Dec. 30, 1952 F. K. ZERBE 2,623,362

VALVE FITTING FOR LIQUEFIED GAS SYSTEMS

Filed July 19, 1948

FIG. 1.

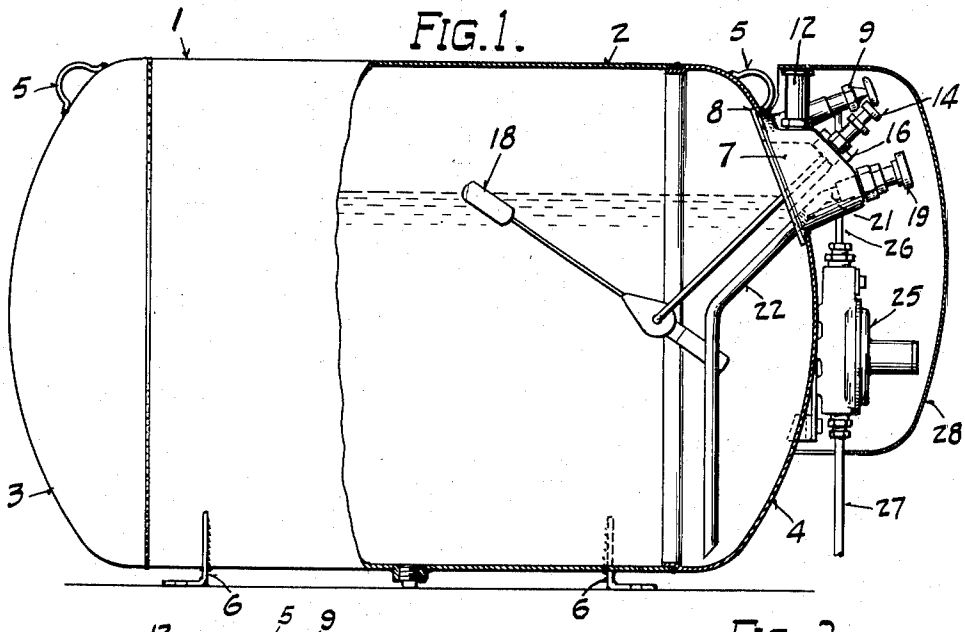


FIG. 2.

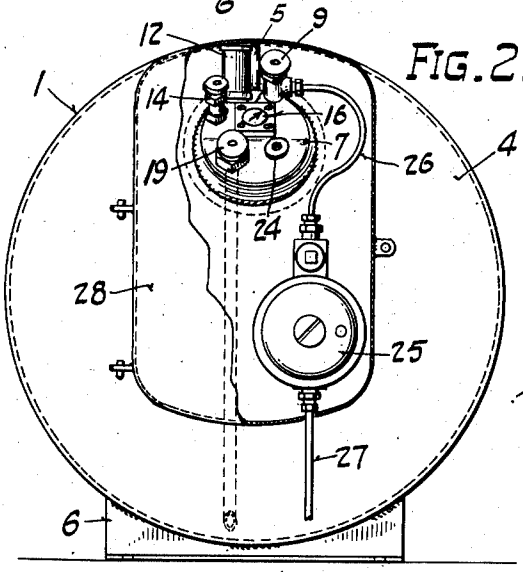


FIG. 3.

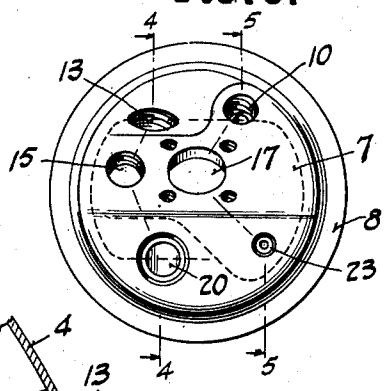


FIG. 4.

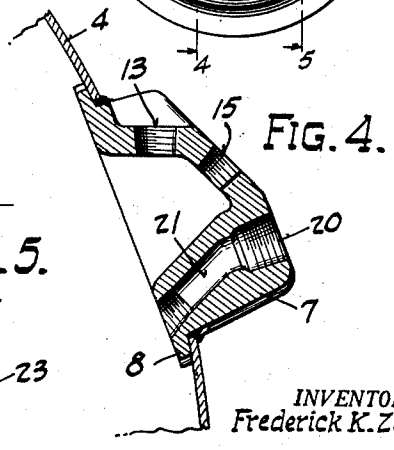
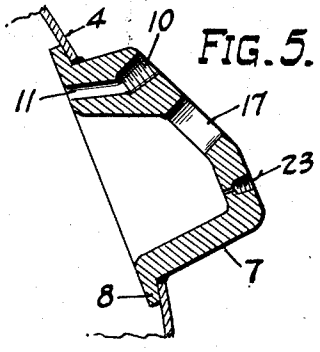


FIG. 5.



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VALVE FITTING FOR LIQUEFIED GAS SYSTEMS

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2 Claims. (Cl. 62—1)

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This invention relates to a multiple valve and gauge unit fitting or assembly to be used in connection with an aboveground storage tank for dispensing liquified gas, such as propane.

Generally, tanks in which liquified gas has been generated and stored, have either been provided with a plurality of openings in the top or end of the tank for receiving the requisite valves and gauges, or an expensive and complicated fitting has been utilized to house the necessary valves, gauges and safety devices. Additionally it has been common practice to employ internal conduits or pipes which lead from the vapor valves into the vapor zone at the top of the tank.

It is particularly desirable that all vapor valves of a liquified gas system be above the liquid level of the tank at all times. Should any of the vapor valves be supported in the liquid zone, and liquid accidentally escapes into one of the valves, the likelihood of an explosion would be greatly increased were only vapor to escape. This is true because of the fact that a cubic inch of liquid will, upon expanding, produce approximately 272 cubic inches of vapor.

An object of the invention is to provide a multiple valve and gauge unit fitting for a gas storage and dispensing tank which forms an integral part of the tank.

Another object is to provide a multiple valve and gauge unit fitting for a gas storage and dispensing tank and to position the fitting so that all vapor valves are supported in the vapor zone.

A further object is to provide a fitting in which all valves, gauges and safety appliances are combined in a single unit which is easily accessible.

Another object is to provide a multiple valve and gauge unit fitting in which it is unnecessary to use internal conduits or pipes leading into the vapor zone of a gas generating and storage tank.

Another object is to provide a multiple valve and gauge unit fitting for use with a storage tank for pressurized gas in which various standardized valve fittings and gauges may be used.

Another object is to provide a multiple valve and gauge unit fitting which is of simple construction and economical to manufacture.

Other objects and advantages of the invention will appear hereinafter.

The invention is illustrated in the accompanying drawing in which:

Figure 1 is a side elevational view of a gas generating and storage tank incorporating the multiple valve and gauge unit fitting embodied in the invention with parts being shown in section;

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Fig. 2 is an end elevational view of the same;

Fig. 3 is a plan view of the fitting;

Fig. 4 is a sectional view of the fitting in its normal position in use taken on line 4—4 of Fig. 3; and

Fig. 5 is a view similar to Fig. 4 taken on line 5—5 of Fig. 3.

Referring to the drawings, an elongated tank 1, of generally cylindrical shape, is provided with a body member 2, and head members 3 and 4. The tank may be formed in any one of several well-known ways, but in the embodiment of the invention shown, it is preferred to weld the head members 3 and 4 to the body 2.

Lifting lugs 5 are preferably welded to each of the heads of the tank near the top, while the bottom of the tank is cradled in the supports 6 which are likewise preferably welded to the body 2.

A valve fitting member 7 is provided at the upper portion of the head 4 of the tank in close proximity to the top of the tank and is preferably formed by forging. An annular flange 8 is formed on the inner end of the fitting to engage the inner side of the head and is complementary to the portion of the head at the opening in which the fitting is mounted. The member 7 may be secured to the tank in any manner, but welding is preferred.

Member 7 is provided with a plurality of threaded openings, to be described, for the reception of several valves which communicate with the vapor zone in the top of the tank. The openings in valve fitting member 7 are all of standard taper pipe thread so that readily available standard commercial fittings may be used therein. This is important in that there is no need to use a one-piece multi-head fitting which is of complicated structure and expensive. Likewise, the replacement of any particular valve fitting is comparatively simple because the fittings are standardized.

With reference to Figs. 2 and 3, particularly Fig. 3, it will be noted that valve fitting member 7 has a plurality of openings drilled therein and screw threaded for the reception of several necessary valves and gauges. One such valve is the house-line or shut-off valve 9 which is threaded into the opening 10. Valve 9 is located as high as possible in valve fitting member 7 to substantially eliminate the possibility of liquid entering the valve.

A port or passageway 11 in the fitting 7 provides communication between shut-off valve 9

and the vapor zone of the tank. This passageway is angularly disposed downwardly toward the interior of the tank, and permits any condensate which might form in the passageway to drip back into the tank.

A relief valve 12 is located to the left and adjacent to house-line valve 9 and is threaded into an opening 13 terminating at a level below that of the port 11. A vapor return valve 14 is threadedly received within an opening 15 in the member 7 and provides a connection for a hose or the like to vent the vapors into the tank truck when filling the tank and equalize the pressure therebetween. All of the vapor valves, namely, house-line valve 9, relief valve 12, and vapor return valve 14, are all located well above the level of the liquid within the tank 1. None of the vapor valves utilize an internal conduit or pipe leading to the vapor zone.

A liquid level gauge 16, of the well-known magnetic type, is secured in an opening 17 in the member 7. This gauge utilizes a float 18 within the tank as best shown in Figure 1.

A filler valve 19 is threaded into an opening 20 located near the lower edge of valve fitting member 7. An inwardly and downwardly inclined passageway 21 provides communication between filler valve 19 and a filling and eduction pipe 22 which is threadedly secured to the inner end of the passageway. Pipe 22 extends into the tank with one end located near the bottom of the tank. This permits easy withdrawal of the contents of the tank at any time should this become desirable.

A fixed liquid level gauge constituting an opening 23 in member 7 is located substantially abreast and to the right of filler valve 19 but at a slightly higher level. The opening 23 is kept open when the tank is being filled so that when the liquid within the tank has reached the highest permissible level for safety, visual indication of this fact is possible. The opening is normally closed by a screw plug 24.

A pressure regulator valve 25 is secured to the head 4 of the tank and is connected to the house-line or shut-off valve 9 by a pipe or conduit 26. A conduit 27 leading from the outlet side of regulator valve 25 is connected to the house-line and conveys the gas to the appliances in which it is to be used.

A protective casing member 28 may preferably be employed to enclose all of the valve fittings located on the end of the tank. Provision may be made to hinge the casing to the tank end so that the fittings enclosed therein may not be tampered with. When the casing is opened, all the fittings are easily accessible and a reading of the magnetic liquid level gauge may be readily taken by virtue of this gauge being located at substantially eye level.

It has been found that a tank having all fittings mounted on one end of the same, and in the manner described in the embodiment herein explained, can be loaded and handled more easily than tanks having fittings mounted, for instance, on their tops. Top fittings are generally cumbersome and present shipping and handling obstacles.

Also, location of the valve fitting in the tank wall above the level of the liquid contained in the tank eliminates internal pipes in the vapor zone of the tank and problems arising due to condensation being trapped in such pipes.

Various embodiments of the invention may be employed within the scope of the accompanying claims.

I claim:

1. A liquified gas dispensing system comprising a horizontal cylindrical pressure storage tank having end heads of generally elliptical shape with one of said heads provided with an opening adjacent the knuckle curvature thereof near the top of the tank, a unitary valve fitting of hollow cast metal welded to said latter head and closing said opening therein, a filler tube secured to the inside of said fitting and extending downwardly within the tank to open near the bottom thereof, a filler valve threaded to said fitting and communicating with said filler tube by means of a passage through said fitting, a central opening in said fitting, a liquid level gauge closing said opening and having float means extending within the tank for operative response to liquid level therein, a fixed level gauge constituting an opening through the fitting above the filler valve for observing the filling of the tank with liquid and normally closed when the tank is not being filled, a relief valve threaded to said fitting and communicating by a separate passage through the fitting directly with the vapor space in said tank, a vapor return valve threaded to said fitting and communicating by a separate passage through the fitting directly with the vapor space in said tank, a vapor discharge shut-off valve threaded to said fitting and communicating by a separate passage through the fitting to the vapor space of said tank near the top of the latter, a vapor discharge conduit connected to said shut-off valve to receive vapor from the tank when said valve is open, a pressure regulator in said conduit adjacent said fitting with a connection therein for a conduit leading to the place of use of said vapor, and a housing hinged to said tank end and disposed to cover the said valve fitting and valves and regulator all within the diameter of the tank whereby shipment of a plurality of the tanks with the valves assembled thereon may be made in stacked relation without danger of injury to the valves or of interference in space requirements by the valves, and said valve fitting serving as a unitary header in the vapor space of the tank for separate access of the several vapor connections direct to the vapor space within the tank.

2. A liquified gas dispensing system comprising a horizontal cylindrical pressure storage tank having end heads of generally elliptical shape with one of said heads provided with an opening adjacent the knuckle curvature thereof near the top of the tank, a unitary valve fitting of hollow metal secured to said head and closing said opening therein, a filler tube secured to the inside of said fitting and extending downwardly within the tank to open near the bottom thereof, a filler valve secured to said fitting and communicating with said filler tube, liquid level indication means provided in said fitting and adapted to ascertain the level of liquid in the tank, a relief valve secured to said fitting and communicating by a passage through the fitting directly with the vapor space in said tank, a vapor return valve secured to said fitting and communicating by a passage through the fitting with the vapor space in the tank, a vapor discharge shut off valve secured to said fitting and communicating through the fitting directly with the vapor space of the tank, and a vapor discharge conduit connected to said shut off valve to receive vapor from the tank when the valve is open, said valve fitting and valves being within the diameter of the tank whereby shipment of

a plurality of tanks with the valves assembled thereon may be made in stacked relation without danger of injury to the valves or of interference in space requirements by the valves, and said valve fitting serving as a unitary header in the vapor space of the tank for access of the several vapor connections direct to the vapor space within the tank.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,129,837	Tanner	Feb. 23, 1915
2,131,270	Chittim	Sept. 27, 1938
2,186,924	Hooper et al.	Jan. 9, 1940
2,216,917	Klumb et al.	Oct. 8, 1940
2,386,554	Holicer	Oct. 9, 1945
2,449,119	Holicer	Sept. 14, 1948
2,449,352	White	Sept. 14, 1948
2,478,760	Holicer	Aug. 9, 1949
2,512,024	Kilham	June 20, 1950
2,513,181	Kilham	June 27, 1950