Title: SMART LIQUID DELIVERY NOZZLE ASSEMBLY

Abstract: A nozzle assembly operable to deliver fluid to a tank to be filled and to sense a level of fluid in the tank, the assembly having a fluid outlet and a sensor portion, the sensor portion comprising a pressure sensor provided in fluid communication with a sensor conduit, the sensor conduit having a sensor conduit aperture provided therein, the assembly being operable in use whereby when a level of liquid in the tank being filled rises above a level of the sensor conduit aperture, the sensor conduit aperture is closed by the liquid and a pressure of gas trapped in the sensor conduit increases thereby indicating a "tank full" condition, the assembly being arranged to detect the increase in pressure of gas and to generate a pressure increase signal indicative of the increase in pressure when the increase in pressure is detected.
FIELD OF THE INVENTION

The present invention relates to nozzles for delivering fluid to a storage tank. In particular but not exclusively the invention relates to nozzles for delivering liquids from the storage tank of a road tanker.

BACKGROUND

It is known to transfer liquid from the storage tank of a road tanker to a fixed storage tank at a site such as a forecourt of a fuel retail facility. Conventionally, an operative couples a nozzle of a delivery fuel delivery hose to an inlet of the storage tank to be filled and commences delivery of fluid from the road tanker. An overspill device mounted to the storage tank is arranged to provide a signal to the operative and/or a controller of the road tanker when the tank is full of liquid. The supply of liquid to the nozzle is then terminated.

STATEMENT OF THE INVENTION

In a first aspect of the present invention there is provided a nozzle assembly operable to deliver fluid to a tank to be filled and to sense a level of fluid in the tank, the assembly having a fluid outlet and a sensor portion, the sensor portion comprising a pressure sensor provided in fluid communication with a sensor conduit, the sensor conduit having a sensor conduit aperture provided therein, the assembly being operable in use whereby when a level of liquid in the tank being filled rises above a level of the sensor conduit aperture, the sensor conduit aperture is closed by the liquid and a pressure of gas trapped in the sensor conduit increases thereby indicating a 'tank full' condition, the assembly being arranged to detect the increase in pressure of gas and to generate a pressure increase signal indicative of the increase in pressure when the increase in pressure is detected.

Embodiments of the invention have the advantage that a tank into which fluid is being delivered does not require an overspill device. This is because the nozzle of the present invention is arranged to prevent over-filling of the tank by terminating the supply of fluid to the tank before the tank overflows with liquid.
It is to be understood that the pressure sensor may be arranged to measure the pressure of gas trapped in the sensor conduit, the assembly being arranged to transmit a signal indicative of the pressure of gas in the sensor conduit, this signal being indicative of the increase in pressure when such an increase occurs.

Reference to a sensor conduit is to be understood to include reference to any volume suitable for the purpose of experiencing an increase in pressure as the level of fluid rises above a level of an aperture of the conduit. Thus the conduit may be any suitable cavity or other volume.

Preferably the signal indicative of the increase in pressure is provided in the form of an RF pressure signal.

This has the advantage that electrical wires are not required in order to enable the assembly to communicate with an operative or a controller on board a tanker.

Preferably the sensor conduit is arranged to project from the fluid outlet.

Preferably the sensor conduit is coupled to an interior portion of the fluid outlet whereby fluid flowing out from the fluid outlet flows over and in contact with at least a portion of the sensor conduit.

Preferably the sensor conduit is coupled to the fluid outlet such that at least a portion of the sensor conduit is substantially coaxial with the fluid outlet.

Preferably the assembly is provided in combination with a spout removably coupled to the fluid outlet, the spout being arranged to direct fluid flowing through the assembly through an outlet of the spout

Alternatively the fluid outlet may comprise a spout arranged to direct fluid flowing through the assembly through an outlet of the spout.

The sensor conduit may be provided in juxtaposition with a wall of the spout.

Preferably the sensor conduit is provided on an inner side of the wall of the spout.
Preferably the sensor conduit is substantially coaxial with the spout.

Alternatively the sensor conduit may be provided on an outer side of the wall of the spout.

Preferably the sensor conduit is arranged to project along at least a portion of a length of the spout.

Preferably the sensor conduit projects along substantially the whole length of the spout.

This has the advantage in some configurations that the sensor can detect when a level of fluid in a tank is proximate a free end of the spout.

Alternatively the sensor conduit may project beyond the outlet of the spout.

This has the advantage that the assembly can detect the level of fluid before it reaches the spout.

The sensor conduit may comprise a substantially rigid member.

Alternatively and preferably the sensor conduit comprises a flexible member.

The sensor conduit may comprise a resiliency flexible member.

Preferably a portion of the assembly is provided with a cavity therein, the cavity being arranged to house a control module.

Preferably the cavity is provided in fluid communication with an interior of the sensor conduit.

The pressure sensor may be provided in the cavity. Alternatively it may be provided at an end of or within the sensor conduit.
Preferably the pressure sensor is in fluid communication with the interior of the sensor conduit by means of a gas tight hose coupled to the sensor wherein a remainder of the interior of the cavity is in fluid isolation from the interior of the sensor conduit.

Preferably the cavity is accessible from an outer surface of the assembly.

Preferably the assembly comprises an RF transmitter, the assembly being arranged to transmit a presence signal indicating that the RF transmitter of the assembly is functioning correctly.

Alternatively the assembly may be arranged to transmit the presence signal substantially continuously.

The assembly is preferably arranged to transmit the presence signal at prescribed periodic intervals.

This has the advantage of reducing an amount of power consumed by transmission of the RF signal relative to a continuous transmission arrangement.

In a second aspect of the invention there is provided apparatus for supplying liquid from a first storage tank to a second storage tank comprising an assembly according to the first aspect of the invention.

Preferably the apparatus comprises a receiver arranged to receive the RF signal indicative of the increase in pressure.

Preferably the receiver is provided in a repeater module, the repeater module being arranged in turn to transmit an RF signal to a tanker controller indicative of the increase in pressure.

It is known for operatives to control the flow of fluid (e.g. switching on and off the flow) using a remote control device by which the operative communicates with a controller on board the tanker. Thus in some embodiments the repeater module is provided in this remote control device. This is particularly useful in scenarios in which a tank to be filled is remote from the tanker, such as at the back of a house or other building.
Preferably the assembly is arranged to generate a presence signal and the repeater module is arranged to transmit a signal to the tanker controller thereby to terminate a supply of liquid to the assembly in the event the presence signal is not detected by the repeater module.

This has the advantage that the system is fail-safe in the event of loss of communications between the nozzle assembly and repeater module due to for example to an obstruction, malfunction or power failure.

Preferably the repeater module is arranged to transmit a signal to the tanker controller to terminate a supply of liquid to the assembly in the event the presence signal from the assembly is not detected for a prescribed period of time.

Preferably the repeater module is arranged to transit an RF signal indicating a presence of the repeater module, the tanker controller being arranged to terminate a supply of liquid to the assembly in the event that the RF signal indicating the presence of the repeater module is not received.

This has the advantage that the system is fail-safe in the event of a corresponding loss of communications between the repeater module and tanker controller, due to for example to an obstruction, malfunction or power failure.

Preferably the tanker controller is arranged to terminate a supply of liquid to the assembly in the event that the RF signal indicating the presence of the repeater module is not received for a prescribed period of time.

Alternatively the receiver is provided in a tanker controller.

The tanker controller may be arranged to terminate a supply of liquid to the assembly when the RF signal indicative of the increase in pressure is received by the tanker controller from the assembly.

In some embodiments the assembly is arranged to transmit the presence signal and the tanker controller is arranged to terminate a supply of liquid to the assembly when the presence signal of the nozzle assembly is not received by the tanker controller.
The tanker controller may be arranged to terminate a supply of liquid to the assembly when the presence signal of the assembly is not received by the tanker controller for a prescribed period of time.

The repeater module is preferably a portable module arranged to be carried by a tanker operative.

Preferably the repeater module is operable by an operative to commence or terminate a supply of fluid to the assembly.

It is to be understood that embodiments of the invention are suitable for use in the delivery of liquid fuels such as petroleum spirit, fuel oil and other liquid fuels. Some embodiments are suitable for use with other liquids such as water, milk and other liquids.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will now be described with reference to the accompanying figures in which:

FIGURE 1 is a perspective view of a fluid delivery nozzle assembly according to an embodiment of the invention;

FIGURE 2 is a cross-sectional view of a nozzle assembly according to an embodiment of the invention;

FIGURE 3 shows the nozzle assembly of FIG. 2 showing a closed volume formed when a level of liquid in a tank being filled reaches the level of the nozzle outlet;

FIGURE 4 shows a nozzle assembly according to a further embodiment of the invention;

FIGURE 5 shows a nozzle assembly having a removable spout showing (a), (c) cross-sectional illustrations of the assembly from respective different orthogonal directions and (b), (d) corresponding exterior views respectively;

FIGURE 6 shows (a) an exterior view and (b) a cross-sectional view of a nozzle assembly according to the embodiment of FIG. 5 with the spout removed;
FIGURE 7 shows a level sensor according to the embodiment of FIG. 5 and FIG. 6;

FIGURE 8 shows a PCB of the embodiment of FIG. 5 and FIG. 6;

FIGURE 9 is an illustration of fuel delivery apparatus according to an embodiment of the invention coupled to a fuel storage tank wherein a tubular member of the level sensor of the nozzle assembly has been removed;

FIGURE 10 is an illustration of fuel delivery apparatus according to an embodiment of the invention coupled to a fuel storage tank wherein a spout of the nozzle assembly has been removed;

FIGURE 11 is an illustration of a nozzle assembly according to an embodiment of the invention coupled to a fluid storage tank;

FIGURE 12 shows a nozzle assembly according to an embodiment of the invention having a flow sensor provided therein; and

FIGURE 13 shows a further view of the nozzle assembly of FIG. 12.

DETAILED DESCRIPTION

In one embodiment of the invention a fuel delivery nozzle assembly 100 is provided as shown in FIG. 1 having a spout 110 and a handle portion 120. The handle portion 120 is arranged to permit handling of the nozzle assembly 100 by an operative.

The spout 110 has a liquid level sensor 130 provided therein. The level sensor 130 is arranged to provide an alert in the event that the spout 110 of the nozzle assembly 100 becomes immersed in liquid, such as when a level of liquid in a tank being filled reaches the nozzle assembly 100.

The level sensor 130 has a tubular member 132 oriented substantially coaxially of the spout 110. In some embodiments the level sensor 130 is provided away from an axis of the spout 110. In some embodiments the level sensor 130 is provided in juxtaposition with an inner wall 111 of the spout 110. Other arrangements are also useful.
FIG. 2 shows the embodiment of FIG. 1 in cross-section. A pressure sensor 134 is provided within the tubular member 132 near a closed end 133 of the tubular member 132 upstream from an open end 138 of the tubular member 132. The open end is provided substantially in the same plane as that of an outlet 110A of the spout 110.

The pressure sensor 134 and closed end 133 of the tubular member 132 in combination with the tubular member 132 itself define a cavity 135 in which an RF transmitter module 136 is provided.

The module is arranged to transmit an RF signal indicative of a 'tank-full' condition when a pressure of gas in the tubular member 132 rises by a predetermined amount relative to an ambient atmospheric pressure. In the present embodiment the predetermined amount corresponds to a condition in which a level of liquid in a liquid tank being filled reaches a free end 138 of the tubular member 132 whereby the free end 138 becomes closed. Such a condition is illustrated in FIG. 3 where the free end 110A of the spout 110 and free end 138 of the tubular member have both become closed by liquid forming a seal 141 proximate the free end 138.

It is to be understood that continued filling of the tank with liquid will cause the gas pressure within the tubular member 132 to rise.

In some embodiments the spout 110 and the tubular member 132 are formed from a material through which RF radiation may readily pass.

In some embodiments of the invention the spout 110 is tubular and formed from a metallic material. In the embodiment of FIG. 4 the level sensor 230 is provided with a tubular member 232 provided in juxtaposition with an inner wall 211 of the spout 210. The tubular member 232 has a pressure sensor 234 provided at an end away from an outlet 210A of the spout 210 as in the case of the embodiment of FIG. 2 and FIG. 3.

As in the embodiment of FIG. 2, the pressure sensor 234 is arranged to detect an increase in gas pressure in the tubular member 232 indicative that a level of liquid in a tank being filled has reached the free end 210A of the spout 210. An RF transmitter module 236 is arranged to transmit an RF signal indicative of a 'tank-full' condition when this increase in gas pressure is detected.
It is to be understood that the free end 138, 238 of the tubular member 132, 232 is not necessarily provided in juxtaposition with an outlet 110A, 210A of the spout 110, 210. In some embodiments the free end 138, 238 of the tubular member 132, 232 is provided at a location axially displaced from the outlet. Thus in some embodiments the free end 138, 238 is provided within the spout 110, 210 whilst in other embodiments the free end 138, 238 is provided beyond the outlet 110A, 210A of the spout 110, 210, i.e. downstream thereof.

FIG. 5 shows a nozzle assembly 300 according to an embodiment of the invention having a removable spout 310. The spout 310 is arranged to couple to a body portion 302 of the nozzle assembly 300. In some embodiments the spout 310 is arranged to couple to the body portion 302 by means of a BSP (British Standard Pipe) thread coupling 355, such as a 2 inch BSP thread coupling.

FIG. 5(a) shows a cross-sectional view of a spout 310 coupled to a body portion 302 and FIG. 5(b) shows a corresponding external view. FIG. 5(c) shows a cross-sectional view from a direction perpendicular to that of FIG. 5(a) and shows a lower gallery 303 of the body portion 302 by means of which a cavity 305 formed in a side of the body portion is provided in fluid communication with an inside of the tubular member 332 of the level sensor 330. The cavity 305 is arranged to receive a printed circuit board (PCB) 360 having a pressure sensor 363 mounted thereto (FIG. 8). The pressure sensor 363 is coupled to a hose 365 whereby the pressure sensor 363 is provided in fluid (and pressure) isolation from the remainder of the cavity. The hose is in turn coupled to the interior of the tubular member 332 whereby the pressure sensor 363 is provided in fluid (and pressure) communication with the level sensor 330.

Thus, the pressure sensor 363 is arranged to detect an increase in pressure of gas trapped in the tubular member 332 when a level of fluid rises above the free end 338 of the tubular member 332 when the assembly 300 is used in the orientation shown in FIG. 3.

A secondary cavity 305A is provided on a diametrically opposite side of the body portion 302 to the cavity 305, the secondary cavity 305A being arranged to contain a power source such as a battery cell. An upper gallery 306 connects the cavity 405 and
secondary cavity 305A to allow electrical wires to pass therebetween carrying power from the battery cell to the PCB.

Other relative positions of the cavity 305 and secondary cavity 305A are also useful.

FIG. 6 shows the embodiment of FIG. 5 with the spout 310 removed.

Removal of the spout 310 of the nozzle assembly 300 allows the assembly 300 to be coupled to a tank to be filled, for example using the same BSP thread coupling by which the spout 310 may be attached to the body portion 302. Coupling of the nozzle assembly 300 directly to the tank has the advantage that an operative does not need to hold the nozzle assembly 300 during a filling operation.

In the embodiment shown in FIG. 5 and FIG. 6 the tubular member 332 of the level sensor 330 is formed from a flexible material. As shown in FIG. 7, the tubular member 332 has a flexible braid provided around an outside thereof.

In the embodiment shown the tubular member 332 is arranged to be decoupled from the nozzle assembly 300. Decoupling may be performed for example when it is required to replace or repair the tubular member 332.

In some embodiments it is desirable to perform a filling operation in circumstances where the level sensor 330 is likely to become flooded with liquid and a risk exists that liquid will come into contact with the pressure sensor 363 or other internal volume of the nozzle assembly 300 that is in pressure communication with the pressure sensor 363. In some embodiments it is undesirable for such contact to occur.

Accordingly, in some embodiments the tubular member 332 of the level sensor 330 is arranged to couple to the nozzle assembly 300 by means of a dry break seal. In other words, upon decoupling the tubular member 332 the interior volume of the assembly that is in fluid communication with the tubular member 332 (e.g. the lower gallery 303) is arranged to be provided in fluid isolation from fluid being delivered to a tank.

Such a configuration may be useful for example in the case where delivery of fuel is made to a tank 590 (FIG. 9) via a fill pipe 592 which is arranged in use to be flooded with liquid. In the example of FIG. 9 the fill pipe 592 runs from an inlet 594 which is at or near
near ground level upwards to an opening in the tank on an upper surface of the tank 590.

Provision of the inlet 594 at or near ground level allows an operative to fill the tank without climbing to the top of the tank thereby reducing a level of danger to which the operative is exposed.

It is to be understood that the vertical portion of the fill pipe 592 rising from the inlet 594 may remain filled with fluid following a filling operation.

Before an operative couples the nozzle assembly 300 to the inlet 594 the operative removes the tubular member 332 of the level sensor 330 whereupon the dry break seal seals the coupling to the nozzle assembly 300 such that liquid cannot enter the lower gallery 303.

In embodiments in which other arrangements of the pressure sensor 363 are provided, the dry break seal essential provides a seal to render the pressure sensor 363 no longer in fluid communication with fluid being delivered from the assembly 300.

In some embodiments, an inlet to a fluid storage tank is provided at an upper level of a tank and the inlet is provided with a fill pipe having a bend portion such that fluid flowing into the tank flows down the bend portion. The provision of a level sensor 330 having a flexible tubular member 332 for example in the form of a flexible hose has the advantage that the level sensor can bend with the bend portion if the spout is removed thereby facilitating insertion of the tubular member 332 into the tank.

FIG. 10 shows such an arrangement in which a nozzle assembly 400 with spout removed has been coupled directly to an inlet 492 of a liquid storage tank 490. In this embodiment removal of the spout allows direct coupling of the nozzle assembly 400 to an inlet of the tank 490 using the same BSP screw thread coupling by which a spout may be coupled to the body portion 402 of the nozzle assembly. In some embodiments the assembly 400 is arranged to allow the nozzle assembly 400 to be coupled to the tank inlet 492 with a spout still connected to the body portion 402.

It can be seen that the tubular member 432 of the assembly 400 bends as it enters the storage tank 490 by impingement against a wall of the inlet 492 whereby a free end of
the tubular member 432 is disposed to be directed downwards. It is to be understood
that the tubular member 432 is thereby usefully positioned to sense when a level of fluid
in the tank has sealed the opening in the free end 438 of the tubular member 432.

Other configurations are also useful.

In some embodiments a nozzle assembly is provided without a spout and with no
coupling for a spout.

FIG. 11 shows a filling operation in which a liquid storage tank 190 is being filled with
liquid from a tanker 160. The tanker 160 has a tanker controller 165 arranged to receive
control signals from a portable control module 170 carried by an operative 175. A nozzle
assembly 100 according to an embodiment of the invention is provided at a free end of a
fluid delivery hose 166 coupled to a liquid outlet of the tanker 160. The nozzle 100 is
arranged to transmit an RF signal indicative of a 'tank full' condition to the portable
control module 170 when the 'tank full' condition is detected.

In some embodiments the portable control module 170 is operable by the operative 175
to start and stop a flow of fluid through the nozzle assembly 100 from the tanker 160.

In some embodiments of the invention the portable control module 170 is arranged to
transmit a signal to a tanker controller 165 when the 'tank full' signal is received from the
nozzle assembly 100 thereby instructing the tanker controller 165 to terminate a supply
of fluid to the nozzle assembly 100.

In some embodiments the nozzle assembly 100 is configured to transmit an RF signal
directly to the tanker controller 165 instead of or in addition to the control module 170.

In some embodiments the nozzle assembly 100 is arranged to transmit a presence
signal to the portable control module 170 either continuously or periodically. In some
embodiments the presence signal is only transmitted when a delivery of fluid is in
progress.

In the event that the portable control module 170 fails to detect the presence signal
transmitted by the nozzle assembly 100, the portable control module 170 is arranged to
transmit a fluid flow termination signal to the tanker controller 165 upon receipt of which the supply of fluid to the nozzle assembly 100 is terminated.

In some embodiments of the invention the portable control module 170 is in turn arranged to transmit a presence signal either continuously or periodically. In the event that the tanker controller 165 fails to detect the presence signal transmitted by the portable control module 170, the tanker controller 165 terminates the supply of fluid to the nozzle 100 assembly.

It is to be understood that in some embodiments the nozzle assembly 100 is arranged to transmit a presence signal directly to the tanker controller 165. The signal may be transmitted continuously or periodically in a similar manner to that described above. For example the signal may be transmitted continuously or periodically when a filling operation is in progress as described above.

In some embodiments the assembly 300 is provided with a fluid flow sensor arrangement for sensing when fluid is being dispensed through the assembly. FIG. 12 illustrates such an embodiment.

The sensor arrangement has a hinged flap member 370 that is coupled to an axle 372, the axle being rotatable such that rotation of the flap member 372 causes rotation of the axle 372.

The flap member 370 is operable to rotate between a first position in which the flap member 370 is arranged to project into a stream of fluid being dispensed by the assembly 300 and a second position in which the flap member 370 lies in a feathered condition where the flap member 370 does not project into the stream of fluid (or projects to a lesser extent into the stream of fluid).

A lever member 373 is also coupled to the axle 372 and projects therefrom in a direction normal to the axis of rotation of the axle 372. With the flap member 370 in the first condition the lever member is arranged to actuate a microswitch 374. With the flap member 370 in the second condition the lever member releases the microswitch 374 which is thereby no longer in an actuated condition.
A bias member 376 in the form of a coil spring is arranged to bias the flap member 370 to the first position. The assembly 300 is arranged such that in the event that dispensing of fluid is commenced through the assembly 300, the flap member 370 is caused to rotate against the influence of the bias member 376 whereupon the microswitch 374 becomes no longer actuated. A controller provided with the assembly 300 thereby detects that delivery of fluid has commenced and transmits a signal to the tanker controller 165 (in some embodiments via the portable control module 170 where such a module is provided) indicative of the fact that delivery of fluid is in progress.

In use, when an operative begins dispensing of fluid, the fluid flow sensor is actuated and a signal transmitted to the tanker controller 165 as described above. The tanker controller 165 may be arranged such that if the signal from the fluid flow sensor is not received within a prescribed time limit from commencement of delivery of fluid the tanker terminates supply of fluid to the assembly 300.

In some embodiments, communication between the nozzle assembly and the tanker controller 165 (in some embodiments via the portable control module 170 as discussed above) is such that the nozzle assembly and tanker controller 165 transmit presence signals to and fro repeatedly. If either the nozzle assembly or the tanker controller 165 fail to detect one another within a prescribed period of time dispensing of fluid is terminated. Alternatively or in addition an alert may be triggered.

Other arrangements are also useful.

Throughout the description and claims of this specification, the words "comprise" and "contain" and variations of the words, for example "comprising" and "comprises", means "including but not limited to", and is not intended to (and does not) exclude other moieties, additives, components, integers or steps.

Throughout the description and claims of this specification, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality as well as singularity, unless the context requires otherwise.

Features, integers, characteristics, compounds, chemical moieties or groups described in conjunction with a particular aspect, embodiment or example of the invention are to be
understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith.
CLAIMS:

1. A nozzle assembly operable to deliver fluid to a tank to be filled and to sense a level of fluid in the tank, the assembly having a fluid outlet and a sensor portion, the sensor portion comprising a pressure sensor provided in fluid communication with a sensor conduit, the sensor conduit having a sensor conduit aperture provided therein, the assembly being operable in use whereby when a level of liquid in the tank being filled rises above a level of the sensor conduit aperture, the sensor conduit aperture is closed by the liquid and a pressure of gas trapped in the sensor conduit increases thereby indicating a 'tank full' condition, the assembly being arranged to detect the increase in pressure of gas and to generate a pressure increase signal indicative of the increase in pressure when the increase in pressure is detected.

2. An assembly as claimed in claim 1 wherein the signal indicative of the increase in pressure is provided in the form of an RF pressure signal.

3. An assembly as claimed in claim 1 or claim 2 wherein the sensor conduit is arranged to project from the fluid outlet.

4. An assembly as claimed in any preceding claim wherein the sensor conduit is coupled to an interior portion of the fluid outlet whereby fluid flowing out from the fluid outlet flows over and in contact with an least a portion of the sensor conduit.

5. An assembly as claimed in any preceding claim wherein the sensor conduit is coupled to the fluid outlet such that at least a portion of the sensor conduit is substantially coaxial with the fluid outlet.

6. An assembly as claimed in any preceding claim in combination with a spout removably coupled to the fluid outlet, the spout being arranged to direct fluid flowing through the assembly through an outlet of the spout.

7. An assembly as claimed in any one of claims 1 to 5 wherein the fluid outlet comprises a spout arranged to direct fluid flowing through the assembly through an outlet of the spout.
8. An assembly as claimed in claim 6 or 7 wherein the sensor conduit is provided in juxtaposition with a wall of the spout.

9. An assembly as claimed in claim 8 wherein the sensor conduit is provided on an inner side of the wall of the spout.

10. An assembly as claimed in claim 9 wherein the sensor conduit is substantially coaxial with the spout.

11. An assembly as claimed in claim 8 wherein the sensor conduit is provided on an outer side of the wall of the spout.

12. An assembly as claimed in any one of claims 8 to 11 wherein the sensor conduit is arranged to project along at least a portion of a length of the spout.

13. An assembly as claimed in claim 12 wherein the sensor conduit projects along substantially the whole length of the spout.

14. An assembly as claimed in claim 12 or 13 wherein the sensor conduit projects beyond the outlet of the spout.

15. An assembly as claimed in any preceding claim wherein the sensor conduit comprises a substantially rigid member.

16. An assembly as claimed in any one of claims 1 to 14 wherein the sensor conduit comprises a flexible member.

17. An assembly as claimed in claim 16 wherein the sensor conduit comprises a resiliency flexible member.

18. An assembly as claimed in any preceding claim wherein a portion of the assembly is provided with a cavity therein, the cavity being arranged to house a control module.

19. An assembly as claimed in claim 18 wherein the cavity is provided in fluid communication with an interior of the sensor conduit.
20. An assembly as claimed in claim 19 wherein the pressure sensor is provided in the cavity.

21. An assembly as claimed in claim 20 wherein the pressure sensor is in fluid communication with the interior of the sensor conduit by means of a gas tight hose coupled to the sensor wherein a remainder of the interior of the cavity is in fluid isolation from the interior of the sensor conduit.

22. An assembly as claimed in any one of claims 18 to 21 wherein the cavity is accessible from an outer surface of the assembly.

23. An assembly as claimed in claim 2 or any one of claims 3 to 21 depending through claim 2 comprising an RF transmitter, the assembly being arranged to transmit a presence signal indicating that the RF transmitter of the assembly is functioning correctly.

24. An assembly as claimed in claim 23 arranged to transmit the presence signal at prescribed periodic intervals.

25. An assembly as claimed in claim 23 arranged to transmit the presence signal substantially continuously.

26. An assembly as claimed in any preceding claim further comprising a flow sensor arranged to detect a flow of fluid through the assembly.

27. An assembly as claimed in claim 26 arranged to transmit a fluid flow signal when a flow of fluid through the assembly is detected.

28. An assembly as claimed in any one of claim 27 wherein the fluid flow signal is an RF fluid flow signal.

29. An assembly as claimed in any one of claims 26 to 28 wherein the flow sensor comprises a flap member arranged to pivot between a first condition when fluid is not flowing through the assembly and a second condition when fluid is flowing through the assembly.
30. An assembly as claimed in claim 29 wherein a position of the flap member is
detectable by means of a sensor, optionally a microswitch.

31. Apparatus for supplying liquid from a first storage tank to a second storage tank
comprising an assembly as claimed in any preceding claim.

32. Apparatus as claimed in claim 31 comprising a receiver arranged to receive the
RF signal indicative of the increase in pressure.

33. Apparatus as claimed in claim 32 wherein the receiver is provided in a repeater
module, the repeater module being arranged in turn to transmit an RF signal to a tanker
controller indicative of the increase in pressure.

34. Apparatus as claimed in claim 33 wherein the assembly is arranged to generate a
presence signal and the repeater module is arranged to transmit a signal to the tanker
controller thereby to terminate a supply of liquid to the assembly in the event the
presence signal is not detected by the repeater module.

35. Apparatus as claimed in claim 34 wherein the repeater module is arranged to
transmit a signal to the tanker controller to terminate a supply of liquid to the assembly in
the event the presence signal from the assembly is not detected for a prescribed period
of time.

36. Apparatus as claimed in any one of claims 31 to 35 wherein the repeater module
is arranged to transmit an RF signal indicating a presence of the repeater module, the
tanker controller being arranged to terminate a supply of liquid to the assembly in the
event that the RF signal indicating the presence of the repeater module is not received.

37. Apparatus as claimed in claim 36 wherein the tanker controller is arranged to
terminate a supply of liquid to the assembly in the event that the RF signal indicating the
presence of the repeater module is not received for a prescribed period of time.

38. Apparatus as claimed in any one of claims 33 to 37 wherein the repeater module
is a portable module arranged to be carried by a tanker operative.
39. Apparatus as claimed in claim 42 wherein the repeater module is operable by an operative to commence or terminate a supply of fluid to the assembly.

40. Apparatus as claimed in claim 32 wherein the receiver is provided in a tanker controller.

41. Apparatus as claimed in claim 40 wherein the tanker controller is arranged to terminate a supply of liquid to the assembly when the RF signal indicative of the increase in pressure is received by the tanker controller from the assembly.

42. Apparatus as claimed in any one of claims 40 or 41 wherein the assembly is arranged to generate a presence signal and the tanker controller is arranged to terminate a supply of liquid to the assembly when the presence signal of the assembly is not received by the tanker controller.

43. Apparatus as claimed in claim 42 wherein the tanker controller is arranged to terminate a supply of liquid to the assembly when the presence signal of the assembly is not received by the tanker controller for a prescribed period of time.

44. Apparatus as claimed in any one of claims 32 to 43 wherein the receiver is further arranged to receive a signal indicative of a presence of flow of fluid through the assembly, the tanker controller being arranged to terminate a supply of fluid to the assembly in the event that a signal indicative of a presence of flow of fluid is not received within a prescribed period following commencement of delivery of fluid to the assembly.

45. A nozzle assembly substantially as hereinbefore described with reference to the accompanying drawings.

46. Apparatus substantially as hereinbefore described with reference to the accompanying drawings.