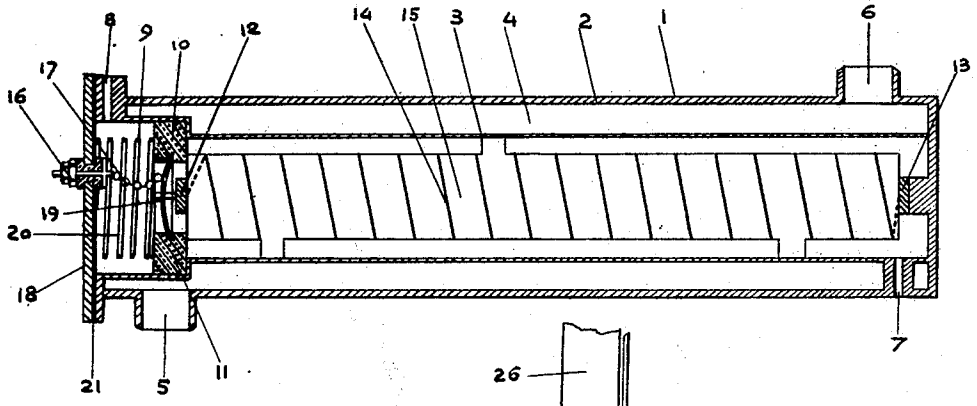
April 22, 1930. P. SOPRANI 1,756,008

FUEL HEATER

Filed Jan. 28, 1930

Fig 1



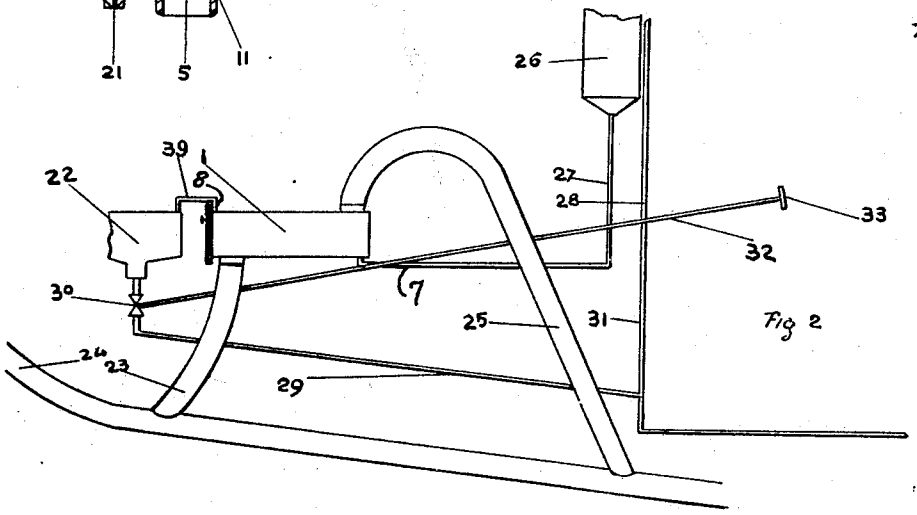


Fig 2

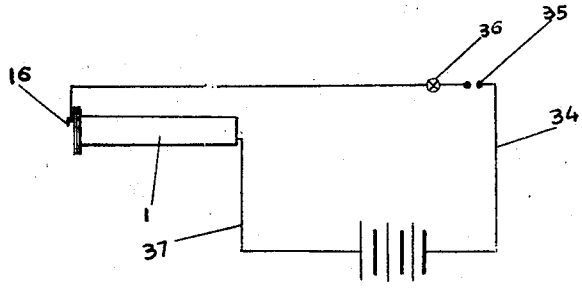


Fig. 3

INVENTOR.
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Patented Apr. 22, 1930 1,756,008

UNITED STATES PATENT OFFICE

PAUL SOPRANI, OF NEW YORK, N. Y., ASSIGNOR OF ONE-FIFTH TO MARTIN C. PIZZAIA; AND ONE-FIFTH TO INTEGRALES, A FIRM COMPOSED OF NICOLA ARIOLA, LINO PIZZAIA, AND NICK MARCHESE

FUEL HEATER

Application filed January 28, 1930. Serial No. 423,976.

This invention relates to fuel heaters for engines and the like, and more particularly to a device of this character for use in preheating crude oil, or other relatively dense oils, to render the same capable of carburetion in the usual carbureters provided for gasoline engines, or for injection purposes with engines of the Diesel, semi-Diesel or other types, whereby a relatively low grade or inexpensive oil can be efficiently used in place of gasoline, in various types of engines or motors.

The primary object of the invention is to enable kerosene or crude oil, or the like, having a density of, say, 32 to 36 degrees Baumé, to be raised to a temperature which will allow proper carburetion in practically any standard type of carbureter as at present used with automobile, stationary or marine engines, so that such kerosene, crude oil, or the like can be efficiently used as fuel for the engine, without any admixture of gasoline or lighter fuels, thereby producing a great saving in the cost of fuel and permitting cheaper grades of oils to be used in place of gasoline.

A further object of the invention is to provide a simple, efficient fuel heater for attachment to practically any standard gasoline engine, to enable the latter to be operated by less expensive grades of fuel, without the necessity of effecting any alteration of the construction of the carbureter or other parts of the engine.

A still further object is to construct a fuel pre-heater adapted to initially heat the fuel to the temperature necessary for proper carburetion by electrical means, whereby the engine can be started up, and to subsequently heat the fuel by means of the exhaust temperature of said engine, whereby the device can be operated at practically an insignificant expense to the user.

Another object of the invention is to simplify and improve the construction of fuel heaters or preheaters, generally, and to produce a unit of this character which can be economically manufactured, and which will be highly efficient in operation.

With the above indicated objects in view, and others which will hereinafter appear, the invention resides in a certain novel construction and combinations and arrangements of parts, clearly described in the following specification and fully illustrated in the accompanying drawings, which latter show an embodiment of the invention as at present preferred.

In said drawings:

Figure 1 is a longitudinal sectional view through the body of the fuel heater;

Figure 2 is a diagrammatic side elevation, illustrating the installation of the fuel heater in the fuel line of an automobile engine; and

Figure 3 is a diagram showing the electrical connections for initially applying heat to the fuel heater before starting the engine.

Referring more particularly to the drawings, the fuel heater in this instance includes a cylindrical body or casing 1, of double-walled construction, including an outer wall 2 and an inner wall 3, thereby forming an annular jacket 4 around the cylindrical inner wall 3. The interior of said inner wall 3 provides a fuel chamber, the fuel being admitted to the fuel chamber through an inlet 7 provided at one end of the casing 1 and discharged through an outlet 8 provided at the opposite end of the casing 1. The fuel inlet 7 in this instance is connected to the usual vacuum tank of an automobile, indicated at 26, by means of a suitable pipe or connection 27; and the outlet 8 is adapted to deliver the heated fuel to a pipe or connection 39 communicating with the carbureter 22.

The annular jacket or chamber 4 constitutes a heating chamber for the fuel oil contained within the fuel chamber when the engine is in operation, and for this purpose the outer wall 1 is provided with an exhaust inlet 5 leading from the engine, this inlet 5 communicating with the chamber 4, an exhaust outlet 6 being provided for escape of the heated products of combustion after the latter have performed the function of heating the fuel chamber by passage through the chamber 4.

I have found in practice that with a fuel heater constructed as just described, the heat of the exhaust gases is sufficient to efficiently

raise the temperature of the crude oil to the degree necessary for vaporization in the carbureter of an automobile engine, while the engine is in operation.

Since, however, the engine can not be started up practically with cold crude oil or the like as fuel, means are provided to initially heat the oil to the temperature required for use preliminary to starting the engine. For this purpose an electric heating element is provided within the fuel chamber, this electric heating element in the present instance including a hollow cylindrical member 15 constructed of refractory material, such as porcelain, a resistance coil 14 being wound upon the cylindrical member 15, within the fuel chamber. This coil 14 is provided with a metallic terminal 12 at one end, and a like terminal 13 at the opposite end, the latter terminal 13 in this instance providing electric contact with the metallic body of the cylinder 1, and thus affording a ground. The terminal 12 is adapted to normally contact with a thermostatic element 19, which may be in the form of a Spencer bi-metallic disc; and this disc 19 is adapted to normally establish electrical connection through the usual storage battery of the vehicle, by means of a terminal 16 provided in the cylinder cover 18, this terminal 16 being suitably insulated from the metallic cover of the cylinder 1 by insulation 21, and having connection with the disc 19 by means of a connecting wire 17 which is flexible and may be covered by glass beads for insulation purposes.

The disc 19 is held in place at the end of the fuel chamber by means of a pair of semi-annular porcelain members 10 and 11, these members 10 and 11 being retained by means of a coiled spring 20 interposed between said members and the interior of the cover 18, this cover 18 being bolted or otherwise secured to the cylinder 1.

To supply current to the electric heater for the fuel chamber, a suitable electrical connection 34 is provided to extend from the positive pole of the storage battery 38, and thence to the terminal 16, connecting wire 17, disc 19, resistance coil 14, and thence to the negative pole of battery 38 through the ground 37. A suitable switch 35 is provided in the circuit wire 34, this switch 35 being preferably mounted on the dash or instrument board of the vehicle, and being utilized to energize the electric heater for the fuel chamber when the engine is started up. When the electric heating circuit is in operation the same is adapted to be made known by means of a suitable signal, as for instance a spy lamp 36 which remains lighted whenever the circuit is closed; but any other type of visible or audible signal may be provided for the purpose.

In the installation of the fuel heater, the exhaust inlet 5 is conveniently connected to the engine exhaust pipe 24, by means of a flexible metallic pipe 23. The jacket or chamber 4 thus receives the proper amount of the exhaust gases of the engine, which after having circulated through said jacket or chamber 4, returns through the connection 6 and the metallic flexible pipe 25 to the main exhaust 24 of the engine.

The drain plug of the carbureter 22 is preferably replaced with a cock 30 communicating, through a pipe 29, with the fuel line 31 which connects the vacuum tank 26 and main fuel tank of the engine.

The fuel heated in the fuel chamber is discharged through the outlet 8 and thence to the carbureter by means of a connecting pipe 39.

The operation of the cock 30 is effected through the rod 32 and handle 33 which may be situated within easy reach of the operator and allows the discharge of the cold fuel from the carbureter before starting the engine.

To start the engine, the switch 35 is thrown to close the circuit through the electrical heating element. When the oil has reached the proper temperature, the thermostatic disc 19, which as will be understood is submerged in the oil, will automatically snap away from the terminal member 12, thus breaking the electric circuit. At the same time this opening of the circuit will extinguish the lamp 36, which will acquaint the operator with the fact that the oil has been heated to a temperature sufficient to start the engine. The engine is then started, and thereafter the heat is supplied by the exhaust gases through the jacket or chamber 4. Under exceptionally cold conditions it may be found desirable to employ both the electrical heating means and the exhaust gas heating means, but under normal conditions the exhaust gas will be found sufficient. Whenever the latter should not impart sufficient heat, however, the cooling of the oil will cause the disc 19 to again establish the electrical circuit for heating the oil electrically. Thus the device operates automatically under any condition of temperature.

The use of the present device results in a great saving in cost of fuel, particularly with engines of large capacity; and the device is equally adaptable for use with automobile, marine, areoplane, or other types of internal combustion engines which ordinarily use gasoline or other relatively expensive grades of fuel.

The hereinbefore described construction admits of considerable modification without departing from the spirit of the invention; therefore, it is the wish not to be limited to the precise arrangements shown and described, which are, as aforesaid, by way of illustration merely. In other words, the scope of the protection contemplated is to be

taken solely from the appended claims, interpreted as broadly as is consistent with the prior art.

What I claim is:

1. A fuel heating device for engines including an inner and an outer chamber, an electrical heating device in said inner chamber, means for admitting fuel to and discharging said fuel from said inner chamber, said outer chamber including an inlet member to receive exhaust gases from said engine and an outlet member to discharge said exhaust gases therefrom, an electrical circuit operative to energize said electrical heating element, means operative to open said electrical circuit when said fuel attains a predetermined temperature suitable for use of said fuel in said engine, whereby, on starting said engine, said exhaust gases passing through said outer chamber effect subsequent heating of said fuel during operation of said engine.

2. A fuel heating device for engines including a cylinder having inner and outer chambers, an electrical heating element in said inner chamber, means for passing fuel through said inner chamber, a source of electrical energy for said electrical heating element, means to render said electrical heating element inoperative when the fuel in said inner chamber attains a predetermined temperature, and means for passing exhaust gases from said engine through said outer chamber for heating the fuel passing through said inner chamber.

3. A fuel heating device for engines including a cylinder having inner and outer chambers, an electrical heating element in said inner chamber, means for admitting fuel to and discharging the same from said inner chamber, a source of electrical energy for said electrical heating element, a thermostatic element for rendering said electrical heating element inoperative when the fuel in said fuel chamber attains a predetermined temperature, means for passing exhaust gases from said engine through said outer chamber for heating said inner fuel containing chamber, and a signal device associated with the operation of said electrical heating element.

In testimony whereof, I hereby affix my signature.

PAUL SOPRANI.