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(54) Closing device with chamber for containers

(57) A closing device with chamber for a container (2) comprising: constraint means, which allow a constraint to said container (2) and are arranged in a lower portion of the device itself; at least one capsule (4), inside which a tank (52) is provided, which contains a first substance "S1", which has to be kept separate from a second substance "S2", which is contained in said container (2"), until their use; said substances "S1" and "S2" being kept separate by a membrane (53), which is arranged at the base of tank (52).

Said capsule comprising a breaking element (41), adapted to break membrane (53) due to the axial downward movement of the capsule, so that the first substance contained in the tank is mixed with the second substance contained in the container.

The closing device comprises, furthermore, a push-pull cap (3), which is arranged in its upper portion and is adapted to allow the two mixed substances to be delivered.

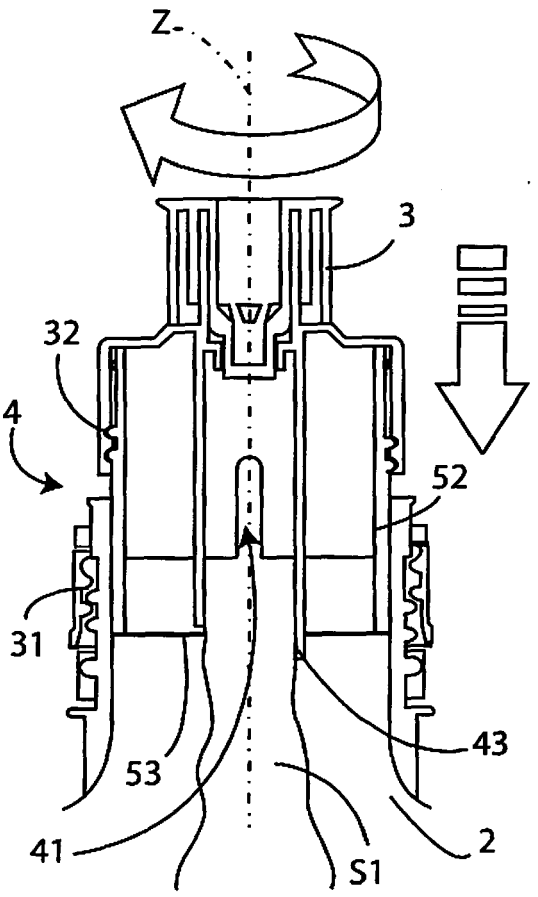


Fig. 3

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Description

[0001] The present invention is relative to a closing device with chamber for a container of substances to be kept separate until their delivery.

[0002] Currently, containers are available on the market, which allow the substances contained therein to be kept separate until their use, when they are mixed. This occurs, for example, in case of preservation of pharmaceutical or over-the-counter products, which, if they were sold already mixed, would loose their therapeutic power over a limited amount of time.

[0003] Said containers are usually provided with a closing device consisting of a capsule, inside which a cylindrical tank is provided, in which a first substance, for example a powdered substance, is contained, which has to be mixed with a second substance, which is contained in the container, for example a liquid substance. Said capsule, furthermore, is associated to a breaking element, whose top can be pressed, so that the stem penetrates into the tank and so that the lower end of the stem breaks the lower base of the cylindrical tank along at least part of its circular perimeter. In this way, the first substance is released in the container, thus forming the desired mix with the second substance contained therein.

[0004] In case of vitamin/mineral supplements used by athletes, said mineral salts/vitamins are usefully mixed with the liquid, normally water, right before the final mixture is actually swallowed by the user, so as to keep all the features of the vitamin/mineral supplement intact.

[0005] Vitamin/mineral supplements are available on the market, which are sold in form of water-soluble tablets or in airtight packagings, which are manually opened in order to introduce their content into a container containing, for example, water. Furthermore, push-pull delivery caps are known, which are applied to containers, such as bottles containing liquids.

[0006] The containers provided with push-pull caps are frequently used by athletes during their sport activities, since the container provided with said cap can be easily opened and closed.

[0007] Normally, said containers are used to hold liquids, in which mineral salts have been dissolved, which are useful for the athlete during the sport activity.

[0008] Advantageously, the closing device according to the present invention can be fitted on containers having any kind of shape and made of any kind of material; the device, furthermore, can be used to mix both liquid and powered products. Preferably, the product contained in the container is a liquid product, whereas the product contained in the closing device is a powered product, such as, for example, a vitamin/mineral supplement.

[0009] An aspect of the present invention is relative to a closing device for a container, which comprises a hollow capsule, which is provided with constraint means constraining said capsule to said container; said capsule comprising a tank, in which a first substance is contained, which has to be kept separate from a second substance, which is contained in said container, until their use, and breaking means for breaking the base of said tank.

[0010] The features and the advantages of a closing device according to the present invention for a container of substances to be kept separate until their delivery will be best understood upon perusal of the following detailed description, which is explanatory and non-limiting, with reference to the accompanying drawings, which specifically illustrate what follows:

- figure 1 shows a view of a container, which is associated to a closing device according to the present invention, prior to the mixing of the substances contained in the container and in the closing device respectively;
- figure 2 shows a front view in section of the closing device according to the present invention, prior to the mixing of the substances contained in the container and in the closing device respectively;
- figure 3 shows a front view in section of the closing device according to the present invention, after the mixing of the substances contained in the container and in the closing device respectively;
- figures 4A, 4B, and 4C show the sequence for the mixing of the substances contained in the container and in the closing device respectively.

[0011] With reference to the figures mentioned above, an embodiment of the closing device is described, which comprises constraint means, adapted to constrain the device to container 2, and are arranged in a lower portion of the device itself.

[0012] In this specific case, said constraint means are obtained by means of a first threaded portion 31, such to screw the closing device onto container 2.

[0013] In a further embodiment, said constraint means can allow the closing device to be fitted onto container 2 with a pressurized application or in similar manners, which can guarantee an airtight closing.

[0014] The closing device comprises, furthermore, at least a capsule 4, preferably having a substantially cylindrical and internally hollow shape, inside which a tank 52 is provided, adaptedto contain a first substance "S1" to be mixed with a second substance "S2" contained in container 2.

[0015] Tank 52 comprises, in a lower portion, a breakable membrane 53, adapted to separate the first substance "S1" contained in tank 52 from the second substance "S2" contained in container 2.

[0016] Membrane 53 of tank 52 is welded onto an edge of the lower portion of tank 52.

[0017] Said membrane 53, for example, is thermowelded or induction-welded or glued onto said edge, and it is made of a plastic material coupled to an aluminum film.

[0018] Said first and second substance (S1 and S2) can be made up, for example, of a powder, a liquid, a granulate, or other substances to be mixed with a liquid.

[0019] Said capsule is associated to a breaking element 41, adapted to break membrane 53 by axially moving the capsule downwards.

[0020] Finally, the closing device comprises a push-pull cap 3, which is arranged above capsule 4 in an upper portion of the closing device and adapted to allow the final mixed substance to be delivered, after the fist substance "S1", which is contained in tank 52, has been mixed with the second substance "S2", which is contained in container 2.

[0021] Preferably, capsule 4, tank 52, said breaking means, and at least a cap 3 are made of a plastic material.

[0022] The downward movement of capsule 4 is obtained, by way of example, by rotating capsule 4 itself by means of a second threaded portion 32.

[0023] As shown in figure 3, said second threaded portion 32, by rotating the closing device, allows breaking element 41 of capsule 4 to move downwards and to act on membrane 53 of tank 52, thus breaking it.

[0024] In case one of the substances is a liquid containing water, membrane 53 hinders a possible passage of water vapor through it and, therefore, avoids an undesired premixing of the two substances, which would cause the product to be ineffective when used.

[0025] According to the present invention, the capsule comprises, in its lower portion, an annular spacer 51, which practically fulfills the function of a security seal of the type of those present on the caps used for beverages contained in plastic bottles, adapted to prevent the capsule from axially moving downwards, along an axis "Z" and, thus, the closing device from being activated, until said annular spacer 51 is removed.

[0026] In particular, said safety seal is of the type with predetermined breaking, since it is connected to the lower edge of the capsule by means of junction elements, which break during the rotation of the capsule itself and, therefore, allow the the spacer to be detached from the capsule, thus allowing the latter to move downwards towards the mouth of container 2.

[0027] The lower end portion of the breaking element suitably presents at least one breaking tip 43, which allows the perforation of the bottom membrane of the tank.

[0028] Breaking element 41 is internally hollow, so as to help the final mixed substance move towards push-pull cap 3, in order to deliver the mixed substance itself.

[0029] When the closing device is activated, said annular weakening sector of membrane 53 is broken, thus allowing push-pull cap 3 and container 2 to communicate by means, for example, of the hollow structure.

[0030] The upper portion of the closing device comprises, furthermore, a protection cap 33, which covers push-pull cap 3, so as to protect it from external agents, before it is actually used by an user.

[0031] Advantageously, the lower portion of the closing device, in correspondence to the constraint means, comprises a plurality of ribs and/or recesses, which are substantially vertically arranged, and adapted to help the device be handled during the opening and closing operations of the container by means of said constraint means.

[0032] Furthermore, the upper portion of the closing device comprises a plurality of grooves, adapted to help the user take hold of the device, so as to allow the device to be activated by means of said activation means.

[0033] The second threaded portion 32 prevents the breaking means from breaking membrane 53 and the first substance "S1" from being accidentally mixed with the second substance "S2", in case a pressure is applied to the upper portion of the closing device.

[0034] When membrane 53 is broken, the first substance "S1", which is contained in tank 52, falls by gravity into container 2, thus coming into contact with the second substance "S2".

[0035] Once the two substances (S1 and S2) have been mixed in container 2, the closing device ends its function as substance separator and becomes an actual closing device for containers 2.

[0036] In order to use the mixed substance, it is sufficient to lift push-pull cap 3.

[0037] Protection cap 33 fulfills a guarantee function for the consumer, since, in order for protection cap 33 to be removed, a further seal has to be broken, which guarantees that push-pull cap 3 has not come into contact with external agents before its use.

[0038] Subsequently, after the removal of protection cap 33, the safety seal obtained by means of annular spacer 51 is removed; the presence of the latter allows users to check whether the product has been tampered with.

[0039] Said safety seal is removed by simply rotating capsule 4.

[0040] Subsequently, by rotating the capsule further on by means of the second threaded portion 32, breaking element 41 is moved downwards, so as to open the bottom of tank 52 and so as to allow substance "S1", which is contained in tank 52, to be mixed with substance "S2", which is contained in container 2, where said closing device is applied.

[0041] Subsequently, by shaking container 2, the two substances are mixed.

[0042] Finally, by lifting push-pull cap 3, the resulting substance contained in container 2 can be delivered.

[0043] In case the resulting substance contained in container 2 is not entirely delivered, in order to avoid product leaks, push-pull cap 3 can be closed again by lowering it, thus preventing said final substance itself from leaking out of container 2.

[0044] Advantageously, if said container is positioned in places where cap 3 can be contaminated, protection cap 33 can be put back in place, thus allowing a second delivery to be performed in a following moment.

[0045] The mixing of substances "S1" and "S2" does not take place in case the closing device is accidentally or unintentionally hit due, for example, to a fall of container 2, since the presence of annular spacer 51 prevents this from happening.

Claims

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

   constraint means with said container (2), placed in a lower portion of the device itself;
   at least one capsule (4), inside which a tank (52) is provided, in which a first substance (S1) is contained, to be kept separate from a second substance (S2) contained in said container (2), until use, separated by means of a membrane (53) placed at the base of the tank (52), such a capsule comprising a breaking element (41) for breaking the membrane (53) by effect of an axial movement of the capsule downwards, so that the first substance contained in the tank is mixed with the second one contained in the container;
   the closing device being **characterized in that** it comprises a push-pull cap (3) placed in one of its upper portions, for permitting the supply of the two mixed substances.

2. Device according to claim 1, wherein the capsule comprises in its lower portion an annular spacer (51) having the function of a security seal, for preventing the axial movement of the capsule downwards, until its removal.

3. Device according to claim 1, wherein the breaking element (41) is internally hollow, such to facilitate the passage of the final mixed substance towards the push-pull cap (3) for delivering the mixed substance itself.

4. Device according to claim 3, wherein the breaking element (41) in the lower end portion has at least one breaking tip (43) that facilitates the perforation of the bottom membrane of the tank.

5. Device according to claim 1, wherein the movement of the capsule (4) downwards is obtained by rotating the same by means of a second threaded portion (32).

6. Device according to claim 1, wherein the upper portion of the closing device also comprises a protection plug (33) which covers the push-pull cap (3) in order to protect it from external agents, before its actual use by an user.

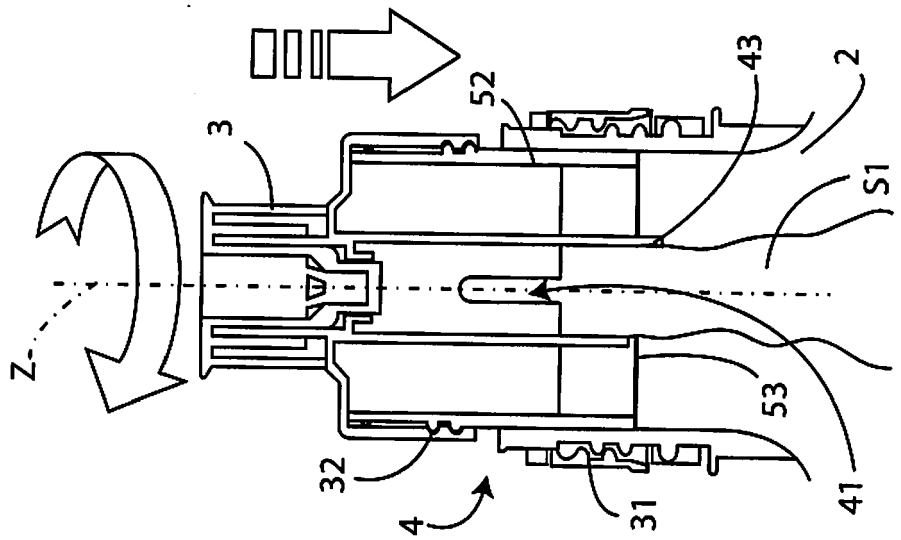


Fig. 3

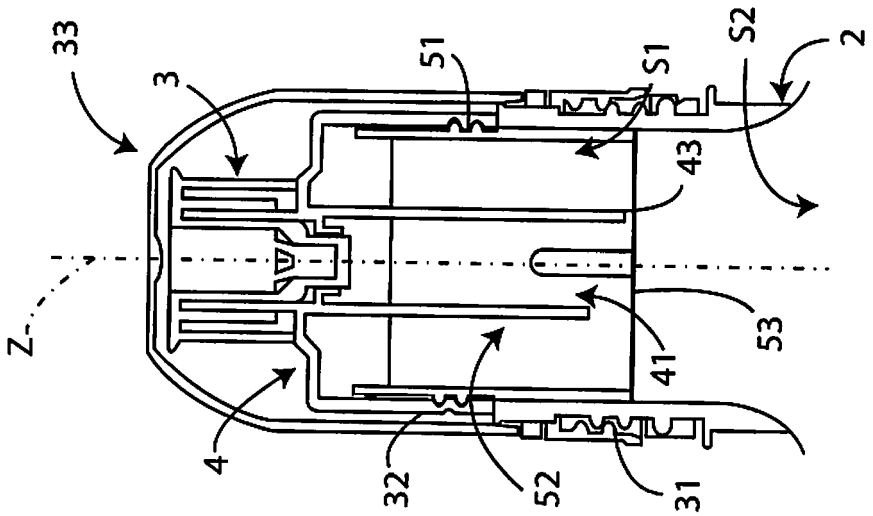


Fig. 2

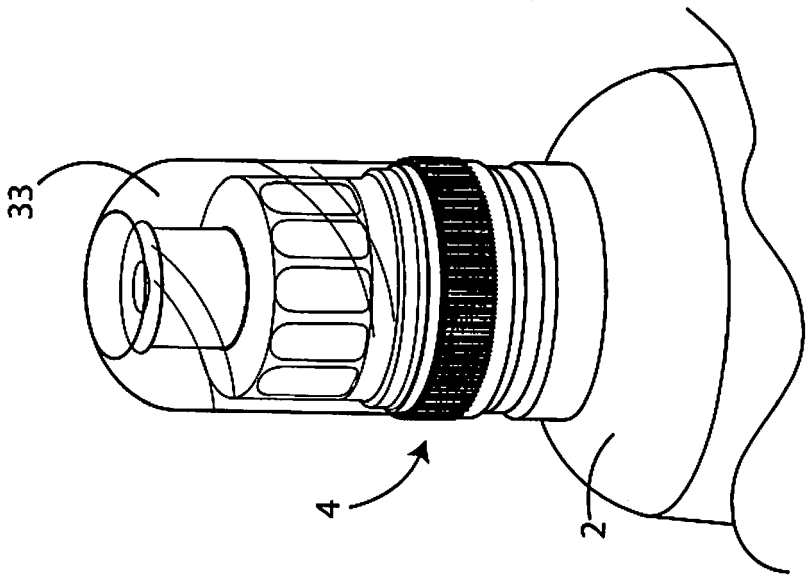


Fig. 1

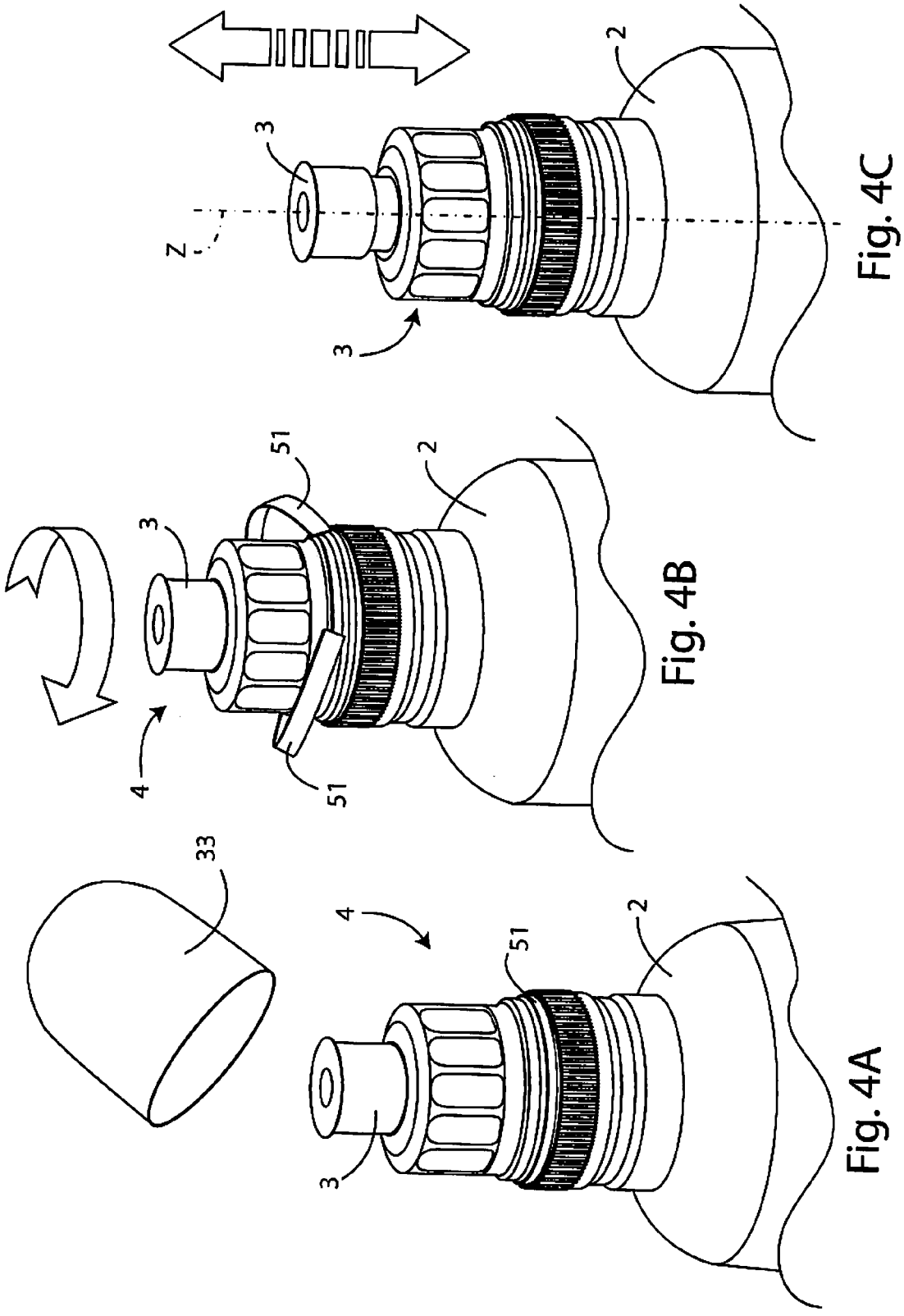


Fig. 4A

Fig. 4B

Fig. 4C

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EUROPEAN SEARCH REPORT

Application Number
EP 12 15 2295

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TECHNICAL FIELDS SEARCHED (IPC)

B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	6 March 2012	Fournier, Jacques

CATEGORY OF CITED DOCUMENTS

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1 EPO FORM 1503 03.82 (P04C01)

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