April 5, 1938. D. A. NICOSIA 2,112,973

FUEL PREHEATER

Filed April 20, 1936

Fig. 1

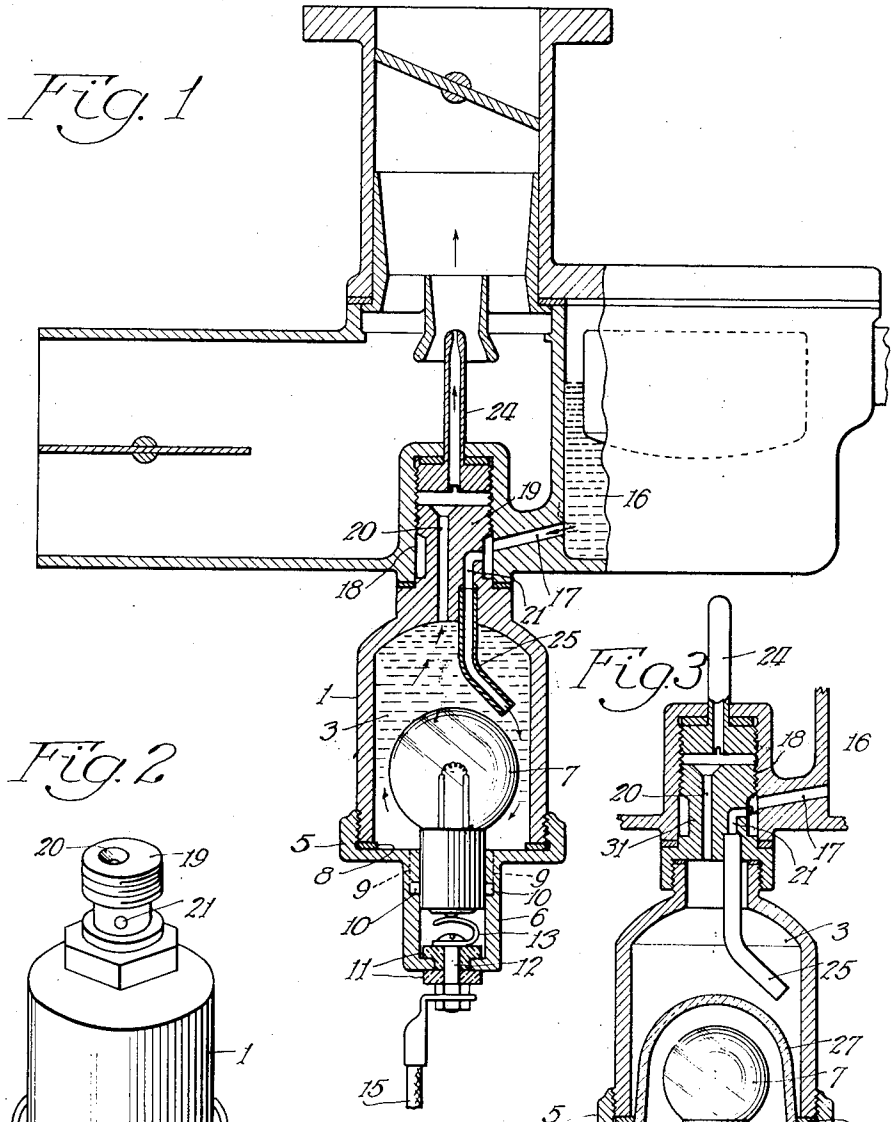


Fig. 2

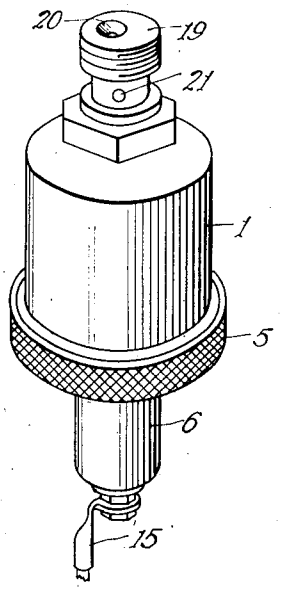


Fig. 3

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Patented Apr. 5, 1938 2,112,973

UNITED STATES PATENT OFFICE

2,112,973

FUEL PREHEATER

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Application April 20, 1936, Serial No. 75,293

6 Claims. (Cl. 219—38)

My invention relates generally to internal combustion engines and particularly to devices for preheating the fuel for such engines.

The objects of the invention are to provide a preheater for the fuel for an internal combustion engine wherein the heating of the fuel shall be accomplished principally by use of radiant energy, without subjecting the fuel to direct contact with the source of such energy; to provide a novel form of preheater which may be readily and simply applied to existing forms of internal combustion engines as an attachment; to provide a preheater particularly suited for use with automobile or similar gasoline engines which shall be inexpensive to manufacture, easy to install, and absolutely safe and highly efficient in its operation; and, generally, to provide an improved preheater for use in conjunction with combustion engines. Other objects and advantages of the invention will be made apparent by reference to the following description and the drawing wherein,

Fig. 1 is a sectional view of a preheater according to my invention as applied to a conventional automobile engine carbureter;

Fig. 2 is a perspective view of the preheater shown in Fig. 1; and

Fig. 3 is a sectional view similar to Fig. 1 illustrating a modified form of my invention.

In the preferred form of my invention illustrated in the drawing, I provide a tubular body member 1 which may be of cast metal for defining the walls of a generally cylindrical heating chamber 3. The lower end of the tubular body member 1 is closed by means of a threaded, flanged cap 5 which is provided with a central socket portion 6 for supporting the heater 7. A suitable gasket 8 assures a liquid tight connection between the cap 5 and the body portion 1. One type of heater which I have found particularly suitable for accomplishing the objects of my invention, and the type which I have illustrated in the drawing, comprises a conventional automobile head lamp bulb, this type of heater combining the features of a heating element (the lamp filament) normally operating at incandescent temperatures so as to constitute a source of radiant energy and a suitable envelope surrounding the heating element and spaced some distance therefrom so as to prevent direct contact between the fuel and the heating element, while at the same time permitting free transmission of the radiant energy liberated by the heating element to the fuel.

The socket portion 6 of the end closure for the chamber is provided with suitable slots 9 for engaging the prongs 10 on the base of the bulb heater 7, and is closed at its lower end by suitable insulating washers 11, as is shown particularly in Fig. 1. A bolt 12 extends through insulating washers 11 and serves the double function of compressing these washers to assure a liquid tight seal at the end of the socket portion and of completing the electrical circuit from without the preheater to the spring contact 13 which engages one of the heater bulb contacts. The outer end of the bolt may be connected to one side of a suitable battery by a conductor such as that illustrated at 15. The circuit from the other side of the battery is completed through the body member 1.

Substantially all of the carbureters in use at the present day are of the jet type, and substantially all jet type carbureters are provided with a jet plug, in order to permit convenient removal of the jet for cleaning or adjustment. This plug usually comprises a member having a suitably threaded body portion and a head portion whereby it may be screwed into a cooperating passageway formed in the walls of the carbureter proper. Such a carbureter is illustrated in the drawing. Fuel is led from the float chamber 16, or from the fuel pump outlet, through a suitable passageway as 17 to the jet plug recess 18. The jet plug ordinarily used in conjunction with the carbureter is provided with a suitable passageway for leading the fuel from the outlet of the passageway 17 to the carbureter jet 24. In order to make the preheater of my invention readily applicable to existing carbureters as an attachment without any modification or change in the structure thereof, I provide means at the upper end of the body member 1 whereby the preheater can be substituted for the jet plug of the carbureter. This means constitutes a suitable threaded member 19 having two separate passageways 20 and 21 formed therein, one of the passageways (20) leading directly from the heating chamber 3 to the carbureter jet 24, and the other passageway (21) being adapted to connect the outlet passageway 17 from the fuel supply with the heating chamber. All of the fuel delivered to the main jet must, therefore, pass through the heating chamber 3. To prevent vapor-lock during use of the device and to insure a more thorough heating of the fuel during its passage through the heating chamber 3, the inlet passageway 21 is extended some distance below the intake opening of the outlet passage-

way 20 by means of a suitably formed section 25 of tubing.

During operation of the device, gasoline is led from the outlet of the fuel supply through the inlet passageway 21 within the support and mounting member 19 through the tube 25 into the heating chamber 3; here it is uniformly heated, principally by the radiant energy liberated by the filament of the bulb heater 7, within an extremely short interval of time. The spherical form of the glass envelope surrounding the filament of heater 7 aids in attaining a circulatory movement of the fuel within the chamber 3, the normal path of flow being indicated by arrows in Fig. 1. Upon leaving the heating chamber 3, the fuel passes through the outlet passage 20 within the support member directly to the carbureter jet 24 and thence to the intake manifold.

The preheater of my invention is capable of accomplishing extremely thorough heating of the fuel even when the engine with which the preheater is used is operated at high speed, this desirable characteristic being due primarily to the radiant character of the heat energy supplied by the heater. For the same reasons, the device heats the fuel contained within the heating chamber 3 so as to facilitate starting of the engine with substantially no appreciable time lag, complete heating of the fuel being possible even before the walls of the heater have been heated through. The preheater also provides a convenient means for retaining and subsequently slowly vaporizing, and thereby disposing of, any water which may get into the fuel system, the carbureter jet plug being ordinarily positioned at a low point so as to facilitate draining of the carbureter when necessary.

Should the heater filament become burned out, the entire heater unit may be readily and conveniently replaced by unscrewing the bottom cap 5 for the body 1, and since bulbs of a suitable type are generally available, the cost of heater replacement is very low. The operation of the heater may readily be controlled by a suitable switch arranged on the dash of the vehicle or in other suitable positions.

A modified form of preheater is illustrated in Fig. 3. In this device the heater bulb 7 is separated from the interior of the heating chamber by means of a suitable concave partition member 27 having a rim 28 for engaging the end of the tubular body member 1 defining the walls of the heating chamber. Gaskets 29 make possible a liquid tight seal between the partition member and the body of the preheater. Preferably, this partition member 27 is made of glass so as to retain the advantages resulting from the use of radiant energy for accomplishing the heating of the fuel. The principal advantage of using a partition member of this type in the preheater is to prevent direct contact between the fuel and the heater bulb, while at the same time obtaining the advantages of the radiant energy heat supply.

A further modification is also illustrated in Fig. 3, the upper portion of the device illustrated in that figure comprising a removable adapter member 31, the function of which is to permit the use of a single standardized form of preheater in conjunction with various makes of carbureters. The adapter member 31 is provided with inlet and outlet passageways 20 and 21 and is otherwise similar to the member 19. To utilize this type of preheater in connection with any of the existing type carbureters, it is merely necessary to affix a suitably proportioned adapter member 31 to the body 1 of the preheater. The adapter members 31 may be cheaply manufactured upon a screw machine, and hence this arrangement permits the application of the preheater to various standard forms of carbureters without requiring the stocking of more than one standard type of preheater and a relatively small number of inexpensive adapter members.

From the foregoing it will be seen that I have disclosed the features of a novel form of fuel preheater for use in conjunction with heat engines, particularly those utilizing liquid fuel. The preheater of my invention makes possible the utilization of radiant energy for accomplishing heating of the fuel without permitting direct contact between the high temperature source of that energy and the fuel, thus greatly increasing the effectiveness of the heating as compared with the previously known devices, without any fire hazard or decomposition of the fuel. My improved preheater can be readily installed upon the carbureter of the engine with which it is used by virtue of the fact that it can be substituted for the jet plug of the carbureter, and through the use of inexpensive adapters, a single standardized preheater can be applied to a large number of different types of carbureter. The preheater of my invention is relatively inexpensive to manufacture; it is absolutely free from fire hazard during its operation; it utilizes a commercially available, and readily replaceable heater; and it readily lends itself to large scale manufacture.

Various modifications may be made in the form of my invention without departing from the principles which I have disclosed in the foregoing. It is my intention, therefore, that the accompanying claims shall be accorded the broadest reasonable construction, consistent with the state of the art.

I claim the following as my invention:

1. An attachment for the carbureter of a heat engine comprising means for defining the walls of a chamber, means whereby said attachment may be substituted for the main jet plug of the carbureter, said means being so arranged that substantially all of the fuel which is delivered to the main jet of the carbureter must pass through said chamber, and means within said chamber for heating the fuel which passes therethrough, said heating means comprising a heater which is ordinarily operated at incandescent temperatures, and an envelope surrounding said heater for preventing the fuel from directly contacting said heater, at least a portion of said envelope being capable of freely transmitting radiant energy.

2. An attachment for the carbureter of a heat engine comprising means for defining the walls of a chamber, means for connecting said chamber into the fluid circuit through the carbureter in such manner that substantially all of the fuel which is delivered to the main jet of the carbureter must pass therethrough, a heater within said chamber, an outlet passageway formed in the walls of said chamber for conducting the fuel from the interior of said chamber to the carbureter jet, an inlet passageway formed in the walls of said chamber, and a tube extending from the discharge end of said inlet passageway into said chamber in such manner that the discharge end of said tube is located a substantial distance beneath the inlet of said outlet passageway.

3. In a device of the class described, means

for defining the walls of a generally tubular chamber, a removable member which normally closes one end of said chamber and which is provided with a socket, a replaceable electrical heater which is disposed within said socket and which comprises a resistance element and a glass envelope spaced some distance from and surrounding said resistance element, and means for closing the other end of said chamber including a member adapted to be substituted for the jet plug of the carbureter with which the device is used, an inlet passageway for conducting the fuel from the fuel supply to the interior of said chamber, and an outlet passageway from said chamber which is adapted to connect with the main jet of the carbureter, the delivery end of said inlet passageway being arranged some distance below the intake end of said outlet passageway for said fuel in order to prevent vapor-lock during the use of said apparatus.

4. In apparatus of the class described, means defining the walls of a chamber for containing the fuel to be heated, a heater within said chamber, and a member arranged at one end of said chamber whereby said apparatus may be substituted for the main jet plug of the carbureter, said last mentioned means comprising an externally threaded cylindrical member having an inlet and an outlet passageway formed therein, said outlet passageway being adapted to connect the interior of said chamber with the main jet of the carbureter, said inlet passageway being adapted to conduct fuel from the source of supply thereof to the interior of said chamber, and a tube extending some distance from the discharge end of said inlet passageway into said chamber.

5. In a device of the class described, tubular means for defining the walls of a chamber, a removable cap member which normally closes one end of said tubular means, and which is provided with a socket located centrally thereof, a replaceable electric heater comprising a resistance element intended to be heated to incandescent temperatures, a glass envelope spaced from and surrounding said resistance element, and a base for engaging said socket, a closure for the other end of said tubular means including an externally threaded member adapted to be substituted for the main jet plug of the carbureter with which the device is used, said member having an inlet passageway for conducting the fuel from the fuel supply to the interior of said chamber and an outlet passageway for conducting the fuel from within said chamber to the main jet of the carbureter, said member being removable as a unit from said tubular closure to permit the substitution therefor of other similarly proportioned members in order that said device may be used in conjunction with different types of carbureters and being adapted to entirely support said device upon the carbureter with which said device is used, and a tube extending inwardly into said chamber from the discharge end of said inlet passageway.

6. An attachment for the carbureter of a heat engine comprising means for defining the walls of a chamber, means for connecting said chamber into the fluid circuit through the carbureter in such manner that substantially all of the fuel which is delivered to the main jet of the carbureter must pass therethrough, a heater within said chamber, an outlet passageway formed in the walls of said chamber, an inlet passageway also formed in the walls of said chamber, and a tube connecting with the chamber end of one of said passageways and extending inwardly into said chamber, the inner end of said tube being open, and said open end and the chamber end of the other passageway being located at substantially different levels.

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