

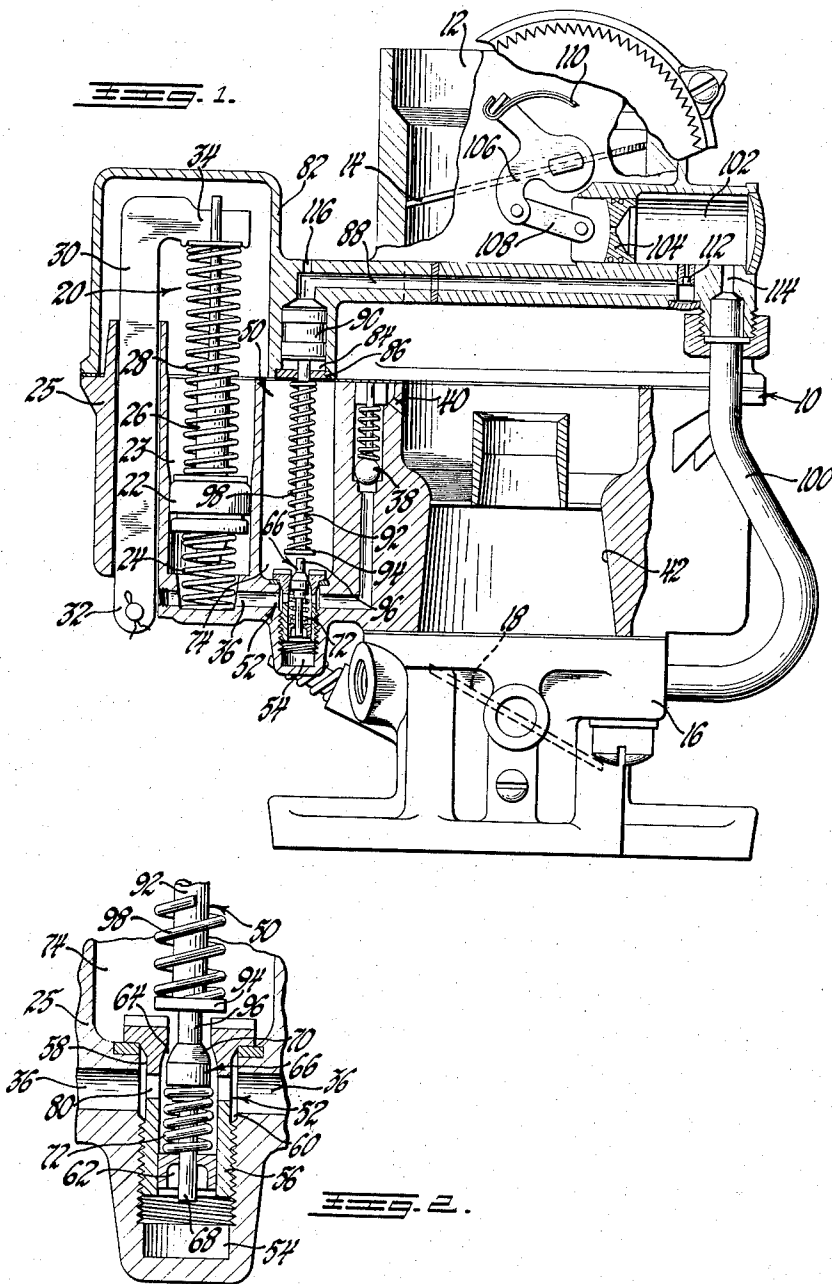
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FUEL SYSTEM

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2,879,047

FUEL SYSTEM

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5 Claims. (Cl. 261—34)

The present invention relates to an improved means for supplying additional fuel to internal combustion engines during periods of acceleration. More specifically the invention relates to an accelerator pump which supplies fuel to a carburetor induction passage in variable amounts in accordance with changes in engine operating temperature.

The desirability of supplying fuel from an accelerator control pump in accordance with changes in temperature is known, and many devices have been devised to achieve this end. In most of the prior devices designed for such purpose, the quantity of fuel supplied from the accelerator pump has been made variable by directly modifying the pump capacity. The problems with this approach are manifold. First, it is expensive to provide a mechanism whereby the pump capacity is variable in accordance with temperature in addition to its normal variability as determined by accelerator position. Secondly, it has been found that in the type of device where accelerator pump capacity is actually changed by some temperature responsive means, the mechanism becomes complicated and hence very susceptible to malfunctioning.

In the present device, a simple means is provided whereby the excess quantity of fuel is controlled in accordance with engine temperature by bypassing excess fuel and without, in any other way, affecting the operation of the normal accelerator pump. In the present device the means whereby the excess quantity of fuel is bypassed is essentially under the control of mechanisms and forces already available in a carburetor. More specifically, the present device utilizes a fuel output control valve controlled by manifold vacuum and further which vacuum is under the control of the choke actuating mechanism.

The fuel output control valve is generally arranged so that, with the engine cold, manifold vacuum is admitted to a control servo piston which permits the valve to close and thereby enabling full pump output to be delivered to the carburetor-induction passage in accordance with accelerator actuation. As the engine warms up, the choke, manual or automatic, is adapted to interrupt the vacuum force causing the fuel control valve to be opened thus bypassing a measured quantity of fuel back to the fuel reservoir and at the same time permitting a diminished quantity of fuel to be supplied to the induction passage consistent with the reduced requirements of the engine.

By virtue of the present control system, accelerator pump supplied fuel is accurately metered in accordance with engine temperature reflecting precisely the engine's fuel utilization capacity. Further, such system may be incorporated in a carburetor without in any way modifying the accelerator pump, per se. It is a further feature of the present device that in the event the means for modifying the fuel supplied in accordance with temperature is subject to some malfunctioning, fuel will continue to be supplied from the accelerator pump en-

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suring the engine will not be deprived entirely of the added fuel requisite to rapid engine acceleration.

Other objects and advantages of the present invention will be realized from a perusal of the detailed description which follows.

In the drawing:

Figure 1 is a partially sectioned elevation of a carburetor embodying the subject invention;

Figure 2 is an enlarged fragmentary section of Figure 1 showing the fuel control valve in a bypassing condition.

Referring to the drawing, a carburetor is shown generally at 10 and includes an induction passage 12 having a choke valve 14. A throttle body is shown at 16 and has rotatably mounted therein a throttle valve 18.

A conventional accelerator pump is shown generally at 20 and includes a piston 22 slidably mounted in a pump chamber 23. A spring 24 is seated in the float bowl casing 25 and tends to bias the piston in an upwardly direction or pump charging position. Piston 22 has a rod 26 formed thereon which projects upwardly from the piston and is surrounded by a spring 28. A control lever 30 articulated at its lower end 32 to the throttle control linkage, not shown, includes a leg 34 seating upon the upper end of spring 28. The functioning of the accelerator pump is such that when the accelerator pedal is depressed, indicating a demand for more power, control lever 30 moves downwardly immediately to a given position thereby compressing spring 28. Pump piston 22 does not immediately follow the movement of the control lever but rather gradually descends within the pump chamber 23 as spring 28 gradually expands against the force of spring 24 to eject the fuel entrapped beneath the piston.

The lower portion of pump chamber 23 communicates through a passage 36 with the induction passage 12. Passage 36 has a spring biased ball check valve 38 formed therein which permits the flow of fuel from the accelerator pump to the induction passage but prevents any reverse flow. Fuel from pump 20 is actually delivered to induction passage 12 through a plurality of fuel orifices 40 peripherally disposed about the induction passage anteriorly of the main venturi 42.

In order to vary the quantity of fuel supplied by the accelerator pump in accordance with engine operating temperatures, a fuel control means indicated generally at 50 is provided. The fuel control means includes a valve mechanism 52 adapted to be interposed in the fuel supply passage 36. The float bowl casing 25 is bored out, or otherwise formed, to provide a receptacle 54 for the valve mechanism 52 which is removably mounted therewithin.

The valve mechanism includes a casing 56 adapted to be threaded within the receptacle 54. Casing 56 is peripherally relieved at 58 and cooperates with the receptacle 54 to define an annular passage 60 which permits a given quantity of fuel to flow through the fuel passage 36 and around the valve casing regardless of the condition of the remainder of the valve mechanism.

Valve casing 56 is hollow and includes an apertured plug 62 fixed in the lower end thereof. An open ended valve seat 64 is formed in the other end of casing 56. A valve 66 is disposed within the hollow casing 56 and includes a stem 68 adapted to slidably project through and be guided by the apertured plug 62. Valve 66 also includes a head portion 70 rounded so as to conform to the shape of valve seat 64. Surrounding guide pin 68 and seated at one end on plug 62 is a spring 72, the other end of which seats against the valve head 70 urging it upwardly to rest upon the valve seat

64. The open end of the valve casing 56 communicates with the fuel reservoir 74.

Valve casing 56 is radially apertured to provide orifices 80 disposed peripherally thereabout. Orifices 80 are generally in alignment with the fuel supply passage 36 such that when fuel is flowing through said passage a metered quantity of fuel is adapted to flow through said orifices to deliver fuel from the accelerator pump to either the fuel reservoir or the induction passage in accordance with the position of valve 66.

A cylinder 84 is formed in the carburetor cover casing 82 in axial alignment with the valve mechanism 52. Cylinder 84 is adapted to be closed at one end by an apertured cover 86. The other end of cylinder 84 is in communication with a manifold vacuum passage 88. Slidably mounted within cylinder 84 is a piston 90 having rod 92 depending therefrom and projecting through the apertured cover 86. Rod 92 terminates in a flattened portion 94 superadjacent stem 96 formed on valve head 70. Surrounding rod 92 and seated at one end against cover 86 is a spring 98, the other end of which biases against the flattened end 94 of rod 92 to urge piston 90 and rod 92 downwardly so that end 94 of the rod engages the valve stem 96 to open valve 70 against the force of spring 98 as shown in Figure 2.

When the engine is running cold or at subnormal temperatures, manifold vacuum in passage 88 overcomes spring 98 raising piston 90 and rod 92 allowing valve 70 to close under the force of spring 98.

Manifold vacuum is supplied to passage 88 through a conduit 100 which communicates at one end with the throttle body posteriorly of the throttle valve, through passages formed in the throttle body casing in the usual manner, but not shown. The other end of conduit 100 communicates with a vacuum chamber 102 formed in cover casing 82. When the subject invention is utilized in combination with an automatic type choke, the vacuum chamber 102 is also the source of a choke opening force through a mechanism which includes a slidable piston 104, a lever 106 fixed to the choke valve shaft and a link 108 articulated between lever 106 and piston 102. As engine temperature increases, a choke thermostat 110 moves in a counterclockwise direction permitting manifold vacuum, through the piston operated linkage 106-108, to rotate the choke valve in a counterclockwise or open direction.

The choke position is correlated to the operation of the fuel control mechanism 50 in such a way as to determine the actuation of the fuel control valve 66. More explicitly, when the engine is cold the choke valve 14 will be closed under the influence of the choke mechanism in order to provide a rich starting mixture. Under the same cold starting and running conditions, it is desirable to have the maximum output from the accelerator pump. Maximum pump output will be realized inasmuch as piston 90 will be in open communication with manifold vacuum through passage 88, orifices 112, 114 and conduit 100. After the engine has warmed sufficiently thermostat 110 will permit choke piston 104 to be drawn to the right of the vacuum chamber 102 and in so doing will cover orifice 112 cutting off the supply of manifold vacuum to passage 88 and at the same time permitting a bleed 116 to admit atmospheric pressure to cylinder 84 causing the spring 98 to move the piston 90 and rod 92 downwardly to open valve 66 thereby bypassing a given quantity of accelerator pump fuel output back to the fuel reservoir. Accordingly with the engine warm the induction passage 12 is supplied with a reduced amount of excess fuel for acceleration purposes.

It is apparent that orifices 112 and 116 may be proportioned as to size to control the rate of movement of piston 90 in accordance with the carburetor operating characteristics desired.

The present improved acceleration fuel feeding system in which fuel is accurately metered precisely in accordance with engine operating needs has resulted in a carburetor more economical in its consumption of fuel.

A corollary to the more economical fuel consumption is a cleaner engine exhaust due to the elimination of excessive or unburned hydrocarbons which otherwise accompany vehicle acceleration, particularly with a warmed up engine.

Other structural variations of the subject invention are comprehended within the scope of the subject teaching otherwise defined by the hereinafter appended claims.

I claim:

1. A carburetor comprising an induction passage, a choke valve, an accelerator pump for supplying metered quantities of fuel to said induction passage, and means connected to said choke valve for decreasing the quantity of fuel flowing from said pump to said passage means as said choke valve moves in an opening direction.

2. A carburetor comprising an induction passage, an accelerator pump for supplying metered quantities of fuel to said induction passage, means responsive to manifold vacuum for controlling the quantity of fuel flow from said pump to said passage, a choke valve, and means for controlling said vacuum response means in accordance with the position of said choke valve.

3. A carburetor comprising an induction passage, an accelerator pump, a conduit connecting said passage and said accelerator pump, a fuel reservoir communicating with said pump for supplying fuel thereto, flow control means disposed in said conduit, said means including a valve, resilient means biasing said valve to a position permitting part of said pump output to be bypassed to said reservoir, vacuum responsive means adapted to move said valve to a position permitting full pump output to be delivered to said induction passage, and a device for controlling said vacuum responsive means in accordance with ambient temperature.

4. A carburetor comprising an induction passage, an accelerator pump, a conduit connecting said passage and said accelerator pump, a fuel reservoir communicating with said pump, a bypass passage communicating with said conduit and said reservoir, a valve disposed in said bypass passage, resilient means biasing said valve to a position communicating said conduit with the reservoir, vacuum responsive means adapted to move said valve to a position permitting full pump output to be delivered to said induction passage, and a device for controlling said vacuum responsive means in accordance with ambient temperature.

5. A carburetor comprising an induction passage, an accelerator pump, a conduit connecting said passage and said accelerator pump, a fuel reservoir communicating with said pump, a bypass passage communicating with said conduit and said reservoir, an orifice restricting the quantity of flow through said bypass passage, a valve disposed in said bypass passage, resilient means biasing said valve to a position communicating said conduit with the reservoir, vacuum responsive means adapted to move said valve to a position permitting full pump output to be delivered to said induction passage, and a device for controlling said vacuum responsive means in accordance with ambient temperature.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,879,047

March 24, 1959

Charles L. Wagner

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 60, after "output to" insert -- be delivered to said induction passage, and a device for --.

Signed and sealed this 1st day of September 1959.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON
Commissioner of Patents