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(54) **Liquid transport apparatus.**

(57) Liquid transport apparatus comprises a liquid transport line having a liquid inlet (1), a rise pipe (2), and an air inlet (8); a pressure-reducing pump (4); and means for replenishing transported liquid, such that a column (h) of liquid can be maintained in the rise pipe when the pump is in operation and the air inlet is open. Liquid transport can be effected by closing the air inlet.

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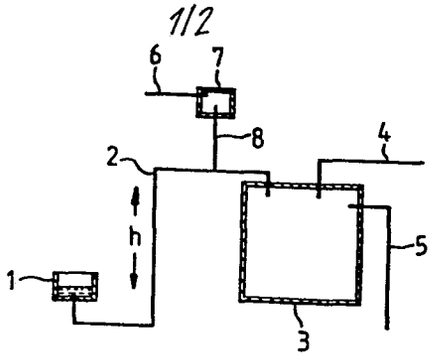

Fig. 1

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This invention relates to apparatus for the transport of liquids, e.g. in a vacuum sewer system.

A conventional vacuum sewer system comprises a waste inlet and a vacuum pump connected by a line including a valve providing a seal in the line. The pressure difference across the valve is often about 0.5 atm. Opening the valve causes evacuation of the inlet,and a plug of waste is subjected to considerable acceleration under the influence of the pressure difference. On evacuation, this plus acts like a projectile and can make the system very noisy.

A further disadvantage of such a system is the need to pass waste through a mechanical valve. Moreover, since the valve is usually operated on a time-delay basis, air may be drawn into the system unnecessarily after the plug of waste has been evacuated from the inlet and before the valve closes.

The flushing, cleaning and filling of conventional lavatories, whether or not flushed under vacuum, involves the use of a considerable amount of water. The design of conventional lavatories is such that they are usually constructed from porcelain, and are shaped to provide the most advantageous flow of flushing water. They also require an odour trap, usually in the form of a "U-bend". These design features combined make a number of internal and external surfaces which are difficult to reach for thorough cleaning.

There may be occasions on which is is desirable to join a vacuum-flush lavatory or a vacuum sewer system, e.g. of the type described and claimed in International

Patent Publication No. WO 81/00102, to a conventional sewer system operated under ambient pressure, or vice versa. For example, it may be desired to increase the number of houses in an area where ground conditions and topography for the undeveloped sites favour the introduction of one or more vacuum-flushed system, but where a conventional system has previously been used in the area. This may involve the contrasting problems of transferring liquid, e.g. effluent, from a vacuum environment to an ambient pressure environment, and vice versa. Further, where waste or other liquid is transported via a pipe under ambient pressure, and the pipe has to pass over unfavourable terrain, it may be desirable to use a vacuum system to transport the liquid from one section of the pipe to another over the terrain.

International Patent Publication No. WO 81/00102 discloses and claims apparatus comprising a tank having an inlet and an outlet; means for reducing pressure in the tank; and an air inlet into the tank. Figure 5 of this Publication illustrates an embodiment of such apparatus in which a first tank (as defined) is connected via a rise pipe to a secondary tank. The secondary tank is connected to a vacuum pump and has an outlet through which liquid may be discharged. When the level of liquid in the first tank reaches the inlet to the rise pipe, a mixture of air and liquid in the primary tank is drawn up through the rise pipe under the influence of the reduced pressure.

According to the present invention, liquid transport apparatus comprises a liquid transport line having an inlet for liquid, a rise pipe and an air inlet; means for reducing pressure in the line; and means for replenishing transported liquid, such that a column of liquid can be maintained in the rise pipe when the pressure-reducing means is in operation and the air inlet is open.

A liquid transport method, according to the present invention, comprises operating apparatus of the invention such that a column of liquid stands in the rise pipe, and closing the air inlet. Transport may also be effected by raising the level of liquid at the inlet.

The present invention provides apparatus and a method which can be used, in general, where vacuum sewer systems are employed. The apparatus and method are of particular use in transporting liquid from a lavatory.

When a column of liquid stands in the rise pipe, apparatus of the invention in use may be said to exist in a "steady state". The height of the liquid column is determined, in the steady state, by the pressure reduction achieved by the pressure-reducing means (for simplicity, hereinafter referred to as a "pump") working against the leak caused by allowing air to pass into the line through the air inlet. Closure of the air inlet causes further redution of pressure in the line and transport of liquid from the inlet, up the rise pripe above the steady state level.

It will be appreciated that the rise pipe should be sufficiently high to allow a column of liquid to stand therein in the steady state. For example, a water column may be about 1 m. higher than the liquid level at the inlet. If transport along the line is desired, the rise pipe should not be so high that there cannot be liquid transport when the air inlet is closed.

If desired, the air inlet may be blocked manually, although it may be preferred to provide a valve which blocks the air inlet mechanically when it is desired to

transport liquid along the line. For example, a suitable valve may comprise a spring-loaded closure member, such that the air inlet is open except when the member is caused to close the inlet against the action of the spring. Closure of the air inlet may be effected on a time-delay sequence. An automatic sequence may be appropriate for use with urinals.

If the air inlet is closed for a relatively short period of time, a proportion only of liquid previously standing in the rise pipe may be transported. If the air inlet is closed for a relatively long time, depending on the liquid replenishment means, the liquid seal between the inlet and the pump may be wholly removed. The resultant increase in pressure in the line may be used of itself to cause replenishment. Similarly, re-opening of the air inlet may be used to cause replenishment.

Any suitable means may be provided to replace transported liquid, positively or otherwise. The replenishment means may comprise, for example, a vessel or pipe in which there can be a standing or continuously flowing body of liquid such that the inlet to the transport line can stand in the body of liquid. A standing body of liquid may itself need replenishment once a sufficient volume of liquid has been transported therefrom using apparatus of the invention. Alternatively, replenishment means may be designed to deliver liquid to replace that transported, only when required. For example, a replenishment tank, or series of tanks, may be provided, designed to deliver a predetermined quantity of liquid to the inlet when, or at a short space of time after, the air inlet is blocked. Such an

arrangement is particularly appropriate when a lavatory forms the liquid inlet for apparatus of the invention. A replenishment tank for a domestic lavatory can be mounted in the same manner as a conventional lavatory cistern.

It will often be appropriate to discharge the liquid transported from the column in the rise pipe into a tank having an inlet connected to the rise pipe; an outlet through which liquid may be removed as desired or necessary; and which is connected to the pump. It is then convenient to introduce an air inlet into the discharge tank. The air inlet can provide the dual purpose of aerating, and causing mechanical attrition of, any solids in the tank, and of acting as the cause of transport, on being blocked. Such discharge tanks are of the type described and claimed in International Patent Publication No. WO 81/00102. The novel apparatus can provide the inlet valve suggested, and illustrated in the drawings as valve 3, in that publication. For maximum attrition and circulation, the point of air inlet into liquid may be surrounded by a skirt.

A replenishment tank discharging directly to the liquid inlet of liquid transport apparatus of the invention may be connected to a liquid supply tank,e.g. via a hydraulic leg, which is in communication with the pump. In the steady state, if the limbs of the hydraulic leg are of sufficient length, separate columns of liquid stand in each limb of the leg. By control of the relative heights and/or cross-sections of the limbs, closure and re-opening of the air inlet can cause liquid to pass into the limb in connection with the replenishment tank. This effect can be used to replace liquid in the transport apparatus inlet, simply

by allowing the liquid level in the replenishment tank to pass through an overflow outlet connected to the liquid inlet of the apparatus.

By way of example, a "flushing" tank may be present in the leg, and this tank may be connected to the pump. The liquid inlet to the flushing tank may be a relatively large bore connection,to the supply tank, and the liquid outlet from the flushing tank a relatively small bore connection, to the replenishment tank. The former connection may be of a height greater than the column of liquid which can be maintained therein in the steady state, but less than the height of the "column" when the air inlet is closed.

The flushing/replenishment tank arrangement described above requires that the height of the limb above the replenishment tank should be such that it can hold a column of liquid, in the steady state. If it is desired that the flushing tank, which will normally be in the apex of the leg, is a smaller height above the replenishment tank, then this can be achieved by leading the air inlet into the flushing tank, and then into a discharge tank of the type described. The pressure difference between the flushing and replenishment tanks is then smaller than the difference between the discharge tank and the inlet (which determines the height of the column in the rise pipe) by a factor determined by the depth of the air inlet line beneath liquid in the discharge tank.

The height of a flushing tank/replenishment tank arrangement may be such that a lavatory can be sufficiently well flushed by discharge of water therèinto, under gravity.

Cleaning of a lavatory may be achieved by control of the air inlet, such that the level of liquid therein is caused to oscillate.

Individual supply tanks can be supplied with, say, water from a main. The supply into each tank is suitably monitored by, say, a conventional ball-cock. It may also be desirable to replace liquid in a hydraulic leg leading to a replenishment tank, e.g. into a flushing tank of the type described, and this can be controlled as desired.

A plurality of liquid inlets may be connected, each via an associated rise pipe, to a single vacuum pump. For example, where a discharge tank is present, liquid removed from each rise pipe on closure of the air inlet may be discharged into one such tank. It will be appreciated that a single such operation will cause removal of liquid from all the rise pipes connected to the pump. This may be satisfactory where, for example, the liquid inlets are a plurality of urinals but will be less satisfactory where, for example, each liquid inlet is an individual lavatory.

Further, liquid in the apparatus of the invention may carry solids, e.g. when the inlet is a lavatory. It may be desirable to ensure that any solids are disintegrated before being carried long distances through pipes in the apparatus, in order that not all the pipes have to be of a cross-section sufficient to allow the solids to pass therethrough.

Where it is desired to control the transport of liquid to a common discharge tank from a plurality of

inlets, and/or where it is desired to disintegrate solids before transporting liquid to a discharge tank, it may be desirable to form each rise pipe as an intermediate tank, or to connect each rise pipe to an intermediate tank. In the latter case, the intermediate tank can be connected to the discharge tank via a secondary rise pipe in which a column of liquid can be maintained, in the steady state. Attrition of solids in an intermediate tank can be provided by an air inlet. Difference in pressure between air inlets into intermediate and discharge tanks can be achieved by providing a constricted line leading into the intermediate tank from a point where the atmosphere is regulated by the pump.

A constricted line can also be used to provide the pressure difference necessary to maintain columns of liquid when the transport line comprises two rise pipes. The height of the liquid column in a rise pipe between one liquid inlet and its intermediate tank is then determined, in the steady state, by the pressure reduction caused by the pump, taking into account the pressure increase caused by the air inlet and the drop in the pressure at the constriction in the air line. Sufficient difference in pressure can be achieved by blocking the air inlet to cause liquid in the first rise pipe to be removed into the intermediate tank.

In apparatus of the invention including a plurality of liquid inlet/rise pipe/intermediate tank units, it may be desirable to use a constant pressure vacuum valve, such that the treatment vacuum is unchanged on blocking the air leak into any intermediate tank. If desired, the over-pressure from the pump may be used to aerate waste

dischargedfrom the system, e.g. in a trickle filter.

As an alternative to the type of discharge tank described above, the liquid transport line may have an outlet submerged in liquid in a discharge tank. Owing to the presence of the pump, a column of liquid will then stand in the line above the liquid level at the outlet. Transport of liquid between the inlet and the outlet may be controlled, if desired, by varying the cross-section of pipes in the line, and/or by providing further air inlets, e.g. between the pump and the outlet, and/or by providing a plurality of vacuum pumps.

The invention will now be described with relation to the use of the apparatus in transferring liquid from a standing, or continuously flowing, body of liquid, depending on the level of the body. This can be achieved by providing the inlet to the transport line in the body of liquid and the air inlet in connection with an opening a small distance above the level of the line inlet. When the level of the body of liquid is below the opening, the air inlet is open and there is no transport. When the level of the body of liquid rises above the opening, liquid or a liquid/air mixture is drawn into the opening, the air inlet is effectively blocked, the pressure in the line is reduced and liquid transport through the line inlet can take place. In this way, for example, apparatus of the invention can be used to transfer liquid from an atmospheric to a vacuum system, e.g. waste from a conventional sewer system to a vacuum sewer system. For this purpose, apparatus may comprise a primary flow pipe; a rise pipe extending into the primary pipe; and a level control pipe, in parallel to the

discharge pipe, both discharge and rise pipes being connected to a vacuum pump.

The rise and control pipes may both lead into the same discharge tank. A first constant pressure valve may be provided in the control pipe line, which causes reduced vacuum to be applied when the inlet to the control pipe is uncovered. A second constant pressure valve may be provided to allow a higher vacuum pressure to be applied between the pump and the inlet to the rise pipe when the inlet to the control pipe is covered. The possibility of large volumes of air being drawn up through the rise pipe can be minimised by providing a recess in the lowermost wall of the primary pipe, into which the discharge pipe extends.

The invention will now be described with relation to the use of the apparatus with the intention of transferring liquid from a vacuum system to a system under atmospheric pressure. For example, apparatus of the invention can be used to discharge waste or other liquid from a vacuum sewer system to a conventional sewer.

For the purposes of illustration, it may be assumed that, in use, waste or other liquid is transported along a primary flow pipe under atmospheric conditions. A rise pipe extends upwardly from the flow pipe and is connect-

ed to a vacuum system, e.g. the outlet of apparatus illustrated in Figure 1 of International Patent Publication No. WO 81/00102. The rise pipe, which acts as the discharge pipe from the vacuum system, should have an internal diameter sufficiently large to permit the continuous sedimentation of solid material. In the steady state, a column of liquid stands in the rise pipe while the level of liquid in the flow pipe is above the inlet to the rise pipe. Again, in order to ensure that the level of liquid in the flow pipe is maintained above the outlet of the rise pipe, it will often be preferred to provide a recess in the wall of the flow pipe, into which the rise pipe extends.

An air inlet is provided in the rise pipe, at a point above the normal level of liquid in the flow pipe, in order that air can pass into the rise pipe and aerate the waste standing therein. In this way, standing waste is prevented from turning septic.

Apparatus of the invention, while being applicable to the transport of all types of liquids, can avoid the disadvantages described above when the inlet is a waste inlet such as a domestic lavatory. The pressure difference which is needed to maintain a liquid column in the rise pipe need not be as great as the vacuum conventionally used in a vacuum-flushed sewer system. For example, the pressure difference may be about 0.1 atm. Apparatus of the invention can yet provide substantially complete, substantially noiseless removal of waste in the inlet when the vacuum above the column is increased.

Transport can be associated with the introduction of materials such as disinfectants, deodorants and dyes, and the invention provides a convenient dosing system for such materials. The apparatus can be used for exhaust ventilation, and allows central monitoring of undesirable gas evolution.

By comparison with conventional vacuum transport systems, where opening of a valve causes transport of a plug of material and subsequent reduction in the transport force, the present invention provides an increased

transport force when this is applied. This is despite the reduction in noise associated with ballistic systems.

Apparatus of the invention can be used with considerably simpler lavatories than the conventional domestic lavatory. Firstly, the system provides an odour trap and there is no need for any conventional "U-bend". Secondly, the lavatory does not have to be constructed in a configuration designed for the transport of flushing water. In other words, apparatus of the invention does not limit the shape of a lavatory which may thus be, for example, funnel-shaped, suitably with vertical or near-vertical side-walls above the funnel. The lavatory can be designed to minimise the area of the surface which can become soiled, and the configuration can be such that a small depth of water is maintained, in use over this area. A funnel-shaped configuration may readily be modified to cause a swirling flow on flushing, if desired.

Apparatus of the invention can have wide utility and yet require a minimum of moving parts. A vacuum pump may be the only moving part, and this can be physically separated from the or each liquid inlet. In particular, any replenishment tank needs no moving parts. The system not only causes transport of water but also removes air, rather than requiring any separate fan as has previously been the case in conventional lavatories. Liquid and any waste do not have to pass through mechanical valves. While specific applications have been described with regard to waste transport, apparatus of the invention may also be used to transport, for example, potable water.

The point at which air is allowed to enter the line may be permanently (e.g. in the rise pipe), occasionally or never in contact with liquid, whether or not during transport. The actual inlet into the line may need to be formed such that it allows the passage of air in one direction, but not liquid in the other. It should not allow the passage of air to a degree which prevents the maintenance of a liquid column in the rise pipe.

The invention will now be described by way of example with reference to the accompanying drawings, in which Figures 1 to 7 are schematic representations of different embodiments of the invention.

Figure 1 shows apparatus comprising a liquid inlet 1 (which may be a lavatory bowl) connected via a rise pipe 2 to a discharge tank 3. Reduced pressure can be maintained in the tank 3 by virtue of its connection, via a line 4, to a vacuum pump (not shown). The tank 3 also has a liquid outlet 5. An air leak having an inlet 6 and a safety tank 7 is connected to the apparatus by a line 8. In use, in the steady state, a column of liquid stands in the rise pipe 2, to a height h above the level of liquid (shown as a dotted line) in the inlet 1. Liquid in the inlet and the rise pipe forms a seal between the inlet and the vacuum pump. Removal of liquid in the column may be effected by blocking the air inlet 6. A tank (not shown) provides liquid to replenish that removed, without breaking the seal.

Figure 2 shows apparatus comprising a plurality of liquid inlets 10, 11 connected via associated rise pipes 12, 13 to a discharge tank 14. Reduced pressure can be achieved in the tank 14 by virtue of its connection, via a line 15, to a vacuum pump (not shown). The tank 14 also has a liquid outlet 16. An air pipe having an inlet 17 passes into the tank 14 and its outlet 18 is formed as an aerator.

Figure 2 also illustrates means whereby liquid removed from inlet 10 can be replaced. A replenishment tank 20 is connected to a liquid supply tank 21 via a

hydraulic leg comprising a relatively large bore limb 22, a relatively small bore limb 23 and, between the limbs, a flushing tank 24. The flushing tank 24 is connected via an air line 25 to the discharge tank 14. The replenishment tank 20 has an overflow outlet 26.

In use of the apparatus illustrated in Figure 2, liquid lies in the inlets 10, 11 and in the tanks 20, 21 and 24 at least, while columns of liquid, the height of which is the same as the height of the columns of liquid in the rise pipes 12, 13, stand in limbs 22, 23. On closure of the air inlet 17, liquid is transferred via the rise pipes 12, 13 into the discharge tank 14 and via limb 22 into the flushing tank 24. At the same time, the level of liquid in limb 23 is raised. When the liquid in any rise pipe has been wholly or partially transferred to the discharge tank 14, air is allowed to enter the system to raise the pressure above the liquid in both tanks 14 and 24. The liquid transferred to the flushing tank 24 via limb 22 is thus transferred via limb 23 to the replenishment tank 20 and is discharged to the inlet 10 via the overflow 26. Re-opening the air inlet 17 permits re-establishment of the "steady state" conditions prevailing before the air inlet was closed.

Figure 3 illustrates apparatus having the same components as that of Figure 2, except that no second inlet/rise pipe assembly is shown. The important distinction lies in the connection of the line 15 to the flushing tank 24. The illustrated apparatus operates in the same manner as that of Figure 2, except that, in the steady state, a lower column of liquid stands in the limb 23.

Figure 4 shows apparatus comprising a liquid inlet 30 connected via a rise pipe 31 to an intermediate tank 32. The intermediate tank 32 is connected via a secondary rise pipe 33 to a discharge tank 34. The discharge tank 34 has a liquid outlet 35, a line 36 connected to a vacuum pump (not shown) and an aerator 37. The intermediate tank 32 and the discharge tank 34 have a

connecting air lines 38 including a constriction at 39. The intermediate tank 32 is connected to an air inlet 40 which terminates in an aerator 41.

In use, with a vacuum pump operating and liquid in the inlet 30, liquid stands in the rise pipes 31,35 to different heights, owing to the different degrees of vacuum pulled in the intermediate tank 32 and the discharge tank 34. The difference is the effect of the constriction 39. Closure of the inlet 40 causes removal of liquid from the column in the rise pipe 31 into the intermediate tank 32, and replenishment liquid passes into the inlet 30 from a source (not shown). This operation does not affect any further waste inlet/rise pipe/intermediate tank systems which may be connected, in a similar manner, to the discharge tank 34. Accordingly, each unit can be operated independently.

The illustrated rise pipe 31 can be replaced by a lead directly into the intermediate tank 32 at any level. The intermediate tank can function to break up solids by attrition on aeration. The pipe 33 can thus be of smaller cross-section than that of pipe 31.

Figure 5 shows a primary flow pipe 50, a rise pipe 51 connected to a vacuum sewer system (not shown) at its upper end, and an air leak 52. The rise pipe 51 extends at its lower end into a recess 53 in the flow pipe 50. In use, as a means of connection between a vacuum sewer system and a conventional sewer system, there is a continuous flow of waste along the primary flow pipe 50, while a column of waste stands in the rise pipe 51 and is discharged therethrough as appropriate. The waste standing in the rise pipe is aerated by virtue of the provision of the air inlet 52.

Figures 6 and 7 again show a primary flow pipe 50 and rise pipe 51 and (in Figure 7) a recess 53. Figures 5 and 6 also show that the upper end of the rise pipe 51 terminates in a discharge tank 54, to which a vacuum pump (not shown) is connected, and a control pipe 55 in parallel with the rise pipe 51. Transport into the discharge tank 54 occurs, in use, when the opening into the control pipe 55 (which is higher than the inlet to the rise pipe 51) is covered by liquid in the flow pipe 50, but not when the control pipe 55 allows the passage of air only.

Figure 7 shows constant pressure valves 56 and 57. These valves bring reduced and normal vacuum pressure into play, respectively, when the opening into the control pipe 55 is uncovered and covered, respectively.

CLAIMS

1. Liquid transport apparatus which comprises a liquid transport line having an inlet for liquid, a rise pipe and an air inlet; means for reducing pressure in the line; and means for replenishing transported liquid, such that a column of liquid can be maintained in the rise pipe when the pressure-reducing means is in operation and the air inlet is open.

2. Apparatus according to claim 1, in which the pressure-reducing means comprises a constant vacuum pump.

3. Apparatus according to claim 1 or claim 2, in which the liquid replenishment means comprises a replenishment tank connected to a liquid supply tank via a hydraulic leg in communication with the pressure-reducing means.

4. Appratus according to any preceding claim, which comprises a discharge tank into which the liquid transported from the rise pipe is discharged.

5. Apparatus according to claim 4, in which a plurality of liquid inlets are connected, each via an associated rise pipe, to the discharge tank.

6. Apparatus according to claim 5, in which each inlet is connected to an intermediate tank which is connected to the discharge tank via a rise pipe, in which there is a constricted air line between each intermediate tank and the discharge tank, and in which there is an air inlet into each intermediate tank.

7. Apparatus according to claim 5, in which the connection between the inlet and the intermediate tank comprises a rise pipe.

8. Apparatus according to claim 1, in which the liquid replenishment means comprises a body of liquid in which the liquid inlet is immersed.

9. Apparatus according to claim 8, in which the air inlet is in a line which terminates above the liquid inlet.

10. Apparatus according to claim 8, in which the air inlet is in the rise pipe, within the flow pipe.

11. A liquid transport method, which comprises operating apparatus according to any of claims 1 to 9 such that

a column of liquid stands in the or each rise pipe, and closing the air inlet.

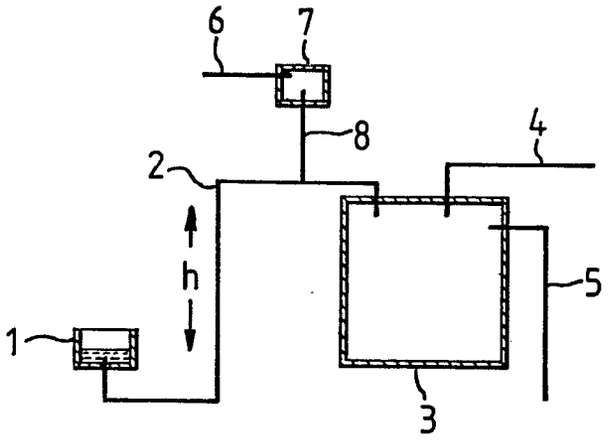

Fig.1

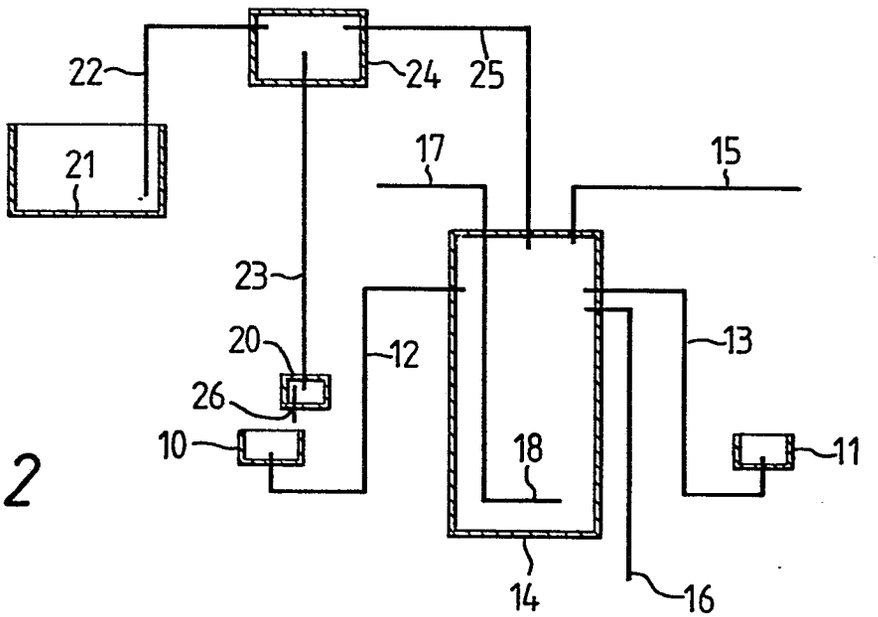

Fig.2

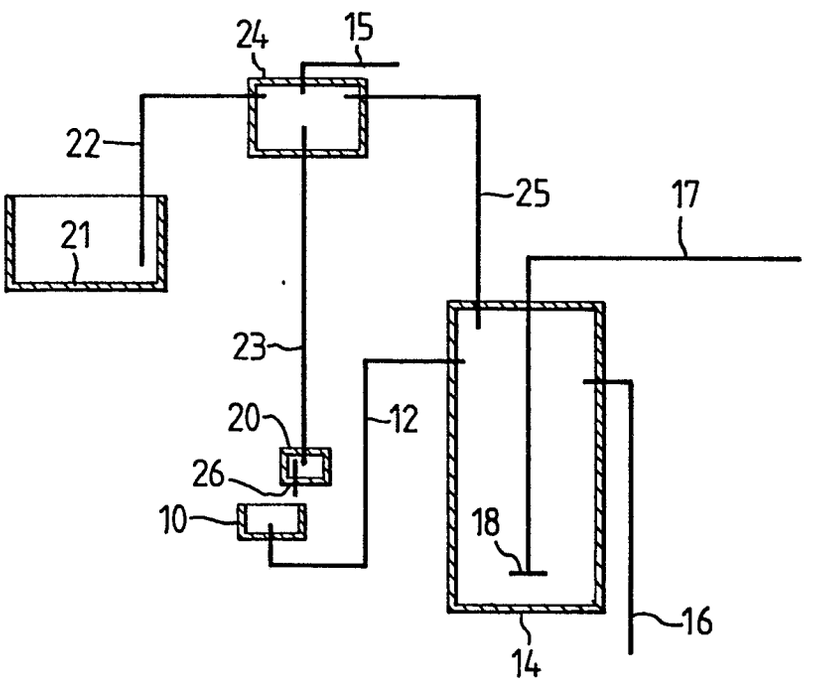

Fig.3

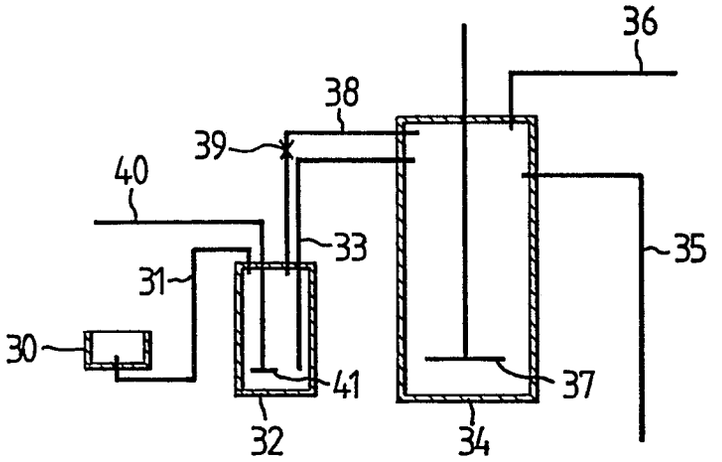

Fig.4

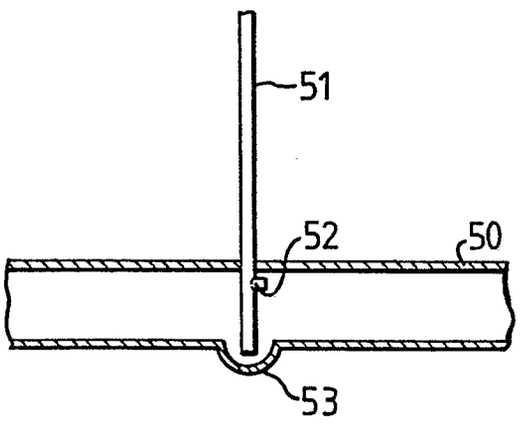

Fig.5

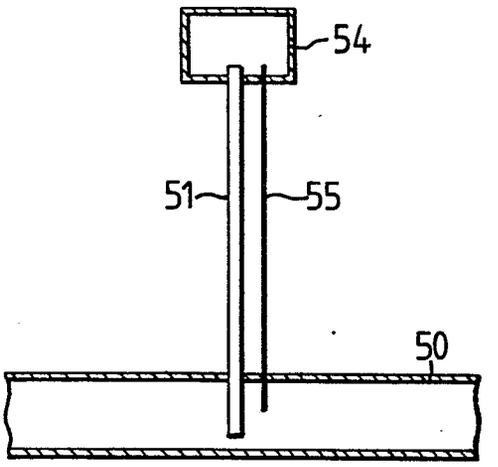

Fig.6

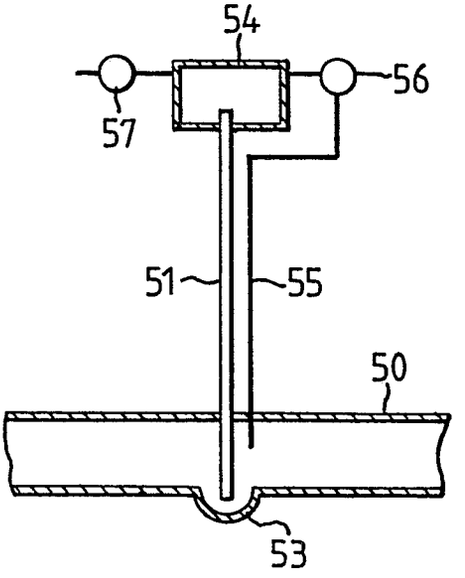

Fig.7

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 81 30 5747

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A/P/D	WO - A - 81/00102 (S.H. SMALL) * page 12, lines 1-20; page 13, lines 1-29; page 14, lines 2-16; figures 1,2,5 *	1,2,4, 5,6
A	FR - A - 2 308 742 (IFO AB.) * page 2, lines 34-40; page 3, lines 1-26; figure 1 * & GB - A - 1 502 552	1,2,4
A	FR - A - 2 415 028 (EVAK SANITAR AB.) * page 4, lines 1-33; page 9, claim 1; figure 1 * & US - A - 4 199 828	1,2,4
A	FR - A - 847 250 (P.A. GANDILLON) * page 2, lines 84-104; page 3, lines 1-66; page 4, lines 73-81; figures 1,2 *	1,2,4, 5,6
A	US - A - 3 049 489 (E.J. CIABATTARI) * column 2, lines 36-72; column 3, lines 1-13; figure 1 *	1
A/P	DE - A - 3 001 150 (ELECTROLUX GmbH) * page 4, lines 1-7; figures *	1

CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

E 03 F 1/00

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

E 03 F

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same category
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	02-03-1982	CLASING

EPO Form 1503.1 06.78