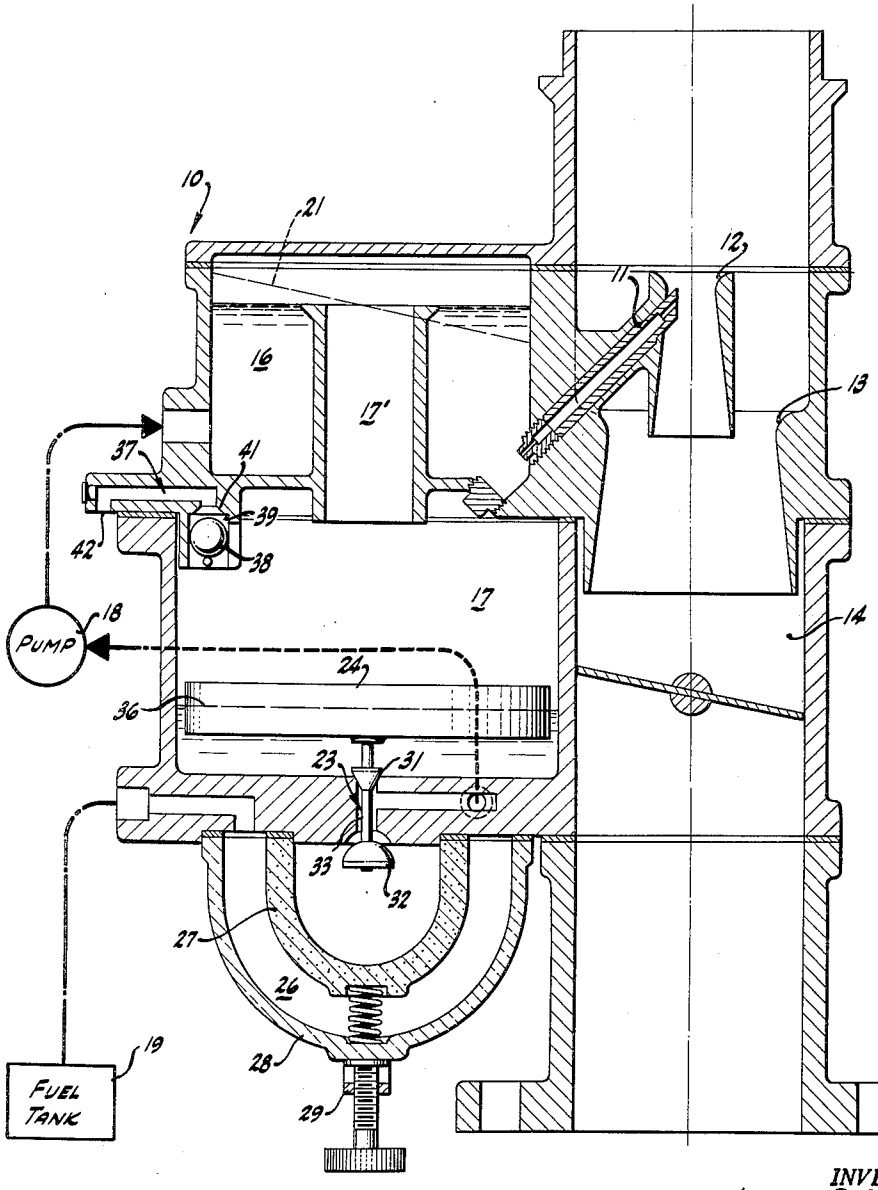
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CARBURETOR DEVICE

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CARBURETOR DEVICE

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This invention relates to the field of internal combustion engines, and more particularly to carburetor fuel metering devices.

The types and complexities of fuel metering devices have multiplied as the engines with which they are associable have increased in complexity and number. During this evolution, one of the constantly perplexing problems has been that of maintaining the air-fuel ratio at the proper point—not too lean and not too rich. Too lean a mixture causes the internal combustion engine to sputter and prevents it from developing needed power. On the other hand, when the ratio becomes too rich, flooding occurs with its incident stalls, lurches, and other well known side effects.

Causes behind improper air-fuel mixtures are many. The lethargy of mechanical valves and other fuel metering components is one factor of course; yet others arise due to sudden accelerations, decelerations and similar types of equilibrium upsetting forces most of which displace the fuel in the carburetor bowl to a non-horizontal level or cant.

The present invention pertains to an improved type of floatless carburetor which is designed to prevent flooding with its adverse effects on fuel economy, engine failures and the other parameters pertaining to the proper operation of internal combustion fuel systems. The improved carburetor constituting the instant invention has a peripherally disposed fuel chamber connected by an interior, more or less, vertical overflow orifice or chamber to a storage chamber therebeneath. The storage or overflow chamber, in turn, cooperates with means to transfer the source of fuel to the upper fuel chamber from a fuel storage tank to the overflow chamber whenever the excess fuel therein commends it. With this type of arrangement, whenever a sudden lurch, acceleration or deceleration occurs and the level of the fuel in the upper or fuel chamber is displaced from its normal equilibrium position (adjacent the upper lip of the connecting overflow chamber), the excess fuel flows under the influence of gravity into the storage chamber. As soon as the excess fuel in the temporary storage chamber reaches the preselected quantity which operates the transfer means, the fuel pump pumps fuel from the storage chamber rather than from the tank. When the amount of fuel in the storage tank decreases beyond the preselected quantity, the source of supply for the fuel pump is transferred back to the fuel tank, and the fuel system again operates in its usual manner.

Since the fuel chamber is peripherally disposed about the outer circumference of the carburetor and the overflow chamber or connecting orifice is interior thereof, it is immaterial from what direction the disequilibrium force arises, insofar as the fuel level is concerned. Whether the disequilibrium is caused by sudden acceleration (causing overflow of the fuel at the rear of the orifice and carburetor), or whether it is due to a sudden stop, parking sideways on a hill, etc., the results are the same. Excess fuel flows into the storage chamber through the orifice, and permits the normal equilibrium fuel level in the fuel chamber to be reestablished by the action of the fuel pump.

Objects of the present invention, therefore, are to provide a fuel metering device which cannot be flooded. More particularly, the invention relates to the combination of fuel and storage chambers arranged whereby any sudden disequilibrium of the fuel level is immediately compensated for in a simple, economic and effective way.

Features of the invention pertain to the structural arrangement whereby a float is eliminated, flooding is prevented, and the egress of fuel from the storage chamber is avoided if the carburetor fails to function properly.

These and other objects and features of the present invention will be more fully understood when the following detailed description is read with reference to the drawings, in which the single FIGURE is a schematic representation of an improved carburetor in accordance with the present invention as it cooperates with a double Venturi mixer, a fuel tank and pumping means.

Considering the figure, it is seen that the fuel metering device 10 cooperates with the fuel discharge nozzle 11 and the fuel Venturi 12. The fuel Venturi 12 lies interior of the air Venturi 13, and both are supported in the throat 14 which connects the carburetor 10 to the manifold of an exemplary internal combustion engine. Broadly, the carburetor 10 includes an upper fuel chamber 16, a storage chamber 17 and a connecting chamber or orifice 17' therebetween. The fuel is pumped into the fuel chamber 16 by fuel pump 18 which, in turn, is connected through the lower chamber 26 of the carburetor 10 to the gasoline or fuel tank 19. As long as the level of the gasoline in the storage chamber 17 is below the preselected level 36, the fuel moved by the fuel pump 18 comes from the fuel tank 19 by way of chamber 26.

Whenever sudden lurches or other disequilibrium occurrences causes the level of fuel in fuel chamber 16 to be displaced from the normally horizontal equilibrium position, as indicated by the dotted line 21, the excess fuel flows over the lip of the orifice 17' and into the storage chamber 17. When the storage chamber fuel level reaches a preselected height—above level 36, the source of gasoline pumped by the pump 18 is transferred from the fuel tank 19 to the storage tank 17 by way of the valve assembly 23. The latter is operated by the float 24 which is positioned in the chamber 17.

As soon as the level of gasoline in the storage chamber 17 decreases below the level 36, the valve assembly 23 closes and the fuel pump 18 again pumps gasoline from the fuel tank 19.

Cooperating with the intermediate or storage chamber 17 is the float 24 and valve assembly 23 supported by it. The valve assembly 23 provides alternate paths to the pump 18 from the fuel tank 19 in one case, and from the storage chamber 17 in the other. It includes an upper valve 31 and a lower valve 32, both of which cooperate with valve stem 33 (which is connected to the lower side of the float) and their respective valve seats. By properly separating valves 31 and 32—along the length of the valve stem 33, it is possible to select the level of fuel 36 in the storage chamber 17 which will cause the float 24 to close the lower valve 32. When the valve 32 rests against its valve seat, the source of fuel from the fuel tank 19 is interrupted and the pump 18 is forced to pull fuel from the storage chamber 17 by way of open valve 31. Whenever the level in the chamber 17 falls to the preselected level 36, valve 31 closes and the path from the gas tank 19 by way of the lowermost chamber 26 and valve 32 is established.

The lower or filter chamber 26 includes a porous filter 27 and a glass bowl 28 cooperating with the bale assembly 29 which maintains the bowl and the filter firmly against the underside of the body of the carburetor 10.

Also cooperating with the storage chamber 17 is an air inlet assembly 37. This includes a hollow aluminum ball 38 and an enclosed chamber 39. The ball 38 is loosely staked in the chamber 39 which includes cooperating valve

seat 41. If the fuel level in the storage chamber 17 rises too high, as a result of some malfunction in valve assembly, etc., it floats ball 38 to rest against its valve seat 41 thereby to close off the port 42. This prevents fuel from flowing out of the air vent 42 onto the engine and other parts of the automobile where combustion or fire might occur.

The present improved carburetor fuel metering device constitutes an improvement and synthesization of the system disclosed and claimed in my copending application, Serial No. 814,426, filed on May 20, 1959. The former invention is an auxiliary fuel level controller which cooperates with a conventional float-operated carburetor, fuel pump and fuel tank to decrease the flooding propensity of currently available internal combustion engines. The present invention eliminates the need for an auxiliary system by providing a compact and efficient carburetor fuel metering device that effectively integrates the anti-flooding features in a carburetor which does not employ a float.

While the present invention has been described with respect to a particular exemplary embodiment, it is apparent that certain other changes and modifications may be effected without departing from the spirit and scope of the invention. As a result, the invention should be limited only to the extent of the appended claims.

What is claimed is:

1. A fuel level control apparatus for a carburetor having a bowl supplied with liquid fuel from a fuel storage tank by means of a fuel pump, said apparatus comprising a vertical overflow tube open at both ends extending upwardly within and substantially coaxial to the centerline of said bowl, the top of said tube being at the normal fuel level of said bowl and said tube piercing the bottom of said bowl with the other end terminating in the top of an overflow chamber located vertically beneath said bowl, the bottom of said bowl forming the top of said overflow chamber, means providing a vent from the upper portion of said overflow chamber to the atmosphere, a check valve associated with said vent to prevent fuel flowing out of said vent, a two-way valve connecting the fuel pump to the fuel storage tank and a lower portion of said overflow chamber selectively, said two-way valve being formed integrally within the lower portion of the overflow chamber and having an upwardly facing inlet opening into said overflow chamber and a downwardly facing inlet opening out of said overflow chamber, a float unit within said overflow chamber, and means operatively connecting said float to said two-way valve for causing the pump to draw fuel from said storage tank through a filter means when the level of fuel in the overflow chamber is low and from the overflow chamber when the level of fuel therein is high, said filtering means comprising a cup-shaped porous ceramic filter attached to the bottom of said overflow chamber to enclose the downwardly facing inlet of said two-way valve, a bowl-shaped enclosure attached to the bottom of said overflow chamber and surrounding said cup-shaped filter to enclose a space around the outside of said filter, and means connecting said space to the storage tank.

2. An improved carburetor fed by a fuel pump from a fuel supply tank comprising an upper chamber, an air-fuel mixing passage laterally displaced alongside and having a common wall with said upper chamber, a lower chamber vertically beneath said upper chamber and separated by a common partition, said upper chamber having two outlets near the bottom of said chamber of which one connects to the suction of said fuel pump and the other connects to said fuel-air mixing passage through a fuel jet nozzle discharging within said mixing passage, a cylindrical baffle within and extending vertically upward from the bottom of said upper chamber partially towards the top thereof and having an upper boundary horizontal with the discharge end of said nozzle, said baffle enclosing a vertical overflow passage substantially coaxial to the vertical axis of said upper chamber and extending through the bottom of said upper chamber and opening into the top of said lower chamber to provide means of carrying overflow fuel rising above the top of said baffle in the surrounding upper chamber into the lower chamber, said air-fuel mixing passage having the interior walls shaped to form a venturi, a hollow tube open at both ends having an outside diameter less than the throat of said mixing passage venturi and supported within said mixing passage to be coaxial thereto, the interior of said tube shaped to form a venturi between both ends thereof, the end of said tube comprising the open exit of the tube venturi being located at the throat of the venturi of said mixing chamber and the entry end of said tube being located upstream therefrom, the discharge end of said fuel jet nozzle being located at the throat of said tube venturi, said lower chamber having a first and a second passage leading therefrom in addition to said overflow passage, said first passage connecting to the atmosphere from the top portion of said lower chamber to provide an air vent, a ball type check valve mounted within said first passage and arranged to check any external flow of fuel from said chamber, said second passage being vertically disposed through the bottom of said lower chamber, the top portion of said second passage shaped to define a valve seat facing upwardly into said lower chamber and the lower portion shaped to define a valve seat facing downwardly out of said lower chamber, the bottom end of said lower chamber having a lateral passage connecting at one end with said second passage between said seats and at the other end to means connecting to the inlet of said fuel pump, a pair of valve disks connected by a stem extending through said second passage, said discs cooperating with said upper and lower valve seats to form a two-way poppet valve, a float inside said intermediate chamber, said stem extending above the upper valve disc and connecting directly to said float, whereby the pump draws fuel from the lower end of said second passage when the fuel level in the intermediate chamber is low and withdraws fuel from the lower chamber when the level therein is high, a cup-shaped porous ceramic filter removably attached to the under side of the bottom of said lower chamber, the lower valve seat facing into the open end of said cup-shaped filter, a bowl-shaped enclosure removably attached to the underside of the bottom of said lower chamber and surrounding said cup-shaped filter to enclose a space around the outside of said filter, the bottom of said lower chamber being provided with still another passage opening at one end into said enclosed space outside said filter, and means connecting the other end of the last mentioned passage to the fuel supply tank outlet, whereby fuel from the supply tank is filtered before it is supplied to the two-way valve to prevent malfunctioning of the valve due to dirt.

References Cited in the file of this patent

UNITED STATES PATENTS

1,025,814	Lemp	May 7, 1912
1,252,440	Howe	Jan. 8, 1918
1,872,291	Hobbs	Aug. 16, 1932
1,881,860	Muzzy	Oct. 11, 1932
1,909,390	Ball et al.	May 16, 1933