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(71) Applicant: **UNIVERSITI PUTRA MALAYSIA** [MY/MY]; Putra Science Park, Pejabat Timbalan Naib Canselor (penyelidikan Dan Inovasi), Universiti Putra Malaysia, 43400 Serdang, Selangor (MY).

(72) Inventors: **IBRAHIM, Rahinah**; Fakulti Rekabentuk Dan Senibina, Universiti Putra Malaysia, Serdang, Selangor, 43400 (MY). **IDRIS, Azni**; Fakulti Kejuruteraan, Universiti Putra Malaysia, Serdang, Selangor, 43400 (MY). **MOHAMMAD, Thamer Ahmed**; Fakulti Kejuruteraan, Universiti Putra Malaysia, Serdang, Selangor, 43400 (MY). **MAZANDARANI, Navid Nasrolah**; Fakulti Rekabentuk Dan Senibina, Universiti Putra Malaysia, Serdang, Selangor, 43400 (MY). **MOHD ZAINI, Mustafa Kamal**; Fakulti Rekabentuk Dan Senibina, Universiti Putra Malaysia, Serdang, Selangor, 43400 (MY).

(74) Agent: **YIP, Jiun Hann**; Trademark2U SDN BHD (670910-M), No. 1, Block C, Jalan Dataran SD 1, Dataran SD PJU 9, Bandar Sri Damansara, Kuala Lumpur 52200 (MY).

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[Continued on next page]

(54) Title: SEWERAGE TREATMENT PLANT

(57) Abstract: The present invention relates to a sewerage treatment plant (10) for a structure of a column (11) and a beam (12), comprising: a tank assembly; an inlet (23) for receiving sewage; an outlet (24) for discharging effluent; and characterised by: a plurality of tanks (21), detachably connected with each other to form the tank assembly having a hollow core (22) for receiving the column (11); wherein the tank assembly being provided with an engaging means for engaging with the column (11) and/or the beam (12).

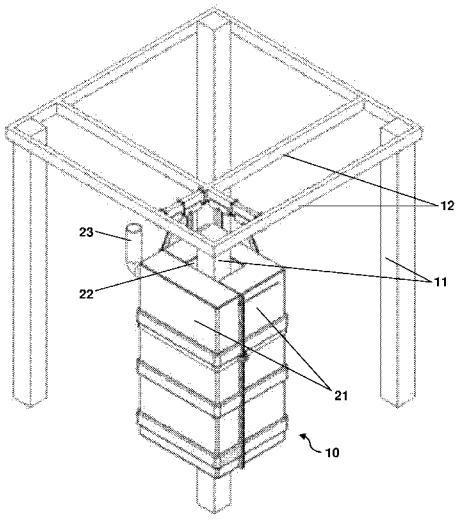

Fig. 1

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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, KM, ML, MR, NE, SN, TD, TG).

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— *as to the identity of the inventor (Rule 4.17(i))*

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

SEWERAGE TREATMENT PLANT

Background of the Invention

Field of the Invention

This invention relates a sewerage treatment plant, and more particularly to a suspended sewerage treatment plant for single dwellings.

Description of Related Arts

In urban areas, used water or sewage is directed into a municipal sewerage treatment system for producing water discharge safe to the environment. However, such treatment system is usually not available in rural dwellings. For example, stilt houses build over the surface of a body of water are not provided with sewerage treatment plant, which causes waste water containing pollutants directly disposed to the natural body of water. Unfortunately, this polluted water causes adverse effects to aquatic life and spreads the transmission of cholera.

The conventional sewerage treatment plant systems are bulky and heavy. Thus, the transportation and set up of the plants in rural environment is difficult. Further, installation of the plant for stilt houses is rather infeasible, especially for stilt houses built over the body of water.

An example of septic tank for waste water disposal of small-sized household is disclosed in EP 0159535 A1. The septic tank comprises a main body of tank partitioned into an inflow side and an outflow side. A siphon tube is set across the partitions so that one end is inserted into a space on the inflow side and the other end is opened above the surface of water on the outflow side. Thus, the flow rate of the water in the main body can be controlled to ensure uniformity of the quantity of treated water.

US 7344641 B2 discloses a water treatment system for serving rural residences lacking a drainage field. The system consisting essentially of a septic tank, a

holding tank in fluid communication with the septic tank, a reactor containing a plurality of media, means to spray the wastewater on the media, and a cyclonic clarification means.

US 6328890 B1 discloses a multiple compartment septic tank structure for minimising transportation and installation cost. The septic tank structure comprises first and second lower tank members for receiving waste materials, and a cover member positioned over the first and second tank members.

However, none of the prior art discloses modular sewerage treatment plant adapted for stilt houses, which may be suspended on stilt and installed on site.

Accordingly, it can be seen in the prior arts that there exists a need to provide an improved sewerage treatment plant for overcoming the drawbacks of the existing systems for use in stilt houses.

Summary of Invention

It is an objective of the present invention to provide a sewerage treatment plant that may be constructed for stilt houses built over the body of water, for producing effluent safe for direct disposal into the water stream.

It is also an objective of the present invention to provide a modular sewerage treatment plant for installation on site.

It is yet another objective of the present invention to provide a sewerage treatment plant for facilitating installation of the plant to stilt houses on site.

Accordingly, these objectives may be achieved by following the teachings of the present invention. The present invention relates to a sewerage treatment plant for a structure of a column and a beam, comprising: a tank assembly; an inlet for receiving sewage; an outlet for discharging effluent; and characterised by: a plurality of tanks, detachably connected with each other to form the tank assembly

having a hollow core for receiving the column; wherein the tank assembly being provided with an engaging means for engaging with the column and/or the beam.

Brief Description of the Drawings

The features of the invention will be more readily understood and appreciated from the following detailed description when read in conjunction with the accompanying drawings of the preferred embodiment of the present invention, in which:

Fig. 1 is a perspective view of installation layout of a sewerage treatment plant in a structure.

Fig. 2 is a perspective view of the sewerage treatment plant.

Fig. 3 is a front view of the sewerage treatment plant.

Fig. 4 is a longitudinal cross sectional view taken along line A-A of Fig. 3.

Fig. 5 is a back view of the sewerage treatment plant.

Fig. 6 is a top view of the sewerage treatment plant.

Detailed Description of the Invention

As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention, which may be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting but merely as a basis for claims. It should be understood that the drawings and detailed description thereto are not intended to limit the invention to the particular form disclosed, but on the contrary, the invention is to cover all modifications, equivalents and alternatives falling within the scope of the present invention as defined by the appended claims. As used throughout this application, the word "may" is used in a permissive sense (i.e., meaning having the potential to), rather than the mandatory sense (i.e., meaning must). Similarly, the words "include," "including," and "includes" mean including, but not limited to. Further, the words "a" or "an" mean "at least one" and the word "plurality" means one or more, unless otherwise mentioned. Where the abbreviations or technical terms

are used, these indicate the commonly accepted meanings as known in the technical field. For ease of reference, common reference numerals will be used throughout the figures when referring to the same or similar features common to the figures. The present invention will now be described with reference to Figs. 1-6.

The present invention relates a sewerage treatment plant (10) for a structure of a column (11) and a beam (12), comprising:

a tank assembly;

an inlet (23) for receiving sewage;

an outlet (24) for discharging effluent;

and characterised by:

a plurality of tanks (21), detachably connected with each other to form the tank assembly having a hollow core (22) for receiving the column (11);

wherein the tank assembly being provided with an engaging means for engaging with the column (11) and/or the beam (12).

In a preferred embodiment of the sewerage treatment plant (10), the sewerage treatment plant (10) comprises two tanks (21).

In a preferred embodiment of the sewerage treatment plant (10), the two tanks (21) are an I-shaped tank (21a) and a U-shaped tank (21b).

In a preferred embodiment of the sewerage treatment plant (10), the sewerage treatment plant (10) comprises three tanks (21).

In a preferred embodiment of the sewerage treatment plant (10), the three tanks (21) are an I-shaped tank (21a) and two L-shaped tanks.

In a preferred embodiment of the sewerage treatment plant (10), a minimum of one of the plurality of the tanks (21) comprises a partition, for defining two chambers within the tank (21).

In a preferred embodiment of the sewerage treatment plant (10), the engaging means comprises brackets, and nut and bolt assemblies.

Below is an example of a sewerage treatment plant from which the advantages of the present invention may be more readily understood. It is to be understood that the following example is for illustrative purpose only and should not be construed to limit the present invention in any way.

Examples

Figures 2-5 refer to an embodiment of a sewerage treatment plant (10) in accordance with the present invention. Figure 1 illustrates a structure incorporated with the sewerage treatment plant (10). The structure may be defined by columns (11) and beams (12), which may be made of lumber, timer, steel, concrete, or any other rigid or reinforcing materials known in the art. The structure may serve as stilts for building houses above the ground. The sewerage treatment plant (10) is composed of a plurality of tanks (21), positioned side to side and detachably connected with each other. The tanks (21) are so shaped and constructed as to form a tank assembly having a hollow core (22) for receiving the column(s) (11) of the structure. Thus, the column(s) (11) may serve to support a load of the plant (10) as well as for resisting impact caused by natural phenomena, such as tidal waves and hurricanes.

In various embodiments, the sewerage treatment plant (10) comprises an inlet (23) for receiving sewage and an outlet (24) for discharging effluent. In an embodiment, the inlet (23) may be connected to a toilet of the house for receiving sewage from the toilet. In another embodiment, the inlet (23) may be connected to sewer pipes of the house for receiving household sewage from toilet, bath, shower, and sink.

In various embodiments, the tank assembly has a storage capacity of no more than 350 litres.

In various embodiments, the sewerage treatment plant (10) may comprise two tanks (21). The two tanks (21) may include an I-shaped tank (21a) and a U-shaped tank (21b) so as the connection of the two tanks (21) form the hollow core (22) for receiving a column (11) of the structure.

In various embodiments, the sewerage treatment plant (10) may comprise three tanks (21). The three tanks (21) may include an I-shaped tank (21a) and two L-shaped tanks, for forming the hollow core (22) for receiving a column (11) of the structure.

Preferably, at least one of the plurality of tanks (21) is provided with an engaging means for detachably engaging with a column (11) and/or a beam (12) of the structure such that the structure serves to support a load of the tanks (21).

In an embodiment of the plant (10) comprising an I-shaped tank (21a) and a U-shaped tank (21b) (Figure 2), the plant (10) may be installed to the structure by engaging the I-shaped tank (21a) to the column (11), following by joining via attaching the U-shaped tank (21b) to the I-shaped tank (21a). In an embodiment, the engaging means may include brackets and nut and bolt assemblies.

In various embodiments, each of the plurality of tanks (21) defines a chamber for performing a sewerage treatment process therein.

In various embodiments, a minimum of one of the plurality of the tanks (21) may include a partition, for defining two chambers within the tank (21).

In various embodiments, the plurality of the tanks (21) are constructed such that three chambers, which may be defined by the tank (21) or the partition, are arranged in a side-by-side manner. The three chambers may include a first chamber for anaerobic treatment, a second chamber for aerobic treatment, and a third chamber for polishing treatment, wherein the first chamber is in fluid communication with the second chamber and the second chamber is in fluid

communication with the third chamber. Preferably, the second chamber is an aeration chamber.

Although the present invention has been described with reference to specific embodiments, also shown in the appended figures, it will be apparent for those skilled in the art that many variations and modifications can be done within the scope of the invention as described in the specification and defined in the following claims.

Description of the reference numerals used in the accompanying drawings according to the present invention:

Reference Numerals	Description
10	Sewerage treatment plant
11	Column
12	Beam
21	Tank
21a	I-shaped tank
21b	U-shaped tank
22	Hollow core
23	Inlet
24	Outlet

Claims

I/We claim:

1. A sewerage treatment plant (10) for a structure of a column (11) and a beam (12), comprising:

a tank assembly;

an inlet (23) for receiving sewage;

an outlet (24) for discharging effluent;

and characterised by:

a plurality of tanks (21), detachably connected with each other to form the tank assembly having a hollow core (22) for receiving the column (11);

wherein the tank assembly being provided with an engaging means for engaging with the column (11) and/or the beam (12).

2. The sewerage treatment plant (10) according to claim 1, wherein the sewerage treatment plant (10) comprises two tanks (21).

3. The sewerage treatment plant (10) according to claim 2, wherein the two tanks (21) are an I-shaped tank (21a) and a U-shaped tank (21b).

4. The sewerage treatment plant (10) according to claim 1, wherein the sewerage treatment plant (10) comprises three tanks (21).

5. The sewerage treatment plant (10) according to claim 4, wherein the three tanks (21) are an I-shaped tank (21a) and two L-shaped tanks.

6. The sewerage treatment plant (10) according to claim 1, wherein a minimum of one of the plurality of the tanks (21) comprises a partition, for defining two chambers within the tank (21).

7. The sewerage treatment plant (10) according to claim 1, wherein the engaging means comprises brackets, and nut and bolt assemblies.

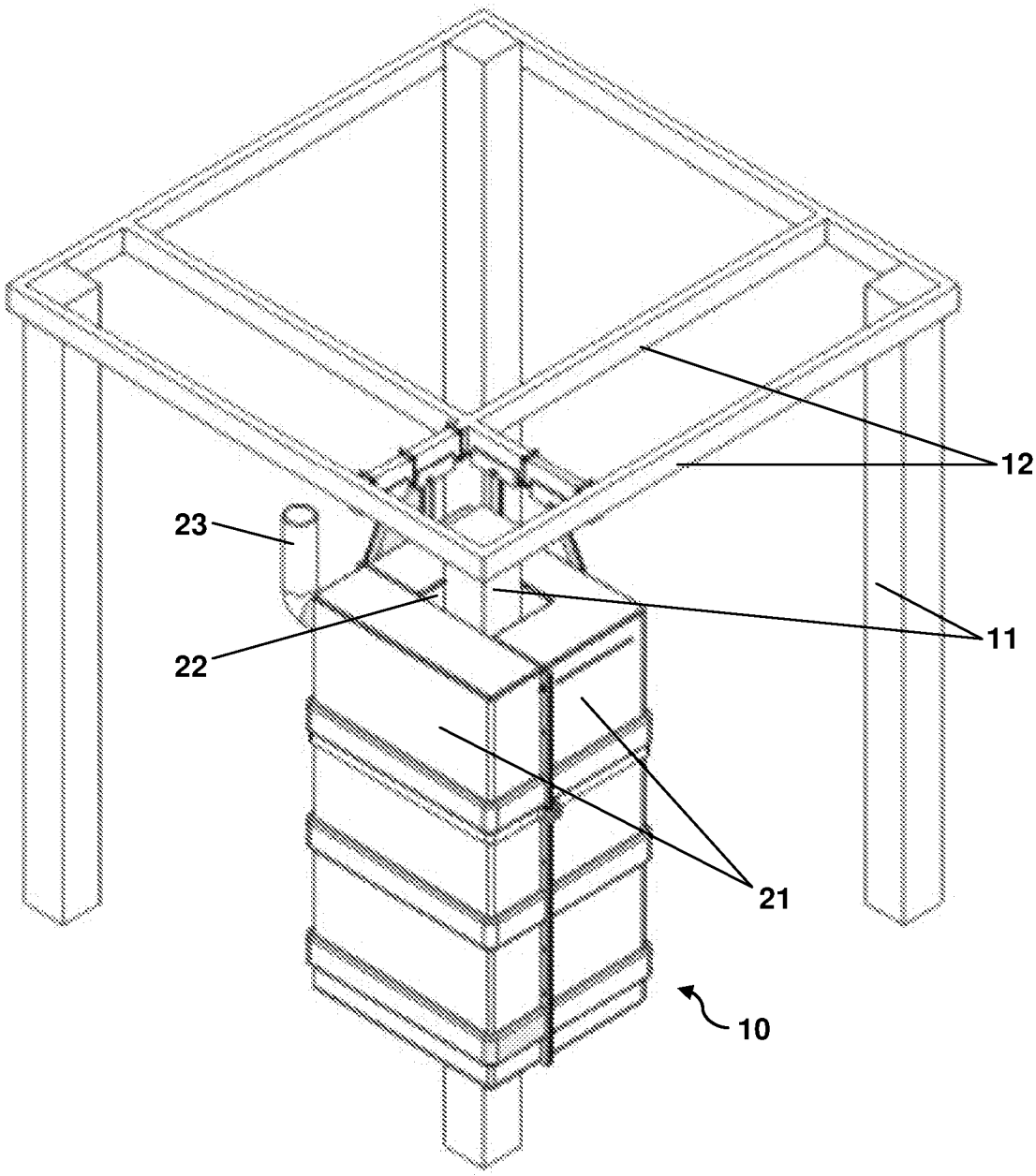

Fig. 1

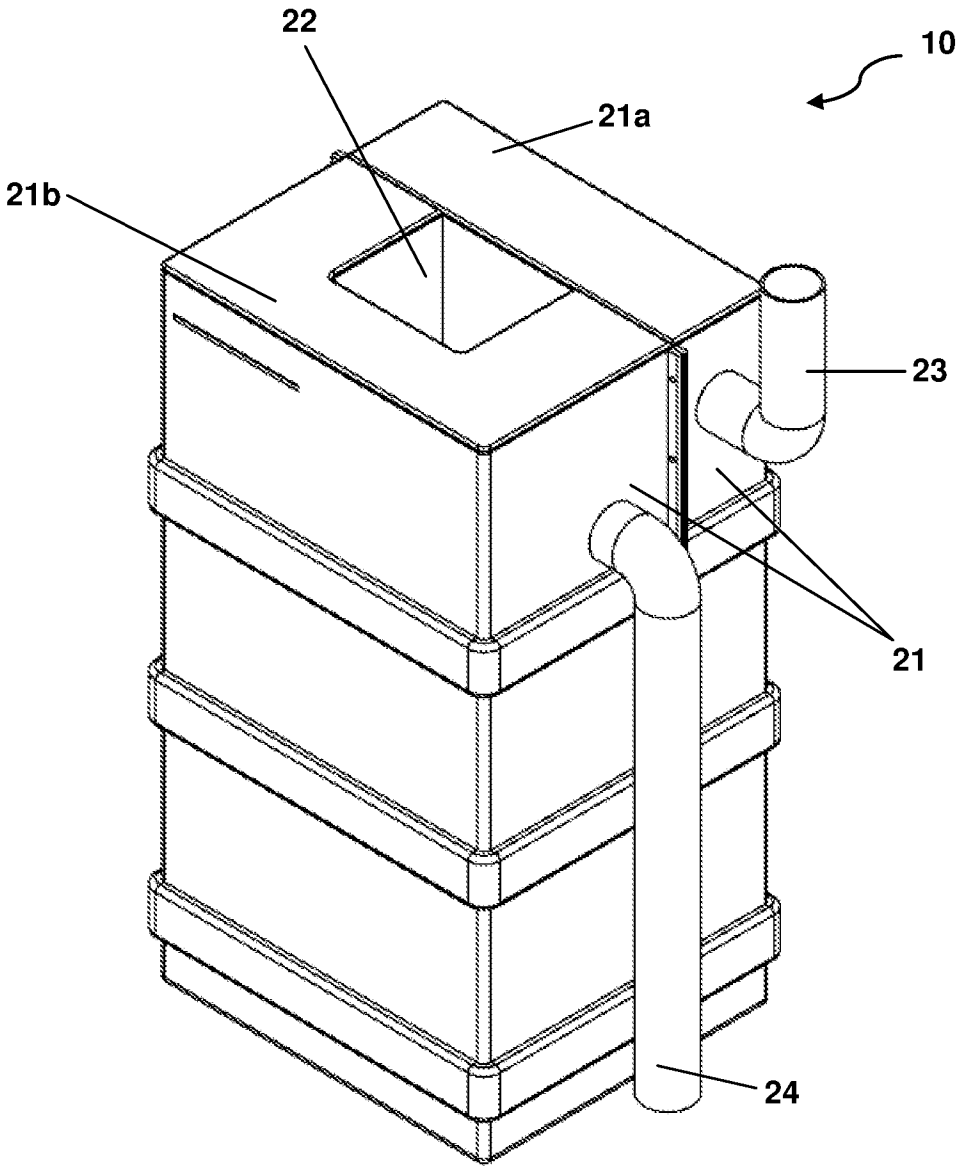

Fig. 2

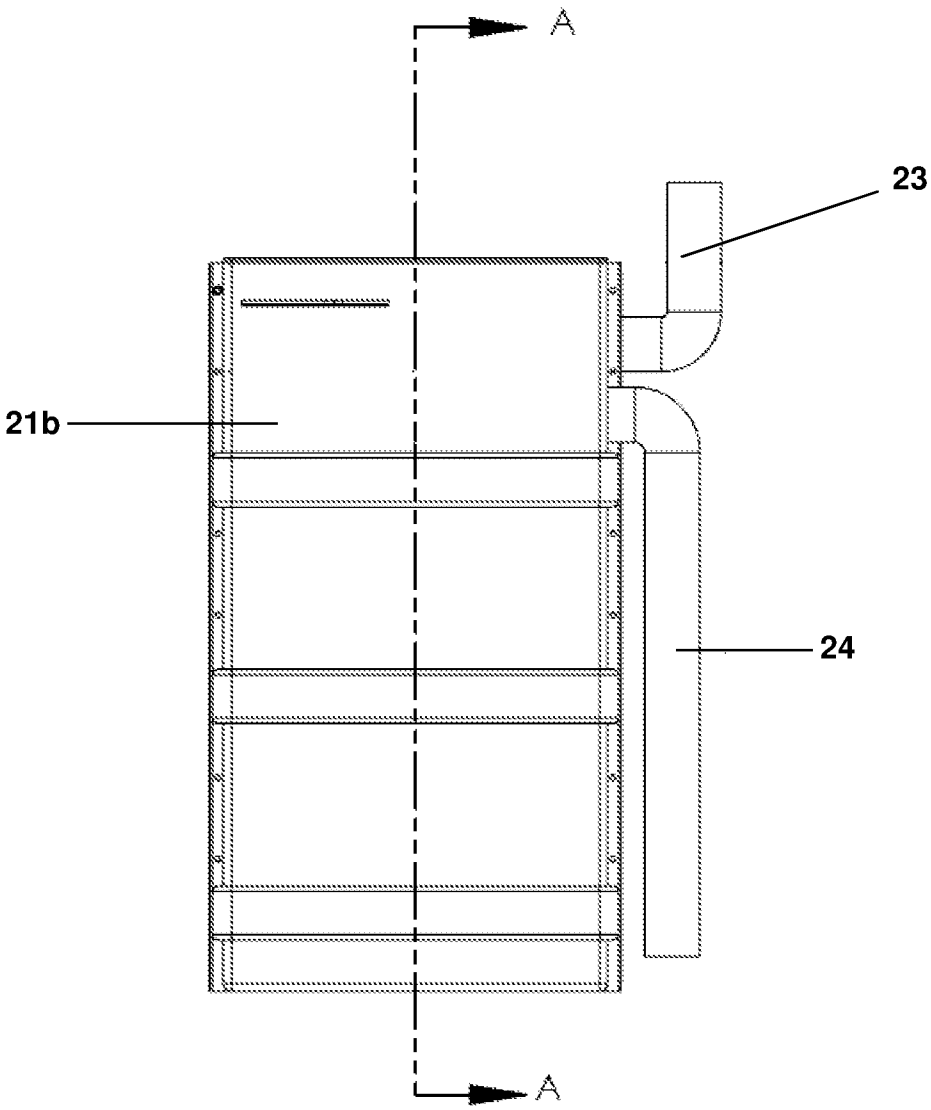

Fig. 3

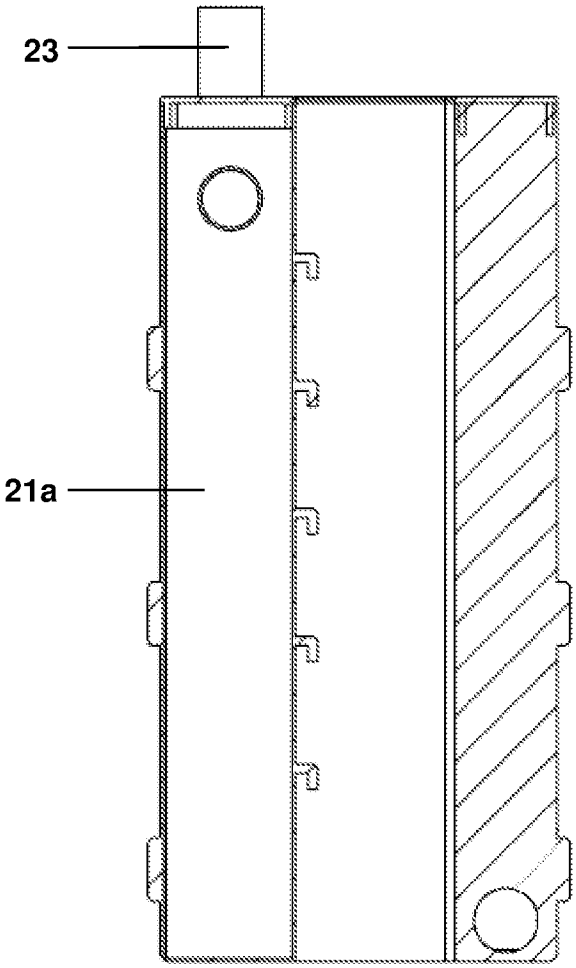

Fig. 4

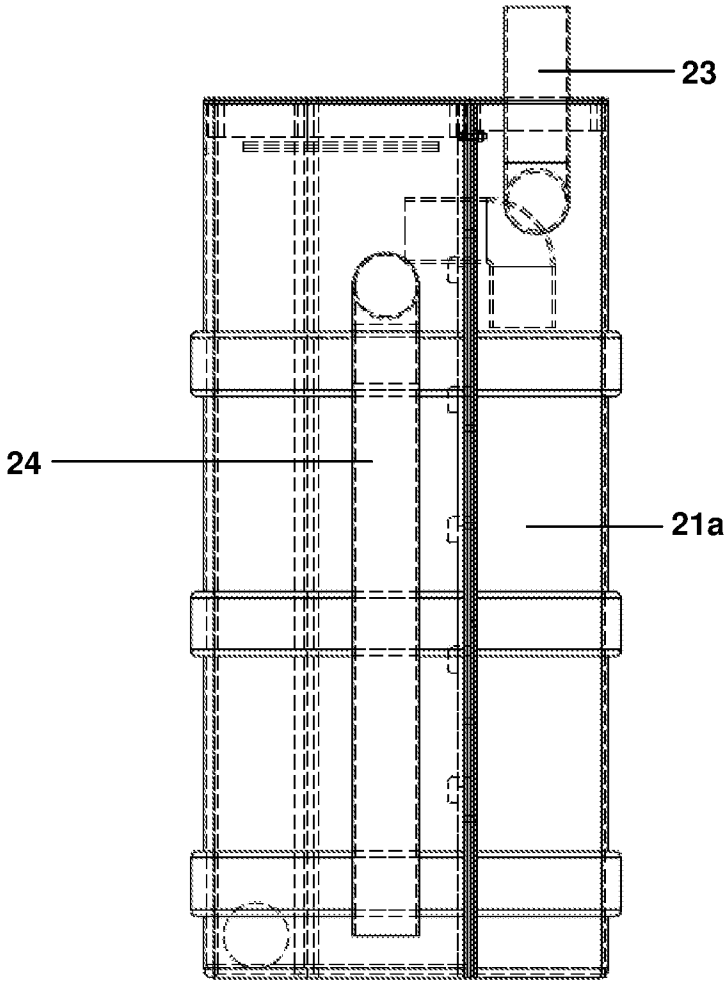

Fig. 5

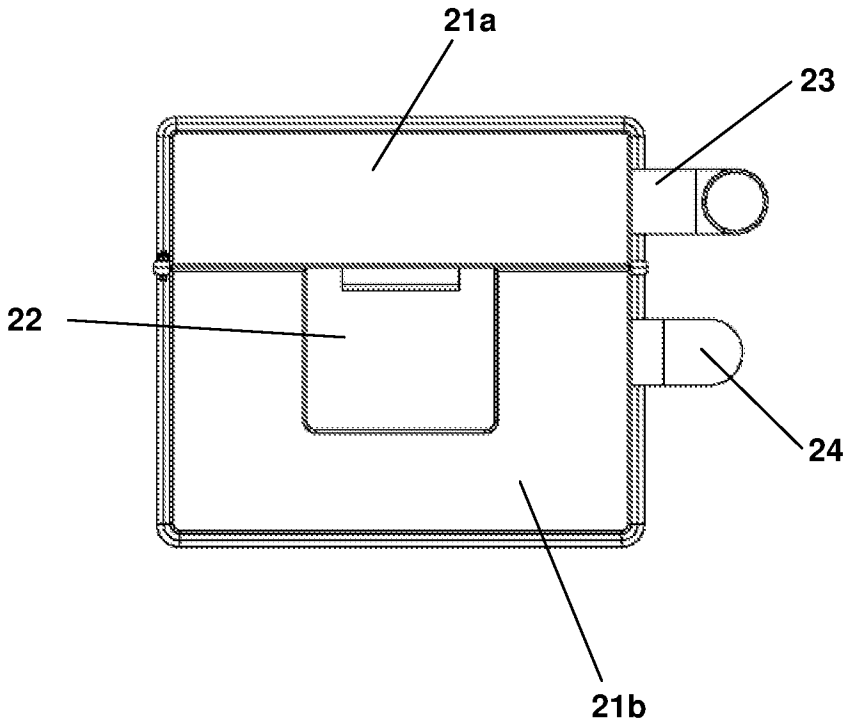

Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/MY2017/050003

A. CLASSIFICATION OF SUBJECT MATTER

C02F 1/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C02F 1/00; B01D 17/038; C02F 1/32; B01D 1/00; B01D 17/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & keywords: sewerage, tank. column, beam, engaging means, bolt, nut

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2005-0061736 A1 (GRESKO, E.) 24 March 2005 See paragraphs [0025]-[0028]; figures 1-4; and claim 1.	1-7
Y	US 2008-0296213 A1 (AN, Y. -C. et al.) 4 December 2008 See paragraphs [0049]-[0050]; figure 1; and claim 9.	1-7
A	US 6296775 B1 (MOODY, K. W. et al.) 2 October 2001 See the entire document.	1-7
A	US 6180004 B1 (DREWERY, T. G.) 30 January 2001 See the entire document.	1-7
A	US 6328890 B1 (THIBAULT, R. M.) 11 December 2001 See the entire document.	1-7

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 June 2017 (27.06.2017)	**04 July 2017 (04.07.2017)**

Name and mailing address of the ISA/KR
International Application Division
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea
Facsimile No. +82-42-481-8578

Authorized officer
MIN, In Gyou
Telephone No. +82-42-481-3326

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/MY2017/050003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005-0061736 A1	24/03/2005	CA 2441725 A1 US 7344641 B2	19/03/2005 18/03/2008
US 2008-0296213 A1	04/12/2008	KR 10-0787625 B1 US 7540954 B2	21/12/2007 02/06/2009
US 6296775 B1	02/10/2001	None	
US 6180004 B1	30/01/2001	None	
US 6328890 B1	11/12/2001	JP 2001-145891 A JP 4700789 B2	29/05/2001 15/06/2011