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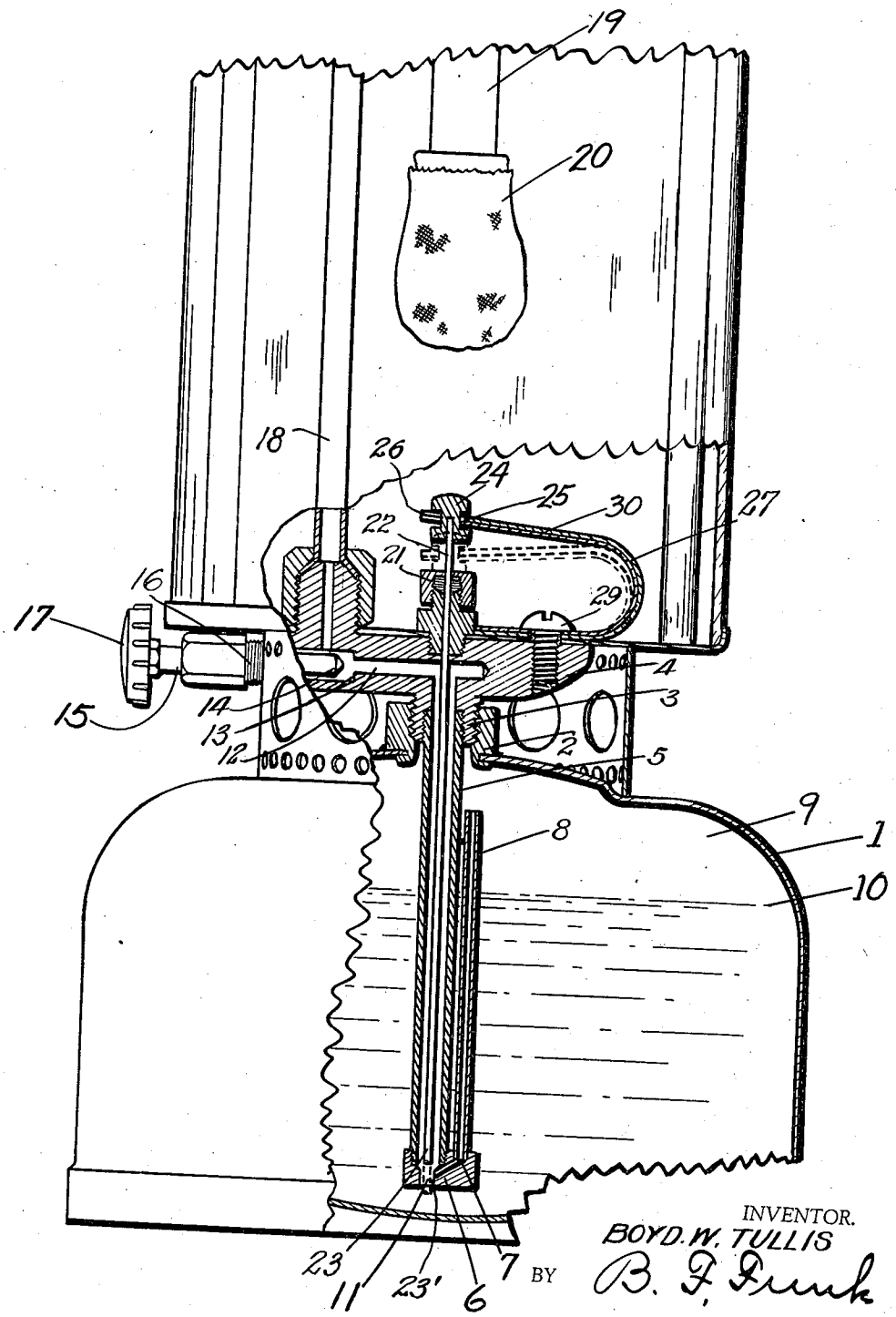

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LIQUID HYDROCARBON FUEL BURNING DEVICE

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This invention relates to liquid hydrocarbon fuel burning devices in which there is a font or tank to contain liquid fuel under air pressure in contact therewith, and a vaporizing generator connected to the tank to convert the liquid fuel into the vapor phase before it enters the burner.

The present invention has to do with that class of devices in which some of the air on top of the liquid is delivered to the generator and burner as a preliminary step to supply combustible fuel through a cold generator which later becomes hot due to its proximity to the burner so that raw liquid fuel can then be fed to the generator to be vaporized and therefore only liquid fuel will be delivered to the generator. This method eliminates the necessity for preheating the generator and the general plan is disclosed in U. S. Patent No. 1,718,473, issued June 25, 1929, to J. E. McCutchen. The present invention contemplates more particularly a thermostatic control for varying the effective port area of the liquid inlet to the vaporizing generator supply and the invention will be understood by reference to the following description in connection with the accompanying drawing in which:

The figure is a view partly in elevation and partly in section of a device constructed in accordance with my invention.

Referring now to the drawing by numerals of reference: 1 designates a tank or font having a threaded collar 2 to receive the threaded stud or nipple 3 of a plug or fitting 4. The nipple carries an elongated tube 5 which extends down to a point near the bottom of the font so that it will be below the normal liquid level therein and it carries at its lower end a cap 6 having a passageway 7 communicating with the upstanding air tube 8 which has its inlet in the air space 9 above the liquid level 10. The cap 6 is provided with a liquid inlet opening 11 which communicates with the tube 5 to deliver fuel into the horizontal passageway 12 in the fitting 4. The passageway is provided with a valve seat 13 to receive the valve 14 on the end of the stem 15 in screw threaded engagement with a gland 16, the valve stem being turned by the disc 17. The passageway communicates with a vaporizing generator 18 of approved construction which delivers fuel into a mixing chamber not shown which may also be of approved construction and which has a depending tube 19 carrying a mantle or burner 20 adjacent to the vaporizing generator 18.

In line with the axis of the tube 5 is a packing gland 21 through which a regulator 22 extends. The regulator consists of an elongated cylindrical bar having an end 23 of less diameter than the diameter of the inlet 11 and the upper end is provided with a head 24 having a constricted intermediate portion 25 straddled by a bifurcated end 26 on the U-shaped thermostatic bar 27, the lower leg 28 of which is fastened to the fitting 4 by a screw 29. The font 10 will be provided with the usual filler cap and means for introducing air under pressure into the space 9.

When the parts are assembled and the regulator end 23 in the inlet opening 11 and the valve 14 unseated, air will flow from the space 9 through the tube 8 up through tube 5 through the passageway 12 in the fitting, through the generator 18 through the mixing chamber into the burner or mantle 20. This air will contain the lighter ends of the hydrocarbon fuel (for example, gasoline), being enriched by the liquid which will pass by the regulator in the inlet so that the fuel will be rich enough and yet light enough to permit it to be ignited by the application of a match flame to the burner 20.

Since the burner 20 is in close proximity to the generator, it will quickly heat the generator to a liquid vaporizing temperature so that now raw liquid can be fed to the generator in sufficient quantities to supply the burner demand. As soon as the generator is heated to vaporizing temperature there will be no further occasion to utilize the air from space 9 so it is then desirable to cut off the supply of air. This is accomplished by moving the regulator out of the inlet opening so that its effective port area is enlarged to such an extent that liquid will flow up through the tube past the passageway 6 and cut off the air supply tube. The device shown for accomplishing this is the thermostatic blade 27 which is so designed that it will heat at the same time that the vaporizing generator 18 is heated so that when the generator 18 is hot enough to vaporize the liquid, the thermostat will open to cause the regulator to recede from the opening to permit a full flow of liquid into the tube 5. Therefore, the air from space 9 will be automatically cut off in response to heat from the burner. When seating the valve 14, the supply of liquid to the generator will be cut off so that the burner will cease to operate permitting the thermostat 27 to cool so that its free end 30 will assume the dotted line position shown in the drawing, to permit the regulator to move back into the inlet opening 11 to restrict its effective port area, but since the diameter of the regulator is less than that of the inlet opening, it will be apparent that the inlet opening 11 will not

be entirely closed, therefore at the next operation when the valve 14 is unseated, air will again flow from the space 9 through tube 8 up through tube 5 through the fitting to the generator, being enriched by a small quantity of liquid which will pass through the inlet opening 11 around the regulator.

The thermostat is made of bi-metallic metal and its operation will therefore be generally understood.

It will be apparent by reference to the drawing that the lower end of the member 22 is of smaller diameter than the tip opening 11, therefore the tip opening is never closed. When the opening 11 receives the lower end of member 22 the tip opening is almost closed but there is sufficient passageway or effective port area to allow a small quantity of liquid hydrocarbon fuel to flow up into tube 5 even when the valve 14 is seated. Therefore, when the lamp is not in use the liquid in the font will flow into the tube 5 to a point above the passageway 7. At this time the air space 9 is also in communication with the pipe or tube 5 through the air tube 8 and the passageway 7. When the valve 14 is first unseated the air pressure in space 9 being greater than the hydrostatic pressure will cause air to flow down through pipe 8 out through pipe 5, through passage 21 to the generator 13, initially carrying over the slug of gasoline or other hydrocarbon fuel which was in the tube 5 so that a very rich mixture will be supplied to the burner. The air from space 9 will continue to flow down through pipe 8, through passageway 7 up through pipe 5 to the generator. At this time the thermostat is in the dotted line position and the end of the member 22 is in the tip opening 11. Upon the initial ignition of fuel at the burner only as much liquid hydrocarbon fuel can pass up through tube 5 as can be admitted through the opening 11 reduced in cross section by the lower end of member 22 but when the generator and burner become hot enough to move the thermostat 20 to full line position shown in the drawing then the end will be drawn out of the tip opening 11 permitting liquid to suddenly flood the pipe 5 and to cut off the air supply so that thereafter only liquid hydrocarbon fuel will pass up to the generator.

The free end of member 22 does not actually close the inlet opening 11 but it is herein called a valve because it has a valving action on the inlet.

It will be apparent that other forms of the thermostat may be used from those shown, so I do not wish to be limited to the details illustrated.

What I claim is:

1. In a device for burning hydrocarbon fuel, a font having a liquid space and an air space above it to receive air under pressure, a fitting in the font, a liquid inlet tube connected to the fitting extending down below the liquid level in the tank said tube having an inlet opening, a vaporizing generator connected to the fitting, a burner, there being a passageway from the tube through the fitting and generator to the burner, a valve in the fitting, a valve in the tube having a cross sectional area less than the liquid inlet tube and normally projecting within the inlet, an air tube having its inlet in the air space and its outlet discharging into the first named tube, and a thermostat responsive to heat from the burner for moving the valve out of the inlet for the first named tube when said thermostat becomes heated.

2. In a hydrocarbon fuel burning device a font having a liquid space and an air space above it to receive air under pressure in contact with the liquid, a fitting in the font, a tube connected to the fitting having an inlet below the normal liquid level, said tube having an inlet opening, an air tube having its inlet communicating with the space above the liquid and its outlet discharging into the tube, a vaporizing generator, a burner to communicate therewith, and a valve for closing communication between the first named tube and the generator through a passageway in the fitting, a valve extending into the tube, said valve having a cross-sectional area less than that of the inlet for the first named tube and a thermostatic means responsive to heat from the burner for actuating the last named valve to withdraw it from the inlet of the first named tube when said thermostat becomes heated.

3. In a hydrocarbon fuel burning device a font having a liquid space and an air space above it to receive air under pressure in contact with the liquid, a fitting in the font, a tube connected to the fitting, having an inlet below the normal liquid level, an air tube having its inlet communicating with the space above the liquid and its outlet discharging into the tube, a vaporizing generator, a burner to communicate therewith, and a valve for closing communication between the first named tube and the generator through a passageway in the fitting, a valve extending into the tube, said valve having a cross-sectional area less than that of the inlet for the first named tube and a thermostatic means responsive to heat from the burner for actuating the second mentioned valve to withdraw it from the inlet of the first named tube when the thermostat is heated, said thermostatic means comprising a substantial U-shaped blade having one end anchored and the other end freely movable in engagement with a part on the second mentioned valve.

4. In a hydrocarbon fuel burning device a font having a liquid space and an air space above it to receive air under pressure in contact with the liquid, a fitting in the font, a tube connected to the fitting, having an inlet below the normal liquid level, an air tube having its inlet communicating with the space above the liquid and its outlet discharging into the tube, a vaporizing generator, a burner to communicate therewith, and a valve for closing communication between the first named tube and the generator through a passageway in the fitting, a second valve extending into the tube, said second mentioned valve having a cross-sectional area less than that of the inlet for the first named tube and a thermostatic means responsive to heat from the burner for actuating the second mentioned valve to withdraw it from the inlet of the first named tube when the thermostat is heated, said thermostatic means comprising a substantial U-shaped blade having one end anchored to the fitting and the other end freely movable in engagement with a part on the second valve.

5. In a device of the class described a font having a liquid space, an air space above it to receive air under pressure in contact therewith, a fitting connected to the font having a valved passageway, a burner to receive vaporized fuel from the generator, a liquid supply tube communicating with the passageway in the fitting and having an inlet below the liquid level in the font, an air tube communicating with the air space in the

font and discharging into the liquid supply tube and a regulator in the first named tube having an end whose cross sectional area is less than that of the inlet for the first named tube, the end being normally in the inlet to reduce the effective port area of the inlet and a thermostat responsive to changes in temperature from the burner and the generator to impart motion to the regulator to withdraw the end out of the inlet when the generator reaches a liquid vaporizing temperature.

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