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(54) **CLOSURE DEVICE**

VERSCHLUSSVORRICHTUNG

DISPOSITIF DE FERMETURE

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Description

[0001] The present invention relates to a means for closing and sealing a bottle for containing a liquid, which container comprises a neck, a rim of the neck and a lid.

[0002] Closing means for bottles are known from the prior art. Glass bottles are generally sealed with a cork, a plastic cap or a screw cap. Glass bottles containing beer or other carbonated beverages are generally sealed with a metal closure that is crimped around a groove that is a feature of the outer neck of the bottle. The commonplace form of this closure device is the crown cork, which is a pressed steel disk formed with a skirt of 21 tines.

[0003] Carbonated beverages may also be contained in plastic bottles, generally made from polypropylene (PP), polyethylene terephthalate (PET) or polyethylene naphthalate (PEN). The closure devices of these plastic bottles are usually screw caps, which are screwed on a threaded neck of the bottle.

[0004] It is a disadvantage of the closure devices of the prior art that specialised tools, such as bottle openers, are required to open a bottle that has been closed by a crown cork. There are some varieties of crown corks which are crimped on a threaded bottle, and may be removed like a screw cap, but these crown corks are mainly limited to the French and North American markets. A further disadvantage of the closing devices of the prior art is that they must be tightly applied to prevent a loss of carbon dioxide upon prolonged storage at ambient temperature and also during pasteurisation. During pasteurisation the temperature of the bottle including the beverage will rise, so that a pressure build-up will take place within the bottle, which must be taken up by the closure. A requirement of the known closing devices is that they should be impervious to oxygen diffusing into the beverage, resulting in a degradation of the flavour of the beverage during prolonged storage of the bottle. Reference is made here to document US-A-5 779 073.

[0005] It is a subject of the present invention to provide a simple closure device that inhibits diffusion of oxygen into the beverage, avoids loss of carbon dioxide upon prolonged storage and pasteurisation, and can easily be opened without the use of a special tool.

[0006] To this end, the glass container according to the present invention comprises a neck, an opening and a cover member closing off the opening, characterised in that the cover member comprises a contacting surface, comprising a rigid material, that is adhesively attached to the neck. The rigid material such as ceramic plastic or metal of the cover member is compatible with the glass of the container, and can be subjected to the same conditions of temperature and pressure, for instance during pasteurisation, without adverse effects. The combination of the rigid material cover in combination with the adhesive attached was found to form a very good barrier, in particular against carbon dioxide diffusion out of the container, containing a carbon dioxide

containing beverage, in particular beer. Because of the small difference in coefficient of expansion between both surfaces and the adhesive, thermal stresses will not have a negative effect on the closing conditions of the container. Preferably the material of the cover member is glass. As both the material of the bottle and the material of the cover member are the same, no difference arises in coefficient of expansion. The rigid cover member is compatible with an adhesive material that seals the area between the cover member and the neck, prevents oxygen from diffusing into the bottle and prevents liquid and/or gaseous contents, such as for instance carbon dioxide from escaping from the container. The tensile strength between the cover member and the neck increases with the bond surface, but the shear strength remains largely unaffected, allowing the cover member to be slid off easily. In that way an easy opening of the rigid cover member by sideways force is combined with a large closing force perpendicular to the contacting surface of the neck.

[0007] Preferably the adhesive can take up a shear force substantially parallel to the contacting surface which is lower than the force perpendicular to the contacting surface that can be taken up by the adhesive. The perpendicular force is between 2 and 10 times larger than the shear force, the perpendicular force being between 1 and 10 kg/cm², preferably between 5 and 10 kg/m². This is especially suitable for carbonated beverages such as beer. In the head space of a bottle, the pressure at normal serving temperature of 6 to 8°C is approximately 1 - 1.2 atmospheres, while during the pasteurisation process, at a temperature of approximately 60°C, the pressure is approximately 6 - 7 atmospheres. The adhesive used in the present invention has a strong holding power during storage and pasteurisation and while the bottle is easy to open by the consumer by applying a sideways shear force.

[0008] The glass bottle has preferably a cover member which has as its sealing side a substantially flat disk-like surface, substantially in line with the neck. The sealing side according to the present invention fits over the bottle neck of standard bottles. It is easy to remove by the consumer, because of the light shear force that has to be applied to move the glass disk. The disk is not projecting beyond the perimeter of the neck, to prevent the disk from being removed accidentally.

[0009] Preferably the cover member comprises a lever element which extends laterally beyond the contacting surface of the neck. It provides leverage to the tensile force that is needed to remove the cover member from the bottle. By use of the lever element the momentum created by the applied force is increased, so that the tensile force in the contacting surface can be overcome easily.

[0010] Preferably the bonding strength of the adhesive is higher at a temperature above 50°C than at a temperature at or below room temperature. At room temperature the bonding strength is less because the

pressure in the bottle is less than during the pasteurisation process.

[0011] Preferably the adhesive has a transition temperature that is above the normal serving temperature of the carbonated beverage. Preferably the transition temperature of the adhesive is in between the normal serving temperature of the beverage and the normal pasteurisation temperature, such as between 5°C and 100°C, preferable between 5°C and 60°C. Whenever the transition temperature is within this range, the closure device is easily to be opened at serving temperature and hard to be opened during the pasteurisation process. Because of the rise in temperature during the pasteurisation process, and the pressure build-up in the closed bottle connected therewith, the bond strength of the adhesive varies between a low bond strength, such as 3 kg/cm² or lower at serving temperature and a high bond strength at higher temperatures, for example the pasteurisation temperature, which usually takes place at 60°C to 65°C, such as 80 kg/cm² or higher.

[0012] Preferably the cover member has undergone a surface treatment, for example such as with a chemical adhesive promotor, to increase the bond strength of the adhesive to the cover member. Whenever a beverage container is opened, it is more hygienic for the adhesive material to stick to the cover member than to stick to the rim of the bottle. It prevents pieces of adhesive material from being swallowed by the consumer of the beverage.

[0013] The glass contacting surface of the cover member can be rougher than the glass contacting surface of the neck. This can for instance be achieved by etching, sanding or applying chemicals to one or both contacting surfaces.

[0014] Preferably the glass bottle comprises a hot-melt or UV-cured adhesive on the cover member, which adhesive is being cured to a larger degree than the adhesive on the bottleneck. After opening the bottle, the adhesive will stick to the cover member instead of to the neck of the bottle. A hot melt adhesive that can be used is for example an atactic polypropylene hot melt obtained from Norcross Adhesives Limited, Longton Road, Trentham, Stoke-on-Trent ST4 8JB, England. UV-cured adhesives, such as for example Loctite 358, can be obtained from Loctite UK Limited, Watchmead, Welwyn Garden City, AL7 1JB, England.

[0015] The same effect can also be achieved by the use of two different adhesives, which consist of a first type covering the contacting surface of the cover member and a second type covering the neck. The bonding strength of the first adhesive is larger than the bonding strength of the second adhesive, so that the adhesive will stick to the cover member after opening of the bottle. The used adhesives can be a hot melt, a UV-cured, or a combination of both types.

[0016] Embodiments of the device according to the present invention will be explained in more detail with reference to the appended drawing, in which:

Fig. 1 shows a perspective view of the closure device according to the present invention;

Fig. 2 shows a underside of the detached glass disk, containing the remaining adhesive material; and

Fig. 3 shows the underside of a second embodiment of the glass disk according to the present invention.

[0017] Figure 1 shows a perspective view of the closure device 1 according to the present invention. It shows a bottle 2, comprising a neck of the bottle 3, and a rim 4 around the opening of the neck. The closure device 1 is in the form of a glass disk 1. During storage of the bottle, the side 6 of the glass disk 1 is connected to the rim 4 by use of an adhesive (5, shown in fig. 2 and fig. 3). The glass disk can be removed from the neck of the bottle by applying a force on the side 8 of the glass disk 1. The adhesive between the rim 4 of the neck and the side 6 of the glass disk 1 will fail due to the applied shear force.

[0018] Figure 2 shows an underside of the detached glass disk 1, containing the remaining adhesive material 5 after removing the glass disk 1 from the bottle 3. The adhesive material 5 stays attached to the glass disk 1.

[0019] Figure 3 shows the underside of a second embodiment of the glass disk according to the present invention. The glass disk 1 contains a lever element 10 to ease the opening of the bottle 3, attached to the side 8 of the glass disk 1. The glass disk 1 shows a protruding part 9, which protrudes from the underside of the side 6 of the glass disk 1 and fits into the opening 11 (figure 1) of the bottle. This protruding part prevents the glass disk from being moved freely in the plane of the adhesive material 5

Claims

1. Glass bottle comprising a neck, an opening bounded by a rim with a substantially flat contacting surface and a cover member being adhesively attached to the contacting surface, **characterised in that**, the contacting surface is situated substantially horizontally around the opening, the cover member comprising a flat, annular sealing surface of a rigid material that is sealingly connected to the contacting surface via the adhesive, wherein the adhesive can take up a shear force substantially parallel to the contacting surface which is lower than the force perpendicular to the contacting surface.
2. Glass bottle according to claim 1, **characterised in that**, that the cover member comprises a glass material.
3. Glass bottle according to claim 1 or 2, wherein the perpendicular force is between 2 and 10 times larger than the shear force, the perpendicular force being between 1 and 10 kg/cm², preferably between

5 and 10 kg/cm².

4. Glass bottle according to any of the preceding claims, the cover member having a substantially flat disk-like surface, substantially in line with the neck. 5
5. Glass bottle according to any of the preceding claims, the cover member comprising a lever element, extending laterally beyond the contacting surface of the neck. 10
6. Glass bottle according to any of the preceding claims, the bonding strength of the adhesive being higher at a temperature above 50°C, than at a temperature at or below room temperature. 15
7. Glass bottle according to claim 6, wherein the glass transition temperature of the adhesive is between 5 and 10°C, preferable between 5 and 60°C. 20
8. Glass bottle according to any of the preceding claims, wherein the bond strength of the adhesive to the cover member is greater than the bond strength to the rim. 25
9. Glass bottle according to claim 8, wherein the glass contacting surface of the cover member is rougher than the glass contacting surface of the neck.
10. Glass bottle according to claim 8, wherein a bonding agent is applied to the contacting surface of the cover member and / or a debonding agent is applied to the neck. 30
11. Glass bottle according to claim 8, wherein the adhesive comprises a hot melt adhesive, the adhesive at the contacting surface of the cover member being cured to a larger degree than the adhesive on the bottle neck. 35
12. Glass bottle according to claim 8, wherein the contacting surface is covered by a first type of adhesive, the neck being covered by a second type of adhesive, wherein the bonding strength of the first adhesive to the cover member being larger than the bonding strength of the second adhesive to the neck. 40

Patentansprüche

1. Glasflasche mit einem Hals, einer Öffnung, die durch einen Rand mit einer im wesentlichen flachen Kontaktfläche begrenzt ist, und einem Verschlusselement, das an der Kontaktfläche klebend befestigt ist, **dadurch gekennzeichnet, dass** die Kontaktfläche im Wesentlichen horizontal um die Öffnung herum angeordnet ist, das Verschlusselement

eine flache, ringförmige Dichtfläche aus einem festen Material aufweist, die dichtend mit der Kontaktfläche mittels des Klebers verbunden ist, wobei der Kleber eine im Wesentlichen zu der Kontaktfläche parallele Scherkraft aufnehmen kann, die geringer als die zu der Kontaktfläche senkrechte Kraft ist.

2. Glasflasche nach Anspruch 1, **dadurch gekennzeichnet, dass** das Verschlusselement ein Glasmaterial aufweist.
3. Glasflasche nach Anspruch 1 oder 2, bei der die senkrechte Kraft zwischen zwei- bis zehnmal größer als die Scherkraft ist, die senkrechte Kraft beträgt zwischen 1 und 10 Kg/cm², vorzugsweise zwischen 5 und 10 Kg/cm².
4. Glasflasche nach einem der vorstehenden Ansprüche, bei der das Verschlusselement eine im Wesentlichen flache, scheibenförmige Oberfläche, die im Wesentlichen mit dem Hals fluchtet.
5. Glasflasche nach einem der vorstehenden Ansprüche, bei der das Verschlusselement ein Hebelelement aufweist, das seitlich über die Kontaktfläche des Halses herausragt.
6. Glasflasche nach einem der vorstehenden Ansprüche, bei der die Bindungskraft des Klebers bei einer Temperatur oberhalb 50° C größer als bei einer Temperatur bei oder unterhalb der Raumtemperatur ist.
7. Glasflasche nach Anspruch 6, wobei die Glasübergangstemperatur des Klebers zwischen 5 und 10° C, bevorzugt zwischen 5 und 60° C, liegt.
8. Glasflasche nach einem der vorstehenden Ansprüche, wobei die Bindungskraft des Klebers mit dem Verschlusselement größer als die Bindungskraft mit dem Rand ist.
9. Glasflasche nach Anspruch 8, wobei die Glaskontaktfläche des Verschlusselementes rauher als die Glaskontaktfläche des Halses ist.
10. Glasflasche nach Anspruch 8, wobei ein Haftmittel an der Kontaktfläche des Verschlusselementes aufgebracht ist und/oder ein Haftlöser an dem Hals aufgebracht ist.
11. Glasflasche nach Anspruch 8, wobei der Kleber einen Schmelzkleber aufweist und der Kleber an der Kontaktfläche des Verschlusselementes zu einem höheren Grad als der Kleber auf dem Flaschenhals ausgehärtet ist.
12. Glasflasche nach Anspruch 8, wobei die Kontakt-

fläche mit einer ersten Kleberart bedeckt ist, der Hals ist mit einer zweiten Kleberart bedeckt, wobei die Bindungskraft des ersten Klebers mit dem Verschlusselement größer als die Bindungskraft des zweiten Klebers mit dem Hals ist.

Revendications

1. Bouteille en verre comprenant un col, une ouverture limitée par un rebord à surface de contact sensiblement plane et un élément de couvercle étant fixé par adhérence à la surface de contact, caractérisée en ce que la surface de contact est située de manière substantiellement horizontale autour de l'ouverture, l'élément de couvercle comprenant une surface de scellement annulaire, plane, d'un matériau rigide qui est raccordé de manière étanche à la surface de contact par l'intermédiaire d'un adhésif, dans lequel l'adhésif peut supporter une force de cisaillement sensiblement parallèle à la surface de contact qui est inférieure à la force perpendiculaire à la surface de contact. 10
2. Bouteille en verre selon la revendication 1, caractérisée en ce que l'élément de couvercle comprend un matériau vitreux. 25
3. Bouteille en verre selon la revendication 1 ou 2, dans laquelle la force perpendiculaire est entre 2 et 10 fois plus grande que la force de cisaillement, la force perpendiculaire étant entre 1 et 10 kg/cm², de préférence entre 5 et 10 kg/cm². 30
4. Bouteille en verre selon l'une quelconque des revendications précédentes, l'élément de couvercle comprenant une surface du type disque sensiblement plane, sensiblement en alignement avec le col. 35
40
5. Bouteille en verre selon l'une quelconque des revendications précédentes, l'élément de couvercle comprenant un élément de levier s'étendant latéralement au-delà de la surface de contact du col. 45
6. Bouteille en verre selon l'une quelconque des revendications précédentes, la force de liaison de l'adhésif étant plus élevée à une température au-dessus de 50°C qu'à une température à, ou en dessous de, la température ambiante. 50
7. Bouteille en verre selon la revendication 6, dans laquelle la température de transition vitreuse de l'adhésif est située entre 5 et 10°C, de préférence entre 5 et 60°C. 55
8. Bouteille en verre selon l'une quelconque des revendications précédentes, dans laquelle la force de

collage de l'adhésif à l'élément de couvercle est plus grande que la force de collage au rebord.

9. Bouteille en verre selon la revendication 8, dans laquelle la surface de contact vitreuse de l'élément de couvercle est plus rugueuse que la surface de contact vitreuse du col. 5
10. Bouteille en verre selon la revendication 8, dans laquelle un agent de collage est appliqué à la surface de contact de l'élément de couvercle et/ou un agent de décollement est appliqué au col. 10
11. Bouteille en verre selon la revendication 8, dans laquelle l'adhésif comprend un adhésif à thermofusion, l'adhésif, au niveau de la surface de contact de l'élément de couvercle, étant durci à un degré plus grand que l'adhésif présent sur le col de la bouteille. 15
12. Bouteille en verre selon la revendication 8, dans laquelle la surface de contact est recouverte d'un premier type d'adhésif, le col étant recouvert d'un second type d'adhésif, dans lequel la force de collage du premier adhésif à l'élément de couvercle étant plus grande que la force de collage du second adhésif au col. 20

Fig 1

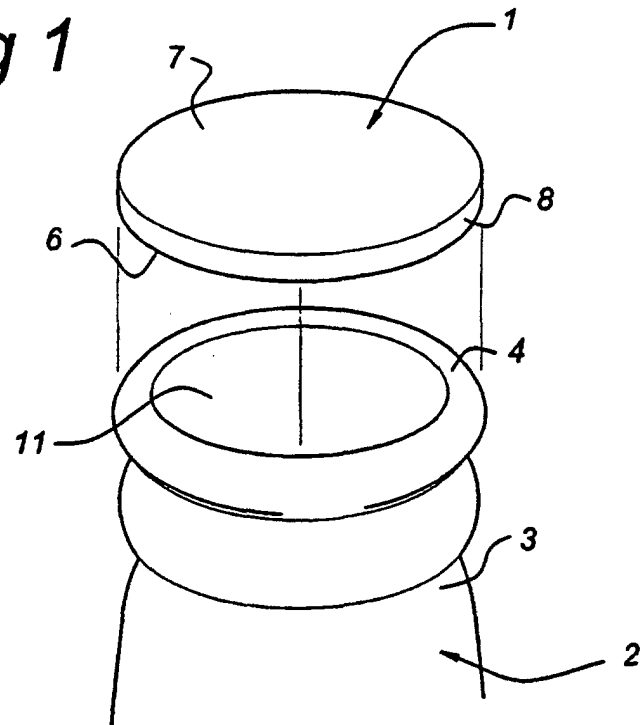


Fig 2

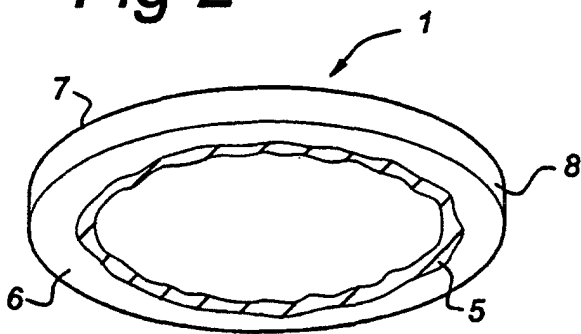


Fig 3

