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[73] Assignee **Corken Pump Company**

[54] **EVACUATION SYSTEM FOR PIPELINE DISCHARGING PUMP**
5 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **222/1,** 222/148, 417/442
[51] **Int. Cl.** **B67d 5/04**
[50] **Field of Search** ..... 222/1, 109, 136, 148, 178; 103/6 (AC), 7, 204, 8, (Inquired); 230/28, (Inquired); 15/304, 314, 315, 330, (Inquired); 134/22, 22 (C); 134/240

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ABSTRACT: A vacuum relief valve installed on the suction side of a pump employed with a compartmented tank on a fuel delivery vehicle or the like to enable the pump and associated piping system to be completely purged of fuel that has been conveyed by the pump from one compartment to a delivery nozzle before the piping system for the pump is communicated with another compartment of the tank having a different fuel therein for eliminating contamination of one fuel with another during sequential delivery of various types of fuel from the various compartments of the multicompartment tank to a delivery point.

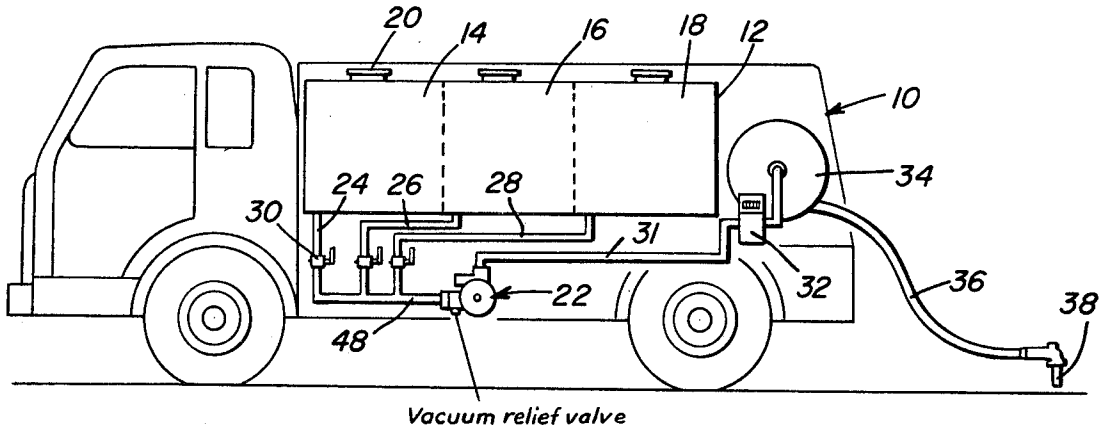


Fig. 1

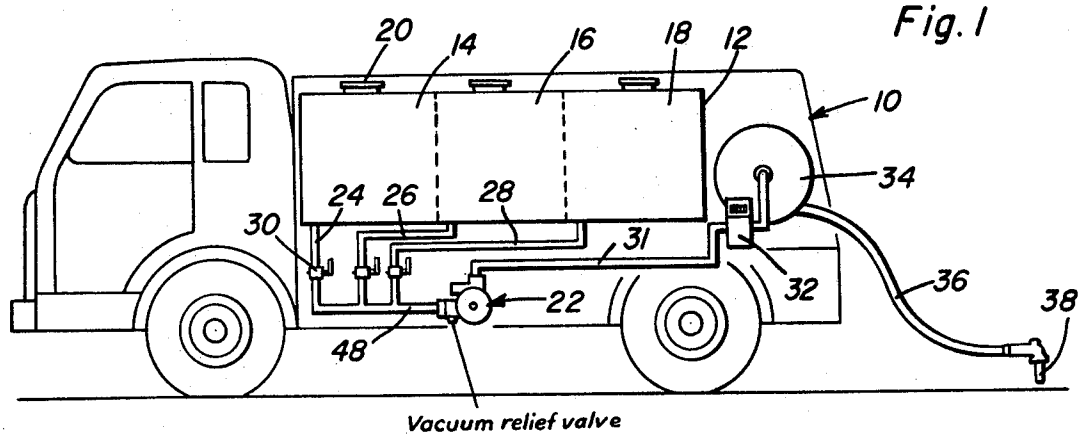


Fig. 2

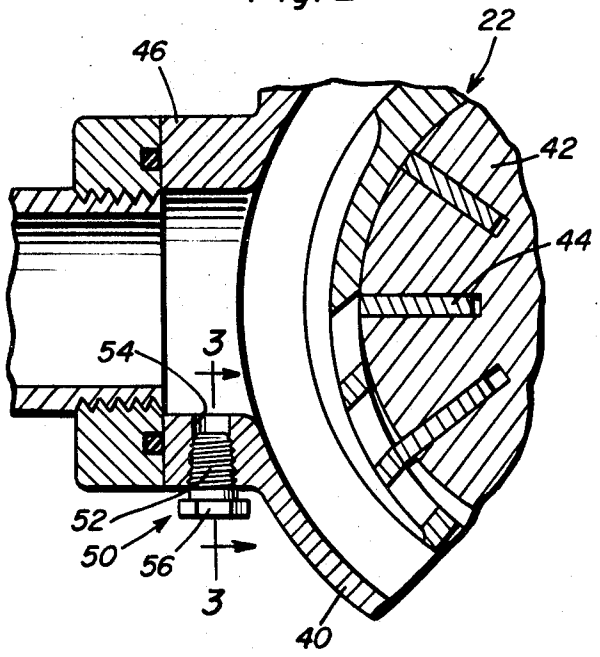


Fig. 3

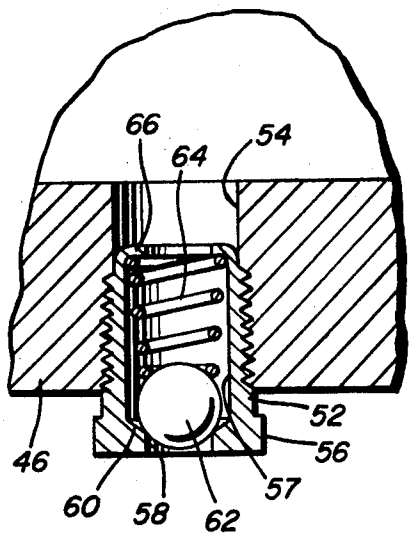
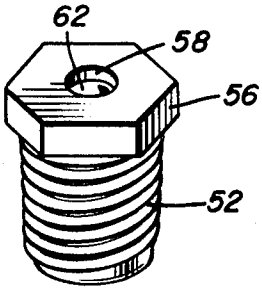


Fig. 4



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EVACUATION SYSTEM FOR PIPELINE DISCHARGING PUMP

It is well known that fuel oil delivery trucks employ multiple compartments so two or more different grades of fuel may be transported in one truck at one time. When fuel oil of one grade is delivered from the fuel truck at one delivery point and at the next delivery point, a fuel oil of a different grade is to be delivered, there is a problem of contamination of the subsequently delivered fuel oil by a residual quantity of the previously delivered fuel oil remaining in the piping system and pump. Such contamination introduces various problems inasmuch as one fuel may be more volatile than the other or may not be as refined as another all of which introduces problems to the user thereof.

A current and quite commonly used procedure to lessen contamination is to insert the delivery hose nozzle into a top opening of the compartment containing the same grade of fuel and the pump suction manifold is arranged, usually by opening an appropriate valve, so the pump is connected to the compartment containing the fuel next to be delivered. As the pump is run, the truck operator, by observation of the fuel leaving the nozzle, decides when the original fuel has been displaced by the new fuel, and closes off the nozzle. If the operator is perfect in his observations, there will be little contamination of consequence. However, the amount of contamination is solely dependent upon the operator and in some instances, due to lighting conditions and other natural factors, it is difficult to observe the fuel as it is being pumped into the compartment and in other instances, the operator may not be able to give his full attention to observing the fuel being pumped. Thus, this procedure, while successful to a degree, relies upon the skill and attention of the operator and thus, is not too successful for solving the problem of contamination.

A second method which has been employed involves the operator closing the compartment shutoff valve located at the compartment outlet after which he inserts the hose nozzle in a top opening of the same compartment. Then he runs the pump until he has evacuated as much of the pump suction piping and the pump itself as he can. The residue in the meter and delivery hose becomes a contaminant for the next fuel delivery. This method, when the pump is new and in good condition, is effective as far as it goes, but when the pump becomes worn, it is quite ineffective. In any event, the pump when employing this method cannot purge the discharge hose because the inlet side becomes a vacuum in a short time and when it does, there is nothing for the pump to discharge so all pumping actually ceases thus leaving a residue of fuel in the meter and in the discharge hose.

Recognizing the problems encountered with contamination of the nature described, the present invention has for its primary object the provision of a vacuum relief valve that is installed in the inlet side of the pump. Thus, the compartment shutoff valve is closed which is normal after the fuel delivery and the discharge hose nozzle is inserted in an opening in the same fuel compartment. The pump is then operated and will evacuate the suction line or inlet side of the pump until a vacuum starts to develop. At that time, the vacuum relief valve opens to admit air into the inlet side of the pump or suction piping system. The pump continues to run and now acts as a low pressure blower which clears the entire system of fuel including the pump itself, the meter, discharge hose and nozzle.

Another object of the present invention is to provide a vacuum relief valve which is spring-loaded and automatic in operation in that no special attention is required on the part of the operator inasmuch as he only has to close off the compartment shutoff valve and insert the discharge nozzle into the top opening of the same compartment and permit the pump to continue operation or restart the pump. The vacuum relief valve is properly sized to admit the required amount of air when called upon to function but yet not permit fuel leakage to the atmosphere under normal pumping operations.

A further object of the present invention is to provide an evacuation system for a multifuel pump and piping system in accordance with the preceding objects which may be easily and readily installed in existing fuel delivery trucks with very little modification with the valve being capable of installation in various positions and arrangements since it is spring-biased into a closed position during normal operation of the pump and will open only when the vacuum reaches a predetermined reduction in pressure thus eliminating leakage of fuel and also eliminating the possibility of the pump losing suction and failing to pump properly.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a schematic elevational view illustrating the present invention installed in a conventional fuel delivery truck;

FIG. 2 is a detail sectional view illustrating the position of the vacuum relief valve in the pump housing;

FIG. 3 is a detail sectional view, on an enlarged scale, taken along section line 3–3 of FIG. 2 illustrating the structural details of the vacuum relief valve; and

FIG. 4 is a perspective view of the vacuum relief valve.

Referring now specifically to the drawings, the numeral **10** generally designates a fuel oil delivery truck of conventional construction which includes a multicompartment tank **12** having compartments **14**, **16** and **18** with each compartment having a closed opening **20** in the top thereof which also is of conventional construction with the opening having a removable closure. A pump **22** is communicated with the compartments **14**, **16** and **18** through suction lines or pipes **24**, **26** and **28** with each suction pipe having a manually controlled cutoff valve **30** which is located in a convenient position for access by the operator so that the pump **22** may be selectively communicated with one of the compartments **14**, **16** and **18**.

The pump **22** is also provided with a discharge pipe **31** extending to the usual meter **32** and then into a hose reel **34** and thus into a discharge hose **36** with a discharge nozzle **38** at the end thereof with all of the aforementioned structure being conventional and well known in the art.

The pump **22** is illustrated in more detail in FIG. 2 and includes a housing **40** with a rotor **42** disposed therein and radial vanes **44** incorporated therein which represents a conventional vane-type pump. The housing **40** includes an inlet adapter or fitting **46** to which the inlet manifold or pipe **48** is communicated with it being noted that the inlet pipe or manifold **48** is communicated with each of the pipes **24**, **26** and **28**.

Incorporated into the fitting **46** is a vacuum relief valve generally designated by the numeral **50** and which includes an externally threaded tubular housing **52** in screw-threaded engagement with an internally threaded bore **54** formed in the adapter fitting **46**. One end of the housing **52** is provided with an enlarged polygonal head **56** by which a suitable tool such as a wrench can be engaged to install the vacuum relief valve or remove it for cleaning, repair or replacement when desired. The interior of the housing **52** is provided with a longitudinal bore **57** extending therethrough with the end of the bore communicating with the end of the housing **52** having the head **56** thereon being of reduced diameter as designated by numeral **58** with the junction between the bore **56** and the smaller diameter passage **58** defining a valve seat or inclined shoulder **60** engaged by a ball valve **62**. The ball valve **62** is spring-biased against the valve seat **60** by a coil compression spring **64** having one end thereof engaging a portion of the periphery of the ball **62** in opposed relation to the valve seat **60** and the other end thereof engaging an inturned flange **66** on the end of the housing **52** remote from the polygonal head **56** with the inner periphery of the flange **66** defining a continuation of the bore **57** but of a slightly smaller diameter.

Thus, during normal operation of the pump **22** while fuel is supplied thereto by one of the valves **30** being in open position, the ball valve **62** will be retained in seated position

against the ball valve seat **60** thus eliminating any possibility of leakage and even when the pump **22** is not being used, the spring **64** will retain the ball valve **62** in closed position. When the pump **22** is operated with all three of the valves **30** closed, it will create a vacuum or suction in the pipe manifold **48** and the adapter **46** thus causing atmospheric pressure to partially compress the spring **64** thus moving the ball valve **62** off of the valve seat **60** and admitting air into the inlet side of the pump **22** so that the pump **22** will serve as a low pressure blower for purging all of the liquid fuel from the pump **22**, the discharge line **31**, the meter **32**, the hose reel structure **34**, the hose **36** and nozzle **38**. Since the fuel will already have been delivered to the point of delivery, the nozzle **38** is inserted into the compartment from which the fuel was just pumped so that this fuel will be pumped back into the compartment having the same type of fuel therein.

The sliding vane pump is preferably employed since it will serve effectively as a low pressure blower. Also, the vacuum relief valve may be installed in the pump casing proper as illustrated or it may be installed in the pump suction line at any convenient location between the pump casing and the valves **30** depending upon the particular type of installation desired and which is the easiest installation depending upon the already existent structure.

The vacuum relief valve may be constructed of any suitable material normally employed in a check valve with the materials being selected to eliminate corrosion or other damaging effects on the liquids being pumped. The spring is calibrated to assure that the vacuum relief will not open until all of the liquid fuel has been pumped and a vacuum builds up in the suction line thus eliminating spillage of fuel and premature opening which may cause the pump to lose vacuum.

While the device has been specifically illustrated and described in association with a multicompartment fuel oil delivery truck, it is pointed out that the invention may be employed in combination with various types of liquid delivery trucks or the like and also may be used in various stationary tank operations, where a single pump is employed with multiple compartments or multiple tanks. Also, on large over-the-road transport large quantities of fuel are pumped into one installation at a single time. In fact it isn't unusual for the whole transport load to be emptied. A further practice of transporters is to carry what is called a "dry" hose. This means that a large hose, say 2", is stored in a compartment and is completely disconnected from the pump or the pumping system. The dry or unfilled hose is then attached to the pump at the delivery site, the delivery cycle is completed and the hose is then completely disconnected and restored in its separate compartment. Obviously any fuel left in the hose must be disposed of in some fashion, and usually it is merely dumped out on the driveway. This causes the owners of the site to be rather unhappy. With the use of this vacuum or evacuation system this hose can be blown completely clean or dry while it is still connected into the system (whether the transport is completely unloaded or not). Obviously this permits the user to store a dry hose with no spillage.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described.

What we claim as new is as follows:

1. An evacuation system for a pump and inlet pipe system employed to pump diverse fluids from diverse sources and including in combination a pump, an inlet pipe system communicated with diverse sources of diverse fluids, valve means for selectively interrupting communication of the inlet pipe system with the source of fluids, and a vacuum relief valve means communicated with the inlet side of the pump and inlet pipe system for admitting air into the pump and inlet pipe system when the pump is operated with the communication with the source of fluids interrupted thereby enabling the pump to purge itself and the inlet pipe system of a fluid just pumped prior to communication of the pump and inlet pipe system with a different fluid thereby enabling the pump to operate as a low pressure air blower when purging itself and the inlet pipe system, said vacuum relief valve means being in the form of a ball check valve, spring means urging said check valve into closed position to prevent leakage of fluid during normal pumping operation and retaining the ball check valve in closed position until the pump induces a vacuum in the pump and inlet pipe system when communication with the fluid source is interrupted thus eliminating spillage of fuel and premature opening of the relief valve thereby eliminating the possibility of the pump losing vacuum.

2. The system as defined in claim **1**, wherein said pump includes a discharge conduit and nozzle thereon with the nozzle being insertable back into communication with the source of fluid pumped by the pump so that the discharge conduit and nozzle may be purged when the pump acts as a low pressure air blower thereby returning all of the fluid to its source, said source of fluid including multiple liquid compartments.

3. The system as defined in claim **2**, wherein said compartments receive fuel of different characteristics with the compartments being mounted on a delivery vehicle delivering different fuels to different delivery points.

4. A system as defined in claim **1**, wherein said pump operates as a pump normally operates when there is fluid available for pumping and said pump operates as a low pressure blower when the vacuum relief valve opens permitting air to enter the pump when communication with the source of fluids is interrupted.

5. The method of pumping fluid by employing a pump having an intake system and discharge conduit system consisting of the steps of pumping fluid with the pump until fluid is no longer available, air into the intake system of the pump while it is operating for purging the pump and associated intake system and discharge conduit system of fluid with the pump acting as a low pressure blower, together with the step of communicating the discharge conduit system with fluid supply when admitting air for purging fluid from the pump, intake system and discharge conduit system into the fluid supply.