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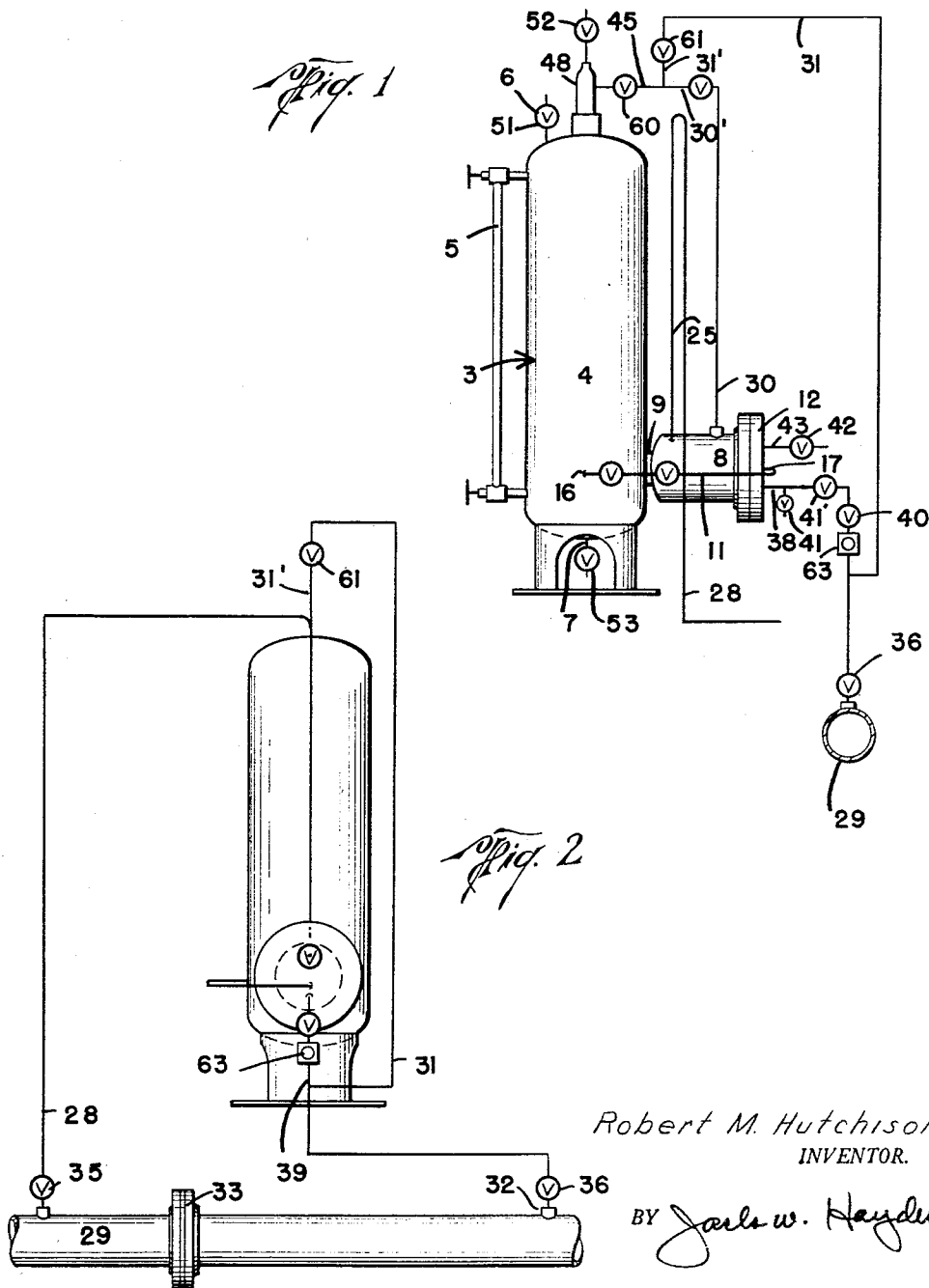
R. M. HUTCHISON

2,921,844

ODORIZING UNIT

Filed March 25, 1955

2 Sheets-Sheet 1



Robert M. Hutchison
INVENTOR.

BY *James W. Hayden*

ATTORNEY

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Fig. 3

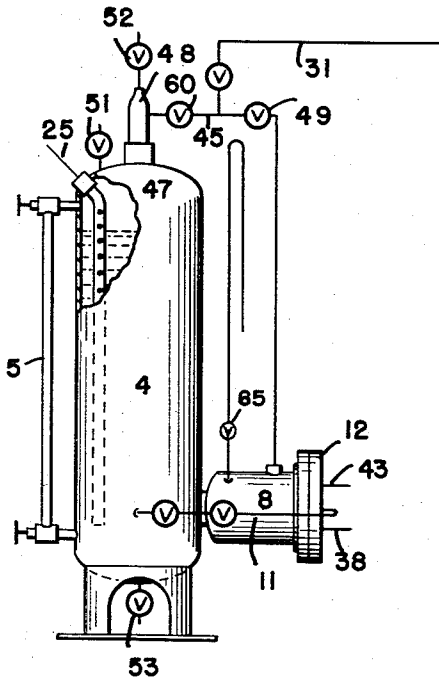
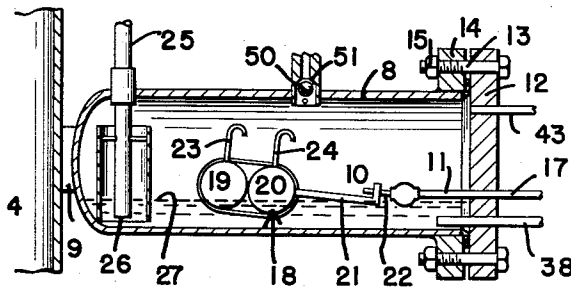


Fig. 4

Robert M. Hutchison
INVENTOR.

BY *John W. Hayden*

ATTORNEY

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ODORIZING UNIT

Robert M. Hutchison, Houston, Tex.

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2 Claims. (Cl. 48—195)

The present invention relates to an odorization unit for gas lines and more particularly to an improved form of odorization unit.

Natural gas consumed in the home and factory is, for all practical purposes, odorless. Because of its explosive and lethal qualities, it is desirable that the gas be odorized so that leaks in gas supply lines may be easily and quickly noted and steps taken to locate and repair the leak.

It is, of course, desirable that a sufficient and uniform rate of introduction of odorant be maintained to the gas line in order to insure that gas flowing through the line will be completely and uniformly odorized at all times.

In the transmission of gas, it is of course, necessary to maintain a pressure at various stages along the transmission line sufficient to flow the gas to the next pressure stage or to the point of use whichever is first. The pressure in the gas transmission line will depend upon numerous factors such as, for example, the volume of gas to be transmitted and the distance between repressuring stages. However, it is not uncommon for the pressure in such transmission lines to equal or exceed 700 to 1,000 pounds per square inch.

The present invention provides an odorization unit which will accommodate both low and high gas pressures and which will properly discharge odorant into the gas line under such pressures. The unit is also provided with various safety means so that in case of failure of certain parts thereof, the entire amount of liquid odorant in the odorization unit will be prevented from discharging into the gas main.

Another object of the invention is to provide a liquid odorization unit for a gas main, including a storage tank for the odorant, a housing secured thereto, means for conducting odorant from said tank to said housing and maintaining a desired liquid level of odorant in the housing, and additional means to prevent overflow of odorant from said housing to the gas line if said means for maintaining said liquid at a desired level should fail.

Still another object of the invention is to provide an odorization unit wherein the gas may be odorized by a combination absorption and drip type process or by either of such processes alone, if desired.

The present invention also provides additional advantages and improvements which will become quite apparent from a consideration of the following description and drawings wherein:

Fig. 1 is an elevational view illustrating one form of the invention;

Fig. 2 is an elevational view of Fig. 1 wherein the view illustrated in Fig. 2 is rotated 90° relative to the view shown in Fig. 1;

Fig. 3 is a sectional view of a portion of the invention and illustrates a liquid odorant chamber or housing which is provided with means for inhibiting overflow of the liquid odorant from the chamber into the gas line being odorized; and

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Fig. 4 is an elevational view, partly in section, somewhat similar to Fig. 1, but illustrating a modification of the invention.

In Fig. 1, one form of the odorization unit is generally illustrated by the numeral 3. Such unit includes a storage tank 4, which storage tank is adapted to receive liquid odorant therein. If desired, a sight gage glass, as illustrated at 5, may be secured to the tank for indicating the liquid level of the odorant therein. Such odorant may be poured into the tank through the connection 48, which connection is provided with a valve 52. The connection 6 may serve as a suitable means in case it is desired to blow down the liquid storage tank during cleaning thereof. Also, a drain connection 7 is provided at the lower end of the tank 4 for draining the liquid odorant from the tank should it become desirable, for any reason, to clean the tank 4, which may be necessary over an extended number of years of use. A valve 53 is provided whereby such drain may be closed during operation of the odorization unit.

A housing 8 is secured to the storage tank 4 by any suitable means such as the welded connection 9, the housing 8 being secured to the tank 4 adjacent the lower end thereof so that the liquid in the tank 4 may flow to the housing 8 as it is needed. The housing 8 is closed at its outer end by any suitable means such as the blind flange 12 which may be secured to the housing by any suitable means such as the bolts 13 extending therethrough and through the upwardly extending portion 14 on housing 8. Nuts 15 are adapted to threadedly engage such bolts whereby the blind flange may be quickly and easily positioned on the housing and may be readily removed therefrom for access to chamber 10. The housing 8 with flange 12 thereon forms a chamber 10 which is adapted to receive liquid odorant from the tank 4 by means of the conduit 11 which communicates the tank 4 with the chamber 10.

The conduit 11 is connected at 16 into the lower end of the tank 4 and extends through the blind flange 12 as illustrated at 17. The liquid odorant in the tank 4 may flow therefrom through the conduit 11 and into the chamber 10 and in order to maintain a desired or predetermined liquid level within the chamber, suitable means as illustrated generally at 18 may be provided. Such means includes the paired ball floats 19 and 20 which are connected by the arm 21 to the plunger valve 22 which normally closes off the end of the conduit 11 to prevent flow of odorant from the tank 4. However, when the liquid level of odorant within the chamber 10 falls below a predetermined amount, the floats 19 and 20 actuate the plunger valve 22 to open the conduit 11 for passage of liquid odorant from the tank 4.

Since in some forms of the invention the pressure within the housing 8 may exceed 700 to 1,000 pounds per square inch, it is desirable to provide each of the floats 19 and 20 with vent tubes 23 and 24 on the top thereof whereby the pressure internally and externally of the floats may be equalized to inhibit crushing thereof by the excessive gas pressures.

A gas inlet conduit 25 is connected to housing 8 and a connection communicating therewith extends into chamber 10 with its lower end 26 terminating below the level 27 of the liquid odorant so that gas discharged into the chamber 8 may be intimately contacted with the liquid odorant therein. The gas inlet 25 is connected by suitable conduit means 28 to the main gas line illustrated at 29. A valve 65 is provided in conduit 25 so that when the Fig. 4 modification is used, such valve may be closed to inhibit loss of odorant from housing 8.

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A gas discharge conduit 30 is connected into the top of the housing 8 whereby the odorized gas may be discharged therefrom through line 30', and then through the conduit 31' to the conduit 31 which discharges it back into the main line 29 at 32.

An orifice plate 33 or venturi plug valve is provided in the main gas line and the valves 35 and 36 are arranged in lines 28 and 31 respectively so that a portion of the gas flowing through the main conduit 29 is passed to the gas inlet conduit 25 whereby it passes through chamber 8 and is subsequently discharged through the outlet 30 to discharge conduit 31 and into the main line at 32 where it mingles with the main gas stream. The amount of odorant picked up by the stream of gas passing through the chamber 10 will be used to odorize all of the gas in the main conduit 29 and to this end, the valve 61 is provided to regulate the amount of by-pass of gas from the main line which is to be flowed through the housing 8.

In cases where the gas flow exceeds a predetermined rate, or where dilute odorants are being used, it is usually necessary to supply additional odorant to the gas line 29 and in such event, odorant may be discharged through the conduit 38 from chamber 10 into the discharge line 31 as illustrated at 39. Suitable valve means as illustrated at 40 may be provided for regulating the amount or number of drops per unit of time which is discharged into the gas flow line 31 from the line 38. A sight glass 63 is provided whereby the number of drops of liquid odorant per unit of time may be counted. A drain valve 41 is provided for line 38 and the valve 41' is provided whereby the conduit 38 may be closed off when such unit is not needed. A valve 42 may be connected in line 43 which is connected into housing 8, which line is provided for suitable testing purposes as desired.

If, for any reason, the ball floats 19 and 20 become collapsed, the valve 22 is opened thereby permitting liquid to flow from the tank 4 and fill chamber 10 in housing 8. It is desirable to prevent such fluid from being discharged from housing 8 in unusually large quantities into the gas main 29 and to this end the present invention provides a float check valve 50 which is arranged in the outlet connection or conduit 30 so that if the chamber 10 in housing 8 becomes full of odorant, the float check valve will seat on the seat 51 in conduit 30 and thereby prevent overflow of the odorant into the gas flow line 29. If any liquid should tend to leak by the float valve 50, it would be conducted through conduit 30 and would tend to flow through the conduit 45 and back into the top of the tank 4, since the portion 31' of the discharge conduit 31 is above the level of the portion 30' of the discharge conduit 30 as illustrated in Fig. 1.

When the device is functioning normally, the pressure in the housing 8 and in the tank will be equalized since the conduits 30, 30' and 45 communicate the housing 8 above the level of liquid odorant therein with the tank 4 above the level of liquid odorant.

In Fig. 4, a modification of the invention is illustrated wherein a perforated tube 47 is shown as extending longitudinally of and into the tank 4. In this modification of the invention, the gas inlet connection 25 is connected to the tube 47 whereby gas may be flowed directly into the tank 4 and bubbled through the liquid odorant therein. The gas is then discharged through nipple 48 and connection 45 into line 30', then discharge line 31. Valve 49 would, of course, be closed to prevent flow of the odorized gas to the housing 8. If desired, the drip type arrangement as illustrated in Fig. 1 may be also utilized with that form of the invention shown in Fig. 4 of the drawings. Of course, when the device of either Figs. 1 or 4 is in operation, valves 51, 52 and 53 will be closed to inhibit escape of odorant or odorized gas from the device.

While it is believed that the operation of the invention is apparent from the foregoing description, to further am-

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plify and describe, the invention will be discussed with regard to several applications.

If the volume of gas flow through the main line 29 is relatively small, say, for example up to seven million cubic feet per day, the bubble or absorption type odorization unit of Fig. 1 or Fig. 4 may be used. Of course, in such event, it is desirable that the liquid odorant used be the type that is suitable for an absorption type odorization unit. When the form of the invention illustrated in Fig. 1 is to be used as a bubble type unit, gas is passed in through line 28 and connection 25 and discharged into the chamber 10 beneath the liquid level odorant therein. Such gas is permitted to intermingle with the odorant in the chamber and is subsequently discharged through line 30 where it in turn passes through connections 30' and 31' and then through line 31 to be discharged at 32 into the main line 29. During such operations the valves 51, 52 and 53 are closed so as to prevent escape of odorant or gas from the system and the valve 60 is opened so that the pressure above the odorant in storage tank 4 is the same as the pressure above the odorant in chamber 10.

As the odorant is used from housing 8, additional odorant from the storage tank 4 may be supplied through the conduit 11 when the floats 19 and 20 open plunger valve 22. If the floats 19 and 20 should collapse or rupture, or if for any other reason they should fail during operation of the unit, they would be ineffective to maintain the plunger valve 22 closed, whereupon liquid odorant would flow from the tank 4 to fill the chamber 10. In order to prevent passage of the liquid odorant into the main line 29 in such event, the float valve 50 is provided so that when the chamber 10 fills with liquid odorant it would seat on the seat 51 in outlet 30 thereby closing off communication between the outlet and the chamber and preventing flow of the liquid odorant into the main line 29. Also, to aid in further preventing flow of liquid odorant into the main line 29, under such conditions, the connection 31' which is connected to the outlet 30 extends upwardly above the portion 30' of outlet 30 so that any liquid odorant tending to flow through the outlet 30 would be conducted through the connection 45 and back to the storage tank 4.

If the Fig. 4 modification of bubble type unit is to be used, the inlet line 25 is connected to the perforated tube 47 which extends longitudinally of the tank 4 and is submerged within the liquid odorant. As the gas is discharged through the perforations in the tube 47 it is odorized and then discharged through the nipple 48 where it in turn passes through the outlet 31 and back into the main line 29. The inlet 25 and the outlet in the modification shown in Fig. 4 may be arranged similar to that shown in Fig. 1 as regards the connection to the main line 29 with an orifice plate 33 so as to cause a portion of the gas flowing through the main pipe line 29 to by-pass through the odorization unit, whereby it may be odorized to thus effect odorization of all of the gas when the by-passed portion is discharged thereinto. When the unit shown in Fig. 4 is used, the valves 51, 52 and 53, as well as the valve 49 will be closed to prevent leakage of liquid odorant from the unit.

When the gas flow becomes larger than approximately ten or eleven million cubic feet per day, it is then desirable to use either the combination bubble absorption and drip type odorization method illustrated in Figs. 1 and 4 or the drip method by itself. When the combination procedure is used, for example, in the unit shown in Fig. 1, the gas is passed through the housing 8 as previously described. Also, the valves 40 and 41' in line 38 are opened so as to conduct liquid odorant from the chamber 10 and drip it into the discharge line 31 to insure effective odorization of the gas in the line 29.

Similarly, the combination type unit may be used with the modification shown in Fig. 4 and in such event the

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gas is discharged through the perforated tube as previously described and then discharged to the main line and again liquid odorant is conducted from line 38 and dropped or dripped into the discharge conduit 31 so as to effect satisfactory odorization of the gas in pipe line 29.

If the drip type unit is to be used by itself, then, of course, no gas is flowed through the housing 8 in the Fig. 1 arrangement nor is gas flowed through the tank 4 in the Fig. 4 arrangement. Rather valves 40 and 41' in line 38 are opened and liquid odorant is allowed to pass directly into the main gas line 29 to effect odorization thereof. When the drip method is used by itself the tank 4 and housing 8 serve as a storage and distribution system for the liquid odorant.

From the foregoing it can be readily appreciated that the instant invention provides improvements in odorization units wherein excessive liquid odorant is prevented from entering the pipe line 29 when a failure occurs in the unit.

Also, the invention provides an odorization unit wherein the gas may be bubbled through the odorant to cause absorption of the odorant by the gas to effect odorization thereof, or where the odorant may be dripped directly into the main gas line, or if desired, a combination absorption and drip arrangement may be provided to effect satisfactory odorization of the gas.

Broadly the invention relates to an odorization unit and to an improved type of odorization unit.

What is claimed is:

1. An odorization unit for gas lines including, a storage tank for liquid odorant, a housing secured to said storage tank, a conduit communicating said storage tank with said housing whereby odorant may be transferred from said tank to said housing, valve means in said housing closing the end of said conduit, paired floats mounted in said housing and connected to said valve means whereby said valve means may be actuated by said floats to open said conduit to flow additional odorant from said storage tank to said housing and maintain a desired liquid odorant level, an elongated perforated tube extending longitudinally of said tank, therebeing a gas inlet in said tank to which said tube is connected whereby gas may be bubbled through the odorant

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substantially throughout the length of said tube and said tank to obtain intimate mingling of the gas in the odorant, and therebeing a gas outlet from said tank for discharging the odorized gas, an additional conduit connected from said housing to the gas outlet, and valve means in said last mentioned conduit whereby additional odorant may be injected into said gas outlet from said housing.

2. An odorization unit for gas lines including a storage tank for liquid odorant, an elongated tube perforated substantially throughout its length and extending longitudinally of said tank, therebeing a gas inlet in said housing to which said tube is connected whereby gas from the gas line may be bubbled through the odorant substantially throughout the length of said tube and tank for intimate mingling of the gas in the odorant, and therebeing a gas outlet from said tank for discharging the odorized gas back into the gas line, a housing secured to said storage tank, a conduit communicating said storage tank with said housing whereby odorant may be transferred from said tank to said housing, valve means in said housing closing the end of said conduit, paired floats mounted in said housing and connected to said valve means whereby said valve means may be actuated by said floats to open said conduit to flow additional odorant from said storage tank to said housing and maintain a desired liquid odorant level, an additional conduit connected from said housing to the gas line, and valve means in said last mentioned conduit whereby additional odorant may be injected into said gas outlet from said housing.

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