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(54) **DEVICE FOR CAPPING A BOTTLE SUITED TO THE PRESERVATION OF SUBSTANCES TO BE KEPT SEPARATE UNTIL THEIR APPLICATION AND SUITED TO THE COLLECTION OF THE MIXTURE OBTAINED BY MEANS OF A SYRINGE**

(57) Device for capping a bottle of substantially cylindrical internally hollow shape, comprising an upper portion (21), which forms a tank (3) therein for a first substance to be mixed with a second substance present in the bottle, a lower portion (22) provided with means for securing to the bottle. The base of the tank has a film (31) welded on an edge located near the junction of the upper portion with the lower portion. The device comprises means for breaking the base of the tank that can be operated by pressure and manually from the top of said

device comprising a piston (4) able to slide downwardly inside the hollow upper portion, provided with at least one fracture tip (41) on its lower end, which during the descent of the piston pierces the aforementioned film releasing the contents of the tank into the bottle. The top of the piston (4) comprises a membrane (42) that can be pierced by a syringe needle that when the piston itself has pierced the tank itself allows such needle to take the contents of the mixture in the bottle.

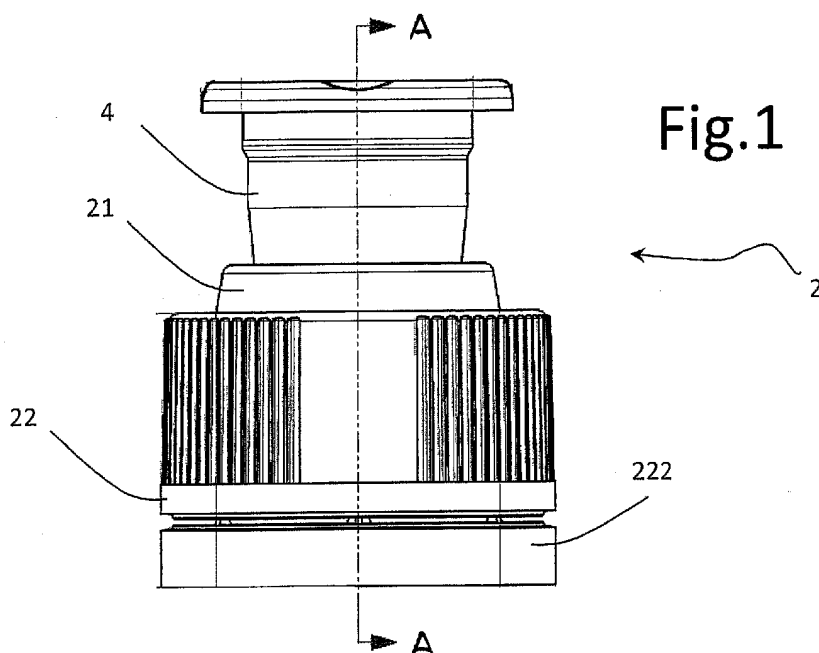


Fig.1

Description

[0001] The present invention refers to a device for capping a bottle adapted for the preservation of substances, for example powders or liquids, to be kept separate up to the moment of use thereof, when they are mixed together.

[0002] There are currently containers on the market that allow substances contained in it to be kept separate up to the moment of use thereof. This need occurs, for example, in the case of preservation of pharmaceutical products that, if proposed to sale already mixed and ready to use, would lose their therapeutic power in a short time period.

[0003] Such containers are usually equipped with a device for capping the bottle consisting of a capsule inside which there is a cylindrical tank for a first substance, for example powdered, which must be mixed with a second substance present in the bottle, for example a liquid substance. Such a capsule is also associated with a breaking element, the top of which can be pressed so that a shank of such an element penetrates in the tank and so that the lower end of the shank breaks the lower base of the cylindrical tank along at least part of the circular perimeter thereof. In this way, the first substance is released inside the bottle forming the desired mixture with the second substance contained therein.

[0004] The perimeter of the base of the tank has a membrane that is advantageously provided with weakening or pre-fracture elements that facilitate the breaking thereof.

[0005] The device is usually connected to the bottle through a threaded coupling, so that the bottle itself can be opened to use the product contained therein after the formation of the mixture. Sometimes, the capsule, the tank and the breaking means are made in a single piece.

[0006] Moreover, the base of the tank is a separation membrane welded to the tank itself and is made of a material adapted for preventing water vapour from passing, from outside to inside the tank and vice-versa.

[0007] Moreover, there are known bottles adapted for containing liquid or powdered drugs that must be mixed with a liquid before use, which must be taken through a syringe. In such bottles the cap is provided with an annular portion for crimping to the neck of the bottle and with a central portion, for example made of rubber, which can be perforated by the syringe needle, avoiding the introduction of air from outside the bottle. In any case, the cap as a whole is provided with sealing means at the neck of the bottle for the preservation of the contents thereof. In the case in which the powdered content must be mixed with a liquid, for example a physiological solution, normally such a liquid is introduced by means of the syringe itself and then after having shaken the bottle to mix the two components with the same syringe the mixed drug is taken.

[0008] The present invention proposes a device for capping a bottle that is at the same time capable of keep-

ing two substances separate up to the application thereof and capable to contain the mixture obtained to be taken through a syringe.

[0009] One aspect of the present invention concerns a device for capping a bottle having the characteristics of the attached claim 1.

[0010] The characteristics and advantages of the device for capping a bottle according to the present invention will become clearer from the following description, given as an example and not for limiting purposes, referring to the attached schematic drawings, in which:

- figure 1 shows a side view of a device for capping a bottle according to the invention;
- figure 2 shows a section along the line A-A of figure 1 of the device according to the present invention;
- figure 3 illustrates a view from above of the device according to the present invention.

[0011] With reference to the quoted figures, an embodiment of the capping device is illustrated that is associated with a bottle, for example of cylindrical shape (not shown). The present invention can in an equivalent manner be applicable to bottles having different shapes.

[0012] Moreover, in the specific case in which the capping device is internally threaded and is consequently screwed onto the container. In a further embodiment, the closure device could be applied on the container by pressure or in equivalent ways that ensure the airtight seal of the closure.

[0013] In detail, the capping device 2 is preferably of internally hollow cylindrical shape, having an upper portion 21, which forms a tank 3 therein for a first substance to be mixed with a second substance present in the bottle.

[0014] Such a first and second substance can be formed for example from powder, liquid, granulate or other substances to be mixed with liquid. The device also comprises means for breaking the base of the tank that can be operated by pressure and manually from the top of said device.

[0015] The capping device 2 also comprises a lower portion 22, of greater diameter than the diameter of the upper portion, provided with means for securing to the bottle, like for example an internal threading 221, or alternatively pressure-fastening means onto the container 2.

[0016] Such a lower portion possibly comprises an annular closure seal 222 with the bottle, of the type of those present on the caps of drinks contained in the bottles made of plastic.

[0017] The base of the tank has a film 31 welded on an edge located near the junction of the upper portion with the lower portion.

[0018] Said film is for example thermowelded, induction welded or glued onto such an edge and is made of a plastic material coupled with aluminium film.

[0019] Such a film, when the separation device is closed on the bottle, separates the first substance con-

tained in the tank 3 from the second substance contained in the bottle.

[0020] In the case in which one of the two substances is liquid, the film prevents a possible passage of water vapour through it, and therefore an undesired pre-mixing between the two substances, which would make the product ineffective at the moment of use thereof.

[0021] Such means for breaking the tank are made by a piston 4 able to slide downwardly inside the hollow upper portion and is provided with at least one fracture tip 41 on its lower end, which during the descent of the piston pierces the aforementioned film releasing the contents of the tank.

[0022] Advantageously, the lower portion 22 comprises a plurality of ribs and/or recesses, arranged substantially vertically, adapted for facilitating the manipulation of the device during the opening and closing operation of the container.

[0023] According to the present invention, the top of the piston 4 comprises a membrane 42 that can be pierced by a syringe needle that when the piston itself has pierced the tank itself allows such a needle to take the contents of the mixture into the bottle.

[0024] Such a membrane can be made of rubber, plastic, in general of a material that guarantees airtight sealing and is easily punctured.

[0025] Such a membrane occupies a substantially central area of the top of the piston. Moreover, it is preferably of discoid shape and is recessed in a seat formed on the top of the piston so as not to protrude with respect to a circular crown that delimits such a seat. Advantageously, the membrane is co-moulded together with the piston or with the device when the latter is made in a single piece. The membrane in the central area thereof has a tapered portion 43, preferably concave, which is the area where the syringe needle is inserted. In this way, the penetration of the needle is facilitated even when it is of a very thin type.

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

[0027] When it is wished to mix the two substances it is sufficient to press on the piston of the device. The latter is thus forced to descend until the fracture tip penetrates into the membrane, causing the almost complete breaking thereof and causing the first substance contained in the tank to fall by gravity into the bottle thus in contact with the second substance. Once the substances have been mixed, it is sufficient to slot a syringe needle into the membrane 42 and reach the mixture in the bottle, since the fracture tip 41 has already opened the film 31 and there are no further barriers between the needle and the inside of the bottle.

- an upper portion (21), which forms a tank (3) therein for a first substance to be mixed with a second substance present in the bottle,
- a lower portion (22) provided with means for securing to the bottle,
- the base of the tank having a film (31) welded on an edge located in the vicinity of the junction of the upper portion with the lower portion,
- means for breaking the base of the tank that can be operated by pressure and manually from the top of said device comprising a piston (4) able to slide downwardly inside the hollow upper portion provided with at least one fracture tip (41) on its lower end, which during the descent of the piston pierces the aforementioned film releasing the contents of the tank into the bottle,

characterised in that

the top of the piston (4) comprises a membrane (42) that can be pierced by a syringe needle that when the piston itself has pierced the tank itself allows such needle to take the contents of the mixture in the bottle.

2. Device according to claim 1, wherein such membrane occupies a substantially central area of the top of the piston.
3. Device according to claim 1, wherein such membrane is of a discoid shape and is recessed in a seat obtained on the top of the piston so as not to protrude with respect to a circular crown which delimits such seat.
4. Device according to claim 1, wherein the membrane is co-moulded together with the piston or the device when the latter is made in one piece.
5. Device according to claim 1, wherein the membrane in the central area thereof has a tapered portion (43), which is the area where the syringe needle is inserted.
6. Device according to claim 1, wherein the tapered portion is concave.
7. Device according to claim 1, wherein such membrane can be made of rubber, plastic, generally of a material that guarantees airtight sealing and is easily punctured.

Claims

1. Device for capping a bottle of substantially cylindrical internally hollow shape, comprising

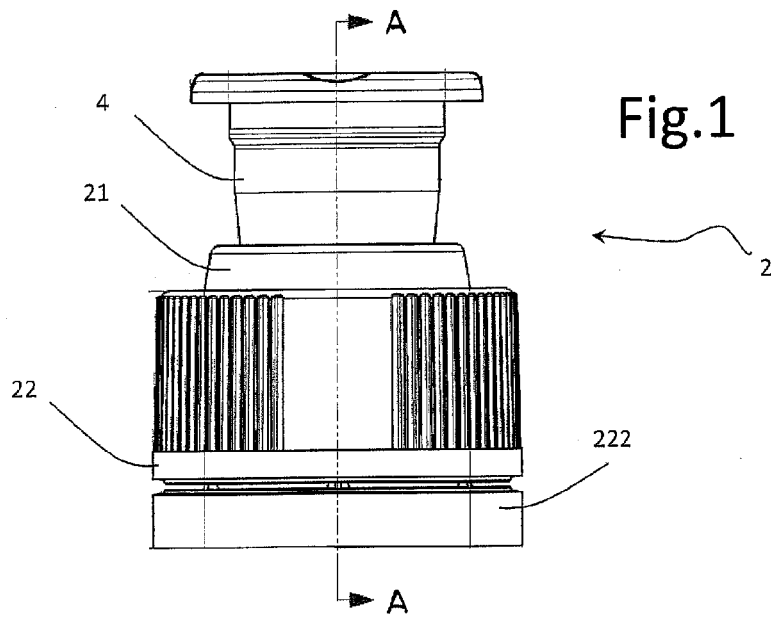


Fig. 2

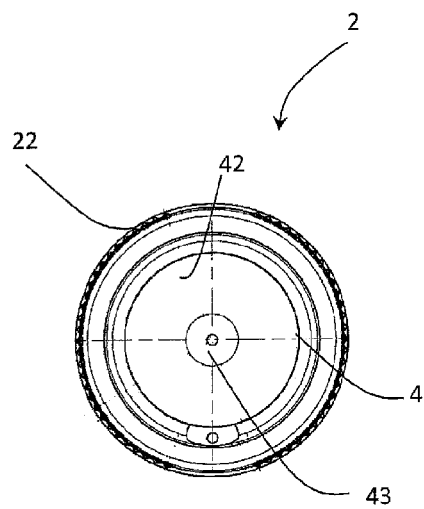
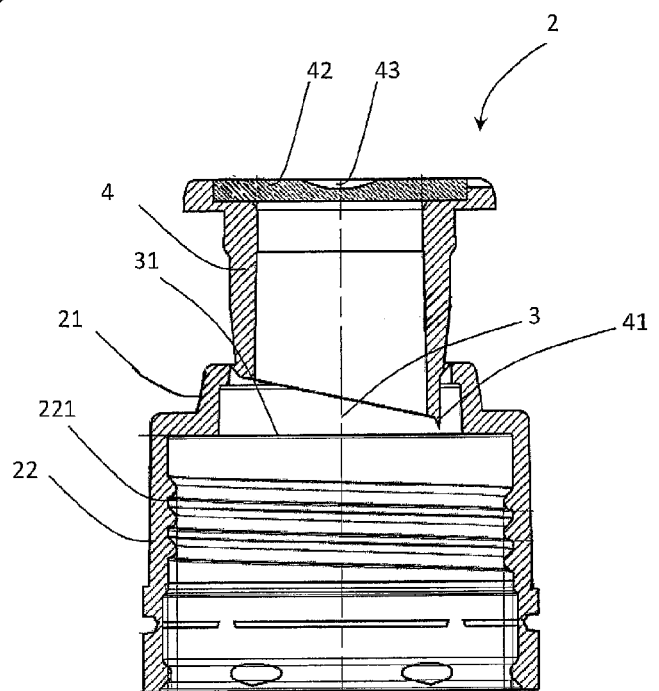


Fig. 3



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 EP 19 16 0847

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Place of search The Hague		Date of completion of the search 26 June 2019	Examiner Mans-Kamerbeek, M
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