



## UNITED STATES PATENT OFFICE

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## CARBURETOR

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My present invention being referred to as a carburetor it may be understood to be an object of this invention to provide an improved means for producing an explosive mixture, suitable for use in internal combustion engines.

It is a primary object of this invention to provide a carburetor wherein each successive portion of a liquid fuel is vaporized, after leaving a float chamber, or the like, by the application of heat through a conductive material. This vaporization is intended to occur immediately in advance of the mixture of air with the liquid fuel as by an application of heat to a valve element which forms a restrictive passage controlling the exit of said fuel from a float chamber; and approved embodiments of my invention may comprise novel means whereby either exhaust gases or a flame, or other means, may be employed to effect the mentioned heating of a liquid fuel immediately preceding the moment of its admixture.

Other objects of my invention include the utilization of means whereby an initial or preliminary heating, before any explosion has occurred, may be conveniently effected, and also the utilization of means whereby undue heat losses may be avoided. With the mentioned means I may associate various additional means, preferably mechanical or electro-mechanical, permitting adjustment and interconnection of parts in a manner favorable to a thermostatic or other automatic control of an entire organization including a float chamber, an engine, and novel carburetting devices interposed and associated substantially as hereinafter described.

It is a further object of my present invention, in applying heat to a liquid fuel after the same has left a float chamber, an overflow chamber, or the like, and immediately in advance of its entrance into a mixing chamber, to so apply this heat as to assure a complete or approximately complete vaporization of said fuel, but without imparting more than the required heat thereto. An explosive mixture may thus be delivered into an engine under conditions which avoid waste of heat and which assure a prompt and

complete combustion, with a maximum resultant efficiency.

Other objects of my invention will appear from the following description of alternative embodiments thereof, taken in connection with the appended claims and the accompanying drawings, in which,

Fig. 1 is a vertical sectional view through a carburetor and parts of an engine organization embodying a form of my invention, and

Fig. 2 is a diagrammatic view of an alternative form of valve mechanism.

Referring to the embodiment of my invention illustrated in Fig. 1, 11 designates a float chamber, and 12 a mixing chamber extending downwardly therethrough, the lower end of this mixing chamber being shown as continuous with an air inlet passage 13, provided with a valve 14, and the upper end of said mixing chamber being shown as provided with a branch 15, which extends toward the inlet manifold IM of an engine, being provided with any suitable valve, such as the valve 16.

The float chamber 11 is provided with a fuel inlet 17, shown as controlled by a valve 18, secured to an arm 19, to which a float 20 in the chamber 11 is pivotally attached. The inlet 17 is threaded into the cover plate, and its lower end portion is conically or spherically ground to interfit with a corresponding surface upon the valve 18. Since the liquid fuel in chamber 11 should be maintained under atmospheric pressure, a cover 22, formed upon the chamber 11, is provided with an air opening 23. The chamber 11 is secured to the air inlet passage 13 in any suitable manner, as by means of a threaded collar 29, and the branch 15 is welded or otherwise rigidly secured in its indicated position after the mentioned parts are assembled.

In the embodiment of my invention herein referred to, the liquid fuel may flow through a horizontal connecting pipe 30, shown as extending across the air inlet 13, thence rising into a delivery pipe 92, shown as provided with a conically ground inner surface 32 at its upper end, this surface being adapted to

serve as a seat for an element 33, serving both as a valve and as a heater and vaporizer for the fuel admitted from said delivery pipe to the mixing chamber 12.

Although I may employ, as a heater or vaporizer (these terms being used interchangeably) any one of a great variety of constructions, I have disclosed a heater comprising a conical head 33, serving as a valve element and forming a restricted passage 33<sup>a</sup> through which a vapor may pass from the delivery pipe 92 to the mixing chamber 12.

For the purpose of effecting the above mentioned heating and vaporizing of the fuel, I provide heating means comprising an outer tube 34 and an inner tube 35, and I consider it advantageous to employ an additional and central tube 97, to permit free access of air to the upper surface of a diaphragm 98, below which may be confined a thermo-expansive fluid within the tip of the heated valve element 33. The mentioned inner tube is shown as being provided with openings 99 to permit a flow of the heating agent from one tube to the other, and the diaphragm 98 is provided with an elongated upwardly extending rod or pin 76, whose reciprocation in response to variations in temperature may be utilized for various purposes in addition to the optional imparting of motion to a lever 79, to control the burner 86.

For example, the rod 76 is provided with means for varying an electrical resistance interposed in a circuit 95; and for this purpose, I have shown a movable contact element 100 as mounted on but insulated from the rod 76 and constantly engaged by a fixed resilient contact 101, which may be connected with, for example, a positive wire, the contact 100 engaging a resistance element 102 with which a negative wire of the circuit comprising the solenoid 94 is connected at 103. The pull upon the armature 104, variably extending into the solenoid 94, may then be effective by means of a rack 105, integral or otherwise connected therewith and engaging a gear 106 on the shaft 107 of the valve 48, to control the flow of exhaust gases toward the head 33 of the vaporizing valve. The valve 48, or its equivalent, is provided with any convenient means, such as, for example, the spring 108 interposed between a fixed stop 109 on the guide bracket 110 and an adjustable stop 111 on the armature rod 104, for adjustably predetermining the normal position of, and for returning, the valve 48. The descending or return movement of the rod 104 may be adjustably limited by means such as a screw 112, extending through a bracket 113 and engaging the lower end of said rod.

I have shown the tube 35 as provided exteriorly with heating fins 73, within a housing 75; this housing being shown as provided also with an extension 114 to which a flame may be projected, as by means of a burner

86, to furnish an alternative or additional means of imparting heat to said fins or to the tube or tubes shown as associated therewith.

Obviously, any flow of hot gases produced by the burner 86, if and when such a burner is used, may be opposite to that of exhaust gases when the latter are introduced past, for example, a valve 83, which may be controlled with the valve 16 through means such as the link 60. I have shown the extension 114 as provided not only with a pipe 87, by which gas or other fluid fuel flowing to the burner 86 may be preheated, but also with a valve 115, which may be provided with operating and returning means of any preferred character. For the purpose last referred to, I have shown the last mentioned valve as provided with a returning spring 116, and I have shown its operating shaft as movable by a variable link 118, adjustably pivoted at 119 to an arm 120, extending from a shaft 121 carrying a gear 50; and the rod 76 is shown as carrying a rack 59 for the rotation of this gear. Longitudinal movement of the rod 76 may thus be effective to control the opening of the valve 115, or its equivalent. It should be understood that all of the mentioned arms and links are intended to be provided with any suitable means for relative adjustment at their respective points of attachment or pivotal connection, in order to adapt the throw thereof to the intended uses of the same.

The above described construction also permits the use of a priming cup C, integral with a knurled handle H, for the adjustment of the valve 33, but a priming cup C may in any case optionally be provided in the top wall of the mixing chamber 12. The rigidly connected tubular and thermal elements of the heating valve may be held in any adjusted position by means such as, for example, threads 124, shown as provided in said top, these threads engaging exterior threads upon the insulating sleeve 66, in such manner as to effect corresponding movement of the tubular element 35, the tubes 34, 35 and 97 being in this case provided at their upper ends with slip-joint sleeve connections permitting their rotation relatively to supporting elements.

It will be obvious that the mechanical and electro-mechanical valve controls last above described are capable of use either in conjunction with a diaphragm 98 placed at a low level, or in conjunction with equivalent means such as a diaphragm placed at a high level (not shown), and that the use of a cylindrical or hollow metal member M having ported sides and secured to the outer tube 34 of my heater and surrounding the tube 92, delivery of liquid fuel into contact with the heated valve 33 must be regarded as optional.

In Fig. 2 I show an electro-mechanical thermostatic valve control comprising a resistance R, variable in accordance with the pressure applied by a rod 76' extending up-

ward from a diaphragm (not shown) of a heating valve, this resistance being interposed in a circuit comprising a solenoid S adapted to move an armature A, against the adjustable tension of, for example, a helical spring H'. The mentioned armature element may be adapted, as by means of a rack thereon, to position any desired valve, such as, for example, a butterfly valve B, in an outlet pipe P, through which exhaust gases may exit after passing through the vaporizing or heating valve organization comprising tubes 34' and 35'; and means such as a screw having a milled head T may be used to adjust a granular or other variable resistance R to a suitable valve or to a suitable point of sensitivity.

Although I have herein described a preferred form of my invention, I take occasion to emphasize in conclusion that the essentials of my invention are independent of the specific structural features referred to, all of these being optional devices subsidiary to my essential invention, which is a carbureting system. The various modifications of the same might easily be devised, by those skilled in the art to which this case relates, without the slightest departure from the spirit and scope of my invention, as the same is indicated above and in the following claims.

I claim as my invention:

1. A carburetor comprising: a container for liquid fuel; a mixing chamber to which fuel is admitted by a delivery passage extending from said container; heating means comprising a substantially hollow heat conductive valve, placed near the outlet end of said fuel delivery passage and forming a restricted passage therewith; means for conducting exhaust gases into a heat conductive relationship with said valve and thermostatic means for controlling the heating effect of said gases with respect to said valve, said heat conductive valve being adapted to vaporize liquid fuel in the upper end of said delivery passage and to impart additional heat thereto during the passage of said vapors through said restricted passage.

2. A carburetor comprising: a container for liquid fuel; a mixing chamber to which fuel is admitted by a delivery passage extending from said container; and heating means comprising a substantially hollow heat conductive valve placed near the outlet end of said fuel delivery passage so as to form a restricted passage therewith, means for conducting exhaust gases into said hollow valve, and valve means for controlling the movement of said exhaust gas through said hollow valve, said heat conductive valve being adapted to vaporize liquid fuel in the upper end of said delivery passage and to impart additional heat thereto during the passage of said vapors through said restricted passage.

3. A carburetor comprising: a shell having

a float controlled fuel intake; a mixing chamber provided with an air inlet passage extending through said shell and secured thereto; an upwardly extending fuel delivery pipe mounted in said mixing chamber; means for delivering fuel to said delivery pipe from said shell, said delivery pipe being provided with a substantially cone-shaped upper surface; a substantially hollow valve element having a cone-shaped lower surface mounted above said delivery pipe adapted to form a restricted passage for the delivery of vapors from said delivery pipe to said mixing chamber; and means for circulating hot gases through said valve element.

4. A carburetor comprising: a shell having a float controlled fuel intake; a mixing chamber provided with an air inlet passage extending through said shell and secured thereto; an upwardly extending fuel delivery pipe mounted in said mixing chamber; means for delivering fuel to said delivery pipe from said shell, said delivery pipe being mounted with a substantially cone-shaped upper surface; a substantially hollow valve element having a cone-shaped lower surface mounted above said delivery pipe adapted to form a restricted passage for the delivery of vapors from said delivery pipe to said mixing chamber, said hollow valve element comprising an outer tubular element, an inner tubular element communicating with said outer tubular element at the lower end thereof; means for introducing hot gases into the upper end of one of said elements; and means for withdrawing said gases from the upper end of the other of said elements.

5. A carburetor comprising: a shell having a float controlled fuel intake; a mixing chamber provided with an air inlet passage extending through said shell and secured thereto; an upwardly extending fuel delivery pipe mounted in said mixing chamber; means for delivering fuel to said delivery pipe from said shell, said delivery pipe being provided with a substantially cone-shaped upper surface; a substantially hollow valve element having a cone-shaped lower surface mounted above said delivery pipe adapted to form a restricted passage for the delivery of vapors from said delivery pipe to said mixing chamber; and means for circulating hot gases through said valve element, the lower end of said valve element being provided with an expansible fluid and means operable by the expansion and contraction of said fluid for governing the flow of hot gases through said valve element.

6. A carburetor comprising: a shell having a float controlled fuel intake; a mixing chamber provided with an air inlet passage extending through said shell and secured thereto; an upwardly extending fuel delivery pipe mounted in said mixing chamber; means for delivering fuel to said delivery pipe from said

shell, said delivery pipe being provided with  
a substantially cone-shaped upper surface;  
a substantially hollow valve element having  
a cone-shaped lower surface mounted above  
5 said delivery pipe adapted to form a restricted  
passage for the delivery of vapors from said  
delivery pipe to said mixing chamber; means  
for circulating hot gases through said valve  
element and threaded means connecting said  
10 valve element with said fuel delivery element  
and adapted to impart lateral adjustment to  
said restricted passage.

In testimony whereof, I have hereunto set  
my hand at Los Angeles, California, this 23rd  
15 day of September, 1924.

LOGAN B. LAMPTON.

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