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(56) Documents Cited:
GB 0633905 A JP 2003082755 A
RU 002176619 C2 US 8366923 B1
US 5505860 A US 5076937 A
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(54) Title of the Invention: **Apparatus for treating waste water**
Abstract Title: **Apparatus for removing fats, oils and grease from waste water**

(57) An apparatus 2 for treating waste water comprises a tank 4 having an inlet for passing waste water into an inlet region (22, Fig. 1) of the tank, an outlet for draining waste water from an outlet region of the tank, and a baffle located in a settlement region of the tank, between the inlet region and the outlet region. The baffle is located such that the upper edge of the baffle remains below the level of waste water in the tank, in use. The apparatus can remove fats, oils and grease (FOG) from waste water downstream of a washing facility, such as a kitchen sink. Suitably, the baffle extends transversely across the settlement region of the tank such that the waste water is constrained to pass over and/or under the baffle. The settlement region may comprise a plurality of baffles 30, 32, 34, 36, 38, wherein the upper edge of each baffle can remain below the waste water level in the tank. An outlet weir 24 can be provided adjacent the outlet. A FOG removal device 26, e.g. in the form of a drum, can be arranged in the settlement region of the tank, preferably downstream of the baffle.

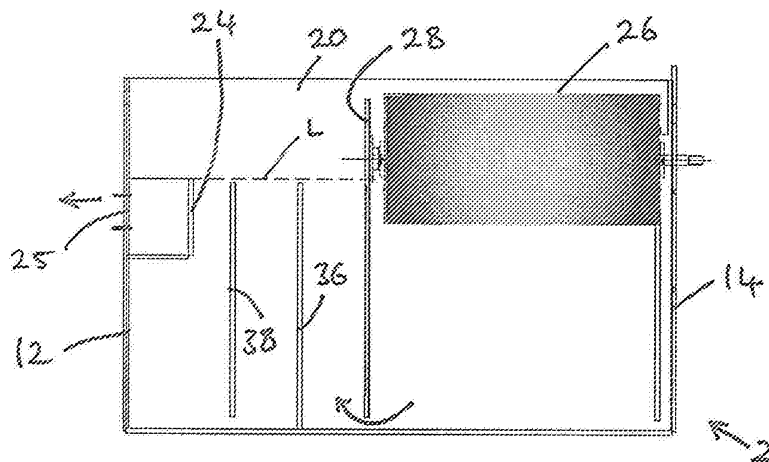


Figure 2

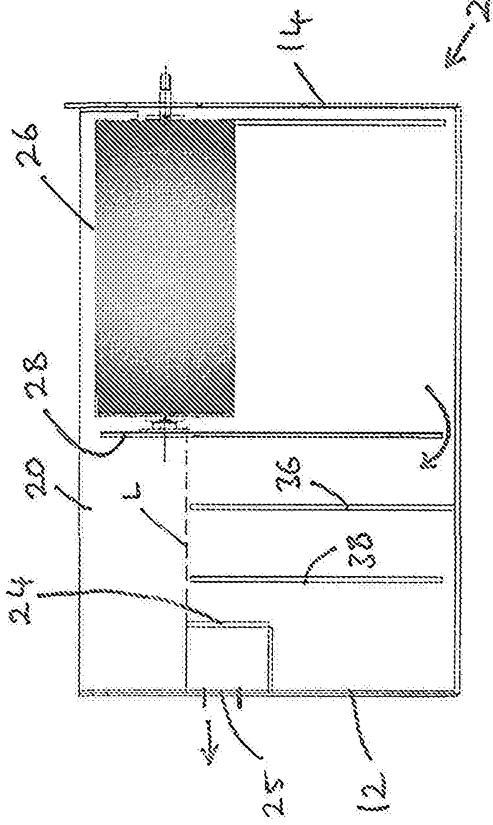


Figure 2

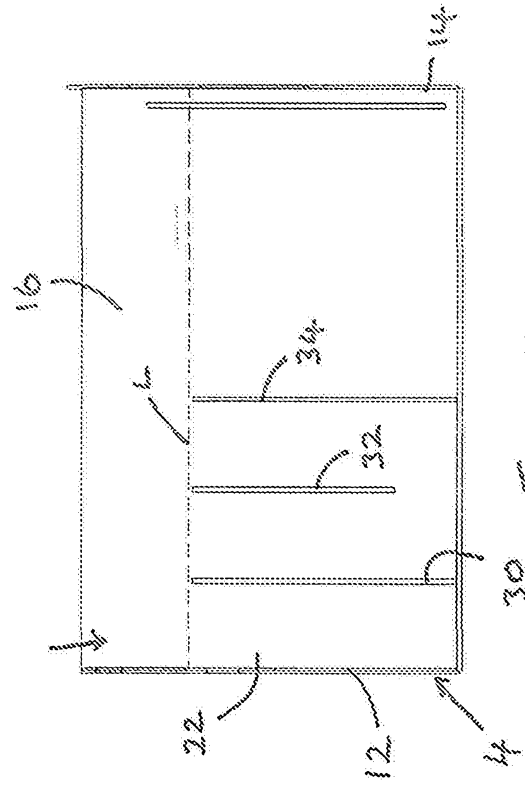


Figure 3

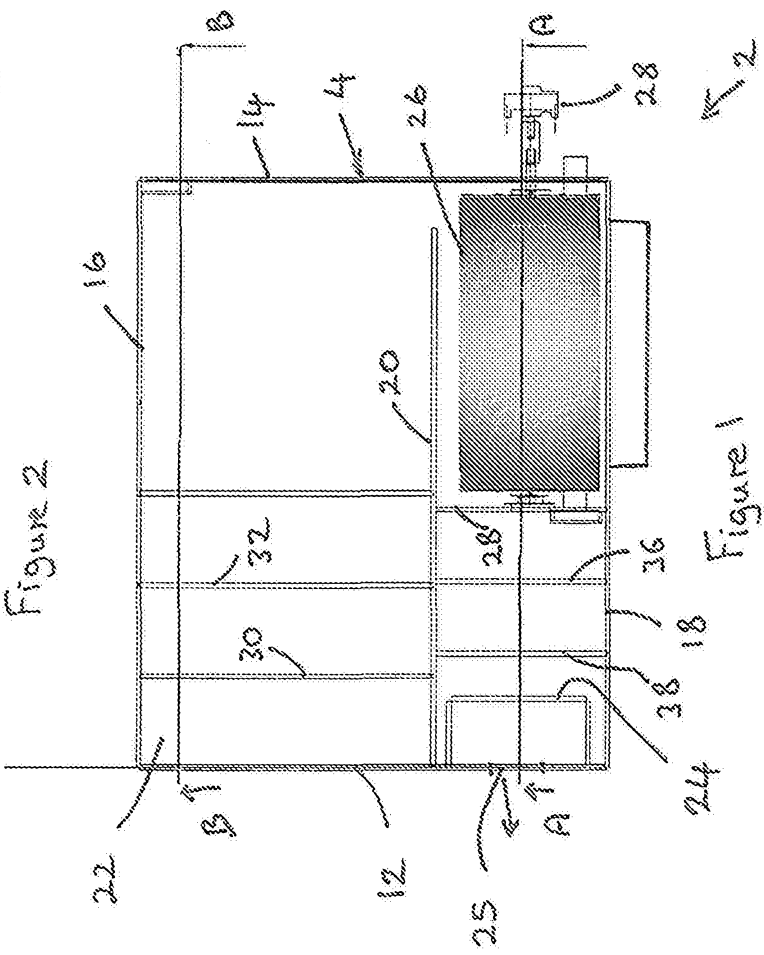


Figure 1

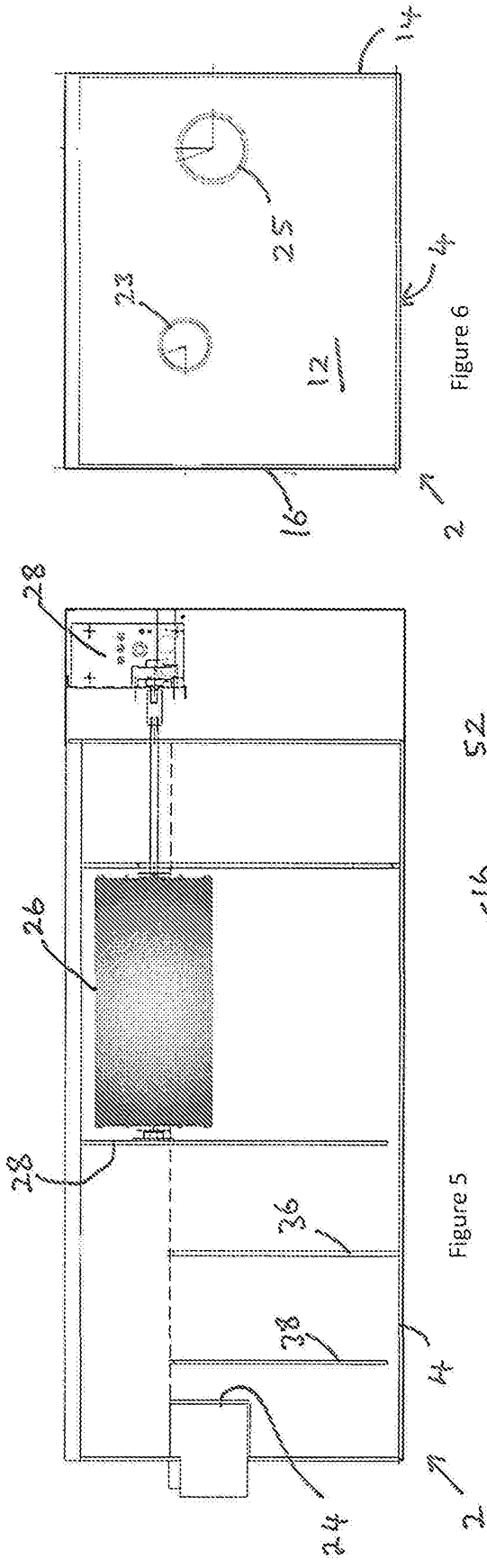


Figure 5

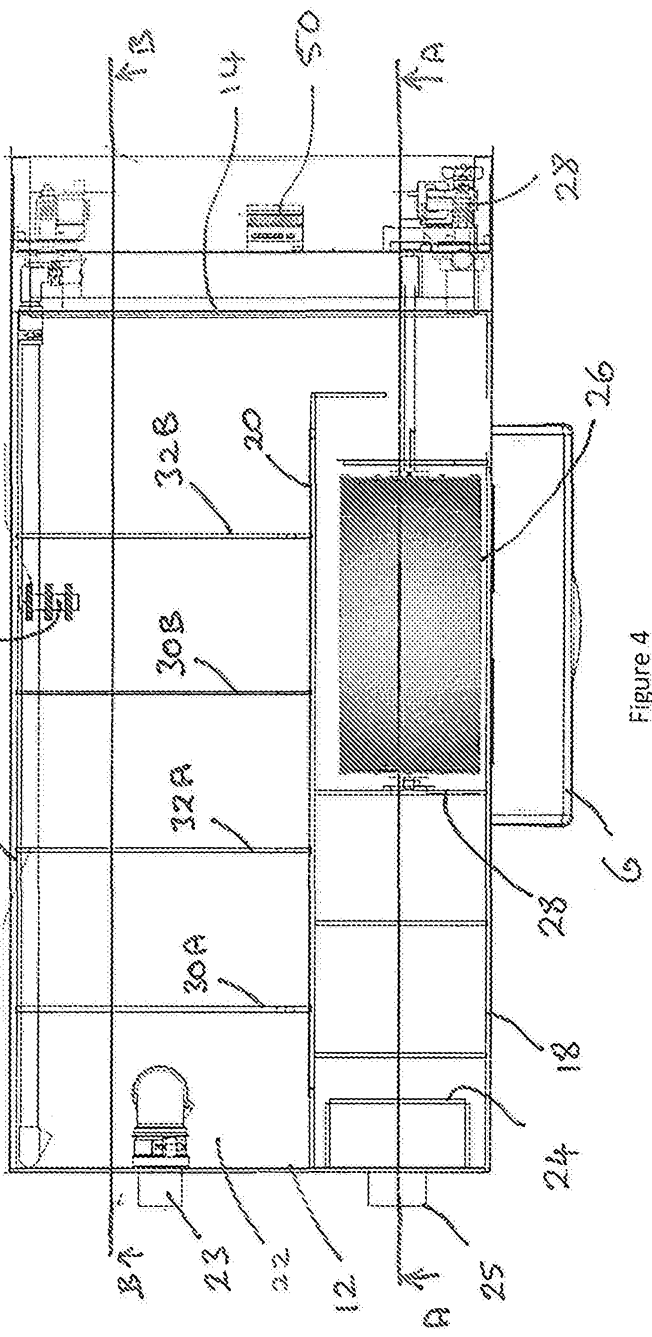


Figure 4

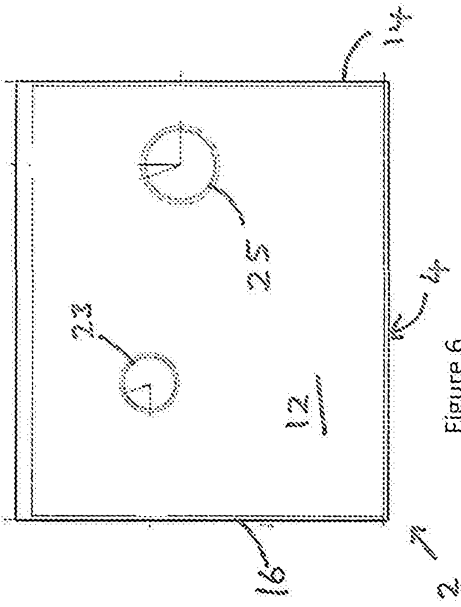


Figure 6

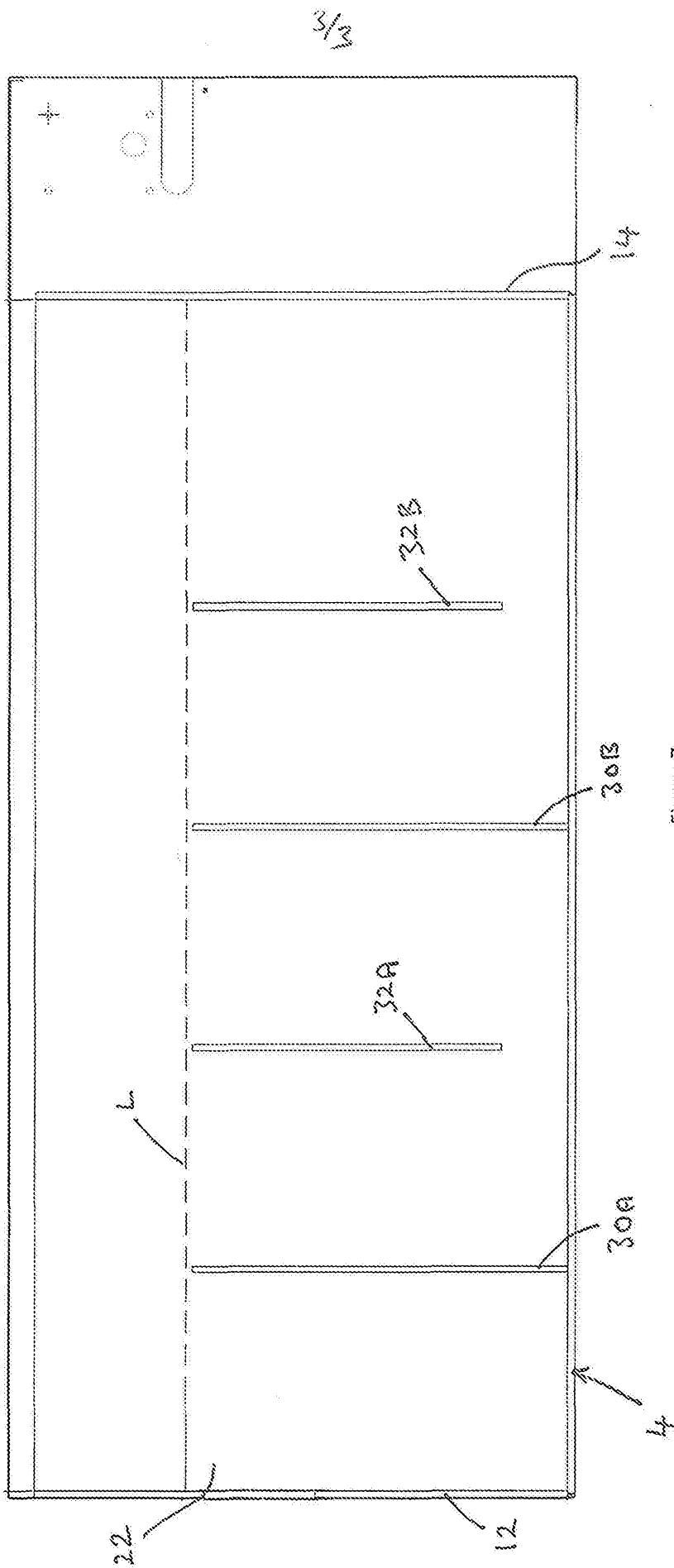


Figure 7

Apparatus for Treating Waste Water

FIELD OF THE INVENTION

5 This invention relates to an apparatus for treating waste water and in particular to an apparatus for removing fats, oils and grease (hereinafter referred to as FOG) from waste water downstream of a washing facility, such as a sink in a commercial kitchen.

10 BACKGROUND OF THE INVENTION

Typically waste water drained from a sink in a commercial kitchen or catering facility contains grease in an emulsified state, as well as grease laden solids in suspension, typically in the form of foods wastes. Such contaminants can cause
15 blockages in drainage systems and/or fouling of filtration systems or pumps within water treatment plants downstream of the drainage system.

Effluent from FOG contamination points in commercial kitchens typically originates from steam combination ovens, convection rotisserie ovens, pot sinks, pre-rinse
20 sinks, dishwashers, canopies and the like. They have in common the use and application of hot water ranging in temperature from 40° C to 85° C for the purposes of dealing with FOG contamination, where FOG is washed away in the waste water stream from such devices.

25 For these reasons, depending on the country, it is often compulsory for commercial kitchen operations to fit some kind of interceptor device to collect the FOG before it enters the sewer, typically referred to as a grease trap. Additionally where FOG is a concern in the local wastewater collection system, inspection programmes have been set up to ensure that these grease traps and/or interceptors are being
30 maintained on a routine basis.

Known grease traps range in complexity from simple settling tanks, known as "passive" grease traps, that require periodic manual grease removal, to rather complex structural arrangements that provide for automatic skimming and collection

of skimmed fats, oils and grease into external containers positioned adjacent the trap assembly, commonly referred to as "automated" grease traps.

Passive grease traps are, in essence, simply a settling tank having a wastewater
5 inlet at one end and an outlet at an opposite end for connection to a drain. Often baffle plates are arranged within the tank to interrupt direct flow-through of wastewater between the inlet and the outlet. Periodically, an employee must manually skim the FOG that has accumulated at the surface of the wastewater.

10 Automated grease traps include automatic skimmer arrangements, typically utilising a skimmer device, in the form of a disc, drum, endless belt or tube, mounted above the tank and connected to a drive arrangement to move the skimming device through the layer of FOG floating on the waste water within the tank of the grease trap. The skimming device collects FOG from the surface of the water in the tank
15 and is subsequently cleaned by means providing a scraping or squeezing action on the skimming device, such as wiper blades, arranged to direct the collected FOG into a collection device before the skimming device passes back into the water. The collection device is typically a separate container or reservoir located on one side of the tank.

20

Known grease traps require a regular maintenance programme to be carried out to pump out such traps and refill with clean water. The European Standard EN 1825 calls for grease traps to be pumped monthly and preferentially fortnightly. In so far as grease traps contain some if not all of the entrained FOG and food wastes, these
25 separate, with FOG having a specific gravity of less than 1 rising to the surface and food waste having a specific gravity greater than 1 sinking to the bottom.

Saturated fats, and animal fats in particular, are viscous above 40° C but may be prone to solidify below such temperature. They are emulsified in the hot water. Hot
30 water is used to remove FOG and to leave crockery, cutlery and pots and pans free and clear of FOG. Most known automated grease traps are only effective when the temperature of the waste water in the grease trap is around 40° C to ensure that the FOG, in particular the more waxy components thereof, remain in viscous form and do not form a solid crust on top of the waste water. Therefore known automated

grease traps often incorporate electrical heating elements within the grease trap. Such heating elements consume considerable electrical power and can cause a fire risk if overheating occurs or if the heating elements become exposed to the air.

- 5 The size of a grease trap is typically determined by the time needed for the FOG to settle out from the waste water and is therefore based upon the required volume throughput of the grease trap. However, size constraints within kitchens produce a desire to keep the grease trap as small as possible.

10 SUMMARY OF THE INVENTION

According to the present invention there is provided an apparatus for treating waste water comprising a tank having at least one waste water inlet for passing waste water into an inlet region of the tank, at least one waste water outlet for draining
15 waste water from an outlet region of the tank, and at least one baffle located in a settlement region of the tank, between said inlet region and said outlet region, wherein said at least one baffle is located such that the upper edge of the baffle remains below the level of waste water in the tank, in use.

- 20 Preferably said at least one baffle extends transversely across the settlement region of the tank such that waste water is constrained to pass over and/or under the at least one baffle between the inlet region and the outlet region of the tank.

In one embodiment a plurality of baffles are located in said settlement region,
25 wherein an upper edge of each of said plurality of baffles remains below the level of waste water in the tank, in use. Preferably said plurality of baffles comprise at least one first baffle and at least one second baffle, said at least one first baffle extending to a base of the settlement region such that waste water is constrained to pass over said at least one first baffle, and wherein said at least one second baffle is spaced
30 from the base of the settlement region of the tank such that waste water is constrained to pass over and under said at least one second baffle. Preferably said first and second baffles are arranged alternately between the inlet region and the outlet region of the tank.

Preferably an outlet weir is provided adjacent the waste water outlet over which waste water must pass whereby said outlet weir determines the waste water level within the tank, in use.

- 5 In one embodiment a FOG removal device is arranged in the settlement region of the tank for removing FOG from the surface of the waste water. Preferably the FOG removal device is arranged downstream of said at least one baffle.

BRIEF DESCRIPTION OF THE DRAWINGS

10

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which :-

Figure 1 is a plan view of a grease trap in accordance with a first embodiment of the
15 present invention;

Figure 2 is a longitudinal sectional view on line A-A of Figure 1;

Figure 3 is a longitudinal sectional view on line B-B of Figure 1;

20

Figure 4 is a plan view of a grease trap in accordance with a second embodiment of the present invention

Figure 5 is a longitudinal sectional view on line A-A of Figure 4;

25

Figure 6 is an end view of the grease trap of Figure 4; and

Figure 7 is a longitudinal sectional view of line B-B of Figure 4.

30 DETAILED DESCRIPTION OF THE DRAWINGS

As illustrated in the Figures 1 to 3, a grease trap 2 in accordance with a first embodiment of the present invention comprises a substantially rectangular tank 4 having a FOG collection reservoir 6 mounted on one side thereof.

The tank 4 comprises first and second oppositely disposed end walls 12,14 spaced apart by first and second oppositely disposed side walls 16,18. As best shown in Figure 1, a longitudinal baffle or dividing wall 20 extends inwardly from said first end wall 12 towards said second end wall 14, parallel to said first and second side walls 16,18, said dividing wall 20 terminating adjacent said second end wall 14. The dividing wall 20 defines a flow path for the waste water through the grease trap 2 and effectively doubles the traverse length of the waste water through the tank 4, maximising the effectiveness of the grease trap 2 within the space confines that are typically present in or around regions of waste water discharge, for example underneath a sink in a commercial kitchen. The change of direction forced upon the waste water as it passes through the tank 4 also slows the flow of waste water, encouraging the separation of the FOG and water in the tank 4.

As best shown in Figure 3, contaminated waste water is delivered into said inlet region 22 of the tank 4 adjacent the first end wall 12 and the first side wall 16.

An outlet weir 24 is provided adjacent a waste water outlet port 25 in the first end wall of the tank 4, adjacent the second side wall 18. The upper edge of the outlet weir defines the level of the waste water in the tank 4 in use, as shown by the dotted line "L" in Figures 2 and 3.

A skimming device is mounted in the tank for removing FOG that settles out on top of the waste water in the tank 4. In the embodiment shown in the drawings, the skimming device comprises an elongate drum 26 having a surface coated with or formed from a hydrophobic and oleophilic material, the drum 26 being mounted in the tank 4 to be partially submerged in waste water held in the tank 4 when in use, the drum 26 being rotatable, under the action of a motor 28, to rotate about an axis extending substantially parallel to the first and second sides 16,18 of the tank 4. However, the use of other types of skimming devices is envisaged.

The FOG collection tank 6 may be associated with a scraper or wiper blade (not shown) arranged to engage the surface of the drum 26 to scrape FOG from the surface thereof and deliver the FOG into the collection tank 6. A baffle plate 28

mounted on the downstream side of the skimming device extends above the level “L” of waste water in the tank and is spaced from the bottom of the tank 4 such that waste water is constrained to pass beneath the baffle plate 28 to reach the outlet weir 24, retaining settled out FOG in the region of the drum 26 for removal by the
5 skimming device.

A plurality of transversely extending baffles 30,32,34,36 and 38 are located in the tank extending between the first and second side walls 16,18 and the dividing wall 20, each of said baffles 30,32,34,36,38 having an upper edge terminating below the
10 level L of waste water within the tank 4. By locating these baffles below the normal level of the waste water within the tank, the baffles do not impede the flow of FOG settled out on top of the surface of the waste water in the tank. However, the presence of the baffles has been found to greatly facilitate the speed at which FOG settles out from the waste water.

15

As shown in Figures 2 and 3, the baffles 30,32,34,36 and 38 alternatively extend to the bottom of the tank 4 and are spaced from the bottom of the tank 4, such that waste water must pass over the baffles 30,34,36 extending to the bottom of the tank while the waste water can pass both over and under the intervening baffles 32,34.

20

The provision of the transversely extending baffles 30,32,34,36 and 38, located fully below the normal level “L” of the waste water within the tank 4 has been found to greatly increase the speed at which FOG settles out from the waste water within the tank, reducing the size of tank needed for a given throughput of waste water when
25 compared to known passive or active grease traps, thereby providing an advantageous small compact unit that can be easily installed in commercial kitchens where space is at a premium.

While the embodiment of Figure 1 to 3 shows the use of a FOG skimming device, it
30 is envisaged that the provision of baffles wholly located below the normal level “L” of waste water within the tank may also increase the performance of a passive grease trap, wherein collected grease is manually removed after a period of time.

Figures 4 to 7 illustrate a grease trap in accordance with a second embodiment of the present invention, having a greater capacity than the grease trap of the first embodiment. In Figures 4 to 7 like parts are associated with the same reference numerals as used in relation to Figure 1 to 3.

5

Due to the larger size of the tank 4 in the illustrated second embodiment, additional baffles are provided between the inlet region 22 and the skimming device 26, namely a pair of first baffles 30A,30B extending to the base of the tank 4 and a pair of second baffles 32A,32B, terminating above the base of the tank 4, each of the
10 baffles 30A,30B,32A,32B having an upper edge arranged to lie beneath the normal level "L" of waste water within the tank 4, in use. The first and second baffles 30A,30B,32A,32B are arranged in alternating relationship, as shown in Figure 7.

A waste water inlet 23 delivers waste water into an inlet region 22 of the tank while
15 waste water, from which FOG has settled out, is delivered to an outlet opening 25 via an outlet weir 24. As before, a baffle plate 28 mounted on the downstream side of the skimming device extends above the level "L" of waste water in the tank 4 and is spaced from the bottom of the tank 4 such that waste water is constrained to pass beneath the baffle plate 28 to reach the outlet weir 24, retaining settled out FOG in
20 the region of the drum 26 for removal by the skimming device and delivery into the FOG storage reservoir 6, in use.

A programmable controller (PLC) 50 is provided for monitoring and controlling the operation of the grease trap.

25

A magnet assembly 52 is mounted in the settlement region of the tank 4.

The invention is not limited to the embodiment(s) described herein but can be amended or modified without departing from the scope of the present invention.

30

Claims

1. An apparatus for treating waste water comprising a tank having at least one waste water inlet for passing waste water into an inlet region of the tank, at least
5 one waste water outlet for draining waste water from an outlet region of the tank, and at least one baffle located in a settlement region of the tank, between said inlet region and said outlet region, wherein said at least one baffle is located such that the upper edge of the baffle remains below the level of waste water in the tank, in use.
- 10
2. An apparatus as claimed in claim 1, wherein said at least one baffle extends transversely across the settlement region of the tank such that waste water is constrained to pass over and/or under the at least one baffle between the inlet region and the outlet region of the tank.
- 15
3. An apparatus as claimed in claim 1, wherein a plurality of baffles are located in said settlement region, wherein an upper edge of each of said plurality of baffles remains below the level of waste water in the tank, in use. Preferably said plurality of baffles comprise at least one first baffle and at least one second baffle, said at
20 least one first baffle extending to a base of the settlement region such that waste water is constrained to pass over said at least one first baffle, and wherein said at least one second baffle is spaced from the base of the settlement region of the tank such that waste water is constrained to pass over and under said at least one second baffle. Preferably said first and second baffles are arranged alternately
25 between the inlet region and the outlet region of the tank.
4. An apparatus as claimed in any preceding claim, wherein an outlet weir is provided adjacent the waste water outlet over which waste water must pass whereby said outlet weir determines the waste water level within the tank, in use.
- 30
5. An apparatus as claimed in any preceding claim, wherein a FOG removal device is arranged in the settlement region of the tank for removing FOG from the surface of the waste water.

6. An apparatus as claimed in claim 5, wherein the FOG removal device is arranged downstream of said at least one baffle.



Application No: GB1712987.5

Examiner: Dr Alun Owen

Claims searched: 1-6

Date of search: 2 February 2018

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-6	US 5076937 A (MONTGOMERY) See the Figures
X	1-3 and 5-6	GB 633905 A (NEWMAN) See Figure 1
X	1-2 and 4	US 5505860 A (SAGER) See Figure 3
X	1-2 and 5-6	JP 2003082755 A (HITACHI) See Figure 1, the EPODOC Abstract and WPI Abstract Accession Number 2003-306429
X	1-6	RU 2176619 C2 (KHAZIEV) See the Figure
X	1-6	US 8366923 B1 (HAPPEL) See Figure 4
X	1-4	US 4943370 A (GORTOWSKI) See Figures 2 & 3

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

Worldwide search of patent documents classified in the following areas of the IPC

B01D; C02F; E03F

The following online and other databases have been used in the preparation of this search report



WPI, EPODOC

International Classification:

Subclass	Subgroup	Valid From
C02F	0001/40	01/01/2006
B01D	0017/02	01/01/2006
B01D	0021/00	01/01/2006
E03F	0005/16	01/01/2006
C02F	0101/32	01/01/2006