

Sept. 29, 1942.

J. T. W. MOSELEY

2,297,109

CARBURETOR

Filed Feb. 23, 1940

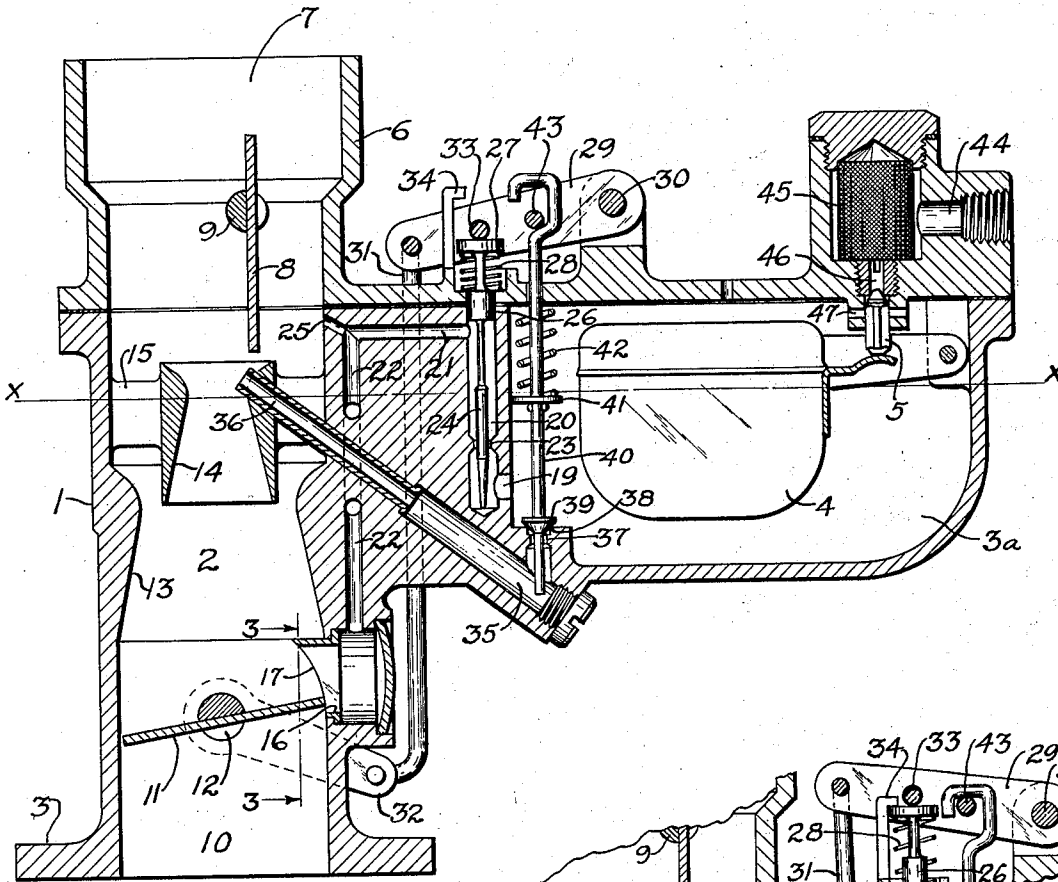


FIG. 1.

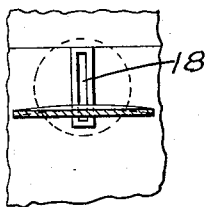


FIG. 3.

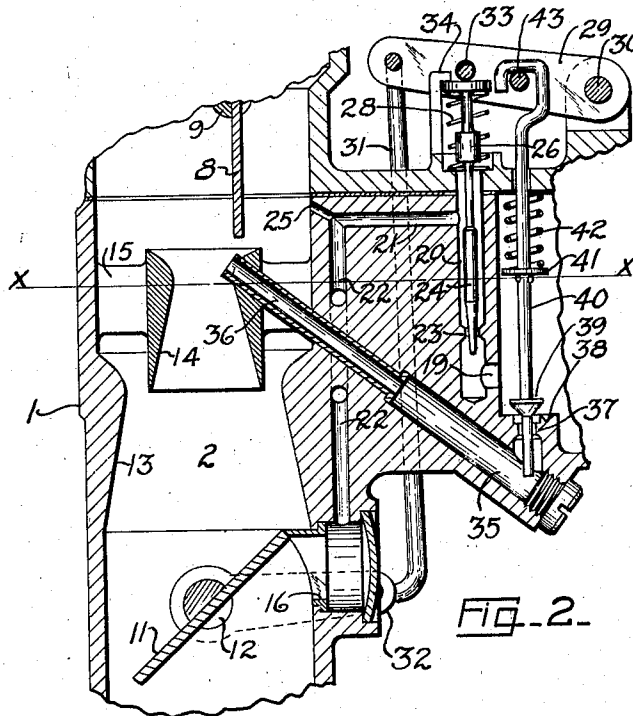


FIG. 2.

INVENTOR
JAMES T. W. MOSELEY

Ronald H. Rich
ATTORNEY

UNITED STATES PATENT OFFICE

2,297,109

CARBURETOR

James T. W. Moseley, Clayton, Mo., assignor to
Carter Carburetor Corporation, St. Louis, Mo.,
a corporation of Delaware

Application February 23, 1940, Serial No. 320,369

6 Claims. (Cl. 261-41)

This invention relates to carburetors for internal combustion engines and more particularly to improvements in downdraft carburetors of the plain tube type.

Constructions of this type are generally provided with main and idling discharge ports. The main ports being arranged to discharge into the mixing conduit anterior to the throttle valve and at a point slightly above the fuel level and are calibrated to supply the total fuel requirement during all operation except idling; while the idling discharge port, which is limited to provide fuel for idling, is located in the wall of the conduit adjacent the edge of the throttling valve so as to be partially exposed to the high suction posterior to the throttle valve when the same is in a nearly closed or idling position. It is also customary to interconnect the fuel passages leading to the main and idling discharge ports and to provide a calibrated common feed therefor. This arrangement results in desirable transfer characteristics and is well known to the art.

However, this arrangement precludes the use of a very effective means of preventing percolation of fuel from the main discharge port or nozzle during sustained idling operation. The effective means referred to being; the shutting off of the fuel supply to the main discharge ports.

It has been proposed that independent fuel passages from the fuel bowl to the main discharge nozzle and idling port be provided. This arrangement will, of course, permit the shutting off of the main fuel passage while fuel continues to flow to the idling port.

A difficulty arises, however, from the use of independent fuel passages. As with this arrangement the control of the main nozzle at low speeds, which constitutes a holding back thereof by suction at the idling port branch, is lost. Without suitable control either a break in the continuity of fuel feed or an over-lapping supply would result at the point of transfer from the idling to main nozzle supply causing irregular engine performance or loss of economy. Loss of economy is particularly objectionable at speeds immediately above idling in what is commonly termed the economy range.

In order to overcome this difficulty it has been proposed that the idling supply passage or the main nozzle supply passage be controlled by valve means. This valve means being arranged to contact with the throttle valve in such manner as to cut off the idling supply at the moment the main nozzle started to feed, or to hold back the main nozzle until such time as it was needed. It was

found in practice, however, that a greater accuracy of control for this purpose was required at dead idle speeds and speeds immediately above, than could be attained without prohibitive cost increase.

It is therefore an object of this invention to provide carburetor structure which obviates the necessity of transferring from an idling port to a main fuel nozzle in the lower speed or economy range.

It is a further object of this invention to provide a downdraft plain tube carburetor having a simple butterfly type throttling valve, in which fuel is available for aspiration only at the points of highest velocity during the throttled and wide open range of operation.

It is a further object of this invention to provide means for preventing percolation of fuel into the mixing conduit. Other objects and advantages will become apparent in the following specification and accompanying drawing referring to which:

Fig. 1 is a diagrammatic representation of a carburetor constructed in accordance with my invention.

Fig. 2 is a fragmentary view of the carburetor shown in Fig. 1 and in which parts are shown in a different operative position.

Fig. 3 is a fragmentary view taken on line 3-3 of Fig. 1.

Numeral 1 indicates the main body portion of the carburetor having a mixing conduit 2 formed therein and a flange 3 formed at the lower end thereof for attachment to the intake manifold of an internal combustion engine. A constant level fuel chamber formed integral with the main body casting is indicated at 3^a, in which a constant level of fuel is substantially maintained as indicated at x-x by the action of float 4 on the fuel inlet needle valve 5. A combination constant level fuel chamber cover and air inlet casting is indicated at 6, having an air inlet passage 7 formed therethrough.

The air inlet 7 is controlled by a conventional plate-type choke valve 8 mounted for rotation on a choke shaft 9. The choke valve 8 may be operated manually or automatically in any suitable manner. The outlet 10 of the mixing conduit is controlled by a conventional plate-type throttle valve 11 which is mounted for rotation on a throttle shaft 12. Manual control means for the throttle valve (not shown) may consist of the usual throttle operating lever rigidly attached to the shaft 12. A portion of the mixing conduit 2 has Venturi form as indicated at 13 and a

second Venturi tube 14 is provided and supported in the mixing conduit by the ribs 15. Projecting into the mixing conduit adjacent the upstream opening edge of the throttle valve 11 is a discharge nozzle 16 having a face 17 substantially conforming to the arc described by the adjacent edge of the throttling valve. Referring to Fig. 3 the nozzle port 18 is shown to be of rectangular shape. It will be understood that the shape of this port may be varied to suit requirements without deviating from the spirit of this invention. It is, however, essential that the nozzle be undercut as indicated in Fig. 1, that the port 18 be substantially elongated as indicated and that the contour substantially conform to the arc described by the edge of the throttle valve as shown.

Fuel is supplied to the nozzle 18 from the constant level chamber 3^a through port 19, passages 20, 21 and 22. The calibration of this supply is effected by the restriction 23, the tapered needle or metering rod 24, the air bleed 25 and by the shape of port 18 and the position of the throttle valve edge with respect to this port. The vertical passage 20 extends upwardly to atmosphere and is closed at its upper end during the economy range of operation by the enlargement 26 of the metering rod 24. The upper end of metering rod 24 terminates in a flange 27, the underside of which forms a bearing surface for the spring 28 which normally urges the metering rod upward.

A lever 29 pivoted at 30 and connected to the throttle shaft 12 by means of a link 31 and a rigidly attached lever 32 is provided. The lever 29 carries a pin 33 which bears against the upper end of the metering rod. The metering rod is thereby positioned in accordance with the throttle position. A fixed abutment 34 also limits the upward movement of the metering rod 24 and by this provision the lever 29 may be further rotated without further upward movement of the metering rod.

Referring to Fig. 2 it will be noted that as the metering rod 24 reaches its upward limit of travel, the enlarged portion 26 thereof is moved out of passage 20 thereby opening the upper end of this passage to atmosphere.

Fuel for full power and top speed operation is supplied to the mixing conduit from the constant level chamber through the passage 35 and nozzle 36 and is discharged within and near the throat of the Venturi tube 14. Fuel enters passage 35 through the calibrated orifice 37. A seat 38 formed concentric with orifice 37 is engaged by the valve 39. The valve 39 is provided with an upwardly extending stem 40 having a collar 41 thereon. A spring 42 bearing at one end on collar 41 and at its other end on the underside of the bowl cover normally urges valve 39 on its seat thereby cutting off the supply of fuel to nozzle 36. The upper end of valve stem 40 is formed at a right angle to provide an abutment for a second pin 43 which is carried by lever 29.

The arrangement of lever 29, the pins 33 and 43 carried thereby, the metering rod 24 and the valve stem 40 is such that the enlarged portion 26 of the metering rod moves upward out of passage 20 to vent this passage to atmosphere at substantially the same time as valve 39 is lifted from its seat.

In operation, fuel is supplied to the carburetor constant level chamber 4 through the fuel inlet 44, through the strainer 45, and through passages 75

46 and 47 and a substantially constant level $x-x$ is maintained therein by the float controlled intake valve 5.

During engine operation at what is termed "dead idle" the throttle valve will be in approximately the position shown in Fig. 1. When the throttle valve is in this position a comparatively small portion of the port 18 will be exposed to the comparatively high suction posterior to the throttle valve. The fuel orifice 23, the metering rod 24, the air bleed 25, and the discharge port 18 are so proportioned as to supply the correct mixture for idling operation. The air bleed 25 has a dual purpose. That of breaking the syphon to prevent flow of fuel during inoperation and of providing a constantly open vent to relieve vapor pressures in the fuel passages posterior thereto.

It may be well at this time to point out that a substantially richer mixture is required for dead idle operation than is required for immediately higher speeds, or for any other speed or load for that matter. For example, a mixture ratio of ten parts of air to one of fuel by weight may be required for satisfactory idling operation which in terms of motor vehicle speed would be 6 or 7 miles per hour, while at a speed of 25 miles per hour a ratio as lean as 17 to 1 will give satisfactory performance.

It will be understood, of course, that as the throttle is advanced toward an open position while the engine is operating at constant load, the vacuum posterior to the throttle valve will decrease. The increased exposure of port 18 to suction below the throttle as this valve moves open, compensates, however, to maintain the required suction on the fuel jet. It is also true that the mixture in the mixture conduit will lean out at a rapid rate as the throttle is moved toward an open position due to the air bleeding of the fuel passage at 25 and the comparatively larger amounts of air admitted around the throttle. To compensate for this, the net opening of the fuel orifice 23 is increased by the upward movement of the tapered metering rod.

As the throttle valve is opened to some predetermined point as indicated in Fig. 2, the metering rod 24 moves upward and opens the upper end of passage 20 to atmosphere whereby the fuel supply passages to port 18 are substantially bled-out. Also, substantially at the same time, the valve 39 is lifted from its seat and fuel is permitted to flow to nozzle 36 and discharge therefrom into the mixing conduit via the venturi 14.

This predetermined point is determined by individual performance requirements. It is the intention of the inventor to have this transfer occur at approximately the point where a maximum power or speed, mixture ratio is required. It is also the intention to arrange the mechanism which controls valve 39 and metering rod 24 in such manner as to insure that fuel is discharging from nozzle 36 at the instant the port 18 ceases to discharge. A slight overlapping of discharge from these nozzles at these higher speeds is not objectionable and will not result in sensible engine irregularities. From the foregoing it will be seen that I have provided a cut-off for nozzle 36 thereby preventing percolation therefrom during idling speed or during periods of inoperation when percolation is likely to occur. The fuel supply passages to port 16 are provided with a constantly open vent 25 which permit release of

pressure built up in these passages anterior thereto.

It will also be seen that I have eliminated a particularly troublesome problem, that of transferring from an idling discharge port to a primary nozzle during lower part throttle range, by providing a single nozzle capable of supplying idling and economy range fuel requirements.

The foregoing description and accompanying drawing are intended to be illustrative and not limiting, and the use of all modifications within the scope of the appended claims is contemplated.

I claim:

1. A downdraft carburetor for internal combustion engines comprising a downwardly directed mixing conduit, a constant level fuel chamber, a plate-type throttle valve in said mixing conduit, a primary discharge nozzle opening into said mixing conduit adjacent the upward opening edge of said throttle valve, the end of said primary discharge nozzle having a configuration with respect to a vertical plane substantially conforming to the arc described by said adjacent throttle valve edge and being juxtaposed therewith, said primary discharge nozzle being further characterized by a vertically elongated discharge opening in the end thereof, a fuel passageway leading from said constant level chamber to said primary discharge nozzle, valve means for controlling said fuel passageway, spring means for urging said valve means toward a less restricting position and mechanism co-acting with said throttle valve to limit the effect of said spring means.

2. A carburetor as described in claim 1 including a secondary discharge nozzle opening into said mixing conduit anterior to said throttle valve, an independent fuel passageway leading from said constant level chamber to said secondary nozzle, a spring pressed valve normally closing said independent fuel passage and mechanism co-acting with said throttle valve to open said spring pressed valve as said throttle is moved toward an open position.

3. In a carburetor, means forming a mixing conduit, said conduit having a cylindrical portion near its outlet end, a disk-type throttle valve in said cylindrical portion, a primary fuel discharge nozzle projecting into said conduit adjacent the upstream opening edge of said throttle valve, said primary nozzle having a discharge opening in the end thereof elongated in a direc-

tion parallel to the axis of said mixing conduit, and having its discharge end shaped to closely conform to the arc described by the adjacent edge of the throttle valve, and a secondary fuel nozzle discharging into said mixing conduit at a point anterior to said throttle valve.

4. In a downdraft carburetor having a single fixed capacity mixture passageway therethrough, a plate-type throttle valve in said mixture passageway near the outlet thereof, a primary discharge nozzle projecting into said mixture passageway adjacent the upstream opening edge of said throttle valve, the projecting end of said primary nozzle being shaped to closely conform to the arc described by the adjacent edge of said throttle and having a discharge opening therein substantially elongated vertically, said primary nozzle being so located with respect to the adjacent edge of said throttle when said throttle is in a nearly closed dead idling position that the greater portion of the discharge opening therein will be above the edge of said throttle valve, and a secondary nozzle discharging into said mixture conduit anterior to said throttle valve.

5. In a carburetor, means forming a mixing conduit, a plate-type throttle valve for controlling the outlet of said conduit, a primary discharge nozzle projecting into said conduit adjacent the upstream opening edge of said throttle valve, said primary nozzle having a discharge end configuration closely conforming to the arc described by the adjacent throttle edge, and a secondary nozzle discharging into said mixture conduit at a point upstream from said throttle valve.

6. In a downdraft carburetor, a mixture conduit, a constant level fuel chamber, a plate-type throttle valve in said conduit, a primary discharge nozzle projecting into said conduit adjacent the upstream opening edge of said throttle valve, the discharge end of said nozzle having a configuration closely conforming to the arc described by said adjacent throttle valve edge and being juxtaposed therewith, said primary nozzle having a vertically elongated discharge opening, a fuel passageway connecting said fuel chamber and said nozzle, means connected to said throttle for progressively restricting said passageway through a portion of the throttle range as said throttle is moved toward a closed position, an air bleed to said passageway, and means connected to said throttle for controlling said air bleed.

JAMES T. W. MOSELEY.