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(54) Stopcock with pushbutton for carafes and the like

(57) The invention relates to a stopcock for a container neck, comprising valve means with a pushbutton (1) suitable for being moved between open and closed positions of a liquid delivery passage. Said valve means comprises, further to said pushbutton (1), a seating member (3) provided with a mouth, adapted to be attached to said neck. Between said seating member (3)

and said pushbutton (1) there is defined an interstitial space (5) wherein there is housed a resilient member (6) ensuring the return of the pushbutton (1) to the closed position thereof, at the same time as it ensures the opening and closing of the liquid delivery passage thanks to ports and to hermetic stoppering means of said interstitial space (5).

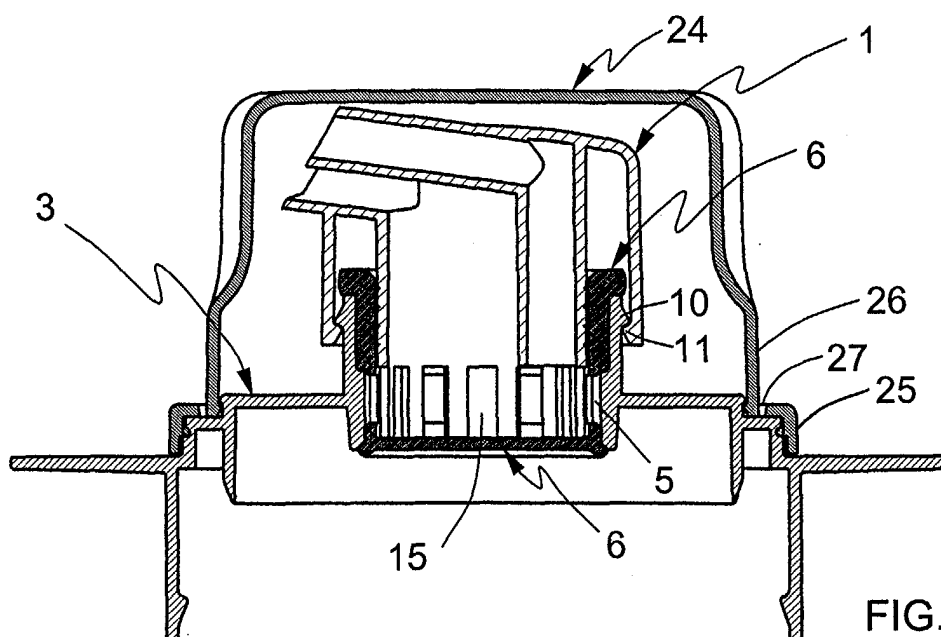


FIG. 1

Description

Field of the Art

[0001] The invention relates to a stopcock suitable for application to the neck of a container for a liquid alimentary product, such as for example a carafe, of the type comprising valve means with a pushbutton adapted to move between a position in which a liquid delivery passage is closed and a position in which said passage is open.

State of the Art

[0002] Stoppers applicable to a carafe neck or the like, for example carafes or bottles of mineral water, and fixedly attached to said carafe and having a valve or pouring spout function, with the capacity to oscillate between a closed position and an open position are known. Particularly appreciated among the above, for their ease of use are those whose pouring spout is operated by a pushbutton which has an elastic return. This type of stopcock is particularly applicable to the mineral water carafes whose position of use is inclined or horizontal, where in the rest position of the pushbutton, the cock is closed and when said pushbutton is pressed the cock opens, allowing the water contained in the carafe to flow out through the spout of said stopper. These known stoppers have a design which is susceptible of improvement, particularly with regard to the simplicity and reliability of the operational mechanism thereof and to the ease of manufacture of the components thereof.

Summary of the invention

[0003] The object of the invention is to overcome the drawbacks of the known stopcocks, by providing a novel design of a stopcock with improved valve means and whose advantages are a small number of parts and great versatility relative to the type of liquid which it can operate.

[0004] This object is achieved by a stopcock with pushbutton for carafes or the like of the type first mentioned above, wherein said pushbutton comprises at least one liquid delivery conduit, said valve means comprises, further to said pushbutton, a seating member having a mouth defining an axial axis orientated towards the upper end thereof, said seating member being adapted for being fixedly attached to said neck of said container, an interstitial space being defined between said seating member and said pushbutton, and wherein said valve means also comprises a resilient member, housed in said interstitial space, which sealingly stoppers said delivery passage when said pushbutton is in the closed position and frees said delivery passage when said pushbutton is in the open position.

[0005] It should be pointed out that the term "lower" designates the part of a stopper member offset towards

the base of said seating member for attachment to the neck of a carafe and the term "upper" designates the part offset in the opposite direction. This designation is adopted solely for the purposes of clarity in the description, since it corresponds to the attached drawings in which the stopper is shown in the vertical position. Nevertheless, this does not mean any limitation in the absolute orientation of said stopper.

[0006] The stopcock according to the invention is formed by only three members: a seating member for attachment of the stopcock to the neck of a carafe or the like, a pushbutton with built-in liquid delivery outlet and a resilient member the function of which is to stopper the liquid passage when the pushbutton is in the rest position and leave it free when a user holds said pushbutton depressed. This configuration is simple, with a minimum number of parts, whereby the manufacturing costs and the weight of the stopper are significantly reduced. The solution of defining an interstitial space between said seating member and said pushbutton is particularly advantageous, since it allows the resilient member to be housed in such a way as to ensure the three basic functions between said seating member and said pushbutton: sealing, opening and closing of the liquid passage, and the resilient recovery of the pushbutton to the rest position thereof, which is the closed position of said delivery passage.

[0007] On the other hand, said seating member may be attached to the neck of a carafe, for example, by snap-fitting or by threading, in a known way.

[0008] Preferably, said pushbutton comprises at least one air inlet conduit, said liquid delivery passage also being an air inlet passage. Thus, when said pushbutton is in the closed position, said valve means prevents both the delivery of water and the entry of air, the interior of the carafe being hermetically isolated from the outside, and when said pushbutton is in the open position, the water and the air flow in opposite directions through the same passage, called liquid delivery passage.

[0009] Advantageously, said liquid delivery conduit is provided, on the final portion thereof where it debouches to the open air, with a direction having an angle lying between 30° and 90° relative to said axial axis of said mouth. This inclined arrangement of the liquid delivery conduit is particularly advantageous when the carafe having the stopper is for placement in a generally horizontal position of use, such as is the case of carafes having a flat lateral surface for support on a horizontal surface. In this case, the liquid delivery jet is directed downwardly, in such a way that the user may serve himself comfortably by placing a glass under said delivery conduit.

[0010] Preferably, said pushbutton defines a generally flat push surface on the upper surface thereof, such that the user may comfortably depress the pushbutton by pressing it against said surface, without the risk of the user being wetted with the outflowing jet of liquid.

[0011] Advantageously, said air inlet passage ex-

tends inside said liquid delivery conduit in the upper portion through which both conduits debouch to the open air. Thereby, there is achieved an appropriate separation of the liquid and air flows between the external mouths of the conduits and the said liquid delivery and air entry passage, so that a regular delivery flow of liquid is obtained.

[0012] Advantageously, the mouth of the seating member is cylindrical, and said pushbutton comprises a peripheral cylindrical wall coaxial with and external to the mouth, said mouth having at least one external rib and said peripheral cylindrical wall having at least one internal rib, said external and internal ribs forming abutment means for the closing position of said pushbutton. Thanks to this configuration, the pushbutton slides along said mouth, guided by the peripheral cylindrical wall thereof, and is retained in the rest or closed position thereof by said abutment-means-like ribs.

[0013] Preferably, said pushbutton comprises an internal cylindrical wall, coaxial with said peripheral cylindrical wall, defining an internal chamber through which there extend the lower portions of said liquid delivery and said air inlet conduits, said interstitial space being cylindrical and defined between said internal cylindrical wall and said mouth, and said internal cylindrical wall having at the lower end thereof at least one window defining said liquid delivery passage. Thus, the air inlet and liquid delivery conduits debouch in the lower end of said internal chamber, said lower end being in communication with the inside of the carafe through said windows forming the liquid delivery and air inlet passage. This pushbutton design allows the said resilient member, to be housed in said interstitial space, ensuring the sealing functions, elastic recovery of the pushbutton and opening and closing of said liquid delivery passage, to have a simple configuration. Furthermore, said windows may have many varied shapes and there may be a variable number thereof, so that, by optimizing the number and shape thereof, the stopcock of the invention can be adapted to liquids in a wide range of viscosities.

[0014] Further, preferably, each of said windows has a shape which is open at the lower end thereof in the axial direction of said internal cylindrical wall, and said inlet and delivery conduits, at the lower portion thereof comprised in said internal chamber, are parallel to the common axis of said internal cylindrical wall and said peripheral cylindrical wall, and said inlet and delivery conduits are parallel to one another at the upper portion thereof where they debouch to the open air. This pushbutton design allows it to be optimally manufactured by plastics injection molding, since it may be easily stripped from the mold in only two directions.

[0015] Advantageously, said resilient member is generally cylindrical and comprises retaining means at the upper end thereof in said mouth of said seating member, support means for the lower end thereof in said pushbutton, hermetic stoppering means for said interstitial space, a resilient stretching area, and at least one port

for the flow of delivery liquid coming from said delivery passage and incoming air from said inlet conduit. The thus formed resilient member ensures the resilient return of the pushbutton to the closed position thereof thanks to the retaining means at the upper end thereof, to the support means in said pushbutton and to the resilient stretching area thereof, at the same time as it ensures the opening and closing of the liquid delivery passage due to the ports thereof and to the hermetic stoppering means for said interstitial space.

[0016] Preferably, said resilient member upper end retaining means is formed by a thick tubular wall terminated at the end thereof by an external lip, and said mouth of said seating member is provided, at the upper portion thereof, with an internal recess mating with said thick tubular wall. There is thus ensured, on the one hand, an effective retaining of the upper end of the resilient member and, on the other hand, that said resilient member, under the action of the pushbutton, stretches exclusively at the resilient stretching area thereof. Further, by this design, the resilient member also guarantees the fluid tightness of said interstitial space at the upper end, thereof.

[0017] Further, advantageously, said resilient member lower end support means is formed by a lower base closing said lower end. This support means permanently ensures the fluid tight sealing of the lower end of said resilient member so that said lower end is only open through the said windows.

Preferably, said resilient member stoppering means is formed by a tubular end wall portion, adjacent said lower end. Further, preferably, said tubular end wall is extended, at the lower end of said resilient member, by an external annular rib. This configuration optimally guarantees fluid tight sealing of said interstitial space when the pushbutton is in the rest or closed position.

[0018] Advantageously, said resilient member resilient stretching area is formed by a thin tubular wall portion, located between said upper end retaining means and said lower end support means of said resilient member. This configuration ensures adequate resilience of the resilient member, at the same time as it allows the latter to stretch and contract a large number of times while maintaining its functionality intact.

Preferably, said ports are disposed in said thin tubular wall portion and, in the open position of said pushbutton, said ports are, at least in part, oppositely disposed to said pushbutton windows. In this way, when the pushbutton is in the open position, in which a portion of its lower end is moved out of said interstitial space, the delivery liquid and the inlet air flow optimally through said oppositely disposed windows and ports.

[0019] Advantageously, said seating member is provided with at least one generally flat wing plate orientated at an angle comprised between + 30° and -30° relative to a plane perpendicular to said axial axis (X) of said mouth. The user may thus hold the carafe on which the stopcock is mounted by these wing plates, such that the

user may comfortably operate the pushbutton with one hand.

[0020] Optionally, the stopcock according to the invention is advantageously provided with a protective cover which comprises one part fixedly attached to said seating member and a removable part attached to said fixed part by a weakening line. This protective cover allows the stopcock to be hygienically isolated from the outside, at the same time as it forms, thanks to said weakening line, a guarantee against manipulation of the carafe content.

Brief Description of the Drawings

[0021] Further advantages and features of the invention will be appreciated from the following description, wherein, without any limiting nature, there is disclosed a preferred embodiment of the invention, with reference to the accompanying drawings, in which:

- Figure 1 is a front elevation cross sectional view of a stopcock according to one embodiment of the invention, with the pushbutton in the closed position;
- Figures 2, 3 and 4 are respectively a front elevation cross sectional view, a top plan view and a side elevation view of the stopcock of Figure 1 without the removable part of the protective cover and with the pushbutton in the open position;
- Figures 5, 6 and 7 are respectively a front elevation cross sectional view, a top plan view and a side elevation view of the pushbutton of the stopcock of Figures 1 to 4;
- Figures 8, 9 and 10, are respectively a front elevation cross sectional view, a top plan view and a side elevation view of the resilient member of the stopcock of Figures 1 to 4;
- Figures 11, 12 and 13 are respectively a side elevation cross sectional view, a top plan view and a side elevation view of the seating member of the stopcock of Figures 1 to 4;

Detailed Description of an embodiment of the Invention

[0022] The stopcock described here as a non-limitative example corresponds to a stopper for a carafe of mineral water. Nevertheless, the invention relates to any stopcock as has been described, suitable for application to any neck of any carafe or similar container containing any type of alimentary liquid.

[0023] Figure 1 shows a front elevation cross sectional view of the stopper with all the members thereof: three main parts formed by a pushbutton 1, a seating member 3 and a resilient member 6, further to a protective cover 24 with a fixed part 25 and a removable part 26 connected by a weakening line 27. Figures 2 to 4 show the stopper after removal of said removable part 26 of the cover 24, with only the fixed part 25 remaining.

[0024] This protective cover 24 is optional, and could

be dispensed with, without going beyond the scope of the present invention.

[0025] As may be seen in greater detail in Figures 5 to 6, the pushbutton 1 is formed by a water delivery conduit 2 and an air inlet conduit 7 which is internal to the former. These conduits 2 and 7, at the upper portion thereof where they debouch to the open air have a direction forming an angle α of 75° relative to the axial axis X of the cylindrical mouth 4 of said seating member 3. On the upper face of said water delivery conduit 2 there is defined a flat surface 8 on which the user may comfortably depress the pushbutton 1 to move it to the open position thereof. The pushbutton 1 is provided with a peripheral cylindrical wall 9 having at the end thereof an internal annular rib 11, and with an internal cylindrical wall 12, coaxial with the peripheral wall 9, defining an internal chamber 13 through which the lower portions of the conduits 2 and 7 pass and the lower end 14 of which is provided with a plurality of straight windows 15 open at the bottom end thereof.

[0026] In this example, said pushbutton 1 is made from plastics material. As may be seen in Figures 5 to 6, the conduits 2 and 7 are parallel at the upper portion thereof and are also parallel at the lower portion thereof, where they are also parallel to the axial direction of said internal cylindrical wall 12 and peripheral wall 9. Furthermore, the windows 15 are open at the lower end thereof and are straight and parallel to this latter direction. This design is particularly advantageous, since it allows the pushbutton 1 to be optimally manufactured by injection molding, with only two directions of mold stripping.

[0027] In this embodiment, the seating member 3 is made from plastics material. As may be seen in Figures 11 to 13, said seating member 3 is provided at the lower end thereof with a cylindrical wall having an annular rib for attachment by snap-fitting to the neck of a carafe. The purpose of this form of attachment is to prevent removal of the stopper from the carafe to refill it. Nevertheless, the seating member 3 could also be designed to be attached by threading on the neck of the carafe, without going beyond the scope of the present invention. The seating member 3 shown comprises two wing plates 23 perpendicular to the axis X. These wing plates 23, which are optional, are to facilitate operation of the pushbutton 1 with one hand only. In fact, the user may hold the carafe with one or several fingers against said wing plates 23 at the same time as the user depresses the pushbutton 1 with his thumb.

[0028] On the other hand, the seating member 3 comprises a mouth 4 having at the end thereof an external annular rib 10 and internally a recess 28, the function of which members will be described below with reference to the seating member 3 and resilient member 6.

[0029] Figures 1 and 2 show that the pushbutton 1 slides axially on the mouth 4 of the seating member, between a closed position (Figure 1), where it is held by the ribs 10 and 11, with these ribs performing an abutment function, and an open position (Figure 2) where

the pushbutton 1 abuts said seating member 3 by the end of the peripheral cylindrical wall 9 thereof. It is also to be seen in these Figures that a cylindrical interstitial space 5 is defined between the internal cylindrical wall 12 of the pushbutton 1 and the mouth 4 of the seating member 3.

[0030] The resilient member 6, illustrated in Figures 8 to 10, is generally cylindrical. It comprises retaining means 16 at the upper end 17 thereof in the mouth 4 of said seating member 3. This retaining means 16 is formed by a thick wall 16a with an annular external lip 16b, said thick wall 16a being complemented by an internal recess 28 of mouth 4, as is to be seen in Figures 1 and 2. This retaining means 16a, 16b also ensures the function of permanently and hermetically stoppering the upper portion of the said cylindrical interstitial space 5. On the other hand, the resilient member 6 is closed at the bottom end thereof, this closed bottom end 18 forming support means for the pushbutton 1 which also hermetically stoppers the lower end of the pushbutton 1. The resilient member 6 also comprises hermetic stoppering means 20 for the lower end of said interstitial space 5 when the pushbutton 1 is in the closed position. This stoppering means 20 is formed by an end tubular wall portion 20a which is extended by an external annular rib 20b. On the other hand, the stretching of the resilient member 6 is effected in an area of stretching formed by a thin tubular wall portion 21 situated between said thick wall 16a and said tubular end wall 20a. Finally, said resilient member 6 comprises a plurality of rectangular ports 22 situated in said thin wall 21 such that when this resilient member 6 is mounted in the stopper, in said interstitial space 5, said ports are opposite the windows 15 of the pushbutton 1.

[0031] In this embodiment, the resilient member 6 is made from elastomeric material, such as for example a silicone.

[0032] In the open position thereof (Figure 2), the pushbutton 1 is displaced such that the windows 15 thereof project from said interstitial space 5 and the ports 22 of the resilient member 6, which are stretched as a result of the stretching of the thin wall 21, are at least partially opposite said windows 15, leaving the liquid delivery passage and air inlet passage free through said ports 22 and said windows 15. In this position, the pushbutton 1 pushes the resilient member 6 at the closed bottom end 18 thereof. Since said resilient member 6 is retained by the retaining means 16a, 16b, it stretches elastically by its thin wall 21. When the thrust of the pushbutton 1 is released, this returns to the rest position thereof by the springback action of the resilient member 6. In this rest position, which is the closed position, the windows 15 of the pushbutton are in said interstitial space 5, which is then hermetically closed at the bottom end thereof by said resilient member 6 due to the hermetic stoppering means 20a, 20b thereof, in such a way that the passage of water and air through said windows 15 is closed.

Claims

1. A stopcock suitable for application to the neck of a container for a liquid alimentary product, of the type comprising valve means with a pushbutton (1) adapted to move between a position in which a liquid delivery passage is closed and a position in which said passage is open, **characterized in that** said pushbutton (1) comprises at least one liquid delivery conduit (2), **in that** said valve means comprises, further to said pushbutton (1), a seating member (3) having a mouth (4) defining an axial axis (X) orientated towards the upper end thereof, said seating member (3) being adapted for being fixedly attached to said neck of said container, and an interstitial space (5) being defined between said seating member (3) and said pushbutton (1), and **in that** said valve means also comprises a resilient member (6), housed in said interstitial space (5), which sealingly stoppers said delivery passage when said pushbutton (1) is in the closed position and frees said delivery passage when said pushbutton (1) is in the open position.
2. The stopcock of claim 1, **characterized in that** said pushbutton (1) comprises at least one air inlet conduit (7) and **in that** said liquid delivery passage is also an air inlet passage.
3. The stopcock of claim 1 or claim 2, **characterized in that** said liquid delivery conduit (2) is provided, at the end portion thereof where it debouches to the open air, with a direction having an angle ($\square$) lying between 30° and 90° relative to said axial axis (X) of said mouth (4).
4. The stopcock of claim 3, **characterized in that** said pushbutton (1) defines at the upper surface thereof a generally flat pushing surface (8).
5. The stopcock of any of claims 2 to 4, **characterized in that** said air inlet conduit (7) extends in the interior of said liquid delivery conduit (2) at the top portion where both conduits (2, 7) debouch to the open air.
6. The stopcock of any of claims 1 to 5, **characterized in that** the mouth (4) of the seating member (3) is cylindrical, and said pushbutton (1) comprises a peripheral cylindrical wall (9) coaxial and external to said mouth (4), said mouth (4) having at least one external rib (10) and said peripheral cylindrical wall (9) having at least one internal rib (11), said external (10) and internal (11) ribs forming abutment means for the closed position of said pushbutton (1).
7. The stopcock of claim 6, **characterized in that** said pushbutton (1) comprises an internal cylindrical wall

(12), coaxial with said peripheral cylindrical wall (9), defining an internal chamber (13) through which there extend the lower portions of said liquid delivery (2) and air inlet (7) conduits, said interstitial space (5) being cylindrical and defined between said internal cylindrical wall (12) and said mouth (4), and said internal cylindrical wall (12) having at the lower end (14) thereof at least one window (15) defining said liquid delivery passage.

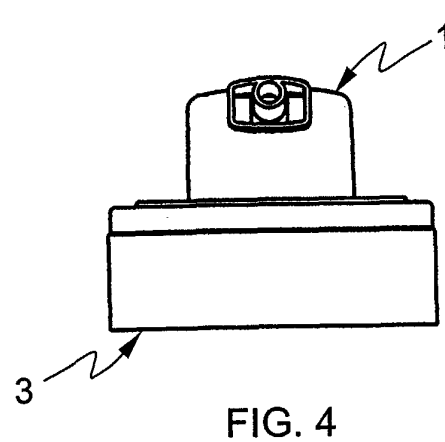
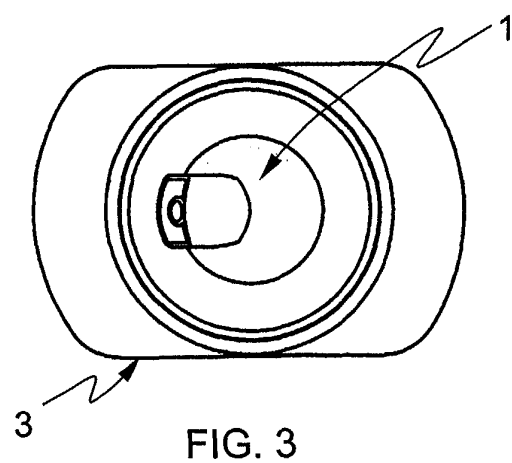
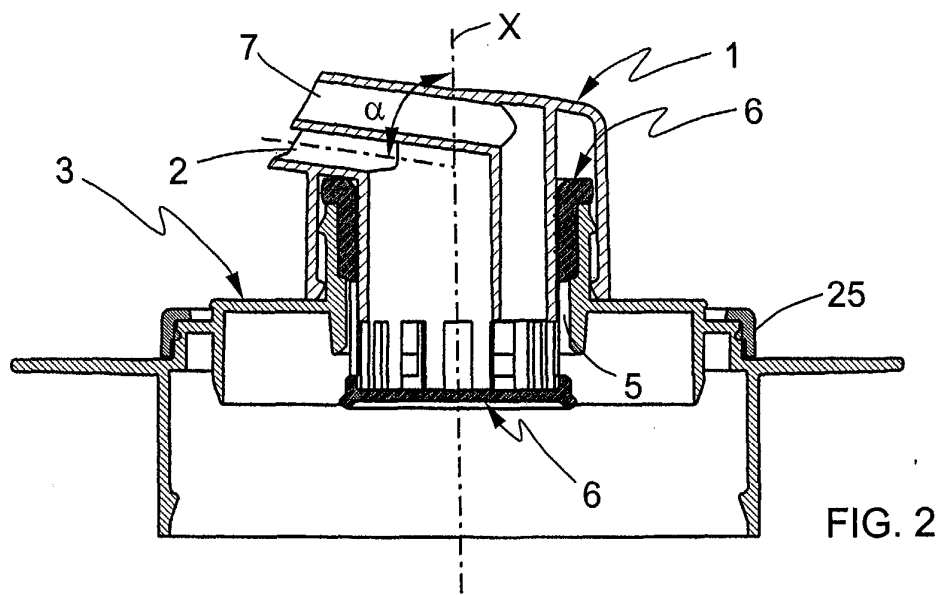
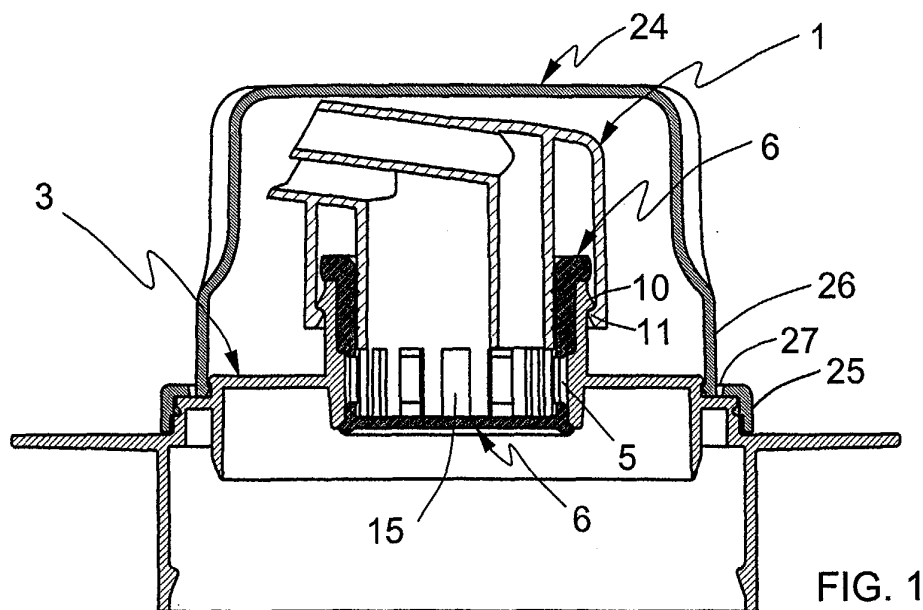
8. The stopcock of claim 7, **characterized in that** each of said windows (15) has a form which is open at the lower end thereof in the axial direction of said internal cylindrical wall (12), **in that** said inlet (2) and delivery (7) conduits, in the lower portion thereof comprised in said inner chamber (13), are parallel to the common axial axis of said internal cylindrical wall (12) and said peripheral cylindrical wall (9), and **in that** said inlet (2) and delivery (7) conduits, in the upper portion thereof whereby they debouch to the open air are parallel to one another.
9. The stopcock of any of claims 1 to 8, **characterized in that** said resilient member (6) is generally cylindrical and comprises retaining means (16) for the upper end (17) thereof in said mouth (4) of said seating member (3), support means (18) for the lower end (19) thereof in said pushbutton (1), hermetic stoppering means (20) for said interstitial space (5), a resilient stretching area (21), and at least one port (22) for the flow of delivery liquid from said delivery passage (2) and of inlet air from said inlet conduit (7).
10. The stopcock of claim 9, **characterized in that** said upper end (17) retaining means of the resilient member (6) is formed by a thick tubular wall (16a) terminated at the end thereof with an external lip (16b), and **in that** said mouth (4) of said seating member (3) is provided, at the upper portion thereof, with an internal recess (28) which mates with said thick tubular wall (16a).
11. The stopcock of claim 9 or claim 10, **characterized in that** said lower end (19) support means of said resilient member (6) is formed by a bottom end (18) which closes said lower end (19).
12. The stopcock of any of claims 9 to 11, **characterized in that** said hermetic stoppering means (20) of said resilient member (6) is formed by a tubular end wall portion (20a), adjacent said lower end (19).
13. The stopcock of claim 12, **characterized in that** said tubular end wall (20a) is extended, at the lower end (19) of said resilient member (6), by an external annular rib (20b).

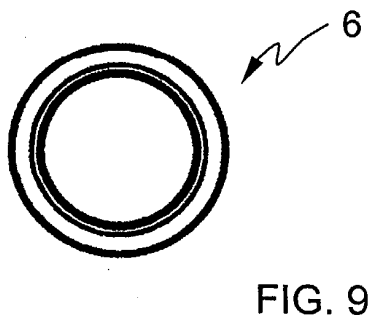
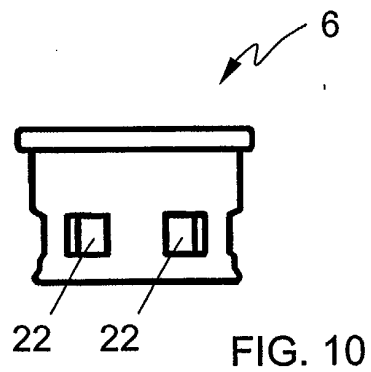
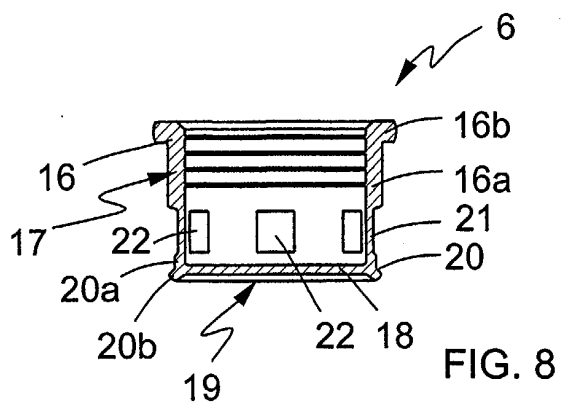
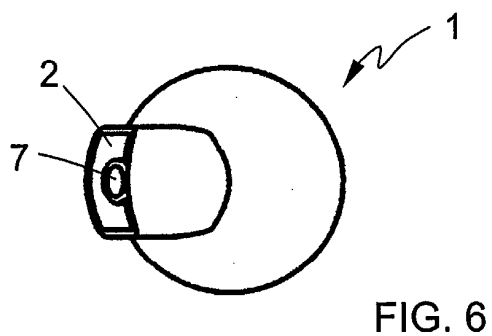
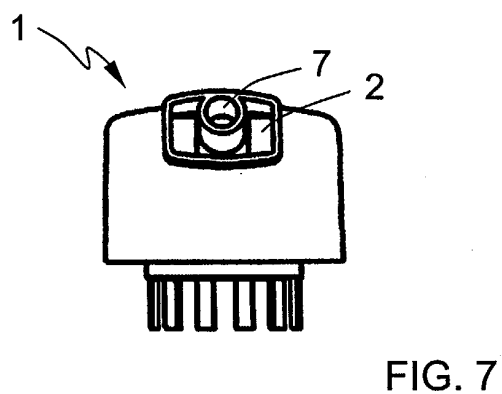
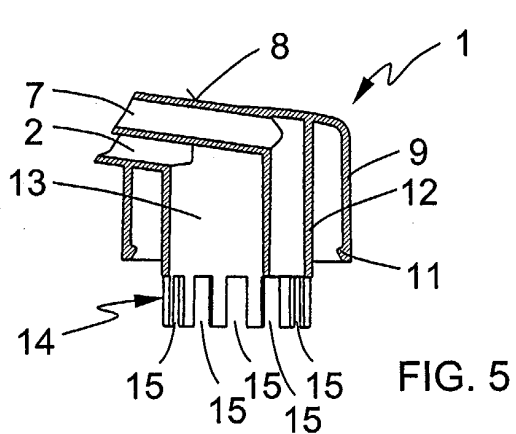
14. The stopcock of any of claims 9 to 13, **characterized in that** said resilient stretching area of said resilient member (6) is formed by a thin tubular wall portion (21), situated between said upper end (17) retaining means (16) and said lower end (19) support means (18) of said resilient member (6).

15. The stopcock of claim 14, **characterized in that** said ports (22) are disposed in said thin tubular wall portion (21), and **in that** in the open position of said pushbutton (1), said ports (22) are opposite, at least partially, said windows (15) of said pushbutton.

16. The stopcock of any of claims 1 to 15, **characterized in that** said seating member (3) is provided with at least one generally flat wing plate (23) orientated with an angle comprised between 30° and -30° relative to a plane perpendicular to said axial axis (X) of said mouth (4).

17. The stopcock of any of claims 1 to 16, **characterized in that** it is provided with a protective cover (24) comprising a fixed portion (25) fixedly attached to said seating member (3) and a removable portion (26) attached to said fixed portion (25) by a weakening line (27).





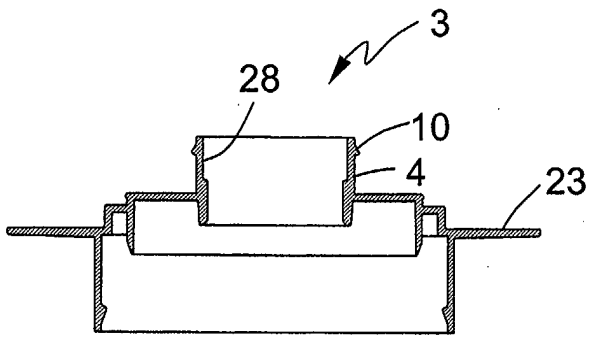


FIG. 11

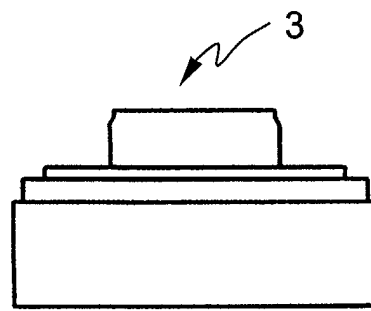


FIG. 12

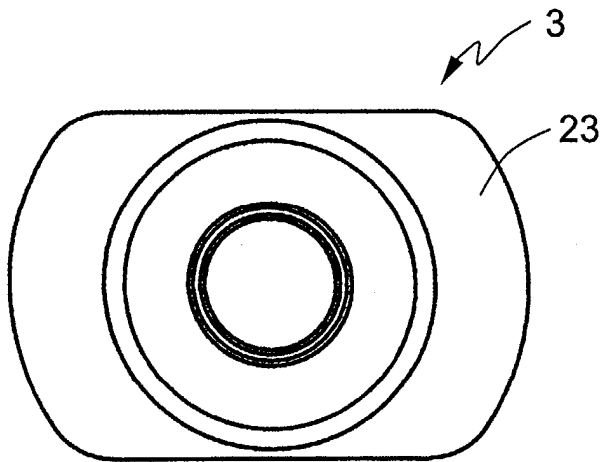


FIG. 13