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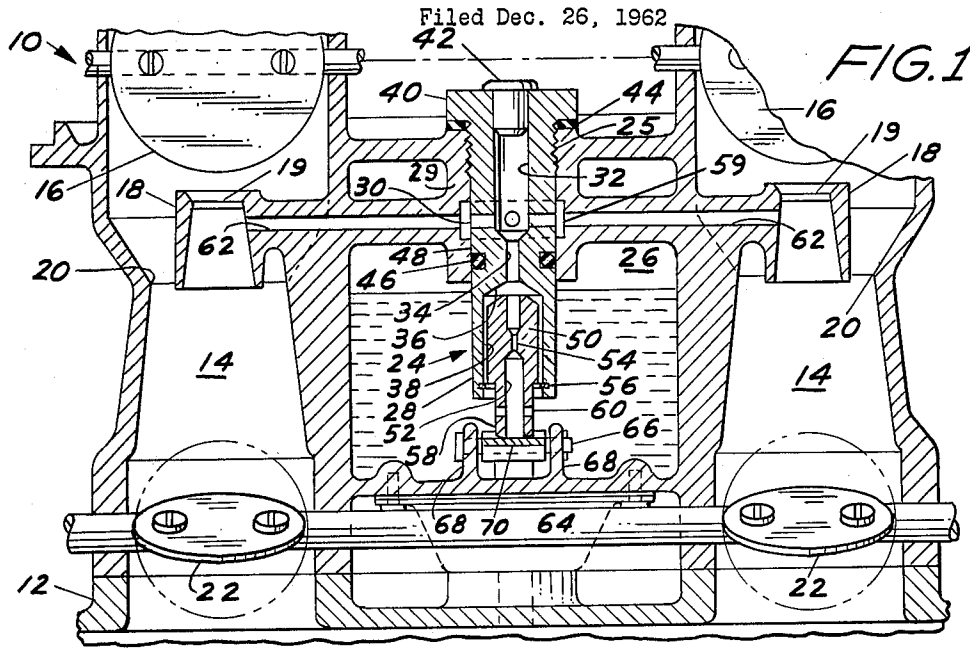


FIG. 1

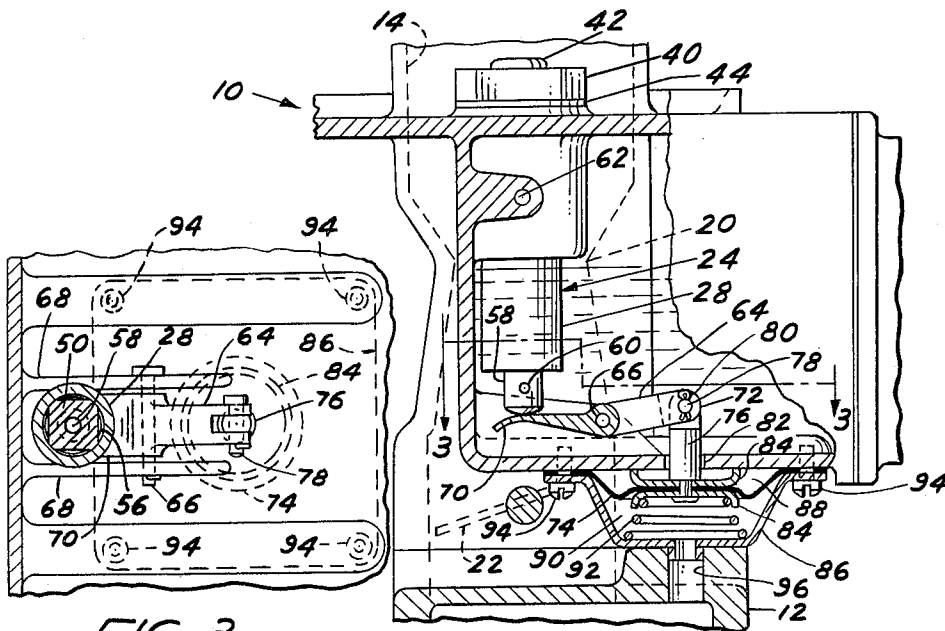


FIG. 3

FIG. 2

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CARBURETOR

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This invention relates generally to internal combustion engine carburetors, and more specifically to the fuel metering systems therefor.

Carburetor main and power enrichment fuel metering systems have been constructed and arranged to function independently, although the separate quantities of fuel supplied thereby may ultimately both be discharged through the same main nozzle. Also, it has been necessary to disassemble at least a portion of a carburetor in order to inspect, clean, repair, and/or replace components of these fuel metering systems. Additionally, since the metering jets in use today are located in a wall of the carburetor, they may at times become heated to the extent that fuel passing therethrough is partially vaporized resulting in erratic metering.

Accordingly, an object of this invention is provide a fuel metering system that is less prone to vapor problems by reason of the metering jet structure thereof being completely immersed in the reservoir fuel.

Another object of the invention is to provide a single carburetor metering unit, the operation of which provides a result equivalent to the normal operation of the usual separate main and power enrichment systems.

A further object of this invention is to provide a fuel metering unit constructed in such a way as to be easily and quickly removable for cleaning or replacement purposes, without having to disassemble any other portion of the carburetor, thereby considerably reducing maintenance costs.

Other more specific objects and advantages of the invention will become apparent when reference is made to the following description and the accompanying illustrations wherein:

FIGURE 1 is a fragmentary cross-sectional view of a two-barrel carburetor embodying the invention, taken on a plane passing through the axes of the induction passages;

FIGURE 2 is a fragmentary cross-sectional view of the same carburetor on a plane passing between the induction passages at right angles to the plane of FIGURE 1.

FIGURE 3 is a fragmentary cross-sectional view taken on the plane of line 3-3 of FIGURE 2, and looking in the direction of the arrows.

Referring to the drawings in greater detail, FIGURE 1 illustrates a two-barrel carburetor 10 mounted on an engine intake manifold 12. It is to be understood, however, that the invention may be employed in any carburetor requiring the conventional main and power enrichment fuel systems, or the equivalent thereof.

The carburetor 10 contains the usual induction passages 14, each passage having a main fuel nozzle 18 including a booster venturi 19, which is not used in all cases, a main venturi 20 and a throttle plate 22. The combination main and power enrichment fuel metering system 24 may be supplied with fuel by any suitable fuel reservoir chamber 26 formed in the carburetor. In the case of the two-barrel carburetor shown, it is preferable, of course, that the reservoir 26 be positioned approximately between the induction passages 14.

The system 24 shown includes a generally cylindrical body 28 having external threads 25 so that it may be assembled into a bridge portion 29 extending between the spaced passages 14 of the carburetor, with the lower por-

tion of body 28 extending into the reservoir 26. The body 28 includes one or more outlet ports 30 extending from a central passageway 32 sealed at one end by a plug 42 and formed to provide a calibrated restriction 34, a valve seat 36 and a larger cylindrical chamber 38 at the other end thereof. The body 28 may also include a flange 40 adapted to engage a suitable seal 44 positioned between the flange 40 and the bridge portion 29 to prevent leakage past the external threads 25 of the body 28. An O ring seal 46 positioned in a groove 48 formed in the body 28 may be used to insure that no fuel can flow around the body 28. If required for any reason, the cylindrical body 28 may be adjusted vertically by shims or other convenient means.

A triangular or square valve member 50 (see FIGURE 3) containing a central passageway 52, which includes a smaller calibrated restriction 54, is slidably inserted into the chamber 38 of the body 28 and retained therein by any suitable means such as a retaining ring 56. A portion 58 of the valve 50 extends beyond the end of the body 28 and includes one or more inlet ports 60 formed through the walls thereof. The annular chamber 59 and the conduits 62 formed in the bridge portion 29 extending over reservoir 26 communicate between the outlet ports 30 and the main fuel nozzles 18.

A pivotable lever 64, better seen in FIGURE 2, is located below the valve portion 58 by means of a pivot pin 66 extending between two bosses 68. The end 70 of the lever 64 contacts the extension 53, while the other forked end 72 is pivotally connected to the diaphragm 74 by means of a stud 76 and pin 78, the stud 76 extending through an opening 82 in the bottom of the reservoir 26 and being connected to the diaphragm by the conventional washers 84 positioned on both sides of the diaphragm 72. The diaphragm 74 is clamped at its outer edges between the outer wall of the reservoir 26 and a separate diaphragm housing 86 so as to form chambers 88 and 90 having the diaphragm as a common wall. The diaphragm housing 86 may be attached to reservoir 26 wall by any suitable means such as screws 94, and the diaphragm 74 is urged upwardly or toward the reservoir 26 wall by a suitable resilient means such as the spring 92. Any suitable conduit 96 is provided to communicate vacuum from the engine intake manifold 12 to the spring chamber 90.

Operation

As is well known in the art, air drawn into the induction passage 14 by the operation of the engine creates a vacuum at the venturi 20 and at the main nozzle 18, which in this case includes a so-called booster venturi 19. The pressure differential between the positive pressure above the fuel in the fuel reservoir 26 and the vacuum at the main nozzle 18 causes a metered flow of fuel from the fuel reservoir 26 into the induction passage 14, via the connecting passageways. As stated above, the present practice is to provide independent main and power enrichment fuel metering systems, the former functioning at all engine speeds above idle and the latter functioning additively only at high speed or heavy load conditions.

As will be seen in the discussion which follows, the invention contemplates cooperating main and power enrichment systems integrated into a single system capable of providing two different metering characteristics that are, in effect, operative alternately at predetermined times. That is, the combined system employs separate main and power metering restrictions, only one of which is controlling at any given condition of engine operation.

During part throttle operating conditions, when a high manifold vacuum is being supplied to the chamber 90 in the diaphragm housing 86 via the conduit 96, the diaphragm 74 is caused to overcome the spring 92 and move away from the wall of the reservoir 26. This pulls the

attached stud 76 downwardly, pivoting the end 70 of actuating lever 64 upwardly in FIGURE 2 so as to raise the valve 50 against the seat 36. In this closed condition of valve 50, fuel is caused to flow from the reservoir 26 into the induction passage 14 via the inlet ports 60, passage 52, controlling restriction 54, ineffective restriction 34, outlet ports 30 and the conduits 62 leading to the main fuel nozzles 18. In other words, it can be seen that the effective metering restriction during this period of high manifold vacuum is the smaller restriction 54, which is calibrated for proper fuel flow at all part throttle engine operating conditions not requiring the extra power fuel.

During high speed or heavy load conditions, when the manifold vacuum transmitted to the diaphragm chamber 90 via the conduit 96 drops to some predetermined lower value, the diaphragm 74 is moved toward the wall of the fuel reservoir 26 by the calibrated spring 92, thereby pivoting the end 70 of the actuating lever 64 downwardly in FIGURE 2 and allowing the valve 50 to drop away from the seat 36. In this open condition of valve 50, fuel in addition to that which enters the passageway 52 through the inlet ports 60 can flow upwardly through the clearance between the square or triangular valve 50 and the wall of the chamber 38, past the seat 36 and thence through the larger calibrated restriction 34, the outlet ports 30, and the conduits 62 to the induction passage 14. It can thus be seen that during this lower manifold vacuum wide-open-throttle condition of engine operation, the larger restriction 34 is the effective metering determinant, and the resultant rich mixture which is required for high speed or heavy load conditions is controlled by the calibrated size of this larger restriction 34. That is, the smaller restriction 54 may flow some fuel, but it does not control metering during this phase of engine operation.

From the above, it should be apparent that the invention embodies a unique and compact single system for efficiently and automatically supplying the fuel required under all off-idle engine operating conditions by alternately giving effect, in a common passageway, to a smaller or a larger calibrated restriction as the controlling fuel metering medium.

It should be further apparent that the sub-assembly embodying this fuel system may be readily removed from the carburetor, for most cleaning or replacement purposes, without having to disassemble any part of the main carburetor body.

Also, it should be still further apparent that the possibilities of erratic metering due to fuel becoming vaporized, as a result of its having to flow through a heated metering jet, will be considerably decreased in a system embodying the invention by virtue of the metering jet being located a substantial distance away from the carburetor wall and completely surrounded by fuel in the reservoir.

While only one embodiment of the invention has been illustrated and described, it is conceivable that other modifications are possible within the scope of the appended claims.

What we claim as our invention is:

1. In an internal combustion engine carburetor having an induction passage with a fuel nozzle positioned in a venturi restriction, a fuel reservoir and a fuel passage leading from said fuel reservoir to said fuel nozzle, a fuel metering device insertable into said passage from the outside of said carburetor upstream of said nozzle, said device comprising a body formed to provide an axial passage containing a larger fixed restriction for metering fuel at lower engine vacuums and a movable valve element, said movable valve element being formed to provide a smaller restriction aligned axially with said fixed restriction for metering fuel required at higher engine vacuums, means for inserting said device into said passage as a unit without disturbing any other portion of said carburetor and such that the inner end thereof extends into and is completely surrounded by the fuel in said reservoir, and engine manifold vacuum responsive means for positioning said valve so as to determine which restriction controls metering of the fuel.

2. In an internal combustion engine carburetor having a fuel reservoir and an induction passage including a venturi and a fuel nozzle therein, a system for metering the fuel drawn to said fuel nozzle by venturi vacuum, said system comprising a body fixedly attached to said carburetor and extending into said reservoir, said body including an outlet port, a valve seat and a first axial passageway having a first restriction and a chamber therein; a piston slidably mounted in said chamber, said piston including an inlet port and a second axial passageway having a second restriction therein, said second axial passageway being in alignment with said first axial passageway; and a vacuum responsive device for moving said piston in said chamber so as to at times seat said piston against said valve seat, said vacuum responsive device including an externally mounted housing, a diaphragm forming two chambers mounted in said housing, a stud fixedly attached to said diaphragm and extending into said reservoir, a lever pivotally attached intermediate its ends to said carburetor, said lever having its one end pivotally attached to said stud and its other end in contact with said piston, resilient means in one of said chambers for urging said diaphragm and said stud in a direction so as to permit said piston to leave said valve seat, and a conduit communicating engine vacuum to said chamber containing said resilient means.

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