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(54) Temperature sensitive closure cap

(57) The sealed closure cap applies specially to containers or bottles which contain carbonated beverages. The stopper, provided with a portion including a stopper itself (plug portion), a cap (top portion) and/or an implant, of the sealed closure cap having temperature sensitivity are molded with a base resin and a temperature sensitive cold color (first color). A molding color is the result of the combination of the base resin natural color and stopper raw material color, natural or pre-colored. The stopper, base resin and cold color are also molded with a temperature sensitive hot color (second color). The visual perception of the contents of the container are determined when the cold color becomes translucent at an ambient temperature of the environment causing the molding color or the hot color to become visually dominant or when the cold color or a mixture of the cold color with the hot color becomes visibly dominant at an ambient temperature of the environment.

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Description

[0001] The present invention is related to an airtight stopper that may be used with a container and/or a bottle, and in particular, an airtight stopper that uses temperature sensitive colorants to detect, by means of color diagnostics, the temperature preparedness of a container contents.

[0002] The problem to be solved by the invention evolves around the inability to assess whether the contents of a container or bottle are at a desired temperature for serving or usability. For example, there is a need to determine whether a beverage that has been placed in a cold environment has reached a temperature at which it is chilled enough to drink. Currently, in order to detect the temperature preparedness of the contents of a container or bottle, the user would be required to physically remove the container or bottle from its location, and then taste and consequently consume the contents in order to assess its readiness for consumption. This physical contact method of consumption assessment is undesirable in that it would require potentially multiple attempts to assess that the contents of a container or bottle are ready for use.

[0003] The above mentioned stopper is applicable to all kinds of liquids and beverage, non-gaseous liquids and also carbonated beverage. The stopper is especially applicable to all types of carbonated beverages (champagne, sparkling wines, beer, carbonated drinks, etc.), having the purpose, aside from ensuring perfect closing that prevents accidental opening of the stopper by an accumulation of overpressure inside the container or vessel that closes, that the container can easily be closed again for subsequent use, until the contained liquid is consumed, without losing the gas, that is to say, without the gaseous content dissipating from the container.

[0004] In the specific case of champagne and sparkling wine, contained in bottles that are normally closed by a cork stopper (very costly), upon the stopper being replaced by the one that the invention proposes, effectiveness and greater economy are likewise achieved.

BACKGROUND OF THE INVENTION

[0005] Spanish utility model no. 9,602,251 describes a stopper of this type, which had an inside tubular wall for insertion in the mouth of the bottle or container, and another outside covering that was placed around the neck of the container, having some through windows through which respective teeth of some radial tongues that could articulate in their connecting line with the top part of the outside covering itself, entered. Once these teeth that passed through the cited windows, they became housed under the ring-shaped projection conventionally provided for on the outside of the neck of the bottle or container, maintaining the retaining position by means of a ring that moved axially in order to remain overlying the tongues, preventing the teeth from coming out of their housing.

[0006] Spanish utility model no. 9,500,853 contemplates a ring-shaped seal with a central tubular rod that seals the mouth of the bottle and whose walls are provided with circular ribs, to provide greater airtightness. In the top part it has a ring-shaped flange from which descend some wings that are place around the mouth of the bottle until the first recess where the stoppers are of another type normally fasten by different processes. This body of the stopper is completed with another top one that constitutes a ring that is connected by means of some tearable points, which break when the ring is pushed in the packaging operation to remain fitted blocking the descending wings of the bottom body, this airtight closing position remaining until it is not released again upon being moved in the opposite direction, or broken.

[0007] U.S. patents numbers 4,456,143, 5,314,084 and 5,522,518 also refer to stoppers and closing systems that reflect the prior art related to the patent of invention applied for over which the latter provides outstanding advantages.

DESCRIPTION OF THE INVENTION

[0008] In broad outline, the improved stopper that constitutes the object of the invention presents, as a special characteristic, the capability of the stopper to provide color indication of the temperature preparedness of the container contents. The improved stopper has a portion provided with a temperature sensitive colorant indicative of the temperature at which the stopper is exposed. The portion provided with a colorant may be a top portion (a cap), a plug portion (a stopper itself) and/or an implant. The temperature related colors are a cold color (first color) and/or a hot color (second color), which are temperature sensitive colorants, that are combined with a base resin to obtain the color concentrate. The base resin may be a plastic or polypropylene resin. Further, the concentrate is then mixed or molded with the raw material of the stopper to form the improved stopper having temperature sensitivity for visually indicating color so as to perceive the temperature readiness of the contents of the container.

[0009] The cold color concentrate, visible below or above a certain temperature value, detects the ambient temperature above or below, respectively, a different temperature value that is higher or lower, respectively, than the temperature for visibility so as to become imperceptible. Disappearance of the cold color causes the hot color to become perceptible to provide the visual color indication of the temperature readiness of the container contents. In addition, if the cold color concentrate is translucent below or above a certain temperature value, the cold color concentrate detects the ambient temperature above or below, respectively, a different temperature value that is higher or lower, respectively, than the temperature for translucence so as to become perceptible. Appearance of the cold color or color resulting from the mix-

ture of the cold color with the hot color becomes perceptible to provide the visual color indication of the temperature readiness of the container contents. The cold color will cause the base resin or natural color (molding color) to become perceptible if no hot color is used. The molding color could be the natural color resulting from the combination of the base resin with the raw material of the stopper or if a pre-color of the raw material is used, the pre-color of the raw material of the stopper. A color-to-color, color-to-colorless, colorless-to-color change over different temperature ranges are feasible and within the scope of the present invention.

[0010] The temperature sensitive colorants, described as a cold color (first color) and a hot color (second color), are suitable materials for use in the present invention. These colorants are commercially obtainable, for example, under the trade name Chromicolor AQ ink, which can be obtained from Matsui Shikiso Chemical Company Limited of Kyoto, Japan. Other examples of use of these colorants are found in US-6281 165 and GB 2325182. These patents describe the application of thermochromic inks onto the surface of crockery, e. g. a mug or a teapot, that changes colour when the crockery is hot.

[0011] In the past, a variety of items have been developed with color-changing features using thermochromic or light-sensitive materials embedded or mixed in plastic, printed on paper or plastic, or impregnated in fibers used for clothing, doll hair, plush figures, or the like. For example, U.S. Pat. No. 4,560,604 issued to Shimizu et al., on Dec. 24, 1985 (coating fibers used for stuffed toys with thermochromic material); U.S. Pat. No. 4,134,853 issued to Ehrlich et al. on Jan. 16, 1979 (photochromic composition combined with moldable materials for forming toys); and U.S. Pat. No. 3,980,300 issued to Hornsby, Jr. on Sep. 14, 1976 (layer of liquid crystalline material used for ball) which disclose the use of such materials in toys. British Patent No. GB 2,066,089A issued to Rickson on Jul. 8, 1981, describes the use of temperature-sensitive cholesteric liquid crystal material for changing the color of the eyes of a doll.

[0012] Thermochromic materials are further disclosed in U.S. Pat. No. 4,567,019 issued to Lawton on Jan. 28, 1986; U.S. Pat. No. 4,421,560 issued to Kito et al. on Dec. 20, 1983; and U.S. Pat. No. 4,028,118 issued to Nakasuji et al. on Jun. 7, 1977.

[0013] An embodiment of the invention includes an independent top cap (top portion) that is connected to the rest of the stopper in the bottling stage, this cap in turn supporting the sealing ring. The cap in raw material form is molded, as described above, with the base resin and the temperature sensitive cold color (first color) and/or hot color (second color) before use in the bottling stage. In the coupling position, coinciding with its bottommost location with regard to the bottle, once the stopper is closing the neck of the bottle or container, this cap keeps the retaining means of the stopper itself blocked. The cap includes a discoidal closing surface, from the bottom of which originates the cylindrical wall or neck that is inserted inside the container to close its mouth, there being parallel to this cylindrical surface some tongues which in their inside part support the teeth which are to remain retained in the ring-shaped recess of the neck of the bottle or container. Precisely due to the presence of the contained gas, it is necessary that such lugs are kept blocked in order to prevent the accidental discharge of the stopper, which is achieved upon placing the cap in the correct position.

[0014] The discoidal sealing surface of the stopper has at the top a tubular portion that has an outside ring-shaped projection in order to constitute the retaining means of the cap in the uppermost position of the same, the cap being axially movable from a bottom closing and sealing position of the peripheral tongues, up to another top position that permits removal of the stopper, or the opening of the bottle or container.

[0015] The cap has in the center a threaded axial projection for connection thereof in the threaded inside of the top tubular portion of the stopper itself. In a position coaxial to this threaded projection, there are other axial tongues whose ends finish in a spear tip, in a similar way that the retaining tongues have in the ring-shaped recess of the bottle neck, naturally emerging from the bottom of said cap. These tongues are duly guided in a ring-shaped part that forms part of the stopper itself, placed in the top part of the same and that keeps them in an axial position, preventing their deviation. These spear tipped projections will remain located between the discoidal surface of the stopper itself and the ring-shaped projection of the top tubular portion of the same, determining the distance at which these cited elements are located, the axial path of the cap.

[0016] The approximation of the cap so that its ring-shaped flap surrounds the neck of the container or bottle in order to ensure the sealing thereof, in a closing operation subsequent to the opening operation, is achieved once the container or bottle is closed, first with a slight axial movement and then by screwing. The same thing happens when opening the bottle or container, in the initial breaking of the seal and the different times when the bottle is opened until the contained liquid is consumed. Naturally in the latter opening operations the sealing ring is detached or broken and the ring remains on the neck or is thrown away.

[0017] The ring-shaped part that keeps the tongues of the cap together, preventing them from coming off the ring-shaped tooth of the top tubular portion of the stopper itself, is connected to the rest of the stopper by easily breakable portions, this breaking taking place in the initial assembly of the stopper, in the bottling factory. This ring-shaped part is formed in the injection molding process itself of the stopper itself and advantageously the easily breakable ribs or portions emerge from the edge of the tooth or ring-shaped projection of the outside of the top tubular portion or neck of the stopper itself, these ribs breaking when sealing itself takes place upon axially introducing the cap.

[0018] Forward and backward movement of the cap with regard to the main body of the stopper, which happens by means of screwing, can also be achieved more effectively upon providing that the retaining tongues are formed by means of axial cuts in the outside covering of the main body, whose outside periphery is fitted with a thread that connects with the one existing on the inside edge of the cap.

[0019] In the last case referred to the sealing ring remains connected to the cap where the threaded area ends and the inviolability is ensured due to the fact that it remains retained by its bottom edge on the neck itself of the bottom or container.

[0020] Another embodiment of the invention includes an implant that may be either inserted in or attached to the stopper itself (plug portion) and/or the cap (top portion). The implant may be composed of the same raw material as that of the stopper and the cap. Morevoer, the implant in raw material form is molded with a base resin and a temperature sensitive cold color (first color) and/or hot color (second color). Similar to the stopper and the cap, the implant may be used as a temperature sensitive device using color as a visual diagnostic to reveal the temperature of the contents of the bottle or container.

[0021] In order to provide a better understanding of the features of the invention and forming an integral part of this specification, some sheets of drawings, in whose figures the following has been represented in an illustrative and non-restrictive manner, are attached hereto.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

Figure 1 is an exploded section view of the two component parts of the stopper, object of the invention.

Figures 2, 3 and 4 are respective sequential views of the connection between both component parts of the same stopper of figure 1.

Figure 5 is a bottom view of figure 4.

Figure 6 is the subsequent assembly position of the two component parts of the stopper.

Figure 7 is a view similar to that of figure 6, corresponding to the position of the cap that allows removal of the stopper from the container or bottle, once the sealing ring has been broken.

Figure 8 is a section view that shows in an exploded manner the two component parts of the airtight seal, object of the invention, also showing in an exploded manner a portion of the neck of the bottle or container containing the carbonated beverage.

Figure 9 is a longitudinal raised section view of the same stopper of figure 8, now coupled to the bottle and with the guarantee seal that ensures the inviolability of the contents.

Figure 10 is a view similar to figure 9, once the cap has been unscrewed in order to proceed to break the seal and subsequently open the stopper by axial traction of the assembly, this position in which the airtight closing of the container being able to take place again.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0023] Making reference to the numbering used in the figures, we can see how the airtight stopper, which the invention proposes, just as it is more especially shown in figure 1, includes a part that materializes the stopper itself or plug portion 1 that fits on the neck 2 of the bottle or container, and the independent part materialized by the cap or top portion 3 supporting the sealing ring 4.

[0024] In addition, an implant, not shown in the figures, may be a part that is inserted in or attached to the stopper 1, 1' and/or the cap 3, 3'.

[0025] In accordance with the present invention, the stopper itself or plug portion 1, 1', the cap or top portion 3, 3' and/or the implant are formed of a plastic base resin containing one or more temperature sensitive colorants; described as a cold color (first color) and/or a hot color (second color).

[0026] The stopper, provided with a portion including the stopper itself 1, 1', the cap 3, 3' and/or the implant, provides visual color diagnostics of the temperature preparedness of the container contents. The cold color concentrate detects the ambient temperature so as to become visually imperceptible. When the cold color concentrate becomes non-visual to human perception, the hot color then becomes perceptible to the human eye to provide the visual color indication. Moreover, the cold color may become visual to human perception to alone provide visual color indication or combine with a hot color to provide visual color indication. Hence, the temperature readiness of the container contents is revealed. If no hot color is used, the cold color will then cause a molding color, a natural color resulting from the combination of the base resin with the raw material of the stopper 1, 1', to become perceptible to the human eye in order to provide the visual color indication. In addition, if the raw material of the stopper 1, 1' is pre-colored, then the molding color, now the pre-color of the raw material of the stopper 1, 1', will be exposed when the cold color becomes imperceptible. Furthermore, if the pre-colored raw material of the stopper 1, 1' and the hot color are both used, then the resultant color from the combination of these two colors will be exposed when the cold color becomes imperceptible.

[0027] The cold color is selected from the group consisting of New Fast Yellow, Gold Orange, Vermilion, Pink,

Magenta, Fast Blue Turquoise Blue, Brilliant Green, Fast Black, Green and Brown. The hot color may be any color except white in order to avoid bleaching the cold color resulting in a paler shade of pigmentation. The hot color and molding color described above must also have a color lightness that is less than that of the cold color.

[0028] The cold color (first color) and the hot color (second color), which are temperature sensitive colorants, both have a composition concentration in range of 15 - 18% when combined with the base resin. The base resin has, in this combination, a composition concentration in the range of 82 - 85% in order to achieve a total weight percentage of 100% for the colorant composition.

[0029] The cold color (first color) and the hot color (second color) compositions have a molding concentration (mixture ratio) in the range of 5 - 20% when mixed with the raw material of the stopper 1, 1'. The raw material of the stopper 1, 1' has a molding concentration mixture ratio in the range of 88 - 90%. For example, a 10% colorant concentration requires 90% raw material for mixture; a 9% colorant concentration requires 91% raw material for mixture; and a 12% colorant concentration requires 88% raw material for mixture. A 10% composition concentration is optimal to achieve the most vibrant color. Thus, the mixing ratio has as its purpose the attainment of lighter or brighter colors for visual indication.

[0030] The stopper 1, 1' provided with the portion may have wall thicknesses greater than or equal to 0.375 mm. Optimally, the thicker the part to be molded, the less the temperature sensitive colorants can be used in order to obtain sufficient color signal indication. Some examples of wall thicknesses and the corresponding percentage of temperature sensitive colorants required are as follows: a wall thickness of 0.375 mm allows for 20% colorant mixture; a wall thickness that is less than 0.8 mm allows for 10 - 12% or greater colorant mixture; a wall thickness that is in the range of 0.8 - 1 mm allows for 8 - 10% colorant mixture; and wall thicknesses that are greater than 1 mm allow for 5 - 8% colorant mixture.

[0031] The molding temperature is a temperature, less than or equal to 235 degrees Celsius, at which the temperature sensitive colorants and base resin composition concentration is mixed with the raw material of the stopper 1, 1' to form an improved stopper having temperature sensitivity for visually signalling to the human eye a color. When the stopper 1, 1' is subjected to a temperature below a certain temperature value, the color is visible and is an indication of non-preparedness of a container contents. The stopper 1, 1', when subjected to a temperature above a temperature value that is higher than the temperature for color visibility, can also be used as a lack-of-color or natural color indication of ready-to-serve container contents. This temperature that creates the lack-of-color indication thus causes the color to disappear. The maximum molding temperature is less than or equal to 235 degrees Celsius. An optimal molding temperature would be around 200 degrees Celsius. The lower the molding temperature, the less damage will occur to the hot color and cold color concentrates.

[0032] The stopper 1 is comprised by the discoidal surface 5 from which descends coaxially the cylindrical neck 6 that fits inside the mouth of the bottle or container 2. On the periphery of this discoidal surface 5 there are axial lugs 7 and 8 distributed in the way shown in figure 5. The axial lugs 8 have an inside projection 9 that fits in the outside ring-shaped recess of the neck of the bottle or container 2, as one can clearly see in figure 1.

[0033] Above the discoidal surface 5 of the stopper itself 1, the tubular portion 10 is provided with a bottom thread 11 and an outside ring-shaped projection 12 with stop functions for the movement of the cap 3 as we will see hereinafter. In the top part of the tubular portion 10 there is the ring-shaped part 13 connected to the rest of the stopper by the breakable ribs 14.

[0034] On its part, the cap 3 has the threaded axial projection 15 to connect the thread 11 of the tubular portion 10 of the stopper itself, also having some axial lugs 16 provided on their free end with a spear tip 17. The enveloping cylindrical wall is referred to as number 18 and on its free edge there is the sealing ring 4 connected by the breakable ribs 19.

[0035] With this arrangement, in the bottling factory the initial sealing of the container or bottle 2 is proceeded with by placing the stopper itself 1 as is seen in figure 1. Hereinafter, the cap 3 is assembled as shown in figures 2, 3, 4 and 6. One can see in figure 3 how the spear tipped ends 17 of the axial lugs 16 of the cap 3 abut against the sloped bevel edge of the ring-shaped projection 12 of the tubular portion 10 of the stopper itself 1, springing elastically in order to remain behind it as one can see in figure 4. The axial tongues 16 cannot be radially separated because it is prevented by the ring-shaped part 13 that remains placed between them and the covering 18 of the cap. In the initial assembly of the cap 3, the tearable ribs 14 of this ring-shaped part 13 break, and the same moves ending up contacting with the discoidal surface 5 of the stopper itself 1, when the cap is totally assembled, as indicated in figure 6.

[0036] In figure 6 one can also see how the sealing ring 4 of the cap 3 remains retained by the axial lugs 7 of the stopper 1, the complementary threaded areas of the tubular portion 10 and of the axial projection 15 also being interconnected. The outside covering 18 of the cap 3 firmly surrounds the tongues 7 and 8 of the stopper itself 1, forcing the inside projections 9 of the axial tongues 8 to remain in the inside of the ring-shaped recess of the bottle or container 2, not being able to come off although the pressure rises in the inside of the bottle.

[0037] In these conditions shown in figure 6, when the bottle or container 2 is opened, an operation that is done by unscrewing the cap 3, first of all the axial ribs 19 of the sealing ring 4 break and then the cap 3 rises until the spear tipped projections 17 of the axial tongues 16 of the same, abut against the ring-shaped projection 12 of the tubular portion 10 of the stopper itself 1, in the highest point of its path, which coincides with the end of the

thread. Upon the retaining tongues 8 remaining released, one can proceed with the total separation of the stopper from the bottle or container 2. Thus one can proceed to open and close the container repeatedly given that, although the sealing ring 4 has been broken, once the cap 3 is screwed back completely, a position similar to figure 6 is reached inasmuch as the lugs 8 are covered by the covering 18, preventing the stopper from being able to accidentally come off.

[0038] Making special reference to figures 8 to 10, we can see a second embodiment of the structure of the airtight stopper, where the references that designate the common modified elements are accompanied by the suffix "'" prime. The outside covering of the main body 1' of the stopper, coaxial to the cylindrical neck 6 sealing the contents of the bottle has a plurality of axial cuts to form the retaining tongues 20 or tongues identical to each other and that have the inside projection 21 that is housed in the ring-shaped recess 22 of the outside of the neck of the bottle 2.

[0039] Reference 13' designates the ring-shaped part that groups the axial tongues 16 of the cap, in the assembled condition of the assembly.

[0040] The cap 3' has the side wall 18' and a top wall 23 or bottom of the same. The sealing ring is referred to in this case as 4' and it is connected to the edge of the side wall 18' by means of some axial breakable ribs that define the frangible line 24. The cylindrical neck 15' that emerges from the bottom 23 is smooth and fits telescopically in the tubular portion 10' of the main body 1, which can be smooth although in this illustrated embodiment it has a helicoidal ridge to optimize guiding.

[0041] The cap 3' has inside thread 25 with various ridges and that connect with the thread existing on the outside of all the retaining tongues 20 of the main body 1', this thread being referred to as number 26. When the unscrewing finishes, the cap can idle, although overcoming a certain resistance.

[0042] With this arrangement, in the packaging factory the container or bottle 2 is initially closed with the stopper itself or the main body 1, or 1', so that the cylindrical neck 6 seals the neck of the bottle 2, then assembling the cap 3, or 3', so that the assembly adopts the position shown in figure 9, taking place in this axial movement: the pulling of the ring-shaped part 13, or 13' by breaking the axial ribs 14 upon the tongues 16 of the cap 3, 3' impinging on them, or else, by the pressure exerted by the edge of the small partitions 27 existing between them and the side wall of the cap 3', upon pressing on the top edge of said ring-shaped part 13, 13'; the location of the threaded portion 25 of the cap 3' on the outside thread 26 of the retaining tongues 20; and the correct location of the sealing ring 4' with regard to the profile of the neck of the bottle. As one can see in figure 9, the tongues 16 of the cap 3' have surpassed the ring-shaped rib 12 of the tubular portion 10 of the main body 1' and are situated in the inside of the ring-shaped part 13'. In this same axial movement, the cylindrical neck 15' of the inside of the cap 3' is inserted tightly inside the top tubular portion 10' of the main body 1'.

[0043] The stopper assembly hermetically and securely closes the mouth of the container or bottle 2, given that the bottom edge of the cap 3, 3' hides and blocks the retaining tongues 20 or axial lugs 8 provided with the projection 9 of the embodiment corresponding to figures 1 to 7, preventing removal of the stopper.

[0044] When the seal of the container is broken, that is to say, when the stopper is opened for the first time, upon unscrewing the cap the axial ribs of the sealing ring 4' break and this ring remains resting on the neck of the container or bottle 2, as one can see in figure 10. The unscrewing takes place until the inside projections 17 of the tongues 16 of the cap 3' knock against the ring-shaped projection 12 of the tubular portion 10' of the main body 1', this position which corresponds with the one shown in figure 10 and very similar to the one shown in figure 7, although in the latter case detachment of the sealing ring 4 takes place upon remaining retained in the other tongues 7 that are inserted between the retainers 8. The two component parts of the stopper cannot be totally separated because the tongues 16 are deprived of angular movement towards the outside due to the existence of the ring-shaped part 13, 13' that blocks them in this direction and therefore the ring-shaped dentation 12 cannot be surpassed.

[0045] The separation of the stopper upon opening the bottle, is produced by axial traction since the retaining tongues 20, or 8, can open angularly towards the outside so that their projections 21 come out of the ring-shaped recess 22 of the neck 2, task which is facilitated by the sloped arrangement of the top or inside part of said projections.

[0046] If the sparkling contents of the bottle 2 has not been consumed in the same position in which the stopper assembly has been removed, the bottle is closed by axial pressure until the position of figure 10 is occupied again. Then the screwing on of the cap up to the stop is then proceeded with and thus the retaining tongues 20 are blocked, thus preventing accidental opening thereof, as if the seal on the bottle had not been broken for the first time, these operations being possible as many times as necessary until the entire liquid content has been consumed, without reducing the proposed characteristics of airtightness and secure closing.

[0047] As one can see in figure 9, the sealing ring 4' before the seal is broken, occupies a position that ensures Inviolability due to the fact that it remains retained by its bottom edge on the neck 2 and when the cap 3' is unscrewed, the axial ribs that comprise the frangible line 24 unavoidably broken. The effectiveness of the closing is carried out due to the close fitting and interconnection the broadest part of the stopper, between the cap and the retaining tongues 20 that remain pressed and blocked against the neck of the bottle 2. Undesired lateral movement and above all a fraudulent operation of trying to separate the stopper assembly from the container are

prevented, due to the above mentioned close fitting, as well as to the penetration of the sealing neck 6 into the inside of the neck, and due to the telescopic fitting in the top part of the stopper, between the cap 3' and the main body or stopper itself 1', upon the respective telescopic parts 10' and 15' sliding tightly, which is also contributed to by the sliding fit of the top tongues 16 between the ring-shaped part 13' and the cylindrical portion 10', as one can infer upon observing this figure 9 which we are considering.

[0048] The movement of the cap 3' with regard to the stopper itself 1' is carried out as it has been indicated above by screwing or unscrewing the cap, which takes place simply by turning a fourth of a turn, since the thread system, as shown in figure 8, has in this case multiple ridges.

[0049] The implant is a component that is inserted in or attached to the stopper itself 1, 1' and/or the cap 3, 3' to be used in conjuction with the bottle 2. The implant may be composed of the same raw material as that of the stopper 1, 1' and the cap 3, 3'. Morevoer, the implant in raw material form is molded with a base resin and a temperature sensitive cold color first color and/or hot color second color. Similar to the stopper 1, 1' and the cap 3, 3', the implant may be used as a temperature sensitive device using color as a visual diagnostic to reveal the temperature of the contents of the bottle 2.

Claims

1. A stopper for a bottle or a container containing a liquid that ought to be in a certain temperature range before the stopper is to be removed from the bottle, said stopper having a top portion (3, 3') formed to protrude over a neck portion (2) of the bottle or the container and
having a plug portion (1, 1') formed to reach into the neck portion (2) of the bottle or the container, said stopper
being at least partially formed of a base resin and
being provided with a portion that is visible when the stopper is mounted on the bottle or the container, said portion
being provided with at least one temperature sensitive colorant that is indicative of the temperature to which the stopper has been exposed, thereby providing color perceptibility of the temperature preparedness of the contents of the bottle or the container.

2. The stopper of claim 1, wherein the portion provided with the at least one colorant is the top portion (3, 3') of the stopper.

3. The stopper of claim 1 or 2, wherein the portion provided with the at least one colorant effectively includes the top portion (3, 3') and the plug portion (1, 1') of the stopper.

4. The stopper of any of claims 1 to 3, wherein the portion provided with the at least one colorant is an implant that is inserted in or attached to the top portion (3, 3') or the plug portion (1, 1') of the stopper.

5. The stopper of any of claims 1 to 4, wherein one of the at least one colorants changes from a visible first color while above a certain temperature threshold to effectively translucent when below said temperature threshold.

6. The stopper of any of claims 1 to 4, wherein one of the at least one colorants changes from a visible first color while below a certain temperature threshold to effectively translucent when above said temperature threshold.

7. The stopper of claim 5 or 6, wherein a second color of one other of the at least one colorants becomes visible.

8. The stopper of claim 5 or 6, wherein a molding color becomes visible.

9. The stopper of claim 7, wherein the second color has a color lightness less than that of the visible first color.

10. The stopper of claim 8, wherein the molding color has a color lightness less than that of the visible first color.

11. The stopper of any of claims 1 to 4, wherein one of the at least one colorants changes from effectively translucent while above a certain temperature threshold to a visible color when below said temperature threshold.

12. The stopper of any of claims 1 to 4, wherein one of the at least one colorants changes from effectively translucent while below a certain temperature threshold to a visible color when above said temperature threshold.

13. The stopper of any of claims 1 to 4, wherein the portion provided with the at least one colorant has a molding concentration in the range of approximately 85 - 95%, preferably approximately 88 - 90%.

14. The stopper of any of claims 1 to 4, wherein the portion provided with the at least one colorant has a wall thickness greater than or equal to approximately 0.2 - 0.7 mm, preferably approximately 0.375 mm.

15. The stopper of any of claims 1 to 4, wherein the portion provided with the at least one colorant has a molding temperature that is less than or equal to 235 degrees C.

16. The stopper of claim 5 or 6, wherein the first color is a color selected from the group consisting of New Fast Yellow, Gold Orange, Vermilion, Pink, Magenta, Fast Blue Turquoise Blue, Brilliant Green, Fast Black, Green and Brown.

17. The stopper of claim 5 or 6, wherein the first color has a composition concentration in the range of approximately 10 - 25%, preferably approximately 15 - 18%.

18. The stopper of claim 5 or 6, wherein the first color has a molding concentration in the range of approximately 2 - 30%, preferably approximately 5 - 20%.

19. The stopper of claim 7, wherein the second color is selected from the group consisting of any color and any mixture of colors that are not white.

20. The stopper of claim 7, wherein the second color has a composition concentration in the range of approximately 10 - 25%, preferably approximately 15 - 18%.

21. The stopper of claim 7, wherein the second color has a molding concentration in the range of approximately 2 - 30%, preferably approximately 5 - 20%.

22. The stopper of claim 1, wherein the base resin is plastic.

23. The stopper of claim 1, wherein the base resin has a composition concentration in the range of approximately 80 - 90%, preferably approximately 82 - 85%.

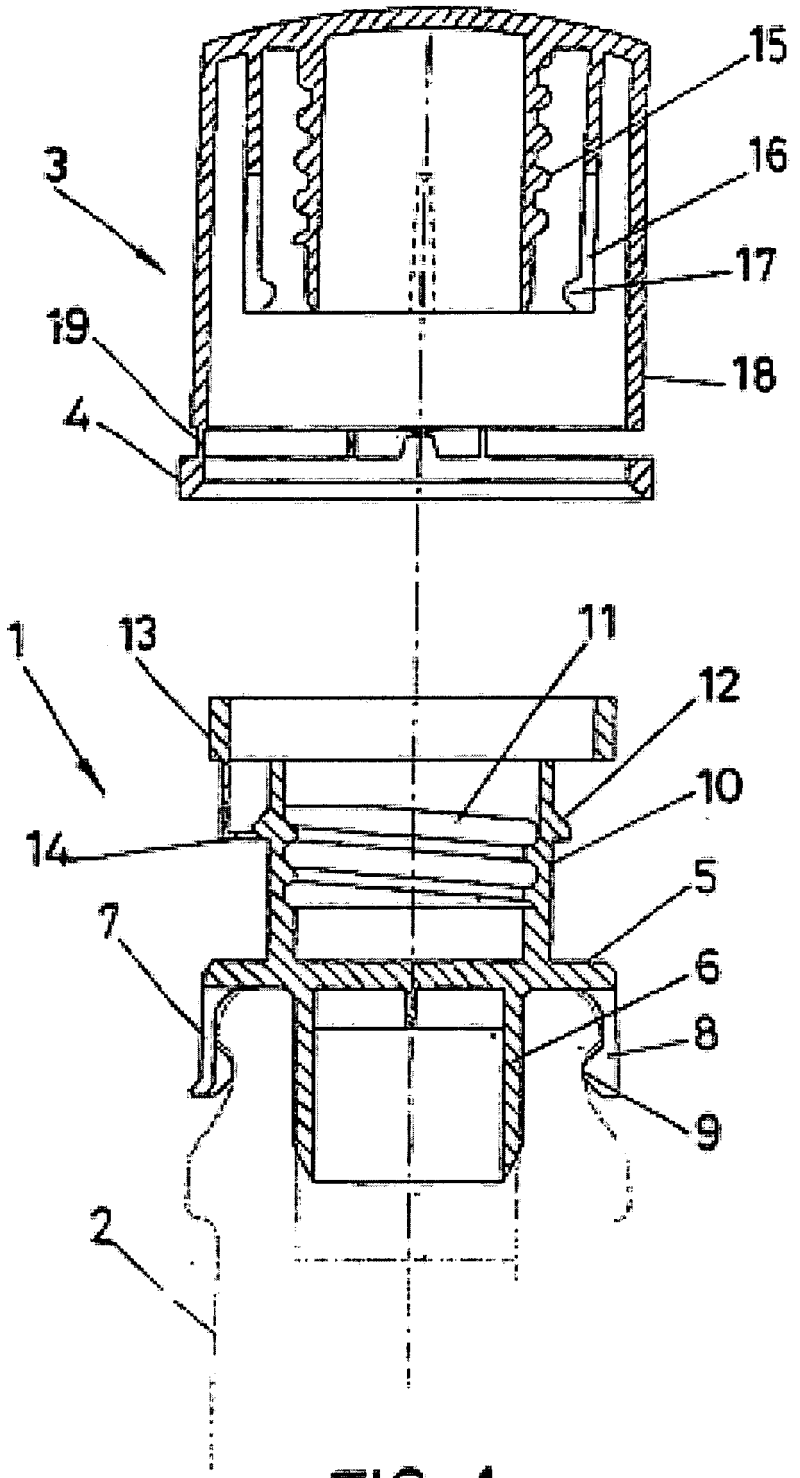

FIG. 1

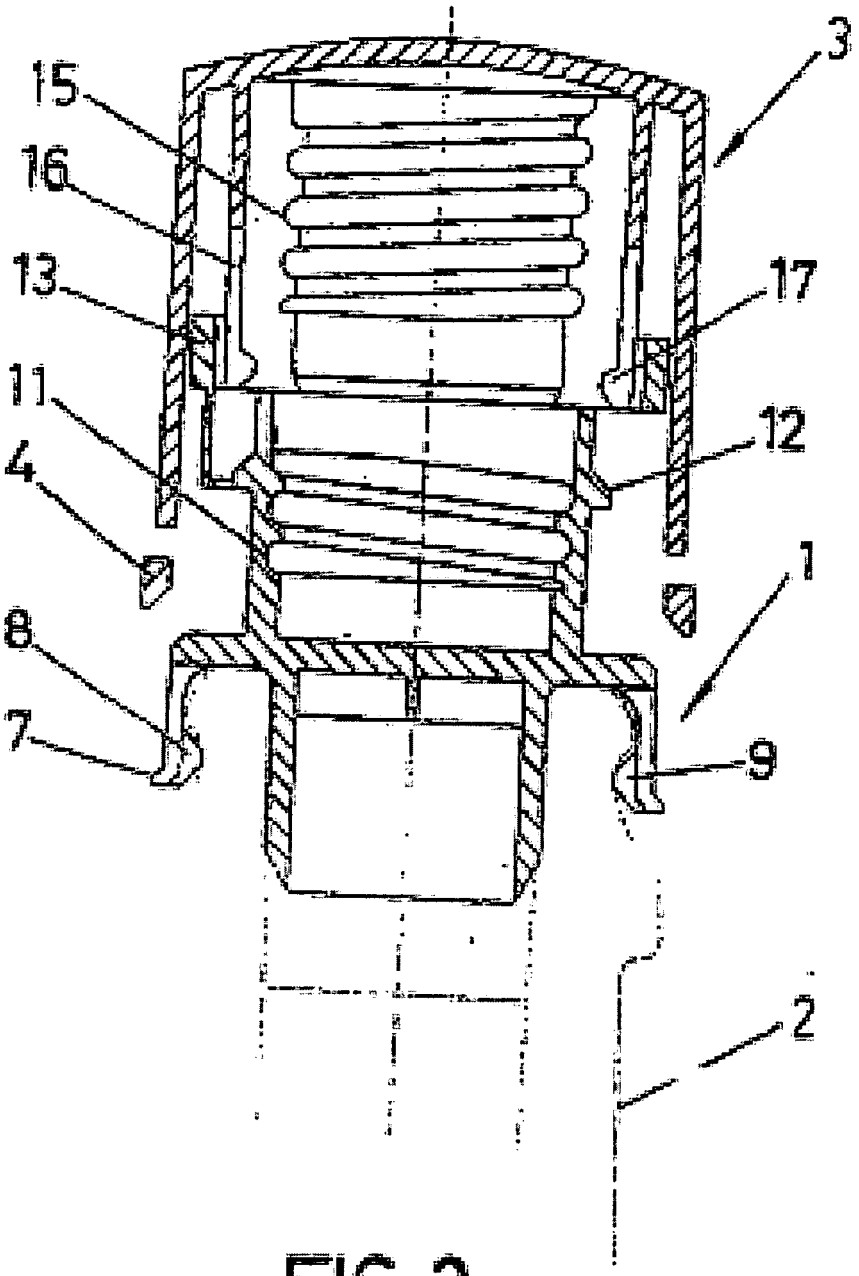

FIG.2

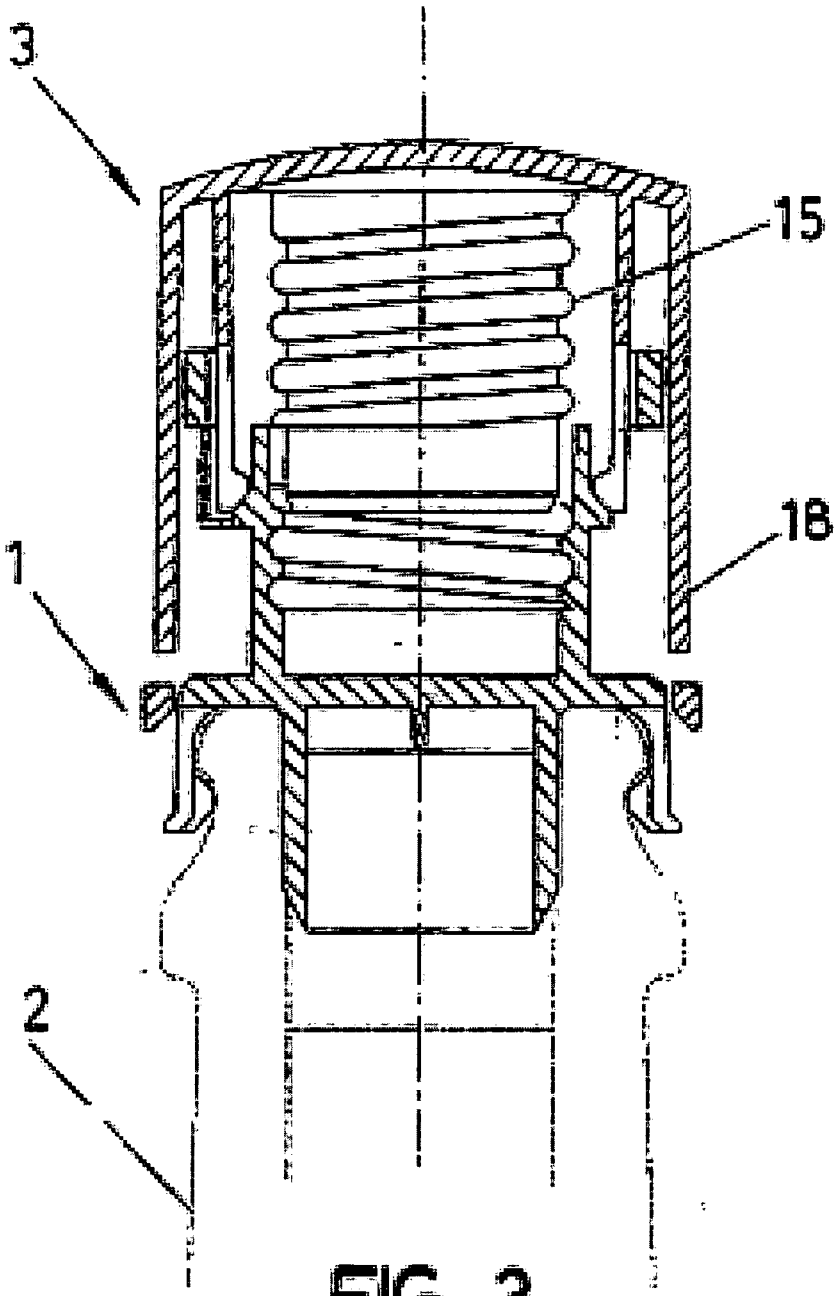

FIG. 3

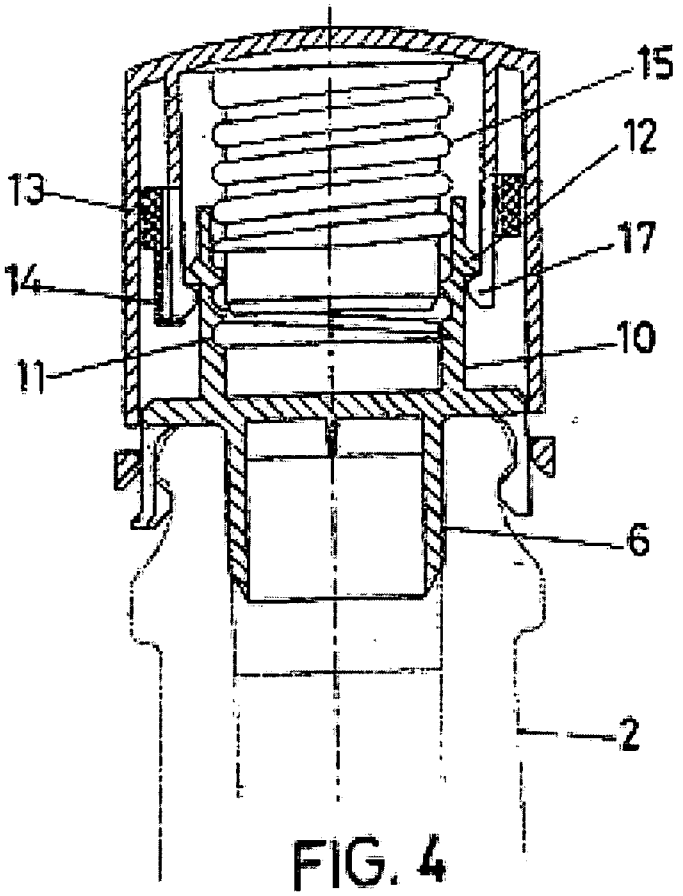

FIG. 4

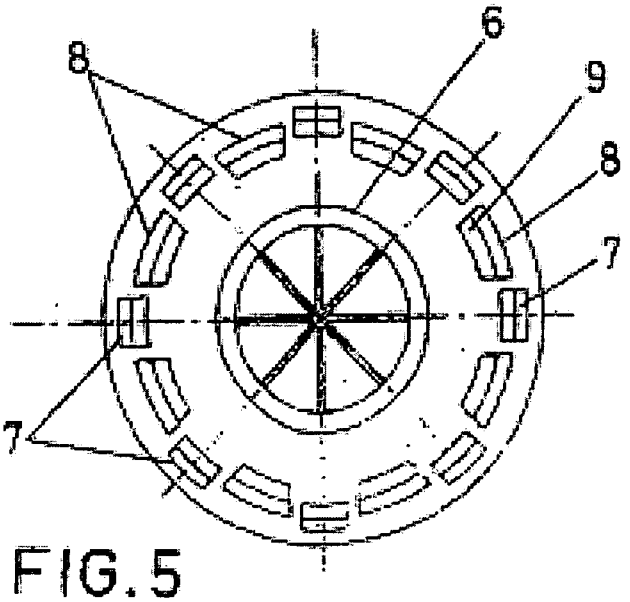

FIG. 5

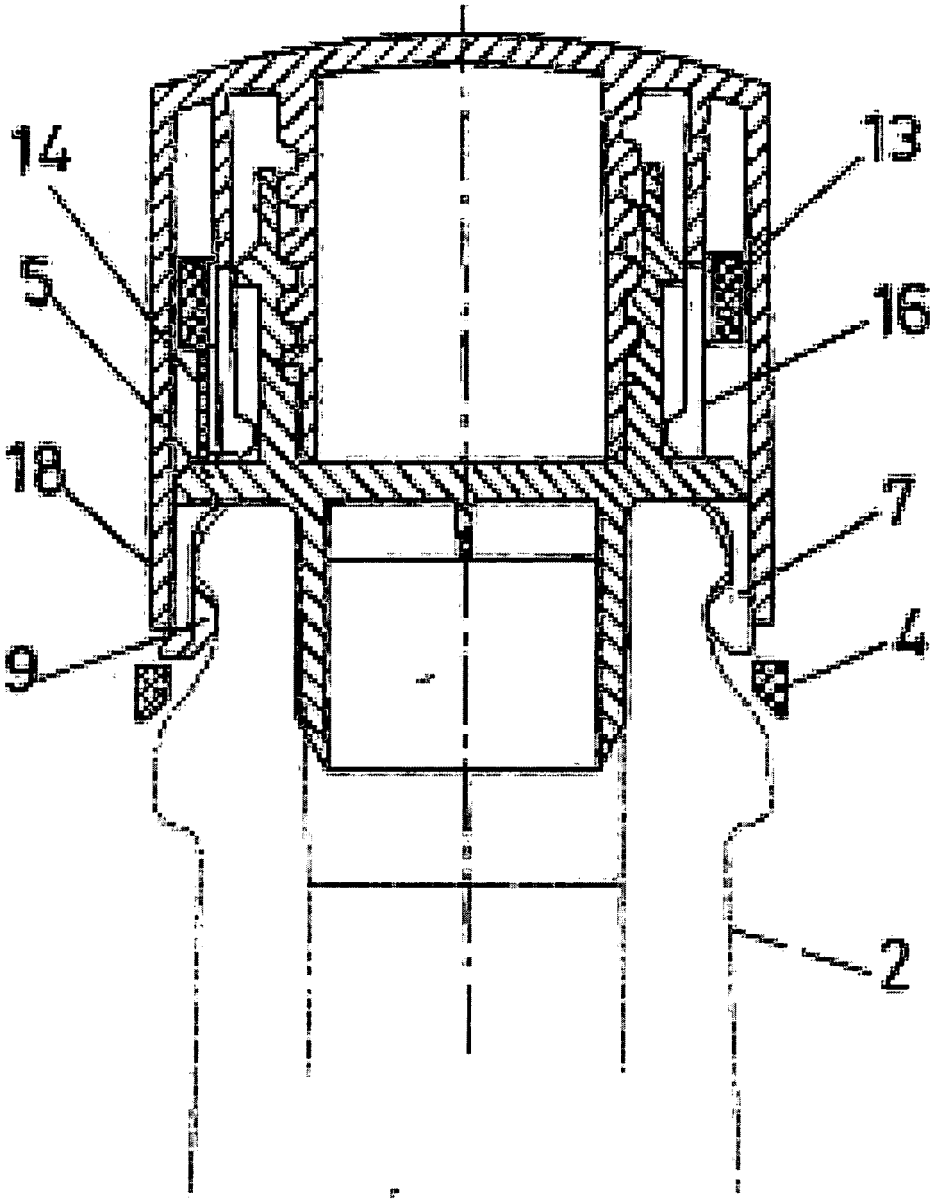

FIG.6

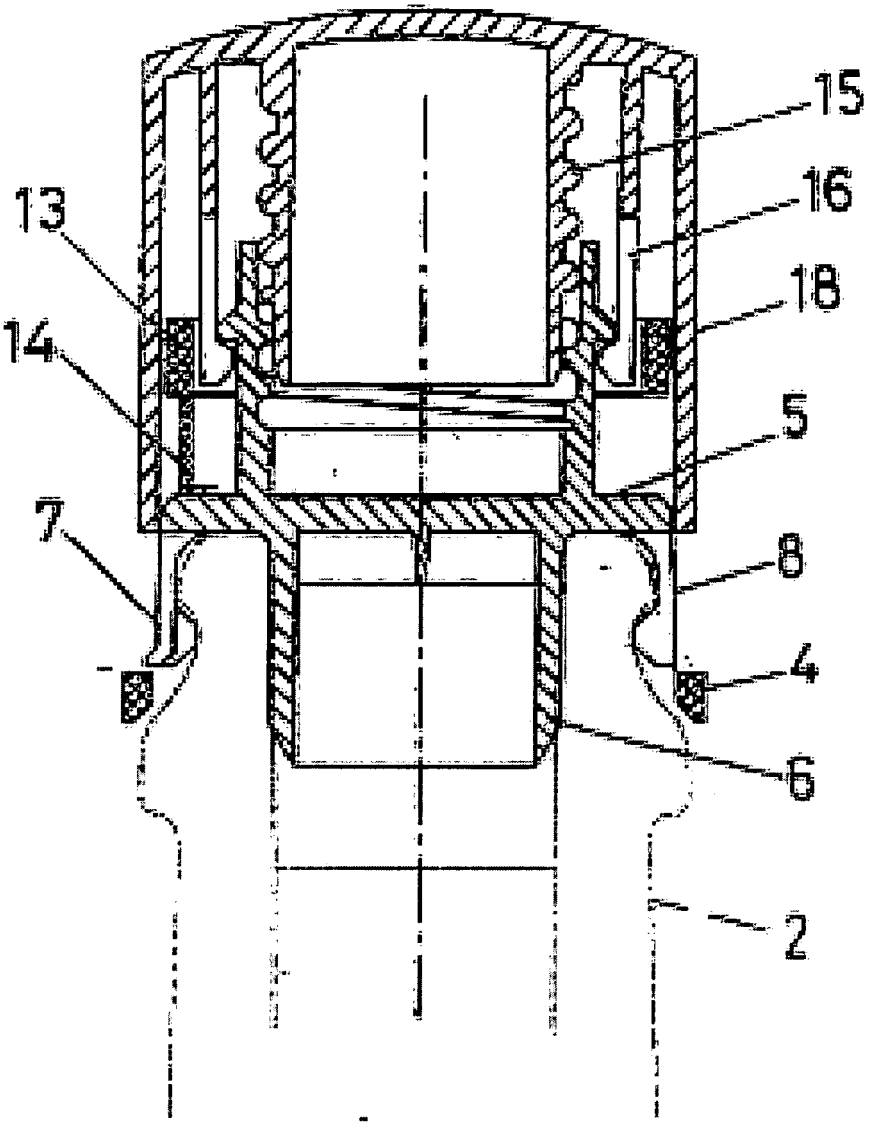

FIG.7

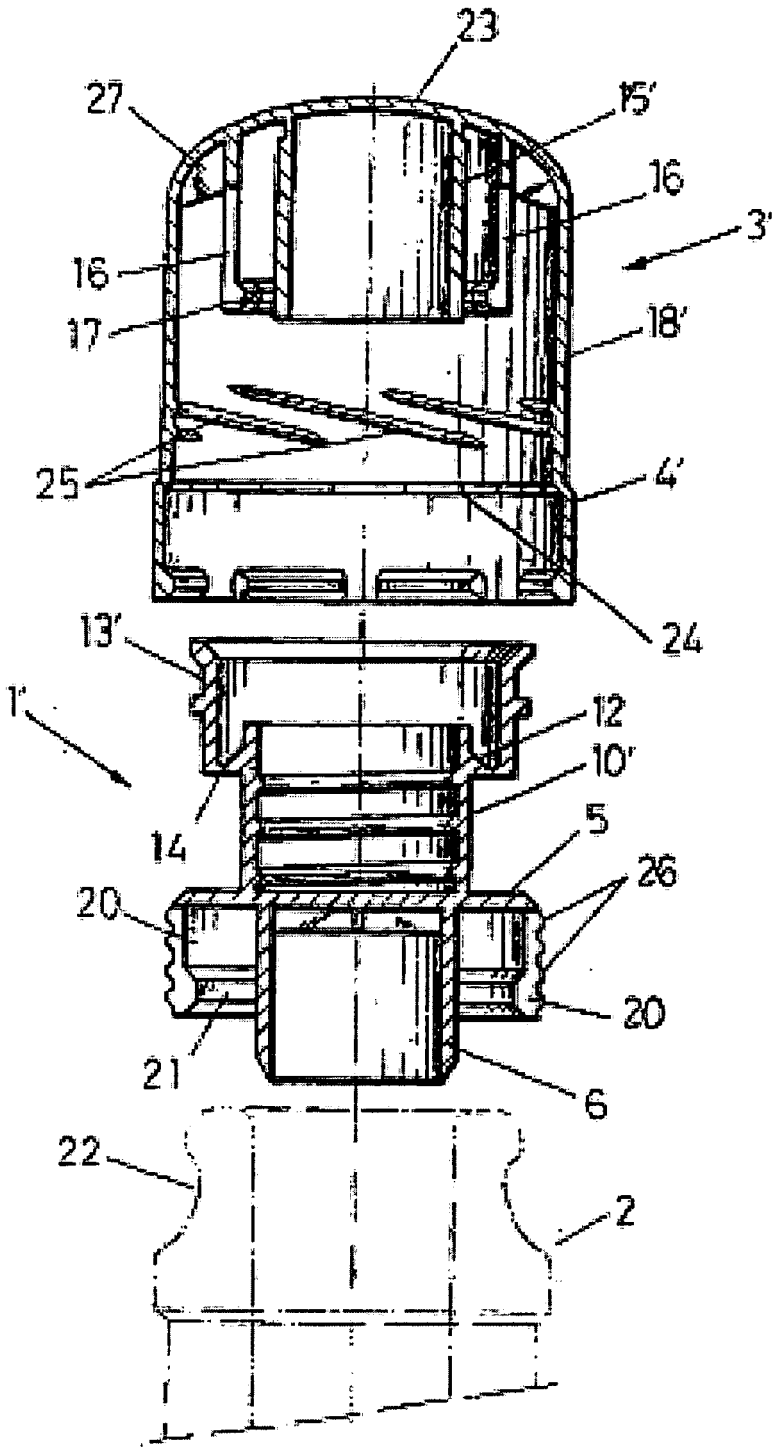

FIG.8

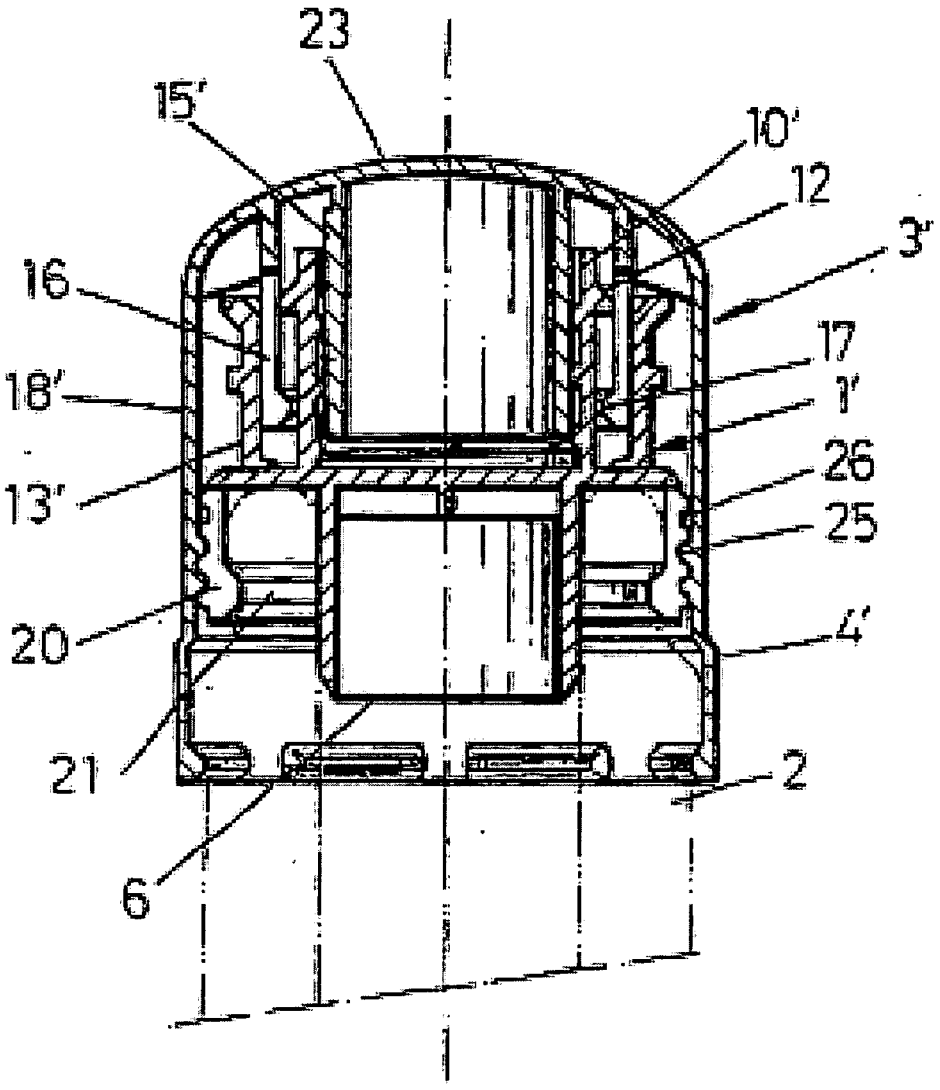

FIG.9

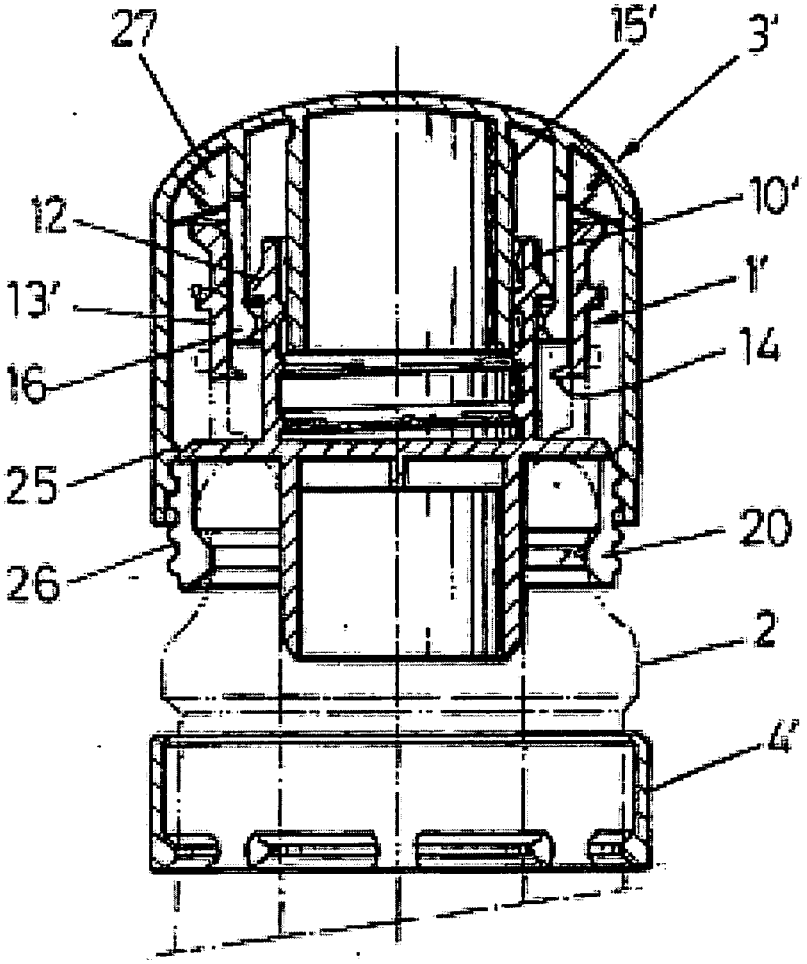

FIG. 10

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EUROPEAN SEARCH REPORT

Application Number
EP 06 02 3127

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 2003/127416 A1 (SALAZAR-LEAL RITA LORENA [MX]) 10 July 2003 (2003-07-10) * paragraph [0032] - paragraph [0058]; figures 1,2 *	1-23	INV. B65D41/58 B65D51/24
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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
Munich	27 March 2007	Fitterer, Johann

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27-03-2007

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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