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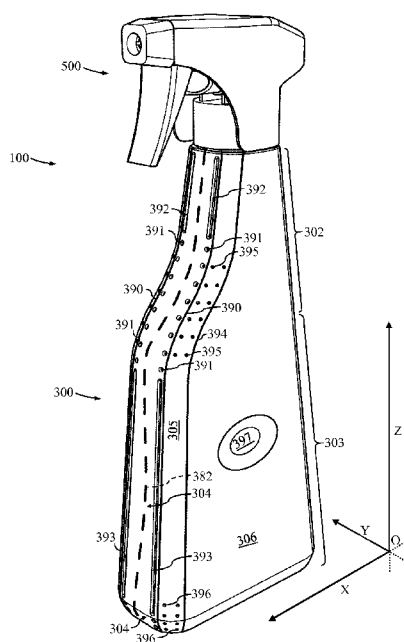


Fig. 1

(57) Abstract: Multifluid dispensing system comprising a receptacle of container in container type and an atomizer. Within the receptacle, between at least two of the component-units is provided a connecting-system that includes at least some of: at least one residual interface; at least one permanent-joint of adhesive or weld type; at least one reinforcing functional-form. The connecting-system preferably extends on the entire height of the receptacle. The parts of the connecting-system are preferably, at least partially, superimposed and contained within an operational-section. Additionally, within the receptacle is provided a partitioning-system that consists of at least one mobile-sector which develops via delamination from an internal component-unit. Within the receptacle is equally provided a compression-system that consists of at least one mobile-sector which also develops via delamination from an internal component-unit. The atomizer is made entirely of plastic, is of multifluid type, and comprises a return-spring having two curved arms, and a precompression valve-system.

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AMENDED CLAIMS
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1. Receptacle of container in container type, comprising one external component-unit and at least one internal component-unit, obtained from a preform-set through a blow-molding process,

characterized in that:

(I) a hybrid connecting-system is provided therein between at least two of the component-units in order to first help convert said receptacle into a multi-chamber one, and then operate the resulting said multi-chamber receptacle, wherein said hybrid connecting-system consists of at least two different elements with complementary roles:

i) at least one segment of a permanent-joint of non-breakable nature, in the shape of at least one line or stripe of adhesive and/ or weld type

wherein said permanent-joint is integrated into the structure of said receptacle in the manufacturing phase of the preform-set which said receptacle derives from

wherein at the end of the blow-molding process said permanent-joint is unable to fully reach its intended position i.e. preferably on the longitudinal median of said receptacle

and consequently, wherein said permanent-joint ends up having a non-orderly, most likely winding shape thus rendering necessary the use of a second connecting element so as to give the connecting-system a definite, predictable geometry

ii) at least one segment of a residual interface of non-unbreakable nature, therefore a connecting element susceptible to loosening under certain circumstances,

wherein said residual interface represents a remainder of the original interface between any two component-units of said receptacle, hence consisting of at least an area of non-unbreakable adhesive contact between said component-units

wherein said residual interface represents the largest component of said hybrid connecting-system in terms of covered area and therefore the general geometry of the entire said hybrid connecting-system coincides with that of said residual interface

wherein said residual interface is contained within a dedicated operational-section of said receptacle

wherein said operational-section represents a clearly demarcated area on the external structure of said receptacle by means of general design and/ or supplementary design features of said receptacle

wherein said operational-section is positioned preferably in the proximity of, and also preferably superimposed on, the longitudinal median of said receptacle

wherein the precise geometric characteristics of said operational-section provide accurate shaping for said residual interface and, consequently, for the entire said hybrid connecting-system

and wherein the components of said hybrid connecting-system are superimposed and thus reciprocally offer one another error margins with regard to manufacturing and operation, as follows:

- said residual interface, by virtue of its much larger size and precise geometry, covers physically and counterbalances functionally the winding, non-orderly final shape of said permanent-joint
- said permanent-joint acts as a safety feature preventing the free communication between the storage-compartments of said multi-chamber receptacle in case an unintended partial delamination process affecting said residual-interface takes place e.g. following an accidental deformation of said receptacle

and wherein said hybrid connecting-system extends preferably on the entire height but at least on one part of the height of said receptacle;

receptacle also characterized in that:

(II) a partitioning-system is provided therein so as to convert a single volume receptacle of container in container type into a multi-chamber one

wherein said partitioning-system is obtained by means of morphing an at least one internal component-unit into an internal divider between at least two storage-compartments

wherein said partitioning-system consists therefore of at least one mobile-sector which represents a surface that:

- i) develops from said at least one internal component-unit via a delamination process taking place between any two component-units of said receptacle
and, either simultaneously, or subsequently, also
- ii) undergoes a repositioning process

and wherein said delamination and repositioning processes occur:

- either prior to, or in the liquid-bottling stage of said receptacle, or over both of the previously indicated phases; and
- in a way that employs the use either of at least one fluid, or of mechanical means, or of a combination of the two;

and wherein said partitioning-system has its margins connected to the structure of said receptacle either (a.) partially, or (b.) completely, by means of the previously indicated hybrid connecting-system.

2. Claim 2 canceled.

3. Claim 3 canceled.

4. Claim 4 canceled.

5. Receptacle of claim 1 wherein a compression-system is provided so as to produce a decrease in the volume capacity of at least one storage-compartment therein during the cycle-of-use of said receptacle in step with liquid-utilization therefrom, wherein said compression-system consists of at least one mobile-sector which represents a surface that:

- i) develops from said at least one internal component-unit via a delamination process taking place between any two component-units of said receptacle

and, either simultaneously, or subsequently, also

ii) undergoes a repositioning process;

and wherein said delamination process occurs:

- either prior to, or over the cycle-of-use of the receptacle; and
- in a way that employs the use either of at least one fluid, or of mechanical means, or of a combination of the two;

and wherein said repositioning process preferably occurs:

- during the cycle-of-use of the receptacle; and
- in a way that employs the use of at least one fluid of which pressure-level can be either similar to, or different from that of the surrounding environment of said receptacle;

and wherein said compression-system has its margins connected to the structure of said receptacle either (a.) partially, or (b.) completely, by means of said hybrid connecting-system.

6. Receptacle of claims 1 and 5, wherein said partitioning-system and said compression-system share an at least one mobile-sector.

7. Receptacle of any one of claims 1, 5 or 6, having at least one functional-form, wherein a said functional-form represents any three-dimensional feature embedded anywhere therein with any precise functioning purpose, such as:

- i. to strengthen the connection between at least two of the component-units of the receptacle
- ii. to help demarcate at least one operational-section on the structure of said receptacle
- iii. to influence the shape and/ or path of movement of a mobile-sector in the course of a repositioning process of the same.

8. Receptacle of any one of claims 1, 5, 6 or 7, wherein at least one of:

- i. a mobile-sector

ii. a functional-form embedded within a mobile-sector,
by making use of the resilience of the material of which the corresponding at least one internal component-unit is produced, exhibits at least partially a non-linear type behavior in the course of a repositioning process.

9. Preform-set for producing a receptacle of container in container type of any one of claims 1, 5, 6, 7 or 8, comprising one external component-preform and at least one internal component-preform,

wherein at least one permanent-joint of adhesive or weld type is provided between at least two of the component-preforms in the form of at least one non-breakable line or stripe executed as at least one preferably substantially vertical segment, extending preferably on the entire height, but at least on one part of the height of the preform-set, and positioned preferably, but not mandatory, on the longitudinal median,

wherein the longitudinal median preferably matches the same of the resulting receptacle;

and wherein said preform-set equally comprises:

- i. at least one coupling element situated on the upper-segment of the external component-preform so as to enable the fitting to the resulting receptacle of a closing element such as, e.g., a dispensing head or atomizer;
- ii. a multicomponent pressure-equalization air-access mechanism, incorporated in the neck area,

wherein said pressure-equalization air-access mechanism helps balance at any given moment the pressure level inside the resulting multi-chamber receptacle, not only with respect to the outside, atmospheric pressure, but also between its internal compartments,

wherein said pressure-equalization air-access mechanism comprises inter alia:

- a) a built-in enclosure formed either: (1.) between two preferably concentric circular walls located in the upper-segment of the external component-preform; or (2.) between a preferably circular wall located in the upper-segment of the external component-preform and a

preferably circular wall located in the upper-segment of an at least one internal component-preform;

- b) a flexible circular flap acting as a check-valve, wherein upon assembling the flexible circular flap is inserted into said built-in enclosure, and wherein said flexible circular flap is either: (1.) attached to the upper-segment of an at least one internal component-preform; or (2.) is produced and fitted separately.

10. Claim 10 canceled.

11. Method for partitioning a receptacle of container in container type of any of claims 1, 5, 6, 7 or 8, and/ or derived from a preform-set of claim 9, with the specific purpose of converting a standard, single volume receptacle of container in container type into a multi-chamber one, in order to have the option of storing more than one fluid inside,

wherein the process involves morphing an internal component-unit of said receptacle into a partitioning-system, prior to the bottling process, as follows:

- i) in the first-stage, a receptacle of container in container type is provided in the state is in at the end of the blow-molding process;
- ii) in the second-stage, a preconfiguring process is carried out in the upper-segment area of the receptacle, in order to create at least one incipient storage-compartment in the area of the neck of the receptacle, by repositioning at least one lateral region present at the top end of an at least one internal component-unit, using either mechanical means, or at least one fluid, or a combination of the two;
- iii) in the third-stage, a two-phase complete configuring process is carried out as follows:
 - a) initially, by at least partially delaminating the external structure of the receptacle, starting the process within the previously indicated at least one incipient storage-compartment created in the preconfiguring stage in the area of the neck of the receptacle; and

- b) next, by repositioning, preferably towards the longitudinal median of the receptacle, at least one mobile-sector which develops from the structure of an at least one internal component-unit via the previously indicated delamination, and which said at least one mobile-sector starts dividing the internal volume of said receptacle at the time its repositioning starts;

and wherein said two phases of the third-stage, the delaminating and, respectively, the repositioning, are carried out:

1. either independently, or concurrently; and
2. by employing either mechanical means, or at least one fluid, or a combination of the two;

and wherein at the end of the partitioning process is obtained a partitioning-system which converts a standard, single volume receptacle of container in container type into a multi-chamber one, ready to store separately at least two fluids at once.

12. Method of claim **11**, wherein: (i.) preferably the whole third-stage, (ii.) but at least the second phase of the third-stage, namely the repositioning, is at least partially carried out during the liquid-bottling stage of the receptacle, utilizing at least one liquid that is actually being bottled, and thus finalizing the steps of the partitioning process concomitantly with the completion of the bottling process.

13. Atomizer for a receptacle of container in container type of any of claims **1, 5, 6, 7** or **8**, and/ or obtained from a preform-set of claim **9**, and/ or obtained via a method of any of claims **11** or **12**, comprising at least:

- i. a main body, having at least one cylinder;
- ii. a piston-set, comprising at least one piston;
- iii. an actuation element, preferably of trigger type;
- iv. a spraying nozzle;

wherein the forepart region of the main body comprises a cylindrical region continued towards the back-end by a frustoconical region, wherein the large base of the

frustoconical region is open, in continuation of the said cylindrical region, and the small base is closed;

and wherein said frustoconical region is intersected by at least one duct, wherein the inner-passageway of said at least one duct opens up inside the frustoconical region in the form of an aperture.

14. Atomizer of claim 13, comprising at least one of:

- i. a plastic return-spring having two curved arms which upon assembling sit on the lateral sides of the main body of the atomizer, wherein said plastic return-spring is secured via a fastening base to a console present at the rear end of the main body of the atomizer;
- ii. a precompression valve-system comprising at least one valve-subassembly which consists at least of: (a.) a valve; (b.) an annular seal; (c.) a bridge, which connects the valve and the annular seal;

wherein said valve consists at least of: (1.) a valve body; (2.) a sealing base; (3.) a flexible circular flap acting as a check-valve; (4.) a semiflexible crown functioning as a precompression mechanism;

and wherein said semiflexible crown:

- consists of a circular region at the top of the valve body operating as a nonpermanent sealing element against the walls of the corresponding valve housing;
- includes an inner horizontal wall that blocks the liquid circulation through the body of the valve and exerts control over the degree of flexibility of the semiflexible crown, hence also exerts control on the precompression;

wherein said at least one valve-subassembly is connected to any similar one by a bridge.

15. Claim 15 canceled.

Statement under Article 19(1)

EXOJET TECHNOLOGIES, in the capacity of applicant, herewith submits under the provisions of article 19 a new set of claims for the international patent application PCT/EP2019/079574, set of claims fully compliant with Article 19 (2) PCT. Alongside the new, amended set of claims, an explanatory letter is also being submitted.

The amended set of claims aims at further clarifying the scope of protection claimed for this patent application.

The new, amended set of claims comprises only one independent claim, i.e. claim **1**, all the other previous independent claims – namely claim **9**, claim **11** and claim **13** – having been modified so as to now stand as dependent claims.

Furthermore, the scope of protection claimed in the independent claim **1** was considerably restricted by (i) significantly expanding the text of claim **1** as filed, based strictly on the description and drawings, and by (ii) adding the subject matter of some of the subsequent dependent claims as filed. The resulting amended claim **1** is therefore much more specific and granular, and for that reason much more limited in its scope.

As mentioned above, the independent claim **1** now incorporates the subject matter of claim **1** as filed – in greater detail, as explained – and also of the subsequent dependent claims **3** and **4** as filed.

Consequently, claims **3** and **4** as filed were canceled. Claims **2**, **10** and **15** as filed were canceled as well.

Particular attention was paid to further clarify that the subject matter of claim **13** as filed – and also as amended – is part of the same invention and not a separate endeavor.