

Description

[0001] The present invention refers to a closing device with chamber for a container of substances to be kept separate until dispensing.

[0002] There are currently containers on the market that allow substances contained in it to be kept separate until the moment of use, when they are mixed. This requirement exists, for example, in the case of conservation for pharmaceutical products that, if put on sale already mixed and ready to be used, would lose their therapeutic strength in a short space of time.

[0003] Such containers are usually equipped with a closing device consisting of a capsule inside which there is a cylindrical reservoir for a first substance, for example a powder, which must be mixed with a second substance present in the container, for example a liquid substance. Such a capsule also has a mushroom-shaped breaking element associated with it, the top of which can be pressed so that the foot penetrates into the reservoir and so that the bottom end of the shaft breaks the lower base of the cylindrical reservoir along at least part of its circular perimeter. In such a way, the first substance is freed into the container forming the desired mixture with the second substance contained in it.

[0004] The perimeter of the base of the reservoir has weakening or pre-fracture elements that make it easier to break.

[0005] The capsule is usually connected to the container through a threaded coupling, so that the container can be opened to use the product contained in it after the formation of the mixture.

[0006] Such closing devices consist of three separate parts: the capsule, the mushroom-shaped element and the reservoir; this constitutes a substantial production complication for the closing device, since it becomes necessary to have a dedicated production line for each part.

[0007] Closing devices, produced by the same Applicant, are also known in which the reservoir is integrated directly into the capsule, whereas the breaking element is made in a single body with the base of the reservoir and can be pressed and pushed downwards from the dome of the capsule, for such a purpose made from a flexible material. Such a solution reduces the number of parts of the device to be produced from three to two, however still maintaining a substantial complication of production.

[0008] According to the present invention the Applicant has made a closing device for a container of substances to be kept separate until dispensing in which the capsule, the reservoir and the breaking means are made in a single piece.

[0009] Moreover, the base of the reservoir is a separation membrane welded to the reservoir itself and is made from a material suitable for preventing the passage of water vapour, from the outside to the inside of the reservoir and vice-versa.

[0010] Advantageously, the closing device according

to the present invention can be mounted on containers of whatever shape and made from whatever material; the device can also be used to mix both liquid and powdered products. Preferably, the product contained in the container is liquid whereas that contained in the closing device is powdered.

[0011] An aspect of the present invention concerns a closing device for a container comprising a hollow capsule provided with fixed attachment means to said container, said capsule, comprising a reservoir in which a first substance is contained, to be kept separate from a second substance contained in said container until the moment of use, breaking means of the base of said reservoir that can be actuated with pressure from the top of said capsule, characterised in that said capsule, said reservoir and said breaking means are made in a single body.

[0012] The characteristics and advantages of a closing device for a container of substances to be kept separate until dispensing according to the present invention shall become clearer from the following description, given as an example and not limiting purposes, referring to the attached schematic drawings, in which:

Figure 1a shows a view of a container with which a closing device according to the present invention is associated before the mixing of the substances contained in the container and in the closing device, respectively, has taken place;

Figure 1b shows a view of a container with which a closing device according to the present invention is associated after the mixing of the substances contained in the container and in the closing device, respectively, has taken place;

Figure 2 shows a front view of the closing device according to the present invention;

Figure 3 shows a section of the closing device according to the present invention.

[0013] With reference to the quoted figures, an embodiment of the closing device that associates with a cylindrical container 2 is illustrated. The present invention can be equivalently applied to containers of different shapes. Moreover, in this specific case the closing device is internally threaded and is consequently screwed onto the container. In a further embodiment the closing device could be applied onto the container with pressure or in equivalent ways that ensure that it is hermetically closed.

[0014] In detail, the closing device comprises a capsule 3, preferably cylindrical and internally hollow, having an upper portion 31 that forms a reservoir 4 on the inside for a first substance to be mixed with a second substance present in the container 2.

[0015] Such first and second substances can be formed, for example, from powder, liquid, granules or other substances to be mixed with liquid.

[0016] The device also comprises breaking means of the base of the reservoir that can be actuated with pres-

sure and manually from the top of said capsule.

[0017] According to the present invention the capsule, the reservoir and such breaking means are made in a single piece, i.e. in a single body, for example made from plastic.

[0018] The capsule has a lower portion 32, with a greater diameter than the diameter of the upper portion, provided with fixed attachment means to the container, such as an internal threading 321, or alternatively pressure fixed attachment means on the container 2.

[0019] Such a lower portion also comprises an annular closing seal 322 with the container, of the same type as those present on the lids of drinks contained in plastic bottles. In particular, the annular seal is connected with the lower portion 32 through joining elements 323 with predetermined breakability.

[0020] The base of the reservoir is made through a membrane 41 welded onto an edge 33 situated near to the join of the upper portion with the lower portion of the capsule. Said membrane is, for example, heat-sealed, induction sealed or glued on such an edge and is made from plastic coupled with aluminium film.

[0021] Such a membrane, when the capsule is closed on the container 2, separates the first substances contained in the reservoir 4 from the second substance contained in the container 2.

[0022] In the case in which one of the two substances is liquid containing water, the membrane prevents any possible passage of water vapour through it, and therefore any undesired pre-mixing between the two substances, which would make the product ineffective at the moment of use.

[0023] The joining zone between the upper portion 31 and the lower portion 332 of the capsule determines an annular weakening or pre-fracture sector 34.

[0024] Such breaking means of the reservoir comprise at least one fracture point 311 made along said annular weakening sector 34. The upper portion 31 also comprises a sealing and clasping ring 313.

[0025] Advantageously, the lower portion 32 comprises a plurality of ribs and/or recesses, arranged substantially vertically, suitable for making it easier to manipulate the device during the opening and closing operation of the container.

[0026] The device according to the present invention operates in the following way.

[0027] The upper portion has a dome 312, by exerting pressure upon which the annular weakening sector fractures and the upper portion inserts inside the lower portion.

[0028] For such a purpose, the dome has, at an axis of symmetry of the closing device, a projection towards the inside, corresponding on the opposite side to a depression that makes it easier to compress the dome with a finger.

[0029] The fracture point 311 penetrates into the membrane 41 making it break practically completely, and causing the first substance contained in the reservoir 4

to fall by gravity into the container 2 thus in contact with the second substance.

[0030] Once the mixing in the container 2 between the two substances has occurred, the closing device can be removed, for example unscrewed, in order to pick up and use the extemporaneous mixture or solution created.

[0031] The sealing and clasping ring 313 allows the lower portion to remain stably inside the upper portion, as illustrated in figure 1b, without the possibility of being removed again.

[0032] The closing device with chamber according to the present invention has a "double" guarantee seal, since the capsule is equipped with a dome that when squashed identifies that the substance contained in the reservoir has fallen inside the container (first seal), and at the base of the capsule there is the seal of the type found in the plastic bottles quoted above (second seal). Such a second seal identifies that the container has been opened and that the mixture or the substance inside the container may have been manipulated.

[0033] Once the mixing of the two substances has been carried out, by removing the closing device the fractured membrane is advantageously taken away together with it, leaving the mouth of the container completely free.

Claims

1. Closing device with chamber for a container (2) comprising:

a hollow capsule (3) provided with fixed attachment means to said container, said capsule, comprising a reservoir (4) in which a first substance is contained, to be kept separate from a second substance contained in said container (2) until the moment of use, breaking means of the base of said reservoir that can be actuated with pressure from the top of said capsule, **characterised in that** said capsule, said reservoir and said breaking means are made in a single body.

2. Device according to claim 1, wherein said capsule comprises an upper portion (31) in which said reservoir (4) is integrated and a lower portion (32), having a greater diameter than the diameter of the upper portion, provided with said fixed attachment means to the container.

3. Device according to claim 2, wherein said base of the reservoir comprises a membrane (41) integrally associated on an edge (33) situated close to the join of the upper portion with the lower portion of the capsule.

4. Device according to claim 2, comprising an annular

weakening sector (34) made in the joining zone between the upper portion and the lower portion of the capsule, which by exerting said pressure on the top of the capsule fractures, causing the upper portion of the capsule itself to insert into the lower portion. 5

5. Device according to claim 4, wherein said breaking means comprise at least one fracture point (311) arranged along said annular weakening sector (34), suitable for penetrating into the membrane (41) causing it to break and causing the first substance contained in the reservoir (4) to fall by gravity into the container (2). 10
6. Device according to claim 4, wherein said upper portion of the capsule comprises a sealing and clasping ring (313) suitable for preventing the withdrawal of the upper portion from inside the lower portion once it has been inserted therein with pressure. 15
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7. Device according to claim 2, wherein said capsule comprises an annular closing seal (322), with the container, connected with the lower portion (32) through joining elements (323) of predetermined breakability. 25
8. Device according to claim 1, wherein said capsule has a dome that when pressed identifies that the first substance contained in the reservoir has fallen inside the container. 30
9. Device according to claim 3, wherein said membrane (41) is heat-welded, fixed by induction or glued to said edge (33). 35
10. Device according to claim 3, wherein said membrane (41) is made from plastic coupled with aluminium film.
11. Device according to claim 1, wherein said first substance is a powdered substance and said second substance is liquid. 40

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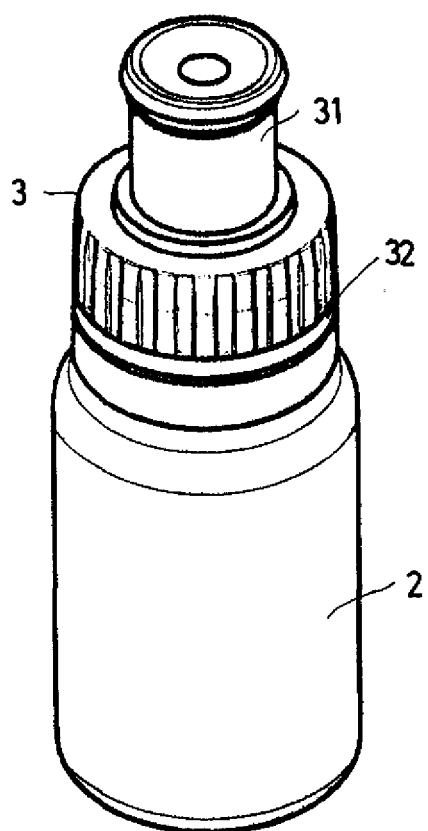


Fig.1a

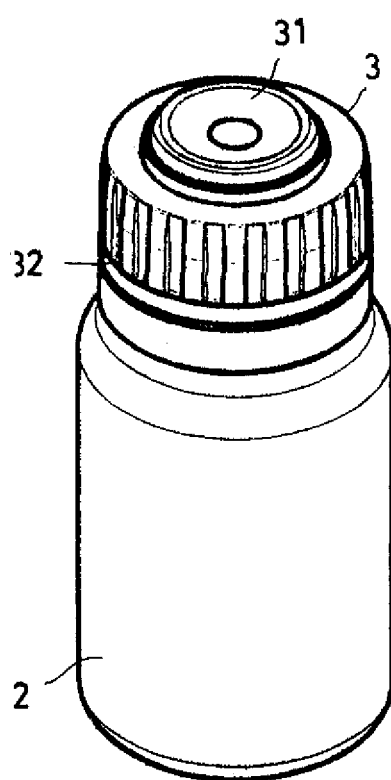


Fig.1b

Fig.2

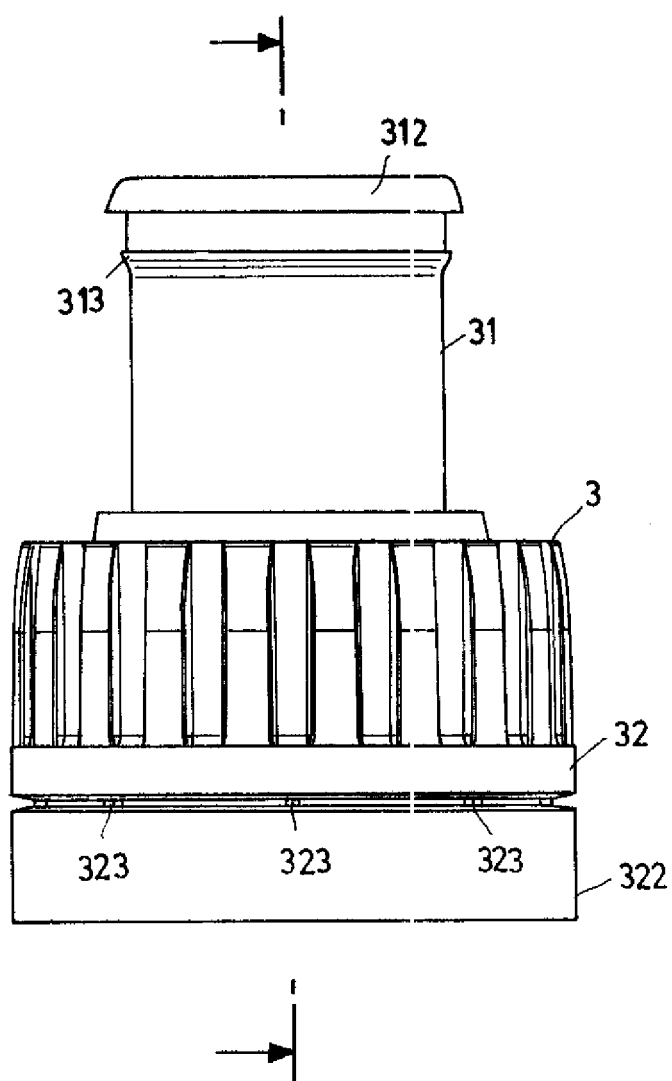
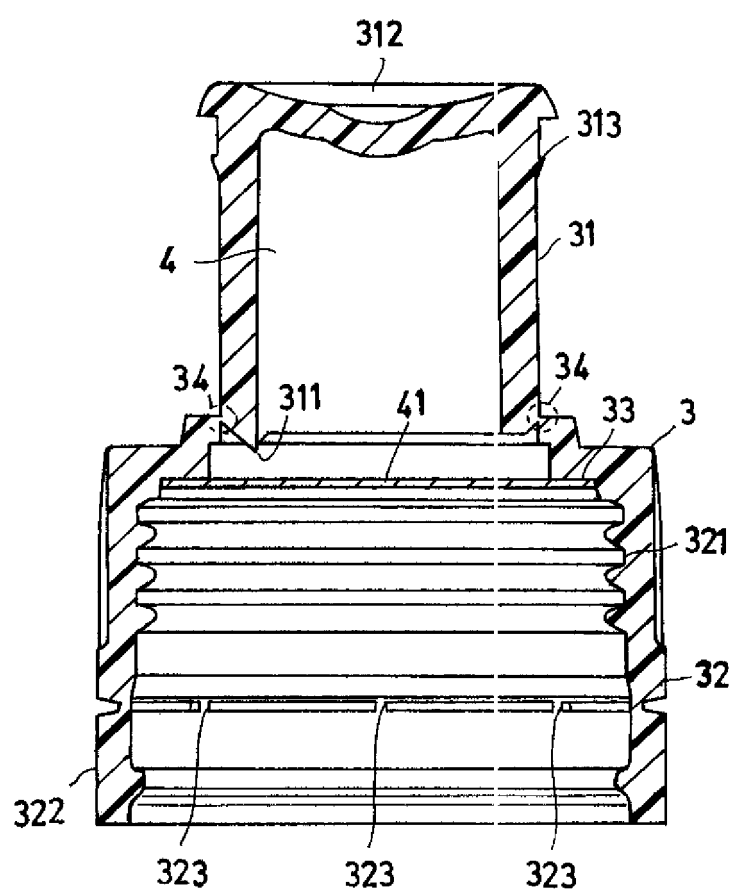


Fig.3





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 10 7010

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 October 2005	Examiner Fitterer, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 05 10 7010

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