Jan. 23, 1951 J. J. MALIR, JR 2,539,148

GAS GENERATOR

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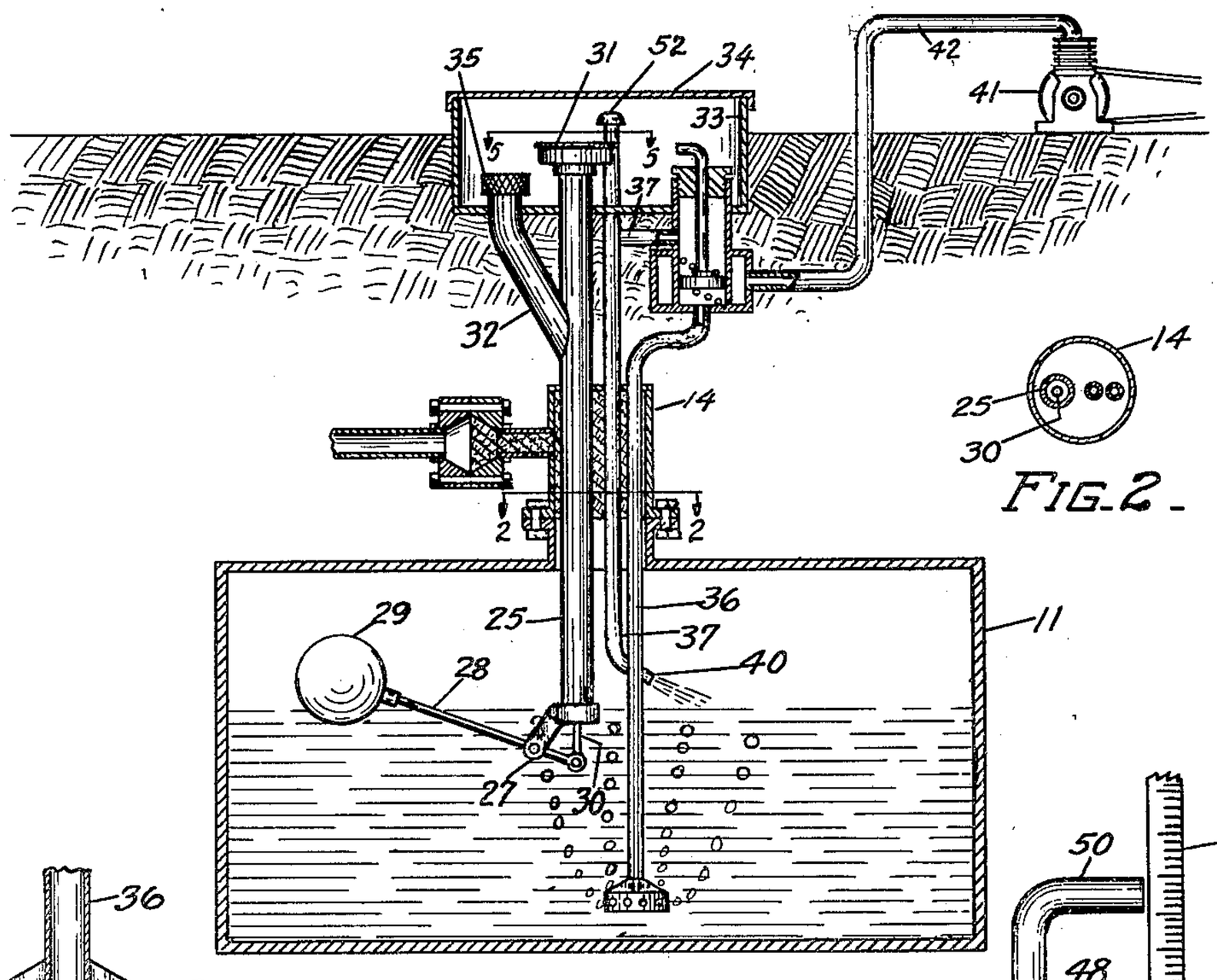

FIG. 1.

FIG. 2.

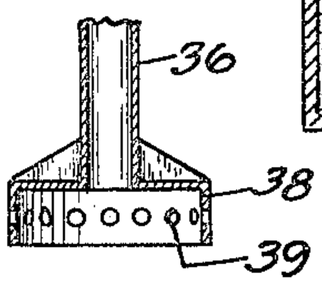

FIG. 6.

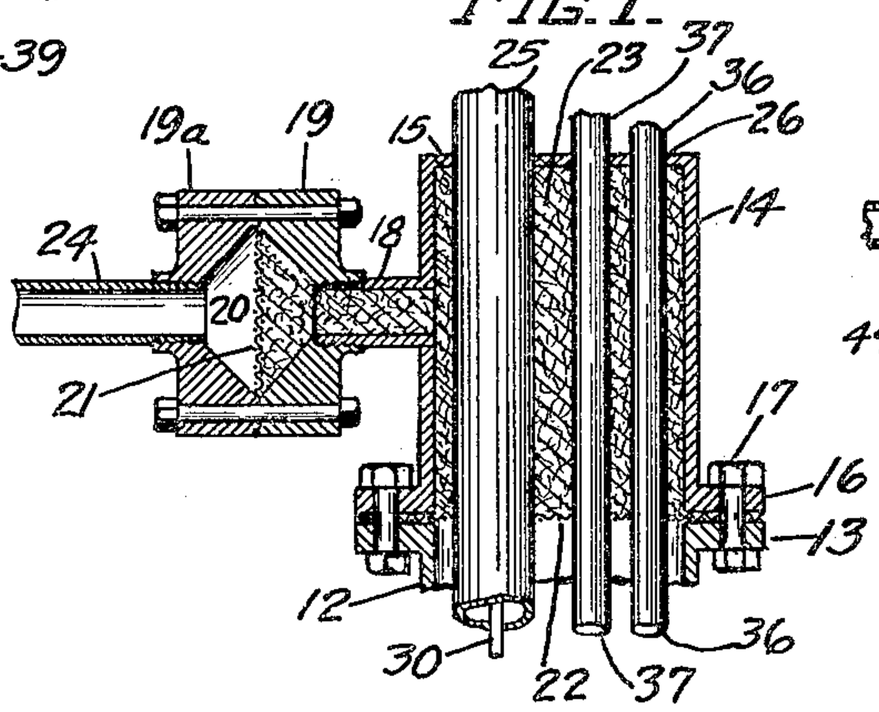

FIG. 4.

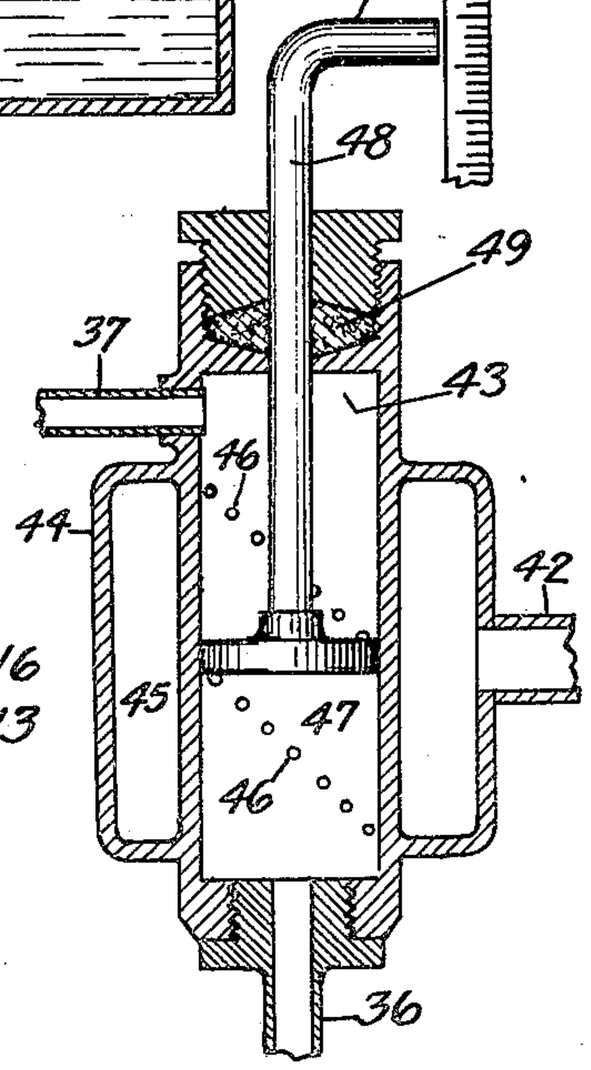

FIG. 3.

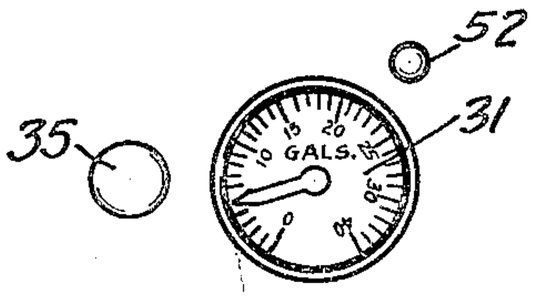

FIG. 5.

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GAS GENERATOR

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5 Claims. (Cl. 261—121)

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This invention relates to improvements in gas generators and has reference more particularly to a generator employing a volatile hydrocarbon.

In many places in our land where the ordinary gas or artificial gas is not available, as, for example, in villages and on farms, gas burning apparatus is usually provided with gas from some local generating plant or gas sold in compressed form in tanks.

It is the object of this invention to produce a simple and economical gas generating plant that employs the volatile hydrocarbon known as pentane. This hydrocarbon can be purchased at a comparatively low price and is exceptionally well suited for use in carbureting air to produce a combustible mixture that can be employed satisfactorily with household equipment, such as gas stoves, gas furnaces and the like.

In order to explain this invention so that it can be readily understood, reference will be had to the accompanying drawing in which the invention has been illustrated in its preferred form, and in which:

Figure 1 is a diametrical vertical section through the apparatus showing the same in position in the ground adjacent the place where the gas is to be consumed;

Figure 2 is a section taken on line 2—2, Figure 1;

Figure 3 is a diametrical section through an air proportioning valve mechanism;

Figure 4 is a diametrical section through the drum containing the copper wool;

Figure 5 is a view looking downwardly in the direction of arrows 5, in Figure 1; and

Figure 6 is a diametrical section through the vaporizer at the lower end of one of the air pipes.

Referring now to the drawing, reference numeral 10 designates the surface of the ground and reference numeral 11 designates a tank which is usually of cylindrical shape. This tank is provided with an upwardly extending cylindrical collar 12 terminating in a flange 13. A cylindrical drum 14, closed at its upper end as indicated at 15, is provided at its lower end with a flange 16 that is bolted to flange 13 by means of bolts 17, as shown in Figure 4. Extending laterally from drum 14 is a short section of pipe 18 that is connected at its outer end with a flash guard comprising two substantially identical members 19 and 19*a*. These members are provided on their inner opposed surfaces with frustoconical recesses 20 that are separated by means of a fine copper screen 21 into two parts. A

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copper screen 22 is clamped between flanges 13 and 16 as shown in Figure 4. The part of drum 14 above screen 22 is filled with copper wool 23. A gas delivery pipe 24 extends outwardly from part 19*a* to the stove or other apparatus where the gas is to be burned.

A fill pipe 25 projects through the top 26 of drum 14 and is welded or otherwise hermetically sealed to the walls of the opening through which it passes. The fill pipe terminates at a point substantially midway between the top and bottom of the tank and is provided at its lower end with two spaced perforated ends 27 between which is pivoted an arm 28 that carries at its end a float 29. A rod 30 is pivotally connected to the short end of rod 24 and extends upwardly through the fill pipe to the gauge 31 that is calibrated to indicate the number of gallons of liquid in the tank. The construction of this gauge has not been shown because it forms no part of this invention and moreover is old and well known. A branch pipe 32 is connected to fill pipe 25 and extends upwardly into the box 33 that is positioned at the top of the ground and which is provided with a cover 34. The upper end of pipe 32 has been shown as provided with a removable cap 35 but is in the actual construction provided with one of the usual quick acting couplings that are normally closed, but with which a pipe from a supply tank wagon can be easily connected. This particular coupling has not been shown because it is old and well known and forms no part of this invention.

In order to generate gas it is necessary to bubble air through the liquid pentane and also to introduce diluting air above the liquid. The introduction of air is accomplished by means of two pipes of somewhat smaller diameter than pipe 25. One of these pipes has been designated by reference numeral 36 and the other by reference numeral 37. Pipe 36 extends to a point near the bottom of the tank where it is provided with an enlargement in the shape of an inverted cup 38 that is preferably provided with a large number of openings 39 in its cylindrical wall. Pipe 37 terminates in a laterally bent end portion 40 to which reference will hereinafter be made. Air under appropriate pressure is provided by means of an air compressor 41 from which a pipe 42 extends to a mixing valve that will now be described. The mixing valve has been shown to an enlarged scale in Figure 3 and consists of a cylinder 43 that is surrounded by another cylindrical member 44 whose ends are connected with the cylinder 43

forming an annular manifold compartment 45. Pipe 42 communicates with compartment 45. The wall of cylinder 43 is provided with a number of small openings 46 through which air may pass. Pipe 37 communicates with the cylinder 43 near its upper end and pipe 36 communicates with the cylinder at its lower end. A piston 47 is slidably mounted in the cylinder and has a piston rod 48 that passes through a stuffing box 49 and terminates at its upper end in a handle 50. Handle 50 terminates adjacent a scale 51 that is provided within the box 33. By moving the piston upwardly or downwardly, the quantity of air that enters the tank 11 through pipes 36 and 37 may be proportioned. The object of this is to get the gaseous mixture of the correct richness. The gas that escapes from the lower end of pipe 36 bubbles upwardly through the liquid and the gas that escapes through the laterally extending end 40 of pipe 37 sets up a turbulence in the gas that produces an intimate mixture. The gas is maintained under a pressure varying from a few ounces to as much as five or six pounds; however, the gas pressure is selected so as to get the desired results and is controlled by means of an apparatus of a well known type that has not been shown in the drawing.

The pentane is replaced from a tank wagon or cylinder in which it is transported under a suitable pressure. The dispensing hose is connected with the automatic coupling at the upper end of pipe 32 and another hose of smaller size is connected with an automatic coupling 52 that extends to the upper end of the tank wagon. This equalizes the pressures and permits the liquid to flow freely into tank 11 until the desired quantity has been reached.

The flash guard serves to eliminate the danger of explosion which otherwise might occur in a plant of this type because the mixture of air and vapor from the pentane in the proportions in which it is delivered is very combustible and precaution must therefore be taken against the possibility of having the gas within the tank ignited by flash back from the stove or furnace.

From the above description it will be apparent that the gas generator that has been illustrated on the drawing and described above is of exceedingly simple construction; that it can be conveniently buried in the ground at a depth where the temperature is fairly constant and when so buried the upper ends of pipes 32 and 37 are available. The richness of the gas can readily be adjusted by means of the proportion valve shown in Figure 3 whose operating handle is accessible when cover 34 is removed from box 33.

Having described the invention what is claimed as new is:

1. A gas generator comprising; a tank for the reception of a volatile liquid hydrocarbon, a unitary control device for said tank comprising a cylindrical drum having means at its lower end detachably securing the unit to securing means on the top of the tank, said drum and securing means being of small size relative to the tank,

said drum projecting upwardly from the tank, the upper end of the drum being closed by a wall and the lower end being open and communicating with the tank, a box having a cover disposed above said wall, a fill pipe secured to and extending through said wall, the lower end being disposed within the tank and the upper end within the box, a source of air under pressure, a first air supply pipe extending through said wall, the lower end terminating near the top of the tank and the upper end within the box, said air supply pipe having coupling means at its upper end for connection to a hydrocarbon supply source, whereby said air supply pipe serves as a vent for the tank during filling thereof, a second air supply pipe secured to and extending through said wall, the lower end thereof terminating near the bottom of the tank and the upper end between said wall and box, an air distributing valve secured to said box having an actuator accessible within the box, constructed to proportion air from said source of air to the two air supply pipes, and conduit means connected to said drum for removing gas from the tank.

2. A gas generator in accordance with claim 1 wherein the securing means at the lower end of the drum comprises a peripheral flange thereon, detachably secured to a similar flange on the tank.

3. A gas generator in accordance with claim 1 including a screen extending across said open lower end of the drum, and a mass of copper wool filling the space within the drum.

4. A gas generator in accordance with claim 1 wherein said fill pipe has branch portions terminating within the box, one branch portion adapted to receive the hydrocarbon when the tank is being filled, and the other branch portion adapted to receive a gage for indicating the quantity of hydrocarbon within the tank.

5. A gas generator in accordance with claim 1 wherein said air distributing valve includes a perforate cylinder and a movable piston therein, the two air supply pipes being connected, respectively, to opposite ends of the cylinder, the construction being such that the position of the piston in the cylinder determines the distribution of air to the two air supply pipes, the piston being connected to said actuator.

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