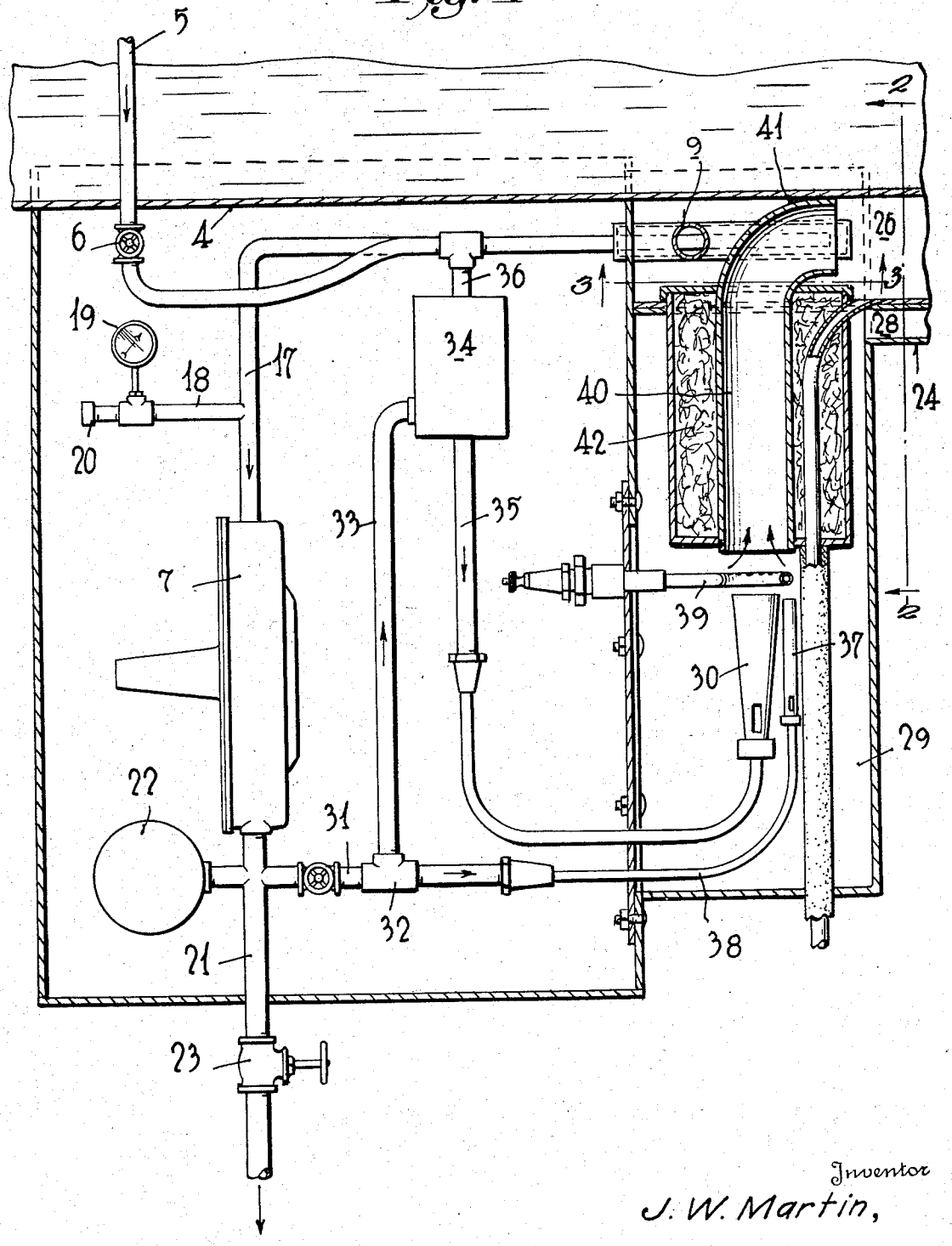
May 25, 1943. J. W. MARTIN 2,319,819

LIQUEFIED GAS VAPORIZER

Filed Oct. 4, 1941 2 Sheets-Sheet 1

Fig. 1



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Filed Oct. 4, 1941 2 Sheets-Sheet 2

Fig. 2

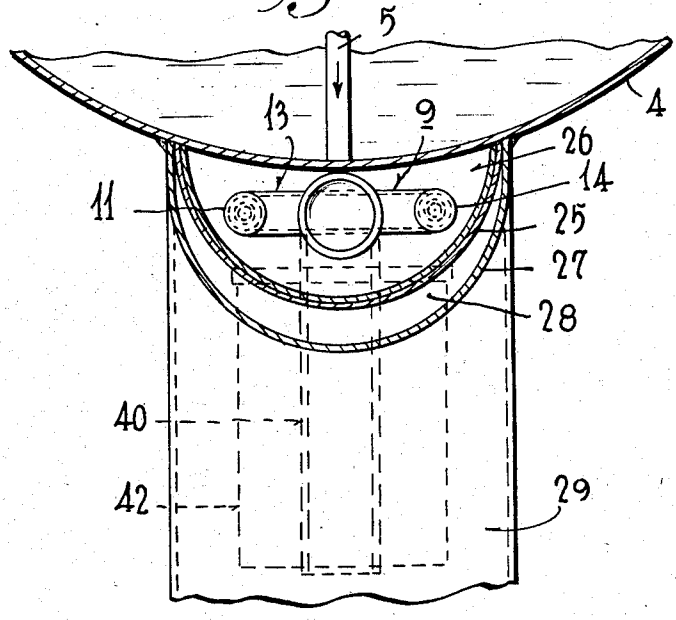
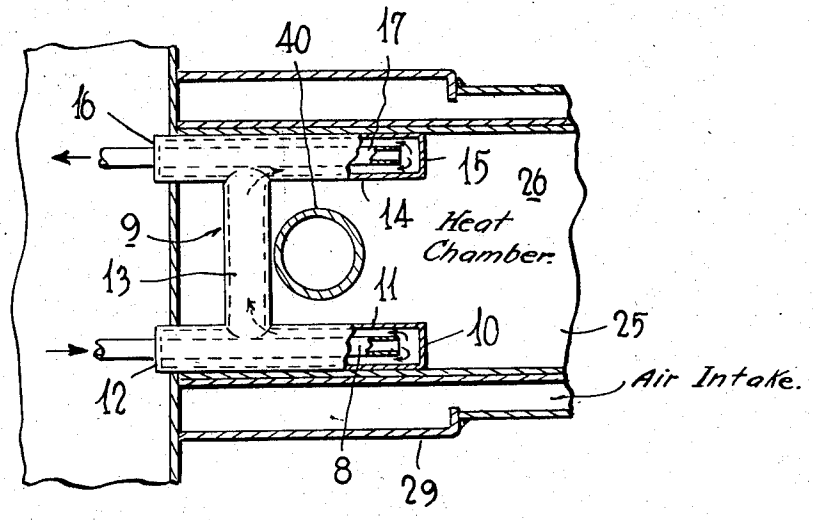


Fig. 3



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2,319,819

LIQUEFIED GAS VAPORIZER

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Application October 4, 1941, Serial No. 413,670

8 Claims. (Cl. 62—1)

This invention relates to vaporizing apparatus, and especially to a vaporizer adapted to vaporize liquefied hydrocarbon gases such as propane, butane, propylene, butylene, etc. or mixtures thereof.

In my Patent No. 2,084,297, and my application Serial No. 410,766, filed Sept. 13, 1941, I disclosed embodiments of a vaporizing apparatus, and set forth certain objects relating to the treatment of liquefiable hydrocarbon gases. The main object of the present invention is to improve such apparatus.

Another object is to provide an apparatus particularly adapted for use in connection with liquefied gases, and including means whereby the gas, before reaching a regulator (controlling the service line), receives heat and is thus maintained above the temperature at which any moisture content would freeze, thereby preventing the regulator from becoming inoperative due to freezing.

A further object is to provide a preheater of novel construction adapted to be heated by the same heater employed in heating the contents of a tank in which the liquefied gas is stored.

A further object is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purposes for which it is designed.

Other features of the invention residing in particular details of construction and characteristic relation of structural parts will hereinafter appear. The accompanying drawings illustrate the invention, and the scope of such invention will be pointed out in the claims.

In the drawings:

Fig. 1 is a vertical sectional view, partly in elevation, of an embodiment of the invention shown in connection with a liquefied gas storage tank, and means for heating the latter, such tank and means being only partially shown.

Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 1.

Referring to the drawings, 4 designates the bottom portion of a tank or receptacle for the storage of liquefied hydrocarbon gases. Vapors from such gases are discharged from the upper portion of the tank through a pipe 5 in which a control valve 6 is interposed. In my previous apparatus, the pipe 5 led directly to the regulator 7, but in accordance with the present invention, the pipe leads, as best shown in Fig. 3, to the intake inner tube 8 of a substantially H-shaped preheater 9. The inner tube terminates near the closed end 10 of an outer tube 11, the opposite end of which is closed, as indicated at 12. A cross pipe 13 connects the medial portion of the outer tube 11 to a similar portion of an outer tube 14 of the discharge leg of the preheater. This outer tube also has closed ends, as indicated at 15 and 16, and gases are discharged from the tube 14 by means of an inner discharge tube 17 having one of its ends located near the closed end 15 of the tube 14. Tube 17 leads to the regulator 7 and may have a branch pipe 18 provided with a pressure gauge 19 and a removable cap 20. After the gas passes through the regulator, it enters a service line 21 provided with a service safety relief valve 22 and a service cock 23.

In accordance with my above mentioned application, a tube of U-shaped cross-section, indicated at 24 in the drawings of the present application, extends along the bottom of the tank for use in heating the latter. This tube has a top portion 25 which, together with the bottom of the tank, forms a heat chamber 26. The top portion 25 and bottom portion 27 of the tube form a flue 28 through which air may be introduced into a burner compartment 29 and be preheated on its way by hot gases of combustion travelling through the chamber 26.

In accordance with the present invention, gas, after travelling through the regulator, can flow to the heat supplying burner 30 arranged in the compartment 29. This is accomplished by a valved branch 31 leading from the service pipe to a T 32 that has an upwardly extending branch connected to one end of a conduit 33. The other end of the conduit is connected to a pressurestat 34 through which the gas passes on its way to the burner line 35. At this point it will be noted that the pressurestat is connected by a branch 36 to the gas conducting pipe 5 so that the pressure of the vapor leaving the storage tank may be used to control the pressurestat. Obviously, a thermostat could be substituted for the pressurestat so that the heat of the liquid or vapor in the storage tank could be employed to control the flow of the gas to the main burner 30. A pilot burner 37 is connected by a tube 38 to one end of the T 32, and an electric ignition device 39 may be employed to ignite the pilot burner. Hot gases of combustion from both burners are discharged through an elbow-shaped stack 40 into the heat chamber 26, and such stack may be welded directly to the bottom of the tank, as indicated at 41. It will be noted that its upper portion extends between the legs of the preheater 9, and it is manifest that the preheater can be directly secured to the stack, if desired, so that heat from the stack will be directly transmitted to the metal forming the preheater. An insulation jacket 42 surrounds the stack between the burner and the heat chamber to prevent the dissipation of heat, and it may be seen in Fig. 3

that the main portion of the preheater is within the heat chamber.

From the above it is believed that the operation of the vaporizer will be obvious, but I may point out that the heat from the burners, in accordance with my prior apparatus, as disclosed in my above mentioned application, is not only employed to heat the contents of the storage tank and the air used for combustion, but in addition, heat up the preheater 9 so that the vapors or gases supplied to the regulator, pressurestat and burners, will be kept in such condition as to prevent the freezing of moisture therein.

Obviously, the invention is not limited to the details of the illustrated construction. These may be variously modified within the scope of the appended claims. Moreover, it is not indispensable that all features of the invention be used conjointly, since various elements may be employed to advantage in different combinations and sub-combinations.

What I claim and desire to secure by Letters Patent is:

1. In vaporizing means of the type having a storage receptacle for liquefied gas, a heat chamber for use in heating the receptacle from the exterior thereof, burner means for below said heat chamber for supplying heat directly to the heat chamber, fuel supply means for leading fuel from the storage receptacle to the burner means, and a regulator interposed in said fuel supply means, the improvement which comprises a preheater for the fuel interposed in the fuel supply means anterior to said regulator and arranged to be heated by heat supplied from the burner means.

2. In vaporizing means of the type having a storage receptacle for liquefied gas, a heat chamber for use in heating the receptacle from the exterior thereof, burner means for supplying heat to the heat chamber, fuel supply means for leading fuel from the storage receptacle to the burner means, and a regulator interposed in said fuel supply means, the improvement which comprises a preheater for the fuel interposed in the fuel supply means anterior to said regulator and arranged to be heated by heat supplied from the burner means, said preheater including substantially parallel outer tubes having closed ends, a cross tube connecting the outer tubes, an inner intake tube extending into one of the outer tubes and terminating near one of the closed ends of the latter, and an inner discharge tube extending into the other outer tube and terminating near one of the closed ends of the latter.

3. In a vaporizing means of the type having a storage receptacle for liquefied gas, a heat chamber extending along the bottom portion of the exterior of said receptacle, a stack communicating with and depending from said heat chamber, burner means below said receptacle for supplying hot gases of combustion to the stack, fuel supply means for leading fuel from the storage receptacle to the burner means, and a regulator interposed in said fuel supply means, the improvement which comprises a preheater for the fuel extending into the heat chamber adjacent to the stack and interposed in the fuel supply means anterior to said regulator.

4. In a vaporizing means of the type having a storage receptacle for liquefied gas, a heat chamber extending along the bottom portion of the exterior of said receptacle, a stack depending from said heat chamber, burner means for supplying hot gases of combustion to the stack, fuel supply means for leading fuel from the storage receptacle to the burner means, and a regulator interposed in said fuel supply means, the improvement which comprises a preheater for the fuel extending into the heat chamber adjacent to the stack and interposed in the fuel supply means anterior to said regulator, said preheater including substantially parallel outer tubes having closed ends, a cross tube connecting said outer tubes, an inner intake tube extending into one of the outer tubes and terminating near one of the closed ends of the latter, and an inner discharge tube extending into the other outer tube and terminating near one of the closed ends of the latter.

5. In vaporizing means of the type having a storage receptacle for liquefied gas, a heat chamber for use in heating the receptacle, burner means below the heat chamber for supplying heat directly to the heat chamber, means for conducting gas from the receptacle to the burner means, and a regulator interposed in the gas conducting means, the improvement which comprises a preheater for the gas extending into the heat chamber and interposed in said gas conducting means anterior to said regulator.

6. In vaporizing means of the type having a storage receptacle for liquefied gas, a heat chamber for use in heating the receptacle from the exterior thereof, burner means for supplying heat to the heat chamber, fuel supply means for leading fuel from the storage receptacle to the burner means, and a regulator interposed in said fuel supply means, the improvement which comprises a preheater for the fuel interposed in the fuel supply means anterior to said regulator and arranged to be heated by heat supplied from the burner means, and a pressurestat controlling said burner means and operatively connected to the fuel conducting means anterior to said preheater.

7. In vaporizing means of the type having a storage receptacle for liquefied gas, a heat chamber for use in heating the receptacle, burner means for supplying heat to the heat chamber, means for conducting gas from the receptacle to the burner means, and a regulator interposed in the gas conducting means, the improvement which comprises a preheater for the gas extending into the heat chamber and interposed in said gas conducting means anterior to said regulator, said preheater including substantially parallel outer tubes having closed ends, a cross tube connecting the outer tubes, an inner intake tube extending into one of the outer tubes and terminating near one of the closed ends of the latter, and an inner discharge tube extending into the other outer tube and terminating near one of the closed ends of the latter.

8. In vaporizing means of the type having a storage receptacle for liquefied gas, a heat chamber extending along the exterior of the bottom of the receptacle, burner means below said chamber for supplying heat directly to the heat chamber, means for conducting gas from the receptacle to the burner means, and a regulator interposed in said gas supply means, the improvement which comprises a preheater for said gas arranged substantially horizontally below the receptacle, interposed in the gas conducting means anterior to said regulator, and arranged to be heated by heat supplied by said burner means.

JAMES WOODWARD MARTIN.