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APPARATUS FOR CATALYTIC HEATING

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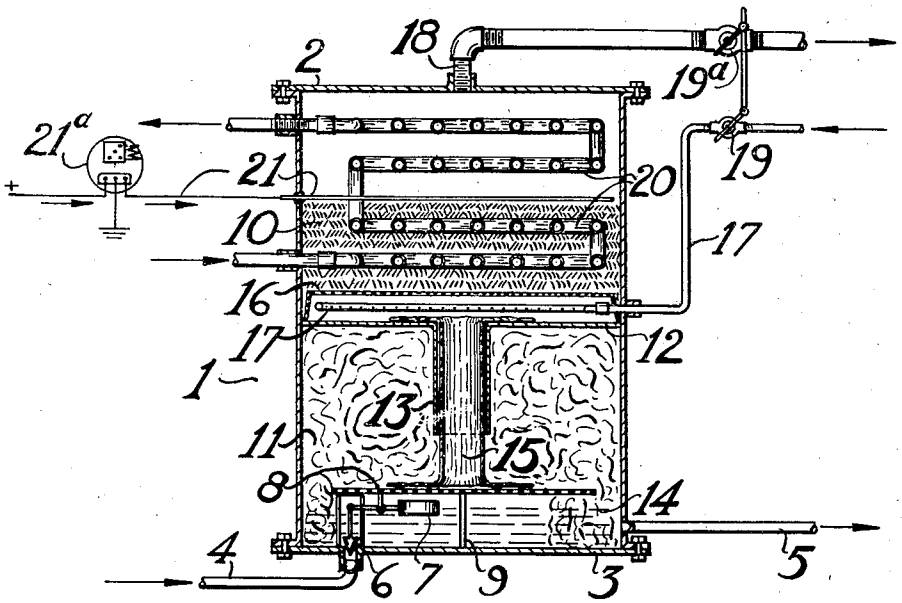


FIG. -1

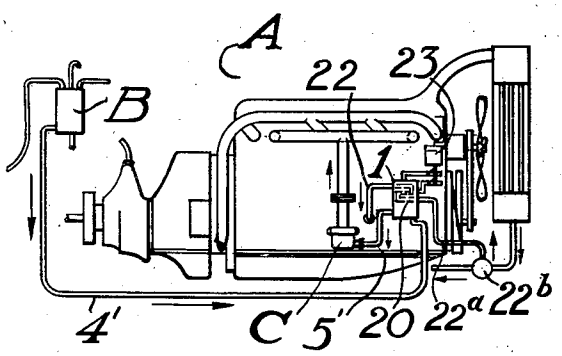


FIG. -2

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APPARATUS FOR CATALYTIC HEATING

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6 Claims. (Cl. 158—96)

This invention relates to an apparatus for catalytic heating. The invention will be fully understood from the following description read in conjunction with the accompanying drawing, in which

Fig. 1 is a vertical sectional view through a preferred form of catalytic heater, and

Fig. 2 is a schematic representation of an internal combustion engine with the heater operatively associated therewith.

This application is a division of my co-pending application Serial No. 380,589, filed July 24, 1929, issued as Patent No. 1,860,837, May 31, 1932, entitled "Apparatus for controlling temperature of fluid."

Referring to Fig. 1, 1 is a casing which may be cylindrical or of rectangular or other suitable cross section. The casing is closed at each end by the top and bottom members 2 and 3. Liquid fuel inlet 4 and outlet 5 are provided to permit fuel from a source of supply, such as the vacuum tank of an automobile, to flow thru the lower part of casing 1. A constant level of fuel is maintained by means of a valve 6 controlled by a float member 7.

Arranged slightly above the normal level of the fuel in the casing I provide a plate 8 which may be supported in any convenient manner as by a standard 9. This plate may be perforated and is spaced from the vertical walls of casing 1. The casing is divided into upper and lower chambers 10, 11 respectively by a partition 12 from which a depending tube or wick holder 13 extends toward the plate 8. Chamber 11 constitutes the fuel receptacle. The chamber 11 is filled with any suitable fibrous packing material such as asbestos fibres, the packing at certain points extending down below the plate 8, thereby coming into direct contact with the liquid fuel contained in the lower part of casing 1, as shown at 14. A wick 15 fills the tube 13 to convey by capillary movement the liquid fuel from chamber 11 to chamber 10. In the lower part of chamber 10, I provide a support 16 which may take the form of non-oxidizable gauze and on this support is placed a suitable catalytic material, such as platinized asbestos, which functions to ignite the liquid fuel vapors given off by the wick 15 as they are carried up through the catalyst body by a current of air which may be supplied by the perforated pipe 17. Products of combustion are conducted from the chamber 10 by an exhaust pipe 18. Pipes 17, 18 are provided with shutters or dampers 19, 19*a*, connected by suitable mechanism so as to open and shut simultaneously for the purpose hereinafter stated.

Arranged in chamber 10 is heat exchange tubing constituted by a pipe coil 20 for the passage of water or other fluid cooling medium therethru. I preferably construct the coil 20 in two sections, the lower section being embedded in the catalyst body and the upper section arranged in the space thereabove. If desired the pipe coil 20 can be omitted and the heat radiated from chamber 10 can be used to heat a vessel or the like. It may be desirable to provide an auxiliary heating device for the initial ignition of the combustible mixture of vapors in the chamber 10. This may take the form of an electrical resistance 21 arranged immediately above the catalyst body or embedded therein.

The catalytic heater may be operated either manually or automatically to heat an entire engine and radiator, and maintain them at any predetermined reasonable temperature. It may be applied also for heating localized areas, such as the cylinder heads to prevent condensation of fuel mixture. It may be employed to heat any suitable articles of a general nature.

In Fig. 2, I have shown one method of using the heater described above. In this drawing, 1 designates the catalytic heater shown in detail in Fig. 1. Water from the cooling system of a motor A is by-passed thru the coil 20 of the heater through suitable connections such as 22, 22*a*. In the preferred form of apparatus for carrying out my invention circulation thru coil 20 is effected by a pump 22*b* which circulates the cooling water. Thermo-siphonic action may be used in whole or in part to effect this circulation, if desired. The heater is supplied with liquid fuel from the vacuum tank B by a pipe 4' and passes thence by a pipe 5' to the carburetor C. It will be observed that all the fuel passes through the catalytic heater and accordingly the fuel level therein is always maintained without the need for special pipe connections to provide automatic control devices for operating the device. Thus I may provide a thermostat 23 of any of the well known types to control the shutters 19, 19*a* so that when the desired temperature in the jacket of the motor has been reached the shutters will be automatically closed. Circulation of air thru the chamber 10 will be cut off by the closing of 19 with the resultant cessation of combustion in the chamber. Likewise this shutter will be automatically opened when the temperature in the jacket falls below a predetermined point, again

permitting air to circulate thru the chamber 10 with the resultant ignition of the combustible mixture therein as it comes in contact with the catalytic body. The simultaneous closing of shutter 19a seals the heater and prevents loss by evaporation. The thermostat 23 preferably also actuates the heating element 21. A thermostatic switch 21a may be provided to automatically energize the auxiliary heating element 21 by means of electrical current from any convenient source, such as a storage battery, until combustion has been started in the chamber 10 and the temperature raised to a point sufficient to maintain the combustion by means of the catalytic body, and then to cut-out the heating element. The switch 21a may be the sole control for element 21 but connection to thermostat 23 is an additional precaution.

It will be obvious to one skilled in the art that various modifications of my apparatus are possible. I may for example, provide separate conduits from the source of fuel supply to the heater and to the carburetor and I may provide auxiliary by-pass connections to various parts of the motor jacket and radiator to insure more satisfactory circulation thru the heater of the cooling medium generally used in an internal combustion motor. Manual instead of automatic operation may be adopted. While I have described my invention with reference to certain specific details I wish to claim all modifications and utilizations which come within the spirit and scope of the invention.

I claim:

1. A heating device comprising a fuel receptacle, a chamber, a wick holder communicating with the receptacle and chamber, a wick disposed in said wick holder the receptacle having oppositely disposed inlet and outlet openings adapted for the passage at a constant level of volatile liquid fuel therethrough, a fibrous material in the receptacle in contact with the volatile liquid fuel and the wick and a catalytic body in the chamber.

2. A heating device comprising a fuel receptacle, a chamber, a wick holder communicating with the receptacle and chamber, a wick disposed in said wick holder, the receptacle having oppositely disposed inlet and outlet openings adapted for the passage at a constant level of volatile liquid fuel therethrough, a fibrous material in the receptacle in contact with the volatile liquid fuel and the wick, a catalytic body in the chamber, means for circulating air through the body and means for controlling the quantity of air being circulated through the body.

3. A heating device comprising a fuel receptacle, a chamber, a wick holder communicating with the receptacle and chamber, a wick disposed in said wick holder, the receptacle having oppositely disposed inlet and outlet openings adapted for the passage at a constant level of volatile liquid fuel therethrough, a fibrous material in the receptacle in contact with the volatile liquid fuel and the wick, a porous catalytic body in the chamber, means for introducing air into the chamber between the body and receptacle and means for controlling the quantity of air introduced in the said chamber.

4. A heating device comprising a fuel receptacle, a chamber, a wick holder communicating with the receptacle and chamber, a wick disposed in said wick holder, the receptacle having oppositely disposed inlet and outlet openings adapted for the passage at a constant level of volatile liquid fuel therethrough, a fibrous material in the receptacle in contact with the volatile liquid fuel and the wick, a porous catalytic body in the chamber, means for introducing air into the chamber between the body and receptacle, means for conducting combustion gases from the chamber and means for controlling the quantity of air being introduced into the chamber and the quantity of combustion gases being withdrawn from the chamber.

5. A heating device comprising a fuel receptacle, a chamber, a wick holder communicating with the receptacle and chamber, a wick disposed in said wick holder, the receptacle having oppositely disposed inlet and outlet openings adapted for the passage at a constant level of volatile liquid fuel therethrough, a fibrous material in the receptacle in contact with the volatile liquid fuel and the wick, a catalytic body in the chamber, means for circulating air through the body, means for controlling the quantity of air being circulated through the body and heating means for initiating combustion in the chamber.

6. A heating device comprising a fuel receptacle, a chamber, the receptacle having oppositely disposed inlet and outlet openings adapted for the passage at a constant level of volatile liquid fuel therethrough, a plate disposed in spaced relation to the bottom and vertical walls of the receptacle and above the level of the body of liquid fuel, fibrous material in the receptacle and in direct contact with the liquid fuel, a wick holder communicating with the receptacle and the chamber, a wick in said wick holder above and in contact with the plate and the fibrous material in the receptacle, a catalytic body in the chamber disposed in spaced relation to one end of the wick and means for circulating a regulated quantity of air through the body.

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