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(54) **A COOLING DEVICE COMPRISING AN ADAPTOR**

KÜHLVORRICHTUNG MIT EINEM ADAPTER

DISPOSITIF DE REFRROIDISSEMENT COMPRENANT UN ADAPTATEUR

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Description

[0001] The present invention relates to a cooling device comprising an adaptor attached on a bottle.

[0002] In cooling devices, especially in refrigerators, auxiliary members requiring liquid supply like water dispenser and ice making unit are used. In the ice making units used in conventional refrigerators, ice cube trays are generally filled by hand by the user. In these embodiments, the need to fill the ice cube tray again after each ice making process occurs and this creates difficulty of utilization. Therefore, cooling devices are developed wherein water supply is automatically made to the ice cube tray. In these embodiments, water supply is generally performed by delivering the water received from a water storage container to the ice cube tray by means of a pump and channels. Similarly in water dispensers the water received from the water storage container is delivered to the tap by the actuation of the latch by the user. In these embodiments, the loading, removing and cleaning of the storage container becomes a difficult process for the user in due course. Besides, the said storage containers occupy a considerable space in the volume of the cooling device and prevent the volume of the cooling device from being used effectively. In order to solve these problems, apparatuses are used which enable liquid to be supplied to the members like ice making unit and water dispenser from the water bottles that are used daily. However, an effective leak-proofing cannot be provided in these apparatuses and various problems are encountered in terms of leak-proofing. Moreover, these apparatuses can be attached to the mouths of the bottles having widths generally predetermined by the manufacturer.

[0003] In the state of the art International Patent Application No. WO2009061118, a cooling device wherein liquid supply is made from a bottle is described. In this disclosure a tube is immersed into a bottle and the tube is connected to a pump from the other end thereof. The liquid received from the bottle is delivered to the member and/or members wherein the liquid will be used by means of the pump.

[0004] The state of art patent application US 2011/0163116 A1 discloses a bottled water dispenser. A tube connected to a pump is immersed with its opposite end into a bottle by means of a funnel placed on the mouth of the bottle and partially entering into the mouth of the bottle. The funnel is provided with a cap grasping the mouth of the bottle to be fixed on the bottle.

[0005] The aim of the present invention is the realization of a cooling device comprising an adaptor enabling the mouth of the bottle to be firmly closed and that can be used together with bottles with different widths.

[0006] The cooling device realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises an adaptor attached to the mouth of the bottle. The adaptor through the middle portion of which the liquid delivery tube is passed comprises a funnel-shaped lid placed to

the mouth of the bottle and a locking mechanism disposed under the lid and that enables the adaptor to be attached on the bottle by grasping the bottle from the neck portion thereof. The locking member is similar to a clamp due to its structure that can be opened and closed. Thus, the bottles with different widths are enabled to be grasped by being compressed from a side.

[0007] The adaptor comprises an upper casing and a lower casing movably mounted to each other. The upper casing and the lower casing can rotate on each other. The lid and the locking member are disposed between the casings. The upper casing exerts pressure on the lid from above and thus eliminates the possibility of air and/or water leakage between the mouth of the bottle and upper casing.

[0008] The lower casing and the upper casing can be simultaneously rotated in opposite directions. Upon this movement, the locking mechanism is guided towards the bottle and enables the adaptor to be fixed on the bottle by compressing the bottle from the neck portion thereof.

[0009] The locking mechanism comprises two opposite crescent-shaped baffles, the concave surfaces of which face each other. The baffles preferably make a movement similar to that of the camera shutter while being closed. By means of the surfaces of the baffles facing the bottle being concave, the baffles can easily grasp the bottle.

[0010] In an embodiment of the present invention, the adaptor comprises two opposite barriers extending upwards from the base portion of the lower casing. The baffles are oppositely placed between the barriers. The barriers perform the aligning function while the upper casing is mounted on the lower casing.

[0011] In an embodiment of the present invention, spring-shaped channels are arranged on the baffles and pins movably placed inside the channels are disposed on the lower surface of the upper casing. In this embodiment, the baffles are rotatably placed on the protrusions disposed on the lower casing. While the adaptor is fixed on the bottle by rotating the casings in opposite directions, the baffles rotate on the protrusions and are guided towards the bottle by means of the movement of the pin on the channel.

[0012] In an embodiment of the present invention, two gear racks are disposed oppositely on the side wall of the upper casing. When the upper casing is placed on the lower casing, two extensions disposed on the lower casing move between the teeth on the gear racks and thus enable the rotational movement to be made in a controlled manner. Moreover, the adaptor is enabled to maintain its position after the fixing process is performed.

[0013] In an embodiment of the present invention, a prestress means is disposed between the lid and the upper casing. The prestress means both strengthen the leak-proofing between the lid and the mouth of the bottle and enables the locking member to grasp the bottle from below the step disposed on the neck thereof. Thus, a strong connection is obtained. In this embodiment, while

the adaptor is being attached, the upper casing is first pressed downwards and then rotated together with the lower casing in the pressed state.

[0014] By means of the present invention, a cooling device is realized, which comprises an adaptor that can be firmly attached on the bottle and used together with the bottles with different widths by means of the structure of the locking member that can narrow and widen.

[0015] The cooling device realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the perspective view of the cooling device.

Figure 2 - is the view of the pump and the adaptor on the cooling device.

Figure 3 - is the front view of the pump and the adaptor related to an embodiment of the present invention.

Figure 4 - is the front view of the pump and the adaptor related to another embodiment of the present invention.

Figure 5 - is the exploded view of the adaptor.

Figure 6 - is the partial perspective view of the adaptor.

Figure 7 - is the view of the adaptor before being fixed to the bottle.

Figure 8 - is the view of the adaptor while being fixed to the bottle.

Figure 9 - is the top view of the adaptor when the locking member is in the free state.

Figure 10 - is the top view of the adaptor when the locking member is compressed.

Figure 11 - is the bottom view of the adaptor when the locking member is in the free state.

Figure 12 - is the bottom view of the adaptor when the locking member is compressed.

[0016] The elements illustrated in the figures are numbered as follows:

1. Cooling device
2. Pump
3. Liquid delivery tube
4. Adaptor
5. Lid
6. Locking mechanism
7. Upper casing
8. Lower casing
9. Baffle
10. Barrier
11. Channel
12. Pin
13. Protrusion
14. Gear rack
15. Extension
16. Prestress means

[0017] The cooling device (1) comprises a pump (2) that enables liquid to be delivered to the members like water dispenser and/or ice making unit disposed thereon, a liquid delivery tube (3) that enables liquid to be taken into the pump (2) from inside a bottle (B), one end of which is immersed into the bottle (B) and the other end of which is connected to the pump (2), and an adaptor (4) that enables the mouth of the bottle (B) to be closed in a leak-proofing manner by being fitted on the liquid delivery tube (3). The adaptor (4) is first fitted on the liquid delivery tube (3) by means of the opening at the middle portion thereof while being attached on the bottle (B). Afterwards, one end of the liquid delivery tube (3) is immersed into the bottle (B) and the other end thereof is connected to the water inlet of the pump (2). Finally, the adaptor (4) is fixed on the bottle (B) (Figure 1, Figure 2, Figure 3, Figure 4).

[0018] In the cooling device (1) of the present invention, the adaptor (4) comprises

- a frustoconical lid (5) placed on the mouth of the bottle (B), at least one portion of which enters into the mouth of the bottle (B) and thus enables the mouth of the bottle (B) to be closed and
- a locking mechanism (6) enabling the adaptor (4) to be fixed on the bottle (B) by grasping the bottle (B) from the neck portion thereof, suitable for grasping bottles (B) with different widths from the neck thereof by narrowing and widening.

[0019] The outer surface of the lid (5) contacts the bottle (B) along the periphery of the mouth of the bottle (B) and enables the mouth of the bottle (B) to be almost entirely closed. The lid (5) can close the mouth of bottles (B) with different widths thanks to its frustoconical shape. As the diameter of the mouth of the bottle (B) gets larger, a larger portion of the lid (5) enters into the bottle (B). The locking mechanism (6) disposed under the lid (5) is moved after the adaptor (4) is seated onto the bottle (B) and grasps the bottle (B) from the neck thereof by being narrowed. The locking mechanism (6) can be used on bottles (B) with different dimensions thanks to its structure that can narrow and widen. By means of the lid (5) and the locking mechanism (6), the adaptor (4) can be fixed on bottles (B) having mouths with different widths. This provides flexibility of utilization (Figure 5, Figure 6).

[0020] In the present invention, the adaptor (4) comprises an upper casing (7) that presses the lid (5) towards the mouth of the bottle (B) from above and a lower casing (8) movably mounted to the upper casing (7) from below. The lower casing (8) and the upper casing (7) form a closed volume when joined. The locking mechanism (6) and the lid (5) are disposed in the volume inside the casings (7, 8). By means of the lower casing (8) and the upper casing (7), the members like the locking mechanism (6) and the lid (5), which provide the operation of the adaptor (4), are protected from external factors (Figure 5).

[0021] In the present invention, the locking mechanism (6) is placed between the upper casing (7) and the lower casing (8) and moves with the upper casing (7) and the lower casing (8) being rotated in opposite directions with respect to each other and enables the adaptor (4) to be fixed on the bottle (B) by compressing the neck of the bottle (B) from the two opposite sides thereof. Since the locking mechanism (6) narrows and widens by rotating the upper casing (7) and the lower casing (8), the adaptor (4) can be fixed on the bottle (B) without requiring an apparatus (Figure 5, Figure 6, Figure 12).

[0022] In the present invention, the locking mechanism (6) comprises two opposite boomerang-shaped baffles (9) movably borne between the upper casing (7) and lower casing (8). The baffles (9) close towards the neck of the bottle (B) by the lower casing (8) and the upper casing (7) being rotated. By means of the baffles (9) the concave surfaces of which face each other, the neck of the bottle (B) is enabled to be firmly grasped (Figure 5, Figure 6, Figure 12).

[0023] In an embodiment of the present invention, the adaptor (4) comprises two opposite barriers (10) extending upwards from the base portion of the lower casing (8). In this embodiment, the baffles (9) are oppositely placed between the barriers (10). The baffles (9) remaining between the barriers (10) cannot move in the horizontal direction and are borne on the lower casing (8). The barriers (10) furthermore enable the upper casing (7) to be aligned with the lower casing (8). Thus, the upper casing (7) is enabled to be more easily mounted on the lower casing (8) and the baffles (9) (Figure 5, Figure 6, Figure 9, Figure 10).

[0024] In an embodiment of the present invention, the locking mechanism (6) comprises a channel (11) disposed on each of the surfaces of the baffles (9) facing the upper casing (7), two opposite pins (12) disposed on the lower surface of the upper casing (7) and movably borne inside the channels (11) and two protrusions (13) disposed on the upper surface of the lower casing (8), whereon the baffles (9) are rotatably placed. While the lower casing (8) and the upper casing (7) are rotated in opposite directions with respect to each other, the baffles (9) rotate inwards. By means of the channels (11) and the pin (12), the baffles (9) are enabled to be supported from above and are not prevented from rotating inwards (Figure 5, Figure 6).

[0025] In an embodiment of the present invention, the adaptor (4) comprises two gear racks (14) disposed oppositely on the skirts of the upper casing (7) and an extension (15) disposed at one end of each barrier (10) and that enables the rotational movement to be made in a controlled manner by moving on the gear rack (14) while the lower casing (8) and the upper casing (7) are rotated in opposite directions with respect to each other. In this embodiment, while the upper casing (7) is rotated on the lower casing (8), the extension (15) continues on its path by passing over the teeth on the gear rack (14) one by one. At the same time, when the rotation process is over,

the extension (15) functions as a stopper by placing between the teeth (Figure 6, Figure 10, Figure 11).

[0026] In an embodiment of the present invention, the adaptor (4) comprises a prestress means (16) disposed between the upper casing (7) and the lid (5) and that enables the lid (5) to close the mouth of the bottle (B) in a leak-proofing manner when the upper casing (7) is pushed downwards and that enables the locking mechanism (6) to firmly grasp the bottle (B) by passing under a step (S) disposed in the vicinity of the mouth portion of the bottle (B). In this embodiment, while the adaptor (4) is being attached on the bottle (B), the upper casing (7) is pressed downwards and rotated in the pressed state. When the upper casing (7) is pressed downwards, the prestress means (16) exerts pressure on the lid (5) and leak-proofing between the lid (5) and the bottle (B) is improved. When the upper casing (7) is rotated in the pressed state, the baffles (9) grasp the bottle (B) from the lower side of the step (S) disposed on the neck of the bottle (B). Thus, the baffles (9) are prevented from detaching from the upper side of the bottle (B). Furthermore, in this situation, as long as the adaptor (4) is attached on the bottle (B), the upper casing (7) remains in the pressed state. This enables the lid (5) to be seated on the mouth of the bottle (B) more firmly (Figure 5, Figure 7, Figure 8).

[0027] By means of the present invention, the adaptor (4) can be easily attached on bottles (B) with different widths without requiring a modification. The attachment process can be performed without the need of using any tool. Moreover, the adaptor (4) is firmly attached on the bottle (4) and an effective leak-proofing is provided.

Claims

1. A cooling device (1) comprising a pump (2) that enables liquid to be delivered to the members like water dispenser and/or ice making unit disposed thereon, a liquid delivery tube (3) that enables liquid to be taken into the pump (2) from inside a bottle (B), one end of which is immersed into the bottle (B) and the other end of which is connected to the pump (2) and an adaptor (4) that enables the mouth of the bottle (B) to be closed in a leak-proofing manner by being fitted on the liquid delivery tube (3), the adaptor (4) having

- a frustoconical lid (5) placed on the mouth of the bottle (B), at least one portion of which enters into the mouth of the bottle (B) and thus enables the mouth of the bottle (B) to be closed, and
- a locking mechanism (6) enabling the adaptor (4) to be fixed on the bottle (B) by grasping the bottle (B) from the neck portion thereof,

characterized by

- the locking mechanism (6) being suitable for

- grasping bottles (B) with different widths from the neck thereof by narrowing and widening,
- the adaptor (4) comprising an upper casing (7) that presses the lid (5) towards the mouth of the bottle (B) from above and a lower casing (8) movably mounted to the upper casing (7) from below,
 - the locking mechanism (6) being placed between the upper casing (7) and the lower casing (8) and moving by the upper casing (7) and the lower casing (8) being rotated in opposite directions with respect to each other and enables the adaptor (4) to be fixed on the bottle (B) by compressing the neck of the bottle (B) from the two opposite sides,
 - the locking mechanism (6) comprising two opposite boomerang-shaped baffles (9) movably borne between the upper casing (7) and lower casing (8).
2. A cooling device (1) as in Claim 1, **characterized** by the adaptor (4) comprising two opposite barriers (10) extending upwards from the base portion of the lower casing (8) and the baffles (9) placed oppositely between the barriers (10).
3. A cooling device (1) as in any one of the above Claims, **characterized by** the locking mechanism (6) comprising a channel (11) disposed on each of the surfaces of the baffles (9) facing the upper casing (7), two opposite pins (12) disposed on the lower surface of the upper casing (7) and movably borne inside the channels (11) and two protrusions (13) disposed on the upper surface of the lower casing (8), whereon the baffles (9) are rotatably placed.
4. A cooling device (1) as in any one of the above Claims, **characterized by** the adaptor (4) comprising two gear racks (14) disposed oppositely on the skirts of the upper casing (7) and an extension (15) disposed at one end of each barrier (10) and that enables the rotational movement to be made in a controlled manner by moving on the gear rack (14) while the lower casing (8) and the upper casing (7) are rotated in opposite directions with respect to each other.
5. A cooling device (1) as in any one of the above Claims, **characterized by** the adaptor (4) comprising prestress means (16) disposed between the upper casing (7) and the lid (5) and that enables the lid (5) to close the mouth of the bottle (B) in a leak-proofing manner when the upper casing (7) is pushed downwards and that enables the locking mechanism (6) to firmly grasp the bottle (B) by passing under a step (S) disposed in the vicinity of the mouth portion of the bottle (8).

Patentansprüche

1. Ein Kühlgerät (1) bestehend aus einer Pumpe (2), die ermöglicht, daß die Flüssigkeit geliefert wird zu den Komponenten wie Wasserspender und/oder Eisherstellungseinheit, die darauf angeordnet ist, ein Flüssigkeitslieferungsrohr (3), das ermöglicht, daß die Flüssigkeit in die Pumpe (2) aufgenommen wird vom Innern einer Flasche (B), deren ein Ende in die Flasche (B) eingetaucht ist und deren anderes Ende zur Pumpe (2) verbunden ist und ein Adapter (4), der ermöglicht, daß der Mund der Flasche (B) geschlossen wird in einer undurchlässigen Weise durch Anpassung zum Flüssigkeitslieferungsrohr (3), der Adapter (4) besitzt

- einen kegelförmigen Deckel (5) hingelegt auf den Mund der Flasche (B), mindestens einen Teil davon eindringt in den Mund der Flasche (B) und erlaubt so, daß der Mund der Flasche (B) geschlossen wird, und
- einen Verschlussmechanismus (6), der ermöglicht, daß der Adapter (4) auf die Flasche (B) durch Fassung der Flasche (B) vom Halsenteil festgesetzt wird,

dadurch gekennzeichnet, daß

- der Verschlussmechanismus (6) geeignet ist für Festhaltung der Flaschen (B) mit verschiedenen Breiten vom Hals durch Verengung und Ausweitung,
- der Adapter (4) beinhaltet ein Obergehäuse (7), das den Deckel (5) zum Mund der Flasche (B) von oben drückt und ein Untergehäuse (8) beweglich montiert ist zum Obergehäuse (7) von unten,
- der Verschlussmechanismus (6) hingelegt ist zwischen dem Obergehäuse (7) und Untergehäuse (8) und sich bewegt durch das Obergehäuse (7) und Untergehäuse (8), die zueinander in entgegengesetzten Richtungen rotiert werden und ermöglicht, daß der Adapter (4) festgesetzt wird auf die Flasche (B) durch Zusammenpressung des Halsen der Flasche (B) von beiden gegenüberstehenden Seiten,
- der Verschlussmechanismus (6) beinhaltet zwei gegenüberstehende bumerangförmige Sperren (9) beweglich getragen zwischen dem Obergehäuse (7) und Untergehäuse (8).

2. Ein Kühlgerät (1) nach Anspruch 1, **dadurch gekennzeichnet, daß** der Adapter (4) beinhaltet zwei gegenstehenden Hindernisse (10), die sich ausstrecken aufwärts von der Basispart des Untergehäuse (8) und die Sperren (9) sind hingelegt gegenüberliegend zwischen den Hindernisse (10).

3. Ein Kühlgerät (1) nach den vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** der Verschlussmechanismus (6) beinhaltet einen Kanal (11) angeordnet auf jeder Oberfläche der Sperren (9), die dem Obergehäuse (7) gegenüberstehen, zwei entgegengesetzten Nadeln (12) sind angeordnet auf der unteren Oberfläche des Obergehäuse (7) und beweglich getragen im Innern der Kanäle (11) und zwei Vorsprünge (13) sind angeordnet auf der oberen Oberfläche des Untergehäuse (8), wo die Sperren (9) rotierbar hingesetzt sind. 5
4. Ein Kühlgerät (1) nach den vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** der Adapter (4) beinhaltet zwei Zahnstangen (14), angeordnet gegenüberliegend auf den Rücken des Obergehäuse (7) und eine Verlängerung (15) angeordnet an einem Ende von jeder Hindernis (10) und ermöglicht, daß die Drehbewegung in einer kontrollierten Weise gemacht wird durch Bewegung auf der Zahnstange (14), wobei das Untergehäuse (8) und Obergehäuse (7) zueinander in entgegengesetzter Richtung rotiert werden. 10 15 20
5. Ein Kühlgerät (1) nach den vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** der Adapter (4) beinhaltet Vorspannmittel (16) angeordnet zwischen dem Obergehäuse (7) und Deckel (5) und ermöglicht, daß der Deckel (5) verschließt den Mund der Flasche (B) in einer undurchlässigen Weise, wenn das Obergehäuse (7) abwärts angeschoben ist und erlaubt, daß der Verschlussmechanismus (6) die Flasche (B) festgreift mit Vorbeigehen unter einer Trittstufe (S) angeordnet in der Nähe von Mundeteil der Flasche (8). 25 30 35

Revendications

1. Dispositif de refroidissement (1) comprenant une pompe (2) qui permet au liquide d'être livré aux éléments, comme un distributeur d'eau et / ou une unité de fabrication de glace disposée sur celui-ci, un tube de distribution de liquide (3) qui permet de prendre le liquide dans la pompe (2) à l'intérieur d'une bouteille (B), dont une extrémité est immergée dans la bouteille (B) et l'autre extrémité est reliée à la pompe (2) et à un adaptateur (4) qui permet la bouche de la bouteille (B) à fermer de manière étanche en étant fixé sur le tube de distribution de liquide (3), l'adaptateur (4) ayant 40 45 50
- un couvercle tronconique (5) placé sur la bouche de la bouteille (B) dont au moins une partie pénètre dans la bouche de la bouteille (B) et permet ainsi de fermer la bouche de la bouteille (B), et 55
 - un mécanisme de verrouillage (6) permettant

à l'adaptateur (4) d'être fixé sur la bouteille (B) en saisissant la bouteille (B) à partir de sa partie de col,

caractérisé en ce que

- le mécanisme de verrouillage (6) étant apte à saisir des bouteilles (B) à différentes largeurs du col de celui-ci par rétrécissement et élargissement,
- l'adaptateur (4) comprenant un boîtier supérieur (7) qui presse le couvercle (5) vers la bouche de la bouteille (B) depuis le dessus et un boîtier inférieur (8) monté mobile sur le boîtier supérieur (7) depuis le bas,
- le mécanisme de verrouillage (6) étant placé entre le boîtier supérieur (7) et le boîtier inférieur (8) et se déplaçant par le boîtier supérieur (7) et le boîtier inférieur (8) tournant dans des directions opposées l'un par rapport à l'autre et permet de fixer l'adaptateur (4) sur la bouteille (B) en comprimant le col de la bouteille (B) des deux côtés opposés,
- le mécanisme de verrouillage (6) comprenant deux chicanes (9) en forme de boomerang opposées portées de manière mobile entre le boîtier supérieur (7) et le boîtier inférieur (8).

2. Dispositif de refroidissement (1) selon la revendication 1, **caractérisé en ce que** l'adaptateur (4) comprend deux barrières opposées (10) s'étendant vers le haut depuis la partie de base de le boîtier inférieure (8) et les chicanes (9) placées de manière opposée entre les barrières (10).
3. Dispositif de refroidissement (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le mécanisme de verrouillage (6) comprend un canal (11) disposé sur chacune des surfaces des chicanes (9) en regard du boîtier supérieur (7), deux des tiges opposées (12) disposées sur la surface inférieure du boîtier supérieur (7) et portées de manière mobile dans les canaux (11) et deux protubérances (13) disposées sur la surface supérieure du boîtier inférieur (8), sur laquelle les chicanes (9) sont placées en rotation.
4. Dispositif de refroidissement (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'adaptateur (4) comprend deux crémaillères (14) disposées à l'opposé sur les jupes du boîtier supérieur (7) et une extension (15) disposée à la fin de chaque barrière (10) et qui permet de faire le mouvement de rotation de manière contrôlée en se déplaçant sur la crémaillère (14) tandis que le boîtier inférieur (8) et le boîtier supérieur (7) tournent dans des directions opposées à l'égard l'un à l'autre.

5. Dispositif de refroidissement (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'adaptateur (4) comprend des moyens de précontrainte (16) disposés entre le boîtier supérieur (7) et le couvercle (5) et qui permettent au couvercle (5) pour fermer la bouche de la bouteille (B) de manière étanche lorsque le boîtier supérieur (7) est poussé vers le bas et qui permet au mécanisme de verrouillage (6) de saisir fermement la bouteille (B) en passant sous une étape (S) disposé au voisinage de la partie de bouche de la bouteille (8).

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Figure 1

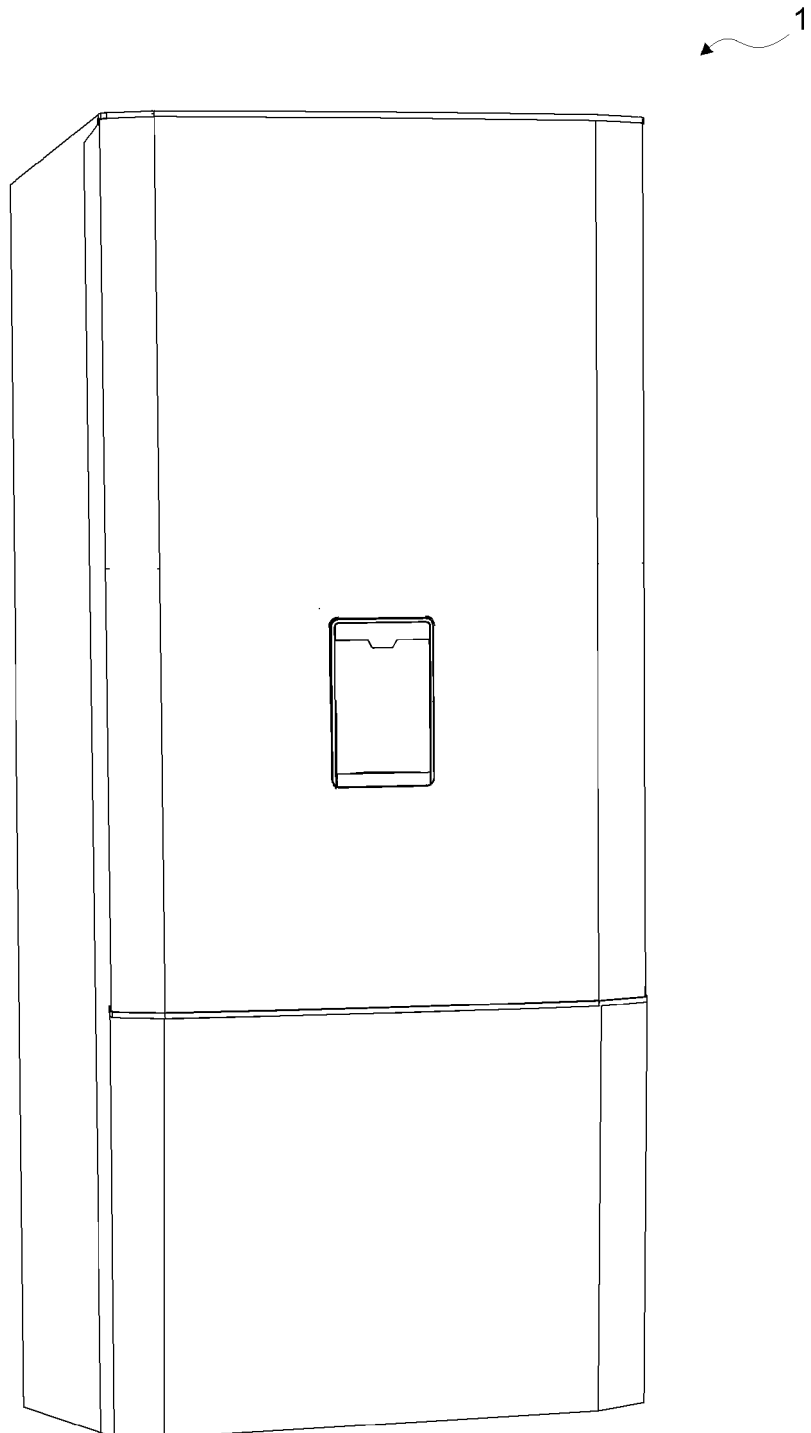


Figure 2

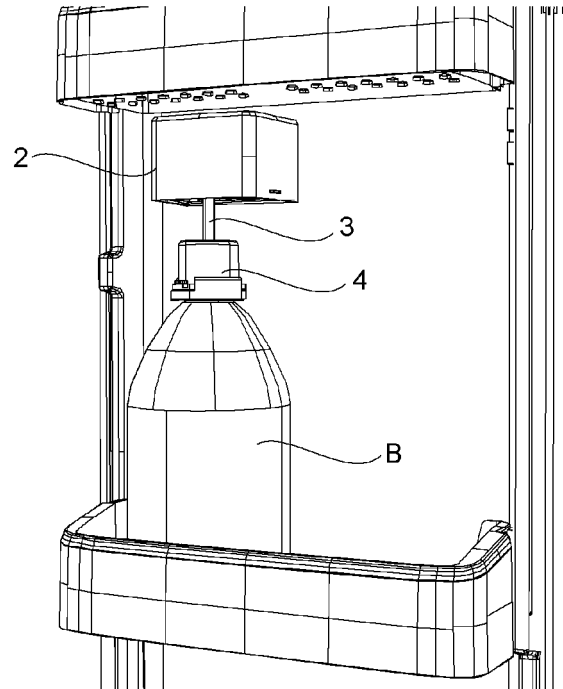


Figure 3

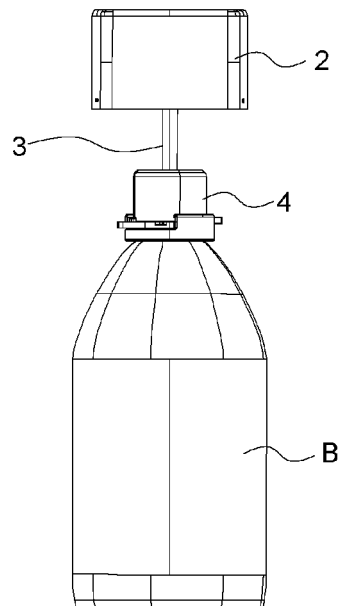


Figure 4

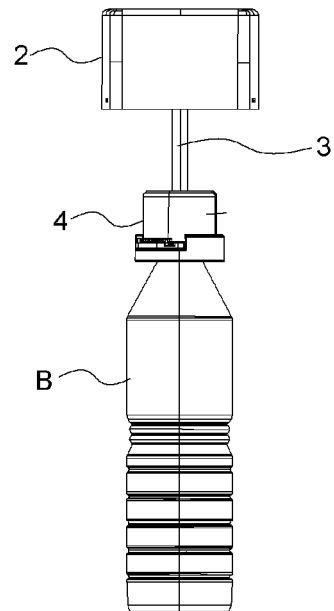


Figure 5

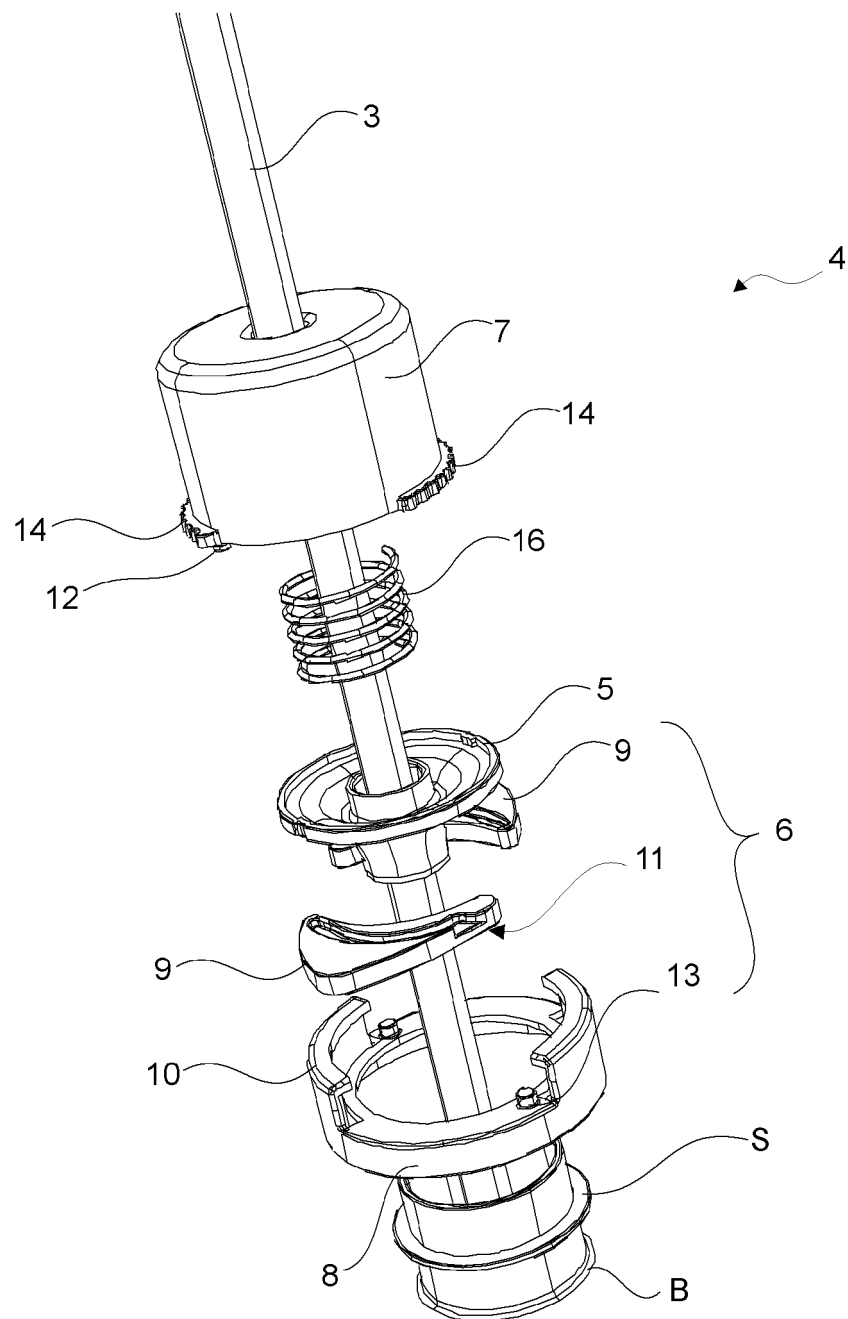


Figure 6

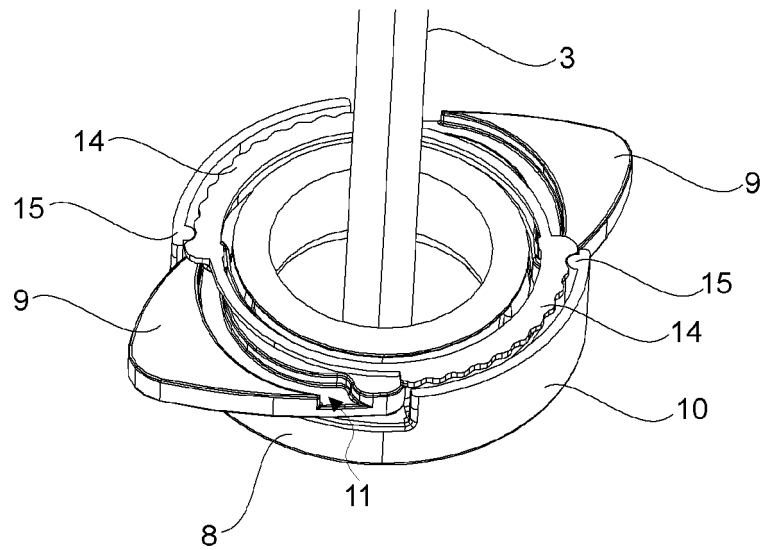


Figure 7

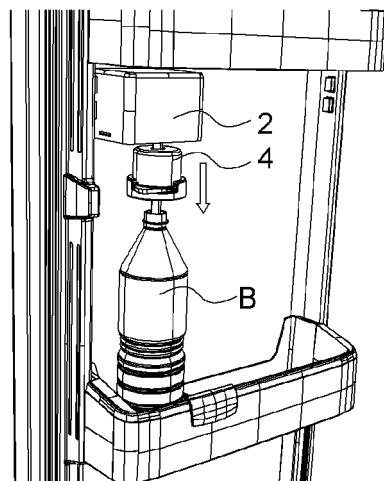


Figure 8

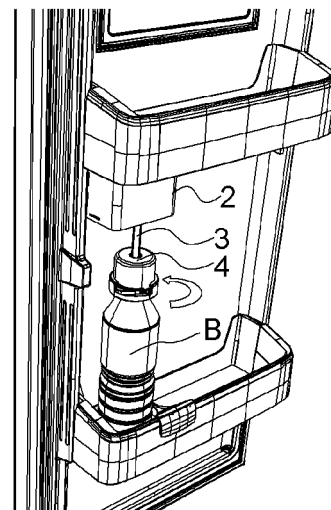


Figure 9

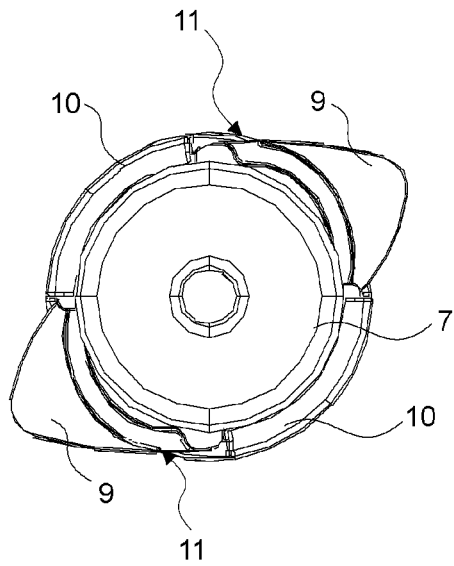


Figure 10

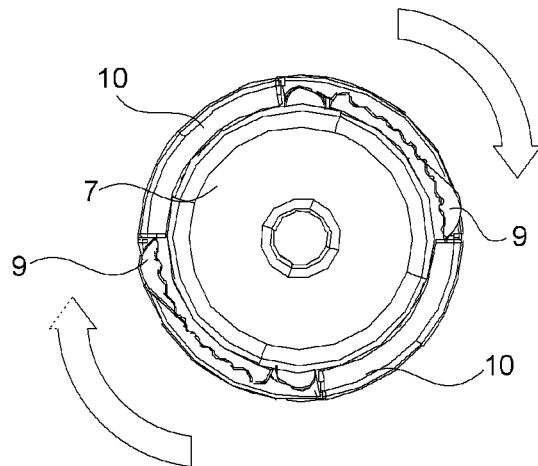


Figure 11

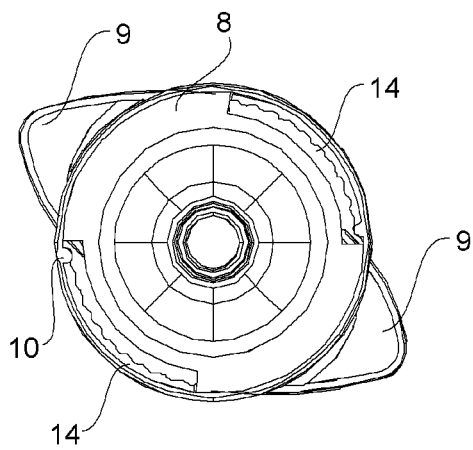
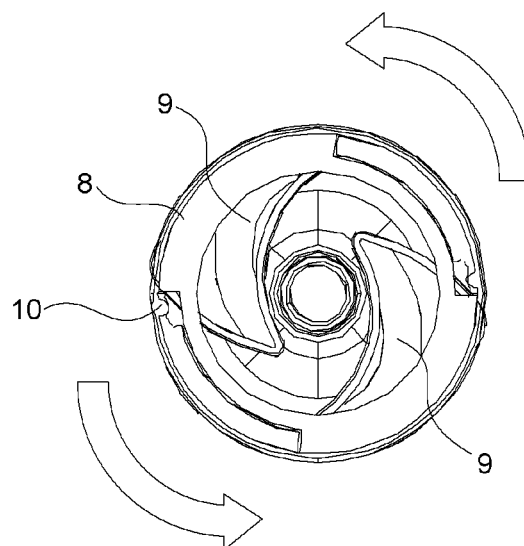


Figure 12



REFERENCES CITED IN THE DESCRIPTION

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