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(54) Pressure relief valve for tankers.

(57) To avoid the danger of inward collapse of milk tankers due to severe reduction in internal pressure during conventional cleaning cycles, a valve is introduced into the wall of the tanker. To avoid spillage of milk through the valve when the tanker is in transit, the valve is kept closed by spring means. For reasons of hygiene, the inner surface of the valve is arranged to be flush with the inner surface of the tank wall in the closed position.

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Pressure Relief Valve for Tankers

The invention relates to road and rail tankers, particularly but not exclusively such as are used for the transport of potable liquids, and to the provision therein of relief valves.

In the operation of milk tankers it is very important that the inner surfaces shall be frequently and thoroughly cleaned and to this end the practice has developed of providing within such tankers spray nozzles which can be connected, when required, to a source of cleansing fluid so that this fluid can be sprayed onto the internal surfaces of the tanker. The tankers are also conventionally provided with an outlet for the discharge of spent cleaning fluid.

A commonly operated cleaning cycle comprises a first rinsing stage wherein cold water is introduced into the tanker through the nozzle under a pressure of say 60 psi followed, after the discharge of the rinsing water, by the introduction into the tanker through the same nozzles of a hot caustic solution which is also, subsequently, discharged. Automatic equipment is now available which simply requires the coupling of a pipe to each of the outlets and an inlet to the nozzles whereupon the sequence of rinse, discharge, caustic wash and discharge is performed under remote control.

In order to keep the process as simple as possible, it is preferred that the tanker shall remain closed during the washing procedure; moreover to open one of the tanker's access ports is to risk the caustic spray escaping through the port and causing damage to the outer surface of the tanker and creating a health hazard to operatives in the vicinity.

It is found in practice, however, that the introduction of a hot spray into a closed tanker of which the walls and contained air have previously been rendered cold by the cold water rinse, leads to a sudden and quite severe reduction in internal pressure in the tanker which in some circumstances could lead to an inward collapse of the tanker.

In order to avoid the aforementioned problem it is proposed according to the present invention to provide in a rail or road tanker an aperture in a wall thereof, closure means mounted for movement between a first position inboard of the tanker and a second position whereby the closure is in sealing relationship with the aperture, and the closure is urged towards the said second position by spring pressure. The arrangement is preferably such that the movement between the said positions is linear, and the closure means may, to this end, be provided with a stem movable lengthwise in guide means. The edge of the aperture and the edge of the closure means may be matchingly profiled and the arrangement is preferably such that with the closure means in the said second position the inward facing surface of the closure means is continuous with the inner surface of the tanker wall.

Embodiments of the invention will now be described by way of example and with reference to the accompanying drawings, of which:-

Fig. 1 is a schematic representation of a road tanker; and

Fig. 2 is a detailed side elevation of a relief valve for a tanker as shown in Fig. 1.

In the drawings there is shown in Fig. 1 a bulk milk carrying vehicle comprising a tank 2 mounted on a chassis 4. The tank 2 is defined by a substantially cylindrical shell wall 6 shown partly cut away to reveal a number of shower heads 8 located in the upper part of the tank. Each of the nozzles is connected by a pipe 10 which run interiorly of the tank and emerge outside the tank at inlet 12 which is protected by a screw cap 14.

The tank 2 is mounted on the chassis 4 with its axis slightly inclined, and the figure also shows a discharge outlet 16 at the lowest edge of the tank, and this is also protected by a screw cap 18.

The tank shell 6 is provided with at least one opening 20 allowing access into the tank by an operative if required, and the opening is normally covered with a lid 22 which is normally held in place by screw clamps 24 which can, however, be released to allow the lid 22 to be removed to give access to the tank through the opening 20.

As described, the tanker is conventional, but Fig. 2 shows an access cover lid 22 modified to provide a relief valve for the purpose of allowing rapid ingress of air in the event that a partial vacuum is created within the tank, for example by the introduction of hot cleaning fluid from the nozzles 8 when the tank had been cooled by the previous introduction of cold rinsing water through the same nozzles.

The valve comprises a ring-shaped plate 26, welded to the lid 22 so as to fill a circular opening 28 therein, with the lower edges of ring 26 and lid 22 flush.

The inner edge of the plate 26 is bevelled so that it presents an opening 56 of larger diameter at the lower surface than at the upper surface. The body supports a wall 30 which is circular in plan view, but viewed from the side presents three equidistantly spaced pillars 32 separated by arches 34. The walls 30 support a circular cap 36 which has a circular axial bore 38.

A tube 40 of internal diameter similar to that of the bore 38 is secured vertically to the underside of the cap 36 in alignment with bore 38, and at its lower end the tube 40 is provided with an internal flange 42.

A circular plate 44 of such diameter and having an appropriately profiled edge 46 as to be a close fit in the circular opening 56 of the body 26, is provided with an axial upright stem 48, and conforms with the body 26 in that it may in its uppermost position tightly fit in the opening of the body 26 but may be displaced downwardly, as shown in dotted lines in the figure. In the downward position of the valve, the interior of the tank is thus seen to be open to the atmosphere via the opening in the ring 26 and the arched openings 34 in the wall 30.

The stem 48 is of smaller diameter than the inner diameter of the tube 40, and at its upper end it terminates in a washer 50 secured in place by a nut 52. A compression spring 54 is arranged within the tube 40 and about the stem 48 and engages at its ends against the washer 50 and the flange 42. The pressure of the spring is such that it keeps the valve plate 44 in its uppermost, closed, position when the only downward pressures on the plate 44 are occasioned by gravity and by uneven motion of the supporting vehicle as it travels. However, when, as explained above, a pressure of less than atmospheric is created within the tank 2, atmospheric pressure on the upper face of the plate 44 is sufficient to overcome the tension of the spring 54 and it is lowered as shown, somewhat exaggeratedly, in dotted lines in Fig. 2 whereby the stem 48 and with it the washer 50 is pulled downwardly against the pressure of the spring 54. The downward movement is, it will be understood, only momentary because as soon as the valve opens, atmospheric air is allowed into the tank so that there is no longer a pressure difference between the outside and inside, and the spring 54 re-asserts itself, raising the washer 50 and with it the stem 48 and the valve plate 44. The stem 48 is a sufficiently slack fit within the tube 40 and the surrounding spring 54 that in its up and down movement it may deviate slightly from the vertical, and this fact coupled with the tapering of the edge 46 and the corresponding edge of the opening 56 in the ring 26 provide that on the return of the valve plate 44 to its uppermost position it seats securely and tightly within the opening 56 and so prevents the escape of the contents of the tank. Moreover, the precise sealing of the plate 44 in the opening 56 ensures that the lower surface of plate 44 is flush with the lower surface of ring 26 which in turn is flush with the lower surface of lid 22 so that the combined surfaces present a smooth profile affording no ledges for the accumulation of small quantities of the tank's contents.

Claims

1. A rail or road tanker having an aperture in a wall thereof, characterised in that the tanker further comprises closure means mounted for movement between a first position inboard of the tanker and a second position whereby the closure means are in sealing relationship with the aperture, said closure means being urged towards the said second position by spring pressure.

2. A tanker according to Claim 1 wherein said movement of the closure means is rectilinear.

3. A tanker according to Claim 2 wherein the closure means comprise a stem movable lengthwise in guide means.

4. A tanker according to any one of the preceding claims wherein the edge of the aperture and the edge of the closure means are matchingly profiled.

5. A tanker according to any one of the preceding claims wherein with the closure means in the second position, the inward facing surface of the closure means is continuous with the inner surface of the tanker wall.

6. A rail or road tanker with an aperture in a wall thereof substantially as described with reference to the drawings.

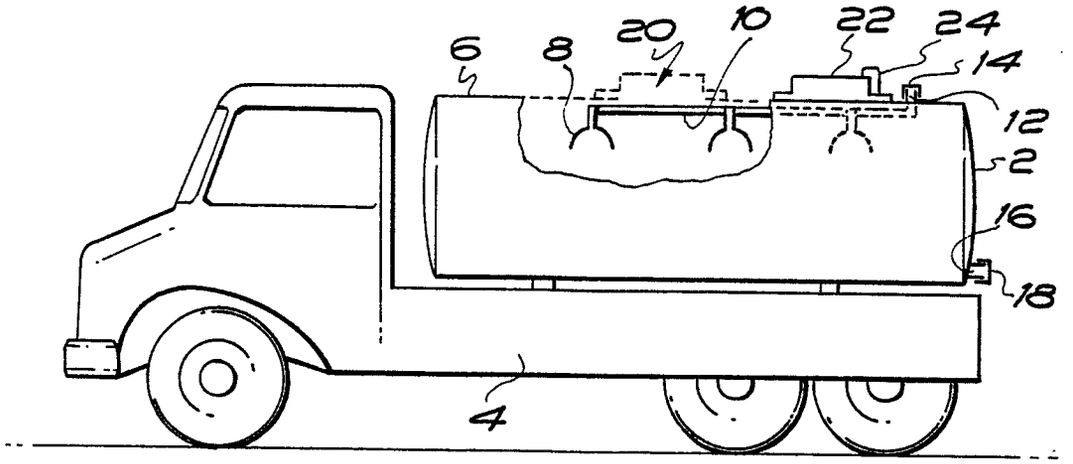
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FIG. 1

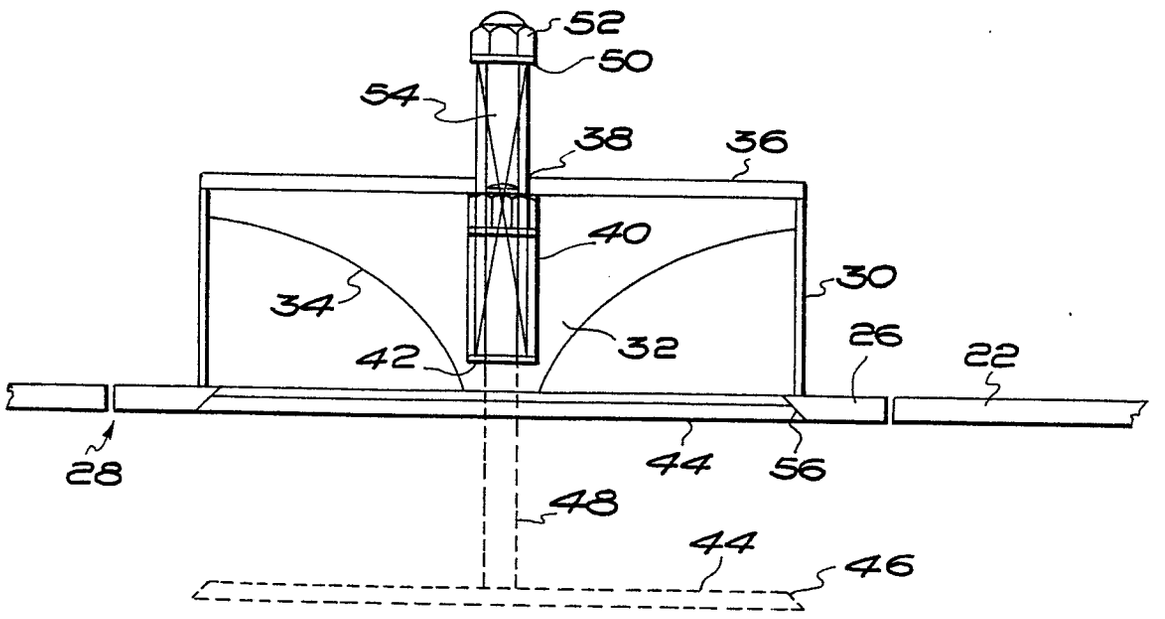
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FIG. 2