Sept. 14, 1937. J. LITHGOW 2,092,926

LIQUID CONTAINER AND MEANS FOR LOADING AND UNLOADING THE SAME

Filed Aug. 30, 1933

Fig. 1.

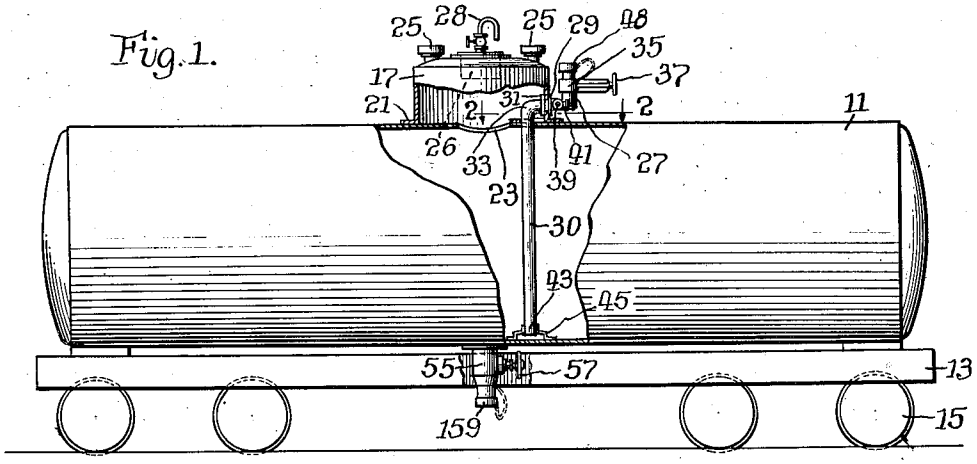


Fig. 2.

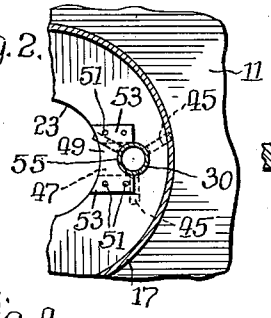


Fig. 3.

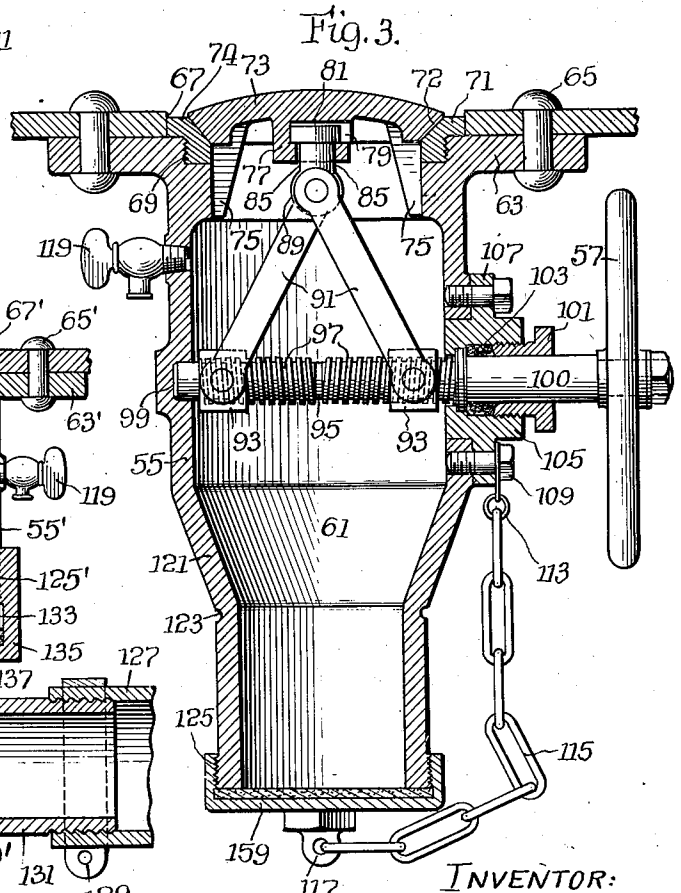
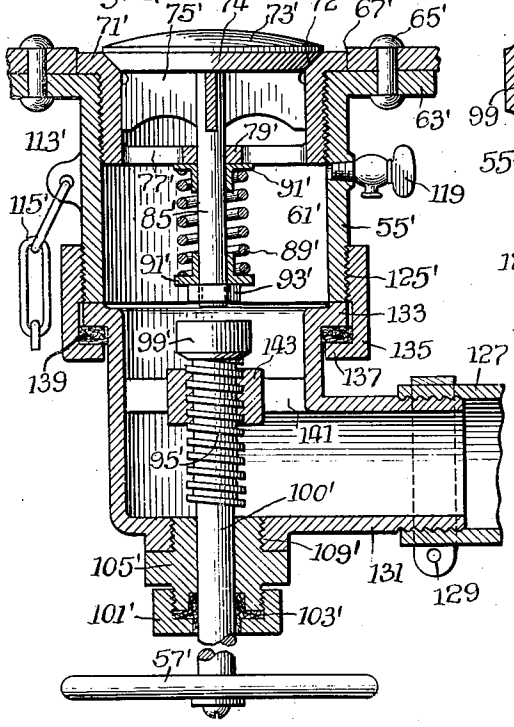


Fig. 4.



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LIQUID CONTAINER AND MEANS FOR LOADING AND UNLOADING THE SAME

James Lithgow, Chicago, Ill., assignor to North American Car Corporation, Chicago, Ill., a corporation of Illinois

Application August 30, 1933, Serial No. 687,418

6 Claims. (Cl. 137—21)

My invention relates in general to containers and has more particular reference to containers for the storage or transportation of liquids, the invention relating more especially to improved means for loading and unloading the container.

An important object of the invention is to provide a railway tank car for transporting sterile liquids having an inlet especially adapted to minimize frothing and foaming in an effervescent liquid as it is introduced into the tank car.

Another important object of the invention is to provide means for and method of introducing liquids which foam readily when agitated, into a container substantially without initiating foaming in the liquid.

Another important object of the invention resides in providing a railway tank car in which prefermented mashes, sterilized wort, beer and other materials of like character may be loaded substantially without foaming and transported, and from which the materials may be discharged while at all times maintained in sterilized condition.

Another important object resides in the provision of a novel outlet through which the contents of the container may be drained, said outlet being of simple, neat construction, readily cleaned, and having means permitting ready sterilization of the same, providing no pockets for the accumulation of unsanitary foreign matter, or sediment, of neat, compact construction, easy to manufacture, inexpensive, and easily attached or detached from operating position.

Another important object of the invention is to provide an outlet valve for a container of the character described having a manually operable device for opening the valve rapidly, and for closing the valve with a wedging action, whereby to firmly and snugly seal the outlet opening.

Another important object is to provide a valve of the character described, for use on tank cars wherein the operation of the valve is controlled by means extending entirely outside of the container sealed by the valve, thus eliminating unsanitary mechanism within the container.

Another important object is to provide a valve of the character described, which is at all times biased strongly toward closed position.

Another important object is to provide an outlet valve for a container, the valve being normally spring-pressed firmly to closed position, and in providing means mountable on the valve only when it is desired to open the valve.

Another important object is to provide a normally closed valve for a container of the character described, and valve-opening means adapted for association with the valve only at the place and time when the valve is to be opened.

Another important object is to provide a drain fitting for a container of the character described, said fitting embodying a valve normally spring-loaded to close, and a hose adapted for connection with said valve when it is desired to drain the container, said hose having a fitting capable of manual operation to open the valve only when the hose is connected thereto.

Another important object is to provide a drain fitting of the character described having valve mechanism, and having a nozzle adapted to be fractured in the event that the fitting encounters an obstruction whereby the fitting will break without damage to the valve mechanism.

These and other numerous important objects and advantages of the invention will be apparent from the following description, which, taken in connection with the accompanying drawing, discloses a preferred embodiment of my invention.

Referring to the drawing:

Figure 1 is a side elevation of a railroad tank car embodying my present invention;

Figure 2 is a sectional view taken substantially along the line 2—2 of Figure 1;

Figure 3 is a sectional view taken through a drain valve forming a part of the device illustrated in Figure 1, in order to illustrate the details of said valve; and

Figure 4 is a sectional view taken through a drain valve of modified form.

To illustrate my invention, I have shown on the drawing a railway tank car having, a preferably cylindrical tank 11 adapted to provide a receiver or reservoir for the storage of liquid materials in sterile condition, the tank being provided with devices adapted for ready sterilization and maintenance in sterile condition, and to facilitate the introduction and discharge of fluids, particularly fluids which foam readily when agitated, into and from the tank, and to maintain the liquid at all times during introduction into and removal from the tank, in sterile condition.

The tank 11 is preferably mounted firmly and securely upon a carriage 13 having wheels 15 to permit the tank to be transported readily from place to place.

In the illustrated embodiment, the axis of the cylindrical tank is arranged in the direction of the movement of the carriage in transit, and the carriage and tank are of the type utilized in railroad transportation. The invention is particularly adapted for use with railroad tank cars.

The tank 11 may be formed of any suitable sheet material, although I prefer to fabricate it by riveting pre-formed sheet metal plates together. The interior of the tank may be treated or coated with any suitable or preferred material in order to protect the tank from corrosion or other deterioration. The seams of the tank also should be carefully sealed in a substantially hermetic manner in order to eliminate vacuum leaks. The tank is also provided with a loading and sealing dome 17, preferably mounted on top of the tank. The dome comprises a casing having preferably cylindrical walls, the lower ends of which are provided with outstanding flanges 21 which are, or may be riveted or otherwise secured to the walls of the tank outwardly of an opening 23 formed in the tank walls. The seam between the flange portions 21 and the walls of the tank is also hermetically sealed to prevent leaks. The dome also has a sealed cover and may be provided with one or more vacuum relief devices 25 which are preferably of the form and construction disclosed in my copending application, Serial Number 673,371 filed May 29, 1933. The dome also preferably carries a sterilized air inlet device 26 having a valve-controlled air inlet 28, which are preferably formed as taught in my copending application aforesaid.

The dome also carries a loading valve fitting 27, sealingly secured to its wall by means of the flange 29. The fitting 27 comprises preferably an elbow fitting having a channel registering with an opening 31 formed in the dome wall and the fitting is provided with a valve 35 preferably of the gate type, and manually operable by means of the hand wheel 37 by means of which the channel of the fitting may be opened or closed.

On the side of the valve 35 nearest the dome, the fitting 27 is provided with a petcock valve 39 controlled by a handle 41 whereby to permit steam to be introduced into the channel of the valve fitting when the valve 35 is closed. Outwardly of the valve 35, the channel of the fitting is formed to receive a hose or other conduit through which the material to be introduced into the tank may be delivered to the inlet valve fitting 27. A cover cap 43 is provided for closing the inlet end of the fitting 27 when the vehicle is in transit.

All of the foregoing is disclosed as claimed in my prior application aforesaid. The present application relates to an improved construction for railway tank cars wherein means is provided for loading the tank with sterile liquid which is delivered into the tank at the bottom thereof through a pipe connection from the loading fitting inlet in the dome of the car and wherein such fitting is provided with a steam connection not only for sterilizing the fitting and pipe but also to introduce the steam for sterilizing the tank, at the bottom of the tank so as to cause it quickly to reach all portions of the tank and fall outwardly through an opening in the dome. In addition by providing the sterile liquid discharge outlet for the tank at the central bottom portion of the tank closely adjacent to the discharge end of this loading inlet pipe, the sterilizing steam also serves quickly and efficiently to sterilize the upper face of the discharge valve controlling the tank outlet and when the valve is thus opened to sterilize likewise the discharge outlet and the valve operating members. Thus this means of sterilizing the discharge valve of the tank most effectively cooperates with an additional steam pipe disposed directly in the discharge pipe controlled by this valve for sterilizing by steam the outlet connections prior to discharging the sterile contents of the tank.

Within the tank, an anti-foaming inlet pipe is mounted, the upper end of this pipe is provided with a flange 31, which is secured to the inner wall of the dome in order to register the channel of the pipe and connect the same with the inlet fitting, the pipe 30 extends downwardly through the wall of the tank 11 adjacent the opening 23, the tank wall being slotted as at 47 in Figure 2 to permit the pipe to be easily assembled in the position shown in Figure 1. The pipe 30 is held in place by means of a plate 49 which is mounted across the slot 47 after the pipe has been mounted in place, the plate 49 being fastened to the wall of the tank preferably by spot welds 51 and spot welding 53 is also preferably made between the edges of the plate 49 and the tank car wall, between the edges of the slot 47 and the plate 49, between the circularly cut edge of the plate 49 and the adjacent sides of the pipe, and between the bottom of the slot 47 and the adjacent side wall of the pipe in order to eliminate any grooves or pockets existing at such points, and in which sediment might collect.

The lower end of the pipe 30 is terminated just short of the bottom of the tank 11, and is held in place by means of the brackets 45 which are secured to the end of the pipe and to the bottom of the tank car preferably by welding.

Fluid may be delivered into the tank through the liquid loading connection formed by the valve fitting 27, and the pipe 30, but more especially the devices are adapted to load liquids which foam readily when agitated, and will permit the entire tank to be filled with effervescent liquids of this character without initiating appreciable foaming or producing appreciable frothing. Consequently, the tank 11 can be filled rapidly and completely with liquids which, if otherwise loaded, would froth abundantly and render the loading operation extremely slow if not commercially impractical.

An outlet connection 55 is provided preferably at the lowest point of the tank in order to permit the contents to be removed by gravity. This outlet comprises a preferably cylindrical shell having a channel 61 opening at opposite ends of the shell, and the shell is provided, at one end, with flanged means 63 whereby said end may be sealingly attached to the walls of the tank opposite an opening 67 therein, as by means of the rivets 65 or other suitable fastening devices. The upper end of the shell inwardly of the edges of the opening 67 is formed to provide a socket 69 into which a valve seat element 71 having inclined valve seating surfaces 72 may be threadingly secured. Preferably, though not necessarily, a valve member 73 having inclined peripheral edges 74 is arranged in position to seat upon the surfaces 72 of the valve seat. The valve member 73 has downwardly extending guiding fingers 75 projecting from its underside in position to engage the inner walls of the channel 61 which are formed to provide guiding surfaces for said fingers. In this manner, wobbling or tilting of the valve member 73 in approaching or leaving the valve seat is prevented. The valve member 73 also has an embossment 77 on its underside, said embossment providing a channel 79 adapted to receive the enlarged head 81 of a removable valve stem 85, the neck of which is adapted to extend through a restricted opening formed between the slot 79 and the lower surface of the embossment 77.

The valve stem 85 is formed with a perforated lug or ear 89 to which is pivotally connected the upper ends of valve-operating arms 91, the lower ends of which are provided with internally threaded nuts 93, the threads of one nut being of opposite hand to those of the other. The nuts 93, threadingly receive threaded portions 97 of an operating shaft 95, said threads 97 being of opposite hand to correspond with the threads on the nuts 93. The shaft 95 is journaled at one end in a socket 99 formed in the shell 55, the other end 100 of the shaft 95 extends outwardly through a packing means carried on the wall of the shell, and the manually operable hand wheel 57 is mounted upon the outwardly projecting end of the shaft. The packing means comprises packing material 103 carried in a suitable socket formed in a yoke 105 and held in place therein by means of the gland 101. The yoke 105 is fastened to the wall of the shell 55 at a suitable opening therein by means of the fastening members 109, which, in the illustrated embodiment, are shown as bolts. One of the bolts 109 carries a terminal 113 to which is attached one end of a chain 115, the other end of which is anchored to a cover cap 159 whereby the lower or open end of the channel 61 may be sealed, as when the outlet fitting is not in use, said cover cap having an eyelet 117 formed thereon to which the chain 115 may be attached. The lower end of the shell 55 is preferably provided with threaded means 125 whereby the cover cap may be secured thereto. The threaded means 125 also provides for the attachment of a hose, so that the fluid passing through the outlet fitting may be distributed through the hose to any desired delivery location remote from the outlet fitting.

The channel 61 downwardly of the valve and valve-operating mechanism is restricted, as at 121, and is grooved as at 123, in order that if the fitting encounters an obstruction or is otherwise struck accidentally, the shell will break at the groove 123 without damaging the valve-operating mechanism.

By turning the hand wheel 57 in one direction, the nuts 93 will be drawn together upon the threaded portions of the shaft and the valve stem 85 will be raised, thus pushing the valve member 73 from its seat, the valve member being guided at all times during its operative movement by means of the fingers 75. Rotation of the hand wheel 57 in the reverse direction will cause the nuts 93 on the threaded portions of the shaft to separate, and will draw the valve member downwardly and wedgingly upon the seat surfaces 74. It is preferable to arrange the threads at a pitch sufficiently steep to normally lock the valve in closed position; by forming the threads 97 at a steep pitch angle the valve may be opened and closed rapidly.

In Figure 4 of the drawing I have illustrated a modified form of outlet valve comprising a shell 55' having a channel 61', and flanges 63' at one end of the shell whereby the same may be secured, as by means of the rivets or other suitable fastening means 65' on the wall of the tank opposite the opening 67'. The upper ends of the channel 61' are internally threaded to receive the valve seat 71' having slanting surfaces 72' providing a valve seat. A valve 73' having inclined seating surfaces 74' is arranged in position to seat upon the inclined surfaces of the members 71'. The valve member 73' has a downwardly projecting valve stem 85' and web-like flanges 75', the outer edges of which are formed to slidingly engage the inner walls of the member 71' in order to guide the valve in its opening and closing movement. Below the flanges 75' the valve seat 71' is provided with inwardly extending arms 77' carrying a bushing 79' in which the valve stem 85' is slidingly supported. The valve stem 85' extends downwardly of the bushing 79' and carries a helical spring 89' which seats at its opposite ends upon the collars 91', one of which bears against the bushing 79' and the other of which bears against a holding nut 93', which is threaded or otherwise secured upon the lower end of the valve stem 85'. The function of the spring 89' is to bias or load the valve stem so that the valve member 73' is normally urged into seating engagement with the valve seat 72'. The valve is thus continually urged towards closed position, and, under ordinary circumstances, will seal the outlet. The shell 55' is also preferably provided with an external, perforated lug 113', to which one end of an anchor chain 115' is or may be fastened. The other end of the anchor chain is provided with a closure cap similar to the cap 159 shown in Figure 3 of the drawing, and by means of which the lower open end of the shell 55' may be closed against the ingress of foreign matter when the valve is not discharging.

When it is desired to discharge fluid through the valve, the cap is removed, and a suitable hose 127 is connected to the shell 55'. The hose is secured to an elbow fitting 131 by means of the hose clamp 129. The fitting has an opening defined by the rim 133, adapted to register with the lower end of the channel 61' after the cover cap has been removed, the fitting having a fastening sleeve 135 adapted to threadingly engage the threaded portion 125' at the lower end of the shell 55', a suitable sealing gasket 139 being provided between a flange portion 137 of the fastening sleeve 135 and the rim 133, of the elbow fitting. The fitting 131 has inwardly extending arms 141 forming a spider carrying a nut 143 in alignment with the end of the valve stem 85' when the fitting has been secured to the shell 55', as shown in Figure 4. The nut 143 receives the threaded portion 95' of a valve-actuating plunger, the upper end of which is provided with a stem-actuating head 99'. The lower end 100' of the valve-actuating plunger extends outwardly through a packing means, and the manually operable hand wheel 57' is mounted upon the outwardly projecting end of the shaft. The packing means comprises packing material 103' carried in a suitable socket formed in a yoke 105' and held in place therein by means of the gland 101'. The yoke 105' is threaded at 109' into an opening formed in the walls of the fitting 131.

By turning the hand wheel 57' in one direction the shaft 95' will be caused to move upwardly in the nut 143, and the head 99' will engage the lower end of the valve stem 85' and raise the valve from its seat against the bias of the spring 89'. By turning the hand wheel in a reverse direction, the valve will be permitted to return to closed position under the influence of the spring 89'. Obviously, the valve cannot be opened as long as the fitting 131 is disconnected from the shell 55', that is to say, the valve will normally remain closed until the fitting 131 is connected and the hand wheel 57' manipulated to open the valve.

Both of the valves shown in Figures 3 and 4 are provided with petcocks 119—119' whereby the valve mechanism, the channel 61, and the hose 127 may be sterilized before the valve is

opened to drain the fluid from the container. Sterilization may be accomplished as taught in my copending application heretofore mentioned.

It is thought that the invention and numerous of its attendant advantages will be understood from the foregoing description and it is obvious that numerous changes may be made in the form, construction, and arrangement of the several parts without departing from the spirit or scope of my invention or sacrificing any of its attendant advantages, the forms herein described being preferred embodiments for the purpose of illustrating my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a tank car, a tank having a dome centrally of the top and rising above the normal liquid level of the tank to provide an expansion chamber thereabove, an inlet valve fitting mounted exteriorly of said dome, the inlet side of said inlet valve fitting comprising means for attachment to a loading conduit, a pipe communicating with the other side of said valve and extending through the dome and downwardly into the tank to a point adjacent the bottom and discharging relatively closely to the central bottom wall of the tank, a valved steam connection in said pipe between the dome and said inlet valve whereby to sterilize the pipe and the valve fitting and discharge sterilizing steam directly at said discharge point, an outlet valve associated with the bottom wall of said tank, said outlet valve being arranged substantially closely adjacent said discharge point whereby the sterilizing steam will be directed on the outlet valve surfaces interiorly of the tank, the outlet valve operating mechanism being located exteriorly thereof and means for introducing sterilizing steam to the outlet valve operating mechanism and outlet.

2. In a tank car, a tank, an expansion chamber thereabove, an inlet valve fitting located exteriorly of said expansion chamber, the inlet side of said valve fitting comprising means for attachment to a loading conduit, a pipe communicating with the other side of said valve extending through said expansion chamber and downwardly within the tank and discharging relatively closely to the central bottom wall of the tank, a valved connection for the introduction of a sterilizing agent in said pipe adjacent said other side of the inlet valve whereby to introduce a sterilizing agent directly to the pipe and the valve fitting and to discharge sterilizing agent through the pipe at said discharge point, an outlet opening and valve associated with the bottom wall of said tank, said outlet opening and valve being located substantially closely adjacent the said discharge point whereby to direct the sterilizing agent in the vicinity of the valve surfaces interiorly of the tank.

3. In a tank car having a dome centrally of the top and rising above normal liquid level to provide an expansion chamber, an inlet valve fitting mounted exteriorly of said dome, a pipe extending from said inlet valve fitting into the dome and downwardly to a discharging point adjacent the central bottom wall of the tank, said inlet valve fitting comprising means for attachment to a loading conduit, a valved steam connection in said pipe between said dome and said valve fitting for discharging sterilizing steam interiorly thereof for sterilizing said pipe and the interior portions of the valve and for discharging sterilizing agent at the lower end of said pipe, the fitting serving also to permit sterilization of the inlet valve interior and the conduit connections when the valve is opened slightly.

4. In a tank car for the transportation of fluids in sterile condition, a tank, a valved inlet through the top portion of the tank, means on one side of said valve inlet for connection with a delivery conduit, a pipe connecting with said inlet and extending interiorly of said tank to a point adjacent the bottom thereof, a valved connection for introducing sterilizing agent into said pipe adjacent the said inlet valve whereby to sterilize the pipe and the valve and to discharge sterilizing agent through the lower end of said pipe, the downwardly extending portion of said pipe being relatively straight to avoid pockets whereby to prevent contamination.

5. In a tank car for the transportation of fluids in sterile condition, a tank having an expansion zone adjacent the upper portion thereof, a valved inlet through the wall of said expansion zone, the intake side of said valve inlet comprising means for attachment to a loading conduit, a pipe connecting with the other side of said valve inlet and discharging interiorly of the container to a point adjacent the bottom thereof, valved means for introducing a sterilizing agent into said pipe, said valved means being located in said pipe on the outlet side of said inlet valve whereby to directly sterilize the pipe and the valve inlet and introduce sterilizing agent through the discharge end of the pipe.

6. In a tank car, a tank, an expansion chamber thereabove, an inlet valve fitting extending into said expansion chamber, the inlet side of said valve fitting comprising means for attachment to a loading conduit, a pipe communicating with the other side of said valve extending downwardly within the tank in a substantially straight direction and discharging relatively closely to the central bottom wall of the tank, a valved connection for the introduction of a sterilizing agent located adjacent the junction of the said inlet valve with the pipe whereby to permit the introduction of a sterilizing agent directly to the interior side of the inlet valve and the pipe, the valve elements and means for attachment to the loading conduit being directly sterilizable by partially opening the inlet valve when the sterilizing agent is present.

JAMES LITHGOW.