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(54) **SYSTEM FOR EMPTYING AND CLEANING A PORTABLE WASTE HOLDING TANK AND RELATED METHOD**

(57) A system (10) for emptying and cleaning a portable waste holding tank (12), the system comprising a housing (26), a controller (34), a carriage (36) mounted within the housing (26) for rotation about a carriage axis (38), the carriage operative to receive the portable waste holding tank (12), a blade actuator (40) controlled by the controller (34) for automatically opening a blade of the

portable waste holding tank (12), a carriage actuator (42) controlled by the controller (34) for automatically rotating the carriage (36) about the carriage axis (38) to empty contents from the portable waste holding tank (12) and a water source (44) for supplying water to an inside of the portable waste holding tank (12) to rinse the portable waste holding tank (12).

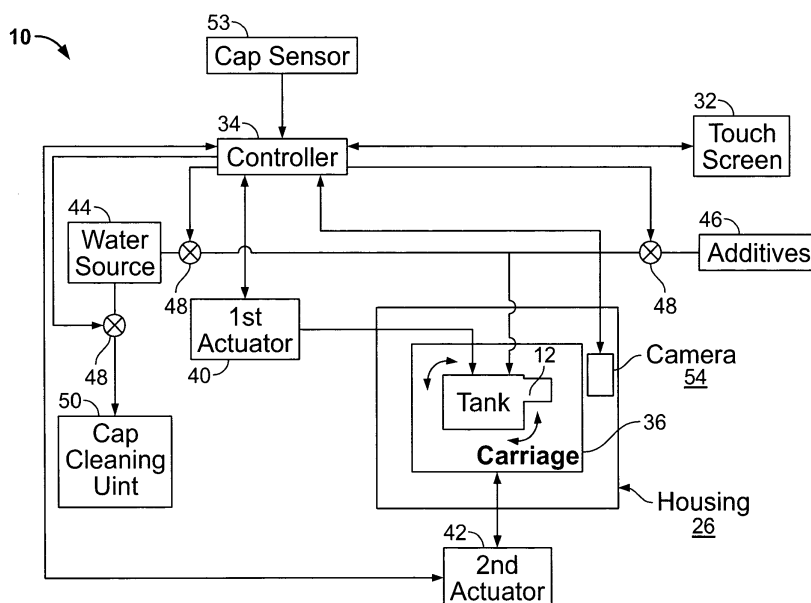


FIG. 1

Description

FIELD

[0001] The present disclosure generally relates to portable waste tanks. More particularly, the present disclosure relates to a system for emptying and cleaning a portable waste transfer tank. The present disclosure also relates to a method for emptying and cleaning a portable waste holding tank.

BACKGROUND

[0002] This section provides background information related to the present disclosure which is not necessarily prior art.

[0003] Vehicles, including but not limited to recreational vehicles ("RVs" in the United States and "Caravans" in Europe), tractor trailers, airplanes, boats, trains, and the like, often incorporate sanitation systems for the comfort and convenience of the occupants. It is necessary to periodically empty such sanitation system. It is generally known in the pertinent art to provide a portable waste transfer tank for transfer waste from an on-board sanitation system to a disposal site.

[0004] The periodic emptying and cleaning of portable waste holding tanks presents challenges to the end user. A continuous need in the relevant art remains.

SUMMARY

[0005] In accordance with one particular aspect, the present teachings provide a system for emptying and cleaning a portable waste holding tank. The system includes a housing, a controller, a carriage, a blade actuator, a carriage actuator and a water source. The carriage is mounted within the housing for rotation about a carriage axis and is operative to receive the portable waste holding tank. The blade actuator is for opening a blade of the portable waste holding tank. The carriage actuator is rotating the carriage about the carriage axis to empty contents from the portable waste holding tank. The water source supplies water to an inside of the portable waste holding tank to rinse and/or spray clean the portable waste holding tank. The system may further include a ramp located outside of the housing for transferring the portable waste holding tank into the housing. Additionally, the system may include a separate cap cleaning unit and one or more sources of additives including a dosing device. The water source may also provide water to the cap cleaning unit for rinsing / cleaning the cap. The water source may be equipped to provide additives to the inside of the portable waste holding tank in a preset quantity after the cleaning process.

[0006] In accordance with another particular aspect, the present teachings provide a method for emptying and cleaning a portable waste holding tank. The method includes providing a system including a rotatable carriage

and positioning the portable waste holding tank with a housing of a system and on the rotatable carriage. The method additionally includes rotating the carriage and the portable waste holding tank to empty a contents of the portable waste holding tank. The method further includes rinsing an interior of the portable waste holding tank with a source of water.

[0007] Further areas of applicability will become apparent from the description provided herein. The description and specific examples in this summary are intended for purposes of illustration only and are not intended to limit the scope of the present disclosure.

DRAWINGS

[0008] The drawings described herein are for illustrative purposes only of selected embodiments and not all possible implementations, and are not intended to limit the scope of the present disclosure.

Figure 1 is a schematic view illustrating a system for emptying and cleaning a portable waste holding tank in accordance with the present teachings.

Figure 2 is a simplified side view of an exemplary waste holding tank for use with the system in accordance with the present teachings.

Figure 3 is a simplified top view of the exemplary waste holding tank of Figure 2.

Figure 4 is simplified side view of the system for emptying and cleaning a portable waste holding tank in accordance with the present teachings, the system shown ready to receive an exemplary waste holding tank.

Figure 5 is simplified front view of the system for emptying and cleaning a portable waste holding tank in accordance with the present teachings, the system shown with a door in an open position and in receipt of the exemplary waste holding tank within the housing, the cap removed and secured onto a separate cap cleaning unit.

Figure 6 a simplified side view similar to Figure 4, a carriage of the system for emptying and cleaning a portable waste holding tank shown rotated through approximately 90 degrees for purposes of emptying the exemplary waste holding tank.

Corresponding reference numerals indicate corresponding parts throughout the several views of the drawings.

DESCRIPTION OF VARIOUS ASPECTS

[0009] Example embodiment(s) will now be described more fully with reference to the accompanying drawings.

[0010] Example embodiment(s) are provided so that this disclosure will be thorough, and will fully convey the scope to those who are skilled in the art. Numerous specific details are set forth such as examples of specific components, devices, and methods, to provide a thor-

ough understanding of embodiments of the present disclosure. It will be apparent to those skilled in the art that specific details need not be employed, that example embodiments may be embodied in many different forms and that neither should be construed to limit the scope of the disclosure. In some example embodiments, well-known processes, well-known device structures, and well-known technologies may not be described in detail.

[0011] The present teachings are particularly directed to a system for emptying and cleaning a portable waste holding tank. The system may be particularly adapted to facilitate emptying and cleaning of a portable waste holding tank. The system 10 may also be particularly adapted to facilitate refilling of the portable waste holding tank 12 with suitable additives. Figure 1 schematically illustrates the various features of the system of the present teachings.

[0012] The drawings illustrate the system of the present teachings operatively associated with an exemplary portable waste holding tank. The exemplary holding tank 12 is shown further in Figures 2 and 3. Suitable waste holding tanks are manufactured and sold by Thetford Corporation. Furthermore, such waste holding tanks are shown and described in commonly assigned U.S. Patent Nos. 6,189,161; 7,293,298 and 8,225,819. U.S. Patent Nos. 6,189,161; 7,293,298 and 8,225,819 are incorporated by reference as if fully set forth herein. It will be appreciated, however, that the system of the present teachings may be adapted to interface with any other type of portable waste holding tank. Briefly, the portable waste holding tank 12 will be understood to conventionally include a housing 14, an opening knob 16, a sliding cover 18, an emptying pipe 20 having a cap 22, and a blade opening 24.

[0013] Figures 4 through 6 further illustrate the various features and operation of the system of the present teachings. The system 10 is shown to generally include a housing 26. The housing 26 may carry a door 28 that is movable relative to the housing 26 between an open position and a closed position. The door 28 provides access to an opening 29 in the housing 26. The open position is shown in Figure 5, for example. The closed position is shown in Figures 4 and 6, for example. A suitably sized ramp 30 may be located in front of the opening 29 of the housing 26 to facilitate insertion of the waste holding tank 12 into the housing 26 and retrieval of the waste holding tank 12 from the housing 26.

[0014] A device 32 for user input may be carried on an exterior of the housing 26. In one application, the device is a touch screen 32 operatively connected to a controller 34 of the system 10 in a known manner. Other applications within the scope of the present teachings may alternatively include a variety of buttons and/or switches on a front face of the housing 26 for user input.

[0015] The system is further shown to generally include a carriage 36. The carriage 36 is positioned inside the housing 26, can be closed off from outside interference (e.g. by the movable door 32 and may be rotatable about

a carriage axis 38. The carriage 36 is adapted to receive the portable waste holding tank 12 upon introduction of the portable waste holding tank 12 into the housing 26.

[0016] The controller 34 may be operative to control a first actuator 40 and a second actuator 42. The first actuator may be a blade actuator 40 for rotating the opening knob 16 to open and close a blade of the portable waste holding tank 12. The second actuator may be a carriage actuator 40 for rotating the carriage 36 about the carriage axis 38.

[0017] The system 10 is shown to still further include a water source 44 and an additive source 46 for respectively delivering water and additives to the portable waste holding tank 12. An included pump may deliver pressurized water to the system to improve cleaning results through a cleaning nozzle 52. A dosing system including flow meters and/or dosing pumps ensures a correct dosing of additives to be delivered to the portable waste holding tank 12. The water and additive sources 44 and 46 may be put into selective communication with the interior of the portable waste holding tank 12. Suitable valves 48 may be provided and controlled by the controller 34 based on input received from a user.

[0018] The system 10 of the present teachings may further include a cap cleaning unit 50. The cap cleaning unit 50 may be located within the housing 26. The cap cleaning unit 50 may be controlled by the controller 34 and operative to deliver pressurized water from the water source 44 through a valve 48.

[0019] With particular reference to Figure 4, the portable waste holding tank 12 is shown prior to insertion into the housing 26. As illustrated, the housing 26 may be associated with the ramp 30 for slidably supporting the portable waste holding tank 12 upon insertion into and receipt from the housing 26. Such ramp 30 may be horizontal or may be tilted downwards towards the housing 26 to avoid spillage of contents of the portable waste holding tank 12 out of the nozzle 20 once the cap 22 is removed. Such ramp 30 may also be equipped with an automatic lifting feature to facilitate lifting the full portable waste holding tank 12 from the floor to the level of the opening 29 of the housing 26. The door 28 is shown in a closed position.

[0020] With particular reference to Figure 5, the door 28 of the system 10 is shown in an open position and the portable waste holding tank 12 is positioned within the housing 26 and on the carriage 36. The cap 22 of the nozzle 20 has been removed and is shown operatively engaged with the cap cleaning unit 50. In this regard, the cap 22 may be threadably received by the cap cleaning unit 50.

[0021] With particular reference to Figure 6, the portable waste holding tank 12 is shown in the housing 26 and on the rotatable carriage 36. The rotatable carriage 36 has been rotated through approximately 90° to an emptying position. The door 28 is shown in a fully closed position. In certain applications, the door 28 may be automatically raised from the closed position to the open

position in response to input from the user or *vice versa*. In this regard, the user may utilize the touch screen 32 or other input device to initiate or cancel a cycle. The cycle may include emptying and rinsing/spray cleaning of the portable waste holding tank 12. The cycle may also include the addition of chemical additives into the tank 12 after the cleaning cycle. For safety reasons, the controller 34 may ensure that a cycle may not start and will immediately stop if the door 28 is in an open position. Initiation of a cycle may require user payment by way of credit card, cash, value tokens or any other form of payment.

[0022] Prior to the controller 34 of the system initiating a cycle, it is important that the cap 22 of the holding tank 12 used to close the nozzle 20 is removed. As particularly shown in Figure 5, the cap 22 may be removed and attached to the separate cap cleaning unit inside the housing 26 so as to activate a sensor 53. When the cap 22 is received in place, the sensor 53 is activated and sends a corresponding signal to the controller 34. At this point, the user may further instruct the controller 34 through his input to control the door 28 to move to its closed position. Alternatively, the door 28 may be manually moved to the closed position. In either event, continuation of the cycle by the system 10 requires both that the door 28 is closed and the cap 22 is registered with the cooperating fitting carried by the housing 26.

[0023] The system 10 may be adapted for use with various types of portable waste holding tanks 12. As such, the system 10 may need to be controlled differently to accommodate different portable waste holding tanks 12. The system 10 may include a camera 54 to detect the type of portable waste holding tank 12. Alternatively, the system 10 may include one or more sensors (not shown) for detecting the type of portable waste holding tank 12 or the user interface may allow the user to input the type of portable waste holding tank 12.

[0024] The first actuator 40 may start from a starting position clear of the rotating carriage 36. After the door 28 is closed, the controller 34 controls the first actuator 40 to rotate the blade actuator (e.g. in the shape of a turning knob on top of the portable waste holding tank 12) from a closed position to an open position. In this regard, an extendable arm of the first actuator 40 may be controlled to translate in a first direction D_1 generally perpendicular to a longitudinal axis of the portable waste holding tank 12 and then in a second direction generally parallel (i.e., perpendicular to the first direction D_1) to the longitudinal axis. At this point, the extendable arm is positioned over the blade actuator 16 and may be lowered into engagement with the blade actuator 16. A distal end of the extendable arm may define a slot for receiving a raised portion of the blade actuator 16. The distal end is rotated to open the blade and the arm of the first actuator 40 is returned to its starting position (shown in Fig. 4).

[0025] The source of water 44 and the source of additives 46 may be placed in fluid communication with an interior of the portable waste holding tank 12 through one

or more hoses. The hose may be carried proximate their distal ends by a sliding member. It will be understood that the hose 50 is flexible. When the first actuator 40 is retracted, the sliding member may be translated downwardly such that the nozzle 52 for the hose 56 is disposed within the portable waste holding tank 12 (as shown in Figure 6). The sliding member may also operate to clamp the portable waste holding tank 12 relative to the rotatable carriage 36 such that the portable waste holding tank 12 securely moves with the rotatable carriage 36. The sliding member may also be equipped as such that it opens the sliding cover on top of the tank opening while the tank 12 is being inserted into the carriage 36 and closes it again upon retrieval.

[0026] The second actuator 42 next rotates the rotatable carriage 36 from its initial position to a waste emptying position. Figure 6 illustrates the rotatable carriage rotated to the waste emptying position. In the waste emptying position, the contents of the portable waste holding tank 12 may be emptied under the force of gravity. In the embodiment illustrated, the rotatable carriage 36 and the portable waste holding tank 12 rotate through about 90 degrees, further or less rotation being possible though if so required.

[0027] While in the waste emptying position, the controller 34 may open the valve associate with the source of water 44 to deliver pressure water to the interior of the portable waste holding tank 12 through the nozzle 52 for rinsing and cleaning. A cleaning agent may be added to the water supply to improve cleaning results. The original contents of the portable waste holding tank 12 and the water/cleaning solution delivered to the portable waste holding tank 12 are both drained from the portable waste holding tank and may be received within a funnel 58. The funnel 58 may drain to a holding tank for periodic emptying. Alternatively, the original contents and water may be directly received by a drain for a sewer.

[0028] In the embodiment illustrated, the pump simultaneously delivers pressurized water to the cap cleaning unit 50 to ensure proper cleaning of the inside of the cap 22 while the portable waste holding tank 12 is also cleaned. A drying feature for the cap 22 may be added to dry off remaining water from the inside of the cap at the end of the cycle.

[0029] The controller 34 next operates to rotate the rotatable carriage 36 back to the starting position. In this position, the controller 34 may control the valve 48 associated with the source of additives 46 to deliver chemical additives to the portable waste holding tank 12. The controller 34 may also control the water supply 44 simultaneously to the supply of chemical additives to ensure addition of a preset mixture of water/additives. The delivery of chemical additives to the portable waste holding tank 12 may be associated with an additional charge to the user. Suitable chemical additives are commercially available from Thetford Corporation.

[0030] The sliding member may next be controlled by the controller 34 to translate upwardly to leave the interior

of the portable waste holding tank 12 and the first actuator 40 may be controlled by the controller 34 to close the blade of the portable waste holding tank 12. Closing of the blade with the first actuator 40 will be understood to be substantially identical to the manner discussed above with regards to opening of the blade. The distal end of the extending arm is simply rotated in the opposite direction.

[0031] The controller 34 next controls the door 28 to open. Alternatively, the controller 34 may simply allow the door 28 to be opened by the user. The cap 22 is then replaced by the user and the portable waste holding tank 12 may be removed from the system.

[0032] After removal of the portable waste holding tank 12 and its cap 22 from the system 10, the door 28 will again be closed and with the door 28 in the closed position, a self-cleaning cycle of the inside of the system 10 may start. All relevant parts of the system will be cleaned by means of the water supply and suitable nozzles.

[0033] It will now be appreciated that the present teachings provide a system which allows for easy emptying of the waste holding tank 12. The contents may be received by the system 10 into a stationary holding tank that may be periodically emptied or the system may be connected to a sewer system. The system 10 also provides for each cleaning of the waste holding tank 12. The system 10 also provides for convenient and easy refilling of the holding tank with chemical additives. The system 10 may be provided in a common area for access by caravan owners. For example, the system 10 may be provided at a camp site.

[0034] In this regard, portable waste holding tanks 12 are conventionally treated with chemical additives to control odors and liquefy paper. Such additives are commercially available from Thetford Corporation, for example. The additives may be dispensed directly into the waste holding tank or otherwise provided for application to the waste holding tank. In either manner, the additives may be conveniently provided and more accurately dosed.

[0035] By including such a cleaning system 10, camp grounds may better serve their customers. The level of user convenience will be increased as well as the hygienic circumstances of the emptying/cleaning process by avoiding almost all contact of the user with the potentially harmful contents of the portable waste holding tank.

[0036] Although the exemplary embodiments of the present invention have been described, it is understood that the exemplary embodiments help one of ordinary skill in the art to easily realize a wind resistant industrial door of the present invention, but the present invention should not be limited to these exemplary embodiments and accompanying drawings. Therefore, various changes and modifications can be apparently made by one skilled in the art without departing from the technical spirit of the present invention. In addition, it is understood that parts that can be easily changed by one skilled in the art are within the spirit and scope of the present invention as hereinafter claimed.

[0037] The foregoing description of the embodiments has been provided for purposes of illustration and description. It is not intended to be exhaustive or to limit the disclosure. Individual elements or features of a particular embodiment are generally not limited to that particular embodiment, but, where applicable, are interchangeable and can be used in a selected embodiment, even if not specifically shown or described. The same may also be varied in many ways. Such variations are not to be regarded as a departure from the disclosure, and all such modifications are intended to be included within the scope of the disclosure.

Claims

1. A system for emptying and cleaning a portable waste holding tank, the system comprising:
 - a housing;
 - a controller;
 - a carriage mounted within the housing for rotation about a carriage axis, the carriage operative to receive the portable waste holding tank;
 - a blade actuator controlled by the controller for automatically opening a blade of the portable waste holding tank; and
 - a water source for supplying water to an inside of the portable waste holding tank to rinse the portable waste holding tank.
2. The system of claim 1, further comprising a carriage actuator controlled by the controller for automatically rotating the carriage about the carriage axis to empty contents from the portable waste holding tank.
3. The system of claim 1, wherein the carriage actuator is rotatable through approximately 90 degrees about a carriage axis for emptying contents from the portable waste holding tank.
4. The system of claim 1, further comprising a cap cleaning unit for automatically cleaning a cap of a nozzle of the portable waste holding tank.
5. The system of claim 4, wherein the cap cleaning unit includes a receptacle for receiving the cap.
6. The system of claim 4, wherein the cap cleaning unit is in fluid communication with the water source.
7. The system of claim 6, further comprising a sensor for sensing the cap on the cap cleaning unit.
8. The system of claim 7, wherein the controller is operative to prevent operation of the system until the sensor senses the cap on the cap cleaning unit.

9. The system of claim 7, wherein the system includes a door for closing the portable waste holding tank within the housing, and further wherein the controller is operative to prevent operation of the system until the sensor senses the cap on the cap cleaning unit and the door is closed. 5
10. The system of claim 1, further comprising a flexible hose for delivering water to the inside of the portable waste holding tank, the flexible hose in communication with the water source and carrying nozzle at a distal end thereof for insertion into the portable waste holding tank, the hose being sufficiently flexible such that the nozzle may remain within an interior of the portable waste holding tank when the portable waste holding tank is rotated from an initial position to an emptying position. 10 15
11. A method for emptying and cleaning a portable waste holding tank, with the system of any of the preceding claims. 20
12. The method for emptying and cleaning a portable waste holding tank, wherein the carriage is rotated through approximately 90° to the emptying position. 25

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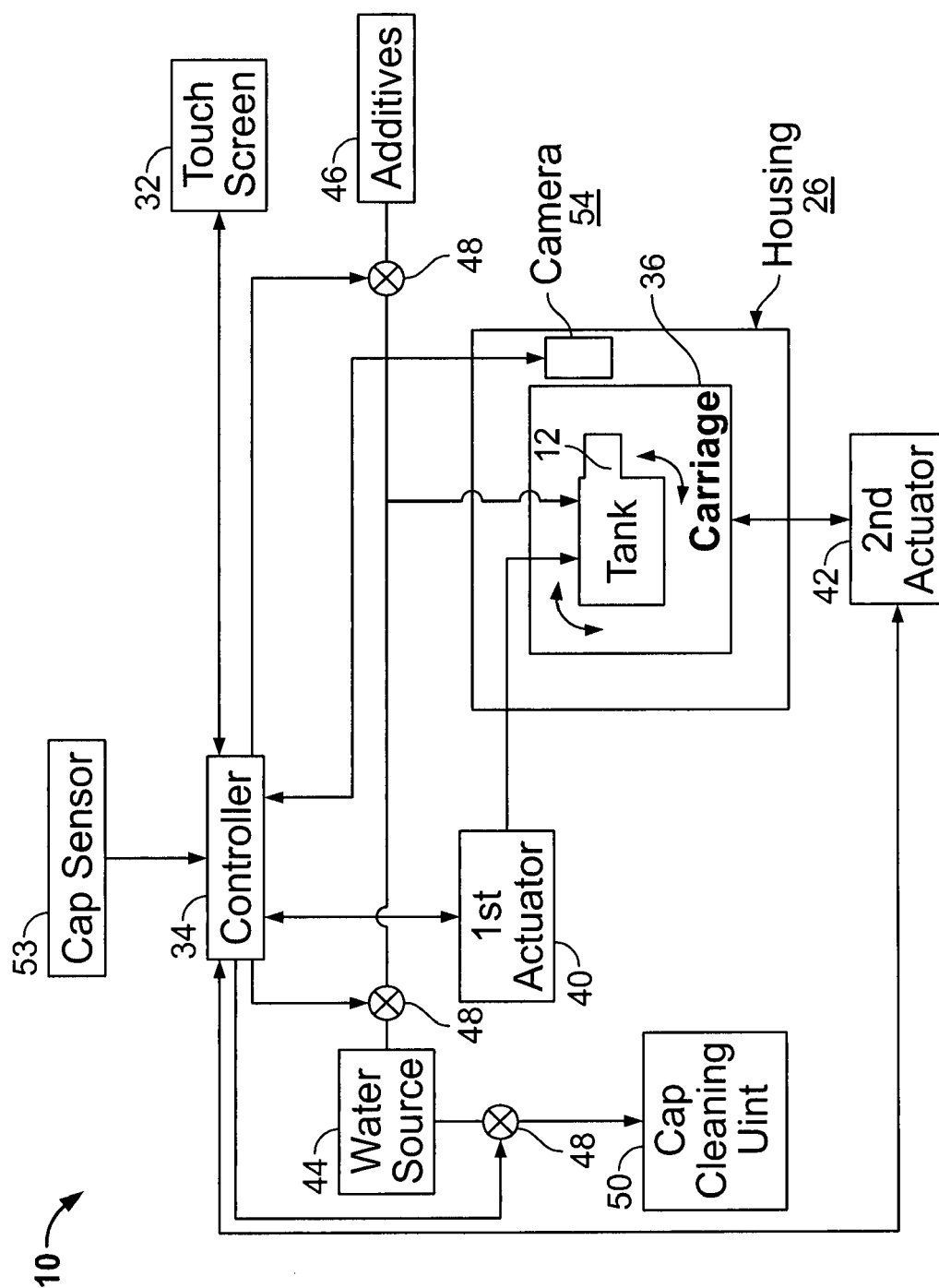


FIG. 1

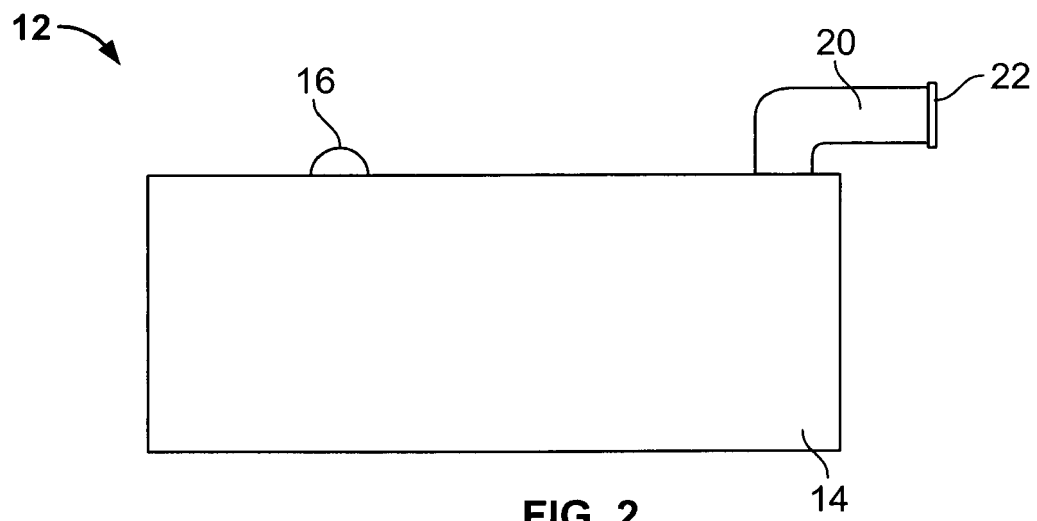


FIG. 2

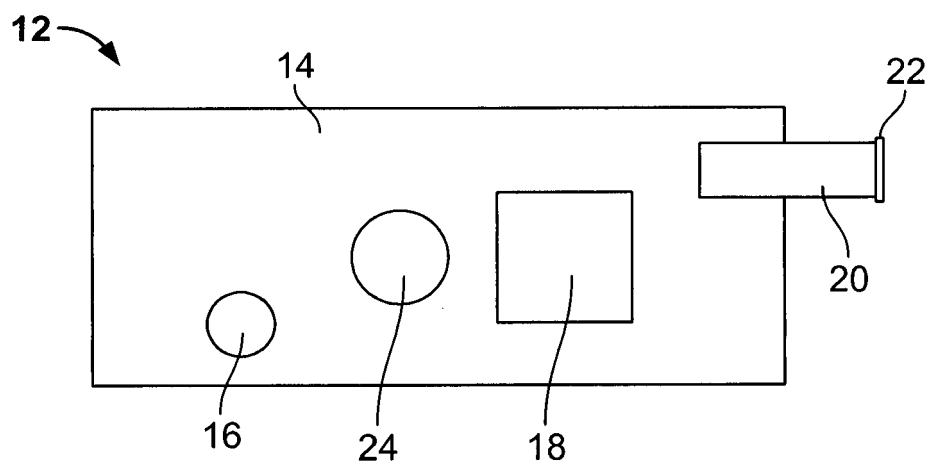


FIG. 3

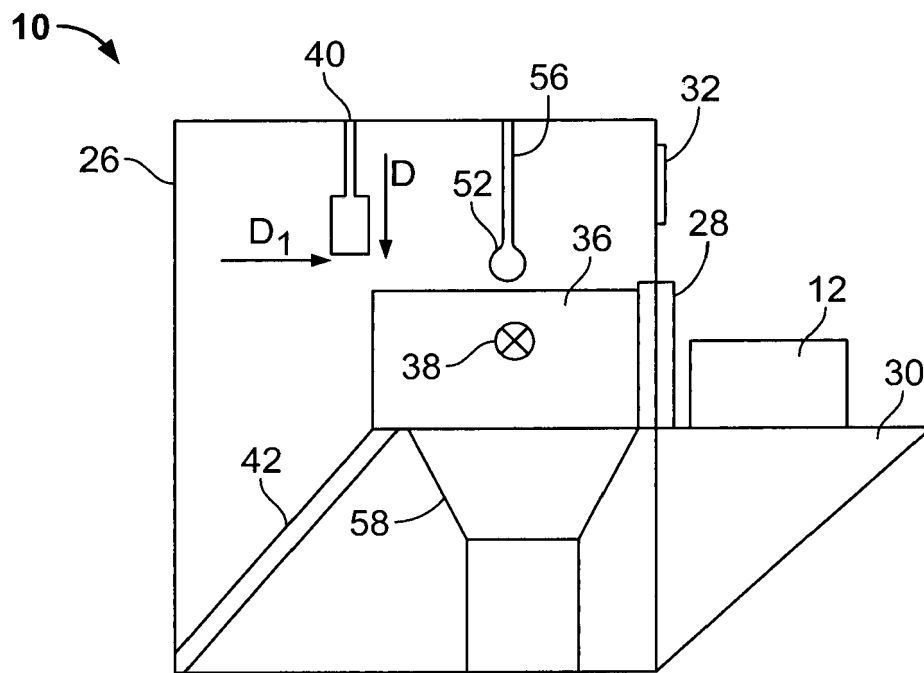


FIG. 4

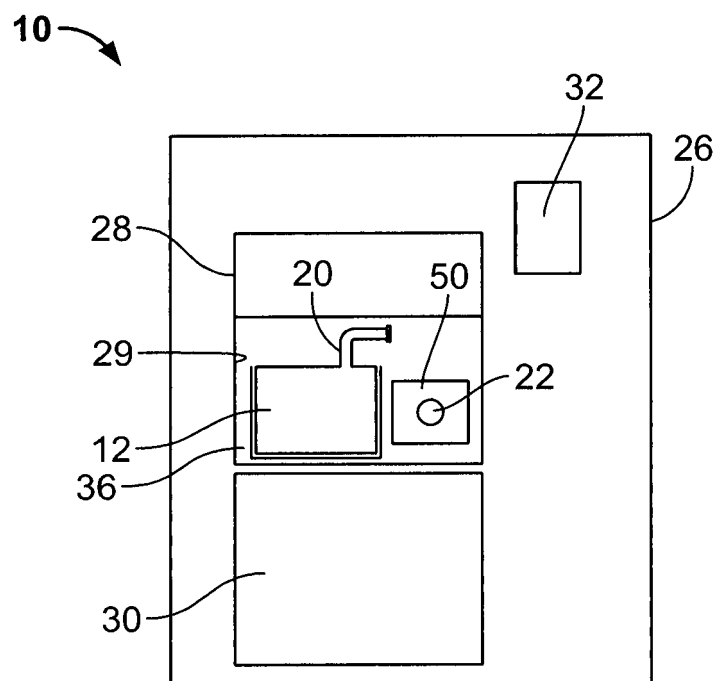


FIG. 5

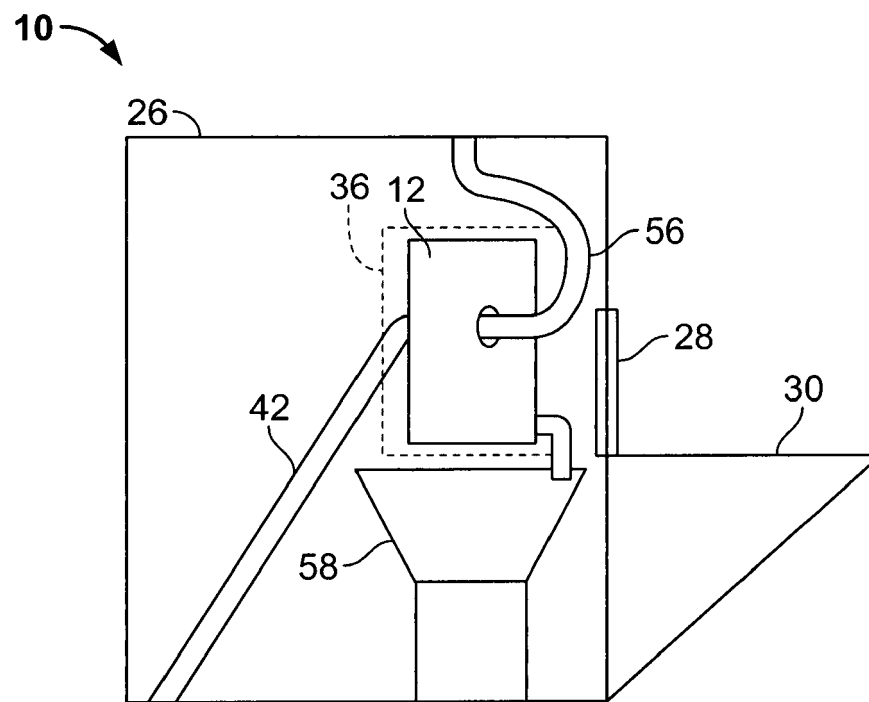


FIG. 6



EUROPEAN SEARCH REPORT

Application Number
EP 15 17 4859

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2002/029793 A1 (DUNN JAMES L [US] ET AL) 14 March 2002 (2002-03-14) * paragraphs [0028] - [0051]; figures 1-11 *	1,2,4-6, 10,11	INV. B08B9/08
X	DE 29 24 050 A1 (KRAFTANLAGEN AG) 18 December 1980 (1980-12-18) * page 4, line 7 - page 8, line 38; figure 1 *	1-3,11, 12	
X	DE 297 06 874 U1 (PLATZ REINIGUNGSSYSTEME GMBH [DE]) 19 June 1997 (1997-06-19) * page 1, line 1 - page 8, line 26 *	1,2,4,6	
X	DE 38 76 745 T2 (ALLIBERT MANUTENTION [FR]) 8 July 1993 (1993-07-08) * page 1, line 3 - page 6, line 34; figures 1,2 *	1,2,4,6	
A	US 6 263 887 B1 (DUNN JAMES L [US]) 24 July 2001 (2001-07-24) * column 1, lines 6-10; figures 1-9 * * column 3, line 39 - column 7, line 17 *	1,10,11	TECHNICAL FIELDS SEARCHED (IPC) B08B
A	US 4 941 491 A (GOERSS WILLIAM G [US] ET AL) 17 July 1990 (1990-07-17) * column 2, line 27 - column 6, line 40; figures 1-5 *	1,10,11	
A	US 3 212 511 A (CUIILLIER ROBERT G) 19 October 1965 (1965-10-19) * column 2, line 60 - column 5, line 52; figures 1-6 *	1,11	
A	DE 10 2010 005130 A1 (TEBARTZ PETER [DE]; TEBARTZ RALF [DE]) 21 July 2011 (2011-07-21) * paragraphs [0001] - [0031]; claims 1-18; figures 1,2 *	1,11	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 November 2015	Examiner Psoch, Christian
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 15 17 4859

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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.

05-11-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002029793 A1	14-03-2002	AT 517702 T	15-08-2011
		CA 2448873 A1	05-12-2002
		EP 1401590 A1	31-03-2004
		EP 2289639 A1	02-03-2011
		HK 1060542 A1	16-12-2011
		JP 4099071 B2	11-06-2008
		JP 2004535285 A	25-11-2004
		US 2002029793 A1	14-03-2002
		US 2003164180 A1	04-09-2003
		US 2003183254 A1	02-10-2003
		WO 02096575 A1	05-12-2002
DE 2924050 A1	18-12-1980	NONE	
DE 29706874 U1	19-06-1997	NONE	
DE 3876745 T2	08-07-1993	DE 3876745 D1	28-01-1993
		DE 3876745 T2	08-07-1993
		EP 0312476 A2	19-04-1989
		ES 2037867 T3	01-07-1993
		FR 2621837 A1	21-04-1989
US 6263887 B1	24-07-2001	AT 388769 T	15-03-2008
		AU 2782201 A	24-07-2001
		CA 2397378 A1	19-07-2001
		DE 60133178 T2	19-03-2009
		EP 1257370 A1	20-11-2002
		HK 1051337 A1	09-05-2008
		JP 2003519572 A	24-06-2003
		US 6263887 B1	24-07-2001
		WO 0151226 A1	19-07-2001
US 4941491 A	17-07-1990	CA 2012606 A1	07-10-1990
		EP 0391845 A2	10-10-1990
		JP H0372986 A	28-03-1991
		US 4941491 A	17-07-1990
US 3212511 A	19-10-1965	NONE	
DE 102010005130 A1	21-07-2011	NONE	

EPO FORM P0459

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 6189161 B [0012]
- US 7293298 B [0012]
- US 8225819 B [0012]