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(54) **REFILL SYSTEM**

(57) A description is given of a refill system (1) comprising:

- a container (4) for a liquid-containing medium, said container being provided with an opening (2) having a screw thread (3);
- a refill container (7) for a medium, said refill container being provided with an opening (5) having a screw thread (6) or click-fit connection; and
- an assembly of connector parts (A;B) which can be attached between the container (4) and the refill container (7) and which is composed of the connector part (A) which can be attached to the opening (2) of the container (4) and the connector part (B) attached to the opening (5) of the refill container (7), wherein the connector parts (A,B) are designed to bring about a mutual exchange of media and air between the refill container and the container in a coupled state.

Technical measures are proposed for providing a leak-free, child-resistant refill system that makes a rapid exchange of medium and air possible.

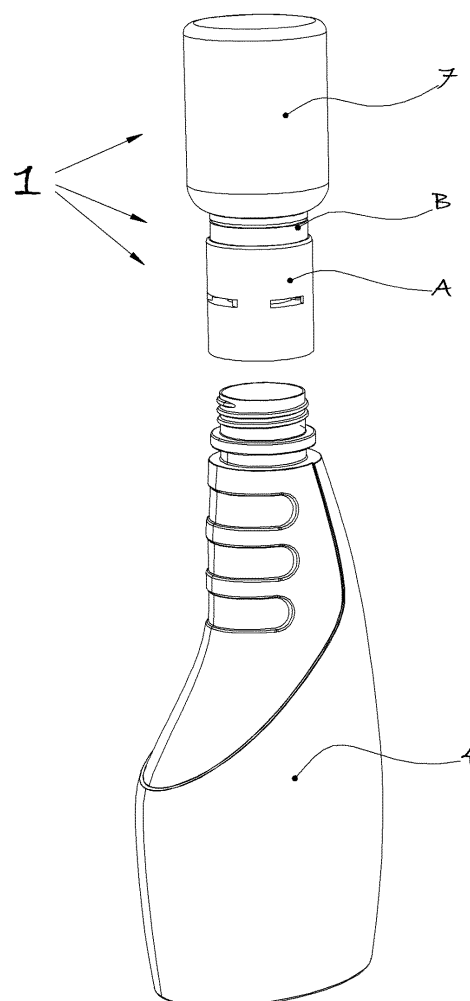


Fig. 1

## Description

**[0001]** The present invention relates to a refill system comprising:

- a container for a liquid-containing medium, said container being provided with an opening having a screw thread;
- a refill container for a medium, said refill container being provided with an opening having a screw thread or click-fit connection; and
- an assembly of connector parts which can be attached between the container and the refill container in a longitudinal direction with respect to each other and which is composed of the connector part which can be attached to the opening of the container and the connector part attached to the opening of the refill container, wherein the connector parts are designed to bring about a mutual exchange of media and air between the refill container and the container in a coupled state.

**[0002]** Such a refill system is known, see for example US-2011/042944. A disadvantage thereof is that the contents of the refill container do not flow into the container in an automatic and leak-free manner via the mutually coupled connector parts. It is therefore usually the case that the refill system as a whole has to be shaken several times or has to be struck in order to stimulate an exchange of media, often liquids and air, and to allow the container to be filled from the refill container. Since the refill system is then not child-resistant or completely leak-free, dangerous situations arise, specifically in the case of aggressive media.

**[0003]** It is an object of the present invention to provide a leak-free and child-resistant refill system that does not possess the above-mentioned disadvantages.

**[0004]** To that end, the refill system according to the invention has the features of claim 1.

**[0005]** An advantage of the refill system according to the invention is that after the mutual coupling of the connector parts A and B, said connector parts are fitted to one another in a leak-free manner and cannot be disconnected from one another. A further advantage is that the connector part B may optionally already be fitted on the refill container upon purchase, which saves on a separate cap on the refill container. In any case, since connector part A is not yet fastened to the container, the assembly A, B is coupled in a leak-free manner. It is only during the further screwing of the container onto the connector part A that the first and second seals present therein are lifted and the ventilation opening and the medium through-flow openings are freed. Furthermore, the presence of the two types of openings which are separate from each other results in improved ventilation, as a result of which the medium from the refill container flows to the container in a direct and unobstructed manner in order there to be able to mix in a satisfactory manner with the

possibly already present medium and/or added water. It is furthermore advantageous that the refill system according to the invention only necessitates the purchase of the refill container, which is a lot smaller in practice, instead of it being necessary to buy a container which is often larger and which has, for example, a closure cap. In this way, less material, in particular plastic, specifically for the manufacture of the refill container, is required, which additionally takes up less shelf space in the retail venue. In practice, a greater concentration of the medium in the smaller refill container ensures that there is a smaller transport volume and that there is less contaminating material from which the container and the refill container are generally manufactured.

**[0006]** According to the invention, one embodiment of the refill system has the feature that one or both of the aforementioned inner regions has/have a circular cross section.

**[0007]** Circular cross sections lead both to a good seal and to a very good through-flow of medium and air. A possible central positioning of one or both of the aforementioned types of openings in further embodiments improves the through-flow profile, the through-flow volumes and the through-flow rates of the media even more.

**[0008]** According to the invention, a further embodiment of the refill system has the feature that the first seal is provided at the end of a funnel shape which narrows in the axial direction from that end face of the connector part which faces towards the container.

**[0009]** The clear spatial separation of the two types of openings from one another here is an advantage that leads to a situation whereby the air flowing back from the container to the refill container and the medium flowing the other way, downward, on account of the exerted gravitational force similarly flow separately from one another.

**[0010]** Further detailed possible embodiments of the refill system according to the invention, which are outlined in the other claims, are mentioned in the following description, together with the associated advantages.

**[0011]** The refill system according to the present invention will now be explained in more detail on the basis of the figures below, in which corresponding components are provided with the same reference numerals. In the figures:

Figure 1 shows an overview of the refill system according to the invention composed of the coupled connector parts A and B with the refill container 7 with the container 4 to be refilled below it.

Figure 2 shows an exploded representation in cross section of the refill system of Figure 1;

Figures 3 and 3A each respectively show, in cross section, a refill container with the mutually coupled connector parts A, B attached thereto and, in detail 3A, the coupled connector parts A, B of the refill system of Figure 1, wherein the two openings therein are sealed by seals;

Figures 4 and 4A each respectively show, in cross

section, the refill container with the mutually coupled connector parts A, B attached thereto and, in detail 4A, these coupled connector parts A, B of the refill system of Figure 1, in which the two openings are open;

Figure 5 shows a detail in cross section at the location of the click-fit connection 24-1, 24-2 in order to explain the interaction during the lifting of the seals present in connector part B;

Figure 6 shows the threaded neck of the container (not shown in any more detail) with a schematic indication of the large resulting axial force in the case of a small exertion of radial force; and

Figures 7 and 8 show combinations of nine images, in which the respective connector parts A and B are shown in various views.

**[0012]** Figures 1 and 2 show a refill system 1 comprising a container 4 for a frequently liquid-containing medium, said container being provided with a neck having an opening 2 with a screw thread 3 thereon. Furthermore, the system 1 comprises a refill container 7 specifically for powdered and/or liquid-containing media, said refill container being provided with an opening 5 having, in this case, a screw thread 6, and an assembly of connector parts A, B which can be attached between the container 4 and the refill container 7 in the longitudinal direction with respect to each other. Said assembly is composed of the connector part A which can be attached to the opening 2 of the container 4 and the connector part B attached to the opening 5 of the refill container 7.

**[0013]** Figure 3 and detail 3A show, in a manner which will be explained in more detail, how the connector parts A and B are designed to bring about an exchange of media and air between the refill container 7 and the container 4 in a coupled state.

**[0014]** To this end, the connector part A is delimited by end faces 8-1, 8-2 located opposite each other as seen in the axial direction and comprises a circumferential cavity 9 which extends axially from the end face 8-1 facing towards the container 4. The cavity 9 contains an internal screw thread 10 for screwing in the screw thread 3 of the container 4, which cavity 9 itself is axially delimited by a recessed stop edge 11. Medium through-flow openings 12 are provided in an inner region 13 separate from the circumferential cavity 9, wherein a ventilation opening 14 is provided in the inner region 13 at an axial spacing from the end face 8-1.

**[0015]** Furthermore, the connector part B is to this end axially delimited by end faces 15-1, 15-2 located opposite each other and comprises a circumferential cavity 16 which extends from the end face 15-2 facing towards the refill container 7 and in which an internal screw thread 17 is located for, in this case, screwing in the screw thread 6 of the refill container 7. Medium through-flow openings 18 are provided in an inner region 19 which is separate from the circumferential cavity 16 and in which a first seal 20 is provided which is designed to seal the ventilation

opening 14 in the connector part A when the connector parts A and B are being coupled, and wherein, at the location of that end face 15-1 of the connector part B which faces towards the connector part A, a second seal 21 is provided which is designed to seal the medium through-flow openings 12 in the connector part A when the connector parts A and B are being coupled.

**[0016]** One or more slots 22 are provided in the stop edge 11 of the connector part A. The combination figure 7 shows four in this embodiment. And the connector part B is provided with ribs 23 which fit into the slots 22, the ribs 23 sliding over the stop edge 11 towards the slots 22 during the coupling, and the mutual twisting, of the connector parts A and B in order to subsequently protrude through the slots 22.

**[0017]** A click-fit edge 24-1 is located on the outer circumference of the connector part B and a corresponding click-fit edge 24-2 is located on the inner circumference of the connector part A, said click-fit edges being snapped over each other in the detail of Figure 3A. This means the connector parts A and B have become immovable in relation to each other, and the ventilation opening 14 and the medium through-flow openings 12 are sealed by the first and second seals 20, 21, respectively. In this coupled state of the refill system 1, the parts A and B are connected to one another in an inseparable manner ex works by way of the click-fit members 24-1 and 24-2 which engage in one another.

**[0018]** This is shown in greater detail in Figure 5. As is known, the click-fit edge angle  $\beta$  shown herein plays an important role in the case of the force which, based on the pitch of the screw thread 3 on the neck of the container 4 which can be twisted, as shown in Figure 6, has to be exerted on the click-fit edges in order to allow said click-fit edges to be click-fitted forward or back with a certain force and audibility.

**[0019]** In the coupled state, the connected parts A and B may, by way of part B, possibly also be screwed to the refill container 7 in an inseparable manner ex works by means of further click-fit members. In that case, the connector part B and the opening 5 of the refill container 7 are thus provided, in a manner not shown and already known per se, with such click-fit members which engage in one another.

**[0020]** After the refill container 7 has been screwed into connector part B and the container 4 has been screwed into connector part A, further relative rotation of the refill container 7 and the container 4 ensures that the ribs 23 of the connector part B which protrude through the slots 22 in the stop edge 11 of the connector part A come into contact with the opening 2 of the container 4. The neck of the opening 2 has an upper edge 25 which, upon that contact, pushes the ribs 23 backwards into the slots 22. In this way, the aforementioned click-fit edges 24-1 and 24-2 snap back over each other, with the result that the connector part B, together with the first and second seals 20 and 21, respectively, are lifted and the ventilation opening 14 and the medium through-flow open-

ings 12 are freed. In this case, medium runs from the refill container 7 to the container 4, and conversely air flows from the container 4 to the refill container 7 for the purpose of ventilation. A smooth discharge of the refill container 7 is ensured by this good manner of ventilation, without it being necessary to shake the system 1 for this purpose. After the lifting, connector part B remains hooked with its click-fit edges 24-1 under the click-fit edges 24-3 of connector part A, as a result of which the two connector parts A and B cannot disconnect from one another. In addition, at every stage of coupling of the parts A, B with one another and/or the container 4 or container 7, the system 1 is leak-free and, as a result of its inseparability, child-resistant. It is noted that the intended child safety is specifically achieved because, in the coupled state of the refill system 1, the parts A and B are connected to one another in an inseparable manner ex works by way of the click-fit members 24-1 and 24-2 which engage in one another. A child will not be able to rotate the refill container 7 together with the two connector parts A and B on the container 4, let alone be able to subsequently rotate the refill container 7 together with the two connector parts A and B further on the container 4 such that the ribs 23 of the connector part B which protrude through the slots 22 in the stop edge 11 of the connector part A are pushed backwards into the slots 22 to the extent that the click-fit edges 24-1 and 24-2 snap over each other. This is independent of whether or not the additional click-fit edges 24-3 are present. From a child safety standpoint, these may also be omitted, but should advantageously be included in order to prevent the two connector parts A and B from coming completely loose from one another after the click-fit edges 24-1 and 24-2 have been forcedly snapped over each other.

**[0021]** Preferably, the aforementioned inner regions 13 and/or 19 have a circular cross section. The inner regions 13, 19 shown are here divided into segments which are delimited and reinforced by reinforcing ribs 26. Preferably, for the purpose of an optimal flow profile of the respective media, including the air, both the ventilation opening 14 and its first seal 20 lie centrally in the inner regions 13, 19 and/or the medium through-flow openings 12 and its second seal 21 lie centrally in the inner regions 13, 19.

**[0022]** In order to ensure that the medium flowing downward from the container 7 and the air rising from the container 4 are separated from one another as far as possible, the first seal 20 is provided at the end of a funnel-shaped member 27 which narrows in the axial direction from that end face 8-1 of the connector part A which faces towards the container 4. This has the benefit of accelerating the exchange of the respective media.

**[0023]** In addition to the one or more slots 22, stops 28 are provided on the stop edge 11 of the connector part A which prevent the twisting of the ribs 23 over the upper side of the aforementioned stop edge 11 and, in that state, position the ribs 23 in front of the slots 22, through which said ribs pass upon further twisting. This results in

improved positioning and centring.

**[0024]** The refill system 1 and its connector parts 7, A and/or B are preferably manufactured from one and the same plastic, and can in this case advantageously be manufactured as individual unitary parts.

## Claims

### 1. Refill system (1) comprising:

- a container (4) for a liquid-containing medium, said container being provided with an opening (2) having a screw thread (3);
- a refill container (7) for a medium, said refill container being provided with an opening (5) having a screw thread (6) or click-fit connection; and
- an assembly of connector parts (A; B) which can be attached between the container (4) and the refill container (7) in a longitudinal direction with respect to each other and which is composed of the connector part (A) which can be attached to the opening (2) of the container (4) and the connector part (B) attached to the opening (5) of the refill container (7), wherein the connector parts (A; B) are designed to bring about a mutual exchange of media and air between the refill container (7) and the container (4) in a coupled state,

wherein the connector part (A), as seen in an axial direction, is delimited by end faces (8-1, 8-2) located opposite each other and comprises a circumferential cavity (9) which extends axially from the end face (8-1) facing towards the container (4) and in which an internal screw thread (10) is located for screwing in the screw thread (3) of the container (4), which circumferential cavity (9) is axially delimited by a recessed stop edge (11), wherein medium through-flow openings (12) lie in an inner region (13) separate from the circumferential cavity (9), and wherein a ventilation opening (14) is provided in the inner region (13);

wherein the connector part (B), as seen in an axial direction, is delimited by end faces (15-1, 15-2) located opposite each other and comprises a circumferential cavity (16) which extends from the end face (15-2) facing towards the refill container (7) and in which an internal screw thread (17) is located for screwing in the screw thread (6) of the refill container (7), wherein medium through-flow openings (18) lie in an inner region (19) separate from the last-mentioned circumferential cavity (16), and wherein, in the last-mentioned inner region (19), a first seal (20) is provided which is designed to seal the ventilation opening (14) in the connector part (A) when the connector parts (A; B) are being coupled, and wherein,

at the location of that end face (15-1) of the connector part (B) which faces towards the connector part (A), a second seal (21) is provided which is designed to seal the medium through-flow openings (12) in the connector part (A) when the connector parts (A; B) are being coupled,

wherein one or more slots (22) are provided in the stop edge (11) of the connector part (A), and the connector part (B) is provided with ribs (23) which fit into the slots (22), the ribs (23) sliding over the aforementioned stop edge (11) towards the slots (22) during the coupling, and the mutual twisting, of the connector parts (A; B) in order to subsequently protrude through the slots (22), wherein a click-fit edge (24-1) provided on the outer circumference of the connector part (B) and a click-fit edge (24-2) provided on the inner circumference of the connector part (A) snap over each other, as a result of which the connector parts (A; B) are secured in a non-movable manner, and the ventilation opening (14) and the medium through-flow openings (12) are hermetically sealed by the first and second seals (20, 21), respectively, and

wherein after the refill container (7) has been screwed into connector part (B) and the container (4) has been screwed into connector part (A), further relative rotation of the refill container (7) and the container (4) ensures that the ribs (23) of the connector part (B) which protrude through the slots (22) in the stop edge (11) of the connector part (A) come into contact with the opening (2) of the container (4), said opening having an upper edge (25), as a result of which the ribs (23) are pushed backwards into the slots (22) and the aforementioned click-fit edges (24-1, 24-2) snap back, with the result that the connector part (B), together with the first and second seals (20, 21), is lifted and the ventilation opening (14) and the medium through-flow openings (12) are freed.

2. Refill system according to claim 1, **characterized in that** one or both of the aforementioned inner regions (13, 19) has/have a circular cross section.
3. Refill system according to claim 1 or 2, **characterized in that** the ventilation opening (14) and its first seal (20) lie centrally in their respective inner regions (13, 19).
4. Refill system according to one of claims 1-3, **characterized in that** the medium through-flow openings (12) and its second seal (21) lie centrally in their aforementioned inner regions (13, 19).
5. Refill system according to one of claims 1-4, **characterized in that** the first seal (20) is provided at the end of a funnel shape (27) which narrows in the axial direction from that end face (8-1) of the connector

part (A) which faces towards the container (4).

6. Refill system according to one of claims 1-5, **characterized in that**, in addition to the one or more slots (22), stops (28) are provided on the stop edge (11) of the connector part (A) which prevent the twisting of the ribs (23) over the aforementioned stop edge (11) and position the ribs (23) in front of the slots (22), through which said ribs pass upon further rotation.
7. Refill system according to one of claims 1-6, **characterized in that** the connector part (B) and the opening (5) of the refill container (7) are further provided with click-fit members which can engage in one another, in such a way that said connector part and opening can be connected to one another thereby in an inseparable manner.
8. Refill system according to claim 7, **characterized in that** the screw thread (17, 6) on the connector part (B) and/or the refill container (7), respectively, is/are designed in such a way that they cannot be unscrewed from one another.
9. Refill system according to one of claims 1-8, **characterized in that** the connector part (B) and the refill container form one component.
10. Refill system according to one of claims 1-9, **characterized in that** the screw thread (17, 6) on the connector part (B) and/or the refill container (7), respectively, is a screw thread with a pawl function.
11. Refill system according to one of claims 1-6, **characterized in that** the connector part (B) and the refill container (7) are connected to one another by means of a click-fit connection with a positive lock.
12. Refill system according to one of claims 1-6, **characterized in that** the connector part (A) is provided with additional click-fit edges (24-3) which are designed to make the connector parts (A) and (B) non-releasable even after opening.
13. Refill system according to one of claims 1-12, **characterized in that** the connector parts (A, B) are manufactured from a plastic.
14. Refill system according to one of claims 1-13, **characterized in that** the connector parts (A, B) and the refill container (7) are manufactured from the same plastic.

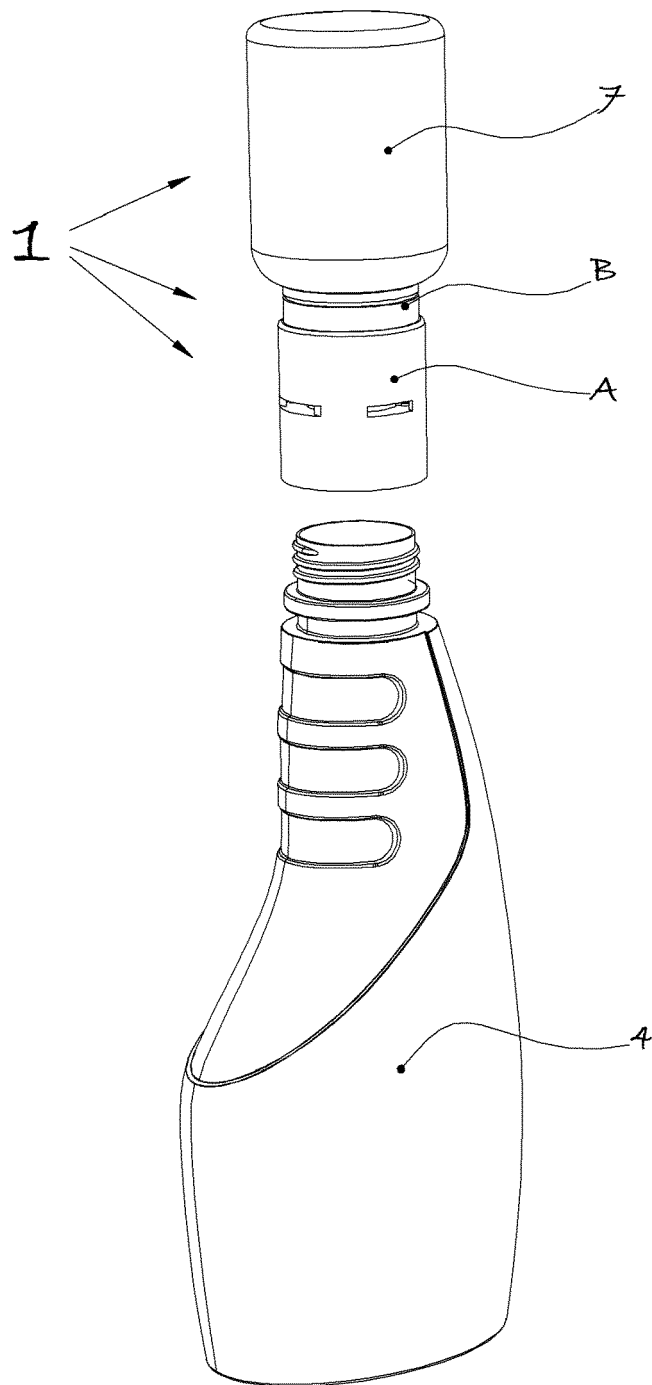


Fig. 1

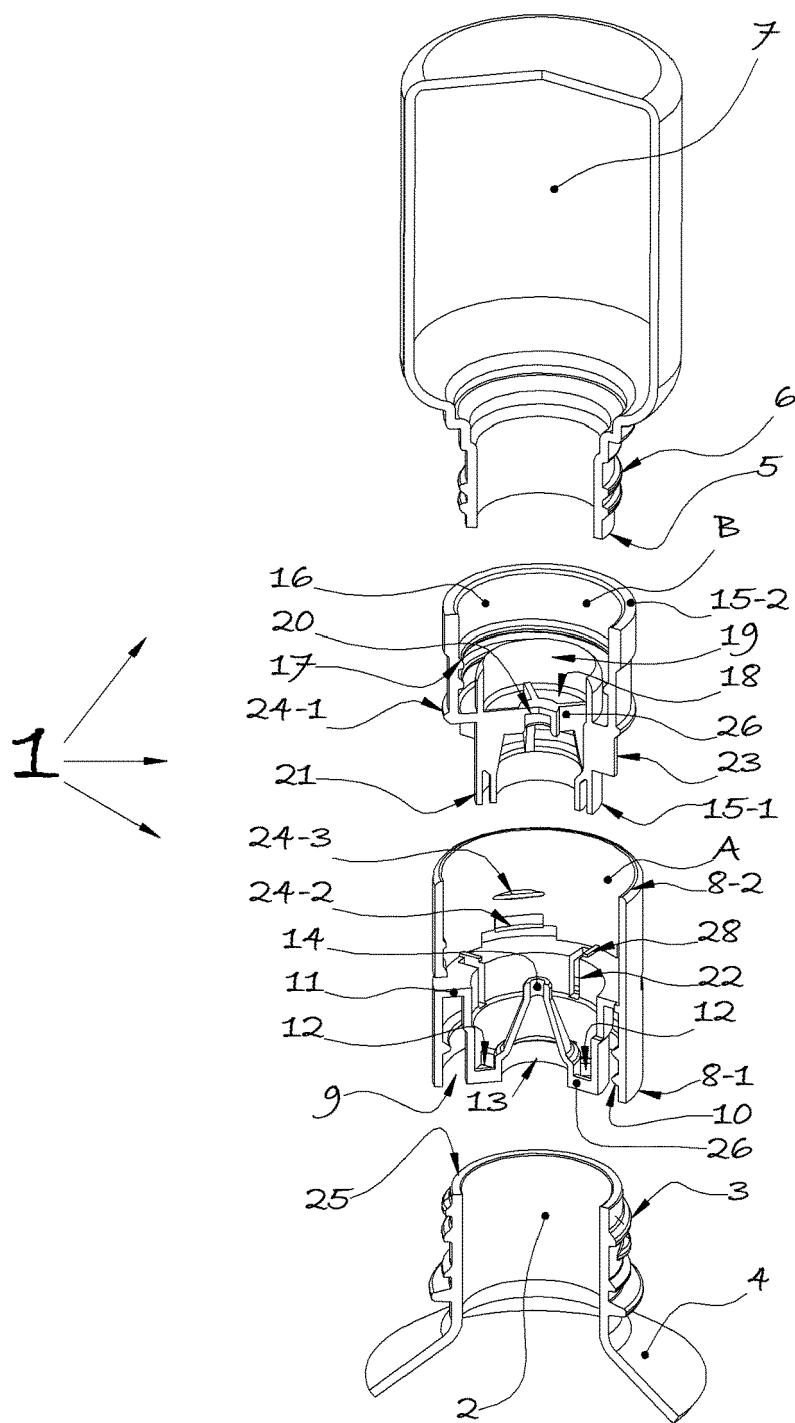


Fig. 2

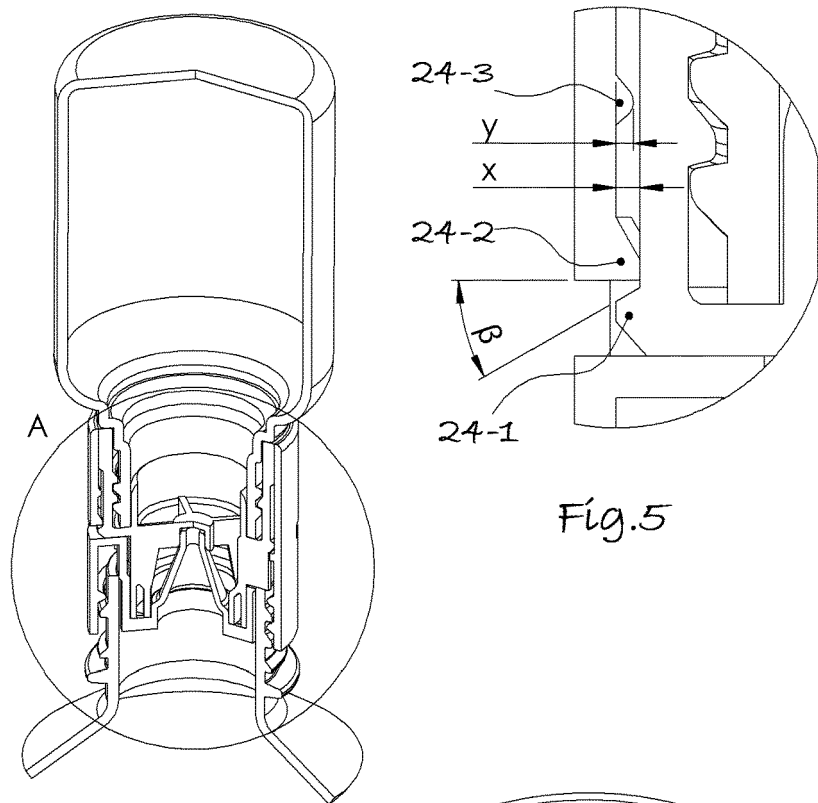


Fig.5

Fig.3

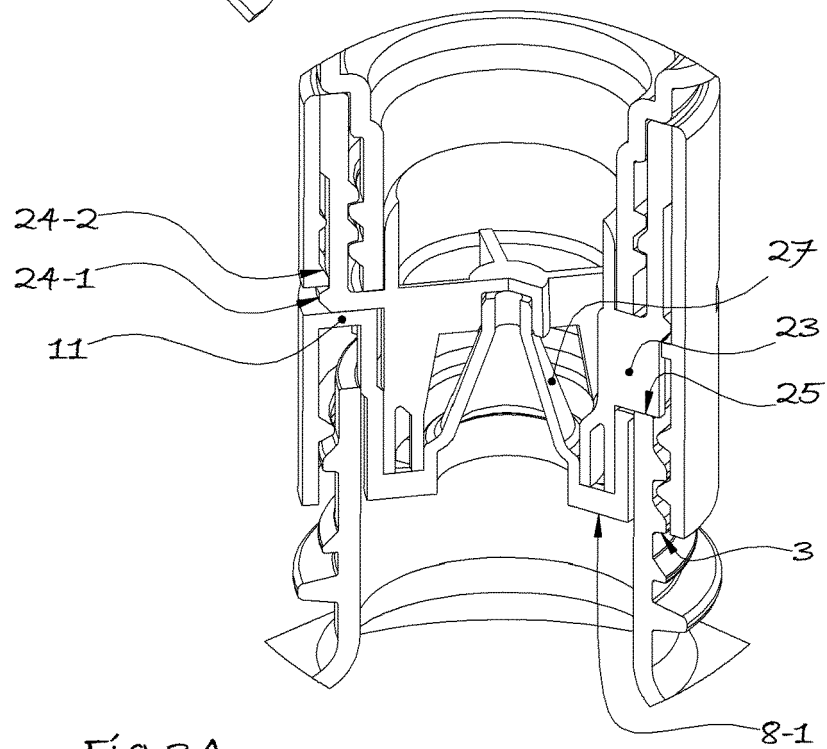


Fig.3A



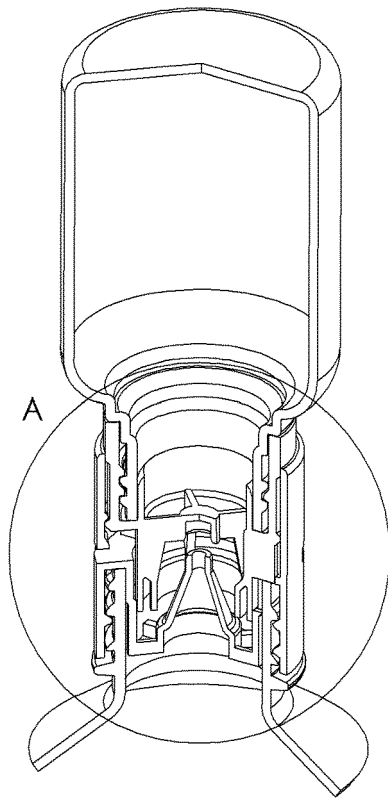


Fig. 4

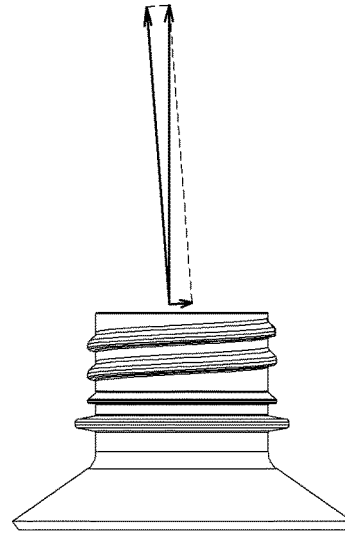


Fig. 6

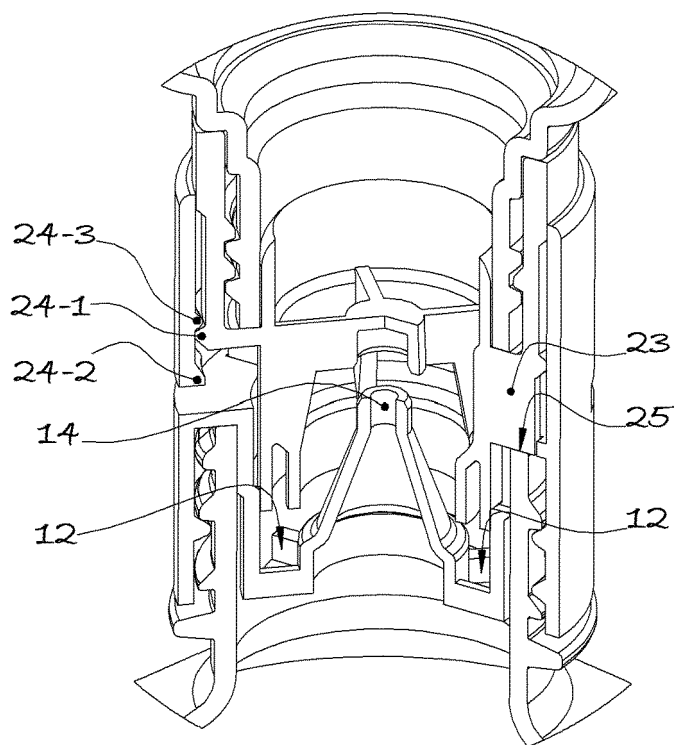


Fig. 4A

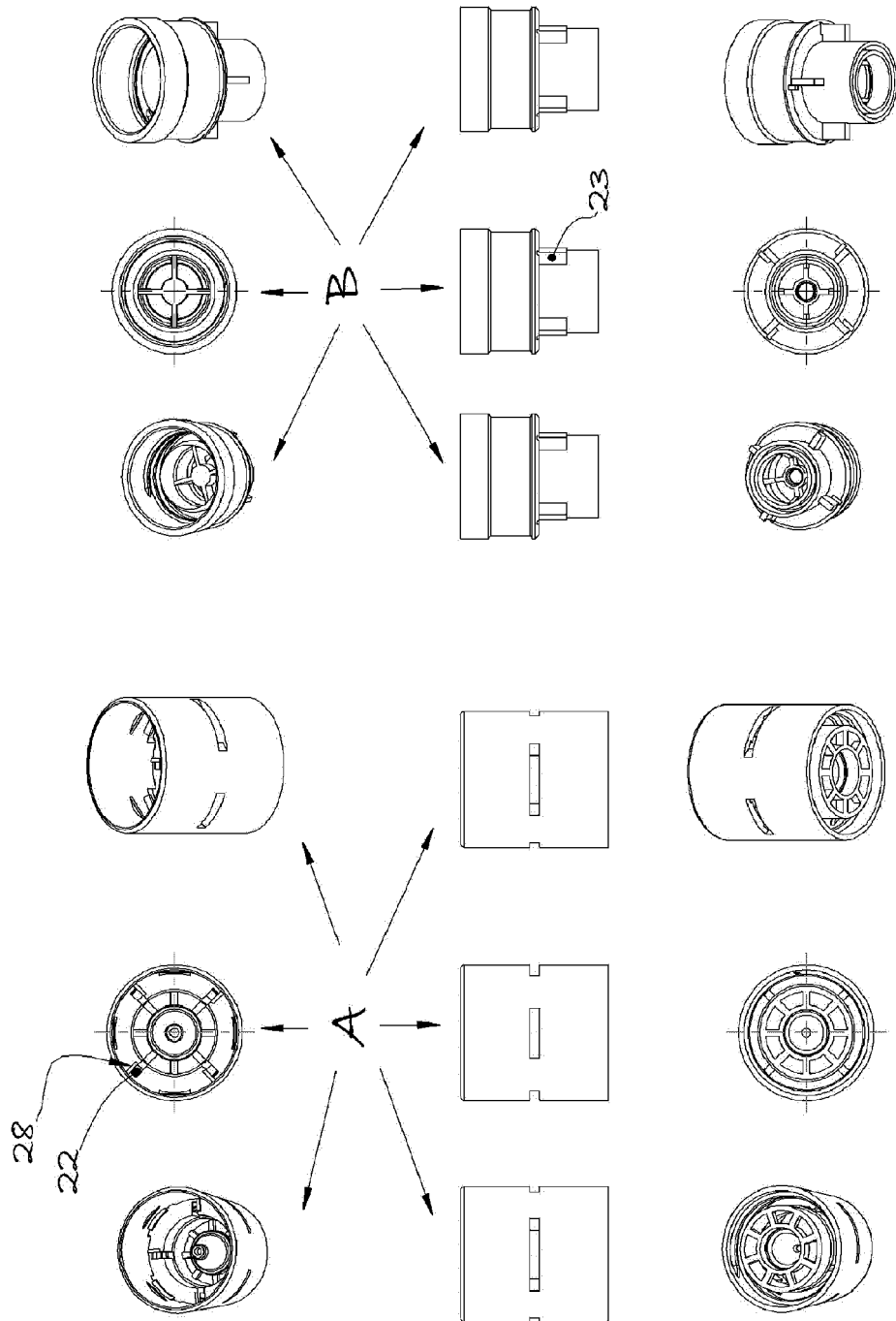


Fig.8

Fig.7



## EUROPEAN SEARCH REPORT

Application Number  
EP 21 16 9829

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2011/042944 A1 (JOHNS GARRY PATRICK [US] ET AL) 24 February 2011 (2011-02-24) * the whole document *	1	INV. B65D81/32
A	US 5 908 107 A (BAUDIN GILLES [FR]) 1 June 1999 (1999-06-01) * the whole document *	1	
A	US 6 135 275 A (KELDERS JAN [NL] ET AL) 24 October 2000 (2000-10-24) * the whole document *	1	
A	US 3 489 306 A (BUBB MAX J) 13 January 1970 (1970-01-13) * the whole document *	1	
A	EP 0 528 707 A1 (OREAL [FR]) 24 February 1993 (1993-02-24) * the whole document *	1	
A	US 2009/308889 A1 (LINDSAY FRANK [US] ET AL) 17 December 2009 (2009-12-17) * the whole document *	1	TECHNICAL FIELDS SEARCHED (IPC) B65D
A	DE 203 08 059 U1 (KLEIN WALTER [DE]) 14 August 2003 (2003-08-14) * the whole document *	1	
A	GB 2 279 069 A (MCIVER ARCHIBALD GERARD [GB]) 21 December 1994 (1994-12-21) * the whole document *	1	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 6 September 2021	Examiner Van Dooren, Marc
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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ON EUROPEAN PATENT APPLICATION NO.**

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5

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50

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011042944 A1	24-02-2011	US 2011042944 A1	24-02-2011
		WO 2011025745 A1	03-03-2011
-----			
US 5908107 A	01-06-1999	AR 011725 A1	30-08-2000
		CA 2235081 A1	06-11-1998
		DE 69807577 T2	09-01-2003
		EP 0881165 A1	02-12-1998
		ES 2183297 T3	16-03-2003
		FR 2763048 A1	13-11-1998
		JP 2948201 B2	13-09-1999
		JP H10310179 A	24-11-1998
		US 5908107 A	01-06-1999
-----			
US 6135275 A	24-10-2000	AT 194808 T	15-08-2000
		AU 722686 B2	10-08-2000
		CA 2265540 A1	12-03-1998
		CN 1229395 A	22-09-1999
		CZ 292916 B6	14-01-2004
		DE 19635833 A1	05-03-1998
		DK 0925234 T3	13-11-2000
		EP 0925234 A1	30-06-1999
		ES 2149013 T3	16-10-2000
		GR 3034302 T3	29-12-2000
		HU 0000260 A2	28-06-2000
		JP 3703852 B2	05-10-2005
		JP 2000517274 A	26-12-2000
		NO 319411 B1	08-08-2005
		PL 331698 A1	02-08-1999
		PT 925234 E	29-12-2000
		RU 2230695 C2	20-06-2004
		SK 27899 A3	10-09-1999
		US 6135275 A	24-10-2000
		WO 9809886 A1	12-03-1998
-----			
US 3489306 A	13-01-1970	DE 1632445 A1	10-12-1970
		GB 1191986 A	13-05-1970
		US 3489306 A	13-01-1970
-----			
EP 0528707 A1	24-02-1993	AT 122987 T	15-06-1995
		CA 2076193 A1	17-02-1993
		DE 69202650 T2	07-03-1996
		EP 0528707 A1	24-02-1993
		ES 2072727 T3	16-07-1995
		FR 2680357 A1	19-02-1993
		JP 2767346 B2	18-06-1998
		JP H05193677 A	03-08-1993

EPO FORM P0459

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

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EP 21 16 9829

5

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The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-09-2021

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 5277303 A	11-01-1994
US 2009308889 A1	17-12-2009	NONE	
DE 20308059 U1	14-08-2003	NONE	
GB 2279069 A	21-12-1994	NONE	

15

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

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- US 2011042944 A [0002]