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CARBURETOR

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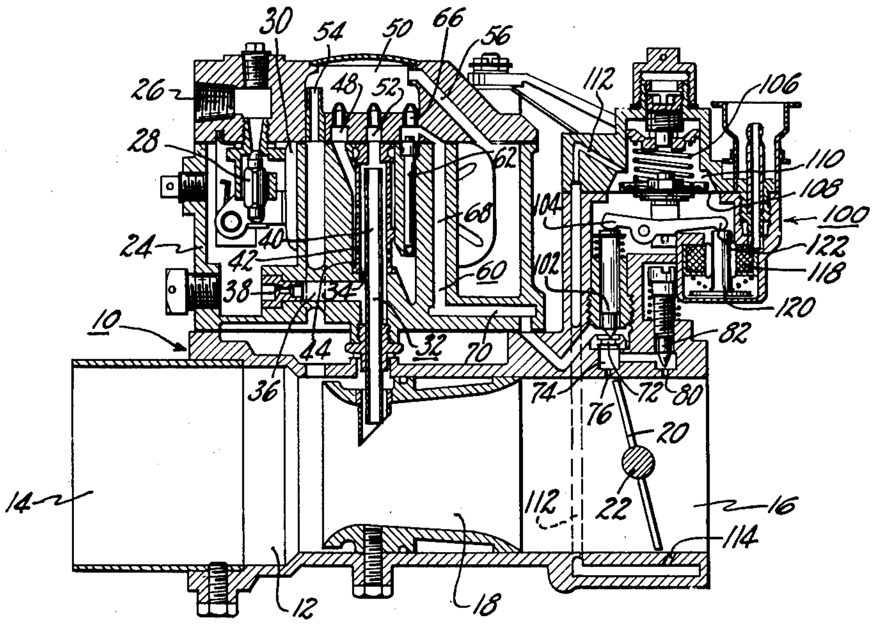

FIG. 1

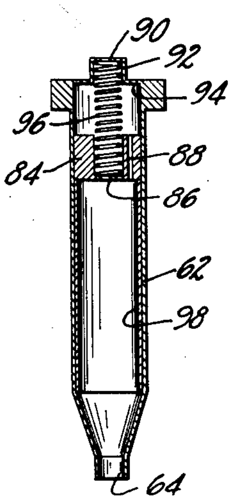

FIG. 2

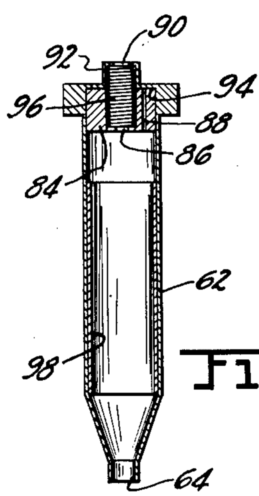

FIG. 3

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CARBURETOR

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The present invention relates to carburetors for internal combustion engines, and more particularly to a means for controlling the fuel-air ratio during the transfer from the idle system to the main metering system.

In conventional carburetors for internal combustion engines, the fuel for idling is usually taken directly from the main metering system and mixed with air from one or more idle air bleeds to form an emulsion which is discharged into the induction passage on the engine side of the throttle valve. In the operation of the engine, as the throttle valve is opened beyond a certain point, the effect of engine suction on the idle system decreases materially and the increased air flow transfers the fuel supply for the engine to the main metering system and at higher speeds reverses the flow in the idle system, causing said system to function as an air bleed for the main metering system. It frequently happens that the idle system becomes ineffective to supply the required amount of fuel before the main metering system has become fully operative so that a deficiency in the fuel supply for the engine occurs in the transfer, particularly during part throttle acceleration. It is, therefore, the principal object of the present invention to provide a means for maintaining a satisfactory fuel-air mixture during the transfer from the idle system to the main metering system. Another object of the invention is to provide a means in the idle system for increasing the flow of fuel in the idle system when the effective engine suction on said system falls below a predetermined value. Further objects and advantages of the present invention will become apparent from the following description and the accompanying drawing, wherein:

Figure 1 is a vertical cross-section through a horizontal draft carburetor, showing one embodiment of the invention mounted in operative position in the idle system; and

Figures 2 and 3 are enlarged sectional views of the idle tube disclosed in Figure 1, showing operative positions of the mixture richness regulating means.

Referring more specifically to the drawing, and to Figure 1 in particular, numeral 10 designates the main body of the carburetor which contains an induction passage 12 having an air inlet 14, a mixture outlet 16, a venturi 18 and a throttle valve 20 mounted for rotation on a shaft 22 in said mixture outlet. A fuel bowl 24 is mounted on said body and is supplied with fuel from a source, such as a tank or fuel pump, through a main fuel inlet passage 26 which is controlled by a valve 28 actuated by a float assembly 30 pivotally mounted in said fuel bowl. The fuel bowl is connected with the venturi by a main metering system 32 which includes a fuel well

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34 connected with the fuel bowl by horizontal passage 36 and metering orifice 38 and with the induction passage by a vertical fuel discharge tube 40 extending from a point near the top of the well above the normal fuel level in bowl 24 to the throat of venturi 18.

A perforated sleeve 42 forms the external wall of well 34 and also the internal wall of annular chamber 44, said chamber being connected by duct 48 with an air chamber 50 located in the cover of the fuel bowl. The upper end of well 34 is also vented to chamber 50 through duct 52 disposed directly above the upper end of discharge tube 40. Chamber 50 is vented directly with the induction passage adjacent inlet 14 through passage 54 and is connected with the fuel bowl above the fuel level through passage 56.

The idle system generally designated by numeral 60 communicates with the main metering system and obtains its fuel therefrom through the perforations in sleeve 42 and annular chamber 44 surrounding said sleeve. This fuel flows upwardly from said chamber through an idle tube 62 and is metered on entering said tube by a restriction 64 in the lower end thereof. On leaving the idling tube the fuel is mixed with air admitted through a duct 66 from chamber 50 to form an emulsion which flows through idling passages 68 and 70, and cut-off valve 72 to chamber 74 where it is either mixed with additional air from port 76 and thence discharged through port 80 or discharged through both ports 76 and 80, depending on the degree of opening of the throttle valve. A valve 82 regulates port 80 to control the overall quantity of fuel delivered by the idle system.

In the upper end of idle tube 62 is a reciprocable piston 84 containing two calibrated orifices 86 and 88 for regulating the quantity of fuel delivered by the idling system. Orifice 86 is centrally located in the cylindrical piston and is in alignment with an orifice 90 in the upper end of tubular projection 92. Orifice 88 is offset from the center of the piston and is in alignment with an annular shoulder 94 formed by the closed portion of the upper end of the idle tube. A calibrated spring 96 which reacts between the upper end of tubular projection 92 and the bottom of a recess in the piston urges the piston to its lower position, as shown in Figure 2, against an abutment formed by the upper end of a sleeve 98 disposed in the central part of the idle tube and held against the force of said spring by the conical portion of said tube. The piston is responsive to manifold vacuum and is held in its uppermost position shown in Figure 3 throughout normal idling and during the first part of the transfer from the idling system to the main metering system as the throttle valve is opened for acceleration. With the piston in the raised position, orifice 88 is closed by shoulder 94, leaving only orifice 86 to supply the fuel to the engine. As the throttle valve is opened, the effect of engine suction decreases to the point where calibrated spring 96 can return the piston to its lowermost position as shown in Figure 2, thus opening orifice 88 and permitting fuel to flow through both orifices 86 and 88 to provide an enriched mixture before the main metering system has fully taken over.

A degasser and shut-off mechanism, designated generally by numeral 100, may be included in combination with the idle system and includes a valve 102 for controlling orifice 72, a lever 104 actuated in the valve opening direction by spring 106 and in the valve closing direction by a diaphragm 108 subjected to manifold vacuum as transmitted to chamber 110 through conduit 112 and port 114. With this arrangement, when the manifold vacuum reaches a predetermined value, as for example 22 inches, during deceleration of the vehicle, diaphragm 108 moves upwardly, moving valve 102 to its closed position, completely cutting off the idle system. This prevents popping during the decelerating period. The unit also includes a solenoid 118 controlled from the instrument panel for closing valve 102 when it is desired to stop the engine. When the switch on the panel is closed, the coil is energized, causing plunger 120 to contact an extension 122 on lever 104 and move said lever in the direction to close valve 102. This stops the engine without permitting excess fuel to flow to the engine.

In the operation of the present carburetor with the engine running and the throttle valve closed or nearly closed, the idle system is supplying the entire requirement of the engine and piston 84 is held in its uppermost position, as shown in Figure 3, closing orifice 88. Under these conditions, the fuel flows from annular chamber 44 upwardly through idle tube 62 and orifice 86 and thence mixes with air from duct 66 to form an emulsion which flows through passages 68 and 70 and orifice 72 into chamber 74, where it mixes with additional air before being discharged through port 80 into the induction passage. As the throttle valve is moved toward open position, the leading edge passes port 76, first subjecting the idle system to additional suction which retains piston 84 in its uppermost position. On further opening of the throttle valve, the effect of engine suction progressively diminishes until it has no appreciable effect on the flow of fluid in the idle system, and the air flow in the induction passage, which has progressively increased, transfers the fuel delivery to the main metering system which supplies the entire fuel requirement of the engine. As the fuel delivery is transferred from the idle system to the main system, piston 84 moves to its lowermost position, thus opening the additional passage 88 to maintain the proper fuel-air ratio throughout the transfer period. At the higher engine speeds, air flows through duct 66 into the idle system, thence downwardly through idle tube 62 and through perforated sleeve 42 into well 34 where it mixes with the fuel to form an emulsion which is discharged through the main discharge tube 40.

Modification may be made in the foregoing arrangement without departing from the scope of the present invention.

I claim:

1. A carburetor comprising an induction passage, a throttle, a main metering system, an idle system including a passageway communicating at one end with the main metering system and at the other end with the induction passage on the engine side of the throttle, a fuel valve in said passageway responsive to the suction in the idle system and adapted to enrich the fuel-air ratio supplied to the engine by said idle system as the throttle is opened from idle position, a constantly open fuel passage by-passing said valve, and a constantly open air bleed for said passageway posterior to said valve.

2. In a carburetor having a fuel bowl and an induction passage with a throttle therein, an idle system including a passageway communicating at one end with the fuel bowl and at the other end with the induction passage on the engine side of the throttle, a cylinder forming a portion of said passageway, an end member for said cylinder having a centrally located orifice therein, a piston in said cylinder urged away from said member by a spring and having one orifice adapted to register with the orifice in said end member, and a second orifice in said piston adapted to be closed by said member when the pressure on the engine side of the throttle is below a predetermined value.

3. In a carburetor having a fuel bowl and an induction passage with a throttle therein, an idle system including a passageway communicating at one end with the fuel bowl and at the other end with the induction passage, a tube in said passageway having a partially closed end on the outlet side thereof, a piston in said tube urged away from said end by a spring and having an orifice adapted to register with the opening in said end, and a second orifice in said piston adapted to be closed by said end when the pressure on the engine side of the throttle is below a predetermined value.

4. In a carburetor having a fuel bowl and an induction passage with a throttle therein, an idle system including a passageway communicating at one end with the fuel bowl and at the other end with the induction passage on the engine side of the throttle, a restriction in said passageway defining a central opening, a piston in said passageway anterior to said restriction, an orifice in said piston adapted to register with said opening, and a second orifice in said piston adapted to be closed by the restricting means when the pressure on the engine side of the throttle is below a predetermined value.

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