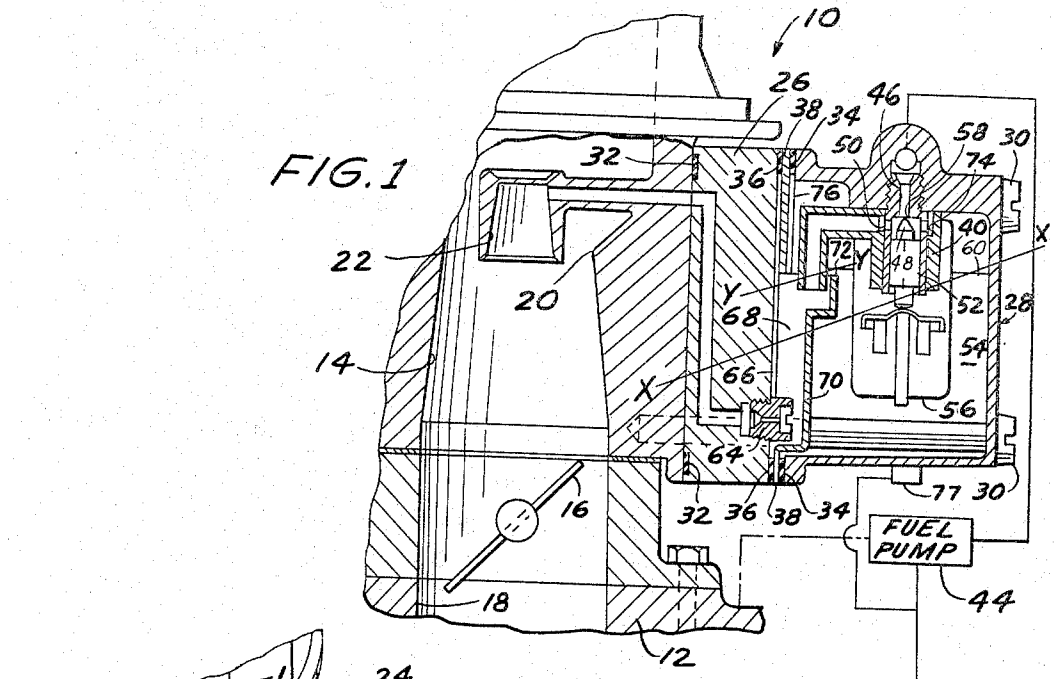
March 12, 1968 S. H. BENMORE 3,372,912

CARBURETOR

Filed Dec. 21, 1966

FIG. 1



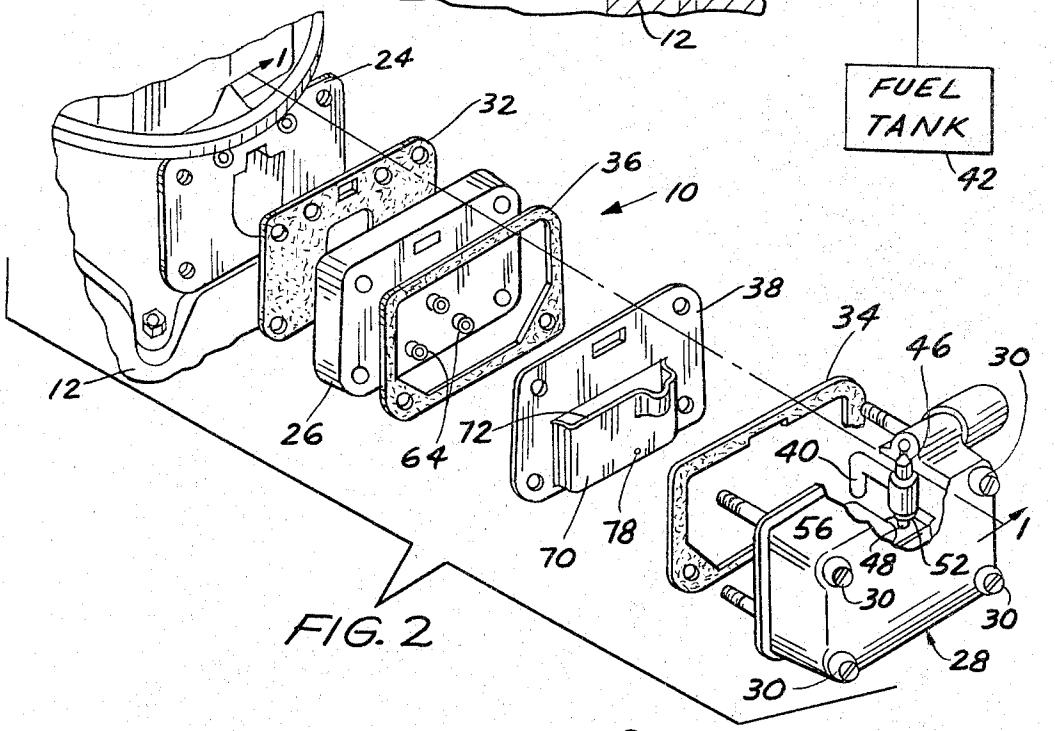


FIG. 2

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United States Patent Office 3,372,912
Patented Mar. 12, 1968

3,372,912

CARBURETOR

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Filed Dec. 21, 1966, Ser. No. 603,514
10 Claims. (Cl. 261—36)

ABSTRACT OF THE DISCLOSURE

This application discloses an improved internal combustion engine carburetor in which the fuel supplied to the induction passage is normally metered through a calibrated jet fed from the fuel bowl in which a predetermined necessary fuel level is maintained by a float-operated valve controlling the fuel inlet, the improvement comprising a relatively small capacity, heat insulated cavity within the fuel bowl and feeding the jet, the cavity having an overflow positioned slightly below the bowl level and the fuel inlet discharging directly into the small capacity cavity so that it quickly fills to its overflow level and provides an approximately proper fuel level sooner upon cranking of the engine than a comparable level would be reached if the fuel inlet discharged into the larger capacity fuel bowl, the improvement being particularly beneficial in but not limited to carburetors in which the fuel bowl is drained each time the engine is shut down to control air pollution by evaporation, a main benefit being an acceptable cranking time on starting and reduction in undesirable fuel vaporization on hot starting when the fuel bowl must be refilled.

This invention relates generally to internal combustion engine carburetors, and more particularly to a carburetor having means to reduce the cranking time required to start the engine.

The well known current effort to reduce air pollution attributable to automotive vehicles has resulted in a proposal that the carburetor float chamber be drained whenever the engine is shut down to prevent fuel vapors from being released to the atmosphere through the usual float chamber external vent and/or to reduce emission of unburned hydrocarbons through the exhaust system upon restart of the engine due to an overrich mixture produced in the engine induction system by float chamber fuel vapor or percolated fuel being discharged through the internal vent or the main nozzle after an engine shut down.

While draining the carburetor float chamber or fuel bowl each time the engine is shut down will tend to reduce or eliminate the above-mentioned sources of air pollution, a predetermined fuel level is required in the float chamber, and an engine will obviously not start and continue to run until the required fuel level is attained. Obviously, excessive cranking will be required to cause the fuel pump is refill the float chamber to the required level. In fact, excessive cranking may occur any time the fuel level is substantially reduced, as it might be due to boiling and evaporation after a hot or long engine shut down.

Accordingly, an object of the invention is to provide means for reducing the engine cranking time whenever the carburetor fuel level is so low that excessive cranking would be required.

Another object of this invention is to provide means for minimizing the cranking time of an engine equipped with a carburetor having means for draining the float chamber whenever the engine is shut down.

Another object of the invention is to provide a carburetor wherein the carburetor metering jets are quickly supplied with an adequate fuel head before the entire carburetor float chamber has been refilled to the required predetermined level.

Another object of the invention is to provide a carburetor having a dual cavity float chamber wherein a cavity having a relatively small volume supplying the carburetor metering jet or jets may be quickly filled with fuel initially supplied by the fuel pump upon cranking of the engine.

Another object of the invention is to provide such a carburetor wherein the filling rate of the relatively low volume compartment or cavity is in excess of the fuel required by the engine so that the engine will start and sustain itself on the fuel available in the relatively low volume cavity, the excess fuel spilling over to the larger volume compartment.

Still another object of the invention is to provide such a carburetor wherein the usual float mechanism controlling the carburetor fuel inlet valve is disposed in the larger volume cavity.

Another object of the invention is to provide such a carburetor wherein the lower volume cavity comprises what may be termed a fuel pocket baffle defined by a wall having the upper edge thereof or an opening therein disposed just below the required fuel level in the float chamber so that the level of the fuel in the pocket spilling into the main larger volume chamber or cavity is at the required level or within allowable tolerances.

Another object of the invention is to provide such a carburetor wherein the lesser volume cavity or pocket communicates with the larger volume main cavity so that the pocket may be drained when the latter chamber is drained upon engine shut down.

Another object of the invention is to provide means for easily converting certain existing carburetors to carburetors embodying the invention.

Another object of the invention is to provide such a carburetor wherein the so-called pocket or chamber of lesser volume is substantially insulated from engine radiated or conducted heat, thereby eliminating or reducing the tendency of cool fuel to flash or vaporize and produce pressure waves that cause fuel to be forced through the metering jet and out the nozzle, as has been observed to occur when fuel is pumped directly into a hot empty float chamber.

Another object of the invention is to provide a carburetor having means for diverting or directing carburetor inlet fuel to fill the lesser volume fuel pocket.

A still further object of the invention is to provide such a carburetor wherein the fuel pocket baffle of lesser volume is positioned adjacent the carburetor vertical axis, thereby improving carburetor cornering and angularity characteristics by limiting the tendency thereof to lower or raise the fuel head in the metering system.

These and other objects and advantages of the invention will become more apparent when reference is made to the following specification and the accompanying drawings wherein:

FIGURE 1 is a fragmentary cross-sectional view of a carburetor embodying the invention, taken along the plane of line 1—1 of FIGURE 2 and looking in the direction of the arrow;

FIGURE 2 is an exploded perspective view of the carburetor portion shown in FIGURE 1, with portions thereof cut away to better illustrate the structure of the invention.

Referring now to the drawings in greater detail, it will be seen that the carburetor 10 shown mounted on the engine 12 is of the type taught by Goodyear, 2,892,622. However, while the invention is shown as applied to a particular carburetor in order to illustrate the ease with which it may be modified to incorporate the invention, it

should be understood that the invention is in no way limited to this particular carburetor and that it is, in fact, easily adapted to any carburetor. It should also be understood that while the invention is particularly adapted for use with carburetors in which the float chamber is drained each time the engine is shut down, it has advantages as already pointed out above, for use in carburetors in which the float chamber is not drained. Since the particular means for draining the float chamber on engine shut down is not a part of this invention, it is not shown. That is, the invention will be described with the understanding that the carburetor **10** may be provided with some means for so draining the float chamber.

A prior art carburetor **10** comprises a body having an induction passage **14** with the usual throttle valve **16** pivotally mounted therein and secured on the engine intake manifold **18**, the induction passage also having the usual venturi **20** and a main nozzle **22**. One side **24** of the carburetor body is formed so as to have secured thereto a so-called metering block **26** and a fuel bowl cover assembly **28** by means such as the screws **30**, with sealing gaskets **32** and **34** therebetween.

The need for the invention can be illustrated by explaining that a prior art carburetor **10** would be assembled without the gasket **36**, the fuel pocket baffle plate **38** and the fuel inlet diverter member **40**. Thus, whenever the engine **12** is being cranked or operating, fuel from the tank **42** and the usually engine driven fuel pump **44** enters and flows down the passage **46**, past the fuel inlet valve **48**, laterally out the openings **50** in the valve seat member **52** and thence into the fuel reservoir **54** in which the float **56** is pivotally mounted. As is well known in the art, the float **56** rises with the rising fuel level in the reservoir **54** and forces the fuel inlet valve **48** upwardly until the valve engages the seat **58** when the required fuel level **60** has been attained, the float force being sufficient to maintain the valve **48** closed against the fuel pressure from the pump **44**.

The metering block **26** and the surface **24** of the carburetor body are, of course, formed with appropriate passages and other systems as required for proper functioning of the carburetor. However, in order to simplify the disclosure of the invention, only the main fuel system is shown in FIGURE 1, this main system comprising a passage **62** between the replaceable main jet **64** threaded into the fuel bowl face **66** of the metering block **26** and the main nozzle **22**. As is well known in the art, the carburetor **10** is calibrated so that proper quantities of fuel are supplied through the main nozzle **22**, provided that the required fuel level **60** is maintained in the fuel reservoir **54**. Obviously, if the fuel level is too high or too low, or if the surface of the fuel in the chamber **54** is not level, as would occur when the vehicle is cornered or positioned at a severe angle, the fuel supplied to the engine will be more or less than desired.

It will be understood that the carburetor **10** also includes other fuel systems, such as the idle fuel system (not shown), and that fuel therefor is supplied through the main jet **64** or through passages with openings (not shown) formed in the face **66** of the metering block **26**.

It will thus be seen that if a prior art carburetor **10** has the fuel drained therefrom each time the engine is shut down, then the engine **12** will not start and continue to run properly until the float chamber **54** is refilled to the proper level **60** by cranking the engine to operate the pump **44**. A primary purpose of the invention is to provide means for reducing such cranking time.

The particular carburetor shown may be modified to incorporate the invention very simple and inexpensively merely be including the additional gasket **36**, the pocket baffle plate **38** and the fuel inlet diverter member **40**. It will be apparent that the pocket baffle plate **38**, which may be stamped sheet metal, molded plastic, etc., when secured against the metering block **26**, provides a dual cavity fuel chamber **54**. The chamber **68**, having a substantially lesser volume than the main float chamber **54** and the wall **70** with the top edge **72** thereof slightly below the desired fuel level **60**, encloses the main jet **64** and any other metering orifices (not shown) that must be supplied with fuel.

It will also be noted that the diverter member, which may be formed from any suitable material,when press fitted or otherwise secured on the valve seat member **52**, causes fuel entering through the passages **50** to flow through the inner annulus **74** communicating with passages **50** and thence through the passage **76** and into the lesser volume cavity **68**.

The capacity of the fuel inlet system is sufficient to quickly fill the fuel pocket chamber **68**, maintain the chamber filled to supply starting and running fuel and cause excess fuel to spill over the top edge **72** of the wall **70** and to thus fill the main chamber **54**, the level in the chambers **54** and **68** thereafter being controlled, as previously stated, by the well known float or any other suitable structure.

When it is desired to drain the float chamber **54** on engine shut down, by any suitable means represented generally by **77**, the opening **78** near the bottom of the pocket chamber **68** permits the fuel therein to also be drained, the opening **78** being relatively small so that it does not prevent quick filling of the chamber **68**. While a single opening **78** will perform the draining function, it may be desirable to have two or more openings at different levels to control the time required to fill and/or drain the lesser volume chamber **68**.

It is thus apparent that the particular carburetor **10** shown may be very easily adapted to embody the invention merely by assembly the same with the additional gasket **34**, pocket baffle plate **38** and fuel diverter member **40**. In such a structure, the pocket baffle plate has only a very thin edge thereof exposed to the engine so that heating thereof by heat radiated from the engine is minimized; also, it is separated from the metering block **26** and the fuel bowl cover **28** by gaskets **34** and **36** which tend to insulate the same from conducted heat. Since the wall **70** is relatively cool, the carburetor is less subject to the previously described pressure fluctuations due to flashing or vaporizing of fuel, as compared to a carburetor wherein the intitial fuel is pumped directly into an empty hot fuel bowl.

While the invention is shown as being embodied in a prior art existing carburetor **10** merely by the assembly of the three additional elements, it is, of course, apparent that any carburetor could be formed with the lesser volume cavity **68** in any suitable manner, such as die casting or otherwise forming the wall **70** as an integral part of the carburetor body, merely fitting a separate baffle plate into formed slots, etc., and providing a fuel inlet system that discharges into the lesser volume cavity.

It will also be apparent that the invention provides a quicker starting advantage for any carburetor wherein the fuel level in the float chamber has evaporated, boiled or otherwise become lower than that required for starting. For example, the line X—X represents the surface of the fuel in a prior art carburetor without the dual cavity fuel reservoir during a hard left turn or when the vehicle is temporarily inclined, assuming that FIGURE 1 is a view looking toward the front of the engine. Such a disturbance tends to reduce the fuel head and results in a lean mixture supplied to the engine. A disturbance in the opposite direction would, of course, result in a rich mixture.

The line Y—Y, on the other hand, illustrates that in a carburetor embodying the lesser volume cavity **68** adjacent the vertical axis of the carburetor or the metering block **26** there is substantially less tendency for the fuel head to be reduced, even though the attitude of the fuel in the main fuel reservoir **54** is along the line X—X, or along any line departing from the horizontal. Thus, the fuel pocket baffle structure contemplated by the invention provides superior cornering and angularity characteristics in any carburetor.

The invention has been shown and described in such clear and concise language as to permit anyone skilled in the art to practice the same. Since modifications are possible within the scope of the invention, no limitations are intended except as recited in the appended claims.

What I claim as my invention is:

1. An internal combustion engine carburetor, comprising a body formed to provide an induction passage having a fuel discharge orifice, a fuel reservoir including a first smaller capacity chamber and a second larger capacity chamber, an inlet for supplying fuel to said reservoir from a source under pressure, means controlling said inlet to maintain a predetermined fuel level in said reservoir, a fuel passage extending between said first chamber and said discharge orifice and including means dependent solely upon the attainment of said predetermined fuel level for metering fuel as required by the engine to said discharge orifice, said inlet discharging fuel directly into said first chamber, said first chamber having an overflow slightly below said predetermined fuel level over which fuel is supplied to said first chamber from said inlet may spill into said second chamber, whereby an approximately correct metering fuel level only slightly below and never exceeding said predetermined fuel level is quickly attained before said predetermined level in said reservoir is reached.

2. A carburetor such as that recited in claim 1, wherein said first mentioned means is a float-controlled valve, said float being disposed in said second chamber.

3. A carburetor such as that recited in claim 1, wherein said metering means in said fuel passage comprises a calibrated restriction.

4. A carburetor such as that recited in claim 1, wherein said metering means is calibrated to meter theoretically correct quantities of fuel only upon the attainment of said predetermined fuel level and is not separately influenced by inlet fuel pressure.

5. A carburetor such as that recited in claim 1, wherein said first cavity into which inlet fuel is discharged is formed so as to be insulated from engine heat when in use and thus normally is at lower temperature than outer walls of said reservoir so as to minimize vaporization of inlet fuel.

6. A carburetor such as that recited in claim 1, wherein the fuel surface area of said first cavity is substantially less than the fuel surface area of said second cavity, whereby disturbances of the fuel level in said first cavity are isolated from and proportionally reduced as compared to disturbances of the fuel level in said second cavity and in said reservoir.

7. A carburetor such as that recited in claim 1, wherein said predetermined fuel level in said fuel reservoir, when attained, exceeds slightly the level of said overflow so that during normal operation fuel metering is determined by said predetermined level and not by a lesser fuel level in said first cavity, the lesser fuel level in said first cavity determining fuel metering only until said predetermined level is reached in said reservoir and said lesser fuel level being reached in said first cavity before it is reached in said second cavity upon filling of said reservoir by overflow from said first cavity.

8. A carburetor such as that recited in claim 1, wherein means is provided for at times draining the fuel from said reservoir, said first cavity having an opening near the bottom thereof communicating with said second cavity so that said first cavity is drained when said reservoir is drained, said opening being restricted so that it serves primarily as a drain and does not substantially reduce the time required to fill said first cavity.

9. A carburetor such as that recited in claim 1, wherein said fuel passage is formed in a separate metering block secured to said body and forming one wall of said reservoir and wherein a member secured on the reservoir side of said metering block and having a portion thereof formed to cooperate with said metering block provides said first cavity having a volume substantially less than the volume of said reservoir and having the reservoir end of said fuel passage disposed therein.

10. A carburetor such as that recited in claim 9, wherein said member is a formed plate secured to said metering block and said reservoir is a hollow body secured to said plate, each with gaskets therebetween.

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