

LIQUID WASTE DISPOSAL UNIT

The present invention relates to a waste disposal unit for collecting liquid entrained with particles from a source
5 of waste liquid. In particular, the unit has application with the collection of waste oil.

Background of the Invention

10 Examples of the collection of waste liquid entrained with particles can be found in the collection of waste oil where the oil has been used for cooking or in machinery as a hydraulic fluid or lubricating oil, or the like. Waste oil from such applications must be disposed of carefully
15 then preferably treated so as not to adversely impact on the environment.

Taking the collection and treatment of spent cooking oil as an example, cooking oil from a waste source such as a
20 deep fryer is often disposed manually by pouring the spent oil into a waste storage unit. From there the spent oil awaits collection for bulk disposal usually through an appropriate collection service.

25 Lifting and pouring of heavy oil poses occupational health and safety issues that should be avoided.

An alternative to manually handling spent oil is to pump the oil from the waste source through a liquid pump
30 directly into a waste storage unit. While this alleviates physical demand on the person concerned it has been found that the pump eventually becomes blocked as a result of the particles entrained in the waste oil becoming lodged in the pump's componentry. The pumping equipment
35 therefore requires regular cleaning and maintenance in order to operate effectively, but in general the pump equipment has a shorter than expected life and will

require early replacement.

There is therefore a need for a manner of disposing waste liquid that as well as being safe to operate is also
5 effective and reliable.

SUMMARY OF THE INVENTION

In accordance with the present invention there is provided
10 a waste disposal unit for collecting waste liquid entrained with particles from a waste liquid source, comprising:

a tank for collecting waste liquid having a lid that when closed creates a substantially sealed
15 environment in the interior of the tank;

a vacuum pump in communication with the tank interior for creating a low pressure in the tank interior;

a delivery conduit sealingly coupled to the tank interior to draw liquid from the waste liquid source to
20 the tank interior when the pressure in the tank interior is lower than the pressure at the waste liquid source.

The vacuum pump preferably draws air from an upper end of the tank interior in order to create a low pressure. This
25 is carried out by way of a vacuum tube coupled to the vacuum pump wherein the tube extends into the tank interior with an open end of the tube facing upwardly of the tank interior. The pump is, in a preferred embodiment, located underneath the tank and the tube
30 extends upwardly through the tank interior.

The open end of the vacuum tube is preferably located close to the underside of the lid. The open end of the tube is surrounded by a shroud in order to avoid waste
35 liquid entering the vacuum tube.

The tank also preferably includes a strainer positioned in

the tank interior to catch waste liquid entering the tank interior through an outlet of the delivery conduit, typically a hose, such that the strainer strains waste liquid entering the tank of particles entrained in the
5 liquid.

In a preferred embodiment the delivery hose is rigidly curved where the hose couples with the tank. The delivery hose preferably has a diameter of between 20mm to 70mm,
10 and preferably 50mm.

The waste disposal unit further typically includes a level indicator that is operable by a ball float located in the tank interior.

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A front compartment located to one side of the tank is used to store the delivery hose and controls for the waste disposal unit.

20 The unit is typically mounted on wheels so as to be moveable.

In accordance with the present invention there is also provided a method of collecting waste liquid entrained with particles from a waste liquid source using a waste
25 disposal unit, including:

inserting a delivery conduit into a waste liquid source, the delivery conduit being sealingly coupled to a tank of the waste disposal unit;

30 activating a vacuum pump that is in communication with an interior of the tank to create a low pressure in the tank interior; and

drawing waste liquid through the delivery conduit and into the tank interior by way of the pressure in the tank interior being lower than the pressure at the waste
35 liquid source.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the present invention will now be described by way of example only with reference to the
5 accompanying drawings in which:

Figure 1 is an isometric view of a waste disposal unit in accordance with an embodiment of the present invention;
Figure 2 is a side sectional view of the waste disposal
10 unit of Figure 1;

Figure 3 is a front view of the waste disposal unit of Figure 1 with a front panel removed;

Figure 4 is a rear elevational view of the waste disposal unit of Figure 1;

15 Figure 5 is a plan view of the waste disposal unit of Figure 1 with a lid open.

Figure 6 is a side sectional view of another embodiment of a waste disposal unit; and

Figure 7 is a plan view of the waste disposal unit of
20 Figure 6.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The drawings illustrate a preferred embodiment of a waste
25 disposal unit 10 for collecting waste liquid entrained with particles. In the embodiment described the waste liquid to be disposed is spent cooking oil entrained with food particles, burnt matter, and the like, that collects as a result of the frying process. It is understood
30 however that the waste disposal unit may be used to collect waste liquid of other kinds and particularly those entrained with solid particles that may clog up regular liquid pumps.

35 The waste disposal unit 10 includes a tank 12 for collecting waste liquid from a waste liquid source (not shown). Figures 2 and 5 illustrate tank 12 reinforced

with reinforcing cross struts 13. As illustrated in all the drawings tank 12 is an open-top tank having an upper tank opening 14 and is capable of holding liquid. Typically, but not necessarily, the tank is manufactured
5 from welded metal panels such as stainless steel.

Tank 12 is fitted with a hinged upper lid 15 that when closed on tank opening 14 creates a substantially sealed environment in the tank interior 17. While not shown in
10 the drawings, sealing of the lid may be achieved by ensuring a close fit of the lid 15 on tank opening 14, by using seals around the rim of the lid, and/or using a lockable toggle latch.

15 As illustrated in the cross sectional view of Figure 2 tank 12 includes an under compartment 18 which houses a vacuum pump 20. The vacuum pump is in communication with the tank interior 17 and, because of the substantially sealed environment created in the tank interior with the
20 closed lid, the vacuum pump 20 creates a low pressure in the tank interior. Vacuum pump 20 is powered by connecting a power supply to a plug 21 located in a rear panel 16 of tank 12 (as shown in Figure 4).

25 A conduit in the form of a delivery hose 30 transfers waste liquid from the waste liquid source to the tank interior 17. Liquid delivery is achieved by way of the pressure in the tank interior being lower than the pressure at the waste liquid source. Consequently the
30 waste liquid is drawn into the tank interior under the suction effect created by the vacuum pump.

Delivery hose 30 is coupled to the tank interior through a rigid sealed coupling 32 located through a front panel 19
35 of the tank 12. Coupling 32 is curved so as to direct liquid through delivery hose 30 in a downwardly direction into tank interior 17 through a delivery outlet 33.

Coupling 32 has a diameter of about 50mm and is fixed to front panel 19 by a welded join.

5 Delivery hose 30 is a flexible hose typically made of wire reinforced rubber and is sufficiently long to manoeuvre into a waste liquid source, such as a deep fryer vat or the like. The hose has a sufficiently large diameter to draw liquid entrained with particles without blocking, with the diameter in the region of 20mm to 70mm, and
10 typically about 50mm.

A long suction nozzle 34 is provided on the end of the delivery hose for inserting into the waste liquid source. Suction nozzle 34 has a smaller diameter than the hose and
15 is about 30mm to 40mm in diameter, and preferably 35mm. A rearwardly directed handle 35 on nozzle 34 allows the user to grip and manoeuvre the delivery hose 30.

Delivery hose 30 is folded and stored in a front
20 compartment 37 of the tank 12, the front compartment 37 being defined by the tank's front panel 19, a hose access door 40 and a hose access cover 41. To remove hose 30 from compartment 37 only hose access cover 41 needs to be hinged open for a user to reach into the front compartment
25 and extract deliver hose 30. Hose access door 40 may be hinged open in order to gain greater accessibility to delivery hose 30 but also to gain access to controls 42 also located in front compartment 37.

30 The controls 42 include a high liquid level indicator operable by a ball float valve 43 located in the tank interior. The controls 42 also include a safety cut-out and reset controls for turning off the vacuum pump when the liquid level in the tank reaches a predetermined
35 maximum.

The suction effect in the tank interior caused by the low

pressure is created by the vacuum pump 20 drawing air from an upper end of the tank interior 17. A vacuum tube 22 coupled to the vacuum pump in under compartment 18 locates through a sealed opening in a bottom panel 23 of tank 12
5 to extend upwardly through the tank interior 17 and terminate with an open end 24 facing upwardly in the tank interior and close to the underside of lid 15 when closed. Drawing air from an upper end of the tank interior in this manner allows the liquid level to rise inside the tank
10 without interfering with the suction effect as the liquid rises.

The open end 24 of vacuum tube 22 is located in the tank interior at an opposite end to the delivery outlet 33 so
15 as to reduce the likelihood of liquid entering the tank inadvertently entering vacuum tube 22 and interfering with operation of the vacuum pump 20. To further protect against liquid entering vacuum tube 22 a shroud 26 surrounds the vacuum tube at the open end 24. Liquid
20 splashing in the vicinity of open end 24 is deflected by shroud 26 back into the tank.

In the embodiment shown vacuum tube 22 is located in the corner of the tank interior and shroud 26 is a right-
25 angled member that boxes off vacuum tube against the corner.

The waste disposal unit 10 also includes a strainer 45 located at an upper end of the tank interior 17 and
30 positioned to catch liquid entering the tank interior through delivery outlet 33. Strainer 45 is a perforated metal strainer that strains liquid that enters the tank of particles entrained in the liquid. Strainer 45 is in the form of a basket with a handle 46 so as to be removable to
35 allow emptying of the waste particles and cleaning of the strainer. The strainer 45 is supported at an upper end of the tank interior by appropriate shelving 48 fixed in the

tank interior.

The whole waste disposal unit 10 is typically supported on
castor wheels 50 to allow the unit to be moveable toward
5 the waste liquid source. The unit 10 may be used to
cumulatively collect waste liquid over a period and store
the liquid until a maximum level is reached and a waste
disposal service is called to dispense the waste liquid
from the unit 10. In this embodiment the size of the tank
10 12 should be sufficient to meet the usage and storage
needs of the user taking into account the volume of waste
liquid generated over a certain period of time. For
example for large business using large volumes of cooking
oil a larger waste disposal unit would be more suitable
15 than a smaller unit which would only cater for occasional
disposal of waste liquid.

In an alternative embodiment illustrated in Figures 6 and
7 a waste disposal unit 110 can be used as a transfer
20 medium between a storage vat and a waste collector. In
this case the unit 110 would also include a discharge pump
125 and a discharge pipe 111 for the transfer of liquid to
the waste collector. The size of tank 112 in this
embodiment would not need to reflect the storage capacity
25 of the unit but only the volume of transient liquid since
the waste disposal unit 110 acts more as a transfer unit
than a holding tank.

This embodiment allows the tank 112 to be emptied so that
30 the contents can be safely transferred to a larger holding
vessel. Alternatively if it is desired to reuse the oil
collected in the tank 112 the oil may be pumped out of the
tank 112 and, for example, back to the fryer passing first
through a cone filter mounted over the fryer.

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Discharge pump 125 is a liquid pump mounted in under
compartment 118 next to vacuum pump 120. Discharge pump

collects the tank contents from an exit hole 127 in the base of tank 112 and is hard plumbed to exit hole 127 to eliminate any leakages at plumbing joins.

5 From discharge pump 125 the tank contents are pumped through a discharge conduit, discharge pipe 111, to the rear of the waste disposal unit 110 and up alongside rear panel 116 where it releasably connects to a U-shaped exit pipe 128 at a camlock fitting 129. When not in use exit
10 pipe 128 is stowed on brackets at the rear of unit 110.

A rigid ext pipe 128 is illustrated in the drawings although flexible hoses may be used instead depending on the application and whether greater flexibility of the
15 exit conduit is required for maneouverability, for example reach into a large holding tank or one located on another level.

Operation of the discharge pump 125 is by way of a
20 discharge switch (not shown) with the controls 142 located in the front compartment 137.

The waste disposal units 10, 110 allow the safe filtration and transfer of liquid contents, such as oil. The units
25 itself may also be used to store the liquid or may provide convenient and safe transfer of liquid to another storage body. An advantage of the units is a minimization of damage and wear to the units' components because liquid is drawn into the tank under low pressure passing through a
30 filter. Liquid contents exiting the tank through the discharge pump and discharge pipe has already been filtered and therefore the risk of damage to the pump is reduced.

35 It will be understood to persons skilled in the art of the invention that many modifications may be made without departing from the spirit and scope of the invention.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A waste disposal unit for collecting waste liquid entrained with particles from a waste liquid source,
5 comprising:
a tank for collecting waste liquid having an access that when closed creates a substantially sealed environment in the interior of the tank;
a vacuum pump in communication with the tank
10 interior for creating a low pressure in the tank interior a vacuum tube coupled to the vacuum pump and extending upwardly through the tank interior with an open end of the vacuum tube facing upwardly in the tank interior to draw air from an upper end of the tank
15 interior;

a delivery hose sealingly coupled to the tank interior to draw liquid from the waste liquid source to the tank interior when the pressure in the tank
20 interior is lower than the pressure at the waste liquid source; and
means for protecting against liquid entering the vacuum tube.
- 25 2. The waste disposal unit claimed in claim 1, wherein the means for protecting against liquid entering the vacuum tube is an outlet of the delivery hose coupled to the tank interior at an opposite side to the vacuum tube.
- 30 3. The waste disposal unit claimed in claim 2, wherein the means for protecting against liquid entering the vacuum tube is a shroud surrounding the open end of the vacuum tube.

4. The waste disposal unit claimed in claim 3, wherein the open end is located close to the underside of the access, which is a lid.
- 5 5. The waste disposal unit claimed in claim 3 or 4, wherein the vacuum pump is located on a lower exterior of the tank and the vacuum tube sealingly passes upward through a bottom wall of the tank.
- 10 6. The waste disposal unit claimed in any one of the preceding claims, comprising a discharge pump connected to a discharge conduit for transferring the waste liquid out of the tank.
- 15 7. The waste disposal unit claimed in claim 6, wherein the discharge pump draws waste liquid from an exit hole in the bottom wall of the tank and transfers waste liquid through the discharge conduit.
- 20 8. The waste disposal unit claimed in any one of the preceding claims, wherein the delivery hose is rigidly curved where the hose couples with the tank.
- 25 9. The waste disposal unit claimed in claim 8, wherein the delivery hose has a diameter of between 20mm to 70mm.
- 30 10. The waste disposal unit claimed in any one of the preceding claims wherein the other end of the delivery hose to the tank is provided with a nozzle having a diameter smaller than the diameter of the delivery hose.
- 35 11. The waste disposal unit claimed in claim 10, wherein the diameter of the nozzle is between 30mm and 40mm.

12. The waste disposal unit claimed in any one of the preceding claims, including a strainer positioned in the tank to strain waste liquid as it enters the tank from the delivery hose.

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13. The waste disposal unit claimed in any one of the preceding claims, including controls and a level indicator to stop operation of the vacuum pump when the level of waste liquid in the tank reaches a predetermined value.

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14. A method of collecting waste liquid entrained with particles from a waste liquid source using a waste disposal unit, including:

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inserting a delivery conduit into a waste liquid source, the delivery conduit being sealingly coupled to a tank of the waste disposal unit;

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activating a vacuum pump that is in communication with an interior of the tank to create a low pressure in the tank interior, a vacuum tube coupled to the vacuum pump and extending upwardly through the tank interior with an open end of the vacuum tube facing upwardly in the tank interior to draw air flow an upper end of the tank interior;

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drawing waste liquid through the delivery conduit and into the tank interior by way of the pressure in the tank interior being lower than the pressure at the waste liquid source; and

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protecting against liquid entering the vacuum tube.

15. The method claimed in claim 14, comprising:

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discharging waste liquid from the tank by pumping the waste liquid through an exit hole in a lower portion of the tank and out through a discharge conduit.

16. The method claimed in claim 14 or 15, including protecting against liquid entering the vacuum tube by locating the delivery conduit in the tank interior at an opposite side of the tank to the open end of the vacuum tube, or providing a shroud surrounding the open end of the vacuum tube.
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