June 27, 1967 J. J. FRANKOWSKI 3,328,012

CARBURETOR

Filed Sept. 29, 1965

FIG. 1

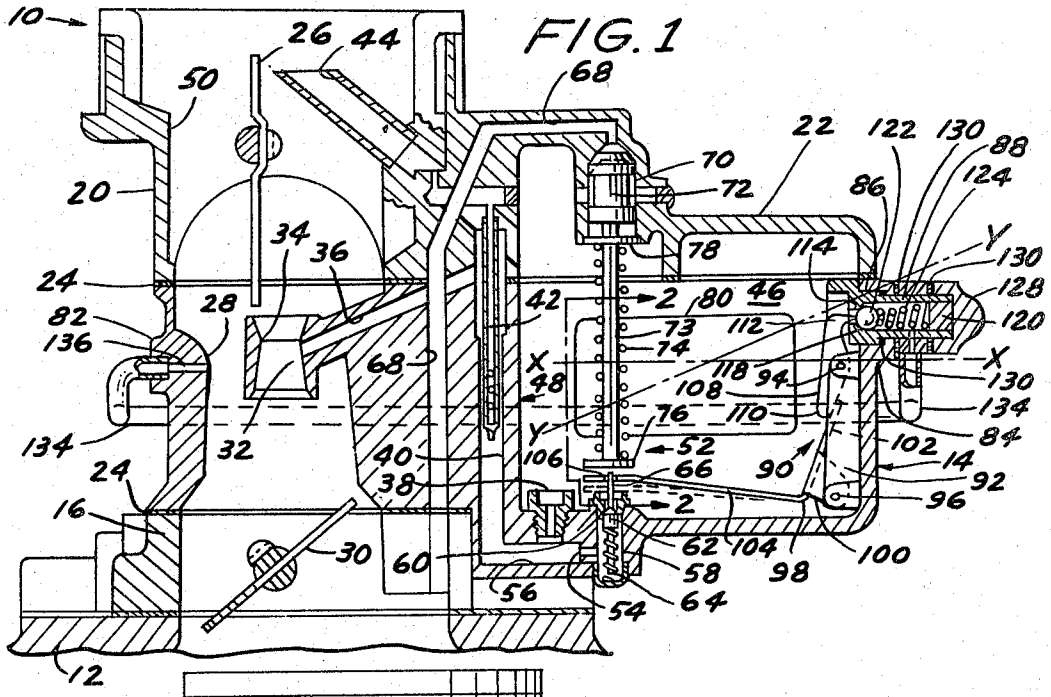


FIG. 3

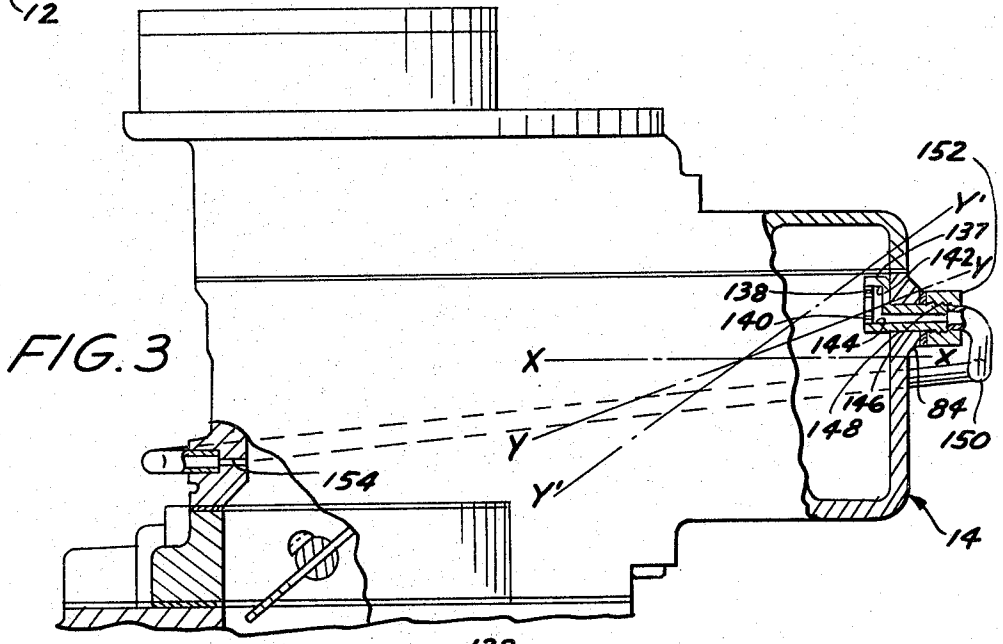
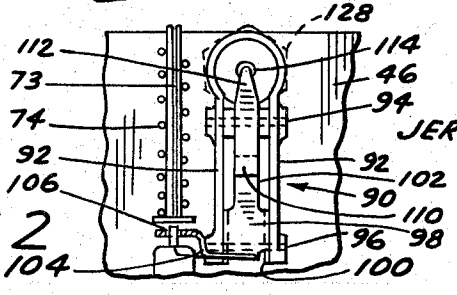


FIG. 2



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CARBURETOR

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This invention relates generally to carburetors, and more particularly to a carburetor having means to compensate for temporary leaning of the fuel-air mixture supplied to an automotive engine when cornering, acceleration, deceleration or vehicle attitude causes the fuel in the float chamber to move away from the carburetor metering section.

In carburetors to which the invention particularly pertains, a predetermined fuel level is maintained in the fuel bowl by a float controlled fuel inlet valve. Fuel metering is accomplished by the difference between the pressure above the fuel in the float chamber or fuel bowl and the pressure at the fuel discharge orifice within the carburetor induction passage; that is, this pressure differential is employed to force fuel from the fuel bowl, through the fuel metering section and out the main fuel nozzle, for example.

Any vehicle operating condition which causes a disturbance of the fuel level in the bowl to the extent that the level in the fuel passages of the carburetor metering section is lowered renders the pressure differential less effective in forcing fuel from the bowl to the nozzle, thereby temporarily leaning out the mixture and causing a noticeable so-called flat spot or hesitation in engine operation. Of course, a disturbance in the opposite direction causing fuel to move toward the metering section will cause a corresponding richening of the mixture; however, this has not been found to create any noticeable effect on engine operation. That is, the problems appear to occur only when the fuel level disturbance is in the direction to lean out the mixture.

In other words, centrifugal force acting on the fuel during cornering, in effect, subtracts from the vacuum available to draw fuel into the carburetor, resulting in a loss of metering. The fuel column is actually withdrawn from the fuel passages. Furthermore, the effect is not limited to a loss of metering, but it also results in faulty or erratic and inconsistent metering.

Accordingly, a primary object of this invention is to provide means to compensate or correct for temporary lean conditions due to the movement of fuel away from the carburetor fuel metering section.

Another object of the invention is to provide means that will supply additional quantities of fuel only during this temporary leaning out condition.

A still further object of the invention is to provide such a means that will be rendered inoperative during idling or engine shut down conditions, such as when the vehicle is standing on a hill or bank, in which case enrichment might stall the engine or cause a difficult restart.

Another object of the invention is to provide such means that may be readily incorporated in existing carburetors in a manner to co-operate with and be actuated by other systems thereof.

More specifically, another object of the invention is to provide such means that is operatively connected to the usual power valve system so that operation thereof will not take place during engine shut off or idle, but only when the power valve is open.

A still further object of the invention is to provide such means that discharges the compensating fuel at the carburetor venturi, manifold vacuum when the means is

operative being too low to draw the additional fuel into the carburetor as quickly as it is needed during the temporary lean condition.

A still further object of the invention is to provide such means that is capable of adjustment so as to enable variation in the amount of additional fuel that is supplied during the temporary leaning condition.

Another object of the invention is to provide such means, with or without a valve mechanism, depending upon the particular carburetor or engine involved.

A still further object of the invention is to provide such means that is relatively easy to install and maintain, and that is dependable and efficient in operation.

These and other objects and advantages of the invention will become readily apparent upon reference to the following specification and the attached drawings wherein:

FIGURE 1 is a cross-sectional view through a carburetor including a preferred embodiment of the invention;

FIGURE 2 is a fragmentary view taken along the plane of line 2—2 of FIGURE 1, and looking in the direction of the arrows;

FIGURE 3 is an elevational view, with portions thereof cut away and in cross-section, illustrating the same carburetor shown by FIGURE 1, but including a modification of the invention.

Referring now to the drawings in greater detail, FIGURE 1 illustrates a carburetor **10** mounted on an engine **12** in a manner such that the fuel bowl portion **14** of the carburetor is to the right of the centerline of the vehicle, when viewed from the rear.

While the invention is adaptable to any carburetor, the particular carburetor **10** shown comprises a lower throttle body portion **16**, an intermediate venturi portion **18** having the fuel bowl **14** formed integrally therewith and an upper air horn portion **20** with an integral fuel bowl cover **22**, the three sections being secured in any suitable manner with gaskets **24** therebetween.

The carburetor **10** contains the usual pivotable choke valve **26**, venturi **28** and pivotable throttle valve **30**. The main nozzle **32**, including a secondary venturi **34**, is located in the main venturi, and the passage **36** between the main nozzle **32** and the fuel bowl **14** includes the usual removable main metering jet **38**, main well **40** and main well air bleed tube **42**, the tube **42** communicating with the internal pitot tube **44** which also vents the fuel chamber **46** to aircleaner pressure. The main jet **38** and the main well **40** comprise a portion of what is referred to herein as the carburetor metering section **48**, it being noted that the metering section is positioned at the wall between the induction passage **50** and the fuel chamber **46**.

The carburetor structure described to this point is well known to those skilled in the art so that further explanation of the structure and operation thereof is not required. However, the particular preferred embodiment of the invention shown involves co-operation with the power fuel system; thus, the power fuel system will now be described.

The power fuel system **52** comprises a passage **54** that communicates between the passage **56** that connects the main jet **38** with the main well **40** and the power valve chamber **58**. The power valve chamber **58** is formed to provide a valve seat **60**, and it contains the power valve **62** urged against the seat **60** by a spring **64** and having an upwardly pointing extension **66**. When the valve **62** is open, fuel from the fuel chamber **46**, in addition to that supplied through the main jet **38**, is supplied to the main well **40**, richening the mixture to meet the demand for greater power.

A passage 68 communicating with that portion of the induction passage 50 below the throttle valve 30 extends upwardly and thence to a cylinder 70 containing the movable piston 72, the piston having a stem 73. A compressed coil spring 74 between the abutment 76 on the end of the stem and the spring retainer 78 through which the stem 73 is movable, normally urges the piston 72 downwardly, as shown in dotted lines. The relationship between the stem 73 and the upwardly extending extension 66 on the power valve 62 is such that when the piston is in its lower dotted line position, the power valve is open to supply the additional power fuel. The spring 74 is selected so that normal manifold vacuum is sufficient to draw the piston upwardly to its solid line position; however, when the throttle valve is opened, in response to a demand for power, the manifold vacuum drops sufficiently so that spring 74 moves the stem 73 and piston 72 to their lower position, opening the power valve 62. The above described power valve system is well known in the art, and such a carburetor can be very conveniently modified to incorporate the invention.

Before describing the invention, it should be pointed out that the fuel is normally at some level such as that represented by line X—X, this level being maintained by a fuel inlet valve controlled by the float 80, as is well known in the art. This normal level also exists in the main well 40, and the difference between the pressure above the fuel in the chamber 46 and the pressure at the main nozzle 32 forces fuel up the main well and into the passage 36 leading to the nozzle.

It will be apparent that when the vehicle is negotiating a relatively sharp left turn, assuming the corburetor to be mounted as shown, the fuel in the chamber 46 assumes some level off the normal level, as represented by the line Y—Y, the slope of the line depending upon the severity of the turn; thus, the vacuum required to draw the fuel up the main well 40 and into the main nozzle 32 is substantially greater than when fuel level is at X—X. However, the vacuum at nozzle 32 does not increase; thus, it is rendered less effective to draw fuel to the main nozzle 32 and the result is a substantial temporary leaning out of the fuel-air mixture to the engine. This leaning out results in a noticeable flat spot or hesitation in engine operation, which is the problem that the invention solves.

With the above explanation, it will now be seen that the invention may comprise a relatively inexpensive modification of an existing carburetor to provide means to compensate for this temporary lean condition. The modification may include providing a boss 82 on one side of the carburetor body opposite the venturi and a second boss 84 on the outer surface of the fiuel bowl 14, the boss 84 being formed to provide a two diameter passage 86 adapted to receive a cylindrical portion 88 of a valve assembly 90.

As seen in FIGURES 1 and 2, the valve assembly 90 comprises a cast or otherwise formed body 92 having pairs of oppositely disposed holes to receive pivot pins 94 and 96. The lower pivot pin 96 has mounted thereon, with the body 92, a lever member 98 having spaced pivot members 100, an upper extension 102 and a lower extension 104. The lower extension 104 is formed to extend over the extension 66 of the power valve 62, and it is preferably formed with an opening 106 through which the power valve extension 66 may extend. The upper pivot pin 94 has pivotally mounted thereon, within the body 92, a second valve operating lever 108, the lower end 110 of the lever overlapping the upper end 102 of the first lever 98 and the upper end thereof having a portion 112 passing through an orifice 114 communicating with the passage 116 in the cylindrical portion 88 to provide a valve seat 118. The passage 116 is plugged at its outer end 120 so as to retain a ball valve 122 loaded by a spring 124, the spring having sufficient force to close the ball valve 122 against its seat 118 and to move the levers 108 and 98 to their FIGURE 1 position, except when the power valve 62 is opened by the stem 73 due to the greater force of the spring 74.

A collar 126 is mounted over the end of the externally threaded portion 88 extending through the boss 84, and a cap nut 128 secures the collar against the boss, with sealing gaskets 130 preventing leakage. Aligned passages 132 extend through the boss 84 and the collar 126. A conduit 134 secured to the collar 126 has the other end thereof inserted into a suitably formed opening in the boss 82 on the other side of the carburetor so as to communicate the valve chamber 116 to the venturi 28, through the passage 136 formed in the wall of the carburetor.

With the above construction, it will be apparent that whenever the fuel is moved away from the metering section 48 of the carburetor, it will assume a position along the line Y—Y, thereby tending to lower the level of the fuel in the main well and covering the orifice 114 which is normally closed by the ball valve 122. This will be true whenever a vehicle, on which the carburetor is mounted as shown, is in a relatively sharp left turn or is parked on a bank that slopes downwardly to the right. The same would be true, of course, if the carburetor was rotated 90° and the vehicle were either accelertaed or decelerated.

If the valve assembly 90 were not provided, fuel could be supplied through the conduit 134 to the venturi 28 any time that the fuel level covered the orifice 114. However, in most cases it has been found that it is undesirable to supply this extra fuel whenever the engine is merely idling, or when the engine is shut down. In the former case, the engine might stall and in the latter case, restarting might be difficult. Thus, the preferred embodiment of the invention includes the valve assembly 90 so that compensating fuel will be supplied only when the following two conditions exist: (a) the fuel is being moved away from the metering section and (b) engine operation is such that the power valve is open.

While it is usually desirable to include the valve assembly 90 in the fuel compensating system, there may, of course, be engines or carburetors that can properly compensate for leaning out due to movements of fuel away from the metering section without the use of such a valve. Thus, a simplified modification of the invention is shown by FIGURE 3 wherein a two-port spill assembly is provided.

In the FIGURE 3 construction, a member 137 having vertically spaced ports 138 and 140 connected by passages 142 and 144 has the portion 146 containing the passage 144 secured through the passage 148 formed through the boss 84, the protruding end of the portion 146 being threaded so as to enable the connection thereto of a flared tube 150 by means of the threaded fitting 152. The other end of the tube 150 is connected to communicate with a passage 154 through the wall of the carburetor and into the induction passage 50, either above or below the throttle valve 30, as desired.

It will be noticed in the FIGURE 3 modification that the vertically spaced orifices are both positioned above the normal fuel level X—X. One or both of the orifices 140 and 138 may be covered by fuel, depending upon the degree of disturbance of the fuel in the fuel bowl to lines Y—Y or Y'—Y', for example. Since the fuel supplied through each of the orifices 138 and 140 is additive, more compensating fuel will be provided when both orifices are covered to correct for the more severe leaning out condition. The FIGURE 3 structure could be employed in cases where the engine can tolerate idle and/or shut down enrichment.

It should be apparent from the above description of construction and operation that the invention provides novel means to accomplish the stated objectives. While a preferred embodiment is shown operative in conjunction with the power valve system, it is conceivable that the valve assembly thereof could be operated in conjunction with some other fuel system, such as accelerating

pump system, or with some predetermined degree of throttle opening. The main objective in the preferred embodiment being to prevent valve opening when the engine is idle or shut down. It is also apparent that other modifications are possible; for example, the FIGURE 1 and 3 embodiments could easily be combined to provide a plurality of valved ports.

It should be noted that the structure of the invention is such that an existing carburetor can be modified at the plant to incorporate the features of the invention merely by drilling a passage to the carburetor induction passage and a passage through the wall of the fuel bowl opposite the fuel metering section of the carburetor. The parts required for the invention are very simple and inexpensive, and they fit into the existing carburetor structure without in any way effecting the operation of the prior systems to the carburetor. For example, the spill orifices are so small, as compared to the pitot tube vent, that continuous bleed of air does not change the pressure above the fuel in the bowl, and the metering characteristics of the carburetor are not effected. The structure of the invention is also particularly adapted for so-called aftermarket sales so that any vehicle owner can purchase a modification kit for his carburetor.

The invention has been described in sufficient detail to enable anyone skilled in the art to practice the same, and no limitations are intended, except as recited in the following claims.

What I claim as my invention is:

1. In combination with an internal combustion engine for use in a vehicle, a carburetor mounted on said engine and comprising a body having an induction passage, a fuel reservoir chamber adjacent said induction passage, said fuel reservoir comprising an undivided single compartment wherein all of the fuel therein acts as a single body of fluid, a fuel supply metering means between said induction passage and said fuel chamber, means for maintaining a predetermined fuel level in said chamber and a passage leading from a side of said fuel chamber opposite said fuel metering means and towards a side of said engine and at a point above said predetermined fuel level to said induction passage.

2. A device such as that recited in claim 1, wherein said fuel chamber end of said latter passage includes more than one orifice positioned at different distances above said normal fuel level.

3. In combination with an internal combustion engine for use in a vehicle, a carburetor mounted on said engine and having an induction passage and a fuel reservoir in which a predetermined normal fuel level is maintained, said fuel reservoir comprising an undivided single compartment such that all of the fuel therein acts as a single fluid body, fuel metering means positioned at the end of said fuel reservoir adjacent said induction passage and subject to lean metering when fuel in said reservoir is displaced so as to lower said level adjacent said metering means as on cornering of said vehicle, and means to compensate for lean metering due to such disturbances in said fuel level, said means comprising a passage between

the carburetor induction passage and an end of said fuel reservoir opposite said metering means and towards a side of said engine at a point sufficiently above the normal fuel level therein so that lean metering would occur if said point were covered wtih fuel, said passage being effective to convey additional amounts of fuel to said induction passage when the fuel reservoir end thereof is covered with fuel due to such leaning disturbances in said fuel level.

4. In combination wtih an internal combustion engine for use in a vehicle, a carburetor mounted on said engine and comprising a body having an induction passage with a venturi restriction, a main fuel nozzle positioned in said passage near said venturi, a fuel reservoir on said body adjacent said induction passage, said fuel reservoir comprising an undivided single compartment such that all of the fuel therein acts as a single fluid body, a first passage between said reservoir and said main nozzle, means for normally maintaining a predetermined fuel level in said reservoir, a second passage having the inlet end thereof open to said reservoir a predetermined distance above said predetermined fuel level and towards a side of said engine such that said inlet end would be covered by fuel during a disturbance in the normal fuel level in said reservoir and its other discharge end open to said induction passage, said second passage providing means for conveying additional fuel to said induction passage when the fuel level in said reservoir is disturbed sufficiently to cover said inlet end of said second passage.

5. In combination with an internal combustion engine for use in a vehicle, a carburetor mounted on said engine and comprising a body having an induction passage, a fuel discharge orifice in said passage, a fuel reservoir on said body adjacent said induction passage, said fuel reservoir comprising an undivided single compartment such that all of the fuel therein acts as a single fluid body, a first passage between said reservoir and said orifice, means for maintaining a predetermined normal fuel level in said reservoir, a second passage having the inlet end thereof terminating in said reservoir and towards a side of said engine a predetermined distance above said predetermined normal fuel level such that said inlet end would be covered by fuel during a disturbance in the normal fuel level in said reservoir and its other discharge end terminating in said induction passage, said second passage supplying additional fuel to said induction passage when the fuel level in said reservoir is disturbed sufficiently to cover said inlet end of said second passage.

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