June 24, 1947. A. J. LALIBERTE 2,422,686

BURNER CONSTRUCTION FOR VAPORIZABLE LIQUID FUEL

Filed July 1, 1943 2 Sheets-Sheet 1

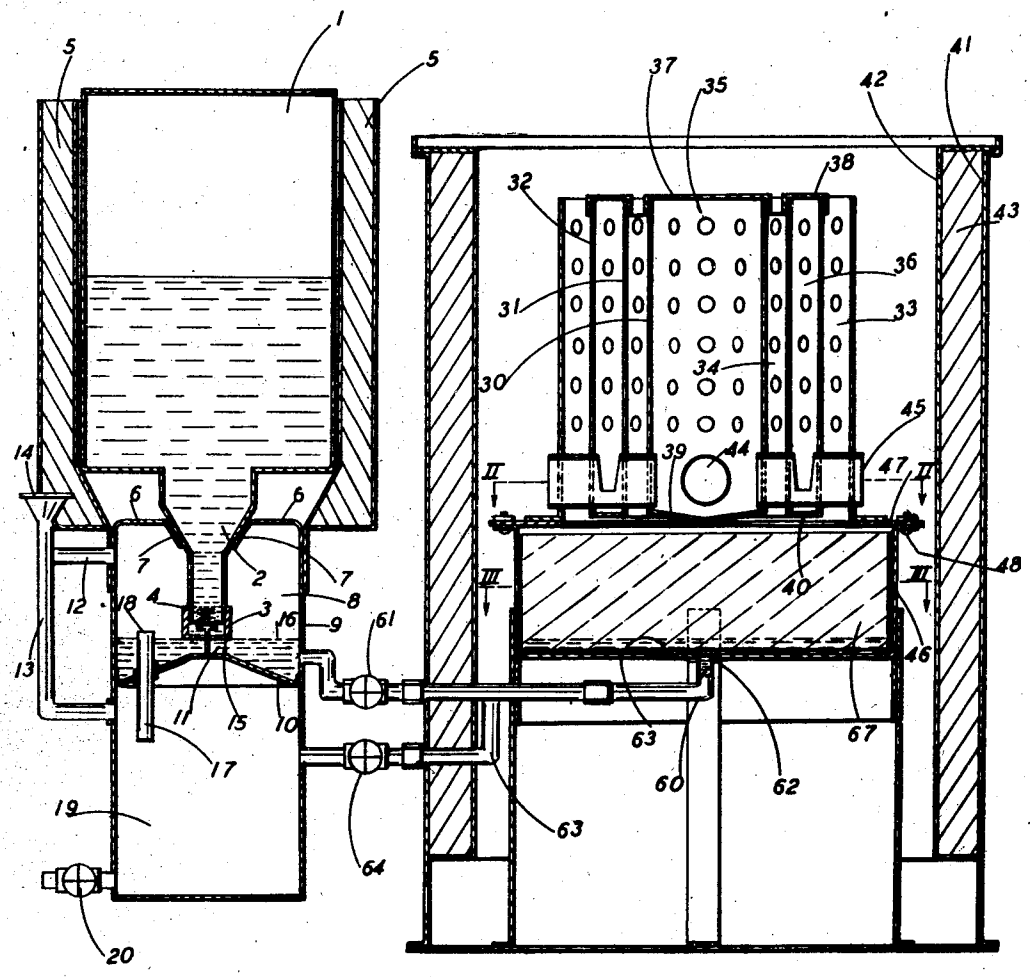


Fig. 1.

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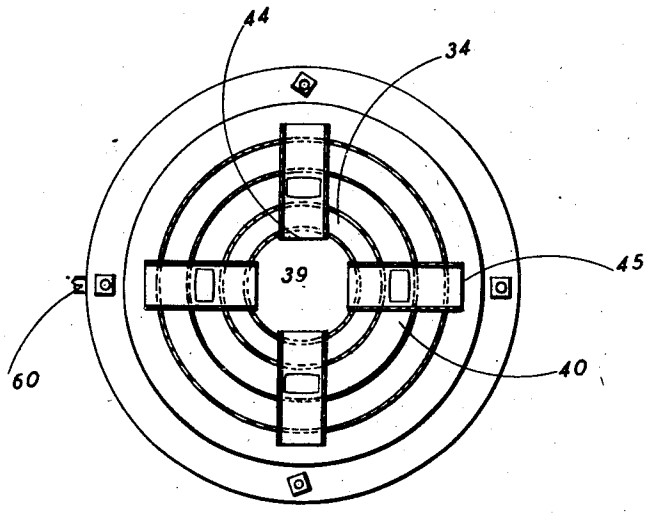


Fig. 2.

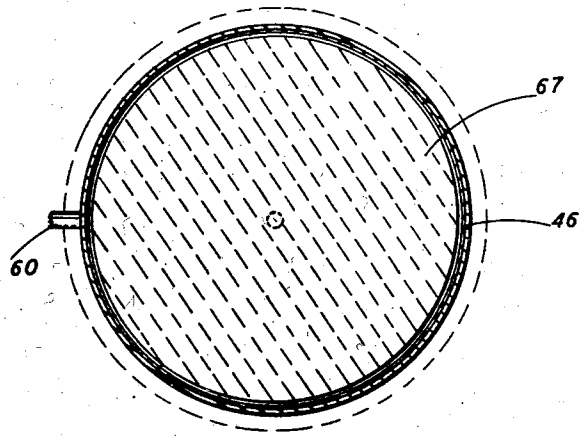


Fig. 3.

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BURNER CONSTRUCTION FOR VAPORIZABLE LIQUID FUEL

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3 Claims. (Cl. 158—96)

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This invention relates to new and useful improvements in burner construction for flammable fuel.

One object of the invention comprises, inter alia, a non-pressure type of burner construction in which the danger of a flash-back from the burner to the fuel feed is substantially eliminated. The improvement in burner construction of the liquid flammable fuel feed type in accordance with the invention essentially comprises a capillarily porous material and preferably a compacted infusorial material, such as a stone, brick, plug or the like of diatomaceous, preferably calcined, material, arranged and positioned with at least a portion of its upper surface in fuel-vapor feed communication with the combustion space of such burner construction, and means for feeding fuel to said material, preferably in combination with means for maintaining the normal fuel feed level below such upper surface position and in contact with the capillarily porous material.

The invention, within the preferred embodiment thereof, includes a fuel receptacle in fuel-vapor feed communication with the combustion space of the burner construction having the aforementioned capillarily porous material therein arranged, preferably as a disk or block, to substantially form with at least a portion of its upper surface a closure for the receptacle with respect to the vapor feed communication.

The invention will be more fully understood and further objects thereof will appear from the following description read in conjunction with the drawings, in which:

Figure 1 illustrates a cross-sectional side view through a burner construction in accordance with the invention.

Figure 2 is a cross-sectional top view through part of the construction illustrated in Figure 1 on the plane II—II thereof; and

Figure 3 illustrates a cross-sectional top view through part of the construction shown in Figure 1 on the plane III—III thereof.

As illustrated in the drawings, 1 illustrates a conventional type fuel can or tank having a converging neck portion 2, a constant level device 3 and a spring valve 4. The fuel can or tank 1 rests removably in the insulated casing or cradle 5. Neck portion 2 of fuel tank 1 snugly fits into the converging portion 6 of cradle 5 by way of a ground fit 7. Converging portion 6 forms the top of an enclosed level control tank 8 having the sides 9 and bottom portion 10. The bottom portion 10 is so arranged that when the container 1 rests in cradle 5 with a satisfactory fit at 7,

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valve stem 11 of spring valve mechanism 4 is pushed up by bottom 10 to thereby open tank 1. Level control tank 8 vents by way of the vent 12, safety screen 14 and vent line 13. The lower surface 15 of constant level device 3 defines the constant fuel level 16 inside enclosed level control tank 8.

An overflow line 17 communicating with overflow reservoir 19 and having the overflow lip 18 in enclosed level tank 8 serves as a check for the constant fuel level inside enclosed level control tank 8 in case of vapor pressure increase inside fuel tank 1. Cock 20 permits withdrawal of fuel from overflow reservoir 19.

The burner assembly as such comprises a series of concentrically mounted perforated cylinders 30, 31 and 32 defining the annular combustion chamber 33 and air distributing chambers 35 and 36. Air distributing chambers 35 and 36 are provided at their top with top closures 37 and 38 and at their bottom with bottom closures 39 and 40. Outer casing 41 and inner casing 42 hold therebetween the insulating material 43. Air intake ports 44 and 45 supply air to the air distributing chambers 35 and 36 respectively.

A fuel receptacle 46 is mounted beneath the cylinder assembly in direct vapor feed communication with combustion chamber 33 by means of the flanged extension 47 secured by screws 48. Fuel receptacle 46 is provided with a substantially heat and flame resistant compacted capillarily porous material 67 characterized by a relatively high capillary attraction with respect to the fuel used in the burner. This material is a disk substantially filling the fuel receptacle and extending to the side walls of the receptacle to form an effective closure therefor with respect to its vapor feed communication with the combustion chamber. Within the preferred embodiment of the invention the capillarily porous material within the fuel receptacle is so constituted that it will capillarily absorb and hold drip-dry, i. e., dried to a point of freedom from dripping in excess of 50% and preferably in excess of 65% of its volume in fuel. Suitable materials of this type, are, for instance, capillarily porous abrasives, pumice, sand and limestone, materials of infusorial origin, and others.

For best results, I prefer to use as the capillary porous material a calcined kieselguhr or diatomaceous material, preferably compacted into brick, block, disk or the like form, of an absorption capacity of about 70% to 72% of its volume of such fuel as gasoline or kerosene. Kieselguhrs of the desired type and characteristics are, for

instance, commercially available in the form of compacted "Celite" or the like base materials such as insulating and similar bricks, stones or blocks and may include infusorial products compacted by low temperature fusion hardening.

As illustrated in the drawings, fuel feed **60** controlled by valve **61** feeds fuel from fuel level tank **8** to the bottom **62** of fuel receptacle **46**. Fuel receptacle **46** is so arranged with respect to the constant fuel level **16** in fuel level tank **8** that the bottom line **63** of fuel receptacle **46** is slightly below the fuel level **16** to insure proper feeding of the fuel and its adequate contact with the capillarily porous material **47**. Fuel feed line **60** is provided with a drain line **63** controlled by valve **64** and leading to overflow tank **19** to permit draining of fuel from the fuel receptacle **46** and fuel feed line **60**.

In the practical operation of the burner construction in accordance with the invention, liquid fuel from the bottle or container **1** discharges into the closed fuel level tank **8** through the neck portion **2** and the valve mechanism **3** moved to "open" position by valve stem **11** resting on the bottom portion **10** of enclosed level tank **8**. Fuel discharges into tank **8** until it reaches the lower surface **15** of the cap or constant level device **3**, thus establishing the constant level **16**. From tank **8** the fuel passes through feed line **60** controlled by the valve **61** to the bottom of the fuel cup **46** and thus into contact with the capillarily porous material **47**. As fuel is taken from tank **8**, additional fuel discharges from the fuel can or tank **1** to maintain the constant level **16**.

If, by reason of an increase in vapor pressure, inside fuel can or tank **1**, fuel is forced into the enclosed level tank **8** to above the predetermined liquid level **16**, the overflow will automatically check any undesirable or dangerous rise of the liquid level inside tank **8** and will thus eliminate the danger of flooding of the tank and/or the fuel receptacle. This arrangement makes the use of gasoline or other fuel of relatively high vapor pressure possible for a liquid fuel-type burner. In hitherto used burner constructions this could not be done and relatively low vapor pressure fuels such as kerosene or the like could not be employed since these constructions were subject to the danger of flooding and thus to fire hazards.

The provision of the capillarily porous material forming a closure for the fuel receptacle interposed between the fuel feed and the burner assembly renders the burner absolutely safe against flash-back and insures an improved and uniform vaporization of fuel, thus resulting in increased combustion efficiency of the burner. The construction in accordance with the invention is further characterized by the advantage that it is substantially spill-proof in that there is no possibility at any point for liquid gasoline or like fuel to spill out and to come into direct contact with a flame.

Aside from the advantages hereinabove enumerated, the use of the capillarily porous material in the fuel receptacle permits the feeding of fuel to the burner through this material by capillary action from an enclosed safety level considerably below the safety level of the burner and thus provides additional safeguard against overflowing and spreading of flames.

The foregoing description is furnished by way of illustration and not of limitation and it is, therefore, my intention that the invention be limited only by the appended claims wherein I have endeavored to claim broadly all inherent novelty.

I claim:

1. In a burner construction of the vaporized normally liquid flammable fuel type which burner construction has means defining a combustion space for the combustion of an intimate mixture of vaporized fuel and air, the improvement comprising a fuel receptacle, a capillarily porous substantially compact material defining, with at least a portion of its upper surface, a closure for said receptacle, substantially air excluding means for feeding fuel vapors from said receptacle, above said closure, to said combustion space, means for feeding fuel into said receptacle below said closure, and means for maintaining the normal fuel feed level in said receptacle below said closure and in contact with said material.

2. In a burner construction of the vaporized normally liquid flammable fuel type, the improvement in accordance with claim 1 in which said capillarily porous material extends in substantial thickness within said receptacle and constitutes a compacted infusorial material having a capillary absorption capacity for normally liquid flammable fuel to be fed to said receptacle of at least 50% of its volume.

3. In a burner construction of the vaporized normally liquid flammable fuel type, the improvement in accordance with claim 1 in which said capillarily porous material is a block of calcined highly porous kieselguhr substantially filling said receptacle.

ALBERT JOSEPH LALIBERTE.

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