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**(54) BOTTLE NECK STRUCTURE AND RELATIVE CAP MADE OF PLASTIC MATERIAL,
PARTICULARLY FOR WATER AND BEVERAGES**

FLASCHENHALSSTRUKTUR UND ZUGEHÖRIGE KAPPE AUS KUNSTSTOFF, INSBESONDERE
FÜR WASSER UND GETRÄNKE

STRUCTURE DE GOULOT DE BOUTEILLE ET CAPUCHON RELATIF RÉALISÉ EN UNE MATIÈRE
PLASTIQUE, EN PARTICULIER POUR DE L'EAU ET DES BOISSONS

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(56) References cited:
WO-A1-2006/066356 JP-A- 10 203 551
US-A1- 2002 043 512 US-A1- 2009 283 494

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Description

[0001] The invention relates to a bottle neck structure and relative cap as set forth in the preamble of claim 1, the basis of which is disclosed in US 2002/0043512 A1 or in US 2009/0283494 A1.

[0002] As known, in the industrial manufacture of bottles made of plastic materials in general and those for mineral water and also carbonated beverages in particular, the bottling companies are provided with preforms made of plastic material, usually, constituted by a tubular apically closed structure and by an open neck.

[0003] Such preforms are subjected to blowing compressed air thereinto, once brought to a suitable degree of heat deformability, under whose constancy the tubular structure is deformed to provide the specific bottle configuration, provided by the mould in which the blowing occurs, which will then be filled by the liquid it is intended to contain.

[0004] In such context the capacity and shape of the tubular structure are fundamental for the final characteristics of the blown container and the respective parameters are intangible to attain containers suitable for the intended purposes, especially regarding deformation due to the pressure of the contained liquid and handling during the emptying and generally use by the end user.

[0005] On the contrary the neck remains unvaried under blowing constancy and thus also the relative thread, i.e. the entirety of the transverse reliefs which are present thereon and which guarantee the possibility of fastening to a type of cap made of plastic material, typically made of HDPE (polyethylene) or PP (polypropylene).

[0006] The greatest effort to improve the manufacture of the aforementioned preforms, i.e. of the bottles made of plastic material, definitely lies in saving the constituting plastic material which, even if little with reference to the single piece, allows considerably saving raw material in the large number of pieces with which it is required to be compared in the sector.

[0007] In such context, as mentioned, there should not be a further reduction of materials from the tubular portions, which are already provided with capacity so as not to be reduced without failing to attain the relative purposes.

[0008] Hence all technological efforts to reduce the weight are almost entirely concentrated on the portion, which is not subjected to deformation, or on the neck.

Objects of the invention

[0009] The main object of the present invention is therefore, in the previously described context, to provide an innovative neck structure and relative cap for bottles made of plastic material, especially for holding water and beverages, capable of allowing lightening the weight of the structure as much as possible, without deteriorating the functionalities not even in the use for holding carbonated beverages.

[0010] Another object of the present invention is to attain the aforementioned object through a solution concept capable of also allowing reducing the height (the axial development) of the neck.

[0011] Another object of the present invention is to attain the aforementioned objects through a solution concept having a corollary of embodiments coherent with the aforementioned objects.

[0012] A further object of the present invention is to attain the previous objects through a solution concept that is simple and efficient, safe during use and relatively inexpensive considering the results practically obtained therewith.

Summary of the solution concept

[0013] These and other objects can be attained with the bottle neck structure and relative cap made of plastic material, particularly for water and beverages, according to the present invention as characterized in claim 1. Further characteristics are set forth in the subclaims.

Description of the attached drawings

[0014] The characteristics and advantages of the bottle neck structure and relative cap made of plastic material according to the present invention, will be more apparent from the following detailed description of a preferred but not exclusive embodiment thereof, represented solely by way of non-limiting example in four attached drawings, wherein:

Figure 1 shows in schematic view a section of bottle neck according to the present invention with relative cap detached in sectional view;

Figure 2 shows in schematic view a section of bottle neck according to the present invention with relative cap attached in sectional view;

Figure 3 shows in schematic view a lateral view of bottle neck according to the present invention with relative cap attached in sectional view;

Figure 4 shows in schematic view a plan sectional view of bottle neck according to the present invention.

Static description of the embodiment

[0015] With reference to such figures, and in particular to figure 1, the neck 1 of a bottle 3 made of plastic material according to the present invention, particularly intended to hold water or even carbonated beverages, which will be described using the orientation terms of "high" and "low" with reference to the usual upright positioning of a container thus made on the relative base (not illustrated).

[0016] The bottle 3 is preferably made using PET (polyethylene terephthalate) or PVC (polyvinyl chloride), while the relative cap 2 is preferably made of HDPE (polyethylene) or PP (polypropylene).

[0017] On the neck 1 helically develops an arc-shaped concavity 4, with arcatures preferably not exceeding 120° (one hundred and twenty nonagesimal degrees), to provide a thread or screw indicated with the same reference number 4.

[0018] The turns of the arched helical concavity or screw are mutually adjacent to define crests 5, as sharp as possible.

[0019] At the top part of the bottle 3, the outer face 8 of the top annular edge 7 defining the opening 6 of the neck 1 is coplanar or, preferably, circumferentially sub-levelled with respect to the bottom of the arched helical concavity 4, with the aim of introducing the female screw 15 of the cap 2, as described hereinafter.

[0020] Below the arched helical concavity 4, or screw 4, there is conceived an annular relief 9 with straight trapezoidal section, with inclined free side 10 and facing upwards.

[0021] Below the trapezoid circumferential relief 9 there is provided a groove 12 constituting a seat of a self-tear sealing strip 11, according to the prior art.

[0022] The groove 12 is delimited at the lower part by a disc-shaped annular relief 13, for automatically handling the bottle 3 during filling and packaging, defined by adjacent lobes 14 (see figure 4).

[0023] The cap 2 is constituted by a cylindrical plane capsule 2, with an upper closure top part 16 and annular edge 17 defining the opening, within which there projects a female screw 15 with spiral of the arc-shaped convex thread in a convex manner, accurately complementary to the concavity 4 of the helical element of the neck 1, i.e. with arcature preferably not exceeding 120° (one hundred and twenty nonagesimal degrees).

[0024] Near the top part 16 the interior of the cap 2 is divided by a pronounced annular partition element 18, with relief 19 on the relative outer face, and by a smaller outer annular partition element 20, between which there is defined a circular interspace 21, whose bottom 22 is shaped degrading from the outer annular partition element 20 towards the annular partition element 18, for the purposes to be described hereinafter.

Dynamic description of the embodiment

[0025] Thus having completed the static description of a preferred embodiment of the device for implementing the method for producing the bottle neck structure and relative cap made of plastic materials according to the present invention, following is the dynamic description thereof, i.e. the respective operation:

The arched profile of the helical concavity or thread 4, on the neck 1 of the bottle 3, coupled with the convexly arched complementary profile of the female screw 15 in the cap 2, integrate a synergic combination which accumulates the two elements on the respective entire surfaces, thus not exclusively on limited unidirectional abutment fronts, as it occurs to

threads that the screws of the bottle necks and caps are provided with according to the prior art. The homogeneous accumulation on all the sections of the complementary profiles thus made is highlighted by the radial expansion of the neck 1, due to the pressure of the contained liquid and, in particular, due to the relative gas therein, still present even when the beverage is not naturally or artificially carbonated.

[0026] In addition, when the beverage is carbonated, to a point that considering greater presence of gas, i.e. a greater pressure beneath the top part 16 of the cap 2 and potentially exposed to the risk of the crests 5 being broken by the part of the female screw 15 of the cap 2, i.e. the so-called "bead-breaking", correspond to a greater radial expansion of the neck 1 and thus a greater coupling between the elements, which is opposed to the bead-breakage of the crests 5 by the female screw 15, in a manner directly proportional to the pressure of the gas.

[0027] In other words, the greater the pressure of the trapped gas that tends to "bead-breaking", equally greater, directly proportional, is the coupling between neck and cap which counters the "bead-breaking".

[0028] Such event is facilitated by the low thickness of the neck 1, which can be attained actually due to the arched shape of the helical concavity 4, or screw 4, which contributes to the functional advantage of facilitating the radial deformation of the neck 1, i.e. the trapping of the female screw 15, as well the structural advantage of attaining the reduction of the plastic material required to obtain the neck 1, i.e. the reduction of the raw material required to form the pre-mould and the entire bottle 1.

[0029] Such advantage is further enhanced by the parallel solution of providing the handling ring 13 provided for the lobes 14.

[0030] At the same time the firm anchoring allows reducing the screw 4 and female screw turns and thus the height of the neck 1 and the cap 2, thus allowing further saving the constituting material.

Alternative embodiments

[0031] It is obvious that further alternative embodiments still falling within the concept solution under the embodiment illustrated above and claimed hereinafter, the bottle neck structure and relative cap made of plastic materials according to the present invention may be obtained using equivalent technical and mechanical materials using actuators of any type suitable for the purpose or provided with further supplementary solutions, same case applying to all configurations of the respective components which may vary to suit the purpose.

[0032] In particular:

the arcature of the screw and female screw tends to the lowest number of nanogesimal degrees possible, where the preferred configuration is comprised in the

range between 90° (ninety) and 120° (one-hundred and twenty) nanogesimal degrees.

[0033] The annular relief underlying the arched thread on the bottle neck can be conceived notched with low relief, with the aim of attaining three objectives: facilitating the dispersion of gases released during the opening, saving weight and abutment of interior part of the security guarantee seal during unfastening, seal with notch preferably less close, so as to facilitate the breakage of the teeth that couple the seal to the cap and will have a smaller diameter due to the fact that the threads with low reliefs obtained in the neck structure reduce the diameter of the cap structure.

Advantages of the invention

[0034] As observable from the detailed description above regarding a preferred embodiment, and from the previously indicated variant embodiment, the bottle neck structure and relative cap made of plastic material according to the present invention offers advantages corresponding to the attainment of the preset objects as well as other objects:

The bottle necks made of plastic material according to the prior art have threads in relief with conical profile, with an interspace capable of allowing the thread of the cap to slide therein, when fastening they are superimposed; this leads to an entirely different solution with respect to the arched grooves with low relief according to the present invention, which dynamically allow adding an opposite force between the thrust towards the external that the pressures of the liquids, especially carbonated ones, create after packaging, and the thrust of the relief thread of the cap, which being provided at the part with greater thickness, i.e. where the thickness of the capsule of the cap is added to that of the relative female screw, and over the entire circumference, confers to the neck structure according to the present invention the possibility of having lower thickness and lower height; the advantage triggers a virtuous cycle in that, being small the interior surface of the neck at contact with the carbonated liquids of the structure subjected to the thrust, is lower and less strained.

[0035] The arched grooves create a rib on the neck structure increasing the resistance and reducing the weight.

[0036] Given that the volutes of the grooves are closely strictly adjacent in the helical development thereof, there occurs a reduction of the height of the structure in its entirety.

[0037] During stretching and blowing of the preforms made of PET, the polymer structure is arranged so as to be less transparent to the gases; the neck in such machining does not attain this structural advantage and re-

mains unvaried after the injection moulding, thus attaining a lower height of the neck also attains the advantage of a lower loss of carbonation of the liquids held therein, as well as greater duration of the stocked products, with good quality advantages and thus those of the image of the product as well as good advantages in the production and distribution logistics.

[0038] The lower height of the neck structure reduces the interior surface at contact with the liquids and subjected to the thrust stresses of the interior gases.

[0039] The arched grooves increase the contact surface with the thread of the cap, providing a greater interaction with respect to the relief thread according to the prior art which, on the contrary, does not counter the thread, given that it is parallel and conical over the entire surface; in other words, by frontally abutting the arched female screw of the cap, the arched screw of the neck, the cap is subjected to stress in the portion of relative greater thickness, so that the stress is uniformly distributed on the structure thereof.

[0040] The neck structure according to the invention subjects the interior of the fitting cap that surrounds it in the arched threads area a thickness that is added to the thickness of the structure on the circular wall and the arched threads being very close, i.e. the cap having a small height, smaller than that of the caps according to the prior art, they reinforce the entire circumference of the cap, creating a belt effect that is more resistant to the neck structure, to the thrust effect of the pressure of the liquids held in the bottle.

[0041] The annular relief underlying the arched thread on the bottle neck, intended to interact with the security seal, co-diametrically at the lower part associated to the cap, has a smaller diameter with respect to the homologous ones according to the prior art, in that the concave arched threads obtained in the neck structure reduce the diameter of the cap structure.

[0042] The annular relief for automatically handling the bottle underlying the seat of the security seal, due to the lobe-like configuration thereof, has a greater reinforcement rib, constituted by the lobes, a lower thickness and a lower inclination angle of the upper part, thus saving in terms of weight.

[0043] The inlet edge, preferably having smaller diameter and possibly greater width with respect to the concave arched threads obtained in the neck structure, facilitates the direction of insertion of the cap by the user when closing the container if the product is not finished, thus facilitating the coupling of the female screw of the cap with the concave arched threads obtained in the neck structure of the bottle.

[0044] The inlet edge of the bottle neck, preferably having a greater thickness, equivalent to the height, with respect to the concave arched threads obtained in the neck structure, distributes the overlaying weights during palletisation and storage or transport, discharging the weights on the structure of the bottle and without interfering with the edges of the grooves of the relief thread.

[0045] The concave arched threads obtained in the neck structure constitute a concept of screw that is inexpensive to produce, hence allowing providing only one type of preform both for the carbonated products and for non-carbonated products, with a less expensive cap for the second, also attaining a considerable productive advantage of eliminating the times required to change the preform upon the variation of the liquid bottled in the automatic operation lines.

[0046] The bottle neck structure and relative cap made of plastic material according to the present invention, considering the reduction of the relative vertical development, also attains a greater reinforcement from the interior annular partition element of the cap, which reinforces the neck up to the level of the rear area at the concave arched threads obtained in the very neck structure.

Claims

1. Bottle neck structure and relative cap made of plastic material, particularly for water and beverages, wherein the neck (1) comprises an outside thread (4) made up of a concave arc-shaped helical element, whereas the cap (2) comprises a female screw (15) defined by a convex arc-shaped thread the convexity of which is accurately complementary to the concavity of the helical element of the neck (1), wherein the turns of the helical element are mutually adjacent such that they form a narrow crest (5), **characterized in that** the interior of the cap (2) near its top part (16) is divided by a protruding inner annular partition element (18) with relief (19) on its outer face and by a smaller outer annular partition element (20) both defining a circular interspace (21) whose bottom (22) is shaped such that it degrades towards the inner annular partition element (18).
2. Bottle neck structure and relative cap according to claim 1, wherein the thread (4) of the neck (1) has an arcature comprised between 90° and 120°
3. Bottle neck structure and relative cap according to claim 1 or 2, wherein the neck (3) of the bottle (1) has an opening (6) the top annular edge (7) of which is coplanar or circumferentially sub-levelled with respect to the bottom of the concave arc-shaped helical element (4) provided on the neck (3).
4. Bottle neck structure and relative cap according to any of the preceding claims, wherein an annular relief (9) having a trapezoidal section with inclined free side (10) and facing upwards for abutment against a self-tear sealing strip (11) is provided which strip (11) is arranged in a groove (12).
5. Bottle neck structure and relative cap according to

any of the preceding claims, wherein said annular relief (9) is notched in low relief.

6. Bottle neck structure and relative cap according to any of the preceding claims, wherein the neck (1) of the bottle (3) bears, at the lower part, a disc-shaped annular relief (13) for automatically handling the bottle (3), said relief (13) being defined by adjacent lobes (14).

Patentansprüche

1. Flaschenhalsstruktur und zugehörige Verschlusskappe aus Kunststoff, insbesondere für Wasser und Getränke, wobei der Hals (1) ein Außengewinde (4) mit einem konkaven, bogenförmigen Schraubelement hat, während die Verschlusskappe (2) ein Innengewinde (15) mit einem konvexen, bogenförmigen Schraubprofil aufweist, dessen Wölbung exakt komplementär zur konkaven Bogenrundung des Schraubelements des Halses (1) ausgebildet ist, und wobei die Gewindegänge des Schraubelementes so aneinandergrenzen, dass sie einen schmalen Grat (5) bilden, **dadurch gekennzeichnet, dass** der Innenraum der Verschlusskappe (2) in ihrem oberen Teil (16) durch ein inneres, ringförmig vorspringendes Trennelement (18), das an seiner nach außen weisenden Seite einen Vorsprung (19) aufweist, und durch ein kleineres ringförmiges Trennelement (20) unterteilt ist, die beide einen kreisringförmigen Zwischenraum (21) begrenzen, dessen Boden (22) so geformt ist, dass er in Richtung auf das innere Trennelement (18) abfällt.
2. Flaschenhalsstruktur und zugehörige Verschlusskappe nach Anspruch 1, **dadurch gekennzeichnet, dass** sich das Außengewinde (4) des Halses (1) über einen Bogen erstreckt, dessen Umfang zwischen 90° und 120° liegt.
3. Flaschenhalsstruktur und zugehörige Verschlusskappe nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der Hals (1) der Flasche (3) eine Öffnung (6) hat, deren obere Ringkante (7) in derselben Ebene oder in Umfangsrichtung innerhalb des Bodens des bogenförmigen, konkaven Schraubelementes (4) des Halses (1) liegt.
4. Flaschenhalsstruktur und zugehörige Verschlusskappe nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** ein ringförmiger Vorsprung (9) mit trapezförmigem Querschnitt und nach oben abgeschrägter Außenfläche (10) für den Anschlag gegen einen selbstabreißenden, in eine Nut (12) eingreifenden Dichtungsstreifen (11) vorgesehen ist.

5. Flaschenhalsstruktur und zugehörige Verschlusskappe nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Vorsprung (9) im Flachrelief gezackt ist.
6. Flaschenhalsstruktur und zugehörige Verschlusskappe nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Hals (1) der Flasche (3) in seinem unteren Bereich einen ringscheibenförmigen Vorsprung (13) für die automatische Handhabung der Flasche (3) hat, welcher aus nebeneinanderliegenden Buckeln (14) besteht.

tes, **caractérisée par le fait que** le ressaut annulaire (9) est denté en demi-relief.

6. Structure de goulot de bouteille et bouchon fileté correspondant selon une des revendications précédentes, **caractérisée par le fait que** le col (1) de la bouteille (3) est muni dans sa partie inférieure d'un épaulement annulaire (13) pour la manipulation automatique de la bouteille (3), ledit épaulement étant formé de segments consécutifs (14).

Revendications

1. Structure de goulot de bouteille et bouchon plastique fileté correspondant, particulièrement pour eaux et boissons, dont le col (1) comprend un filet extérieur (4) formé d'un élément hélicoïdal concave en arc de cercle tandis que le bouchon (2) présente un filet intérieur (15) à profil de filetage convexe en arc de cercle dont la partie bombée est exactement complémentaire à la courbure concave de l'élément de filetage du col (1), les spires du filet se limitant entre elles par une arête étroite (5), **caractérisée par le fait que** l'intérieur du bouchon (2) est divisé dans sa partie supérieure (16) par une séparation intérieure (18) annulaire, munie sur sa face extérieure d'une partie saillante (19) et divisée par une plus petite séparation (20), ces deux séparations délimitant un espace annulaire (21) dont le fond (22) descend vers la séparation intérieure (18).
2. Structure de goulot de bouteille et bouchon fileté correspondant selon la revendication 1, **caractérisée par le fait que** le filet extérieur (4) du col (1) s'étend sur un arc dont la circonférence se situe entre 90° et 120°.
3. Structure de goulot de bouteille et bouchon fileté correspondant selon la revendication 1 ou 2, **caractérisée par le fait que** le col (1) de la bouteille (3) présente une ouverture (6) dont le bord annulaire extérieur (7) est dans le même plan ou a la même circonférence que la circonférence du fond du filet (4) concave du col (1).
4. Structure de goulot de bouteille et bouchon fileté correspondant selon une des revendications précédentes, **caractérisée par le fait qu'**est prévu un ressaut annulaire (9) à section trapézoïdale ayant une surface extérieure (10) chanfreinée vers le haut pour l'arrêt contre un cordon d'étanchéité (11) à rupture automatique qui s'engage dans une rainure (12).
5. Structure de goulot de bouteille et bouchon fileté correspondant selon une des revendications précédentes,

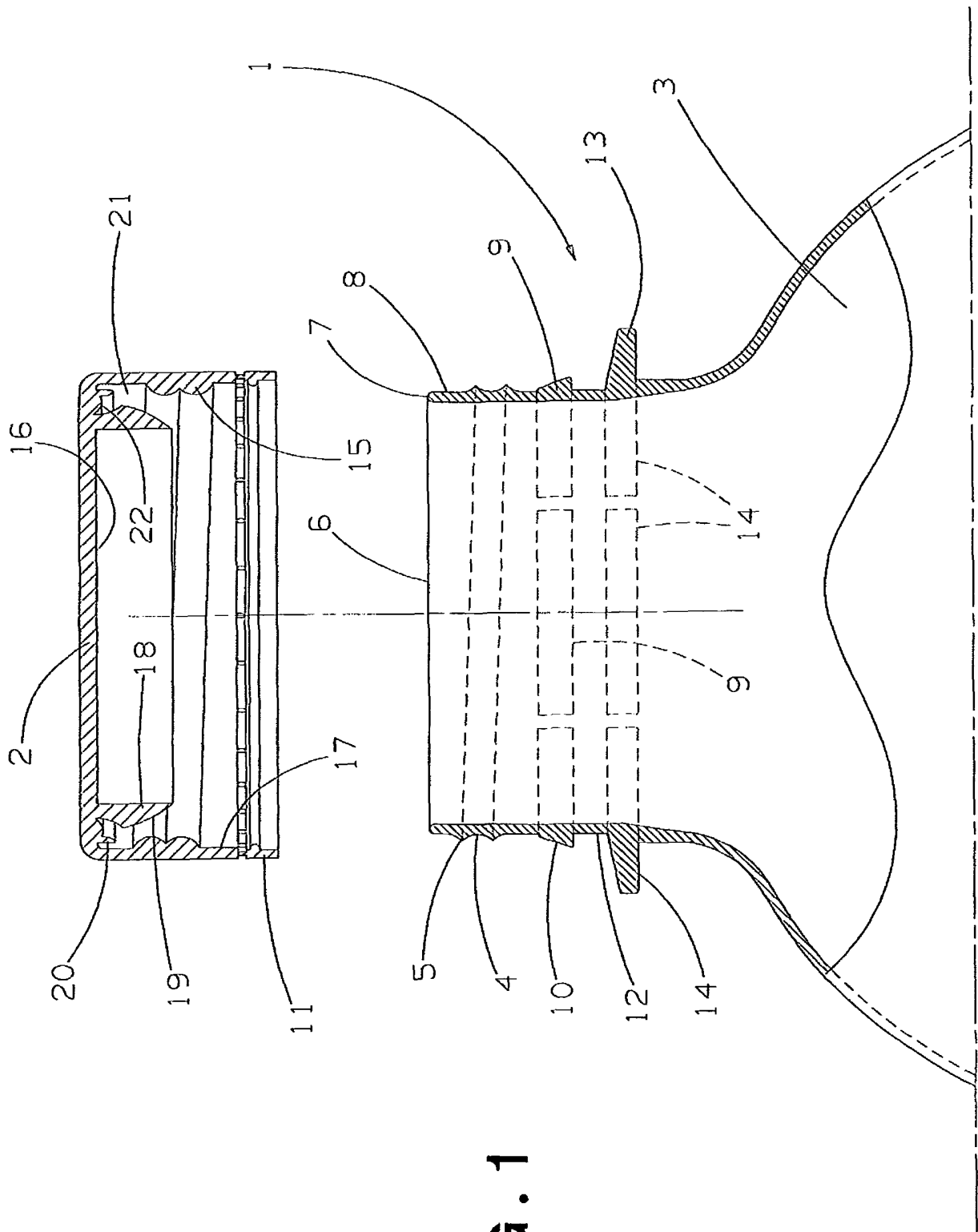


FIG. 1

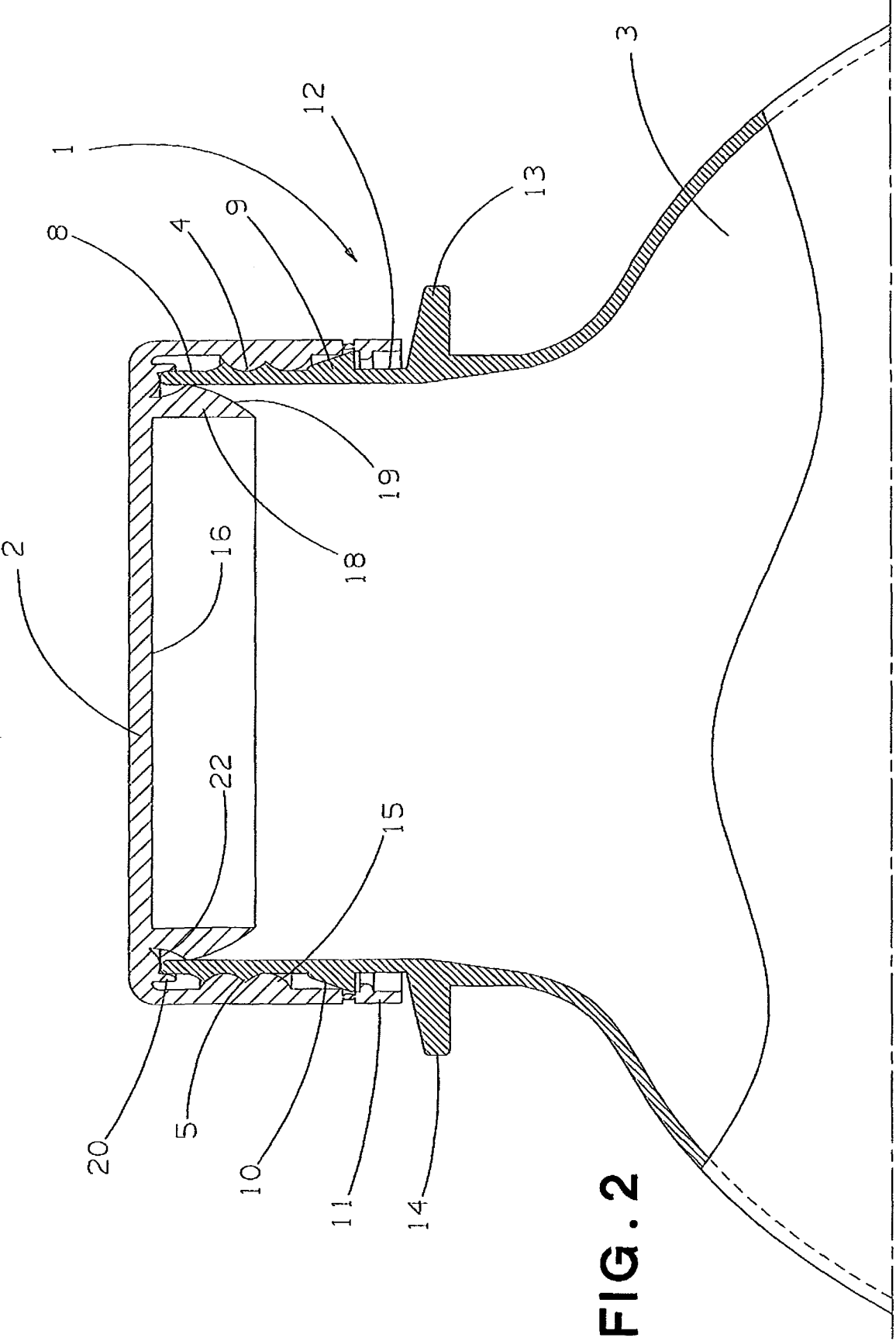


FIG. 2

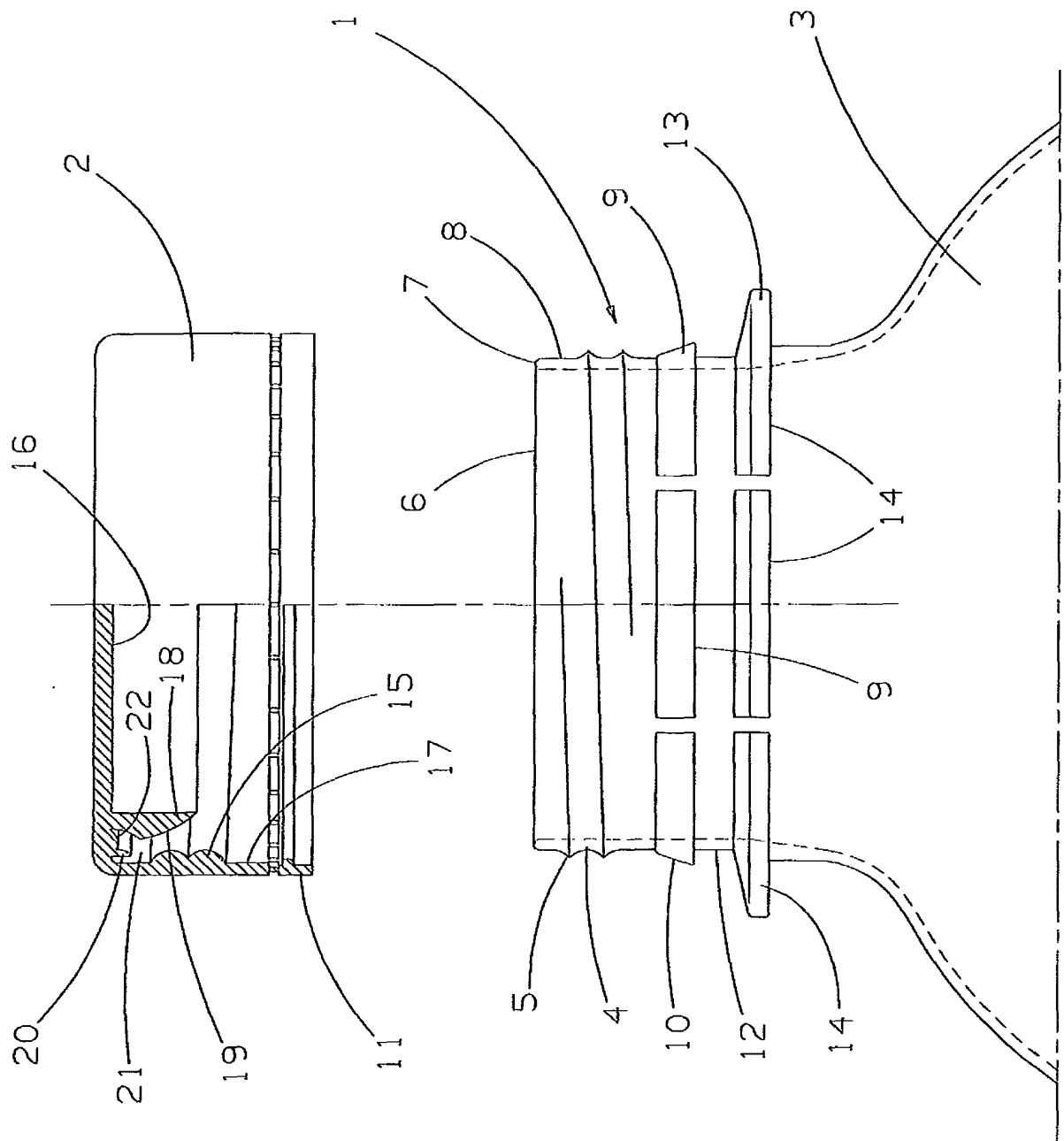


FIG. 3

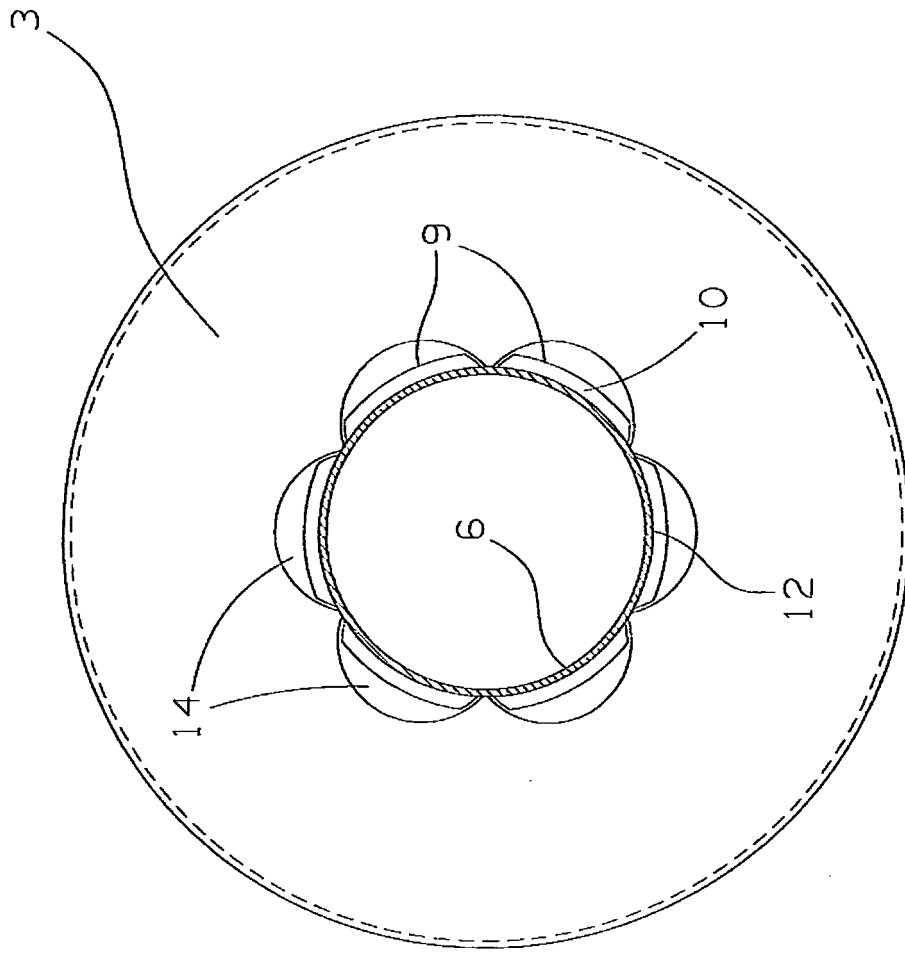


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 20020043512 A1 [0001]
- US 20090283494 A1 [0001]