Oct. 20, 1936. S. WIDEGREN 2,057,808

CARBURETOR

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FIG. 1.

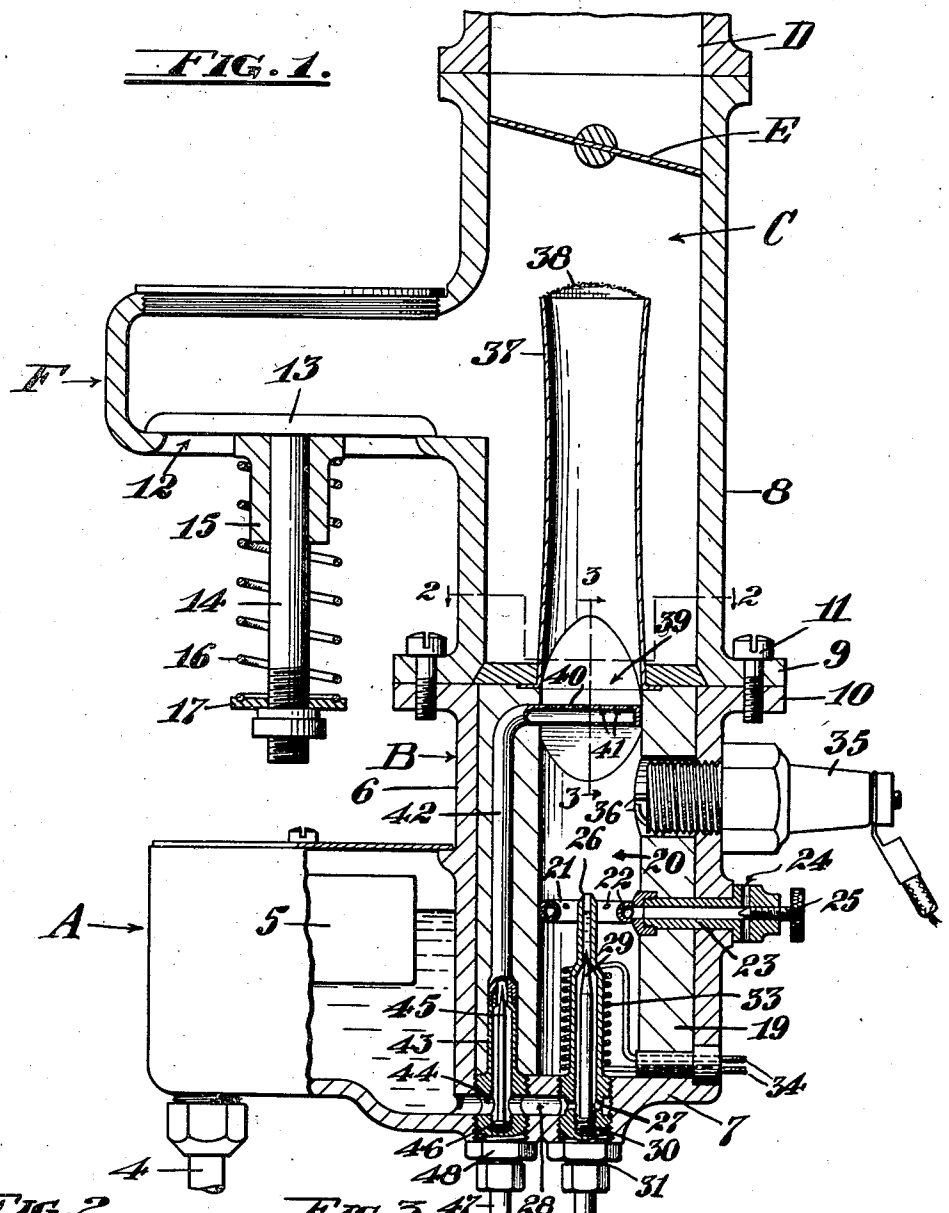


FIG. 2.

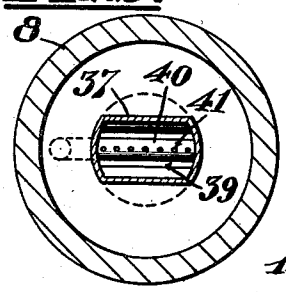
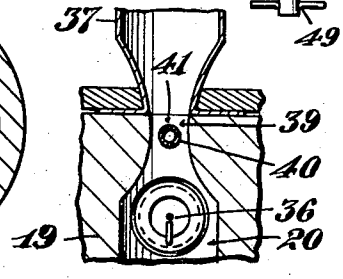


FIG. 3.



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CARBURETOR

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3 Claims. (Cl. 48—107)

This invention relates to a carburetor and has as its primary object the provision of a carburetor which will effect decomposition of low gravity hydrocarbons, such as Diesel engine oil, in such manner as to render hydrocarbons of this low grade suitable for use as fuel in internal combustion engines of the compression and spark ignition type.

Another object is to provide a carburetor of the above character which is adapted to be applied to internal combustion engines now generally in use in motor vehicles, and especially in automobiles, trucks, busses and the like, whereby such vehicles may be operated at greatly reduced cost of fuel consumption than where operated with refined hydrocarbon distillates as now generally practiced.

Another object is to provide a carburetor in which decomposition and vaporization of a hydrocarbon fuel may be effected by the direct action of hot products of combustion, and in which such hot products of combustion and the hydrocarbon are thoroughly intermixed in a vacuum so as to obviate premature ignition of the hydrocarbon and avoid any possibility of explosion of the fuel before ignition thereof in the engine cylinder.

With the foregoing objects in view together with such other objects and advantages as may subsequently appear the invention resides in the parts and in the combination, construction and arrangement of parts hereinafter described and claimed and illustrated by way of example in the accompanying drawing in which:

Fig. 1 is a view of the carburetor as seen in vertical section with parts shown in elevation.

Fig. 2 is a plan view and horizontal section taken on the line 2—2 of Fig. 1.

Fig. 3 is a detail in vertical section as seen on the line 3—3 of Fig. 1.

Referring to the drawing more specifically A indicates generally a float chamber to which hydrocarbon is delivered from a suitable source of supply through a feed pipe 4, and which chamber is equipped with the usual float valve 5 controlling the delivery of the fuel to the float chamber in a conventional manner.

Connecting with the float chamber is a housing B, here shown as embodying a vertically extending cylindrical side wall 6 fitted at its lower end with a bottom wall 7. The upper end of the housing B connects with a mixing chamber C having a cylindrical wall portion 8 formed at its lower end with a flange 9 which is secured to a flange 10 on the upper end of the cylindrical wall 6 by bolts 11. The upper end of the mixing chamber C connects with an intake manifold D of an internal combustion engine and is provided with a throttle valve E for controlling the feed of fuel to the engine in the usual manner.

The mixing chamber C is provided with an air intake arranged below the valve E which is here shown as comprising a hollow horizontal extension F on the wall 8 communicating with the chamber C and having an air intake opening 12 on its under side. The opening 12 is here shown as normally closed by an upwardly opening valve 13 carried on a stem 14 projecting downwardly through a tubular guide 15 on the lower wall of the extension F and which valve is normally disposed in its closed position under the urge of a spring 16 bearing between a collar 17 on the lower end of the stem 14 and the guide 15.

The housing B is lined with a cylindrical wall 18 of heat insulating material which encircles a cylindrical space constituting a combustion chamber 20. Arranged in the chamber 20 intermediate its ends is an annular air inlet tube 21 formed with upwardly and inwardly extending openings 22 for directing air to the combustion chamber and which tube connects with an air intake pipe 23 leading to the exterior of the housing B and having air intake openings 24 exteriorly of the latter. The outer end of the pipe 23 is fitted with a needle valve 25 adapted to be adjusted to vary the cross sectional area of the air intake so as to regulate the volume and velocity of air directed to the combustion chamber through the air inlet tube 21.

Extending upwardly into the combustion chamber 20 from the bottom wall 7 is a burner nozzle 26 which opens to the combustion chamber adjacent the upper margin of the air intake tube 21, the lower end portion of which burner nozzle is enlarged and screwed into the end wall 7. Lateral openings 27 lead from the interior of the lower portion of the burner nozzle and communicate with a fuel feed passage 28 formed in the wall 7 which connects with the lower portion of the float chamber A. A needle valve 29 is provided in the burner nozzle 26 the stem of which is threaded into engagement with the lower end portion of the nozzle as indicated at 30 and extends through a packing gland 31. The needle valve stem is fitted at its lower end with a handle 32 whereby it may be readily turned. Discharge of fuel through the burner nozzle 26 may be regulated by adjustment of the needle valve 29 and which fuel is designed to be burned in the combustion chamber 20 to form hot gases therein.

As a means of heating the fuel delivered to the combustion chamber through nozzle 26 an electrical heating element 33 is wound around the lower portion of the nozzle 26 the terminals of which element connect with a pair of electrical conductors 34 through which electrical current is supplied from any suitable source to the heating element as required.

As a means of igniting the fuel discharged from the nozzle 26, a spark plug 35 is screwed into the wall 6 of the housing B and has the sparking points 36 thereof arranged to produce sparks such as will ignite the combustible fuel in the chamber 20.

The upper end of the combustion chamber 20 connects with the lower end of a vapor generating tube 37 extending upwardly into the mixing chamber C and opening to the latter a short distance below the valve E. The upper end of the generating tube 37 is covered by a flame retarding screen 38. The generating tube 37 is circular in cross section throughout its upper portion.

Formed at the intersection of the combustion chamber 20 and the tube 37 is a throat 39 of reduced cross sectional area relative to the cross sectional area of the combustion chamber, which throat is formed by converging opposite portions of the walls of the combustion chamber toward each other and likewise converging opposed portions of the lower part of the tube 37, thus giving the throat the characteristics of a Venturi tube as shown in Fig. 3 whereby velocity of flow of gases from the combustion chamber to the generating tube will be augmented.

Extending across the throat 39 at its narrowest point is a fuel feed nozzle 40 comprising a horizontally extending length of tubing formed with discharge openings 41 on the upper face thereof, and which connects with a fuel supply tube 42 leading downwardly through the insulated wall 19 and connecting with a valve housing 43 screwed into the end wall 7.

The valve housing 43 is formed with a lateral opening 44 in its lower end portion communicating with the passage 28 whereby fuel may be delivered from the float chamber A to the tube 42 and nozzle 40 through the valve housing 43.

A needle valve 45 is provided in the valve housing 43 having a threaded portion 46 screwed into engagement with an enlarged end portion on the housing 43 and having a stem 47 projecting through a packing gland 48 and fitted with a handle 49 whereby the needle valve may be adjusted to regulate the flow of fuel through the tube 42 and nozzle 40.

In the construction here shown the parts are so relatively arranged that the discharge end of the burner nozzle 26 will be disposed on a plane above the maximum and normal level of the fuel oil contained in the float chamber A so that when the carburetor is not in operation the liquid then seeking its level in the burner nozzle will not overflow the discharge end of the latter; the outlet of the burner nozzle being in open communication with the float chamber through the openings 27 and the passage 28. The air inlet tube 21 is arranged in the combustion chamber 20 on a plane immediately below the discharge end of the burner nozzle 26 and the air inlet openings 22 are disposed to discharge a series of jets of air upwardly and inwardly at an inclination so as to cause the jets to meet adjacent the discharge end of the burner nozzle and thereby insure thorough intermixture of the air with liquid fuel discharged from the nozzle.

The spark elements 36 of the spark plug 35 are arranged a short distance above the discharge end of the burner nozzle and at a point below the fuel delivering nozzle 40 to insure ignition of the liquid fuel, and air mixture formed between the burner nozzle 26 and the fuel nozzle 40.

The vapor generating tube 37 which also constitutes a vacuum chamber, extends above the fuel delivering nozzle 40 such distance that in normal operation of the carburetor flames from the combustion of the fuel mixture in the combustion chamber will not be apt to reach the upper end of the vaporizing tube; the latter however being provided with a screen 38 which serves to prevent flame from discharging therefrom. The discharge end of the generating tube 37 is disposed on a plane above the air intake 12 so that air flowing through the latter will be directed upwardly into vapors and gases flowing upwardly from the generating tube 37.

In the operation of the invention, the needle valve 29 controlling the flow of fuel to the burner nozzle 26, and the needle valve 25 controlling the flow of air to the burner nozzle, are relatively adjusted so that during operation of the carburetor (which occurs during operation of the engine to which it is applied in the usual manner) fuel and air will be delivered to the combustion chamber 20 in such relative proportions as to insure a substantially complete combustion of the fuel delivered from the burner nozzle and such that the flame resultant from such combustion will pass through the throat 39 around the fuel delivering nozzle 40 and into the lower end of the generating tube with the flame extending only a small portion of the length of the generating tube 37.

On starting the engine the suction induced by the pistons in the engine cylinders on their intake strokes acts to create a vacuum or at least a partial vacuum within the mixing chamber C, as is common in engine operations, causing the valve 13 to open under atmospheric pressure and thereby the intake 12 into the chamber C and at the same time develops at least a partial vacuum within the generating tube 37 and combustion chamber 20 thereby inducting a flow of liquid fuel and air into the combustion chamber from the burner nozzle 26 and air intake 21 and of fuel into the throat 39 through the fuel feeding nozzle 40.

On igniting the fuel and air mixture in the combustion chamber 20, as by operation of the spark plug 35, which spark plug is preferably maintained in continuous operation while the engine is running, the hot products of combustion are caused to flow through the throat 39 and into the generating tube 37 and are thereby brought into direct contact with the jets of fuel oil discharged from the delivery nozzle 40 so as to effect decomposition of the fuel oil and the formation of hot vapors and gases which pass from the generating nozzle 37 and are intermixed with air in the mixing chamber C forming an explosive mixture which when delivered to the engine cylinder and compressed and fired will effect operation of the engine in a manner compatible with the use of refined hydrocarbon distillates; it being understood that the fuel oil delivered through the nozzles 26 and 40 from the float chamber is a heavy hydrocarbon such as Diesel engine oil and which is not ordinarily suitable for use in operation of the combustion and spark ignition type of internal combustion engine.

On initial starting of the carburetor the heating coil 33 is placed in operation so as to heat

and consequently reduce the viscosity of the oil and thereby facilitate its initial vaporization in the combustion chamber. After the carburetor is in operation it becomes heated by the hot gases formed therein and accordingly operation of the heating element 33 may then be discontinued.

During the operation of the carburetor the intermixture of the hot gases produced in the combustion chamber 20 with the fuel oil delivered from the nozzle 40, will take place in a vacuum, or partial vacuum, formed in the generating tube by the suction of the engine pistons on the intake stroke thereof in the usual manner so that little or no combustion of the fuel discharged from the nozzle 40 will occur even though such fuel may pass through flame emitted from the burner nozzle 26; the supply of air to the combustion chamber 20 through the intake nozzle 21 being insufficient to support combustion to any appreciable extent above the nozzle 40.

It has been found in practice that a carburetor constructed in accordance with the disclosure herein will form from a low grade fuel oil a mixture of air and fuel oil vapors of such high combustibility as to form a negligible amount of carbon when burned in the engine cylinders, and with little or no smoke on exhaust of the combusted products from the engine.

While I have shown and described a specific embodiment of my invention I do not limit myself to the exact details of construction and arrangement shown, but may employ such changes and modifications as occasion may require coming within the meaning and scope of the appended claims.

I claim:

1. In a carburetor, a mixing chamber, means for delivering air to said mixing chamber, a vapor generating tube extending into said chamber and opening thereto, a combustion chamber having an outlet connecting with said tube, the connection between said outlet and tube comprising a contracted throat, a fuel discharging nozzle arranged in said throat for directing liquid fuel into said generating tube, and means for forming hot products of combustion in said combustion chamber to cause hot gases to pass through said throat around said nozzle, including a fuel burner and means for electrically heating said burner.

2. In a carburetor, a float chamber, a combustion chamber, means for initially delivering preheated fuel from said float chamber to said combustion chamber, means for directing air to said combustion chamber, spark means for igniting fuel in said combustion chamber to form hot gases, a generating tube having one end thereof in communication with said combustion chamber through a contracted throat, a fuel feed nozzle arranged in said throat for directing fuel into said tube, means for delivering fuel from said float chamber to said nozzle, a mixing chamber with which the other end of said tube communicates, and means for admitting air to said mixing chamber.

3. In a carburetor, a vapor generating tube, a mixing chamber with which one end of said tube communicates, means connecting with said chamber through which a partial vacuum is created in said chamber and tube, a nozzle for delivering fuel oil into said tube, a combustion chamber communicating with said tube around said nozzle, a fuel oil burner in said combustion chamber for generating hot gases in said combustion chamber, means for electrically heating said burner, and means for supplying fuel oil to said nozzle and to said burner from a common source.

SEFAST WIDEGREN.