Aug. 19, 1941. M. C. BROWN 2,252,960

CARBURETOR STRUCTURE

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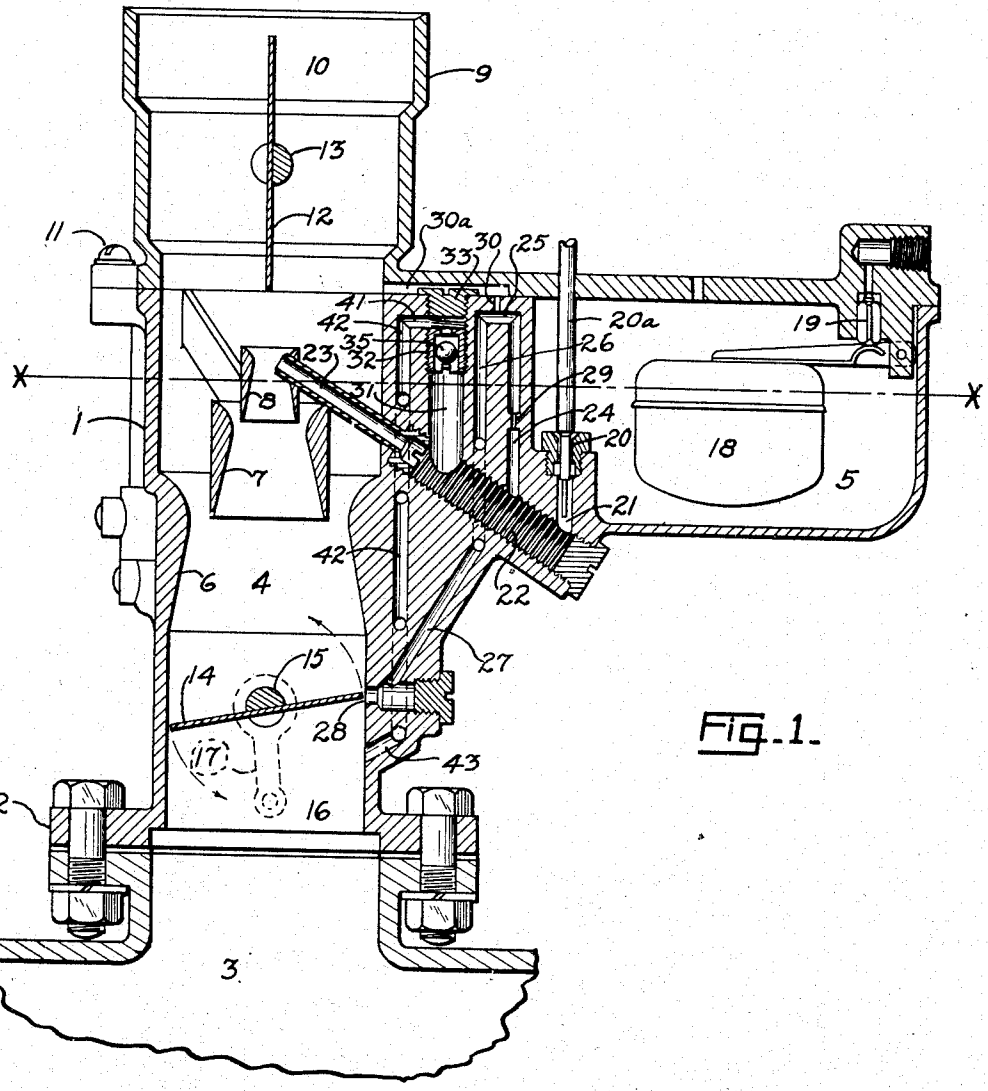


Fig. 1.

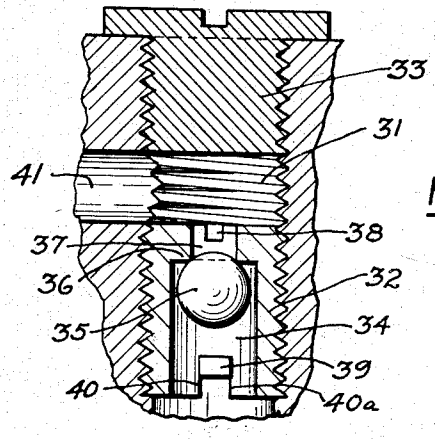


Fig. 2.

INVENTOR
MORRIS C. BROWN

Donald C. Rick

ATTORNEY

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CARBURETOR STRUCTURE

Morris C. Brown, Normandy, Mo., assignor to Carter Carburetor Company, St. Louis, Mo., a corporation of Delaware

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6 Claims. (Cl. 261—41)

This invention relates to carburetors for internal combustion engines and more particularly resides in the provision of novel means for preventing "percolation" of fuel from the main nozzle.

"Percolation" or untimely exuding of fuel into the mixing conduit is caused by vapor pressures in the fuel passages, which become excessively heated due to their location, as in current downdraft carburetors, immediately above or adjacent the exhaust manifold. Means for relieving the pressures in these passages by providing vents and vapor bubble escape chambers have been disclosed as in the patent to James T. W. Moseley #2,013,787.

It is, however, of utmost importance that the above mentioned vent to the main fuel passage be closed during those periods of operation wherein fuel is being supplied through the main fuel passage and main fuel nozzle to the mixing conduit. Otherwise, air-bleeding will occur, and although air-bleeding of the main fuel nozzle is practised, a vent properly located and proportioned so as to be effective in relieving pressures in the main fuel passage to prevent percolation, could not practically be used reversely as an air-bleed.

The patent to Moseley #2,013,787 further discloses valve means for controlling the anti-percolating vent. This valve is opened by means of interconnecting linkage as the throttle valve is moved toward a closed position. It is important that the valve does not open while the main nozzle is discharging, and as the main nozzle, under normal operating conditions, continues to discharge until the throttle valve is almost closed, it will be seen that the opening of the vent control valve must be accomplished by a comparatively slight angular movement of the throttle valve.

Anti-stall devices which have recently been incorporated in some carburetors function to open the throttle valve as the intake manifold suction drops below a predetermined point, these devices have the further purpose of presetting the throttle valve in order to facilitate re-starting of the engine. It will be seen from the foregoing that the incorporation of an anti-stall device of this character precludes the use of a throttle actuated anti-percolating vent control valve which must be opened by a throttle closing movement at a time when the manifold vacuum becomes nil as when the engine becomes inoperative.

It is a primary object of the present invention to provide valve control means for a carburetor fuel passage vent which functions to close said vent when said main fuel passage is discharging and to open said vent when said carburetor is inoperative, irrespective of the position of the carburetor throttle valve.

Other objects and advantages will appear in the following description and accompanying drawing in which like numerals in the various figures refer to like parts. Referring to the drawing:

Fig. 1 is a somewhat diagrammatic view of a downdraft carburetor embodying one form of the present invention.

Fig. 2 is an enlarged detail of the control valve and valve housing, showing the valve in a closed position.

Numeral 1 indicates the main body member of a carburetor which is provided with a flange 2 at its lower end for attachment to the intake manifold 3 of an internal combustion engine. A mixture conduit 4 is formed through the main body casting 1 and an adjacent fuel chamber 5 is formed as an integral part thereof. The mixing conduit 4 is provided with a venturi formed constriction 6 and Venturi tubes 7 and 8.

A combination fuel bowl cover and air inlet casting 9 having an air inlet 10 formed therethrough is provided. Casting 9 is attached to the main body member 1 by means of attaching screws 11. The air inlet 10 is controlled by a choke valve 12 which is mounted for rotation on a shaft 13. The choke valve 12 may be operated either manually or automatically. A throttle valve 14 mounted for rotation on a throttle shaft 15 is provided for control of the outlet 16 of the mixing conduit. An operating lever 17 is rigidly attached to the throttle shaft 15.

A substantially constant level of fuel is maintained in the fuel chamber 5 as indicated by the dot-dash line x—x, by the action of the float 18 on the intake needle valve 19. Fuel is supplied to the mixing conduit from the constant level fuel chamber 5 through the metering jet 20, through passages 21 and 22 and through the main discharge nozzle 23 from whence it is discharged into the primary Venturi tube 8. A branched, idling fuel supply system comprising the passages 24, 25, 26 and 27 also supplies fuel to the mixing conduit through the idling discharge port 28 which is situated near the upward opening edge of the throttle valve 14. The idling supply system further comprises a metering restriction 29 and air bleed passages 30 and 30a. For the purpose of varying the net opening of the metering orifice 20, a stepped and/or tapered metering rod 20a is provided and arranged to be slidably positioned therein. The

metering rod may either by positioned in accordance with the position of the throttle valve, by means of interconnecting linkage, or it may be positioned in accordance with intake manifold vacuum by a pressure responsive device, neither method being shown but both are well understood in the art.

Rising vertically to the top of the main body casting from the passage **22** is a comparatively large passage or chamber **31** which is threaded at its upper end to receive the threaded valve housing **32** and the threaded sealing plug **33**. The valve housing **32** comprises a cylindrical, exteriorily screw threaded plug having a comparatively large longitudinal bore **34** extending upwardly through a greater portion of its length and in which is housed the ball valve **35**. A valve seat **36** is formed near the upper end of bore **34** by the concentric reduced bore **37** which completes a passageway through the plug. The upper end of the housing is provided with a screw driver slot **38** to facilitate assembly. The lower end of the plug is provided with several tangs **39** which are formed by slitting along the lines **40** and **40***a* and then bending inward to approximately a 90° angle to retain the ball valve **35**. The ball valve **35** is preferably of light weight material as an aluminum alloy. The upper end of the passage **31** is connected to the mixing conduit at a point posterior to the throttle valve **14** by means of passages **41**, **42** and **43**. The operation of the device is as follows:

During the operation of an engine to which the carburetor is attached, a sufficient vacuum will exist in the intake manifold and in the mixing conduit posterior to the throttle valve to draw the ball valve **35** against the seat **36** as indicated in Fig. 2, thereby sealing the upper end of passage **31**. When the engine becomes inoperative, the consequent loss of manifold vacuum permits the ball **35** to drop from its seat thereby opening the upper end of passage **31**, whereby this passage is vented through the passages **36**, **41**, **42** and **43**.

The vertical passage **31** is made considerably larger than the passage through nozzle **23** so as to provide a path of lesser resistance for vapor bubbles which may form near the base of the nozzle or anterior thereto. Further, the valve seat **36** is located at a point sufficiently above the fuel level *x*—*x* to permit boiling or bursting of these bubbles on the surface of the fuel in the passage **31**. This prevents the carrying of liquid fuel over through passages **37** and **41** by unbroken bubbles. It will be understood that the weight and diameter of ball **35** are so proportioned that the differential in pressures at a point below the ball valve in passage **31** and in the mixing conduit below the throttle valve during all periods of engine operation will retain the ball valve **35** on its seat. The foregoing description and 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. In an internal combustion engine, a downdraft carburetor having a mixing conduit, a throttle valve for controlling the outlet of said mixing conduit, a constant level fuel chamber, a fuel conduit system for conducting fuel from said fuel chamber to said mixing conduit comprising a passageway extending diagonally upward from a point near the bottom of said fuel chamber, a nozzle extending from the upper end of said passageway to a point in said mixing conduit slightly above the level of fuel, said nozzle forming a constricted continuation of said passageway, a branched passageway diverging from said diagonal passageway and rising substantially vertically to a point above the level of fuel and then downwardly and discharging near the upward opening edge of said throttle valve, a constant size atmospheric vent to said branched passageway at a point above the level of fuel, a second branched passageway substantially less restricting than said nozzle diverging from said diagonal passageway and rising more directly to a point above the level of fuel, a passageway connecting the upper end of said second branched passageway with said mixing conduit at a point posterior to said throttle valve, and a gravity opened check valve positioned near the upper end and constructed and arranged to close said second branched passageway in response to suction consequent to normal engine operation.

2. A device as described in claim 1 in which said conduit system further comprises a highly restricted metering passageway, connecting said diagonal passageway with said fuel chamber.

3. In a carburetor, a downwardly directed mixture conduit, a constant level fuel chamber adjacent said conduit, a throttle valve in said conduit located substantially below the level of fuel, a nozzle opening into said conduit at a point above the level of fuel, a fuel passageway leading from said fuel chamber to said nozzle and being below the level of fuel, a vapor venting passageway leading upwardly from said fuel passageway to a point above the level of fuel and then downwardly and opening into said mixture conduit at a point posterior to said throttle valve, and a gravity opened check valve in said venting passageway at a point above the level of fuel and being subjected to the suction in said vapor venting passageway and being responsive with sufficient sensitiveness to said suction to close the vapor venting passageway at any degree of suction on which the carburetor would operate.

4. In an internal combustion engine, a carburetor having a mixing conduit, a throttle valve in said conduit, a constant level fuel chamber, a fuel conduit system for conducting fuel from said fuel chamber to a point in said mixing conduit above the level of fuel including a fuel passageway disposed below the level of fuel, a vapor venting passageway leading from said fuel passageway and opening into a zone of pressure which is atmospheric when the engine is not operating and valve means controlling the venting passageway and being subjected to suction existing in the mixing conduit at all positions of the throttle and being responsive with sufficient sensitiveness to said suction to close the venting passageway at any degree of suction on which the carburetor would operate.

5. In a carburetor, means forming a mixture conduit, a throttle valve in said conduit, a constant level fuel chamber, a fuel conduit system for conducting fuel from said fuel chamber to said mixture conduit which includes a fuel passageway disposed below the level of fuel, a vapor venting passageway leading from said fuel passageway to said mixture conduit, and valve means for controlling said venting passageway, said valve means being subjected to the suction in said mixture conduit at all positions of said throttle and being sufficiently sensitive to said suction to close said venting passageway at any degree of

suction capable of drawing fuel into said mixing conduit.

6. In a downdraft carburetor, means forming a mixture conduit, a throttle valve for controlling the outlet of said conduit, a constant level fuel chamber, a fuel conduit system for conducting fuel from the lower part of said fuel chamber to a point in said mixing conduit above the level of fuel including a fuel passageway extending diagonally upward, a vapor venting passageway extending vertically from a point in said diagonal passageway below the level of fuel to a point above the level of fuel and then downwardly and opening into said mixing conduit posterior to said throttle valve, and a valve in said venting passageway subjected to the suction in said venting passageway and being responsive with sufficient sensitiveness to said suction to close the venting passageway at any degree of suction on which the carburetor would operate.

MORRIS C. BROWN.