Nov. 13, 1934. H. E. MUSSELWHITE 1,980,496

LOW GRADE FUEL VAPORIZER FOR INTERNAL COMBUSTION ENGINES

Filed June 24, 1933 2 Sheets-Sheet 1

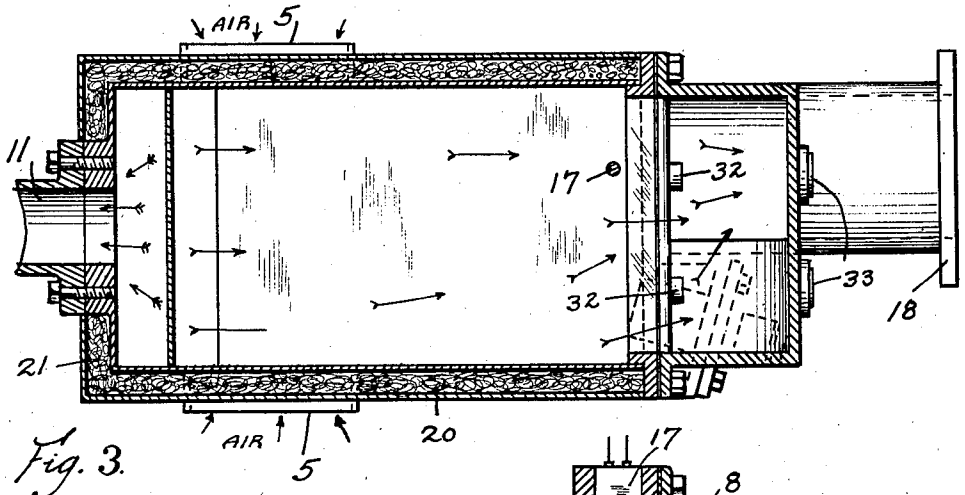

Fig. 3.

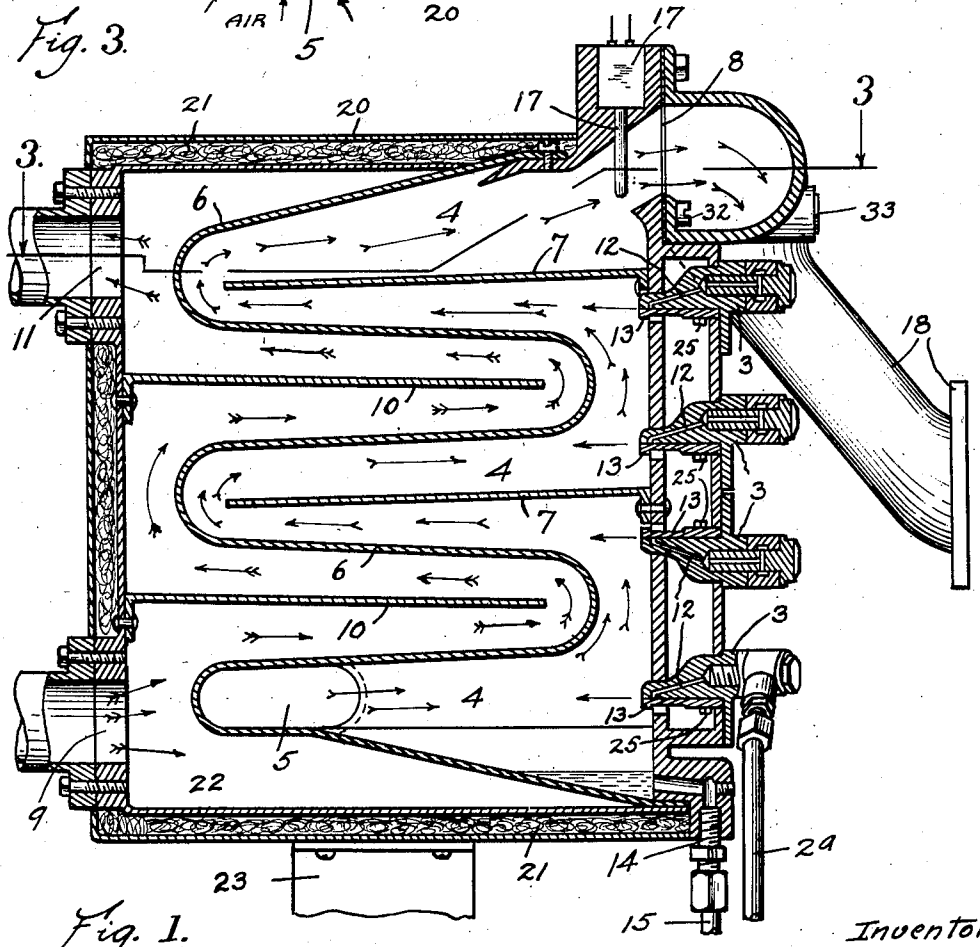

Fig. 1.

Inventor:
Harry E. Musselwhite
by
Atty

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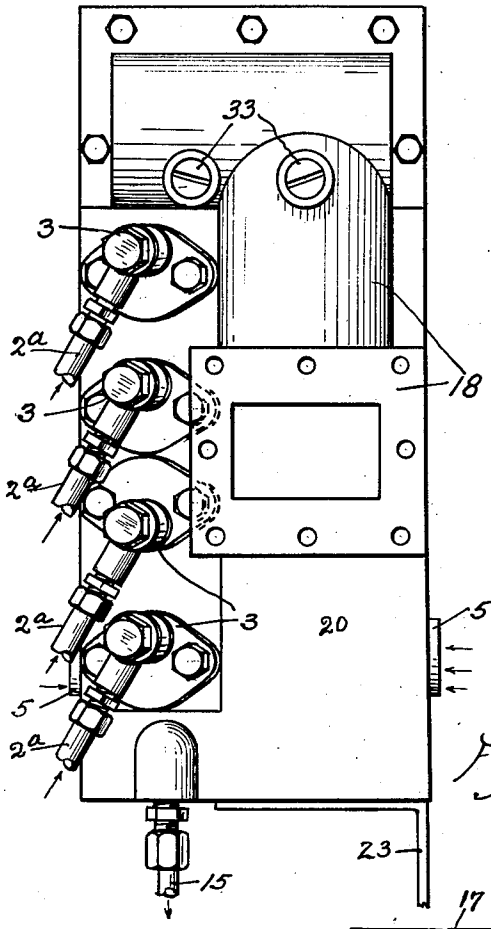
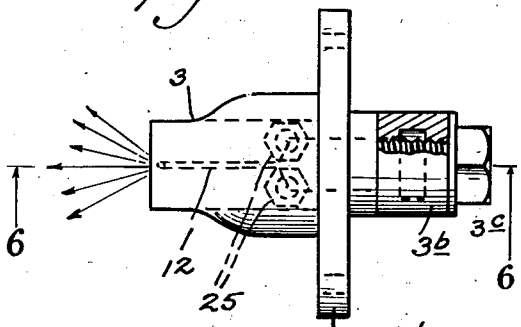


Fig. 2.

Fig. 5.



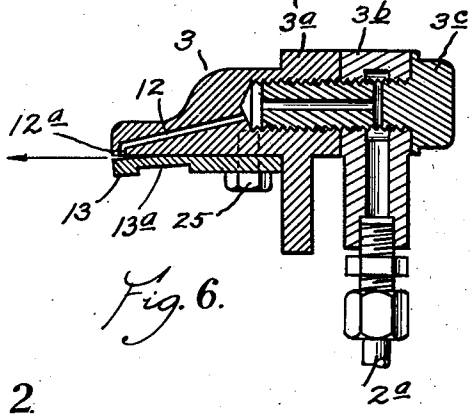


Fig. 6.

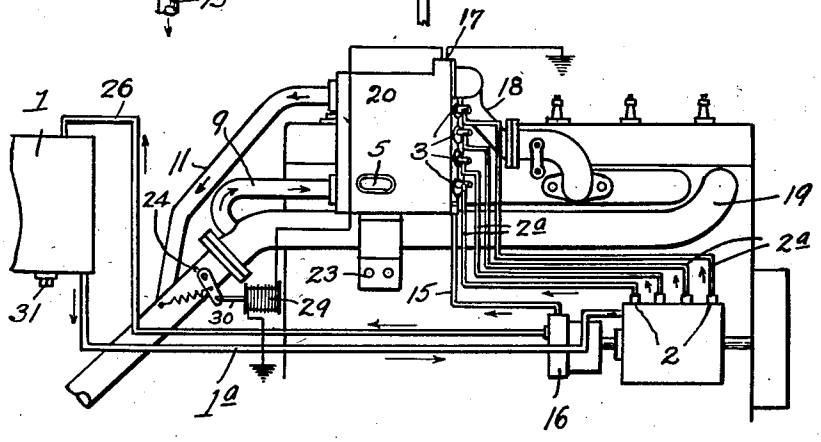


Fig. 4.

Inventor:
Harry E Musselwhite
by J. J. Geisler
Atty

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UNITED STATES PATENT OFFICE

1,980,496

LOW GRADE FUEL VAPORIZER FOR INTERNAL COMBUSTION ENGINES

Harry E. Musselwhite, Portland, Oreg., assignor to Leslie E. Crouch and David W. Cushman, both of Portland, Oreg.

Application June 24, 1933, Serial No. 677,388

3 Claims. (Cl. 261—13)

At present there is no practical device, known to me, by which low grade fuel oils can be atomized and converted into a combustible gas for use in an internal combustion engine; such, for example, as used in automobiles. Thus many fuel oils now available, having a high heating value and low in price, can not be used.

The particular object of my invention is to provide a device by which such low grade fuel oils may be used; that is to say, a device installed in connection with an internal combustion engine, by which the low grade fuel oil is atomized, and its vapor mixed with air so as to be converted into a suitable fuel medium; and the temperature of such fuel medium being heated, as may be necessary, by a conduit leading from the exhaust manifold of the engine.

A further object of my invention is to provide an efficient device of small size, especially adapted to be installed in an automobile as part of its engine.

In attaining the objects of my invention I convert the low grade fuel oil into a fine spray; that is atomizing the same and injecting a series of the sprays of the atomized oil into a chamber connected with the inlet of the engine; with one of said sprays located at a point remote from said connection, admitting air into the chamber at the latter point, and the other sprays arranged to function to enrich the mixture of atomized oil and air produced by the first spray, the enrichment being adjustable at the will of the operator by the turning on or shutting off of the sprays; and the mixture so produced being heated as may be required due to atmospheric temperature condition.

I accomplish the objects of my invention by providing in combination with the internal combustion engine, the device hereinafter fully described with reference to the accompanying drawings, in which:

Fig. 1 shows a vertical longitudinal section of the housing in which my device is installed; the section being taken thru the center of the series of atomizing nozzles of my gasifier;

Fig. 2 shows an end elevation of my device looking at said atomizing nozzles;

Fig. 3 shows a section taken on the line 3—3 of Fig. 1;

Fig. 4 shows a diagrammatic elevation of an automobile engine equipped with my gasifier;

Fig. 5 shows a larger scale top view of one of my atomizing nozzles; and

Fig. 6 shows a section on line 6—6 of the nozzle shown by Fig. 5.

Referring first to Fig. 4 which shows my gasifier diagrammatically incorporated with an internal combustion engine: From a fuel oil holding tank 1 the oil flows thru the pipe 1*a* to a high pressure pump element 2, which operates to force oil thru each of a series of pipes 2*a*, controlled by any ordinary hand throttle (not shown), each of which pipes discharges thru an atomizing nozzle. These nozzles are located in the mixing chamber 4 within the housing 20, as shown by Figs. 1 and 4.

Fig. 4 represents four pumps as assembled in the block 2; said pumps supplying the four atomizing nozzles 3. This number of atomizing nozzles may, however, be varied if desired.

The walls of the housing 20 are preferably insulated as indicated by 21. The atomizing nozzles 3 are arranged spaced apart as shown by Fig. 1. The interior of the housing 20 is divided by a thin wall 6 into an interior circuitous passageway, or mixing chamber 4, and an exterior circuitous passageway or heating chamber 22.

Adjacent the lowermost of the atomizing nozzles 3 is provided an air inlet 5 to the mixing chamber 4. The outlet 8 of the mixing chamber 4 is connected by pipe 18 with the intake of the engine.

The atomized oil sprayed from the lowermost of said nozzles 3 becomes intermixed with the air admitted thru the air inlet 5, and thence such intermixture is drawn by the suction of the engine past the remaining atomizing nozzles, thru the outlet 8 of the mixing chamber 4 into the engine. In addition to the air inlet 5, I have found it desirable to provide a small opening in the pipe 18 to permit a small amount of cold air to be drawn in and mixed with the vapor as the latter enters the engine. This is not shown in the drawings, but this is commonly done in ordinary gas engines.

Within the mixing chamber 4 are provided baffles 7, and within the heating chamber 22 are provided baffles 10, serving to conduct the vaporized fuel on one side and the hot exhaust gases on the other close to the wall 6, and to prolong the travel of these in contact with said wall.

The exterior circuitous passageway or heating chamber 22 is connected by a conduit 9 with the exhaust manifold 19 of the engine, so that the hot exhaust gases will serve to heat the wall 6. In order to control the flow of said hot gases thru the heating chamber 22, I found it convenient to provide in said exhaust manifold 19 a damper 24, which is operated by a solenoid 29, the operation of which is assumed to be controlled by a thermo-

static element 17 located in the said outlet 8 of the mixing chamber 4, see Fig. 4.

In order to provide for the removal of the unatomized oil which will be deposited on the wall 6 within the mixing chamber, the said wall is arranged to slope down to a drain 14, and cause such deposit to run into said drain. The oil so drained off may be returned by pipe 15, a centrifugal pump 16, and pipe 26 to fuel oil tank 1, see Fig. 4.

The pipe 18 is attached to the housing 20 by bolts 32 which are inserted thru plug openings 33 as shown in Fig. 1. The housing 20 is supported by a plate 23 and the flange of the pipe 18 as shown by Fig. 1.

In order to effect the required atomization of the oil, my nozzles are preferably constructed as shown by Figs. 5 and 6.

The parts 3 and 3c are drilled to provide an oil duct 12 which is connected to its related oil supply pipe 2a, as shown.

The tip of the oil duct 12 is preferably bent at a right angle, as indicated at 12a Fig. 6, so as to discharge directly on the tongue 13. To the under side of the nozzle part 3, Fig. 6, is secured a steel spring tongue 13, which may be weakened as at 13a to give it the necessary springiness. The tongue 13 is preferably secured in place by two screw bolts 25, so as to hold it against lateral movement.

The tongue 13 normally closes the discharge end of the oil duct 12; and said tongue is adapted to resist the opening of the said oil duct, and thus the nozzle, under a pressure of approximately 6000 pounds; in other words, high pressure is essential to the atomization of the oil by my nozzles, and the pump element 2 is assumed to be adapted to that service.

Operation

The pressure of the oil on the spring tongue 13, forcing the opening of the nozzles, causes the oil to be ejected into the mixing chamber in the form of a wide, flat atomized spray, thus in best condition for intermixing with the body of gas surrounding the spray.

The atomized oil so injected into the mixing chamber by the lowermost nozzle 3, see Fig. 1, is intermixed with a supply of air drawn from the exterior thru the air inlet 5 by the suction of the engine. The intermixture so produced then passes thru the circuitous passageway of the mixing chamber to the outlet 8.

In such travel of the intermixture of vaporized oil and air, it is successively enriched by the other atomizing nozzles; and the intermixture so produced is automatically heated as required by its contact with the thin heat-radiating wall 6, which is heated by the exhaust gases of the engine passing in close contact therewith thru the heating chamber of the housing 20, above described.

I claim:

1. In an internal combustion engine a low-grade fuel vaporizer comprising a fuel-tank, a housing divided by a partition into adjoining vaporizing and heating chambers, the vaporizing chamber provided with an air inlet and a drain at the bottom, said drain connected with the fuel-tank, said vaporizing chamber connected at the top with the intake manifold of the engine, an atomizing nozzle discharging into said vaporizing chamber, a high pressure pump connecting said nozzle with said fuel-tank, said heating chamber connected with the exhaust manifold of the engine, and an additional atomizing nozzle, also connected by a high pressure pump with the fuel-tank, discharging into the vaporizing chamber.

2. A low grade fuel vaporizer for an internal combustion engine comprising a fuel-tank, an insulated housing divided by a partition into adjoining vaporizing and heating chambers, the vaporizing chamber provided with an air inlet and a drain at the bottom, means adapted for connecting said drain with the fuel-tank, and means adapted for connecting said vaporizing chamber with the intake manifold of the engine, an atomizing nozzle discharging into said vaporizing chamber, a high pressure pump connecting said nozzle with said fuel-tank, means adapted for connecting said heating chamber with the exhaust manifold of the engine, and an additional atomizing nozzle, also connected by a high pressure pump with the fuel-tank, discharging into the vaporizing chamber.

3. A low-grade fuel vaporizer gasifier for an internal combustion engine comprising a fuel-tank, an insulated housing containing vaporizing and heating chambers, means for connecting said vaporizing chamber with the intake manifold of the engine, an atomizing nozzle discharging into said vaporizing chamber, a high pressure pump connecting said nozzle with said fuel-tank, means for discharging a second jet of atomized fuel into said vaporizing chamber, and means for connecting said heating chamber with the exhaust manifold of the engine.

HARRY E. MUSSELWHITE.