to be sealed by the restoration elasticity of the elastic deformation, thereby preventing leakage of liquid in the container 7. The resin coating layer 3 covers the circumferential surface of the cork stopper body 2, so that a corky smell is prevented from diffusing into the beverage in the container 7.

[0057] The elastic contact portion of the inner diametrical face 70b of the mouth portion 70 and the columnar portion 40 includes the resin coating layer 3 therebetween, thereby achieving sealing performance completely. When the resin coating layer 3 includes the above-mentioned lubricant so as to control the friction resistance with the inner diametrical face 70b of the mouth portion 70, the compression stress at the time of closing the mouth portion is easily controlled and a stable open-ability is obtained.

[0058] The cork stopper coated with a resin layer produced as mentioned above and the conventional cork stopper coated with a resin layer disclosed in Patent Literatures 1, 2 and 4 include moisture of 2.0 weight percent (moisture content ratio) at the time of production and the moisture content ratio changes from 2.0 weight percent to 6.0 weight percent depending on the conditions thereafter. When the moisture content ratio changes, the compression stress when the cork stopper blocks off the mouth portion of the container by being pressed therein also changes.

[0059] FIG. 3 shows the measurement results of the compression stress depending on the moisture content ratio when the stopper coated with a resin layer of the embodiment of the present invention is pressed into the hollow tubular part with the tightening allowance of 1.5 mm, in comparison with that of the conventional cork stopper coated with a resin layer.

[0060] In FIG. 3, the product compressed in the axial direction (the vertical direction) is a conventional cork stopper coated with a resin layer produced in such a manner that a columnar body is formed by a compression molding of a cork granule and binder in the axial direction and the circumferential surface is coated with resin layer.

[0061] The product compressed in the radial direction (the centripetal direction) is a cork stopper coated with a resin layer of the embodiment of the present invention in which a columnar body produced by the method disclosed in Patent Literature 5 is coated with a resin layer. The former is called a conventional product and the latter, a cork stopper coated with a resin layer of the embodiment of the present invention, is referred to as "Inventive Product".

[0062] As shown in FIG. 3, the values of the compression stress of the Inventive Product when the moisture content ratio is 2.0 weight percent and 6.0 weight percent are lower than those of the conventional cork stopper, thereby the open-ability of Inventive Product is superior to that of the conventional cork stopper. The Inventive

Product is smaller than the conventional cork stopper in the change amount of the compression stress between the moisture content ratio of 2.0 weight percent and 6.0 weight percent.

[0063] Therefore, any change caused by circumstances and seasons in the open-ability of Inventive Product is smaller than that of the conventional cork stopper, such that the Inventive Product is superior to the conventional cork stoppers in the suitability as the cork stopper.

[0064] Several examinations were executed in the range of a moisture content ratio from 2.0 weight percent to 6.0 weight percent. It was found that in view of sealing ability, the open-ability and popping of the cork stopper, in case of pressing the core portion in the hollow tubular portion with the tightening allowance of 1.5 mm, the compression stress should be 100 N to 300 N when the moisture content ratio of the core portion 4 is 6 weight percent and should be smaller by 100 N to 150 N than that when the moisture content ratio of the core portion is 2 weight percent.

[0065] It was also found that the excellent features of the cork stopper coated with a resin layer of the embodiment of the present invention are based on the fact that the cork stopper body was formed by a compression molding in the centripetal direction, and the friction coefficient of the surface of the core portion was easily controlled, different from those of the conventional cork stopper coated with a resin layer.

[0066] When the cork stopper 1 coated with a resin layer blocks up the container 7, a part of the expanding portion 41, as shown in FIG. 1 abuts or elastically contacts the inside of a shoulder portion 71 of which the diameter gradually enlarges from the mouth portion 70 of the container 7 to a container main body (not shown in the figure).

[0067] An anchoring effect is achieved between the expanding portion 41 and the shoulder portion 71 by abutting or elastic contact of the expanding portion 41 and the inside of the shoulder portion 71, thereby preventing popping of the cork stopper and stably keeping a blocked up condition of the cork stopper 1 coated with a resin layer.

[0068] When the cork stopper 1 coated with a resin layer is closed or opened, the expanding portion 41 passes through the smallest diameter portion D2 of the inner diametrical face 70b of the mouth portion 70 so that the expanding portion 41 is largely compressed under elasticity in the centripetal direction. By the reaction force of the elastic compression, a large force is required for closing or opening of the cork stopper.

[0069] Considering operation ability of closing or opening the cork stopper and prevention of popping of the cork stopper, the expanding width of the expanding portion 41, namely the result of the calculation formula, largest outer diameter D3 of the expanding portion 41 minus the outer diameter D1 of the columnar portion 40 and multiplies 0.5 thereafter, is preferably 0.1 mm to 0.3 mm.

[0070] The expanding width of the expanding portion 41 is less than 0.1 mm, thereby reducing prevention function of popping of the cork stopper. When the expanding width of the expanding portion 41 exceeds 0.3 mm, the burden applied to the fingers of an operator at the time of closing or opening becomes large. The coating layer of silicone is formed on the surface (the zone Z1) of the expanding portion 41, thereby smoothly opening or closing and preventing sound at the time of closing or opening.

[0071] The expanding portion 41 extends from the region corresponding to the start point of 20b of the attachment hole 20 to the other end 2b of the core portion 4, namely the entire area of the zone Z1. Thus, the largest outer diameter D3 of the expanding portion 41 becomes larger than the outer diameter D1 of the columnar portion 40. In addition, the relation of the diameters with the outer diameter D4 corresponding to the deepest portion of the bottom 20a of the attachment hole 20 of the expanding portion 41 is as follows: D3 is larger than D4 which is larger than D1, as shown in FIG. 1.

[0072] However, the expanding portion 41 can be formed in a zone Z2 expanding from the deepest portion of the bottom 20a of the mounting hole 20 to the other end 2b. When the expanding portion 41 is formed in the zone Z2, in the step S5, the zone Z2 is applied with silicone and heated, or the zone Z2 is heated without applying silicone, thereby forming the expanding portion 41 in the zone Z2 by thermal expansion.

[0073] In the above-mentioned embodiments, a cork stopper coated with a resin layer is used for a container for whisky. The container is also used for beverages such as brandy, wine, champagne, Japanese sake or juice. The shape of the cork stopper 1 coated with a resin layer in FIG. 1 is an example and the embodiment of the present invention is not limited to such a shape. In the figure, the core portion 4 has an expanding portion 41.

[0074] However, the core portion 4 can be constituted with a straight body without the expanding portion 41 as long as the moisture content ratio and the compression stress of the core portion 4 are in the above-mentioned relation. In the above-mentioned embodiment, the excellent features of the above-mentioned relation of the moisture content ratio and the compression stress of the core portion are based on the compression molding of the cork stopper body in the centripetal direction.

[0075] However, the present invention also includes the case wherein the above-mentioned features of the relation of the moisture content ratio and the compression stress of the core portion are obtained by other compression molding.

List of Reference Signs

[0076]

1	cork stopper coated with a resin layer
2	cork stopper body
2a	end

2b	other end
3	resin coating layer
4	core portion
5	flange portion
6	washer
7	container
20	attachment hole
20a	bottom
20b	start point of the concave bottom portion 20a
41	expanding portion
50	flange body
51	projecting portion
70	mouth portion of beverage container (hollow tubular portion)
70a	upper open edge portion
70b	inner diametrical face
D1 - D4	diameters
L	axis
Z1	zone
Z2	zone

Claims

1. A cork stopper (1) coated with a resin layer comprising:

- a columnar cork stopper body (2) formed by a compression molding of a cork granule with a binder resin; and
- a resin coating layer (3) covering an outer circumferential surface of the cork stopper (1) from an end (2a) side to another end (2b) of the cork stopper body (2) along an axial direction,

the cork stopper body (2) and the resin coating layer (3) constituting a core portion (4), and
the core portion (4), when being pressed in a hollow tubular portion (70) with a tightening allowance of 1.5 mm, experiencing a compression stress of 100 N to 300 N in case of a moisture content ratio of the core portion (4) being 6 weight percent and experiencing a compression stress smaller by 100 N to 150 N than that in case of a moisture content ratio of the core portion (4) being 2 weight percent.

2. The cork stopper (1) according to claim 1,
wherein the cork stopper body (2) is formed by a compression molding executed in a centrifugal direction.

3. The cork stopper (1) according to claim 1 or 2,
wherein the cork stopper body (2) has an attachment hole (20) configured to attach a flange portion (5), the attachment hole (20) extending from the end (2a) side toward the other end (2b) side of the cork stopper body (2) along an axial direction.

4. The cork stopper (1) according to claim 3,
wherein the cork stopper (1) coated with a resin layer further comprises an expanding portion (41) with a diameter (D3) larger than an outer diameter (D2) of another portion of the core portion (4), the expanding portion (41) extending from a region corresponding to a bottom (20a) of the attachment hole (20) to the other end (2b) of the cork stopper (1).

5. The cork stopper (1) according to claim 4,
wherein the expanding portion (41) is formed by heating the core portion (4).

6. The cork stopper (1) according to any one of claims 1 to 5,
wherein the resin coating layer (3) is made of a polyethylene terephthalate.

7. The cork stopper (1) according to any one of claims 1 to 6,
wherein resin of the coating layer (3) includes a lubricant.

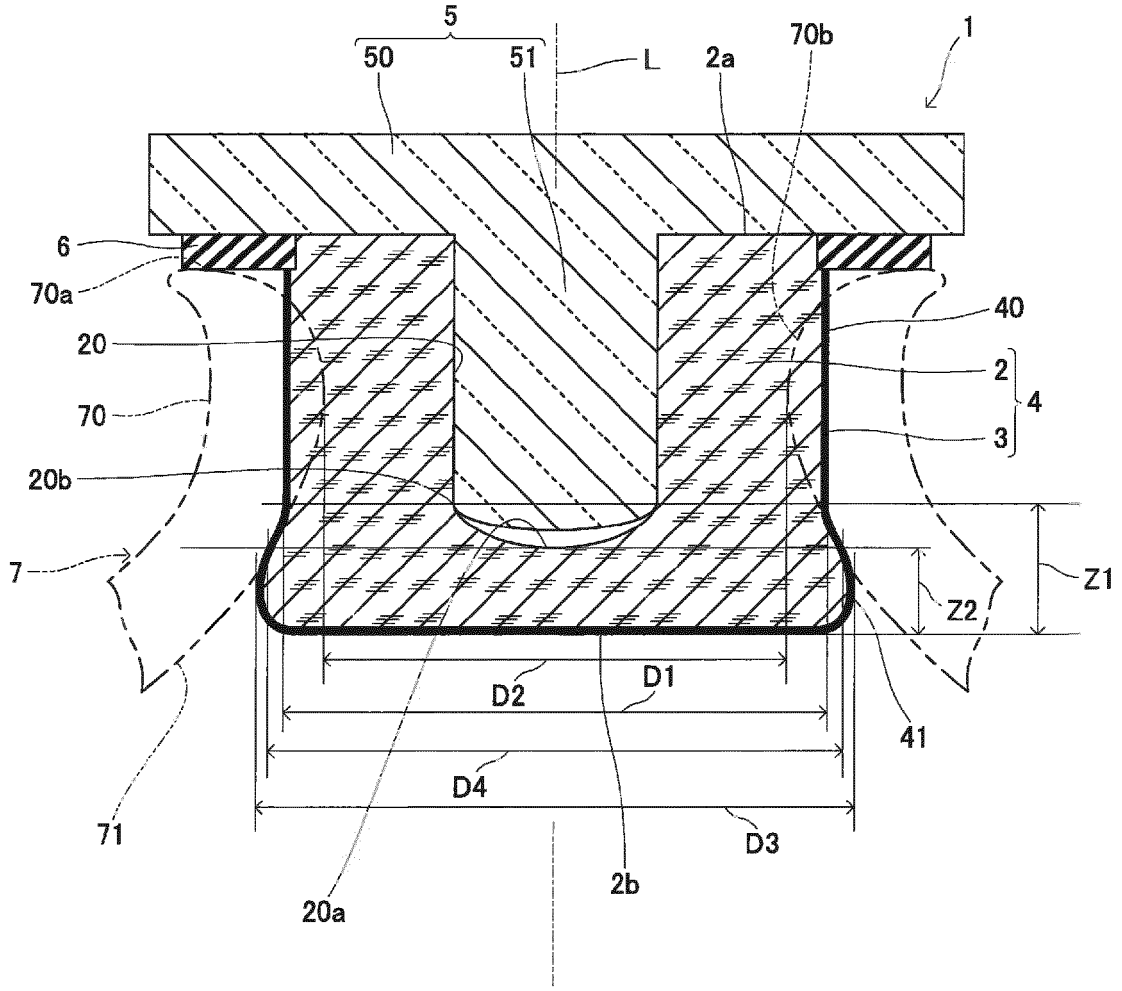
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Fig.1

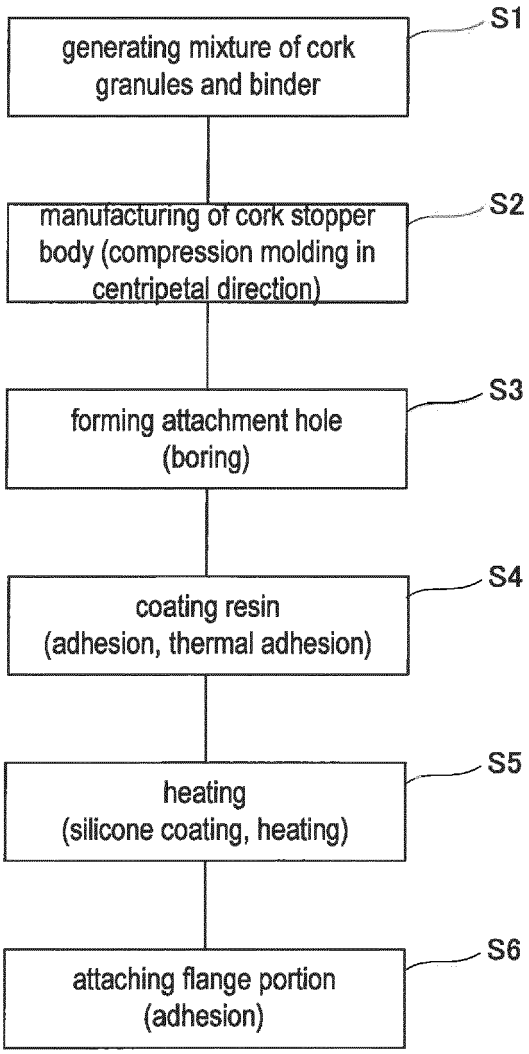
generating mixture of cork granules and binder
S1
manufacturing of cork stopper body (compression molding in centripetal direction)
S2
forming attachment hole (boring)
S3
coating resin (adhesion, thermal adhesion)
S4
heating (silicone coating, heating)
S5
attaching flange portion (adhesion)
S6

Fig.2

water content ratio (weight percent)	compression stress (N)	
	compressed product in axial direction (vertical direction)	compressed product in radial direction (centripetal direction)
6. 0	3 1 0	2 1 4
2. 0	5 0 0	3 4 0
change amount in compression stress between 2 w% and 6 w%	1 9 0	1 2 6

Fig.3

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EUROPEAN SEARCH REPORT

Application Number
EP 14 19 7571

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Place of search	Date of completion of the search	Examiner
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