

DISCHARGE CONTROL APPARATUS AND METHOD

Field of Invention

The present invention relates generally to a discharge control apparatus and method.

Background

Storage tanks for the storage of liquids, also known as water tanks, are typically sited at the top of residential or industrial apartment buildings for the storage and supply of water or potable water to residential units within the buildings. Such water tanks may also be sited away from the top of the buildings but at an elevated position from residential units where water is to be supplied to. Water from a network of water pipes supplies water to these water tanks. Additional water tanks may be installed to inter-couple the network of water pipes and the water tanks at each apartment building. Each additional water tank buffers and boosts a water mass for provision of water to the water tanks on top of multiple buildings. For each building, pumps are used to transport the water from the additional water tank to the elevated water tanks, or in some cases, also directly to lower-level units within each building. The additional water tank uses one or more of a pumps and valves to control flow of water from the water pipes thereinto. As water demands within each building fluctuate at different times, using the pressure head established by the elevated water tanks allows for water pressure on-demand. The pumps will only function to keep the water in the water tank including the water in the additional water tank, at a particular level. For example, a level sensor may be used with the water tank to tell the pumps to start pumping when the water level in the water tank falls below a lower limit, or to stop pumping when the water level goes beyond an upper limit. However, there are frequent occasions where the sensors or the circuitry operating the pumps do not work as expected and continues to signal the pumps to supply water to the water tanks even though the upper limit has been reached or exceeded. The water tanks, including the additional water tanks, are therefore constructed with an outlet, or outlet pipe or overflow pipe, to allow excess water in the tank to overflow so that the water tanks do not become damaged by over-pressurisation. However, such outlets create a problem of allowing access to the water to insects, rodents and environmental debris which may contaminate the water in the water tank. To solve this problem, a mesh, or mesh net, is placed over the opening of the outlet. However, there are many occasions where the mesh nets do not allow

the water to be discharged fast enough from the outlet, thereby generating back-pressure which results in damage to the water tanks by over-pressurisation. Therefore, there is an apparent need to provide a closure addressing the foregoing problems.

Summary

In accordance with a first aspect of the invention, there is disclosed a discharge control apparatus comprising a housing, a valve assembly and a biasing mechanism. The housing has a first end and a second end and defines a channel extending between a first opening at the first end and a second opening at the second end for the passage of liquids therethrough. The valve assembly couples to the housing and disposed with the channel for reciprocating between an open position and a closed position. The biasing mechanism couples to at least one of the valve assembly and the housing for resiliently biasing the valve assembly towards the closed position. The first end of the housing is couplable to an outlet of a storage tank for fluid communicating the first opening of the channel with the outlet such that flow of liquids from the outlet to the second opening of the channel is substantially impeded when the valve assembly is in the closed position and the biasing mechanism is adapted such that when pressure of liquids at the outlet is at least at a pre-defined pressure level, the valve assembly displaces from the closed position towards the open position to enable flow of liquids from the outlet and thereby discharge of at least a portion of liquids contained in the storage tank towards and out of the second opening of the housing.

In accordance with a second aspect of the invention, there is disclosed a discharge control method comprising providing a storage tank for containing liquids with an apparatus comprising a housing having a first end and a second end, the housing defining a channel extending between a first opening at the first end and a second opening at the second end for the passage of liquids therethrough, a valve assembly coupled to the housing and disposed with the channel for reciprocating between an open position and a closed position, and a biasing mechanism coupled to at least one of the valve assembly and the housing for resiliently biasing the valve assembly towards the closed position, the first end of the housing is coupled to an outlet of the storage tank for fluid communicating the first opening of the channel with the outlet. The method further comprises providing the storage tank with liquids, flow of liquids from the outlet to the second opening of the channel is substantially

impeded when the valve assembly is in the closed position, and discharging at least a portion of the fluids contained in the storage tank when the fluids in the storage tank exceeds a pre-defined containment capacity, thereby causing the pressure of liquids at the outlet to be at least at a pre-defined pressure level, the biasing mechanism is adapted such that when pressure of liquids at the outlet is at least at the pre-defined pressure level, the valve assembly displaces from the closed position towards the open position to enable flow of liquids from the outlet and thereby discharge of at least a portion of liquids contained in the storage tank towards and out of the second opening of the housing.

In accordance with a third aspect of the invention, there is disclosed liquid storage system comprising a storage tank for containing liquids, the storage tank having an outlet and a pre-defined containment capacity, a housing having a first end and a second end, the housing defining a channel extending between a first opening at the first end and a second opening at the second end for the passage of liquids therethrough, a valve assembly coupled to the housing and disposed with the channel for reciprocating between an open position and a closed position, and a biasing mechanism coupled to at least one of the valve assembly and the housing for resiliently biasing the valve assembly towards the closed position. The first end of the housing is coupled to the outlet of a storage tank for fluid communicating the first opening of the channel with the outlet such that flow of liquids from the outlet to the second opening of the channel is substantially impeded when the valve assembly is in the closed position and the biasing mechanism is adapted such that when pressure of liquids at the outlet is at least at a pre-defined pressure level, the valve assembly displaces from the closed position towards the open position to enable flow of liquids from the outlet and thereby discharge of at least a portion of liquids contained in the storage tank towards and out of the second opening of the housing, pressure of liquids at the outlet is at least at a pre-defined pressure level when the liquid contained in the storage tank exceeds the pre-defined containment capacity.

Brief Description of the Drawings

FIG. 1 shows a partial front sectional view of a discharge control apparatus in accordance with an aspect of the invention with two flaps in a closed position and abutting a seat structure;

FIG. 2 shows a partial plan sectional view of the discharge control apparatus of FIG. 1 in view A-A of FIG. 1;

FIG. 3 shows a partial first end view of the discharge control apparatus of FIG. 1 in view B of FIG. 2;

FIG. 4 shows a partial second end view of the discharge control apparatus of FIG. 1 in view C of FIG. 2;

FIG. 5 shows a partial front sectional view of a discharge control apparatus of FIG. 1 with the two flaps in an open position;

FIG. 6 shows an exemplary illustration of a storage tank wherewith the discharge control apparatus of FIG. 1 may be utilised and with an outlet being formed without a bend;

FIG. 7 shows an exemplary illustration of the storage tank of FIG. 6 with the outlet being formed with a bend;

FIG. 8 shows an exemplary illustration of the storage tank of FIG. 6 with the outlet being formed with a bend and being elongated;

FIG. 9 shows an exemplary illustration of the storage tank of FIG. 6 with the outlet being formed with a bend and being dimensioned for positioning the discharge control apparatus over a sump pit; and

FIG. 10 shows a process flow chart of a discharge control method for use with the discharge control apparatus of FIG. 1.

Detailed Description

Reference will now be made in detail to an exemplary embodiment of the present invention, examples of which are illustrated in the accompanying drawings. While the invention will be described in conjunction with the embodiment, it will be understood that they are not intended to limit the invention to these embodiments. On the contrary, the invention is intended to cover alternatives, modifications and equivalents, which may be included within the spirit and scope of the invention as defined by the appended claims. Furthermore, in the following detailed description of embodiments of the present invention, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be recognized by one of ordinary skill in the art that the present invention may be practiced without these specific details. In other instances, well-known methods, procedures, components, and circuits have not been described in detail as not to unnecessarily obscure aspects of the embodiments of the present invention

An exemplary embodiment of the invention, a discharge control apparatus 20 utilising an exemplary discharge control method 100, is described with reference to FIGS 1 to 10. The discharge control apparatus 20 is preferably utilised with, on or as a part of a storage tank 22 for containing liquids, for example potable water.

The discharge control apparatus 20 comprises a housing 24 having a first end 26a and a second end 26b. The housing 24 defines a channel 28 extending between a first opening 30a at the first end 26a and a second opening 30b at the second end 26b for the passage of liquids therethrough.

The discharge control apparatus 20 further comprises a valve assembly 32 coupled to the housing 24 and disposed with the channel 28 for reciprocating between an open position and a closed position, and a biasing mechanism 34 coupled to at least one of the valve assembly 32 and the housing 24 for resiliently biasing the valve assembly 32, or at least a portion of the valve assembly 32, towards the closed position.

Preferably, the first end 26a of the housing 24 is couplable to an outlet 36 of a storage tank 22 for fluid communicating the first opening 30a of the channel 28 with the outlet 36. The outlet

36 is preferably a conduit, an annular stub or an opening to a liquid containment portion 37a of the storage tank 22 wherethrough the inside of the storage tank 22, consequently being the inside of the liquid containment portion 37a thereof, is accessible. In most implementations, the outlet 36 is preferably sited at an elevated part of the storage tank 22 and has the function of enabling liquids to be discharged from the storage tank 22 when the storage tank 22 is overfilled or internally over-pressurised. The outlet 36 can be and is usually referred to as an overflow outlet or an overflow pipe in most implementations. In addition to the outlet 36, the storage tank 22 further comprises an inlet 37b for receiving liquids into the liquid containment portion 37a, for example from a municipal water pipe network or from an additional storage tank which receives liquids from the municipal water pipe network, and a supply manifold 37c wherefrom liquids from the liquid containment portion 37a is drawn for provision to consumers, for example the drawing of potable water from the storage tank 22 for supply or provisioning to residential units at or around the location where the storage tank 22 is located. In various implementations, the storage tank 22 is elevated from a support surface 37d, for example the surface atop a residential apartment building, by a support structure 37e formed from concrete blocks, metal beams or the like structurally rigid materials.

The additional storage tank, hereinafter also referred to as the storage tank 22 when used in conjunction with the discharge control apparatus 20 and the discharge control method 100, is functionally similar to but has higher liquid or water containment capacity than the storage tanks 22, may be installed to inter-couple the network of water pipe network and the storage tanks 22 at each apartment building. Each additional storage tank boosts the mass of liquids contained therein for facilitating provision of liquids to the storage tanks 22 of multiple buildings. For each building, pumps are used to transport the liquids from the additional storage tank to the elevated storage tanks 22, or in some cases, also directly to lower-level units within each building. The additional storage tank uses one or more of a pumps and valves to control flow of liquids, for example potable water, from the water pipe network thereinto. For clarity, any reference to and description on the storage tank 22 also applies to the additional storage tank.

Flow of liquids from the outlet 36 to the second opening 30b of the channel 28 is substantially impeded when the valve assembly 32 is in the closed position. Further, access through the outlet 36 to reach the inside of the storage tank 22 is also substantially impeded when the valve assembly 32 is in the closed position. In an exemplary scenario, access by insects into the storage tank 22 through the outlet 36 is substantially impeded by the valve assembly 32 when in the closed position.

Further, the biasing mechanism 34 is adapted such that when pressure of liquids at the outlet 36 is at least at a pre-defined pressure level, the valve assembly 32 displaces from the closed position towards the open position to enable flow of liquids from the outlet 36 and thereby discharge of at least a portion of liquids contained in the storage tank 22 towards and out of the second opening 30b of the housing 24.

The valve assembly 32 comprises at least one flap 38 positionable between an open position and a closed position corresponding respectively to the open position and the closed position of the valve assembly 32. Specifically, the at least one flap 38 comprises two flaps 38 forming a double-flap check valve. The two flaps 38 may be inter-coupled in a manner by mechanisms, gearing or linkages to enable displacement of one of the two flaps 38 to also displace the other of the two flaps 38, in tandem. Alternatively, each of the two flaps 38 is independently displaceable from the other of the two flaps and having a planar semi-circular shape.

The biasing mechanism 34 is at least one of a spring and an elastic band or a combination thereof. When a spring, or more than one spring, is used for forming the biasing mechanism, the spring is preferably a torsion spring. An exemplary specification of a torsion spring used has an outer diameter (OD) of 10.95mm, a wire diameter (WD) of 1.3mm and a body length of 16.6mm with leg length being 40mm. It is also preferred that the torsion spring is made of stainless steel.

The valve assembly 32 further comprises a seat structure 40 formed within the channel 28 of the housing 24 wherewith the at least one flap 38 abuts when in the closed position. The seat structure 40 defines at least one aperture 42 for the flow of liquid therethrough when the at

least one flap 38 is displaced towards the open position and is shaped and dimensioned to enable the at least one flap 38 to extend over the at least one aperture 42 to impede flow of fluids therethrough when the at least one flap 38 is in the closed position. It is preferred that the number of aperture 42 correspond with the number of flaps 38. When two flaps are implemented, the seat structure 40 will be formed to define two apertures 42. The shape of each aperture 42 preferably shape-matches the corresponding flap 38. It is preferred that each of the flap has a planar semi-circular shape which in turn requires each of the aperture 42 to also have a semi-circular shape. However, the flap 38 will be dimensioned to be larger than the aperture 42 so that the flap 38 can be positioned to seat over the corresponding aperture 42, when in the closed position, to substantially impeded the flow of liquids therethrough.

The discharge control apparatus 20 further comprises a bolt structure 44 for anchoring the at least one flap 38 to the housing 24 and whereabouts the at least one flap 38 rotatably displaces between the open position and the closed position. With two apertures 42 defined, the seat structure 40 will have a brace portion 46 that separates the two apertures 42. The brace portion 45 is longitudinal and is preferably substantially aligned with the bolt structure 44. This enables the brace portion 46 to act as a support for the bolt structure 44 in some implementations. Additionally or alternatively, the brace portion 46 will form a shield to reduce the force of the liquids acting on the bolt structure 44 during flow of the fluids through the apertures 42, thereby increasing its longevity.

The bolt structure 44 is elongated and having two free ends 48 forming extremities thereof. The two free ends 48 of the bolt structure 44 extends either into two blind holes formed on the inside of the housing 24 for affixing the bolt structure 44 to the housing 24 or out of two through holes formed in the housing 24 at two substantially diametrically opposite points of the housing 24. When utilising the two through holes in the housing 24, the bolt structures 44 are preferably threaded at the two free ends 48 thereof so that nuts can be used to secure and locate the bolt structure 44 at a fixed position on the housing 24.

When a torsion spring is used as the biasing mechanism 34, the torsion spring may be held by or secured to the housing 24 by having the torsion spring's body 50 loop around the bolt

structure 44. In this configuration, the torsion spring is held adjacent to the two flaps 38 of the valve assembly 32. As a typical torsion spring has two legs 52, this enables the two legs of the torsion spring to abut against the two flaps 38, one of the legs 52 for each of the flaps 38. Further in this configuration, each of the two flaps 38 can be independently displaced from one another by using just one single torsion spring for resiliently biasing both of the flaps 38 to the closed position and specifically to abut against the seat structure 40. For clarity, this does not exclude the implementation of multiple torsion springs being looped around for being held in place by the bolt structure 44 for resilient biasing of the two flaps 38 towards the closed position.

Further, it is preferred that each of the at two flaps 38 has a pair of projections 54 extending from and substantially perpendicular the plane of the corresponding flap 38. Each of the pair of projections defines a hole being aligned to enable the bolt structure 44 to extend therethrough for movably coupling the two flaps 38 to the enable rotational displacement substantially about the longitudinal axis of the bolt structure 44. In an implementation of the valve assembly 32, the two flaps 38 are disposed inside the channel 28 of the housing 24.

The discharge control apparatus 20 further comprises a coupling means, for example a pipe clamp, for coupling the first end 26a of the housing 24 to the outlet 36 of the storage tank 22. Additionally or alternatively, the first end 26a of the housing 24 is coupled to the outlet 36 of the storage tank 22 by cement adhesive.

The housing 24 is preferably elongated and formed with a substantially right-angle bend. The housing 24 can also function without the right-angle bend or with a slight bend that is directed downwards when coupled with the outlet 36 of the storage tank 22. At least one of the housing 24 and the valve assembly 32 being formed from polyvinylchloride (PVC). For clarity, the housing 24 and the valve assembly 32 may be formed from other materials and may be formed from different materials. The housing 24 is substantially cylindrically shaped and having an internal diameter within the range of 110mm to 230mm and a thickness of between 5mm to 6.5mm.

The outlet 36 may be shaped as a short stub as shown in FIG. 6, or has a right-angle bend as shown in FIG. 7. With the outlet 36 having a right-angle bend, it is preferred that the housing 24 be shaped substantially straight without any bends. Further, the right-angle bend may be achieved by use of an interconnector to intercouple and fluid communicate a straight-piped outlet 36 to the housing 24. The outlet 36 may further be elongated, in addition to having a right-angle bend, as shown in FIG. 8 which allows the discharge control apparatus 20 to be positioned adjacent the support surface 37d which reduces splatter of liquids being discharged therefrom on the support surface. The outlet 36, or the interconnector interconnecting the outlet 36 to the housing 24 when in use, may be further dimensioned to position the discharge control apparatus 20 just above and over a sump pit 56 so that liquids discharged from the discharge control apparatus 20 may be directed into the sump pit 56 as shown in FIG. 9.

When in use, the housing 24 may be provided in a variety of sizes to fit various sizes of the outlet 36 of the storage tank 22. Preferably, the housing 24 may be provided in a 4-inch sizing with an outer diameter of 124mm and a housing thickness of 5mm, a 6-inch sizing with an outer diameter of 178mm and a housing thickness of 6.5mm and a 8-inch sizing with an outer diameter of 229mm and a housing thickness of 6.5mm.

When in use, the discharge control method 100 comprises a step 110 of providing the storage tank 22 for containing liquids with the discharge control apparatus 20, and a step 112 of providing the storage tank 22 with liquids. In the step 110, the storage tank 22 is provided with the discharge control apparatus 20 by installing or coupling the discharge control apparatus 20 to the storage tank 22. This is done by securing the first end 26a of the housing 24 to the outlet 36 of the storage tank 22 with the first opening 30a of the channel 28 being aligned with the outlet 36 for enabling fluid communication therewith by use of cement adhesive, a pipe clamp or the like coupling means. Should there be a pre-installed contraption or attachment to the outlet 36, for example a screen attachment, this should preferably be removed before installation of the discharge control apparatus 20 to the outlet.

Flow of liquids contained in the storage tank 22 from the outlet 36 to the second opening 30b of the channel 28 is substantially impeded when the valve assembly 32 is in the closed

position. The discharge control method 100 further comprises a step 114 of discharging at least a portion of the fluids contained in the storage tank 22 when the fluids in the storage tank 22 exceeds a pre-defined containment capacity, thereby causing the pressure of liquids at the outlet 36 to be at least at a pre-defined pressure level. The biasing mechanism 34 is adapted such that when pressure of liquids at the outlet 36 is at least at the pre-defined pressure level, the valve assembly 32 displaces from the closed position towards the open position to enable flow of liquids from the outlet 36 and thereby discharge of at least a portion of liquids contained in the storage tank 22 towards and out of the second opening 30b of the housing 24.

In a forgoing manner, a discharge control apparatus is described according to an exemplary embodiment of the invention. Although only one embodiment of the invention is disclosed in this document, it will be apparent to one skilled in the art in view of this disclosure that numerous changes and/or modifications can be made to the disclosed embodiment without departing from the scope and spirit of the invention.

Claims

1. A discharge control apparatus comprising:
 - a housing having a first end and a second end, the housing defining a channel extending between a first opening at the first end and a second opening at the second end for the passage of liquids therethrough;
 - a valve assembly coupled to the housing and disposed with the channel for reciprocating between an open position and a closed position; and
 - a biasing mechanism coupled to at least one of the valve assembly and the housing for resiliently biasing the valve assembly towards the closed position,wherein the first end of the housing is couplable to an outlet of a storage tank for fluid communicating the first opening of the channel with the outlet such that flow of liquids from the outlet to the second opening of the channel is substantially impeded when the valve assembly is in the closed position and the biasing mechanism is adapted such that when pressure of liquids at the outlet is at least at a pre-defined pressure level, the valve assembly displaces from the closed position towards the open position to enable flow of liquids from the outlet and thereby discharge of at least a portion of liquids contained in the storage tank towards and out of the second opening of the housing.
2. The discharge control apparatus as in claim 1, the valve assembly comprising at least one flap positionable between an open position and a closed position corresponding respectively to the open position and the closed position of the valve assembly.
3. The discharge control apparatus as in claim 2, the at least one flap comprising two flaps forming a double-flap check valve.
4. The discharge control apparatus as in claim 3, each of the two flaps being independently displaceable from the other of the two flaps and having a planar semi-circular shape.
5. The discharge control apparatus as in claim 3, the biasing mechanism being at least one of a spring and an elastic band.

6. The discharge control apparatus as in claim 2, the valve assembly further comprising a seat structure formed within the channel of the housing wherewith the at least one flap abuts when in the closed position.
7. The discharge control apparatus as in claim 6, the seat structure defining at least one aperture for the flow of liquid therethrough when the at least one flap is displaced towards the open position and being shaped and dimensioned to enable the at least one flap to extend over the at least one aperture to impede flow of fluids therethrough when the at least one flap is in the closed position.
8. The discharge control apparatus as in claim 1, further comprising:
 - a bolt structure for anchoring the at least one flap to the housing and whereabout the at least one flap rotatably displaces between the open position and the closed position.
9. The discharge control apparatus as in claim 1, further comprising:
 - a coupling means for coupling the first end of the housing to the outlet of the storage tank.
10. The discharge control apparatus as in claim 1, the housing being elongated and formed with a substantially right-angle bend.
11. The discharge control apparatus as in claim 1, at least one of the housing and the valve assembly being formed from polyvinylchloride (PVC).
12. The discharge control apparatus as in claim 1, the housing being substantially cylindrically shaped and having an internal diameter within the range of 110mm to 230mm and a thickness of between 5mm to 6.5mm.

13. A discharge control method comprising:
 - providing a storage tank for containing liquids with an apparatus comprising:
 - a housing having a first end and a second end, the housing defining a channel extending between a first opening at the first end and a second opening at the second end for the passage of liquids therethrough;
 - a valve assembly coupled to the housing and disposed with the channel for reciprocating between an open position and a closed position; and
 - a biasing mechanism coupled to at least one of the valve assembly and the housing for resiliently biasing the valve assembly towards the closed position, the first end of the housing is coupled to an outlet of the storage tank for fluid communicating the first opening of the channel with the outlet;
 - providing the storage tank with liquids, flow of liquids from the outlet to the second opening of the channel is substantially impeded when the valve assembly is in the closed position; and
 - discharging at least a portion of the fluids contained in the storage tank when the fluids in the storage tank exceeds a pre-defined containment capacity, thereby causing the pressure of liquids at the outlet to be at least at a pre-defined pressure level, the biasing mechanism is adapted such that when pressure of liquids at the outlet is at least at the pre-defined pressure level, the valve assembly displaces from the closed position towards the open position to enable flow of liquids from the outlet and thereby discharge of at least a portion of liquids contained in the storage tank towards and out of the second opening of the housing.
14. The discharge control method as in claim 13, the valve assembly comprising at least one flap positionable between an open position and a closed position corresponding respectively to the open position and the closed position of the valve assembly.
15. The discharge control method as in claim 14, the at least one flap comprising two flaps forming a double-flap check valve, each of the two flaps being independently displaceable from the other of the two flaps and having a planar semi-circular shape, and the biasing mechanism being at least one of a spring and an elastic band.

16. The discharge control method as in claim 14, the valve assembly further comprising a seat structure formed within the channel of the housing wherewith the at least one flap abuts when in the closed position, the seat structure defining at least one aperture for the flow of liquid therethrough when the at least one flap is displaced towards the open position and being shaped and dimensioned to enable the at least one flap to extend over the at least one aperture to impede flow of fluids therethrough when the at least one flap is in the closed position.
17. The discharge control method as in claim 13, further comprising:
 - a bolt structure for anchoring the at least one flap to the housing and whereabout the at least one flap rotatably displaces between the open position and the closed position.
18. The discharge control method as in claim 13, further comprising:
 - a coupling means for coupling the first end of the housing to the outlet of the storage tank, wherein the housing is elongated and formed with a substantially right-angle bend.
19. The discharge control method as in claim 13, at least one of the housing and the valve assembly being formed from polyvinylchloride (PVC), and the housing being substantially cylindrically shaped and having an internal diameter within the range of 110mm to 230mm and a thickness of between 5mm to 6.5mm.

20. A liquid storage system comprising:

a storage tank for containing liquids, the storage tank having an outlet and a pre-defined containment capacity;

a housing having a first end and a second end, the housing defining a channel extending between a first opening at the first end and a second opening at the second end for the passage of liquids therethrough;

a valve assembly coupled to the housing and disposed with the channel for reciprocating between an open position and a closed position; and

a biasing mechanism coupled to at least one of the valve assembly and the housing for resiliently biasing the valve assembly towards the closed position,

wherein the first end of the housing is coupled to the outlet of a storage tank for fluid communicating the first opening of the channel with the outlet such that flow of liquids from the outlet to the second opening of the channel is substantially impeded when the valve assembly is in the closed position and the biasing mechanism is adapted such that when pressure of liquids at the outlet is at least at a pre-defined pressure level, the valve assembly displaces from the closed position towards the open position to enable flow of liquids from the outlet and thereby discharge of at least a portion of liquids contained in the storage tank towards and out of the second opening of the housing, pressure of liquids at the outlet is at least at a pre-defined pressure level when the liquid contained in the storage tank exceeds the pre-defined containment capacity.