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CARBURETOR.

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FIG. 1

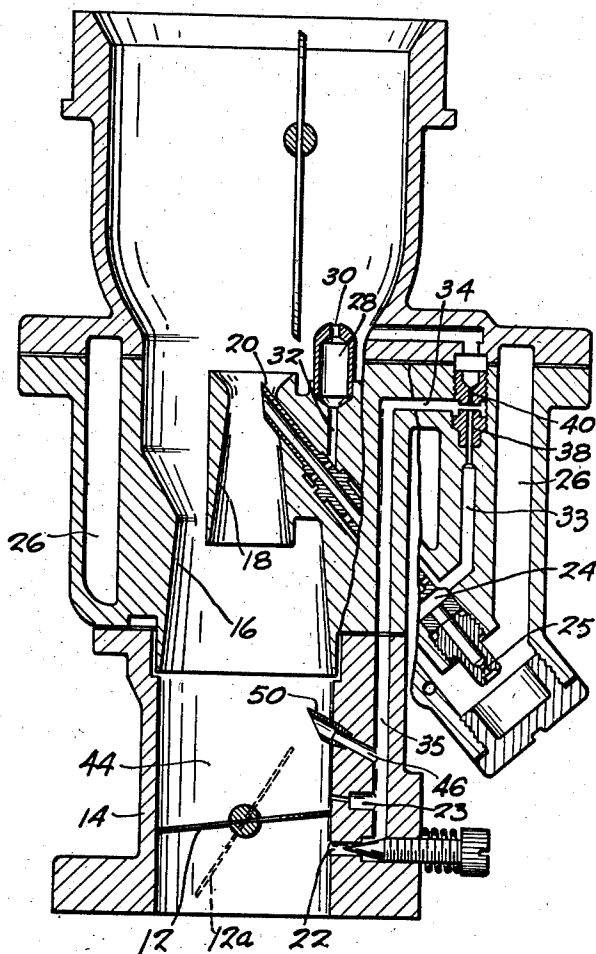
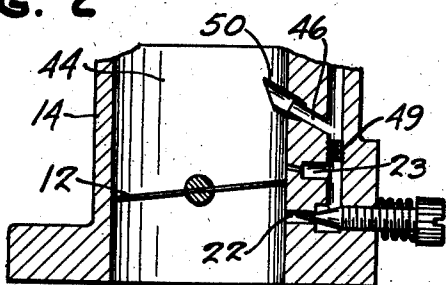


FIG. 2



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CARBURETOR

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5 Claims. (Cl. 261-41)

This invention relates to carburetors, and more particularly to downdraft carburetors of the plain tube type generally adapted for automotive vehicle internal combustion engine use.

In carburetors of the above general type two fuel discharge systems are usually employed, one being a main fuel nozzle and the other an idling nozzle, and provision is made for transferring from the operation of one nozzle to the other as the throttle is opened. Both nozzles may be of the air bled type, and to assist in a smooth transfer from one to the other both nozzles may be supplied from a single well communicating with fuel supply or float chamber, so that the fuel may divide between the nozzles, depending on demand. During open throttle operation, particularly at low speed, it has been found that the usual air bleed for the idling nozzle interferes with the operation of the main fuel nozzle, by supplying the same with excess air, thus leaning out the mixture at a time when increased power is especially desired and an enriched mixture would be preferable if any change at all must take place. Such interference also empties the passages leading to the idling nozzle, so that upon a subsequent transfer back to the idling nozzle, a momentary delay in the supply of fuel mixture results, due to the time taken to restore fuel to these passages.

In the past the air bleed for the idling nozzle has in general been from a region of substantially atmospheric pressure such as the air horn between the choke valve and the venturi, and thus there was no resistance to the inflow of air at any time when the idling nozzle or its connecting passages were subjected to reduced pressure.

Under what may be termed normal operating conditions, a sufficient pressure differential exists between the idling nozzle and the idling air bleed inlet so that all of the air which enters the inlet is drawn out with the idling mixture at the idling nozzle, thus leaving no excess air to "back bleed" to the main nozzle. Under certain other operating conditions, however, as at wide open throttle and low engine speed, this differential is insufficient, with the result that part or all of the air entering the idling bleed port "back bleeds"; that is, it is drawn to the main fuel nozzle, since suction on the idling nozzle is too small in comparison with the suction on the main nozzle in the Venturi throat.

To overcome this effect the present invention provides an idling bleed inlet in the induction passage at a point of relatively low suction, as

between the venturi and throttle valve, so that with closed throttle the bleed inlet is exposed to substantially atmospheric pressure, due to the relatively small flow through the intake, but the inlet is so designed that as the rate of flow through the induction passage increases, the pressure at the bleed inlet and the idling nozzle is decreased, so that the decreasing pressure at the main nozzle (due to Venturi depression, a function of the rate of air flow therethrough) does not produce back bleeding of air to the main nozzle. To accomplish this result, the bleed inlet may be made in the form of a tube projecting into the air stream in the vicinity of the throttle. By modifying the shape and position of the tube, varying degrees of suction from the air sweeping past it may be made effective upon the idling passages. Instead of projecting into the vicinity of the throttle, the inlet tube may be connected into one of the venturis in order to assure suction equal to or greater than that to which the main nozzle is subjected.

In such a system it has been found that the idling nozzle operates nearly continuously (since it ceases functioning only at low speed and open throttle), thus supplementing the charge furnished by the main nozzle; if the parts are properly designed, a substantially fixed fuel-air ratio may be maintained throughout the entire range of speed and throttle opening variations.

Accordingly an object of the invention is to provide a combined air bled idling and main fuel nozzle system wherein back flow of air from the bleed inlet for one nozzle cannot interfere with and lean out the mixture supplied by the other nozzle.

Another object of the invention is to provide in a carburetor of the type described a system wherein the idling passages are not emptied of fuel during the operation of the carburetor.

A further object of the invention is to provide in a carburetor of the type described a bleed inlet for the idling nozzle so positioned as to be under atmospheric pressure during closed throttle but subjected to subatmospheric pressure under certain conditions of operation.

Other objects of the invention have to do with providing a carburetor of improved characteristics particularly with respect to economy of operation throughout the range of operations of the internal combustion engine for which it is adapted.

The above and other novel features of the

invention will appear more fully hereinafter from the following detailed description when taken in conjunction with the accompanying drawing. It is expressly understood, however, that the drawing is employed for purposes of illustration only and is not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

10 In the drawing, wherein like reference numerals indicate like parts:

Figure 1 is a longitudinal section through a carburetor embodying the hereinbefore described bleed principle; and

15 Figure 2 is a fragmentary section of a slightly modified form of Figure 1.

Referring to Figure 1, there is shown therein a carburetor of the plain tube downdraft type having an air horn 10, throttle valve 12, throttle body 14, large venturi 16, small venturi 18, fuel nozzle 20, and an idling nozzle comprising discharge holes 22 and 23.

The main fuel nozzle is supplied with fuel from a well 24 in communication with float chamber 25 through a metering orifice 25, the nozzle being air bled through a calibrated orifice 30 and a chamber 28 which connects with the nozzle through port 32 at about the normal fuel level. The idling nozzle is connected to the well 24 through passages 33, 34, and 35, which together form an inverted U tube. Since the U tube is in the form of a siphon, a break to atmosphere in the form of a very small port 40 is provided to prevent the siphon action from continuing after the engine has been shut off. The port, however, is too small to admit any appreciable amount of air to the tube while the carburetor is in operation. The restriction 38 serves to meter the idling fuel and may be placed anywhere along the passage 33.

40 The idling nozzle includes a port 23 in the mixing chamber 44 just above the throttle when in closed position, normally serving as an air inlet adapted to feed air into the lower end of tube 35, to mix with the fuel which is thereafter drawn into the manifold through the adjustable discharge port 22.

To bleed the idling fuel with air prior to the introduction of air from the port 23 an air inlet 46 connecting the mixing chamber with the passage 35 is provided. When the throttle is closed, the movement of air through the induction passage is slow, so that the air inlet 46 is under atmospheric pressure and air is free to flow there-through into the passage 35 to bleed the fuel.

55 In order to adapt port 46 to function as an auxiliary nozzle under certain conditions, and to increase the suction effect thereon under all conditions, the port 46 is preferably provided with a tube 50 which projects into the induction passage and has a beveled inlet designed to produce a Pitot or negative impact effect to thus take advantage of the flow velocity therepast to create additional suction. As shown in Figures 1 and 2, the inlet of tube 50 faces in the direction of air flow, but it may if desired be rotated to obtain any degree of positive or negative impact effect, as may be found desirable in the carburetor in which the invention is to be embodied.

70 As the throttle is opened, the port 23 is subjected to increasing suction transmitted from the intake manifold, so that fuel is discharged therefrom as well as from the port 22, the air which passes the throttle valve being sufficient to maintain a proper mixture. As the throttle is opened

5 wider, the idling port 22, port 23, and tube 50 all become subjected to subatmospheric pressure of such degree that there can be no reverse flow of air up the passage 35 and into the base of the fuel well 24 to cause back bleeding of the main nozzle.

As the throttle is opened further and reaches the position indicated at 12a in Figure 1, the vacuum existing posterior to the throttle becomes effective on tube 50 to such extent that fuel is drawn therefrom at an increasing rate, while the fuel discharge from ports 22 and 23, which are not subject to the Pitot effect as is tube 50, decreases and finally becomes zero. At high speed, wide-open throttle operation, air is bled through ports 22 and 23 into passage 35 to mingle with the fuel being discharged out of tube 50.

10 In Figure 2, a restriction 49 is shown in the fuel passage 35 located between the port 46 and the idling nozzle. Without this restriction, however, the throttle is closed sufficiently to produce vacuum of from 13 to 20 inches of mercury on the idling nozzle, the flow remains a constant maximum, since any increase from about 13 inches does not increase the flow of fuel. However, with the restriction, maximum flow does not occur at 13 inches, but with proper design can be made to gradually increase to maximum as the vacuum gradually increases from 13 to 20 inches. Thus it is possible to provide a gradual increase or decrease in the discharge of idling fuel as the throttle is opened and closed, which results in considerable economy during closed or substantially closed throttle operation. The restriction also tends to cut down back bleeding from ports 22 and 23 to the port 46, when the latter is discharging fuel as above explained, and assists in maintaining fuel in the passage 35 immediately adjacent the idling nozzle.

While several embodiments of the invention have been shown and described, they are merely by way of illustrating the underlying principles. As many changes in construction and arrangement of parts and passageways may be made, without departing from the spirit of the invention, as will be readily understood by those skilled in the art, reference will be had to the appended claims for a definition of the invention.

What is claimed is:

1. In a carburetor of the plain tube downdraft type, an induction passage including a venturi and a throttle, a fuel chamber, a main fuel passage extending from said fuel chamber to the throat of said venturi, a main metering restriction in the fuel passage, an idling fuel passage leading from the main fuel passage posterior to the main metering restriction to the induction, passage adjacent the edge of the throttle when in closed position, an idle fuel metering restriction in the idle fuel passage, and a conduit leading from the idling fuel passage posterior to the metering restriction therein including a tube projecting into the induction passage between the venturi and the throttle and having its outlet facing in the direction of air flow and so formed and disposed as to be subject to a degree of suction increasing with the rate of such air flow.

2. The invention defined in claim 1, wherein the outlet of the last mentioned conduit is positioned below the normal level of fuel in the fuel chamber and discharges fuel from the idling fuel passage into the induction passage due to increase of suction when the throttle is opened a predetermined amount.

3. In a carburetor of the plain tube downdraft type, an induction passage, a throttle controlling

the passage, a venturi in said passage, a fuel chamber, a main fuel duct leading from said chamber and discharging in a constricted portion of the venturi, means including a calibrated restriction in said duct for metering the flow of fuel therethrough, and an idling fuel supply system comprising an inverted U-shaped passageway having its uppermost portion above the normal fuel level in the fuel chamber and leading from the main fuel duct posterior to the metering means and having a restricted outlet in the induction passage adjacent the throttle, an idle fuel metering restriction in the passageway, a restricted air bleed into said passageway at a point above the fuel level in the fuel chamber and posterior to said idle fuel metering restriction, and a conduit leading from the passageway posterior to the restricted air bleed including a tube projecting into the induction passage between the throttle and the venturi and having an outlet facing in the direction of air flow and positioned below the normal level of the fuel in the fuel chamber.

4. In a plain tube carburetor comprising a main body portion and a throttle body portion, an induction passage extending through said portions,

a venturi in the main body portion of said induction passage, a fuel chamber, a main fuel duct leading from said chamber to the venturi and having a fuel metering restriction therein, a throttle in the throttle body portion for controlling flow through the induction passage, an idle fuel nozzle discharging in the induction passage posterior to the throttle, an idling fuel duct comprising an inverted U-shaped passage having its upper portion above the normal level of fuel in the fuel chamber and having one of its vertical legs communicating with the main fuel duct posterior to the restriction and the other leg communicating with the idle fuel nozzle, and an idle air bleed nozzle projecting into the throttle body portion connecting said other leg with the induction passage between the throttle and the venturi, the entrance of said bleed nozzle opening in the direction of air flow to increase the suction thereon as the air flow increases.

5. The invention defined in claim 4 including a restriction in said other leg intermediate the air bleed and the idle fuel nozzle.

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