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FUEL VAPORIZER AND CARBURETOR

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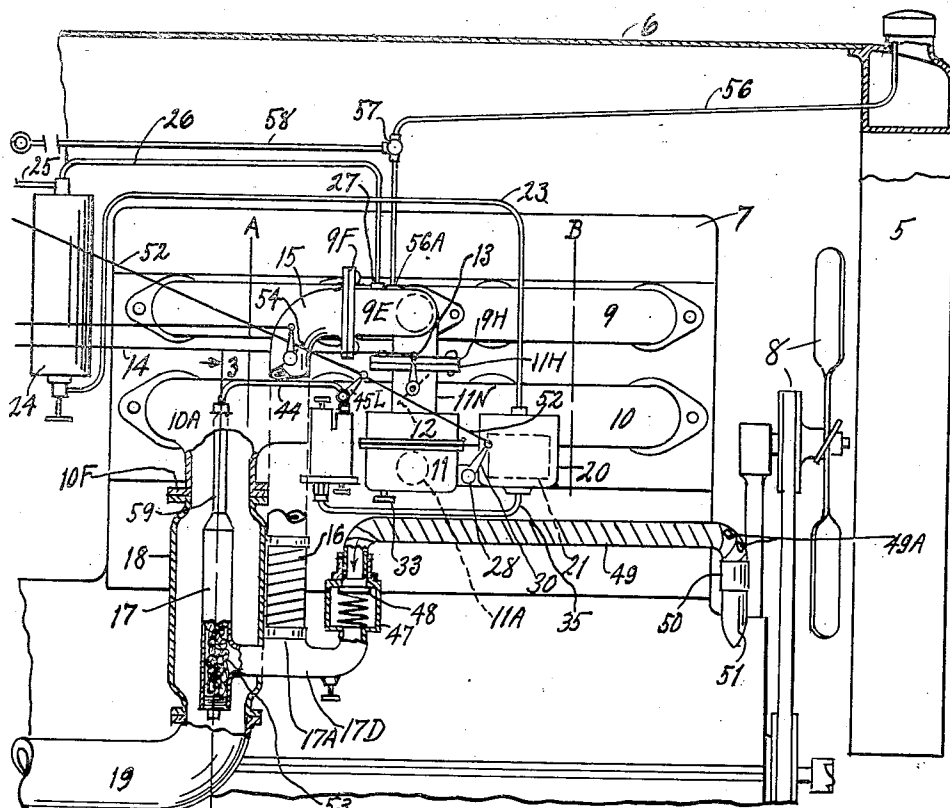


FIG. 1.

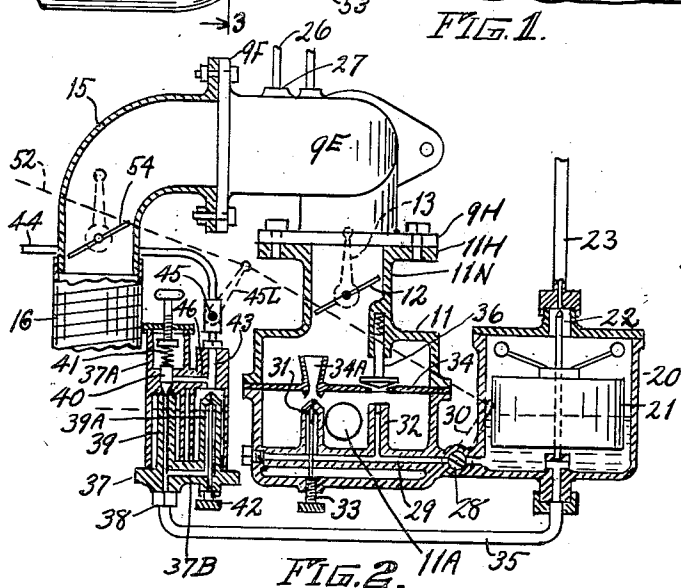


FIG. 2.

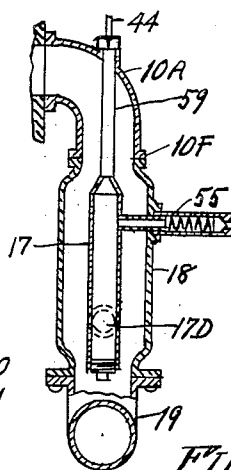


FIG. 3.

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FUEL VAPORIZER AND CARBURETOR

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11 Claims. (Cl. 123—127)

My invention relates to carburation devices for explosive type engines particularly engines as used in motor cars.

The main object is to provide means of special construction or an attachment for engines of the class described and which means will deliver, when the engine is running, a hot, dry gas to the explosion chambers of the engine. By these means also the consumption of fuel is reduced to a minimum and efficiency of the engine increased providing for greater mileage in pleasure car or truck driving or in stationary engines providing for longer running thereof as compared to present known devices for carburation.

In the use of my device, as applied to a motor car, for example, any previous suitable carburetor is used for starting and running the engine for a short period, then, after the engine and its exhaust ducts have become heated my apparatus is most effectively put into use and continued so as long as the engine is running it being assumed that when my device is put into action the starting carburetor is disconnected or shut off. It will be understood that my carburation device is auxiliary to present or existing carburation means of an engine, either device being adaptable for and ready for use at any and all times, control means being provided therefor and accessible to the driver or attendant of the engine.

In the use of my device and its construction fuel is subjected to heat in the hottest available part of an engine, namely, in the exhaust pipe as near the outlet from the explosion chambers as possible, raw fuel or imperfectly broken up particles of the fuel circulating through my device being perfectly vaporized while passing from the source of fuel to the intake parts of the engine, all as hereinafter fully set forth and reference being had to the accompanying drawing, in which,—

Fig. 1 is a right side elevation of an explosive type engine such as used in pleasure cars or motor trucks certain adjacent parts of a motor car being shown.

Fig. 2 is an enlarged longitudinal sectional elevation of the central part of Fig. 1 as between the lines A and B of said Fig. 1 to reveal clearly the details of my device and the adjacent regular carburation means of the engine.

Fig. 3 is a vertical sectional elevation of the fuel heater unit of my device as on line 3—3 of Fig. 1.

Referring to the drawing by reference numerals, I have illustrated my device as an auxiliary unit to the carburetor of a pleasure car motor of which 5 is the radiator, 6 the hood, 7 designating

a four cylinder motor. Between the front end of the motor and the radiator is shown the usual power driven fan 8. 9 designates a common type of intake manifold with intake connection 9E below which is shown the exhaust manifold 10, both having the usual bolted and flanged connections to the engine, the intake manifold being further shown with a horizontal flange 9H for attachment of a likewise flanged part 11H of a carburetor 11 therebelow, a tubular integral neck 11N connecting 11 with 11H and said neck having a so-called butterfly valve 12 in its passage and exteriorly of the neck a lever 13 with suitable rod connection 14 operatable by foot or hand operated means (not shown) within driver's reach.

9F is a vertical flanged opening of the intake manifold, 9 comprising a suitable connection for a rigid fuel intake duct or pipe 15 of my device which at the said connection forms a preferably horizontal duct near which it is formed with an elbow for the duct to extend downwardly to a connected flexible tube 16, the latter connected at its lower end to a special fuel duct 17D of my device which will presently be described.

10F is the outlet of the exhaust manifold directed downwardly into an enlarged downward continuation pipe 18 to the lower end of which is connected the usual exhaust pipe 19 directed rearwardly, preferably to a muffler (not shown).

20 designates the float chamber of a regular carburetor, with a float 21 guided on a vertical pin 22, the latter having pointed upper end which shuts off inflow of fuel from a pipe 23 leading from the source of fuel supply indicated as a vacuum tank 24 when the fuel level reaches a predetermined level in chamber 20. 25 is the fuel intake pipe to the vacuum tank said fuel being drawn into the tank by suction or semi-vacuum in a tube 26 connected with one end at 27 to the intake manifold, all this construction being common to motor vehicles. Also, adjacent the float chamber is the usual mixing or carburation chamber 11 connected by a duct 29 to the float chamber and in said duct is provided between the chambers a valve 28 regulated by a lever 30 to control flow of fuel into the carburetor. Within chamber 11 is provided usually two up-right jets 31 and 32 from duct 29, and of which 31 is a needle-valve-controlled jet with the exteriorly accessible needle valve 33 controlling volume of fuel drawn upwardly through it by the vacuum action. Fuel is drawn upwardly out of jet 32 only for excess supply of fuel through a spring pressed tappet valve 36 seated normally in a fixed plate 34 of the carburetor located over

the fuel level. 34A is a funnel-like jet in the plate 34 over the jet 31 to guide the fuel sprayed from jet 31 into the mixing chamber from which the fuel is drawn through 11N into the intake manifold 9, past the butterfly valve 12.

11A designates the usual air intake to the carburetor a suitable valve (not shown) being mounted in the passage thereof.

The carburetor above described and illustrated in the accompanying drawing discloses construction and operation well known in the art but herein specified as necessary in conjunction with my improved cooperating device and to more readily and clearly understand the latter.

35 is an auxiliary fuel duct from the float chamber to the under side of my auxiliary fuel device which will now be described. Said auxiliary device comprises a shell or housing 37—37A of which 37 is the base and 37A the top, tube 35 entering 37 at 38 to convey fuel into the device to two upwardly directed jets 39—39A of which 39 is a high tension jet normally closed by a suitably pointed and seated valve 40 yieldably retained downward by an adjustable spring. 37B is a by-pass from the intake leading to the other jet 39A, with a needle valve 42 controlling fuel flow to an upper aligned duct 43 connected exteriorly of the chamber to a pipe 44 in which is a valve 45 controlled by a lever 45L. 46 is a by-pass from seat of valve 40 so located as to draw fuel only when said valve is retracted, to duct 43 thence to pipe 44.

The pipe 44 is a conductor of fuel to a heating device comprising an important feature of my invention.

At the exhaust pipe common outlet 10A the hottest accessible part of the motor, the pipe 44 enters downwardly and preferably concentrically into the downwardly directed exhaust pipe 10A, into a larger pipe 59 which in turn is connected at its lower end to an aligned tubular heating chamber 17 of approximately the full length of section 18 of the said exhaust pipe. Near its lower end, said chamber 17 has a horizontal outlet duct 17D previously mentioned and extending out through the side wall of 18 immediately outward of said wall having an upward outlet 17A preferably connected to the flexible tube 16 extending to duct 15 connected at 9F to the intake manifold. At the outer extremity of duct 17D it is preferably opened upwardly to and connected with a chamber 47 containing a spring pressed valve plate 48 at its upper opening and to said opening is connected one end of a flexible tube 49 or equivalent means, the other end of said tube connected (removably) at 50 to the outlet of the breather tube 51 of the engine (see Fig. 1). 49A are a number of air inlets in tube 49.

Valve lever 30 of valve 28 and valve lever 45—L of valve 45 of my auxiliary device may be connected by a rod or cord 52 which extends to a suitable accessible location near the driver. A pull on this cord operates both valve levers simultaneously, valve 28 being closed and valve 45 opened, fuel thus being diverted from flow into the main or original mixing chamber 11 to pass through tube 35 to my auxiliary device where liquid fuel will fill up the jets 39—39A to the level in the float chamber. Said jets will function when the motor is running in the same manner as the jets 31—32 although the latter are inoperative when my device is in operation. The normal suction from the intake manifold provides semi-vacuum in my fuel heater tube 17 and outlet 17A connected to pipe 15, the

same suction also drawing fuel into the heater through tube 44 from the auxiliary device. Normal engine speed will draw fuel from the needle valve jet 39A (low tension jet) and higher speed of engine with consequent greater suction will cause the high tension jet 39 to function. My auxiliary jet means may be smaller than like jets in the mixing chamber 11.

It will be understood that the fuel conducted through tube 44 is directed into the primary heater pipe 45 thence into the larger heater 17 arranged concentrically within the enlargement 18 of the exhaust pipe where the most intense heat available from the engine vaporizes the fuel within the heater during its passage therethrough to outlet 17D. 53 in Fig. 1 designates any suitable material in the heater which serves as a wick on which insufficiently vaporized fuel may lodge and become thoroughly heated. The fuel thus vaporized passes outwardly from the heating chamber through duct 17D and up through ducts 17A—15 to the compression chambers of the engine.

Shutting off of fuel to the heater at 45L and intake of air through 55 and circulation of heated air only through duct 16 has also been found to produce high efficiency and economy in engine operation. For best results the intake 55 should have communication with the heater at its uppermost part. In this operation it is obvious that heated air is drawn into the compression chambers with fuel from the carburetor.

Obviously the gaseous, vaporized fuel delivered from my device directly into the intake manifold is in perfect condition for combustion, and in order to maintain the vaporized fuel in the said condition until combustion takes place it is desirable to make all parts of such proportions that the distance traveled by the vaporized fuel is reduced to a minimum.

In the use of my device, it is necessary to start a so-called cold engine with the regular carburetor means shown and described until the engine has warmed up enough to heat the exhaust pipe and the heater 17, then diverting the fuel to my auxiliary jet chamber 37 and through the heater, to the fuel intake 15 leading to the intake manifold.

54 is a suitably controlled valve of the butterfly type in pipe 15.

My device is highly efficient in the type of engine having exhaust manifold outlet in such location that benefit is derived from the exhaust heat from all the cylinders of the engine.

In Fig. 1 is clearly shown an auxiliary air intake 49 from which the suction in tube 16 draws air through the valve chamber 47 from the crank case, through the breather tube 51. The air inlets 49A provide for a quantity of pure air to enter said line and mix with the air drawn from the crank case, it being understood that the latter air contains vaporous oil in very small amount but known to be beneficial when thus introduced into the vaporized fuel and thence into the compression chambers.

I have illustrated my device attached to a four-cylinder engine though it is equally efficient on other types. Various modifications of construction will be necessary according to the design of the engine. Other modifications may be embodied without departing from the scope and spirit of the invention.

It will further be understood that in the use of my device a relatively lean mixture of fuel

is required, this because of the thorough heating and vaporization of the fuel before it enters the combustion chambers. This provides for considerably greater mileage or time of engine running per gallon of fuel used.

55 in Fig. 3 designates an automatic air intake valve for introducing air directly into the heater 17.

Referring to Fig. 1 particularly it will be noted that during speedy driving or during comparatively long runs, and my device in operation, butterfly valve 12 may be opened to let in more air to the intake manifold, thus making the fuel mixture as lean as possible without sacrificing power. Simultaneously suction through members 16, 17, and valve 48 is correspondingly decreased, said latter valve likely not opening but very little if any. Obviously, warmer air is thus drawn into the intake manifold through valve 12 than through tube 49, improving the quality of fuel entering the engine although of course no vaporized fuel is drawn past valve 12 when my device is in operation.

When fuel valve 45L is shut off, the butterfly valve 54 must be simultaneously shut off stopping suction through my device when the original carburetor is to be used. Various types of foot or hand operated control means (not shown) for the butterfly valves and fuel valve means may be used as needed.

56, in Fig. 1, designates an added feature, comprising an air conducting pipe with one end opening in the upper radiator chamber above the water line, said pipe connected at 56A to the intake manifold. 57 is a valve in said pipe operatable by suitable means such as a reach rod 58. This duct merely permits entry of warm moist air from the radiator into the fuel entering the combustion chambers and is available for use particularly when a car so equipped is operated in hot and dry air.

I claim:

1. In an explosive type engine having a fuel carburetor including a float chamber, an adjacent mixing chamber, a valve controlling flow of fuel from the former to the latter, an intake manifold and suitable duct means connecting the latter with the carburetor, an exhaust manifold with a common outlet for the engine exhaust; an auxiliary carburetor mounted adjacent the first described carburetor a valve to control the flow of fuel therefrom, fuel valve actuating means arranged to selectively divert flow of fuel from the float chamber to the auxiliary carburetor and simultaneously shut off fuel flow to the primary carburetor, or to shut off flow of fuel to the auxiliary carburetor and simultaneously permit intake of fuel into the primary carburetor, and means for superheating the fuel conducted from the auxiliary carburetor, pipe connection to the intake manifold independent of the intake duct from the primary carburetor and having tubular operative connection with the fuel heating means to directly draw the said superheated fuel into the combustion chambers of the engine.

2. The structure specified in claim 1 and a valve in said latter tubular connection to regulate the flow of vaporized fuel therethrough.

3. In an explosive type engine having a fuel carburetor including a float chamber, an adjacent mixing chamber, a valve controlling flow of fuel from the former to the latter, an intake manifold and suitable duct means connecting the latter with the carburetor, an exhaust manifold with a common outlet for the engine exhaust;

an auxiliary carburetor mounted adjacent the first described carburetor a valve to control the flow of fuel therefrom, fuel valve actuating means arranged to selectively divert flow of fuel from the float chamber to the auxiliary carburetor and simultaneously shut off fuel flow to the primary carburetor, or, to shut off flow of fuel to the auxiliary carburetor and simultaneously permit intake of fuel into the primary carburetor, and means for superheating the fuel conducted from the auxiliary carburetor, pipe connection to the intake manifold independent of the intake duct from the primary carburetor and having tubular operative connection with the fuel heating means to directly draw the said superheated fuel into the combustion chambers of the engine, said fuel heating means comprising a primary pipe arranged longitudinally of and centrally within the exhaust manifold outlet and adapted to receive fuel from the auxiliary carburetor, an enlarged tubular fuel heater extending further within the exhaust manifold outlet and in alignment with the primary tube, said manifold outlet part comprising an enlarged section of the exhaust pipe, an outlet duct from said heater extending exteriorly from the exhaust pipe and tubular connection with said latter duct to the independent manifold intake means.

4. The structure specified in claim 3, and an auxiliary automatically controlled air intake for said outlet duct from the heater, comprising a tubular, connection with the interior of the crank case of the engine.

5. The structure specified in claim 3 and a wick element placed in said fuel heater to retain particles of fuel therein for vaporization.

6. In an internal combustion engine having an intake manifold and an adjacent exhaust manifold with a common outlet duct, a primary carburetor with controlled direct fuel conducting means connected to said intake manifold, an auxiliary indirect fuel intake on said intake manifold, an auxiliary carburetor and fuel conducting means therefrom to said auxiliary intake of the manifold, fuel vaporizing means intermediate the auxiliary carburetor and said auxiliary intake, said vaporizing means comprising a tubular heating member fixed within the outlet part of the exhaust manifold to expose said heater directly to all the expelled products of combustion, and a single float chamber for controlling supply of liquid fuel to both carburetor means and suitable selective valve means to divert flow of fuel from the float chamber to either carburetor and simultaneously cut off fuel to the other carburetor.

7. The structure specified in claim 6, and an air intake for the primary carburetor, a valve in the fuel duct from the latter, said valve adaptable to control of air through the primary carburetor when the auxiliary carburetor is in use, said air current to be regulated for mixture with the vaporized fuel produced by the heater and drawn into the intake manifold.

8. In an explosive type engine having a fuel carburetor including a float chamber, an adjacent mixing chamber, a valve controlling flow of fuel from the former to the latter, an intake manifold and suitable duct means connecting the latter with the carburetor, an exhaust manifold with a common outlet for the engine exhaust; an auxiliary carburetor mounted adjacent the first described carburetor a valve to control flow of fuel therefrom, fuel valve actuating means arranged to selectively divert flow of fuel from the float

chamber to the auxiliary carburetor and simultaneously shut off fuel flow to the primary carburetor, or, to shut off flow of fuel to the auxiliary carburetor and simultaneously permit intake of fuel into the primary carburetor, and means for superheating the fuel conducted from the auxiliary carburetor, a superheater device for selectively heating air or fuel and mounted operative longitudinally within the bore of the exhaust pipe and comprising a tubular duct, an air inlet adjacent one end of said duct, and a fuel intake conductor from the carburetor at said end, valve means in said fuel intake, and an outlet from said duct communicating with the engine intake manifold in predetermined spaced relation to the carburetor.

9. The structure specified in claim 8, and an automatic valve in said air intake of the heater device, said valve normally closed to atmospheric pressure.

10. A vaporizer for internal combustion engines

having a fuel carburetor, an exhaust manifold and an intake manifold, said vaporizer comprising a tubular fuel conductor from the carburetor and connected to the intake manifold in predetermined position between the carburetor and the intake passage of the intake manifold to the cylinders, to provide suction through said conductor, said vaporizer consisting in part of an enlargement of said conductor comprising a heater mounted concentrically and longitudinally within the bore of the exhaust manifold.

11. The structure specified in claim 10, in which said conductor comprises a fuel passage to draw fuel into and through said heater and thence to the engine, and an air intake valve communicating with the interior of the heater, and means for shutting off fuel passage through the conductor to permit intake of air only into the heater and thence through the conductor, as set forth.

CHARLES H. LONG.

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