

(19) World Intellectual Property Organization  
International Bureau



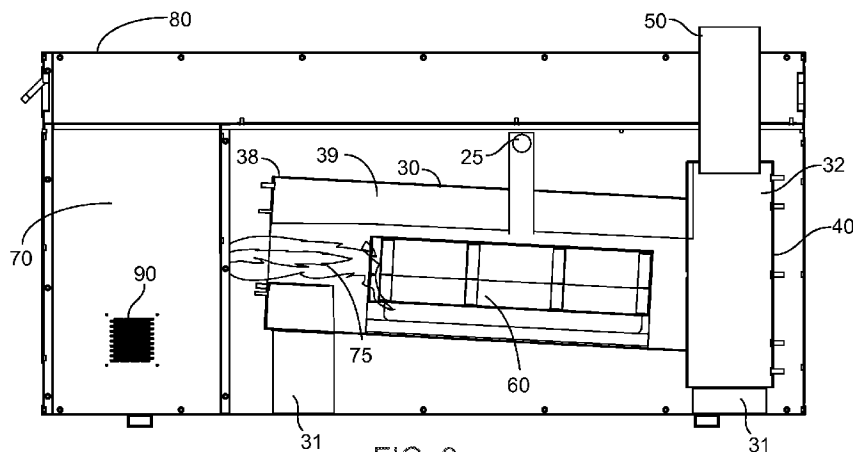
(43) International Publication Date  
19 January 2012 (19.01.2012)

PCT

(10) International Publication Number  
**WO 2012/009449 A2**

- (51) **International Patent Classification:**  
F23G 5/00 (2006.01) F23J 11/00 (2006.01)  
F23G 5/44 (2006.01)
- (21) **International Application Number:**  
PCT/US2011/043875
- (22) **International Filing Date:**  
13 July 2011 (13.07.2011)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**  
61/363,955 13 July 2010 (13.07.2010) US  
13/182,221 13 July 2011 (13.07.2011) US
- (72) **Inventors; and**
- (71) **Applicants :** JOHANSSON, Stefan [SE/US]; PO Box 3752, Costa Mesa, California 92628 (US). JOHANSSON, Mattias [SE/US]; PO Box 3752, Costa Mesa, California 92628 (US).
- (74) **Agent:** PRINCE, Kevin; QuickPatents, Inc., 32861, Calle Perfecto #A, San Juan Capistrano, California 92675 (US).
- (81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:**  
— without international search report and to be republished upon receipt of that report (Rule 48.2(g))

(54) **Title:** WASTE COMBUSTION CHAMBER



(57) **Abstract:** A waste incinerator system is disclosed for incinerating waste in a holding tank. The system comprises a pump in fluid communication with the waste, and adapted to pump waste out of the holding tank and into a substantially hollow burning chamber. The burning chamber includes a raised open end and a lowered chimney end. The chimney end is sealed with a selectively removable chamber plate and includes a chimney for venting exhaust fumes from the burning chamber. A waste tray is adapted to be slid into the burning chamber through the chimney end and holds waste received from the pump. A burner assembly is fixed adjacent with the open end of the burning chamber and adapted to direct a flame into the open end of the burning chamber to heat the waste tray and incinerate the waste therein. A housing is included to enclose the burner assembly and burning chamber.

WO 2012/009449 A2

1 **TITLE:** WASTE COMBUSTION CHAMBER

2

3 **INVENTORS:** STEFAN JOHANSSON AND MATTIAS JOHANSSON

4

5 **CROSS-REFERENCE TO RELATED APPLICATIONS**

6

7 This application is a non-provisional utility patent application that claims priority to  
8 US provisional utility patent application 61/363,955, filed on 7/13/2010, and US non-  
9 provisional utility patent application 13/182,221, filed on 7/13/2011, both of which  
10 are incorporated herein by reference.

11

12

13 **FIELD OF THE INVENTION**

14

15 This invention relates to waste management, and more particularly to a waste  
16 incineration system.

17

18

19 **DISCUSSION OF RELATED ART**

20

21 It is known in the art to incinerate sewage, gray water, and other waste products of a  
22 plumbing system. Non-combustible waste products, such as ash materials, tend to  
23 accumulate over time in such systems, and must be manually removed. Heretofore,  
24 no easy way of removing such accumulated materials has been devised. Further,

|

1 systems of the prior art have lacked in efficiency and made such systems expensive to  
2 operate.

3

4 Such prior art devices with efficiency and ease-of-use drawbacks include the  
5 following:

6

7	<u>Publication No.</u>	<u>Publication Date.</u>	<u>Inventor</u>
8	US 3815159	6/11/1974	Delaney et al.
9	US 4213864	7/22/1980	Asikainen
10	US 4359789	11/23/1982	Roberts
11	US5265544	11/30/1993	Bigelow et al.
12	US 6745407	6/8/2004	Van Acker, Jr.
13	US 6,763,528	7/20/2004	West
14	US 2006/0206996	9/21/2006	Lumbert
15	US 2007/0062423	3/22/2007	Johansson et al.
16	WO 94/06338	3/31/1994	Blankenship
17	WO 2004/018937	3/4/2004	West
18	WO 2006/079906	8/3/2006	Sjovik

19

20 Therefore, there is a need for a device that allows for easy removal of non-  
21 combustible ash byproduct materials, while at the same time improves efficiency over  
22 the prior art. Such a needed system would be relatively easy to install in a wide  
23 variety of applications, and would be relatively inexpensive to manufacture and  
24 operate. The present invention accomplishes these objectives.

25

26

27

1 **SUMMARY OF THE INVENTION**

2

3 The present device is a waste incinerator system for incinerating waste from a holding  
4 tank. The system may include a waste level sensor for sensing a waste level within  
5 the holding tank. Such a holding tank may be an outhouse holding tank, a septic tank,  
6 or other holding tank for holding sewage or gray water from a plumbing system, for  
7 example.

8

9 The system comprises a pump in fluid communication with the waste from the  
10 holding tank, and which is adapted to pump waste out of the holding tank and into a  
11 substantially hollow burning chamber. The burning chamber includes a raised open  
12 end and a lowered chimney end. The chimney end is sealed with a selectively  
13 removable chamber plate and includes a chimney for venting exhaust fumes from  
14 within the burning chamber.

15

16 A waste tray is adapted to be slid into the burning chamber through the chimney end  
17 when the chamber plate is removed. The waste tray holds waste received from the  
18 pump. The waste tray may further include heat sink fins, and is preferably made of a  
19 suitably high-temperature metal or alloy that is able to transmit heat efficiently, such  
20 that applying heat to one side thereof generally heats the entire waste tray. A burner  
21 assembly is fixed adjacent with the open end of the burning chamber and adapted to  
22 direct a flame into the open end of the burning chamber to heat the waste tray and the  
23 waste therein. A housing is included to enclose the burner assembly and the burning  
24 chamber.

25

1 A control system includes a power source and is adapted to activate the pump and the  
2 burner assembly. The control system includes at least one temperature sensor fixed  
3 proximate the chimney for determining when the burning chamber has reached a  
4 predetermined temperature.

5

6 In use, when the waste level sensor of the holding tank indicates that a waste level in  
7 the holding tank has exceeded a predetermined level, such as 60% capacity, for  
8 example, the control system activates the pump for a predetermined time, such as  
9 between 5 and 20 seconds, in order to pump a predetermined volume of the waste into  
10 the waste tray, such as between 0.25 and 2.5 gallons, for example. The control system  
11 then activates the burner assembly after the predetermined time of pumping and until  
12 the burning chamber has reached the predetermined temperature, indicating that the  
13 waste has been incinerated. More waste can then be pumped into the waste tray and  
14 incinerated in the same manner, until the waste level sensor indicates that the waste  
15 level in the holding tank has fallen to a predetermined minimum level, such as 5% of  
16 capacity, for example.

17

18 The present invention is a system that allows for easy removal of non-combustible ash  
19 byproduct materials, while at the same time improves efficiency over the prior art.

20 The present device is relatively easy to install in a wide variety of applications, and is  
21 relatively inexpensive to manufacture and operate. Other features and advantages of  
22 the present invention will become apparent from the following more detailed  
23 description, taken in conjunction with the accompanying drawings, which illustrate,  
24 by way of example, the principles of the invention.

25

1

2 **DESCRIPTION OF THE DRAWINGS**

3

4 FIG. 1 is a perspective view of a housing of the invention;

5 FIG. 2 is a perspective view of a burning chamber of the invention;

6 FIG. 3 is a cross-sectional view of the invention, taken generally along lines 3--3 of

7 FIG. 1;

8 FIG. 4 is a perspective view of a waste tray of one embodiment of the invention;

9 FIG. 5 is a diagram of the invention, illustrating a waste holding tank buried below a

10 ground surface upon which the housing is mounted;

11 FIG. 6 is a perspective view of an alternate embodiment of the waste tray;

12 FIG. 7 is a bottom plan view of FIG. 6;

13 FIG. 8 is a cross-sectional view of the alternate embodiment of the waste tray, taken

14 generally along lines 8--8 of FIG. 7; and

15 FIG. 10 is a cross-sectional view of the invention, illustrating an embodiment further

16 including a heat insulating tube within the burning chamber.

17

18

19 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

20

21 Illustrative embodiments of the invention are described below. The following  
22 explanation provides specific details for a thorough understanding of and enabling  
23 description for these embodiments. One skilled in the art will understand that the  
24 invention may be practiced without such details. In other instances, well-known

1 structures and functions have not been shown or described in detail to avoid  
2 unnecessarily obscuring the description of the embodiments.

3

4 Unless the context clearly requires otherwise, throughout the description and the  
5 claims, the words “comprise,” “comprising,” and the like are to be construed in an  
6 inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in the  
7 sense of “including, but not limited to.” Words using the singular or plural number  
8 also include the plural or singular number respectively. Additionally, the words  
9 “herein,” “above,” “below” and words of similar import, when used in this  
10 application, shall refer to this application as a whole and not to any particular portions  
11 of this application. When the claims use the word “or” in reference to a list of two or  
12 more items, that word covers all of the following interpretations of the word: any of  
13 the items in the list, all of the items in the list and any combination of the items in the  
14 list.

15

16 FIGS. 1, 3 and 5 illustrate a waste incinerator system 10 for incinerating waste 15 in a  
17 holding tank 16. The system 10 may include a waste level sensor 17 for sensing a  
18 waste level within the holding tank 16, or may utilize the signal from a waste level  
19 sensor 17 that is already present in the holding tank 16. Such a holding tank 16 may  
20 be an outhouse holding tank, a septic tank, or other holding tank for holding sewage  
21 or gray water from a plumbing system, for example.

22

23 The system 10 comprises a pump 20 in fluid communication with the waste 15 in the  
24 holding tank 16, and which is adapted to pump waste 15 out of the holding tank 16  
25 and into a substantially hollow burning chamber 30 (FIGS. 2 and 3). The burning

1 chamber 30 includes a raised open end 38 and a lowered chimney end 32. The  
2 chimney end 32 is sealed with a selectively removable chamber plate 40 and includes  
3 a chimney 50 for venting exhaust fumes from within the burning chamber 30. The  
4 burning chamber 30 may be made of stainless steel or other suitably rigid metal  
5 material suitable for use with high temperatures. An internal layer of insulation 39  
6 may be included to insulate the burning chamber 30 from the more extreme  
7 temperatures therein.

8  
9 A waste tray 60 (FIGS. 3, 4, and 7--9) is adapted to be slid into the burning chamber  
10 30 through the chimney end 32 when the chamber plate 40 is removed. The waste  
11 tray 60 holds waste 15 received from the pump 20, such as through a conduit 25  
12 (FIGS. 3 and 5). The waste tray 60 may further include heat sink fins 67, and is  
13 preferably made of Inconel®-type steel, cast iron, or other suitably high-temperature  
14 metal or alloy that is able to transmit heat efficiently, such that applying heat to one  
15 side thereof generally heats the entire waste tray 60. Further, such a waste tray 60  
16 may be coated with a high-temperature resistance coating, such as those produced by  
17 Plasma Technology Incorporated of Torrance, California, or other suitable coating or  
18 treatment to increase efficiency and durability thereof. In one embodiment, additional  
19 heat sink fins 67 may include notches 68 for accepting air vent pipes, or the like,  
20 therethrough (FIGS. 7--9).

21  
22 Legs 31 may be used to incline the burning chamber 30 at an angle of between 5 and  
23 20 degrees to the horizontal, for example. In one embodiment, the legs 31 are  
24 adjustable (not shown) so as to allow some adjustment to the angle of incline of the  
25 burning chamber 30. As such, any waste 15 overflowing the waste tray 60 will be

1 directed towards the chimney end 32 of the burning chamber 30 and be captured  
2 therein.

3

4 A burner assembly 70 is fixed adjacent with the open end 38 of the burning chamber  
5 30 and adapted to direct a flame 75 into the open end 38 of the burning chamber 30 to  
6 heat the waste tray 60 and the waste 15 therein. The burner assembly 70 includes  
7 access to a fuel source (not shown), such as natural gas, propane, butane, diesel fuel,  
8 or the like, and further includes an ignition source (not shown) and at least one burner  
9 nozzle (not shown) directed towards the open end 38 of the burning chamber 30 (FIG.  
10 3). Such burner assemblies 70 are common in the art, such as in forced air heating  
11 units, pool heaters, and the like. Alternately, an electric burner assembly (not shown)  
12 may be utilized to sufficiently heat the waste tray 60.

13

14 A housing 80 is included to enclose the burner assembly 70 and the burning chamber  
15 30. Such a housing 80 may be made of a sheet metal material supported by an  
16 internal frame, for example. At least one air vent 90 may be included to allow air to  
17 circulate freely within the housing 80 and in order to provide oxygen to the burning  
18 assembly 70.

19

20 A control system 100, such as a computerized controller, includes a power source (not  
21 shown) and is adapted to activate the pump 20 and the burner assembly 70. The  
22 control system 100 includes at least one temperature sensor 110 fixed proximate the  
23 chimney 50 for determining when the burning chamber 30 has reached a  
24 predetermined temperature, such as between 800 and 1,000 degrees Fahrenheit.

1 Electrical conductors between the control system 100 and the temperature sensor 110,  
2 waste level sensor 17, and pump 20 carry power and signal information therebetween.

3

4 In use, when the waste level sensor 17 of the holding tank 16 indicates that a waste  
5 level in the holding tank 16 has exceeded a predetermined level, such as 60%  
6 capacity, for example, the control system 100 activates the pump 20 for a  
7 predetermined time, such as between 5 and 20 seconds, in order to pump a  
8 predetermined volume of the waste 15 into the waste tray 60, such as between 0.25  
9 and 2.5 gallons, for example. The control system 100 then activates the burner  
10 assembly after the predetermined time of pumping and until the burning chamber 30  
11 has reached the predetermined temperature, indicating that the waste 15 has been  
12 incinerated. More waste 15 can then be pumped into the waste tray 60 and  
13 incinerated in the same manner, until the waste level sensor 17 indicates that the  
14 waste level in the holding tank 16 has fallen to a predetermined minimum level, such  
15 as 5% of capacity, for example.

16

17 The control system 100 may include a timing means such that the pump 20 and burner  
18 assembly 70 are not activated except between certain times, such as in the early  
19 morning hours, for example. Any of the parameters of the control system 100 may be  
20 adjusted based on the requirements of any particular installation. For example, to  
21 increase efficiency, the predetermined maximum waste level may be set high and the  
22 predetermined minimum waste level may be set low so as to cause the system 10 to  
23 incinerate a maximum amount of the waste 15 when the waste tray 60 has already  
24 been heated to its incinerating temperature. Alternately, if in a particular installation

1 it is determined that the waste holding tank 16 should never exceed 50% of its  
2 capacity, then the predetermined maximum waste level may be set to 50%.

3

4 In one embodiment, an insulating tube 120 is included in each burning chamber 30  
5 (FIG. 10). As such, the structure of the burning chamber 30 is protected from the  
6 intense heat produced by each burner assembly 70. Such an insulating tube 120 may  
7 be made from heat insulating materials, such as ceramic, glass, or the like, such as  
8 produced by Western Industrial Ceramics, Inc. of Santa Fe Springs, California, for  
9 example. In one embodiment (not shown), multiple burner assemblies 70 and burning  
10 chambers 30 are included within the housing 80.

11

12 While a particular form of the invention has been illustrated and described, it will be  
13 apparent that various modifications can be made without departing from the spirit and  
14 scope of the invention. For example, the particular shape of the waste tray 60 may  
15 altered from that shown in the figures. Accordingly, it is not intended that the  
16 invention be limited, except as by the appended claims.

17

18 Particular terminology used when describing certain features or aspects of the  
19 invention should not be taken to imply that the terminology is being redefined herein  
20 to be restricted to any specific characteristics, features, or aspects of the invention  
21 with which that terminology is associated. In general, the terms used in the following  
22 claims should not be construed to limit the invention to the specific embodiments  
23 disclosed in the specification, unless the above Detailed Description section explicitly  
24 defines such terms. Accordingly, the actual scope of the invention encompasses not

1 only the disclosed embodiments, but also all equivalent ways of practicing or  
2 implementing the invention.

3

4 The above detailed description of the embodiments of the invention is not intended to  
5 be exhaustive or to limit the invention to the precise form disclosed above or to the  
6 particular field of usage mentioned in this disclosure. While specific embodiments of,  
7 and examples for, the invention are described above for illustrative purposes, various  
8 equivalent modifications are possible within the scope of the invention, as those  
9 skilled in the relevant art will recognize. Also, the teachings of the invention  
10 provided herein can be applied to other systems, not necessarily the system described  
11 above. The elements and acts of the various embodiments described above can be  
12 combined to provide further embodiments.

13

14 All of the above patents and applications and other references, including any that may  
15 be listed in accompanying filing papers, are incorporated herein by reference.

16 Aspects of the invention can be modified, if necessary, to employ the systems,  
17 functions, and concepts of the various references described above to provide yet  
18 further embodiments of the invention.

19

20 Changes can be made to the invention in light of the above "Detailed Description."

21 While the above description details certain embodiments of the invention and  
22 describes the best mode contemplated, no matter how detailed the above appears in  
23 text, the invention can be practiced in many ways. Therefore, implementation details  
24 may vary considerably while still being encompassed by the invention disclosed

1 herein. As noted above, particular terminology used when describing certain features  
2 or aspects of the invention should not be taken to imply that the terminology is being  
3 redefined herein to be restricted to any specific characteristics, features, or aspects of  
4 the invention with which that terminology is associated.

5

6 While certain aspects of the invention are presented below in certain claim forms, the  
7 inventor contemplates the various aspects of the invention in any number of claim  
8 forms. Accordingly, the inventor reserves the right to add additional claims after  
9 filing the application to pursue such additional claim forms for other aspects of the  
10 invention.

11

12

## 1 CLAIMS

2

3 What is claimed is:

4

5 1. A waste incinerator system for incinerating waste in a holding tank having a waste  
6 level sensor, the system comprising:7 a pump in fluid communication with the waste in the holding tank and adapted  
8 to pump waste out of the tank;9 at least one substantially hollow burning chamber in fluid communication with  
10 the pump and adapted to receive a portion of the waste from the pump, each burning  
11 chamber including a raised open end and a lowered chimney end, the chimney end  
12 sealed with a selectively removable chamber plate and including a chimney for  
13 venting exhaust fumes from within the burning chamber;14 a waste tray adapted to be slid into each burning chamber through the chimney  
15 end when the chamber plate is removed, and for holding the waste received from the  
16 pump;17 at least one burner assembly, each burner assembly fixed with the raised open  
18 end of one of the at least one burning chambers and adapted to direct a flame into the  
19 open end of the burning chamber to heat the waste tray and the waste therein;20 a housing for holding the at least one burner assembly and the at least one  
21 burning chamber, the housing including at least one air vent to allow air to circulate  
22 therein;23 a control system adapted to activate the pump and each burner assembly, and  
24 including at least one temperature sensor fixed proximate the chimney for

1 determining when the at least one burning chamber has reached a predetermined  
2 temperature;

3 whereby when the waste level sensor of the holding tank indicates that a waste  
4 level in the holding tank has exceeded a predetermined level, the control system  
5 activates the pump for a predetermined time, and then activates each burner assembly  
6 after the predetermined time of pumping and until each burning chamber has reached  
7 the predetermined temperature, the process repeating until the waste level sensor  
8 indicates that the waste level in the holding tank has fallen to a predetermined  
9 minimum level.

10

11 2. The waste incinerator system of claim 1 wherein the waste tray further including a  
12 plurality of heat sink fins.

13

14 3. The waste incinerator system of claim 1 wherein each burning chamber further  
15 includes an insulating tube into which one of the at least one waste trays may be  
16 inserted.

17

18 4. The waste incinerator system of claim 1 wherein each of the at least one waste trays  
19 is made from a cast iron material and is coated at least at one end thereof with a heat  
20 resistant coating.

21

22 5. A method of incinerating waste in a holding tank having a waste level sensor,  
23 comprising the steps:

24

- 1 a) providing a pump in fluid communication with the waste in the holding tank  
2 and adapted to pump waste out of the tank; at least one substantially hollow burning  
3 chamber in fluid communication with the pump and adapted to receive a portion of  
4 the waste from the pump, each burning chamber including a raised open end and a  
5 lowered chimney end, the chimney end sealed with a selectively removable chamber  
6 plate and including a chimney for venting exhaust fumes from within the burning  
7 chamber; a waste tray adapted to be slid into each burning chamber through the  
8 chimney end when the chamber plate is removed, and for holding the waste received  
9 from the pump; at least one burner assembly, each burner assembly fixed with the  
10 raised open end of one of the at least one burning chambers and adapted to direct a  
11 flame into the open end of the burning chamber to heat the waste tray and the waste  
12 therein; a housing for holding the at least one burner assembly and the at least one  
13 burning chamber, the housing including at least one air vent to allow air to circulate  
14 therein; and a control system adapted to activate the pump and each burner assembly,  
15 and including at least one temperature sensor fixed proximate the chimney for  
16 determining when the at least one burning chamber has reached a predetermined  
17 temperature;
- 18 b) connecting the waste level sensor in the holding tank to the control system;
- 19 c) upon detection of the waste level sensor of the holding tank indicating that a  
20 waste level in the holding tank has exceeded a predetermined level, the control system  
21 activating the pump for a predetermined period of time;
- 22 d) activating each burner assembly after the predetermined time of pumping  
23 and until each burning chamber has reached the predetermined temperature;
- 24 e) repeating from step c) until the waste level sensor indicates that the waste  
25 level in the holding tank has fallen to a predetermined minimum level.

1/3

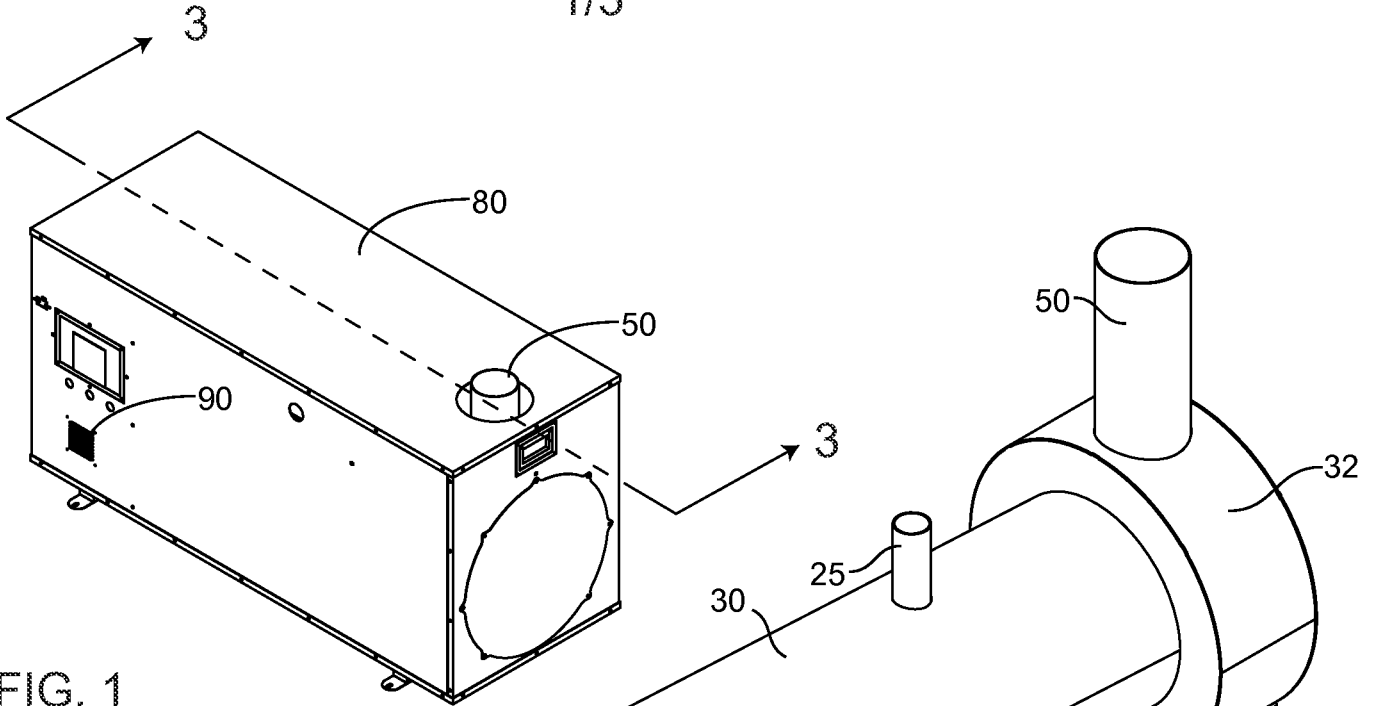


FIG. 1

FIG. 2

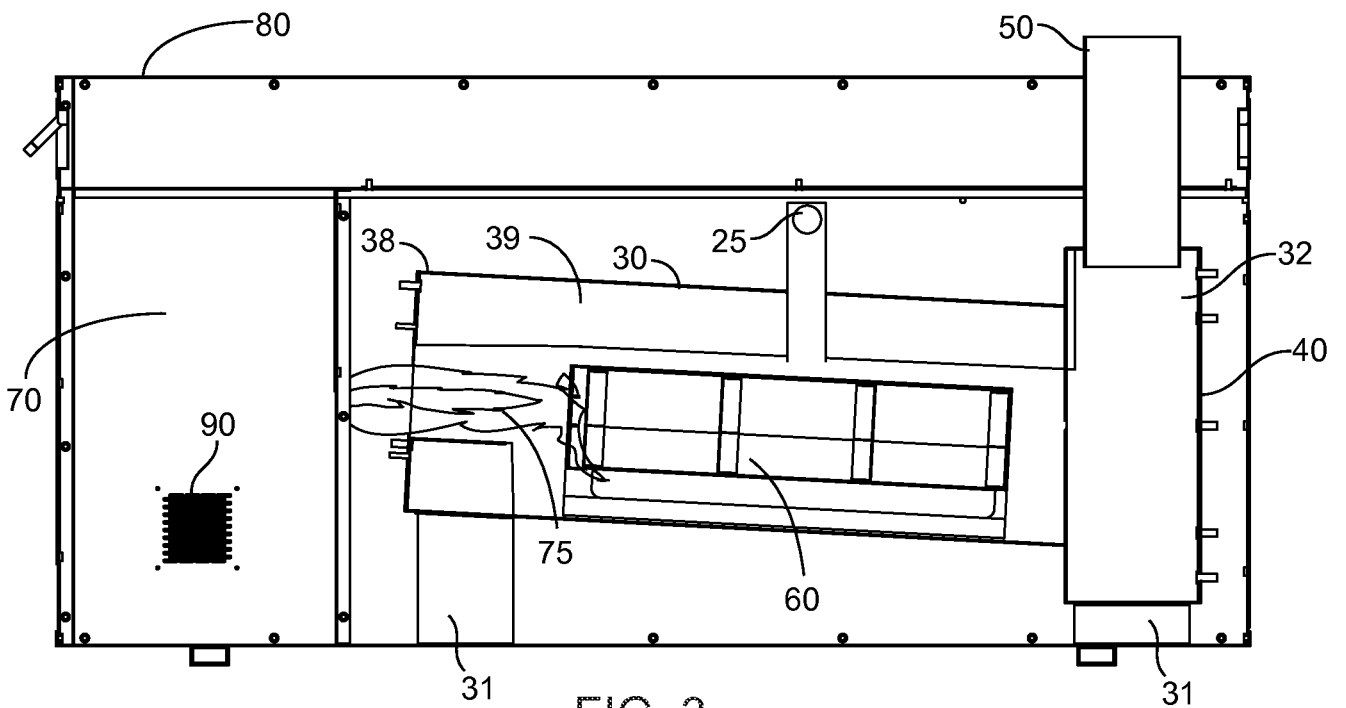


FIG. 3

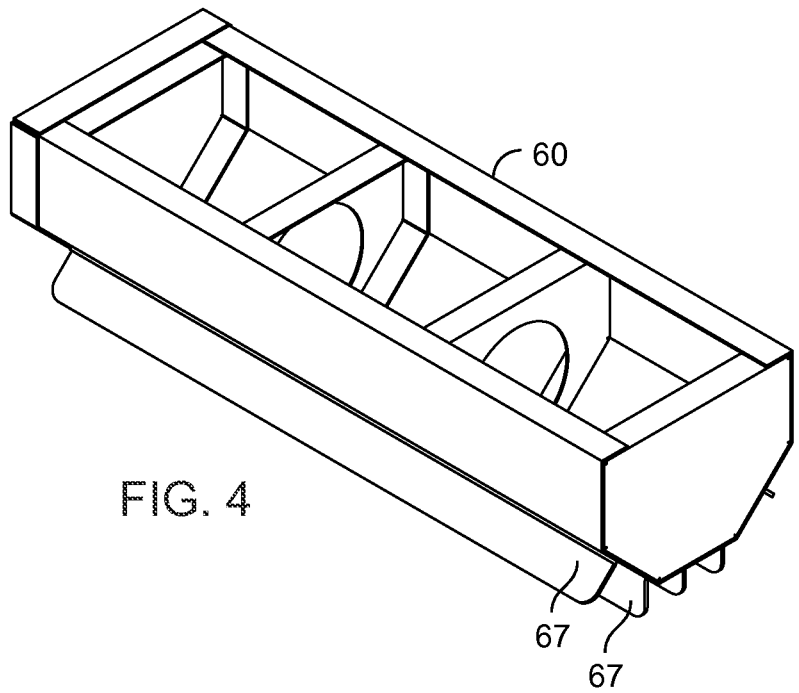


FIG. 4

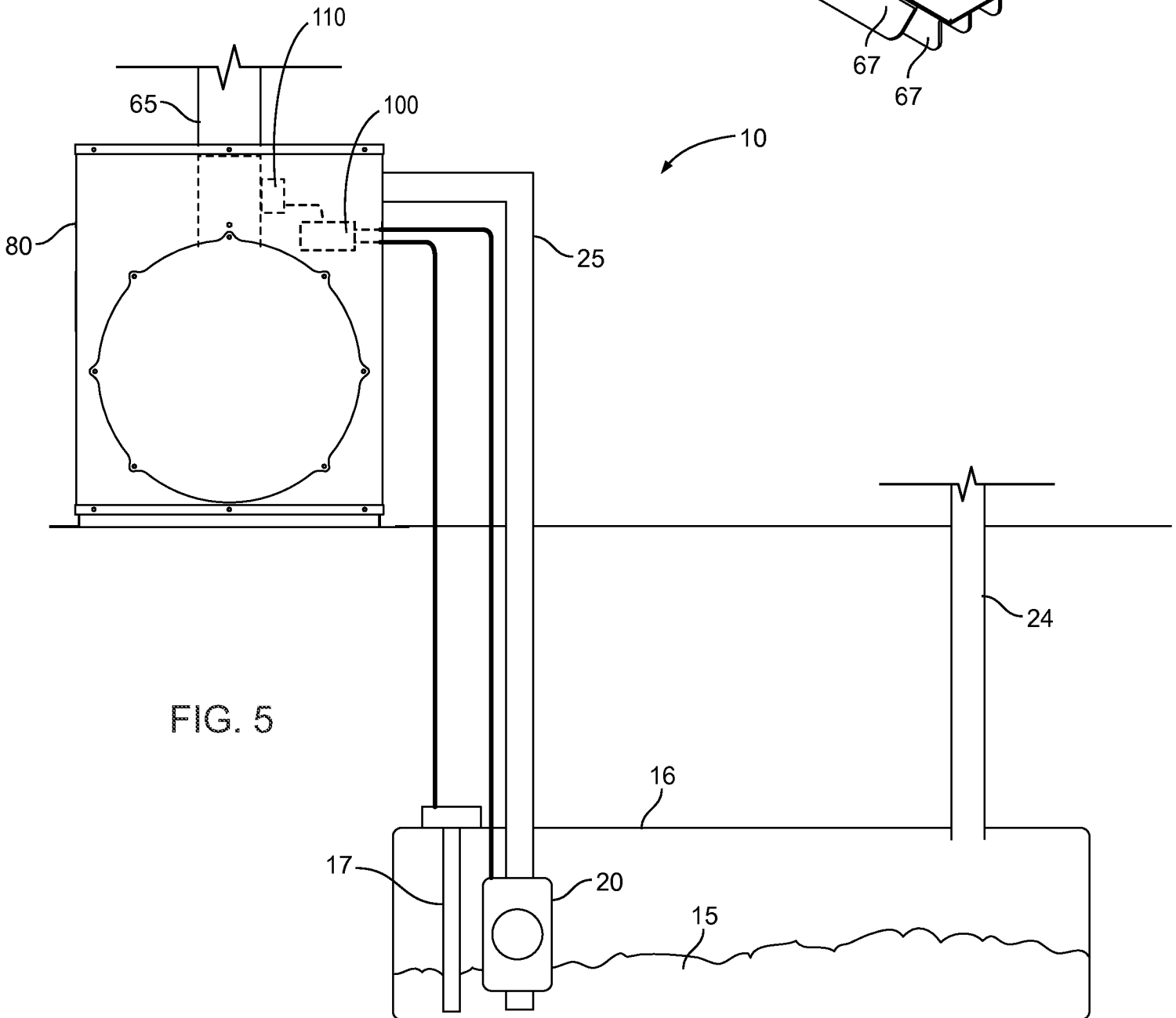


FIG. 5

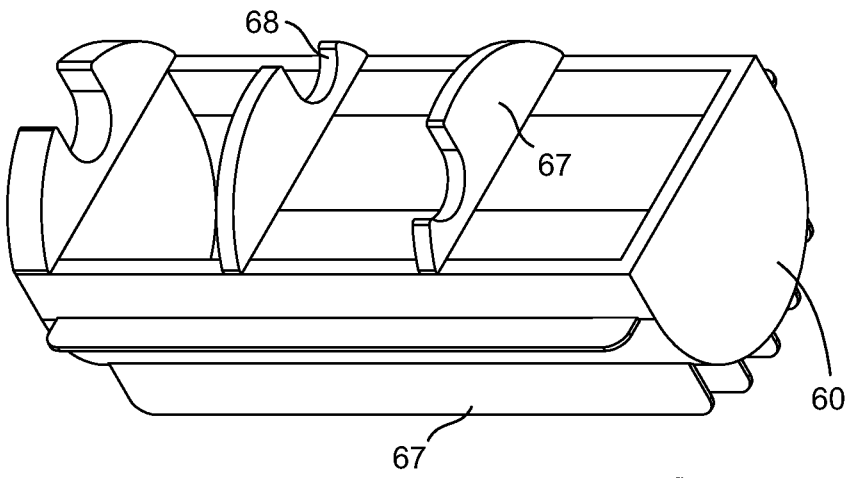


FIG. 6

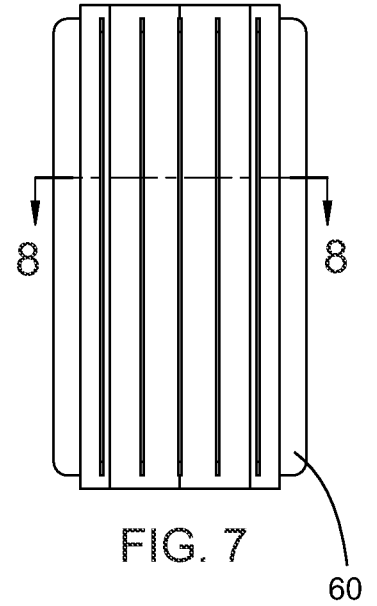


FIG. 7

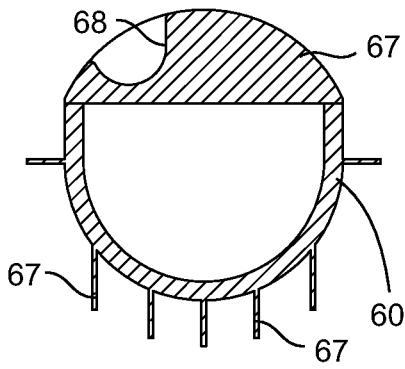


FIG. 8

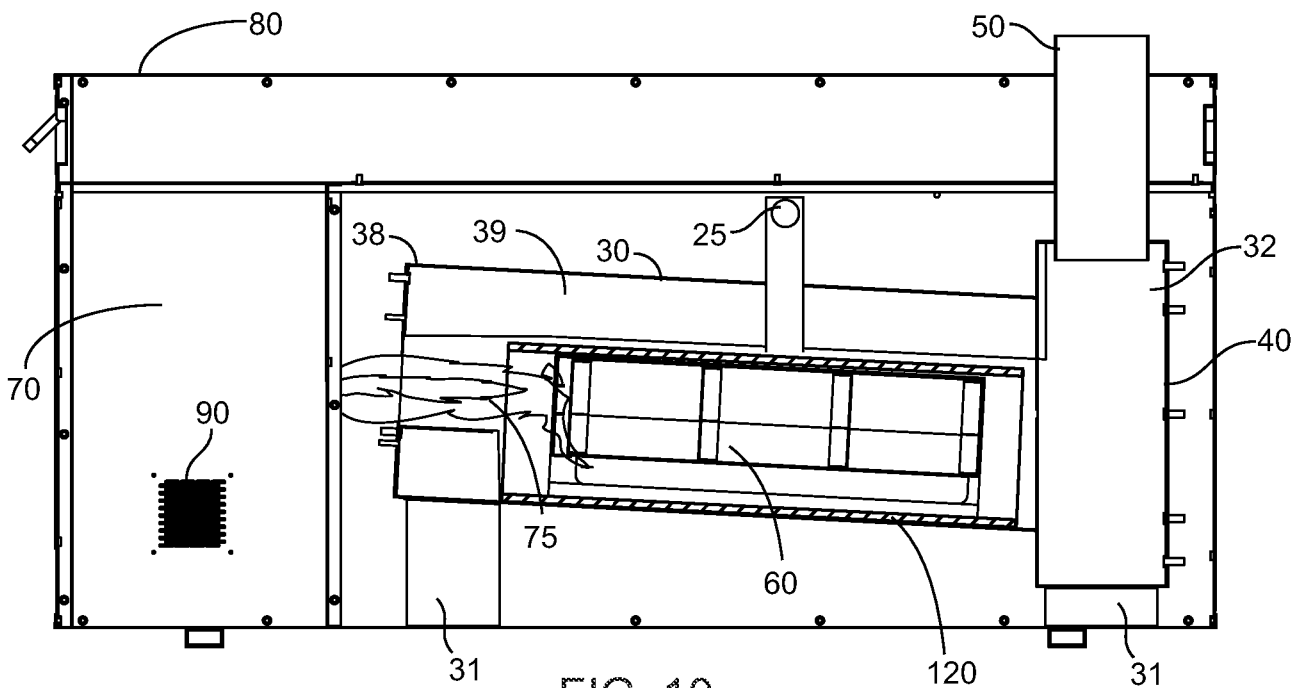


FIG. 10