



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
30.12.2015 Bulletin 2015/53

(51) Int Cl.:
E03D 9/03 (2006.01)

(21) Application number: **15173310.2**

(22) Date of filing: **23.06.2015**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
MA

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(30) Priority: **23.06.2014 SE 1450777**

(54) **A LIQUID DOSING UNIT FOR A TOILET FLUSHING SYSTEM**

(57) A liquid dosing unit for providing detergent to a WC suit is provided. The liquid dosing unit comprises a dosing piping (120, 220) having two open ends (140a, 140b), of which at least one open end (140a) is connecting to an outlet valve (130) of the WC suit, and a water trap (110, 210) arranged between said two open ends (140a, 140b) at a position vertically above said open ends (140a, 140b). The water trap (110, 210) of the dosing piping (120, 220) is configured to enclose detergent, and when the outlet valve (130) is opened for flushing the WC suit, air entrapped in said dosing piping (120, 220) will push detergent arranged at the water trap (110, 210) to flow out from one of said open ends (140a, 140b).

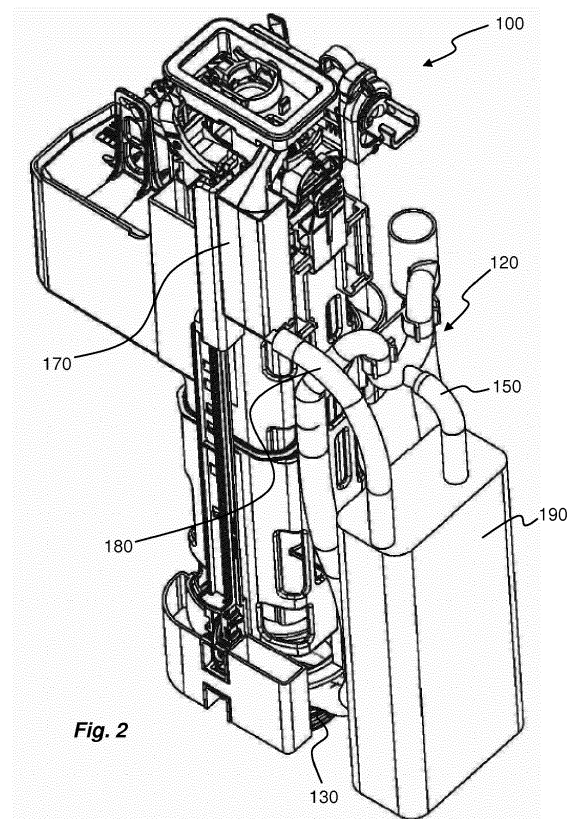


Fig. 2

Description

Technical Field

[0001] The present invention relates to a liquid dosing unit for toilet flushing system. In particular the present invention relates to a liquid dosing unit for providing detergent to a WC suit.

Background

[0002] Different types of cleaning system to be used in a toilet flushing system of a WC suit exist on the market. One common system is provided by attaching a detergent container in the toilet bowl, e.g. under the rim or to the interior of the toilet tank by suction cups or similar. With every flush these systems will release detergent solution into the bowl, since flushing water will be allowed to enter at least a part of the container during flushing and upon exit draw detergent into the trap of the WC suit. Although such systems results in a fresh appearance in the toilet bowl, there is a risk that the containers come loose and thus falls into the bowl creating an obstacle in the toilet. In addition, the dosing volume varies over time with a higher dose of detergent solution when the container is full and a lower dose when the container starts to run empty. Furthermore, these kinds of systems require the user to arrange the container in and out of the toilet bowl when re-filling. This may be considered as a hygienic hazard, especially at public toilets.

[0003] Another system, as described in EP1756372 by the same inventor, operates by allowing a solid state chemical to partly dissolve during flushing.

[0004] Other systems have been proposed for which liquid detergents are used to clean the WC suits. One such system is described in EP2696003, wherein a feed tank has an inner chamber that contains service liquid. A siphon system connects the chamber to a branch opening that communicates with a drain hole. The described system is extremely complex, and requires the use of tanks with inner chambers in order to provide the desired functionality. Further to this, since dosing is provided by a suction force the system is not suitable for high viscous liquids. Hence, there is a need for an improved dosing unit that has a less complex construction, although providing full functionality also for high viscous liquids.

Summary

[0005] Accordingly, the present invention preferably seeks to mitigate or eliminate one or more of the above-identified deficiencies in the art singly or in any combination and solves at least the above mentioned problems by providing liquid dosing unit for providing detergent to a water trap of a WC suit.

[0006] An idea of the present invention is therefore to provide an efficient liquid dosing unit for providing detergent to a WC suit in a safe manner, and using a simple

and robust construction.

[0007] A WC suit should in this context be interpreted broadly as any flush toilet, either standing on the floor or wall-hung.

5 [0008] According to a first aspect, a liquid dosing unit for providing detergent to a WC suit is provided. The liquid dosing unit comprises a dosing piping having two open ends, of which at least one is connecting to an outlet of the WC suit, and a water trap arranged at a position vertically above said open ends. The water trap of the dosing piping encloses detergent such that when an outlet valve is opened for flushing the WC suit, air entrapped in said dosing piping will push detergent arranged at the water trap to flow out from one of said open ends. Optionally, 10 in case each one of the open ends is connecting to the outlet valve, air entrapped in the dosing piping will push detergent from the water trap to one the open ends and into the outlet valve.

[0009] The water trap of the dosing piping may be connected to one of the open ends via a first hose, and to the other open end via a second hose. The first hose may be connected to a first end of the water trap, and the second hose may be connected to a second end of the water trap.

20 [0010] In an embodiment, the first hose is connected to the first end of the water trap via a vent device. The vent device may form part of a funnel.

[0011] The outlet may be an outlet valve of a water cistern enclosing flushing water.

30 [0012] The dosing unit may further comprise a dosing reservoir enclosing detergent, wherein the dosing reservoir is connected to the water trap of the dosing piping for allowing detergent to flow from the dosing reservoir to the water trap.

35 [0013] The dosing reservoir may be connected to the water trap by means of a fluid channel. In an embodiment, the dosing reservoir has an outer shell comprising a flexible material.

[0014] The dosing reservoir may be arranged vertically below the water trap.

40 [0015] According to a second aspect, a piping for dosing liquid detergents to a WC suit is provided. The piping comprises two open ends, of which at least one end having means for connecting to an outlet valve of the WC suit, and a water trap arranged between said two open ends at a position which in use is vertically above said open ends. Optionally, each end comprises means for connecting to the outlet valve of the WC suit.

[0016] The water trap may comprise means for connecting said water trap to a dosing reservoir.

[0017] In an embodiment, the water trap of the dosing piping is connected to one of the open ends via a first hose, and to the other open end via a second hose.

45 [0018] The first hose may be connected to the first end of the water trap via a vent device.

[0019] According to a third aspect, a WC suit is provided. The WC suit comprises a liquid dosing unit according to the first aspect.

Brief Description of the Drawings

[0020] Further objects, features and advantages will appear from the following detailed description, with reference being made to the accompanying drawings, in which:

Fig. 1 is an isometric view of a flushing system of a WC suit comprising a liquid dosing unit according to an embodiment;

Fig. 2 is an isometric view of the liquid dosing unit shown in Fig. 1;

Fig. 3 is an isometric view showing parts of the liquid dosing unit shown in Fig. 2;

Fig. 4 is an isometric view showing parts of a liquid dosing unit according to an embodiment;

Fig. 5 is an isometric view of a dosing piping according to an embodiment;

Fig. 6 is an isometric view of a dosing piping before a flush has been initiated;

Fig. 7 is an isometric view of a dosing piping directly after a flush has been initiated;

Fig. 8 is an isometric view of a dosing piping after a flush has been initiated;

Fig. 9 is an isometric view of a water trap of a dosing piping according to a further embodiment; and

Fig. 10 is a cross-sectional view of the water trap shown in Fig. 9.

Detailed Description

[0021] The following description focuses on embodiments of the present invention applicable to a liquid dosing unit for providing detergent to a WC suit. The WC suit may be any kind of flush toilet, such as a floor-standing flush toilet or a wall-hung flush toilet.

[0022] In an embodiment according to Fig. 1, a flushing system 10 of a WC suit is shown. The flushing system 10 is constructed to allow a user of an associated WC suit to flush the toilet after use, and for this purpose the flushing system 10 comprises a water cistern 20 and a flushing mechanism 30. The water cistern 20 is in fluid communication with the WC suit by means of an outlet being controlled to open by means of the flushing mechanism 30.

[0023] The flushing mechanism 30 is constructed to open and close the outlet when the user operates a flush initiation means, such as a push button 32. Hence the outlet will be open and the water enclosed within the water cistern 20 will drain out from the outlet and into the WC suit.

[0024] The water cistern 20 and the flushing mechanism 30 are well known and will not be described in further detail herein.

[0025] A liquid dosing unit 100 is provided in cooperation with the flushing mechanism 30. The liquid dosing unit 100 comprises a dosing reservoir 190 for enclosing detergent. The dosing reservoir 190 is connected to a

filling funnel 170, via a filling piping 180, which is used to fill the dosing reservoir 190 with detergent. By removing the flush button 32 the user, such as an attendant or a cleaner, can fill the dosing reservoir 190 with detergent by filling the funnel 170 and allowing liquid to pour down into the reservoir 190.

[0026] The dosing reservoir 190 is further connected to a fluid channel 150 that connects the reservoir 190 to a dosing piping 120. The dosing reservoir 190 may contain various kinds of liquid having different viscosities, such as for example liquid detergent, cleanser and/or any other liquid cleaning agent.

[0027] The dosing reservoir 190 may be a flexible bag which is compressible by the surrounding water pressure. For this the dosing reservoir 190 has an outer shell of which at least a part is formed by a flexible material, such as a thin sheet of plastic. The hydrostatic pressure of the water cistern in the WC suit will consequently compress the dosing reservoir 190, thus allowing the enclosed detergent to be pressed up through the fluid channel 150 into the dosing piping 120.

[0028] Now turning to Fig. 2, an embodiment of a liquid dosing unit 100 is shown. An outlet valve 130 is arranged at the lower part of the flushing system 10 and is connected to the dosing piping 120, as will be described more in detail in conjunction with Fig. 3.

[0029] When pressing the flush button 32 (see Fig. 1), the outlet valve 130 is opened to allow the water to flush out into the WC bowl (not shown). In practice, the outlet valve 130 may form part of the flushing mechanism 30, e.g. by means of an overflow pipe which is raised upon flushing for opening the valve 130.

[0030] Now turning to Fig. 3, a more detailed view of the liquid dosing unit 100 is shown where the dosing reservoir 190 is hidden to facilitate understanding. The dosing piping 120 has two open ends 140a, 140b that connects to the outlet valve 130 of the flushing system 10, at a position being subject to the water flow only when the outlet valve 130 is open.

[0031] In a further embodiment the two open ends (140a, 140b) are connected to a flushing pipe downstream the outlet valve 130. The two open ends (140a, 140b) should be connected to a piping which is dry and filled with air between flushing, and which is wet and filled with water upon flushing.

[0032] During operation of the liquid dosing unit 100 shown in Fig. 3, detergent arranged in the dosing piping 120 will flow into the outlet valve 130 upon flushing. This will be further described below.

[0033] In Fig. 4 another embodiment of a liquid dosing unit 100 is shown, in which only one end 140a is connecting to the outlet valve 130, while the other open end 140b opens to the volume inside the cistern 20. Hence, detergent arranged in the dosing piping 120 will flow into the cistern 20 upon flushing.

[0034] Now turning to Fig. 5, a detailed view of a part of the dosing piping 120 will be described. The dosing piping 120 comprises a water trap 110, a first hose 121

and a second hose 122. The water trap 110 is arranged at a position vertically above the open ends 140a, 140b, and forms a U-bend, or an M-shaped structure. The water trap 110 has two open ends which are connectable to one of the open ends 140a by means of the first hose 121 and to the other open end 140b by means of the second hose 122. Hence, the first hose 121 is connected to a first end of the water trap 110, and the second hose 121 is connected to a second end of the water trap 110.

[0035] In addition, the water trap 110 has a third open end located in between the two open ends which is connectable to the fluid channel 150. The first hose 121, the second hose 122 and the fluid channel 150 may all be formed by fluid transporting devices, e.g. flexible hoses.

[0036] The water trap 110 further comprises a vent device 160 arranged to act as an equalizer of the air pressure, as will be described more in detail in conjunction to Fig. 7. In a first embodiment the vent device 160 is arranged as an interface between the water trap 110 and the first hose 121.

[0037] The function of the dosing piping 120 will now be described with reference to Fig. 6 to 8. The neutral position, i.e. before a flush has been initiated, of the dosing piping 120 is shown in Fig. 6. The water trap 110 is filled with detergent up to a level corresponding to the surrounding water level in the cistern, as is schematically shown in Fig. 6. This is achieved due to the flexible shell of the dosing reservoir 190, pressing enclosed liquid to the same vertical level as the water level of the cistern 20. Thus, the replenishment of detergent into the water trap 110 occurs after every WC flush when the cistern (not shown) in the flushing system 10 is filling up with water. In this state, for the embodiment shown in Fig. 3 the first hose 121 and the second hose 122 are filled with air since the connections are made to a dry environment downstream a sealing gasket of the outlet valve 130. For the embodiment shown in Fig. 4, the first hose 121 will be filled with water up to the water level of the cistern 20, while the second hose 122 will be filled with air since its connection is to the dry environment inside the outlet valve 130.

[0038] Fig. 7 shows a schematic view of the dosing piping 120 after a flush has been initiated, i.e. when a user has initiated a flush. When flushing the WC suit the outlet valve 130 is opened whereby water is starting to drain from the water cistern 20 out through the outlet valve 130. For the embodiment shown in Fig. 3, the first and second hose 121, 122 will thus be exposed to the water flow via the open ends 140a, 140b, and the hoses 121, 122 will be filled with water up to approximately the same vertical level as the water level inside the cistern 20. As the water level is rising in the first and second hose 121, 122, the remaining air is pressed upwards through the first and second hose 121, 122. Air entrapped in the first hose 121 of the dosing piping 120 will consequently flow out through the vent device 160.

[0039] On the other hand, air entrapped in the second hose 122 of the dosing piping 120 will expose the dose

of detergent arranged in the water trap 110 to a pushing force towards the vent device 160, and into the first hose 121 being already filled with water. Hence, the detergent will form an upper layer of the water column inside the first hose 121. This is shown in Fig. 8. The dose of detergent that was pushed down from the water trap 110 into the first hose 121 of the dosing piping 120, will now mix with the flushing water.

[0040] As the flushing continues, leading to a decreased water level inside the cistern 20, the height of the water column inside the hoses 121, 122 will be reduced accordingly until they are reaching an empty state. As the flush is being finalized the water in the first hose 121 and the second hose 122 flows out, through the open ends 140a, 140b, into the outlet valve 130. As a result the last water flushed into the toilet bowl is the water mixed with detergent, thus creating a fresh finish of the water that will stay in the WC suit until a next flush. Liquid detergent is in fact never dosed in the water while enclosed in the water cistern 20, and liquid detergent, which may be corrosive/abrasive, may consequently never be allowed to damage critical components inside the water cistern 20 such as gaskets etc. Further to this, since the dosing will occur at the end of the flushing sequence, a reduced volume of dosing will be required in order to clean the WC suit.

[0041] However, for the embodiment shown in Fig. 4 the detergent will be pushed out from the first hose 121 and the associated open end 140b, into the water cistern 20. The detergent will reach the water of the cistern 20 rather immediately after initiating the flush, which means that the entire flushing will provide a cleaning action. Especially during the initial phase of the flushing the flushing water will expose the entire WC bowl to detergents, which means that the entire WC bowl will be cleaned.

[0042] A second embodiment of a dosing pipe is shown in Fig. 9 and 10. The dosing piping 220 comprises a water trap 210, a first hose 221 and a second hose 222. The water trap 210 is arranged at a position vertically above the open ends 140a, 140b. The water trap 210 has two open ends which are connectable to the first hose 221 and the second hose 222. In addition, the water trap 210 has a third open end located in between the two open ends which is connectable to the tube 250. The first hose 221, the second hose 222 and the tube 250 may be formed by flexible hoses

[0043] The water trap 210 forms an S-bend, whereby the first hose 221 and the second hose 222 are both arranged on the same side of the trap. Similarly to what has been described with reference to Figs. 5-8, the water trap 210 comprises a vent device 260 arranged to act as an equalizer of the air pressure.

[0044] As will be obvious to a person skilled in the art, the function of the dosing piping 220 is the same as has been described above according to the embodiments of Figs. 5-8.

[0045] Although the present invention has been described above with reference to specific embodiments,

it is not intended to be limited to the specific form set forth herein. Rather, the invention is limited only by the accompanying claims and, other embodiments than the specific above are equally possible within the scope of these appended claims.

Claims

1. A liquid dosing unit for providing detergent to a WC suit, the liquid dosing unit comprising;
a dosing piping (120, 220) having two open ends (140a, 140b), of which at least one open end (140a) is connecting to an outlet valve (130) of the WC suit, and a water trap (110, 210) arranged between said two open ends (140a, 140b) at a position vertically above said open ends (140a, 140b), wherein the water trap (110, 210) of the dosing piping (120, 220) is configured to enclose detergent, and wherein when the outlet valve (130) is opened for flushing the WC suit, air entrapped in said dosing piping (120, 220) will push detergent arranged at the water trap (110, 210) to flow out from one of said open ends (140a, 140b).
2. The liquid dosing unit according to claim 1, wherein the water trap (110, 210) of the dosing piping (120, 220) is connected to one of the open ends (140a) via a first hose (121, 221), and to the other open end (140b) via a second hose (122, 222).
3. The liquid dosing unit according to claim 2, wherein the first hose (121, 221) is connected to a first end of the water trap (110, 210), and the second hose (122, 222) is connected to a second end of the water trap (110, 210).
4. The liquid dosing unit according to claim 3, wherein the first hose (121, 221) is connected to the first end of the water trap (110, 210) via a vent device (160, 260).
5. The liquid dosing unit according to claim 4, wherein the vent device (160, 260) forms part of a funnel.
6. The dosing unit according to any one of the preceding claims, wherein the outlet valve (130) is an outlet valve (130) of a water cistern (20) enclosing flushing water.
7. The dosing unit according to any one of the preceding claims, further comprising a dosing reservoir (190) enclosing detergent, wherein the dosing reservoir (190) is connected to the water trap (110, 210) of the dosing piping (120, 220) for allowing detergent to flow from the dosing reservoir (190) to the water trap (110, 210).
8. The liquid dosing unit according to claim 7, wherein the dosing reservoir (190) is connected to the water trap (110, 210) by means of a fluid channel (150, 250).
9. The liquid dosing unit according to claim 7 or 8, wherein the dosing reservoir (190) has an outer shell comprising a flexible material.
10. The liquid dosing unit according to any one of claims 7-9, wherein the dosing reservoir (190) is arranged vertically below the water trap (110, 210).
11. The liquid dosing unit according to any one of the preceding claims, wherein each one of said open ends (140a, 140b) is connecting to the outlet valve (130) of the WC suit, and wherein air entrapped in the dosing piping (120, 220) will push detergent arranged at the water trap (110, 210) to flow to one of the open ends (140a, 140b) and into the outlet valve (130).
12. A piping for dosing liquid detergents to a WC suit, comprising
two open ends (140a, 140b), of which at least one end (140a) comprises means for connecting to an outlet valve (130) of the WC suit, and
a water trap (110, 210) arranged between said two open ends (140a, 140b) at a position which in use is vertically above said open ends (140a, 140b).
13. The dosing piping according to claim 12, wherein said water trap (110, 210) comprises means for connecting said water trap (110, 210) to a dosing reservoir (190).
14. The dosing piping according to claim 12 or 13, wherein the water trap (110, 210) of the dosing piping (120, 220) is connected to one of the open ends (140a) via a first hose (121, 221), and to the other open end (140b) via a second hose (122, 222), and wherein the first hose (121, 221) is connected to the first end of the water trap (110, 210) via a vent device (160, 260).
15. A WC suit, comprising a liquid dosing unit according to any one of claims 1-10.

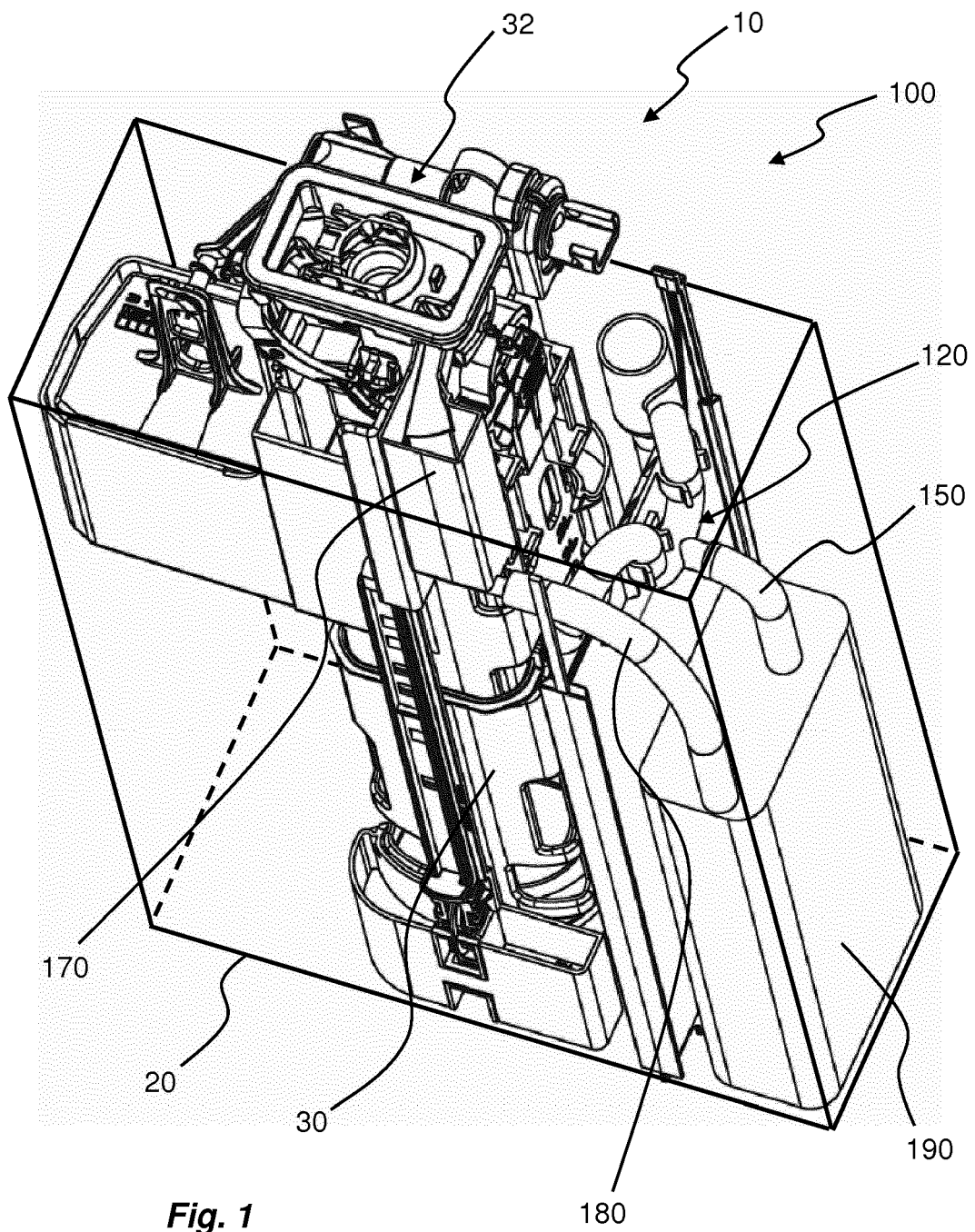
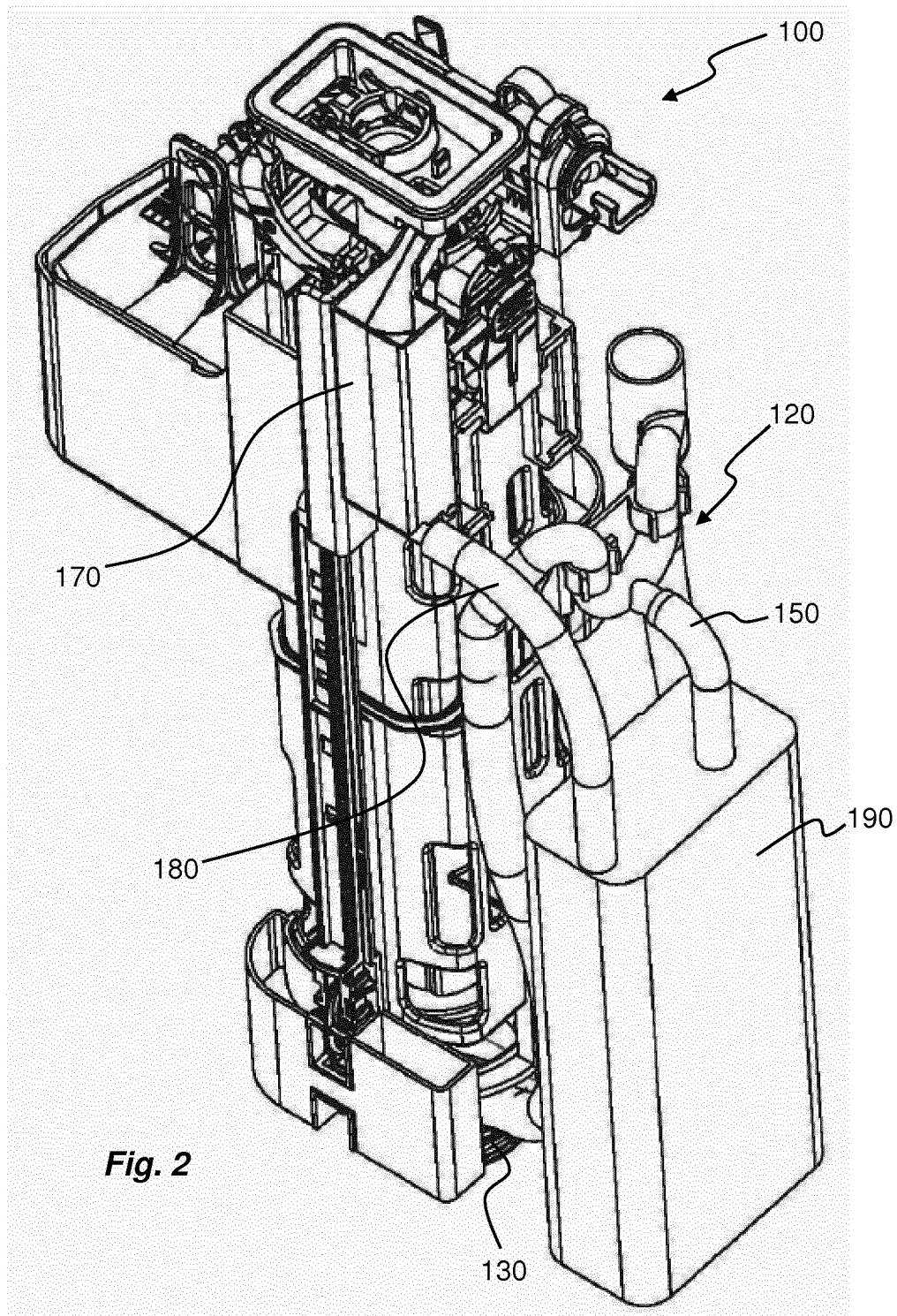
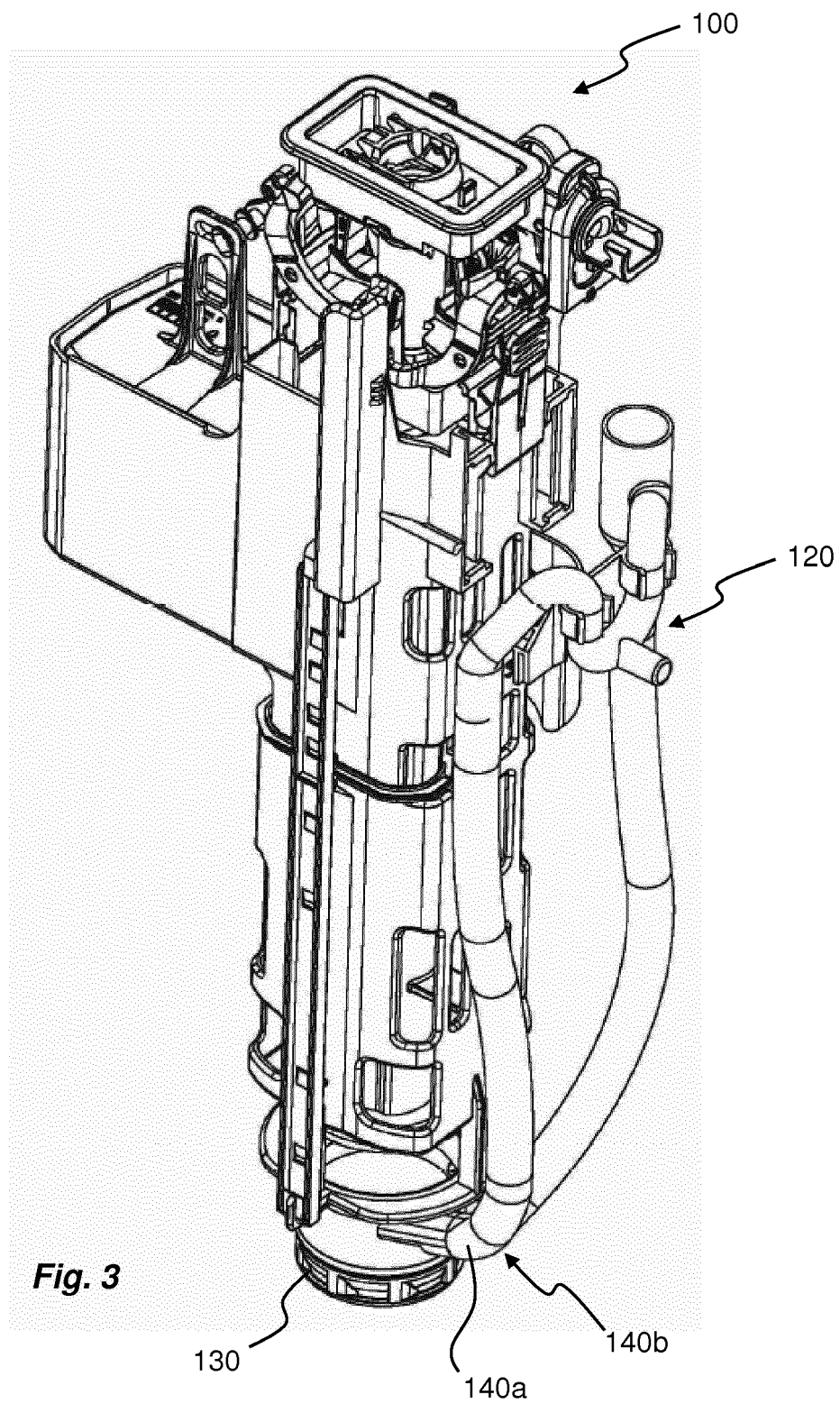
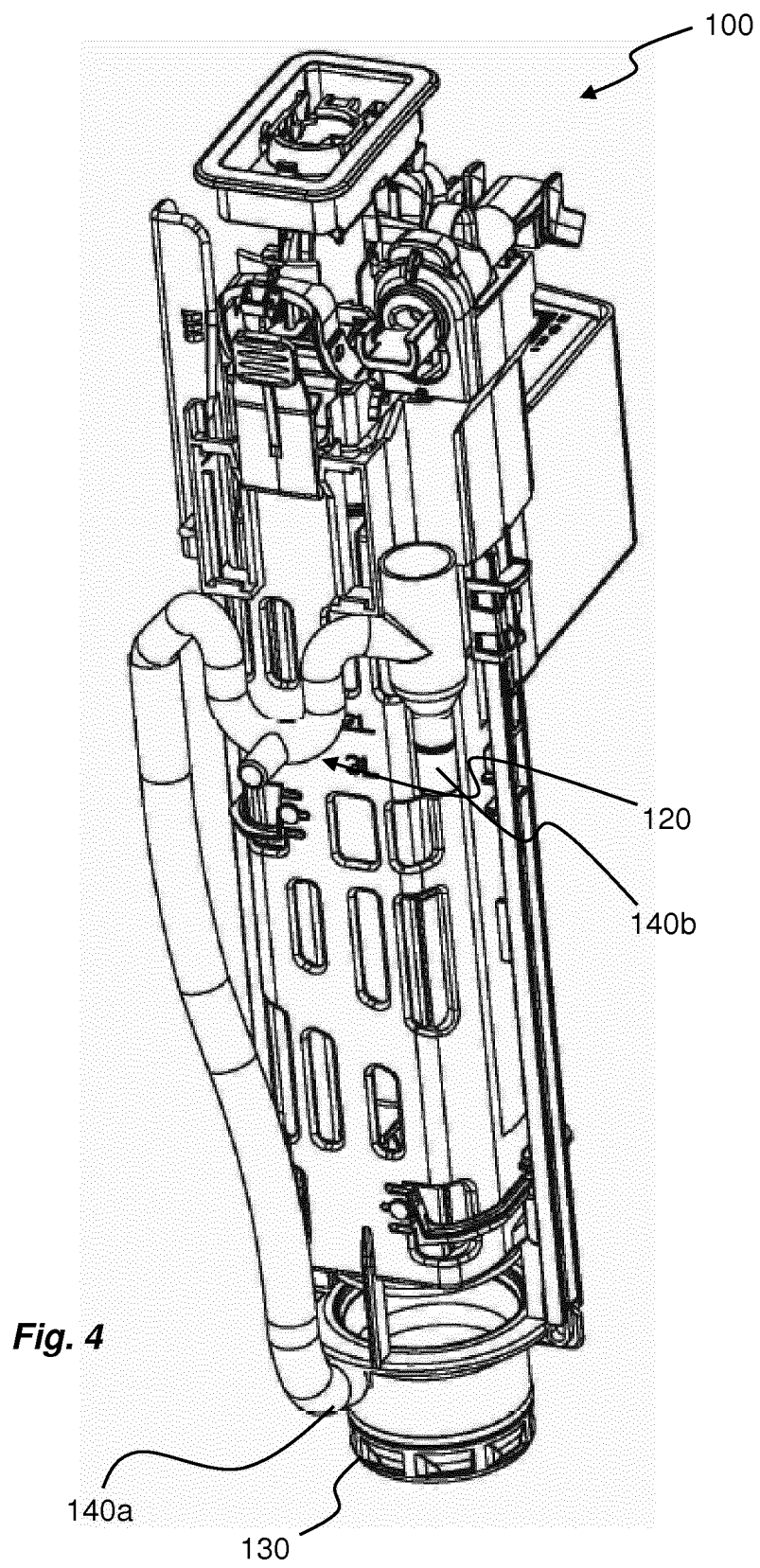
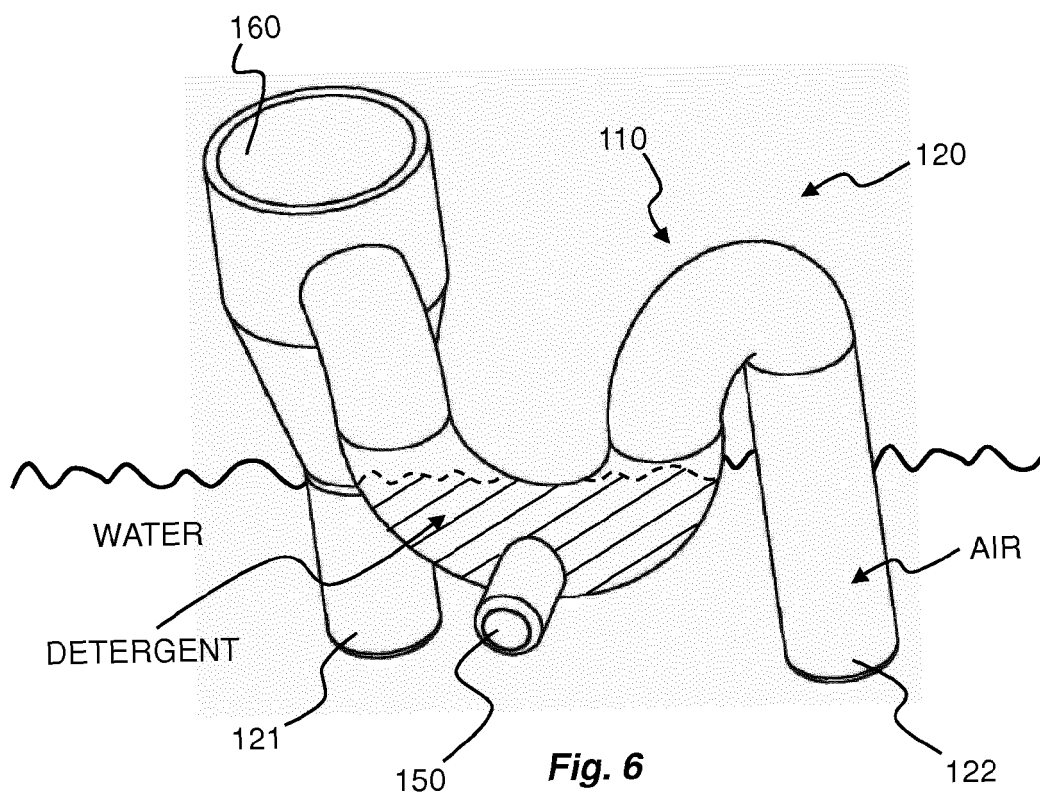
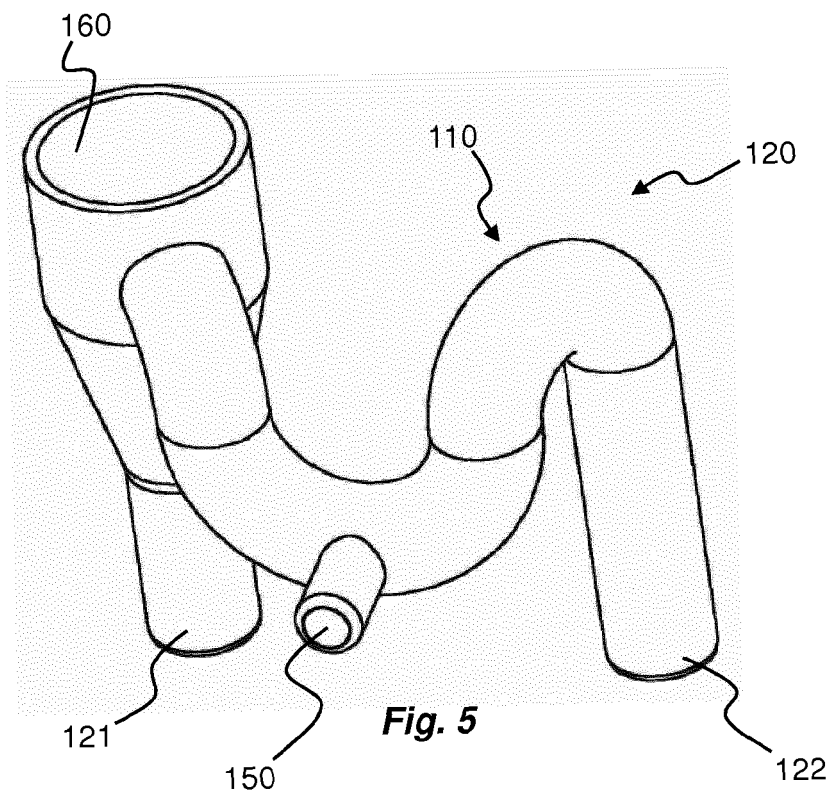


Fig. 1

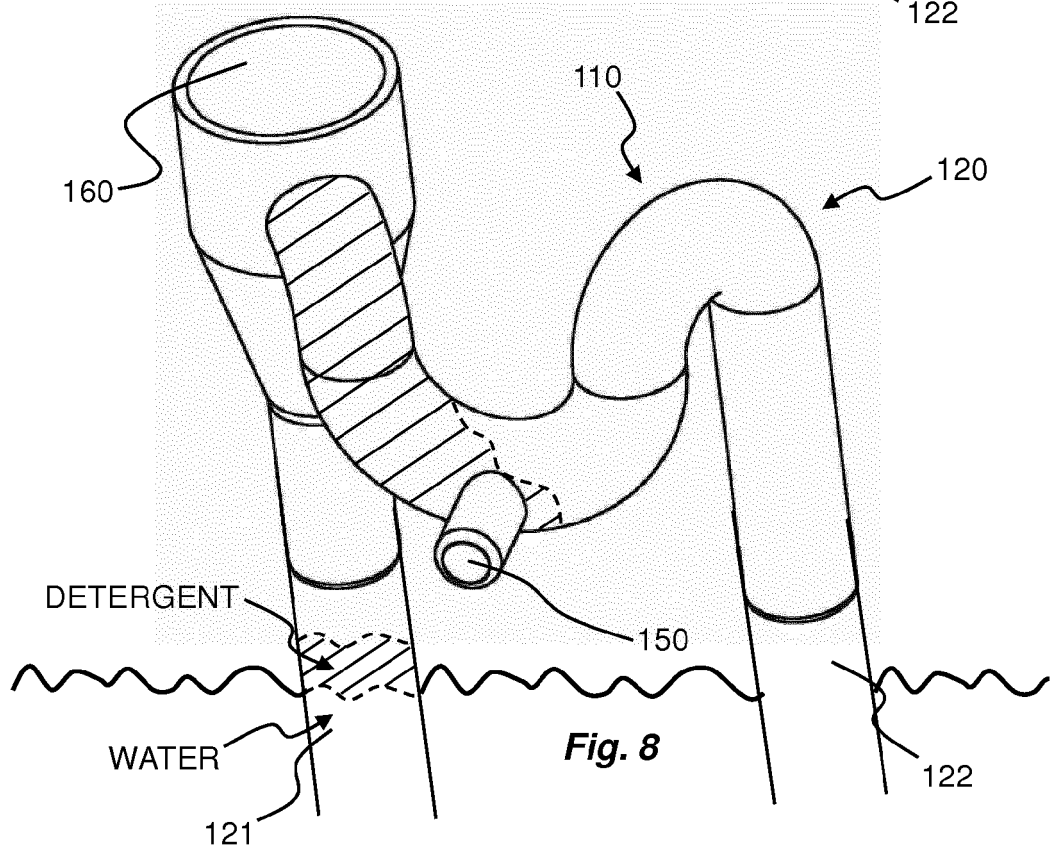
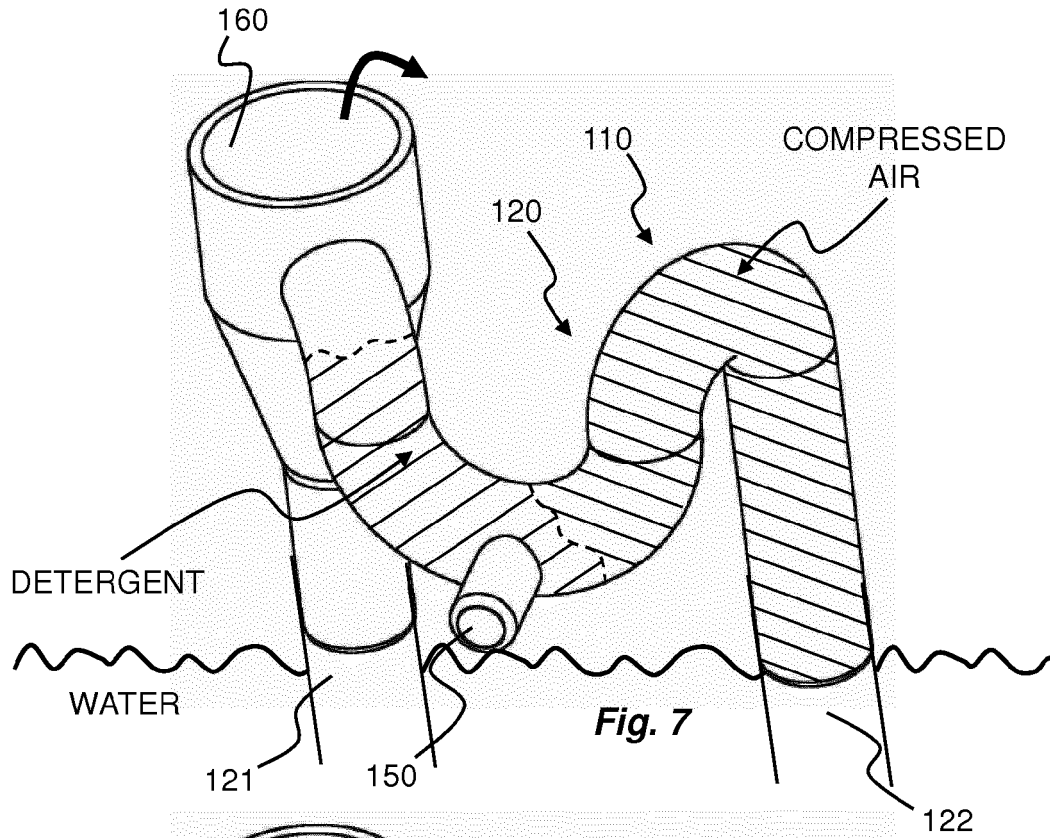








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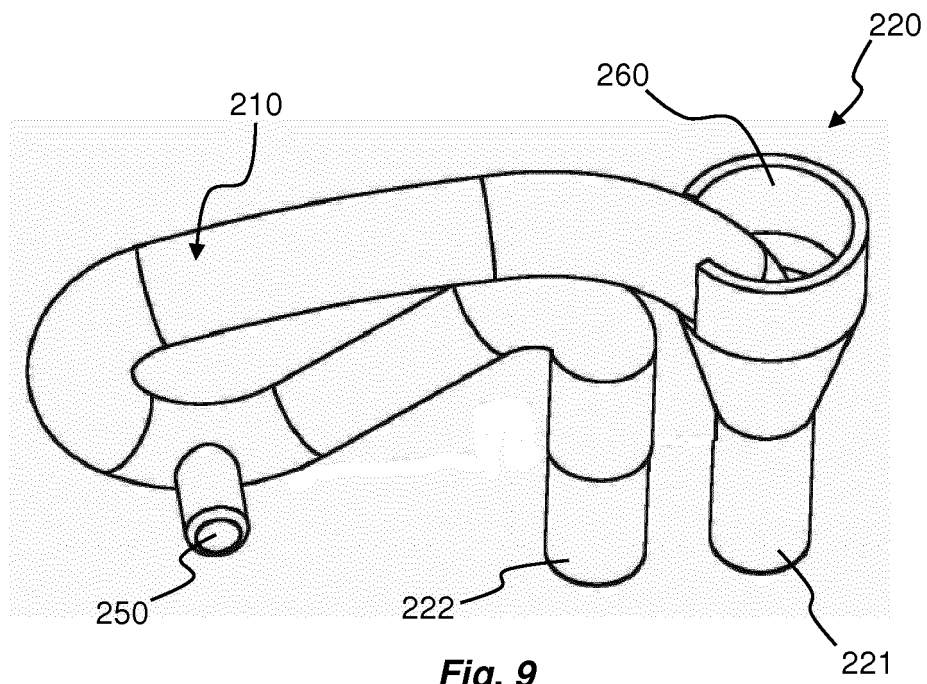


Fig. 9

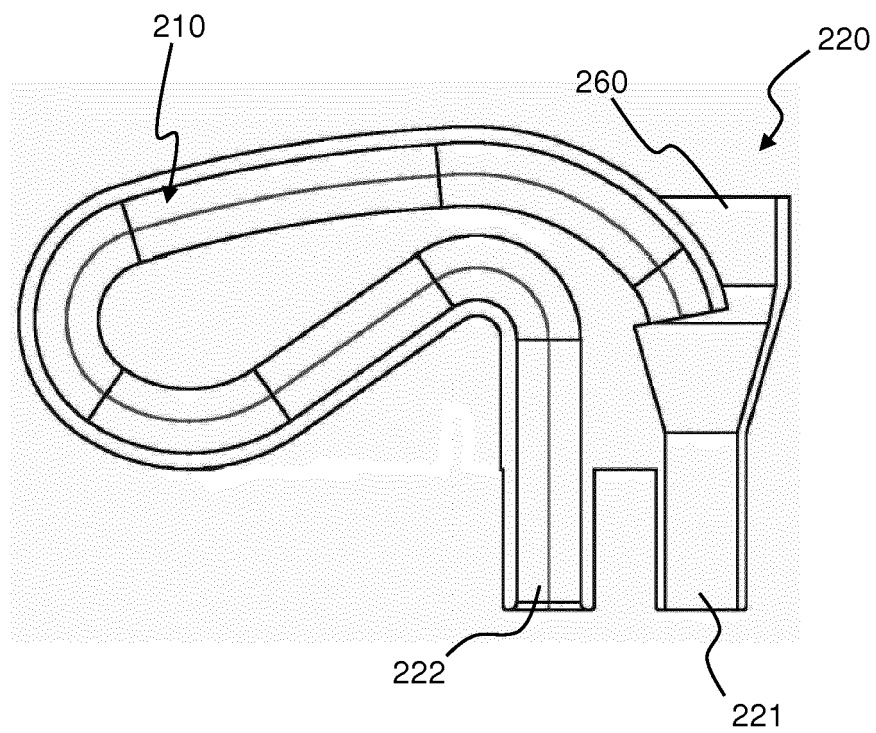


Fig. 10



EUROPEAN SEARCH REPORT

Application Number
EP 15 17 3310

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 17 November 2015	Examiner Flygare, Esa
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 15 17 3310

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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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