Sept. 14, 1965 G. J. WILSON 3,205,923

VENTED FILLING DEVICE

Filed Aug. 12, 1963

FIG. 1.

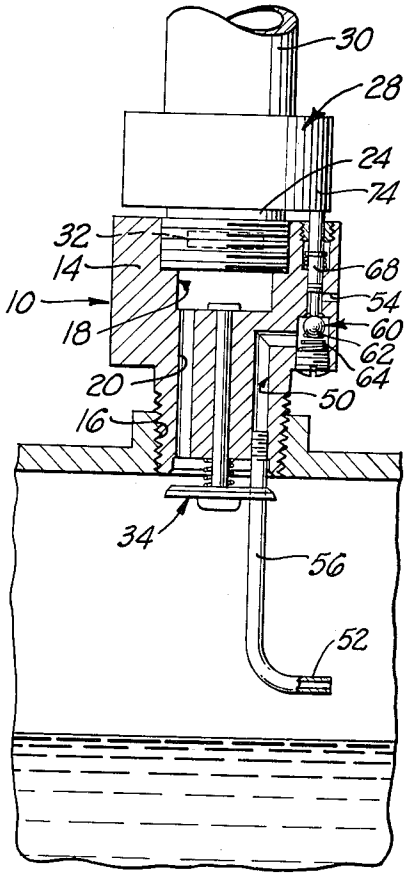
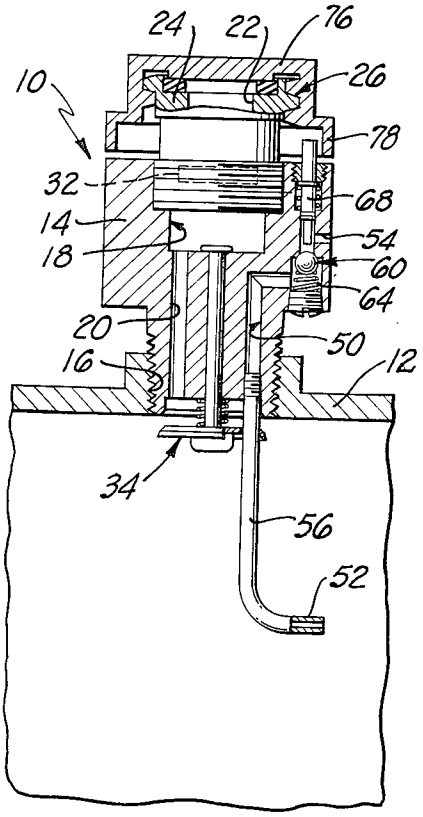


FIG. 2.



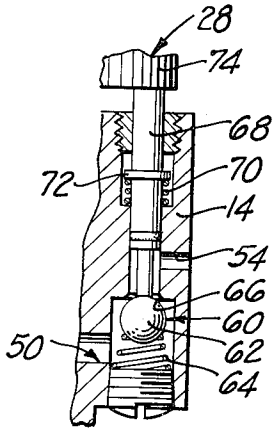


FIG. 3.

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VENTED FILLING DEVICE

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The present invention relates in general to inlet devices through which containers of various types may be filled with the fluids they are designed to contain, and a basic object of the invention is to provide a container inlet or filling device which is self venting.

The invention is particularly applicable to vented container filling devices for tanks used to store liquefied petroleum gases, such as butane. Consequently, the invention will be considered primarily herein in such an environment, with the understanding that it may have other applications.

Butane storage tanks are conventionally provided with manually operated vents, which have various disadvantages. For example, in filling a butane tank, opening of the vent is sometimes overlooked, with the result that the tank is not filled to capacity. It is also possible for closing of the vent after filling the tank to be overlooked, resulting in dangerous leakage. Another disadvantage is that since the normal procedure is to fill the tank until liquid butane begins to escape from the vent, closing of the conventional manually operated vent is hazardous to the operator because of the possibility of contact of the butane with his fingers or hands. Serious frostbite may result.

Another disadvantage of conventional vents is that they are usually separate from the inlet devices or filler plugs on the tanks. This tends to promote the possibility of overlooking the vents, and also results in more expensive tanks because of the necessity for making separate filler plug and vent installations on each tank.

With the foregoing as background, a primary object of the present invention is to provide a vented container filling device which is a unitary structure and which has venting means automatically actuated upon connection of an inlet or filling line to the device. This eliminates any necessity for making separate filler plug and vent installations on the container, and eliminates any possibility of overlooking opening and subsequently closing the vent, which are important features of the invention.

Another object of the invention is to provide a vented container filling device wherein the venting means includes normally closed valve means, held closed by pressure within the container, and wherein the inlet or filling line is provided with actuating means for automatically opening such normally closed valve means upon engagement of the inlet line with an inlet means of the filling device. An incidental advantage of a normally closed valve means which is held closed by pressure within the container is that any possibility of leakage through the venting means is minimized, as compared to a manually operated vent, which is another important feature.

Another object of importance is to provide a filling device having a vent passage the outer end of which is directed laterally away from the filling device so as to minimize any possibility of contact between escaping butane, for example, and the operator's fingers or hands as he connects or disconnects the inlet line. In other words, with such an orientation for the outer end of the vent passage, any escaping butane is directed away from the normal working position of the operator's hands to minimize the possibility of injury.

More particularly, an object of the invention is to provide a vented container filling device which includes: a fitting having an inner end connectible to a container and having an outer end; means providing an inlet passage extending longitudinally through the fitting from its inner end to its outer end and having inner and outer ends respectively communicating with the interior and the exterior of the container when the fitting is connected thereto; check valve means carried by the fitting for preventing outward flow through the inlet passage; connecting means on the outer end of the fitting engageable by a connecting means on an inlet line for connecting the inlet line to the fitting in communication with the outer end of the inlet passage; means providing a vent passage extending through the fitting and having inner and outer ends respectively communicating with the interior and the exterior of the container when the fitting is connected thereto; the outer end of the vent passage being oriented laterally of the fitting; normally closed valve means carried by the fitting and controlling flow through the vent passage; and means carried by the fitting alongside the inlet passage and engageable by the connecting means on the inlet line, upon engagement of the connecting means on the inlet line with the connecting means on the fitting, for automatically opening the normally closed valve means.

Still another object of the invention is to provide a vented container filling device wherein the vent passage is provided at least partially by a vent tube which forms the inner end of the vent passage and which extends into the container a predetermined distance when the fitting is connected thereto. A related object is to orient the portion of this vent tube which forms the inner end of the vent passage generally laterally away from the axis of the filling device to minimize the possibility of the entry of liquid into the inner end of the vent passage as liquid is being introduced into the container through the filling device.

The foregoing objects, advantages, features and results of the present invention, together with various other objects, advantages, features and results thereof which will be evident to those skilled in the art to which the invention relates in the light of this disclosure, may be achieved with the exemplary embodiment of the invention described in detail hereinafter and illustrated in the accompanying drawing, in which:

FIG. 1 is a longitudinal sectional view illustrating the vented container filling device of the invention in use to fill a container to which it is connected;

FIG. 2 is a view similar to FIG. 1, but showing the vented filling device in closed condition; and

FIG. 3 is a view duplicating a portion of FIG. 1 on an enlarged scale.

In the drawing, the vented container filling or inlet device of the invention is designated generally by the numeral **10** and is shown as connected to a tank, or other container, **12**, as by being mounted thereon. The tank **12** may, for example, be designed to contain a liquified petroleum gas such as butane.

The filling device **10** includes a single unitary fitting **14** shown as taking the form of a plug having its inner end threaded into a suitably reinforced opening **16** in the tank **12**. The fitting **14** is provided with an inlet or filling passage **18** which extends longitudinally through the fitting from its inner end to its outer end, the inlet passage having inner and outer ends respectively communicating with the innerior and the exterior of the tank **12**. The inlet passage **18** may take various forms. In the particular construction illustrated, it includes a plurality of circumferentially spaced, longitudinal passages **20** adjacent its inner end, only one such passage being visible. The outer end of the inlet passage **18** is designated generally by the numeral **22**, and is shown as formed in a bushing **24** forming part of the fitting **14** and threaded into the outer end of the body thereof.

The bushing 24 of the fitting 14 is provided at its outer end with a fitting connecting means 26 engageable by an inlet line connecting means 28 on an inlet or filling line 30 for introducing liquid into the tank 12 through the filling device 10. The two connecting means 26 and 28 may be of any suitable, complementary constructions, the connecting means 26 being shown as being of threaded construction.

In order to prevent outward flow through the inlet passage 18, the bushing 24 carries a check valve means 32, diagrammatically represented by a dotted rectangle, of the type which is closed by internal pressure within the tank 12, but which opens in response to an external pressure higher than the internal pressure. In the particular construction illustrated, the filling device 10 is shown as including a second, supplementary check valve means 34, shown as being of the poppet type. The check valve means 34 is also designed to be closed by internal pressure, and is shown as being lightly spring-biased toward its open position.

As thus far described, the filling device 10 is convention and, as a matter of fact, is a commercially available filling device. The manner in which the present invention is embodied in the filling device 10 to render it self-venting will now be described.

The filling device 10 includes means providing a vent passage, designated generally by the numeral 50, extending through the fitting 14 and having inner and outer ends 52 and 54 respectively communicating with the interior and the exterior of the tank 12. The inner end 52 of the vent passage 50 is constituted by one end of a vent tube 56 which forms part of the vent passage and which extends inwardly (through the poppet of the check valve means 34 as a matter of convenience in the particular construction illustrated) into the tank 12 a predetermined distance, corresponding to the maximum liquid level desired within the tank. Consequently, when the tank 12 is filled to the desired maximum level, liquid can enter the inner end 52 of the vent passage 50. As will be apparent, the maximum liquid level may be varied by substituting vent tubes of different lengths, the vent tube 56 being shown as having its outer end removably threaded into the fitting 14 for this purpose. Another feature is that the vent tube 56 is generally L-shaped with the inner end 52 of the vent passage directed horizontally away from the axis of the filling device 10. This tends to minimize entry of liquid into the inner end of the vent passage 50 as the tank 12 is being filled, and prior to filling thereof to the maximum level.

The outer end 54 of the vent passage 50 is oriented laterally of the filling device 10 and is exposed at a lateral outer wall thereof, so as to direct any liquid escaping through the vent passage laterally away from the filling device. This minimizes any possibility of injury to the fingers or hands of the operator in engaging and disengaging the connecting means 26 and 28, which is an important feature.

The vented filling device 10 of the invention includes a normally closed valve means 60, carried by the fitting 14, for controlling flow through the vent passage 50. The valve means 60 is shown as including a movable valve element or valve ball 62 and a compression spring 64 for biasing the ball into engagement with a seat 66 surrounding the vent passage 50 and facing inwardly relative to such passage. With this construction, the ball 62, in addition to being biased closed by the spring 64, is also biased closed by any pressure in the tank 12 in excess of the external pressure, which is atmospheric pressure where, as shown, the outer end 54 of the vent passage communicates directly with the atmosphere.

The valve means 60 is carried by the fitting 14 alongside the inlet passage 18 and is so oriented that the ball 62 moves longitudinally inwardly and outwardly in moving to its open and closed positions. For the purpose of moving the ball 62 to its open position, the fitting 14 carries a longitudinally reciprocable pin 68 in alignment with and engageable wth the ball 62. The pin 68 is suitably sealed relative to the fitting 14 and is biased longitudinally or axially outwardly relative to the fitting by an encircling compression spring 70 seated against the fitting and against a collar 72 on the pin.

The pin 68 normally projects axially or longitudinally outwardly from the body of the fitting 14, as shown in FIG. 2 of the drawing. When the connecting means 28 on the inlet line 30 is engaged with the connecting means 26 on the fitting 14 to place the inlet line in communication with the tank 12 through the inlet passage 18, an element 74 of the connecting means 28 engages the outer end of the pin 68 to cause it to unseat the ball 62, thereby opening the normally closed valve means 60 and placing the interior of the tank 12 in communication with the atmosphere through the vent passage 50. Thus, the element 74 of the connecting means 28, which element may be a collar containing the connecting means 28, constitutes an actuating means for automatically opening the normally closed valve means 60 upon connection of the inlet line 30 to the fitting 14.

It will be noted that the foregoing automatic opening of the vent valve means 60 occurs solely in response to connection of the inlet line 30 to the fitting 14, and requires no attention whatsoever on the part of the operator. Therefore, opening of the vent valve means 60 cannot be overlooked, which is always a possibility in the case of a manually operated vent valve means. Furthermore, re-closing of the vent valve means 60 cannot be overlooked because it is automatically re-closed, upon disconnection of the inlet line 30, by the spring 64 and by the pressure differential between the interior and the exterior of the tank 12. It will be understood, of course, that filling of the tank 12 to capacity is indicated by the discharge of liquid laterally from the outer end 54 of the vent passage 50, whereupon the introduction of liquid may be terminated and the inlet line 30 disconnected to permit the vent valve means 60 to re-close. Thereafter, any possibility of leakage through the vent valve means 60 is minimized because of the fact that it is held closed by the internal pressure.

FIG. 2 of the drawing shows the connecting means 26 on the bushing 24 of the fitting 14 as having a cap 76 engaged therewith. The cap 76 performs two functions. First, it prevents the entry of dirt, or other foreign matter, into the inlet passage 18 between fillings of the tank 12. Second, it is provided with an annular skirt 78 which encircles the exposed, projecting outer end of the pin 68 and acts as a guard to prevent inadvertent opening of the vent valve means 60.

Thus, it will be apparent that the present invention provides a very simple vented container filling device which is self-venting, and which includes a venting means that is actuated automatically merely by connecting a filling line to the device.

Although an exemplary embodiment of the invention has been disclosed herein for purposes of illustration, it will be understood that various changes, modifications, and substitutions may be incorporated in such embodiment without departing from the spirit of the invention as defined by the following claims:

1. A vented filling device for use between a container and an inlet line having inlet line connecting means comprising:

a single unitary fitting connectable to said container and having upper and lower ends and a lateral outer wall;

means providing an inlet passage extending through said single unitary fitting from said lower end to said upper end to provide inner and outer ends respectively communicating with the interior and the exterior of said container when said single unitary fitting is connected thereto;

check valve means for normally preventing flow through said inlet passage;

fitting connecting means on said single unitary fitting engageable by said inlet line connecting means for connecting said inlet line to said single unitary fitting in communication with said outer end of said inlet passage;

means providing a vent passage extending through said single unitary fitting and having an outer end at said lateral outer wall and an inner end respectively communicating with the atmosphere and the interior of said container when said single unitary fitting is connected thereto, said vent passage including a generally L-shaped tube within said container when said single unitary fitting is connected thereto, said inner end of said vent passage being provided by said L-shaped tube and extending away from the axis of said single unitary fitting;

normally closed valve means carried by said single unitary fitting and controlling flow through said vent passage, said normally closed valve means including a valve seat within said vent passage within said single unitary fitting and a valve ball in said vent passage biased into engagement therewith, a reciprocating pin having one end exposed at said upper end of said single unitary fitting and adapted to be engaged and moved toward said lower end of said single unitary fitting by said inlet line connecting means when the latter engages said fitting connecting means, the other end of said reciprocating pin being engageable with said valve ball for automatically unseating said valve ball when said reciprocating pin is engaged and moved toward said lower end by said inlet line connecting means; and

means for normally biasing said reciprocating pin out of engagement with said valve ball.

2. A vented container filling device for use between a container and an inlet line having inlet line connecting means, comprising:

a single unitary fitting connectable to said container and having upper and lower ends and a lateral outer wall;

means providing an inlet passage extending through said single unitary fitting from said lower end to said upper end to provide inner and outer ends respectively communicating with the interior and the exterior of said container when said single unitary fitting is connected thereto;

check valve means for normally preventing flow through said inlet passage;

fitting connecting means on said single unitary fitting engageable by said inlet line connecting means for connecting said inlet line to said single unitary fitting in communication with said outer end of said inlet passage;

means provding a vent passage extending through said single unitary fitting and having an outer end at said lateral outer wall and an inner end respectively communicating with the atmosphere and the interior of said container when said single unitary fitting is connected thereto;

normally closed valve means carried by said single unitary fitting and controlling flow through said vent passage, said normally closed valve means including a valve seat within said vent passage within said single unitary fitting and a movable valve element in said vent passage biased into engagement therewith, a reciprocating pin having one end exposed at said upper end of said single unitary fitting and adapted to be engaged and moved toward said lower end of said single unitary fitting by said inlet line connecting means when the latter engages said fitting connecting means, the other end of said reciprocating pin being engageable with said movable valve element for unseating said movable valve element when said reciprocating pin is engaged and moved toward said lower end by said inlet line connecting means; and

means for biasing said reciprocating pin out of engagement with said movable valve element.

3. A vented container filling device for connection to a container, comprising:

a single unitary fitting for connection to said container and having upper and lower ends and a lateral outer wall;

means providing an inlet passage extending through said single unitary fitting from said lower end to said upper end to provide inner and outer ends respectively communicating with the interior and the exterior of said container when said single unitary fitting is connected thereto;

means for normally preventing flow through said inlet passage;

means providing a vent passage extending through said single unitary fitting and having an outer end at said lateral outer wall and an inner end respectively communicating with the atmosphere and the interior of said container when said fitting is connected thereto;

normally closed valve means carried by said single unitary fitting and controlling flow through said vent passage, said normally closed valve means including a valve seat within said vent passage within said single unitary fitting and a movable valve element in said vent passage biased into engagement therewith, a reciprocating pin movable toward said lower end of said single unitary fitting and having one end exposed at said upper end of said single unitary housing, the other end of said reciprocating pin being engageable with said movable valve element for automatically unseating said valve element when said pin moves toward said lower end;

a filling line having at one end a collar containing inlet line connecting means; and

fitting connecting means on said single unitary fitting for engaging and connecting to said inlet line connecting means, said collar engaging and moving said reciprocating pin toward said lower end to unseat said movable valve element upon the engagement of said fitting connecting means and said inlet line connecting means.

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LAVERNE D. GEIGER, *Primary Examiner.*