Dec. 5, 1939. M. MALLORY 2,182,090

CARBURETOR

Filed Oct. 21, 1936

Fig. 1

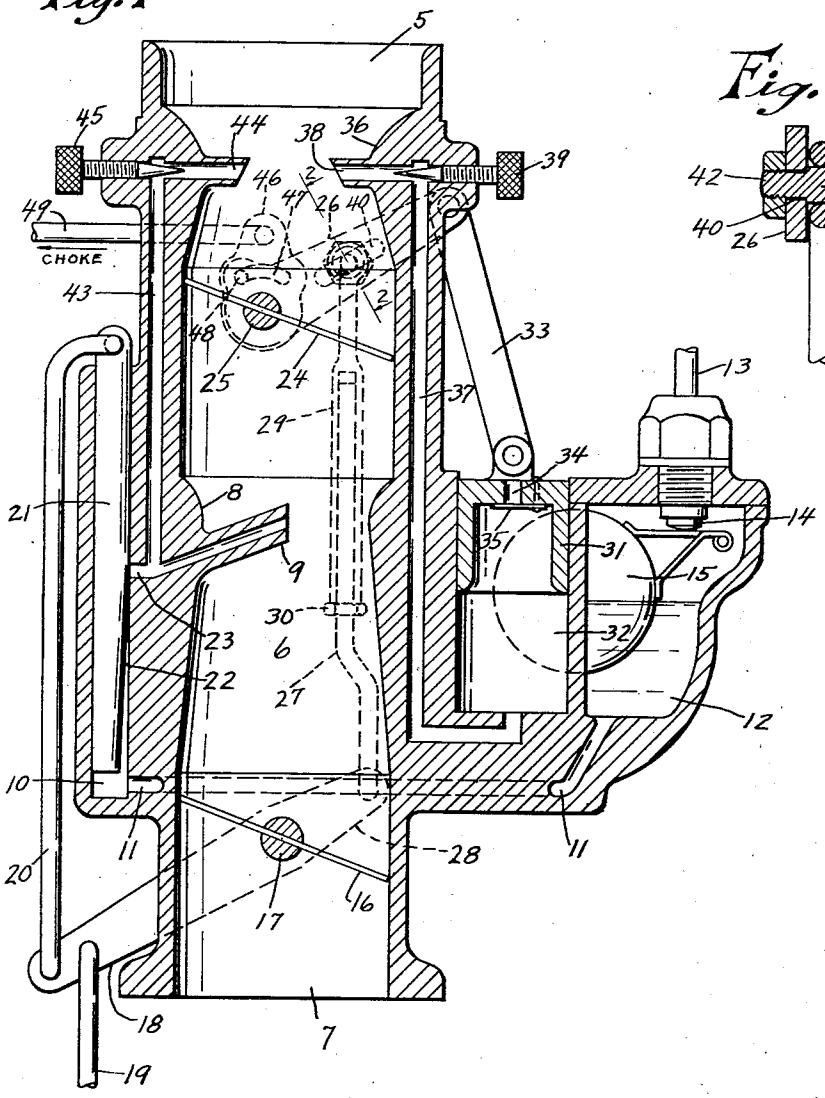


Fig. 2

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Patented Dec. 5, 1939

2,182,090

UNITED STATES PATENT OFFICE

2,182,090

CARBURETOR

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Application October 21, 1936, Serial No. 106,917

4 Claims. (Cl. 261—52)

This invention relates to new and useful improvements in a carburetor and more particularly to means for controlling the mixture ratio as the position of the throttle and the load vary.

The primary object of the invention is to provide a carburetor of simple construction, in which the mixture ratio is automatically controlled to insure smooth and economical operation during variations in the throttle opening and in response to variations in engine speed and load.

A further object of the invention is to provide improved means whereby, upon an increased throttle demand, the mixture will be enriched temporarily until there is a corresponding increase in the speed of the engine.

A still further object of the invention is to provide improved means for adjusting the mixture ratio as affected by an increase in the throttle opening.

The specific construction of the invention in its present embodiment and the principles governing its operation will be more particularly explained in connection with the accompanying drawing, in which—

Fig. 1 is a vertical sectional view taken centrally of a carburetor constructed according to the invention.

Fig. 2 is an enlarged sectional detail view taken on the line 2—2 of Fig. 1, showing a means for adjusting the mixture ratio for the higher speeds.

The invention is illustrated in the drawing as applied to a down draft carburetor, which has an air inlet 5, a mixing chamber 6, and a fuel mixture outlet 7 adapted to be connected with the engine intake manifold. The mixing chamber 6 is formed with a venturi 8 and fuel is discharged into the center of this venturi through a jet nozzle 9 from a well 10. The fuel is supplied to the well 10 through a passage 11 from a bowl 12, to which the fuel is admitted through a conduit 13 and a valve 14 controlled by float 15 in the usual manner.

The fuel mixture outlet 7 is controlled by a main throttle valve 16 mounted on a stem 17, which is provided with an arm 18 connected to a throttle control rod 19. A link 20 connects the arm 18 to a metering pin 21 provided with a flat taper 22, which opens the port 23 leading to the nozzle 9 in synchronism with the opening of the throttle valve 16.

An air valve 24 mounted on a stem 25 controls the direct admission of air to the mixing chamber 6. An arm 26 is secured to the stem 25. A rod 27 pivotally connected to a rearward extension 28 of the arm 18 telescopes into the end of a rod 29 which is pivotally connected to the arm 26 and is provided with an adjustable stop nut 30.

Thus it will be seen that, when the throttle valve 16 is closed, the valve 24 will be positively closed in synchronism therewith. If the valve 16 is opened slowly, the valve 24, which is unbalanced, will open at the same time, due to air flow and pressure thereon. If the valve 16 is opened quickly, however, the valve 24 will lag behind, due to the influence of a dash pot, which comprises a piston 31 reciprocable in a cylinder 32 and connected by a connecting rod 33 to the arm 26. The piston 31 is provided with a relief vent 34 covered by a valve 35 to permit its ready return when the throttle is closed.

A venturi 36 is formed in the air inlet passage above the valve 24 and an air passage 37 with an outlet 38 into the venturi connects the latter to the lower end of the dash pot cylinder 32. As the throttle valve 16 is opened for acceleration, the lagging of the valve 24 creates an increased vacuum in the vicinity of the nozzle 9, thus temporarily enriching the mixture without imposing a permanent load upon the valve 24 and without the necessity of using an accelerating pump, until the engine picks up speed, thereby increasing the suction through the venturi 36 and through the passage 37. This in turn hastens the opening of the valve 24, relieving the increased vacuum around the fuel nozzle and restoring the normal mixture ratio. An adjusting screw 39, extending into the passage 37, determines the rate at which the dash pot permits the valve 24 to open in response to an increase in the main throttle opening.

As the throttle is opened, the mixture depends in part upon the degree of vacuum around the nozzle 9. If the ultimate opening of the valve 24 with reference to the valve 16 is decreased, the vacuum will be increased and the mixture enriched. In order that this may be adjusted, the arm 26 is provided with a longitudinal slot 40. The pin 41, which receives the end of the connecting rod 33, is as shown in Fig. 2, in the form of a shouldered stud 42 with a threaded end secured in the slot 40 and is adjustable longitudinaly thereof. Thus, by adjusting the pin toward the outer end of the slot, the mixture may be enriched and by adjusting the pin in the opposite direction, it may be made leaner.

A by-pass 43 is connected at its lower end to the fuel nozzle 9 and at its upper end to a nozzle 44, which projects into the upper venturi 36. The effective capacity of this by-pass is adjusted by

a screw 45. When the throttle is in idling position, air is drawn through this by-pass and mixes with the fuel discharged from the nozzle 9 to form an idling mixture. As the throttle is opened, the suction through the venturi 36 progressively increases, thus cutting down the flow of air through the by-pass 43 and increasing the flow of fuel through the nozzle 9.

For choking the engine, an arm 46 pivotally mounted on the valve stem 25 is provided with an arcuate slot 47, which receives a pin 48 secured to the arm 26. A choke rod 49 is connected to the arm 46 and, when moved in the direction of the arrow, positively holds the valve 24 closed when the valve 16 is opened, thereby restricting the supply of air to the fuel mixture.

In order to control the mixture ratio automatically during variations in the throttle opening and in response to variations in engine speed, the invention comprises a main throttle valve and an air valve with a fuel jet nozzle between them. The main throttle valve, which is on the engine side of the fuel nozzle, is positively actuated through the throttle control rod. The air valve, which is unbalanced, is positively closed by the closure of the main throttle valve, but is opened only by air flow or suction. A dash pot connected to the air valve retards the opening of the latter if the main throttle valve is opened quickly, thereby maintaining a sufficient suction around the nozzle to temporarily enrich the mixture until the engine picks up speed. Unlike a spring loaded valve, however, the dash pot does not impose a permanent load and does not permanently increase the vacuum around the fuel nozzle.

In the operation of this carburetor, it will be noted that all of the fuel for idling, for acceleration or for operating under a heavy load is always supplied from the well 10 through a single port to the nozzle 9. No accelerating pump or power jet piston is necessary. The fuel is metered by the pin 21 in proportion to the opening of the throttle valve 16.

The air for the idling mixture is drawn through the by-pass 43 and mixes with and atomizes the fuel before it leaves the nozzle 9. As the valves 16 and 24 are opened, there is a suction through the venturi 36 which, as the speed increases, becomes sufficient to stop the air flow through the by-pass 43. The suction through the venturi 8 is then sufficient to atomize the fuel as it leaves the nozzle 9.

Since the unbalanced valve 24 may be opened only by air flow or pressure, if the throttle valve 16 is opened quickly, the valve 24, temporarily retarded by the dash pot, lags behind the valve 16 until the engine picks up speed. The suction developed by the increasing speed of the engine first acts directly upon the valve 16 and then, as suction is developed through the venturi 36 and in the passage 37, accelerates the bleeding of the dash pot. As a result, the mixture is temporarily enriched for acceleration without the use of an accelerating pump. Since the valve 24 is not spring loaded, the mixture ratio again becomes normal as soon as the desired acceleration is effected. If, however, it should be desirable to have a slightly richer mixture for high speed, this may be obtained by adjusting the pin 41 so that the valve 24 will not open as wide as the valve 16. This increases the suction around the fuel nozzle 9, with a consequent increase in the mixture ratio.

While I have shown and described in detail one specific embodiment of the invention, it is to be understood that this is merely illustrative and that the invention also embraces such modifications as may be made within the scope of the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. A carburetor comprising a fuel mixture chamber with a venturi having a fuel inlet, an air inlet, and an outlet adapted to be connected to an engine intake manifold, a main throttle valve controlling said outlet, an unbalanced valve controlling the air inlet, a dashpot tending to retard the opening of the unbalanced valve, means for closing both valves in unison, said means serving to open the throttle valve but being out of operative relationship with the unbalanced valve during opening movement of the throttle valve, another venturi on the atmospheric side of the unbalanced valve, and a passage connecting the dash pot to the last mentioned venturi, whereby suction through the said venturi tends to accelerate the movement of the piston as the unbalanced valve opens.

2. A carburetor comprising a passage having an air inlet and a fuel mixture outlet with two venturis between them, a fuel supply duct with a nozzle discharging into the second venturi, a main throttle valve on the engine side of the second venturi, an auxiliary unbalanced valve between the first venturi and the fuel nozzle adapted to be opened by air flow and pressure alone, an idling air by-pass from the first venturi into the fuel supply duct, and means for positively closing the unbalanced valve in synchronism with the closure of the main throttle valve, said means serving to open the throttle valve but being out of operative relationship with the unbalanced valve during said opening movement.

3. A carburetor comprising a passage having an air inlet and a fuel mixture outlet with two venturis between them, a fuel supply duct with a nozzle discharging into the second venturi, a main throttle valve on the engine side of the second venturi, an auxiliary unbalanced valve between the first venturi and the fuel nozzle adapted to be opened by air flow and pressure alone, a dash pot with a piston connected to the unbalanced valve to retard the opening of the latter, means for bleeding the dash pot into the first venturi, and means for positively closing the unbalanced valve in synchronism with the closure of the main throttle valve.

4. A carburetor comprising a passage having an air inlet and a fuel mixture outlet with two venturis between them, a fuel supply duct with a nozzle discharging into the second venturi, a main throttle valve on the engine side of the second venturi, an auxiliary unbalanced valve between the first venturi and the fuel nozzle adapted to be opened by air flow and pressure alone, a dash pot with a piston connected to the unbalanced valve to retard the opening of the latter, means for bleeding the dash pot into the first venturi, and means to adjustably limit the opening of the unbalanced valve in proportion to the opening of the main throttle valve.

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