Oct. 17, 1950 F. P. DE LARZELERE 2,525,874

VAPORIZER FOR LIQUEFIED PETROLEUM GAS DISPENSING SYSTEMS

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Fig: 1.

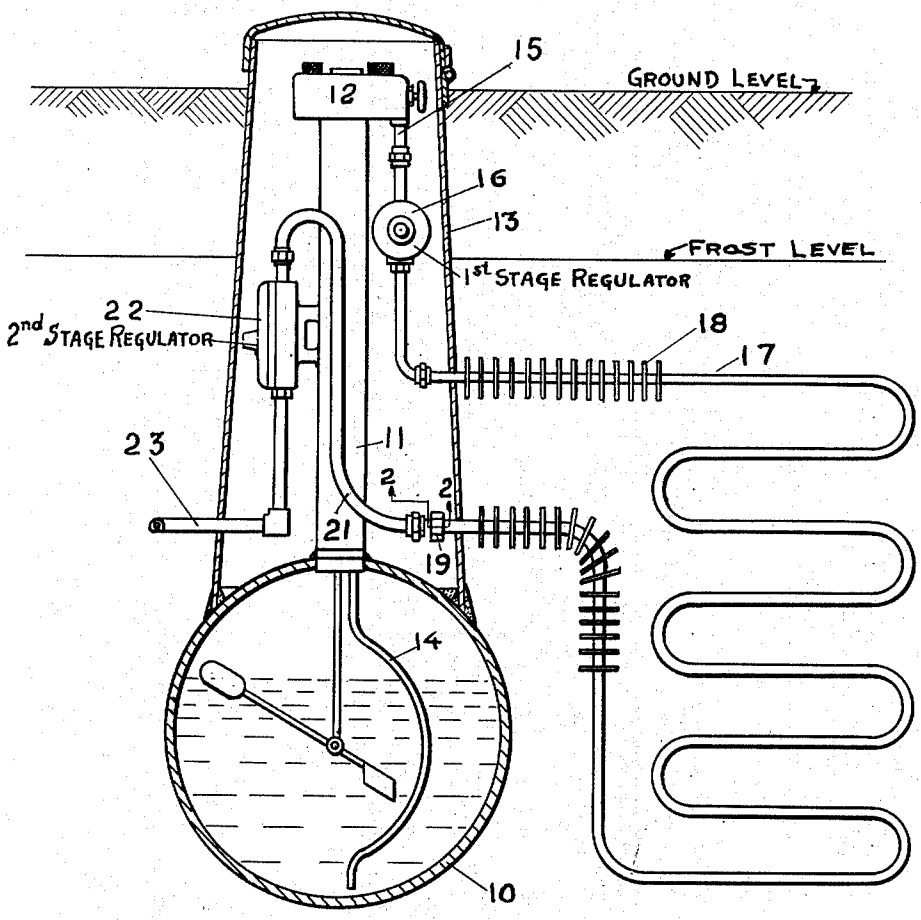
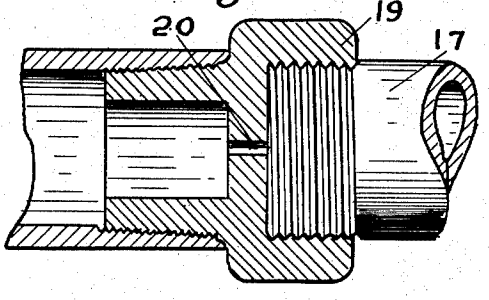


Fig: 2



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VAPORIZER FOR LIQUEFIED PETROLEUM GAS DISPENSING SYSTEMS

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4 Claims. (Cl. 62—1)

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This invention relates to liquefied petroleum gas dispensing (L. P. G.) systems wherein liquefied gas, such as commercial butane, is stored in a pressure vessel and vaporized for use in domestic appliances. More particularly, the invention involves a liquid eduction system of this type employing a vaporizer between pressure reducing regulators, and the idea is to provide an underground vaporizer with a restricting orifice which will positively prevent overloading the system beyond the capacity of the vaporizer to supply dry gas to the appliances. In other words, the idea is to limit the maximum flow of gas to an amount within the capacity of the vaporizer independently of the control of the regulators. Experience has demonstrated that many such systems are overloaded, because the second-stage pressure reducing regulators have valve openings which permit the flow of gas at a greater rate than the vaporizing capacity of the particular vaporizer. This invention, therefore, provides an underground vaporizer which has a definite heat absorbing capacity at the usual pressure and temperature existing between the first and second stage regulators, with a restricting orifice at its outlet to limit the delivery of vaporized gas to its vaporizing capacity.

Other aims and advantages of the invention will appear in the specification, when considered in connection with the accompanying drawing, wherein:

Fig. 1 is a diagrammatic sectional view, partly in elevation, of an underground system embodying the invention; and

Fig. 2 is an enlarged sectional view of a restricting orifice member employed in the outlet end of the vaporizer in Fig. 1.

Referring particularly to the drawing, the type of L. P. G. liquid eduction system there shown, is generally similar to that disclosed in U. S. Patent No. 2,176,829, wherein a charge of liquefied butane is stored in an underground tank 10 having a standpipe 11 and a filling and dispensing fitting 12. The standpipe and fitting are usually arranged in a protecting casing 13 mounted on the tank. Gas is delivered from the tank in the liquid phase through a liquid eduction tube 14 submerged in the liquid at the bottom of the tank. It passes through the valved fitting 12 to an outlet nipple 15; thence, through a first stage pressure reducing regulator 16 which reduces the pressure to, say, about five pounds, gauge.

The vapor pressure generated in the underground tank 10, due to the absorption of heat from the surrounding earth, will cause the liquid

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to pass through the liquid eduction tube 14. It is partially vaporized as it passes through the pressure reducing valve in the first stage pressure reducing regulator, and the residual liquid is vaporized in an underground vaporizer 17, shown as being of the coil type having heat conducting fins 18. However, the particular type of vaporizer is immaterial. At the outlet end of the vaporizing tube or coil there is shown a restricting orifice member 19 which is in the form of a pipe fitting and has a small opening 20, shown in Fig. 2, designed to permit the flow of vapor at a rate not exceeding the vaporizing capacity of the coil. Thence, the vapor passes through a conduit 21 to a second stage pressure reducing regulator 22 which reduces the pressure of the vapor from that existing in the vaporizer to the usual service pressure of about six ounces. It is then delivered through an underground service pipe 23 to the gas consuming appliance (not shown).

The size of the valve orifice in the second stage pressure reducing regulator is usually much larger than that of the restricting orifice associated with the vaporizer and such systems can be overloaded, due to an excessive fuel demand, if the restriction is not employed. The size of the orifice is determined by the nature of the liquefied gas used, the effective heat exchanging surface of the vaporizer, the pressure and the resulting temperature existing in the vaporizer between the two pressure regulators, and the average temperature of the earth below frost level. In other words, the rate of heat absorption by the vaporizer determines the quantity of gas at the pressure existing in the vaporizer which can be vaporized and delivered without being mixed with residual liquid. The delivery of residual liquid through the outlet orifice and the second stage pressure reducing regulator will cause serious trouble, because the heat content of the liquid is many times greater than that of the vapor or gas. All of the burners are set to supply only enough air for complete combustion of dry gas or vapor.

From the foregoing description, it will be understood that vaporizers for liquid eduction systems of the type disclosed, may be designed to insure the delivery of dry gas, within the capacity of the system to generate it and without any danger of overloading. They will also promote the efficiency of the gas consuming appliances. Moreover, the invention is equally applicable to systems employing aboveground pressure storage tanks.

Obviously, the invention is not restricted to the particular form herein shown and described.

Having thus described the invention, what is claimed is:

1. In a liquefied petroleum gas dispensing system the combination including a vaporizer, a conduit for withdrawing liquefied gas from a storage tank and conducting said gas to said vaporizer, a pressure reducing regulator in said conduit, a second conduit leading from said vaporizer to a point of use, and a flow limiting orifice in said second conduit said orifice being of such size as to provide a flow of dry gas therethrough equivalent to the capacity of the vaporizer.

2. In a liquefied petroleum gas dispensing system the combination including an underground vaporizer, a conduit for withdrawing liquefied gas from a storage tank and conducting said gas to said vaporizer, a pressure reducing regulator in said conduit, a second conduit leading from said vaporizer to a point of use, and a flow limiting orifice in said second conduit, said orifice being of such size as to provide a flow of vapor less than the capacity of the vaporizer to vaporize liquid at the minimum expected ground temperature.

3. In a liquefied petroleum gas dispensing system the combination including a vaporizer, a pressure reducing regulator for controlling the pressure of fluid delivered to said vaporizer and a flow limiting orifice in the outlet of said vaporizer providing a maximum rate of flow therethrough less than the capacity of said vaporizer.

4. A liquefied petroleum gas dispensing system of the liquid eduction type comprising an underground storage tank, an underground vaporizer for the liquid fuel arranged between a pair of pressure reducing regulators, and a restricting orifice member in the outlet conduit from the vaporizer and between said pair of regulators, said orifice being of such size as to provide a maximum flow of gas at the pressure existing in the vaporizer equivalent to the capacity of the vaporizer to generate the gas.

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