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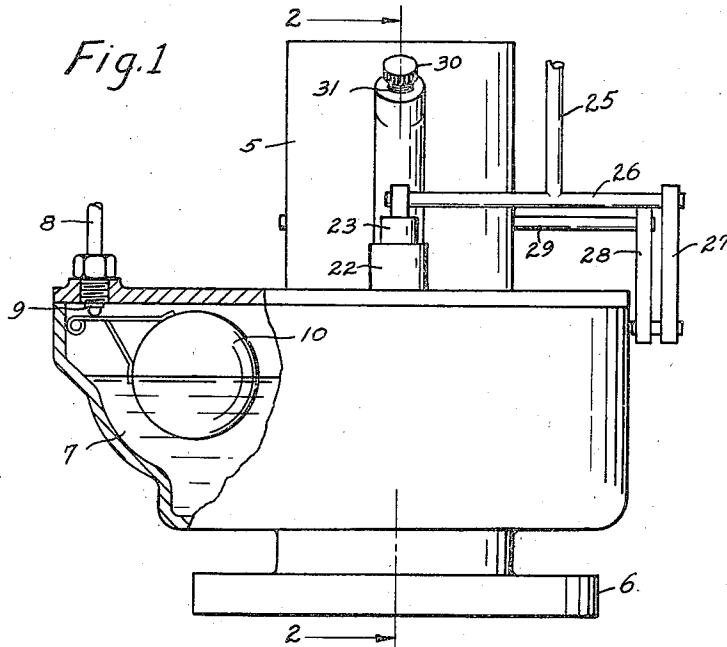
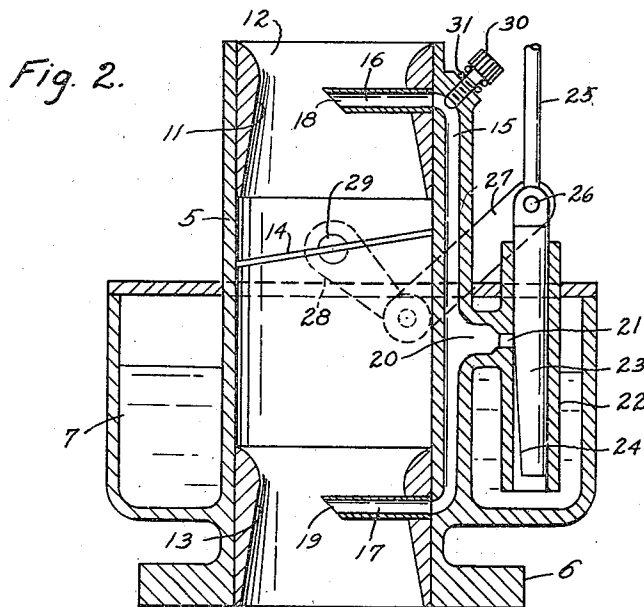
M. MALLORY

2,269,949

CARBURETOR

Filed Sept. 30, 1939

2 Sheets-Sheet 1



INVENTOR
MARION MALLORY
BY
Burner, Kinsella, Laughlin & Kinsell
ATTORNEYS.

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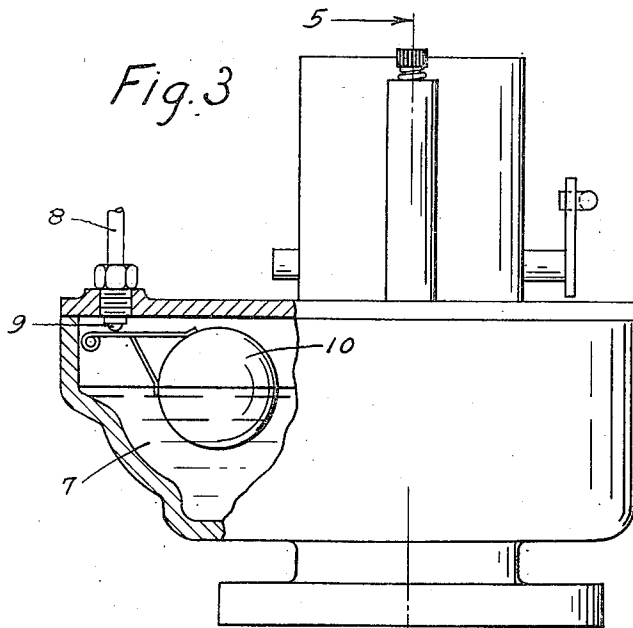
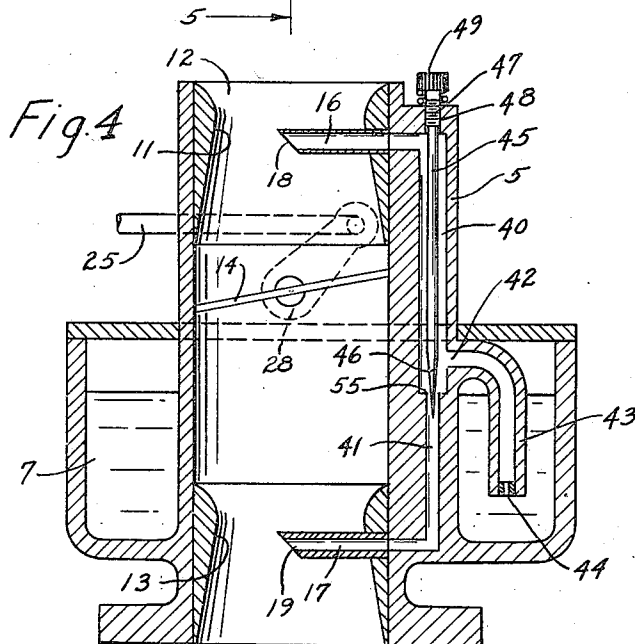
M. MALLORY

2,269,949

CARBURETOR

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2 Sheets-Sheet 2



INVENTOR
MARION MALLORY

BY
Barneo, Kissell, Laughlin & Kirsch
ATTORNEYS

UNITED STATES PATENT OFFICE

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CARBURETOR

Marion Mallory, Detroit, Mich.

Application September 30, 1939, Serial No. 297,258

8 Claims. (Cl. 261—50)

This invention relates to new and useful improvements in carburetors, and more particularly to means for metering the fuel, mixing air therewith, and delivering the mixture to the engine intake manifold. This application is a continuation in part of application Serial No. 94,075, filed August 3, 1936.

In the operation of internal combustion engines, if the throttle valve is located on the engine side of the fuel nozzle, it is inevitable that some of the fuel mixture will strike the throttle valve, be deflected against the side of the manifold and become condensed. Such condensation takes place to a greater extent if the throttle valve is partially closed. This upsets the distribution and causes an undesirable variation in the mixture ratio. One object of the present invention is to prevent such condensation by locating the fuel discharge nozzle between the throttle valve and the intake manifold, so that the intake passageway is entirely unobstructed between the fuel nozzle and the manifold.

Another object of the invention is to discharge the fuel into the air stream at a point where the vacuum is high, as for example, on the engine side of the throttle valve, instead of on the atmospheric side thereof, where the vacuum is comparatively low.

A further object of the invention is to mix air with the fuel before it is discharged into the high vacuum, whenever the throttle valve is in any position other than wide open, decreasing the proportion of such pre-mixed air as the throttle valve moves toward open position and increasing the proportion thereof as the throttle valve moves toward closed position.

The above and other objects of the invention, and the preferred means for attaining them, will be more particularly explained in connection with the accompanying drawings, in which,

Figure 1 is a view, partly in elevation and partly in section, of a carburetor embodying the invention.

Figure 2 is a section taken on the line 2—2 of Figure 1.

Figure 3 is a view, partly in elevation and partly in section, of a carburetor embodying a second modified form of the invention.

Figure 4 is a section along the line 4—4 of Figure 3.

The invention is shown, in the present instance, in connection with a down draft carburetor comprising a passageway 5, formed at its lower end with a flange 6 adapted to be secured to the intake manifold of the engine, and a fuel

bowl 7 which is supplied with fuel through a tube 8, the fuel being maintained at a constant level by a valve 9 controlled by a float 10.

As shown in Figures 1 and 2, a venturi 11 with an air inlet 12 is located at the intake end of the passageway 5, and a second venturi 13 is located at the end leading to the engine intake manifold. The throttle valve 14 is between these two venturies.

Extending longitudinally along one side of the passageway 5, is an air by-pass 15 having at one end an inlet tube 16 from the venturi 11 and at the other end an outlet tube 17 into the center of the venturi 13. The nozzles of the tubes 16 and 17 are preferably beveled on the under side as shown at 18 and 19 respectively.

The air passageway 15 is formed with a recess or chamber 20 in which is a fuel inlet port 21 located slightly above the normal liquid level in the bowl 7. The fuel enters this port from a tube 22 which extends below the level of the fuel in the bowl 7, and is metered by a pin 23 which is adjustable within the tube 22 and is tapered on the side facing the port 21, as shown at 24.

The throttle rod 25, which is controlled from the accelerator pedal, is provided with a cross-head 26, which is connected at one end to the metering pin 23 and connected at the other end through a link 27 to an arm 28 secured to the shaft 29 of the throttle valve 14.

The flow of air through the by-pass 15 may be adjustably restricted by a valve, which is in the form of a screw 30 adapted to be held in adjusted position by a spring 31.

In the operation of this invention, when the engine is idling with the throttle valve closed or nearly so, the nozzle 19 will be in the manifold vacuum, which is very high. Consequently, there will be a high vacuum in the passageway 15 between the nozzle 19 and the adjusting valve 30. The metering pin 23 at this time is in a position to open the port 21 very slightly and fuel drawn into the high vacuum of the passageway 15 will be completely atomized. The nozzle 18 will be at atmospheric pressure and enough air will flow through the passageway 15 to effect this atomization. This air flow and the degree of vacuum in the passageway 15 are regulated by the adjusting valve 30, which might properly be termed an air bleed jet. Obviously, by screwing in the valve to increase the restriction, the vacuum is increased around the port 21 and the mixture enriched. If the valve is screwed out, more air will enter the pas-

sageway 15, decreasing the vacuum around the port 21 and causing the mixture to be leaner.

It will be noted that the port 21 opens into a recess or chamber 20 in the passageway 15. If it were not for this recess, the passageway 15 would function as a venturi and, with the high vacuum when the engine is idling, too much fuel would be drawn in. By providing this recess, however, the suction around the port 21 is definitely reduced and further adjustment of the mixture ratio is effected by turning the valve 30 in or out.

As the throttle valve is moved toward an open position, air will begin to flow through the venturi 11 and will tend to develop a suction in the tube 16. The more the throttle valve is opened, the greater this tendency will be, thus progressively cutting down the flow of air through the by-pass 15. The increased air flow through the venturi 13, effected by opening the throttle valve, and the wider opening of the port 21, effected by raising the metering pin 23 in synchronism with the throttle valve opening, increase the fuel flow from said port.

In this carburetor, the fuel always enters the main air stream at a point on the engine side of the throttle valve, after being first mixed with air in the passageway 15. The upper venturi 11 controls the suction in the nozzle 18 to give a perfectly balanced mixture, which is discharged into the highest vacuum of the manifold, resulting in complete atomization. While the throttle is closed or partially open, air flows into the passageway 15 through the nozzle 18 and out through the nozzle 19. As the throttle is opened, air flow through the passageway 15 diminishes, due to the suction developed on the nozzle 18 by the increased air flow through the venturi 11.

The rich mixture, thus completely atomized by the high suction direct from the intake manifold, is discharged from the nozzle 19 directly into the center of the main air stream, and between that point and the engine, there is no valve or other obstruction in its path to cause condensation or to deflect it against the wall of the manifold.

In the modification shown in Figure 3, the venturi 11 is omitted and the passageway 15 has an atmospheric air inlet port 32, which intersects the extended upper portion of the tube 22. The metering pin 23 has an upwardly tapered portion 33 where it crosses the port 32, so as to control the air bleed into the passageway 15 inversely to the metered fuel inlet opening 21. That is, when the metering pin 23 is lifted to admit more fuel, the air bleed through the port 32 is cut down, and when the metering pin is lowered to cut down the fuel charge, the air supply through the port 32 is increased. It may be said, therefore, that this is a mechanical control of the air bleed into the passageway 15, synchronized with the throttle opening, whereas Figures 1 and 2 show a pneumatic control thereof.

In the modified form shown in Figs. 3 and 4 the metering pin 23 is omitted. In this arrangement the air by-pass which runs from inlet tube 16 to outlet tube 17 is provided with an upper portion 40 having a greater diameter or cross sectional area than the lower portion 41. The fuel enters the air by-pass portion 40 as at 42 from tube 43 positioned in the float bowl 7 and the lower end of which extends below the level of the fuel in bowl 7. The lower end of the tube is provided with a restricted inlet 44, that is, the inlet 44 has a smaller cross sectional area than the outlet port 42 leading into air by-pass 40. The

inlet opening 55 into air by-pass 41 is controlled by a valve 45 having a tapered end 46. The upper end of the valve stem is threaded as at 47 and has a screw fit as at 48 in the carburetor housing 5. The valve is provided with a knob 49 by means of which it can be turned to adjust the valve upwardly and downwardly to decrease or increase respectively the restriction of inlet port 55.

The operation of the modified form is substantially the same as that of the principal form above described except that the fuel is metered without the benefit of a metering pin 23. The valve head 46 is preferably initially adjusted to provide the proper restriction of inlet 55 to give proper idling mixtures and further need for adjustment will not be necessary throughout the life of the carburetor.

When the engine is idling with the throttle valve 14 closed or nearly so, the nozzle 19 will be in manifold vacuum which is very high. There will be a high vacuum in the passageway 41 between the nozzle 19 and the inlet 55 and valve head 46, but due to the fact throttle 14 is almost closed, there will not be enough air passing through venturi 11 to create a suction on nozzle 16. Naturally, this nozzle plays the role of an air bleed to jet 44 and reduces the suction at opening 42, which, in turn, prevents the mixture from being too rich at idle or at times when the vacuum is high in the manifold. If the valve 45 is turned upwardly to decrease the restriction of inlet 55, the vacuum at inlet 42 will be increased and the mixture entering passageway 41 enriched.

As the throttle valve 14 is moved towards an open position, the vacuum around nozzle 19 will decrease rapidly, but a leaning out of the mixture is prevented under such conditions due to the increase in air flow through venturi 11 and around nozzle 16. In other words, nozzle 16 changes from an air bleed to a suction nozzle as the throttle is opened, which prevents the mixture from leaning out due to a decrease of vacuum in nozzle 17 as the throttle valve 14 is opened. The venturi 11 and nozzle 16 might be termed as a pneumatic air bleed to regulate the suction on nozzle 44 and port 42. The nozzle 44 and port 42 are air bled to prevent the mixture from being too rich at idle, and the air bleed decreases or diminishes as the throttle is opened to prevent the mixture from becoming too lean as the vacuum decreases around nozzle 17 due to opening of throttle 14.

It will of course be understood that the details of construction herein shown and described are merely illustrative and that the invention also embraces all other modifications which may fall within the scope of the appended claims.

I claim:

1. In a down-draft carburetor, a passageway having its upper or intake end in the form of a venturi, a throttle valve in said passageway below the first venturi, a second venturi in said passageway below the throttle valve, a conduit having its inlet in the first venturi and its outlet in the second venturi, said conduit being provided with an enlarged lateral recess, a fuel port opening into said recess, and an adjustable restriction in the conduit between the first venturi and said recess.

2. In a down-draft carburetor, a main passageway having its upper or intake end in the form of a venturi, a throttle valve in said passageway, a second venturi in said passageway below

the throttle valve, a conduit having its inlet in the first venturi and its outlet in the second venturi and provided with a fuel inlet port, a fuel supply tube leading to said port, a metering pin in said tube, and means for simultaneously opening the throttle valve and moving the metering pin to increase the size of the effective opening through said port.

3. In a carburetor, two venturies in series, a throttle valve located between the two venturies, an air passageway having its inlet in the venturi which is positioned upstream of said throttle valve and its outlet in the other venturi, a source of fuel having an inlet into said passageway between its inlet and its outlet, metering means interconnected with the throttle valve for metering the fuel flowing through the inlet into said passageway whereby the metering means tends to increase the flow of fuel into said passageway as the throttle valve is opened and tends to restrict the flow of fuel into the passageway as the throttle valve is closed.

4. In a carburetor, a passageway having an intake end and an outlet in the form of a venturi, a throttle valve in said passageway between the intake end and the outlet venturi, an air conduit having its inlet in the intake end of said carburetor passageway and its outlet in the outlet venturi, the outlet of said air conduit having the form of a tube projecting into the throat of the said venturi, and an inlet for admitting fuel to said air conduit at a point between its inlet and outlet, the portion of said air conduit above said fuel inlet being restricted relative to the portion of the air conduit below said fuel inlet whereby the fuel enters the said passageway on the engine side of the throttle valve, and metering means for metering the fuel flowing into said conduit connected with the throttle valve for movement with the throttle valve whereby the metering means tends to increase the flow of fuel as the throttle valve opens and tends to restrict the flow of fuel as the throttle valve closes.

5. In a carburetor, a passageway in the form of two venturies in series, a throttle valve for said passageway located between the two venturies, an air conduit extending from one venturi to the other, said air conduit having its inlet end in the form of a tube projecting into the throat of the venturi at the inlet end of the said passageway and its outlet end in the form of a tube projecting into the throat of the venturi at the outlet end of said passageway, and means for admitting fuel to said conduit at a point be-

tween its inlet and its outlet, the inlet in said air conduit positioned in the inlet venturi serving to bleed air into the air conduit to decrease the flow of fuel into the conduit as the throttle is moved toward closed position and serving to check the flow of air into the air conduit due to the suction created by the flow of air through the inlet venturi as the throttle is moved toward open position thereby increasing the flow of fuel into said air conduit, and metering means for metering the fuel flowing into said conduit positively connected with the throttle valve for movement with the throttle valve whereby the metering means tends to increase the flow of fuel as the throttle valve opens and tends to restrict the flow of fuel as the throttle valve closes.

6. In a carbureting system, a main intake passageway, two venturies in said passageway through which all the air charge must flow, a nozzle in each of the venturies, a conduit connecting the said nozzles, a source of fuel connected to said conduit, and a throttle valve in said intake passageway between the two venturies, and metering means for metering the fuel flowing into said conduit positively connected with the throttle valve for movement with the throttle valve whereby the metering means tends to increase the flow of fuel as the throttle valve opens and tends to restrict the flow of fuel as the throttle valve closes.

7. In a carburetor having two venturis in series through which the main air charge passes, a throttle located between said venturis, a nozzle in each of said venturis, a conduit connecting the two nozzles together, a fuel orifice in said conduit, and a metering pin, and means connecting said throttle and pin whereby said pin moves with said throttle for increasing the size of said orifice as the throttle is moved towards an open position and for decreasing the size of said orifice as the throttle is moved towards a closed position.

8. In a carburetor having a throttle valve, a venturi on the atmospheric side of the throttle valve, a venturi on the engine side of the throttle valve, said venturis being in series through which the main air charge passes, a conduit connecting the two venturis together, a fuel orifice in said conduit, and means positively connected to said throttle for movement with said throttle for increasing the size of said orifice as the throttle valve is opened and for decreasing the size of said orifice as the throttle valve is closed.

MARION MALLORY.