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(54) Title: WATER MANAGEMENT SYSTEM AND METHOD

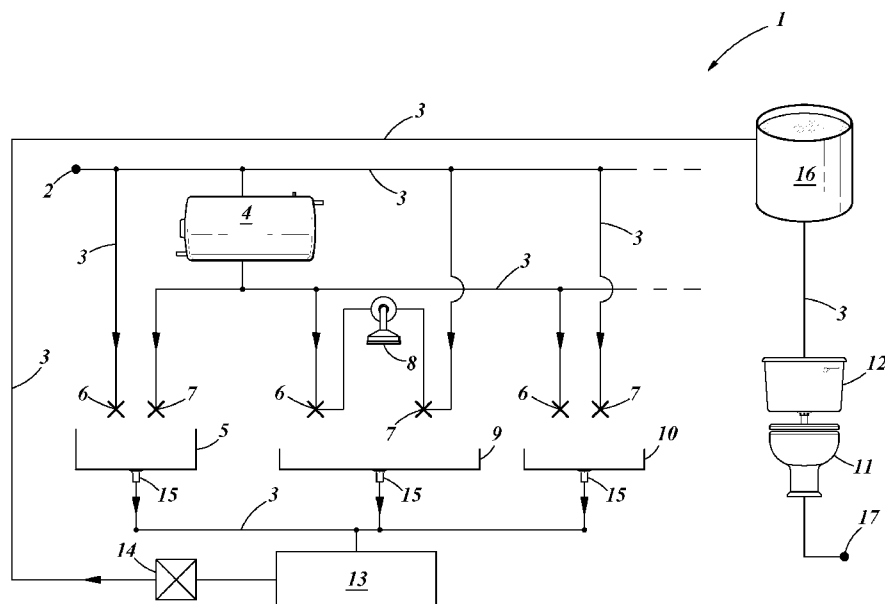


FIG. 1

(57) Abstract: This invention relates to a water management system and method more particularly, but not exclusively, to a water management system and method for managing the use of grey water. This invention provides a water management method comprising the steps of: - pumping grey water used in a dwelling to a grey water storage tank, - allowing the grey water in the grey water storage tank to feed a toilet cistern; and - using the water from the storage tank to flush a toilet.



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## WATER MANAGEMENT SYSTEM AND METHOD

### FIELD OF THE INVENTION

This invention relates to a water management system and method more particularly, but not exclusively, to a water management system and method  
5 for managing the use of grey water.

### BACKGROUND TO THE INVENTION

Water management systems are well-known and widely used.  
10

Many countries and regions have experienced severe droughts in recent times and water management has become of utmost importance.

In this specification, the term "grey water" shall mean gently used water from  
15 bathroom sinks, showers, tubs, and washing machines. It is not water that has come into contact with human waste, either from the toilet or from washing diapers. Grey water may contain traces of dirt, food, grease, hair, and certain household cleaning products.

20

## OBJECT OF THE INVENTION

It is an object of this invention to provide a water management system and method to facilitate the use of grey water.

## 5 SUMMARY OF THE INVENTION

In accordance with this invention there is provided a water management method comprising the steps of:

- pumping grey water used in a dwelling to a grey water storage tank,
- allowing the grey water in the grey water storage tank to feed a toilet  
10 cistern; and
- using the water from the storage tank to flush a toilet.

The method further includes the step of collecting the grey water in a collection tank from where the grey water is pumped to the storage tank.

15

There is still further provided for the method to include the step of a control means actuating a valve for disconnecting mains water supply from the toilet cistern and connecting the storage tank to the cistern when a sensor senses that there is sufficient grey water in the grey water storage tank.

20

The storage tank may have an overflow to allow excess grey water pumped into the storage tank to be discarded into a further storage tank or into an exciting waste water outlet or to an outlet outside of the dwelling.

Alternatively, a second sensor senses that the grey water storage tank is full and causes a control means to switch a second valve to disconnect the collection tank from the storage tank and to connect an outlet of the storage  
5 tank to a waste water outlet or to an outlet pipe that terminates outside the dwelling for use of the water in a garden or the like.

A further step includes allowing the water to flow under force of gravity from the storage tank to the toilet cistern.

10

There is provided for connecting an air vent to the collection tank and/or the storage tank or to a pipe in the system and for the air vent to terminate outside the dwelling.

15 In accordance with a second aspect of this invention there is provided a water management system comprising a pump for pumping grey water from an installation or equipment in a dwelling to a grey water storage tank, the grey water storage tank being selectively connectable to a toilet cistern.

20 The grey water storage tank is at a higher elevation than the cistern.

Grey water may be collected in a collection tank prior to being pumped by the pump to the storage tank.

There is provided for the storage tank to be at a higher elevation than a cistern of a toilet.

A further feature of the invention provides for the installation to include one or  
5 more consisting of the group of: a basin, a shower, a bath, a dishwasher, a sink and a washing machine.

There is provided for a pipe network to be connected to an outlet of each installation and to the collection tank.

10

A still further feature of the invention provides for the pipe network to connect the pump between the collecting tank and the storage tank.

A further pipe including a valve connects the storage tank to a toilet cistern.

15

The storage tank has an overflow to discard excess water into a waste outlet or into an outlet that terminates outside the dwelling to use the water in a garden or the like.

20 Alternatively, a sensor senses that the storage tank is full and causes a valve to cause water pumped from the pump to be pumped to a waste water outlet or to an outlet that terminates outside the dwelling instead of to the storage tank, to discard such water or to use it in a garden or the like.

The sensor or a second sensor causes a control means to actuate the valve when the storage tank is empty, to disconnect the storage tank from the cistern and/or to connect a mains supply to the cistern.

- 5 These and other features of the invention are described in detail below.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

One embodiment of the invention is described below, by way of example only and with reference to the drawings in which:

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Figure 1 shows a schematic diagram of a first embodiment of the invention; and

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Figure 2 shows a schematic diagram of a second embodiment of the invention.

### **DETAILED DESCRIPTION OF THE DRAWINGS**

With reference to the drawings a water management system is generally indicated by reference numeral 1.

20

With reference to figure 1, the system includes a network of pipes 3 connected on one side to a mains water supply 2 and, on the other side, to a sewage outlet 17.

The main supply is connected to a geyser 4 and to cold water taps 6 of a basin 5, shower 9 and bath 10. In turn, an outlet of the geyser 4 is connected to hot water taps 7 of the basin 5, shower 9 and bath 10.

5

The outlets 15 of the basin 5, shower 9 and bath 10 drain into a collecting tank 13, under force of gravity. A pump 14 pumps the water used by the basin, shower and bath to a storage tank 16 which is at a higher elevation than a toilet 11.

10

The system and/or storage tank may include air vents extending therefrom to a practical, logical and acceptable height, preferably above a roof of the dwelling, where the system is installed, as is known in the art. Additional air vents may be installed in the network of pipes as may be required.

15

Water pumped by pump 14 from the collection tank to the storage tank 16, flows, and force of gravity, into the cistern 12 of the toilet 11 where it can be used to flush toilet. Once a toilet is flushed sewage exits the system at the sewage outlet 17.

20

Instead of only the bath, shower and the basin, grey water can also be collected from equipment such as sinks, washing machines and dishwashers.

Figure 2 shows a slightly different embodiment. A pump and filter system pumps the collected grey water to the storage or grey water tank. However,

25



should the grey water tank be full, grey water is discarded as waste water, as is known in the art.

The storage or grey water tank may have an over flow which overflow allows  
5 water to be discarded as waste water. Alternatively, it may have a sensor to switch a valve to allow the used grey water to be discarded as waste water instead of being pumped into the grey water storage tank. The sensor will again allow grey water to be pumped into the storage tank when the water level in the storage tank drops.

10

In addition, when the storage tank is low on grey water, a sensor will cause a valve to allow mains to feed the toilet cistern. The valve will again be switched once the grey water storage tank is sufficiently full, thereby shutting off mains water supply to the toilet cistern.

15

The storage tank may have an outlet connection to facilitate use of the grey water in a garden or as may otherwise be desired.

In use, when the equipment such as the basin, shower or bath are used, the  
20 used water or grey water, instead of being discarded into drains, is collected in the collection tank 13 and then used to flush a number of toilets within a domestic, office or other dwelling.

It is envisaged that the invention described herein will be relatively easily and  
25 inexpensively installed and will lead to a substantial water-saving.

The invention is not limited to the precise details as described herein and many other embodiments are possible without departing from the scope of the invention. For example, filters and odour removing chemical systems, may be  
5 included if required and any other equipment from where grey water is normally discarded may be used instead of only the equipment referred to above.

10

**CLAIMS**

1. A water management method comprising the steps of:  
pumping grey water used in a dwelling to a grey water storage tank,  
allowing the grey water in the grey water storage tank to feed a toilet  
5 cistern.
2. The method of claim 1 further including the step of collecting the grey  
water in a collection tank from where the grey water is pumped to the  
storage tank.  
10
3. The method of any one of the preceding claims including a control  
means for actuating a valve to disconnect mains water supply from the  
toilet cistern and connecting the storage tank to the cistern when a  
sensor senses that there is sufficient grey water in the grey water  
15 storage tank.
4. The method of any one of the preceding claims in which the storage  
tank includes an overflow to allow excess grey water pumped into the  
storage tank to be discarded into a further storage tank or into an  
20 exciting waste water outlet or to an outlet terminating outside of the  
dwelling.
5. The method of any one of claims 3 or 4 in which a second sensor  
senses that the grey water storage tank is full and causes the control

means to switch a second valve to disconnect the collection tank from the storage tank and to connect an outlet of the storage tank to a waste water outlet or to an outlet pipe that terminates outside the dwelling.

5 6. The method of any one of the preceding claims including the further step of allowing the water to flow under force of gravity from the storage tank to the toilet cistern.

10 7. A method as claimed in any one of claims 2 to 6 in which an air vent is connected to the collection tank and/or the storage tank or to a pipe in the system and for the air vent to terminate outside the dwelling.

15 8. A water management system comprising a pump for pumping grey water from an installation or equipment in a dwelling to a grey water storage tank, an outlet of the grey water storage tank being selectively connectable to a toilet cistern.

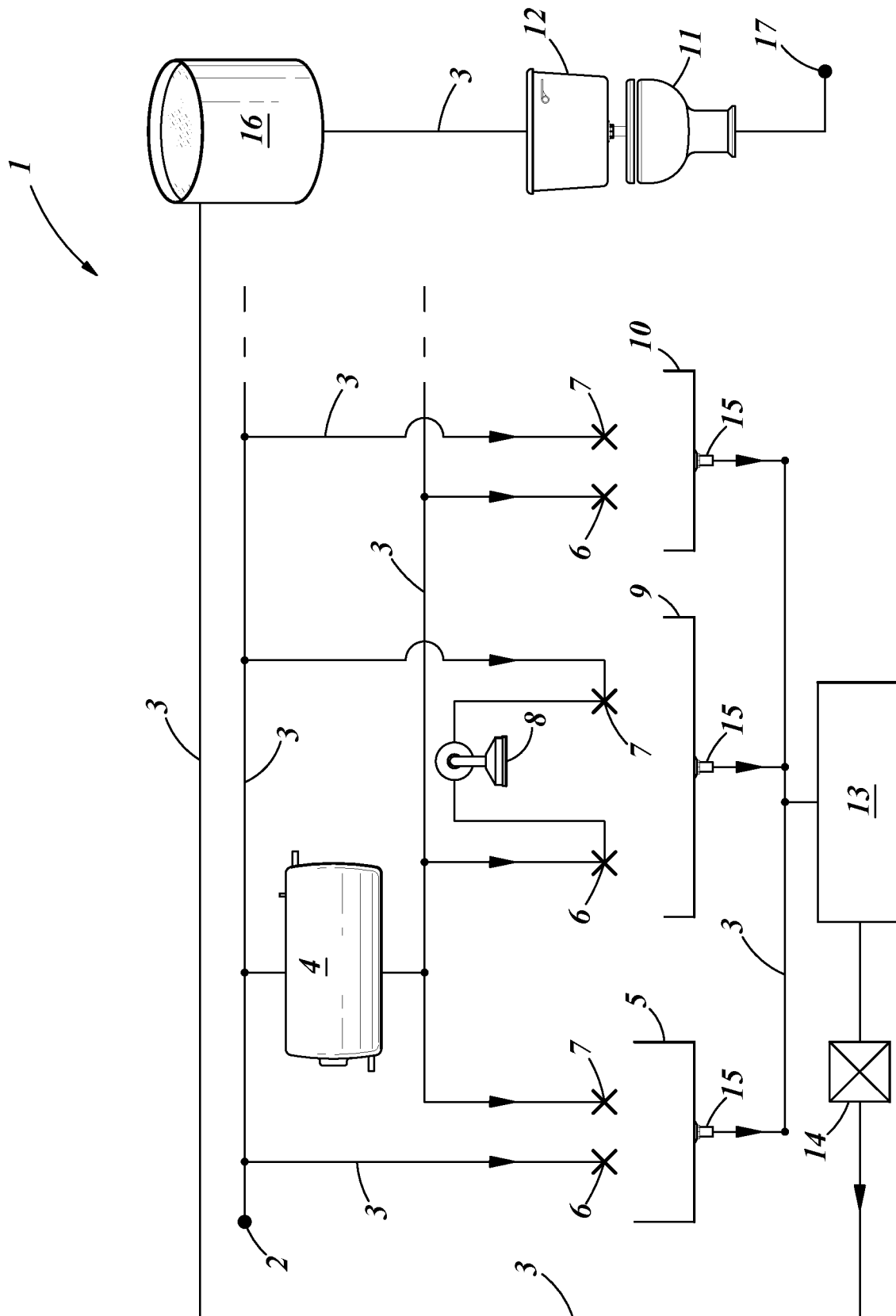
20 9. A system as claimed in claim 8 in which the grey water storage tank is at a higher elevation than the cistern.

10. A system as claimed in any one of claims 8 or 9 in which grey water is collected in a collection tank prior to being pumped by the pump to the storage tank.

11. A system as claimed in any one of claims 8 to 10 in which the installation or equipment includes one or more consisting of the group of: a basin, a shower, a bath, a dishwasher, a sink and a washing machine.
- 5
12. A system as claimed in any one of claims 8 to 11 in which a pipe network is connected to an outlet of each installation and to the collection tank.
- 10
13. A system as claimed in claim 12 in which pipes of the pipe network connects the pump between the collecting tank and the storage tank.
14. A system as claimed in claim 13 in which further pipes or a further pipe including a cistern valve or valves connects the storage tank to a toilet
- 15
- cistern.
15. A system as claimed in any one of claims 8 to 14 in which the storage tank has an overflow to discard excess water into a waste outlet or into an outlet that terminates outside the dwelling.
- 20
16. A system as claimed in any one of claims 8 to 15 in which a sensor senses that the storage tank is full and causes a control means to actuate a valve to cause water pumped from the pump to be pumped to a waste water outlet or to an outlet that terminates outside the dwelling
- 25
- instead of to the storage tank.

17. A system as claimed in claim 14 in which the sensor or a second sensor causes the control means to actuate a valve or valves when the storage tank is empty, to connect the cistern a mains water supply

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**FIG. 1**

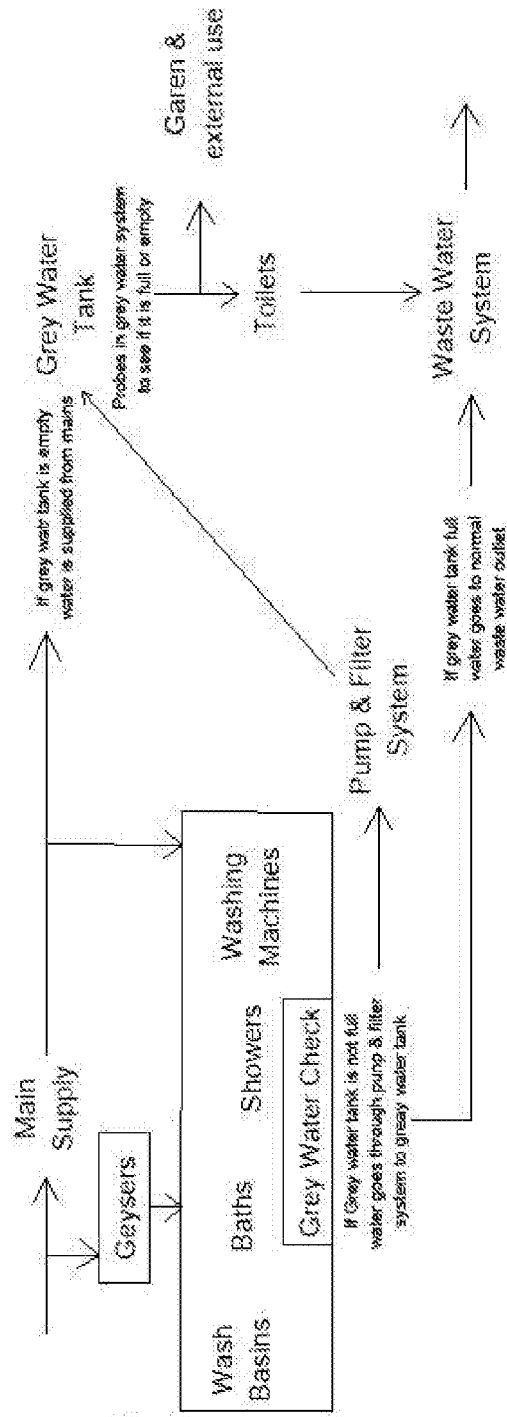


FIG. 2



**INTERNATIONAL SEARCH REPORT**

International application No.

PCT / IB 2017/056282

<p><b>A. CLASSIFICATION OF SUBJECT MATTER</b>                  IPC: <b>E03D 5/00</b> (2006.01)                  According to International Patent Classification (IPC) or to both national classification and IPC</p>		
<p><b>B. FIELDS SEARCHED</b>                  Minimum documentation searched (classification system followed by classification symbols)                  E03D                  Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p>		
<p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)                  EPODOC, WPIAP</p>		
<p><b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b></p>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004168992 A1 (BEN-AMOTZ ORI) 02 September 2004 (02.09.2004) paragraphs [0010]-[0012], [0017], [0031], [0032], [0034], [0035], [0038], [0040], [0046], [0047]; figs. 1, 5	1, 2, 4, 6-15,
Y		5, 16
X	WO 2004046474 A1 (GRAMM ENVIRONMENTAL LIMITED, WILLIAMS, PAUL) 03 June 2004 (03.06.2004) page 5: paragraphs 1 and 2; page 7: last paragraph; fig.1	1, 2, 4, 6-13, 15
Y		5, 16
X	US 2013025695 A1 (KATZIR DALIA, KATZIR SASI) 31 January 2013 (31.01.2013) abstract; paragraphs [0001], [0010] - [0017], [0027] - [0034], [0056] - [0060], [0070], [0098], [0103], [0104], [0107]; figs. 1, 7	1-3, 5, 8-14, 17
Y	DE 19541189 A1 (ROEBL, HERBERT, 92253 SCHNAITTENBACH, DE, ROEBL, MANFRED, 92253 SCHNAITTENBACH, DE, ROEBL, CHRISTINE, 92253 SCHNAITTENBACH, DE) 23 January 1997 (23.01.1997) column 1: lines 40-48, 57-65; column 2: lines 45-49; figure	5, 16
<input type="checkbox"/> Further documents are listed in the continuation of Box C.		<input checked="" type="checkbox"/> See patent family annex.
<p>* Special categories of cited documents:</p> <p>“A” document defining the general state of the art which is not considered to be of particular relevance</p> <p>“E” earlier application or patent but published on or after the international filing date</p> <p>“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)</p> <p>“O” document referring to an oral disclosure, use, exhibition or other means</p> <p>“P” document published prior to the international filing date but later than the priority date claimed</p> <p>“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</p> <p>“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</p> <p>“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</p> <p>“&amp;” document member of the same patent family</p>		
Date of the actual completion of the international search 16 January 2018 (16.01.2018)		Date of mailing of the international search report 25 January 2018 (25.01.2018)
Name and mailing address of the ISA/AT Austrian Patent Office Dresdner Straße 87, A-1200 Vienna Facsimile No. +43 / 1 / 534 24-535		Authorized officer THÜRRIEDL T. Telephone No. +43 / 1 / 534 24-515

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
PCT / IB 2017/056282

Patent document cited in search report			Patent family member(s)			Publication date
US	A1	2004168992	US	A1	2004168992	2004-09-02
WO	A1	2004046474	WO	A1	2004046474	2004-06-03
			AU	A1	2003302131	2004-06-15
US	A1	2013025695	US	A1	2013025695	2013-01-31
DE	A1	19541189	DE	A1	19541189	1997-01-23