Oct. 13, 1936. P. R. SCHREURS 2,057,165

APPARATUS FOR SUPPLYING FUEL GASES TO INTERNAL COMBUSTION ENGINES

Filed April 24, 1933 2 Sheets-Sheet 1

Fig. 1.

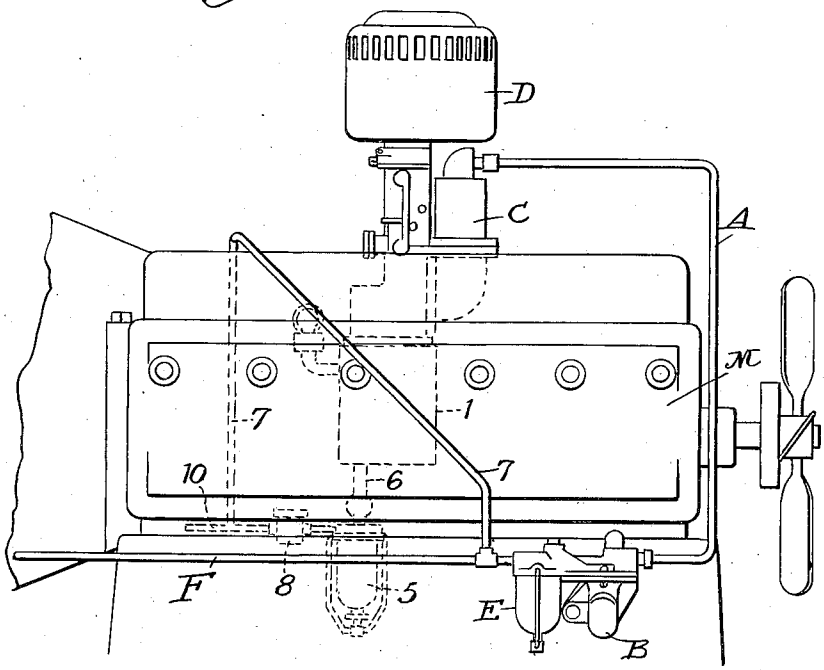

Fig. 2.

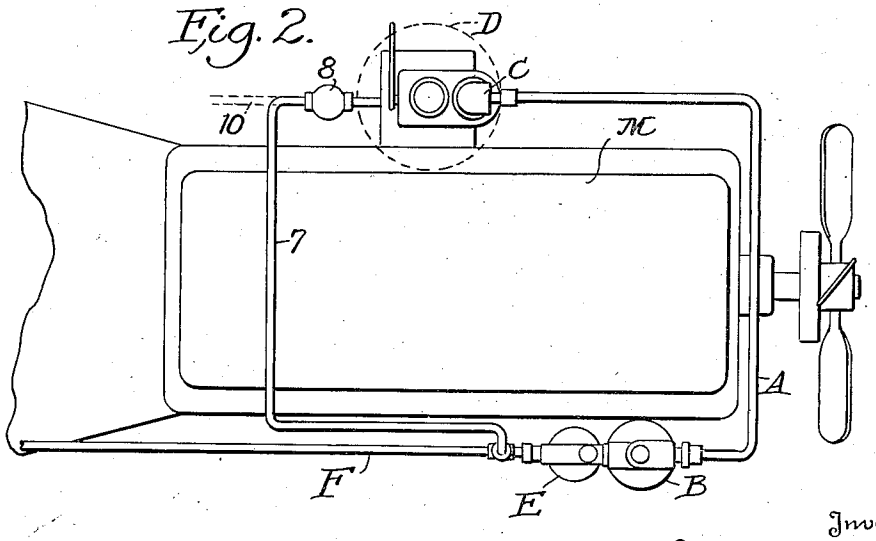

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Fig. 3.

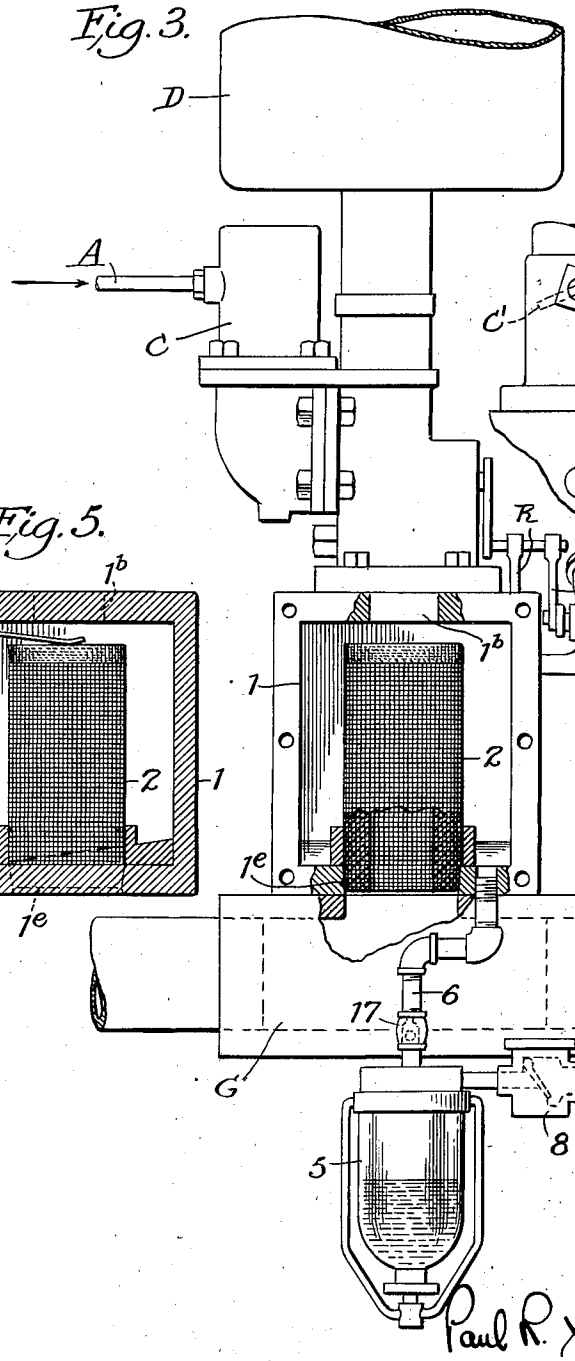

Fig. 4.

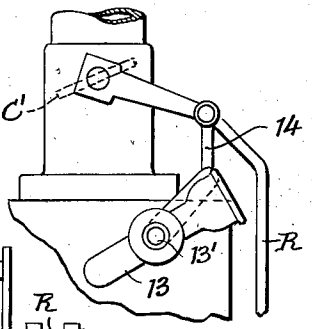

Fig. 5.

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APPARATUS FOR SUPPLYING FUEL GASES TO INTERNAL COMBUSTION ENGINES

Paul R. Schreurs, Muscatine, Iowa

Application April 24, 1933, Serial No. 667,750

4 Claims. (Cl. 123—141)

This invention is a novel improvement in method and apparatus for feeding fuel gases in internal combustion engines and the like, and the principal object of the invention is to provide a method and apparatus in which the liquid fuel is drawn from the main supply by a fuel pump and forced into a carburetor, preferably but not necessarily of the down-draft type, and the carbureted fuel delivered into a separating chamber interposed between the carburetor and intake manifold, in which chamber the fuel vapors are mechanically separated from any liquid fuel which might be discharged into chamber due to flooding or excessive choking of the carburetor, and the unvaporized liquid fuel collected in a trap and returned to the main fuel supply or to the fuel pump to be returned to the carburetor.

A further object is to provide in such apparatus a filter impervious to liquids within the separating chamber for preventing the passage of liquid fuel to the intake manifold while permitting dry fuel vapors to pass therethrough, said filter consisting of a plurality of layers of metallic filter cloth of exceedingly fine openings or passages (about 500 mesh) made up to desired proportions to form a relatively dense filter having exceedingly fine minute passages therein to retain and hold the liquid globules of hydrocarbons or oils and prevent them from passing therethrough, while permitting the air containing the dry fuel gases to be pulled through the filter by suction or vacuum created in the intake manifold. Such filters are shown in my copending application Serial No. 598,868, filed March 14, 1932.

The apparatus is particularly adapted for use with carburetors of the down-feed type in which the fuel vapors are passed downwardly through the carburetor into the intake manifold, such carburetors being particularly subject to flooding and consequent wasting of fuel, but by use of my apparatus all liquid fuel passing the carburetor is collected and returned directly to the fuel pump which feeds the carburetor, or directly to the fuel tank, thereby saving the excess liquid fuel which would otherwise be wasted.

A still further object is to provide in such apparatus means for augmenting the supply of air to the separating chamber after a predetermined engine speed has been attained.

The present application is a continuation-in-part of my copending application filed March 14, 1932, Serial No. 598,868.

To enable others to understand and use the invention I will explain one practical embodiment thereof, as illustrated in the accompanying drawings; and in the appended claims will summarize the essentials of the invention, and novel features of construction, and novel combinations of parts, for which protection is desired.

In said drawings:—

Fig. 1 is a side elevation of an internal combustion engine showing my novel apparatus applied thereto.

Fig. 2 is a top plan view thereof.

Fig. 3 is an enlarged view of the carburetor, separating chamber, and intake manifold, showing the separating chamber open; also the means for collecting the liquid fuels, and the means for augmenting the supply of air to the separating chamber.

Fig. 4 is a side view of the means for operating the air valve of the separating chamber.

Fig. 5 is a transverse section through the separating chamber.

As shown in Figs. 1 and 2 the carburetor C of the motor M is of conventional type, receiving air from a conventional air cleaner and intake silencer D, the carburetor being supplied with liquid fuel through pipe A by a conventional fuel feed pump B, said pump having the usual sediment trap E interposed in the feed line F from the fuel tank (not shown). Any type of carburetor or fuel vaporizer either down-draft or up-draft, also any form of fuel feed to the carburetor might be used, and I do not limit my invention to the particular type shown.

The intake manifold of the engine cylinders is shown at G (Fig. 3). Disposed between the inlet of manifold G and the outlet of carburetor C is my novel gas separator which comprises a casing 1 (preferably rectangular) provided with an inlet 1*b* in its top directly opposite the outlet of the carburetor. Casing 1 also has an outlet 1*e* in its bottom directly opposite the inlet of the intake manifold G. The front face of the casing 1 is open and provided with a removable cover 1*c* secured by screws to the body of the casing.

Within casing 1 is a cylindrical or tubular filter 2 such as shown in my copending application Serial No. 598,868, preferably comprising a plurality of thicknesses of metallic filter cloth having exceedingly fine openings (about 500 mesh) superimposed or wrapped layer upon layer to form a tube having dense walls of substantial thickness (¼" to ½" thick) the upper ends of the layers being soldered together and to a top plate 2*b* to close the upper end of tube 2. The lower ends

of the layers of metallic filter cloth are soldered together and adapted to fit snugly into the outlet 1e of casing 1 whereby the filter 2 will be properly positioned in the casing. The filter 2, thus formed, is impervious to liquid fuel carried over into casing 1, due to flooding or excessive choking of the carburetor, and the screen 2 will effectively retain any unvaporized particles of hydrocarbons or oils that may be introduced by carburetor C into the gasifier casing 1. The filter 2 forms a very close dense mass with many exceedingly minute openings which will permit the dry fuel vapors to be passed or drawn therethrough but any ungasified particles, or any parts of the gasoline or distillates such as kerosene or heavy carbons will be deposited in and retained in filter 2 until taken up or entirely vaporized by the air.

A new filter 2 may be readily installed in the casing 1 by merely removing the front plate 1c and raising the filter upwardly out of its socket 1e and inserting a new filter down in its place. The particular form of filter 2 is immaterial, and any other shape filter may be used, either rectangular or circular in form, or a flat screen removably retained over the outlet 1e of the casing 1 may be used. The cubical content of casing 1 should be such as will supply all gas required by the engine when operating under full load; and preferably such as will greatly reduce the velocity of the mixture entering the gas separator from carburetor C.

By the use of my gas separator the efficiency and power of the engine is greatly increased; the engine can be started in "high" without jerking; the engine will not choke or flood; and the oil in the engine cylinders will not be contaminated by carbon or gasoline; and as no impurities are carried over by or with the gas, no carbon is deposited in the cylinders.

My filters 2 are particularly adaptable to carburetors of the down-draft type, as use of such filters will not only prevent back-fire but will effectively prevent liquid fuel from passing from the carburetor C directly into the intake manifold G or into the cylinders.

In event the carburetor should flood and liquid fuel should be passed over from the carburetor into casing 1 the liquids will collect in the bottom of the casing; and I provide a trap 5 below casing 1 and connected by pipe 6 with the bottom of casing 1. Pipe 6 is further provided with a check valve 17 permitting the liquid in said pipe to drop into the trap 5. From trap 5 extends a pipe 7 having a check valve 8, pipe 7 leading back to the fuel feed pump B, whereby the excess liquids from trap 5 are returned to the fuel feed to be returned to the carburetor C instead of being lost when the carburetor overflows, thereby effecting a substantial saving in fuel consumption. A branch 10 of pipe 7 leads back to the fuel tank (not shown) so that if the fuel feed pump B cannot take care of all the return liquid fuel from trap 5 the fuel may be by-passed directly into the fuel tank. Actual tests have shown that a motor equipped with my novel filter 2 and trap 5 and return pipes may be operated continuously with the carburetor choke wide open.

In order to supercharge casing 1 with air when the motor is operating at high speeds I provide a valved branch 13 extending from the side of the casing 1 adjacent the operating rod R of the butterfly valve C' of the carburetor. A link 14 connects rod R with the stem of the valve 13' of branch 13, whereby after a certain motor speed has been attained valve 13' will be opened to the atmosphere, to augment the air supplied through the carburetor.

I claim:—

1. In combination with an internal combustion engine having a carburetor, an intake manifold, and a fuel pump connected in a closed liquid fuel circuit, and a gas separator interposed in the circuit between the carburetor and manifold; a filter in the separator adapted to supply gas to the manifold; and means for returning the ungasified liquid to the fuel circuit in advance of the carburetor.

2. In apparatus as set forth in claim 1, the gas separator comprising a casing having an inlet from the carburetor, and an outlet for gas to the manifold, said filter being disposed over the gas outlet; and an outlet for surplus fluid connected with the return means.

3. In apparatus as set forth in claim 1; the gas separator comprising a casing having an inlet from the carburetor, an outlet for gas connecting with the manifold, and an outlet for ungasified fuel; and a member in the casing permeable by gas but impermeable by liquid covering the gas outlet.

4. In combination with an internal combustion engine having a manifold, a carburetor and a pump to supply liquid fuel to the carburetor; a gas separator interposed between the manifold and the carburetor and containing a member permeable by gas but impermeable by liquid fuel whereby only gas is admitted from the separator into the manifold, and means whereby any ungasified fuel is withdrawn from the said separator and returned to the pump.

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