Sept. 24, 1957 W. O. MANNING, JR 2,807,449

CARBURETOR CONSTRUCTION

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FIG. 1

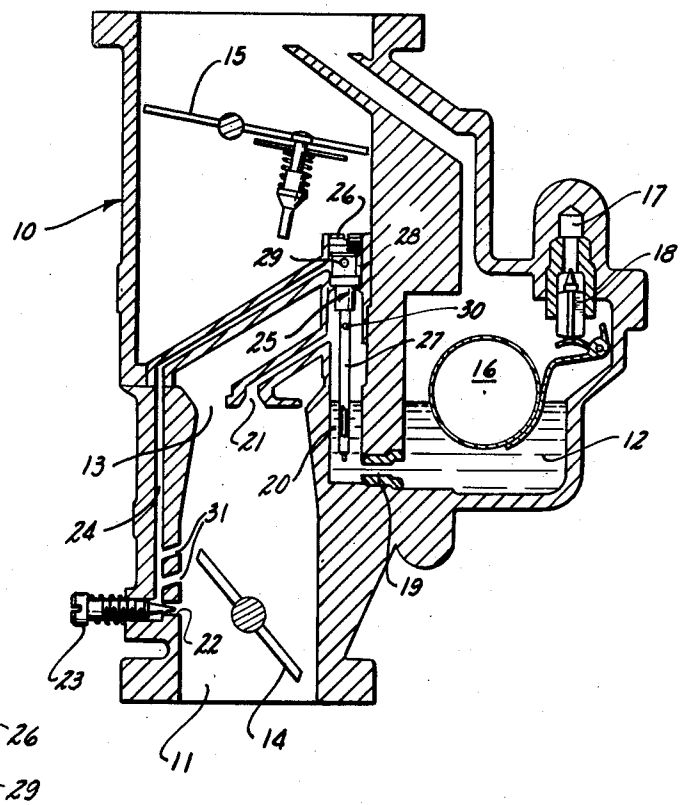
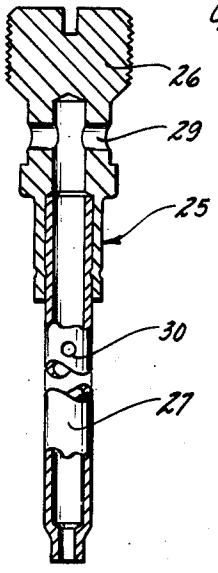


FIG. 2



INVENTOR.
WILLIAM O. MANNING JR.
BY
Whittemore, Hulbert & Belknap
ATTORNEYS

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CARBURETOR CONSTRUCTION

William O. Manning, Jr., Detroit, Mich., assignor to Holley Carburetor Company, Detroit, Mich., a corporation of Michigan

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This invention relates generally to carburetors of the type employed for feeding fuel mixture to internal combustion engines and refers more particularly to an improved idling or low speed jet system for carburetors.

Internal combustion engines employed to propel vehicles are usually provided with a carburetor of the down draft type having an idling jet communicating with the fuel mixture supply passage at the down stream side of the throttle valve and also communicating with the upper end of an idling tube to receive fuel from the latter. The lower end of the idling tube ordinarily extends into a fuel well which is connected by a main metering jet to a fuel supply or float bowl of the carburetor.

The primary function of the idling system is to assure delivery of an ample supply of fuel mixture to the engine when the throttle valve is closed or substantially closed. However, in many installations the fuel supply bowl occupies such a position that rapid deceleration of the vehicle resulting from closure of the throttle valve while the vehicle is moving forward, causes the supply of fuel in the bowl to surge in a direction away from the main metering jet and this surging action has a tendency to effect a reverse flow of fuel through the main metering jet with a corresponding lowering of the fuel level in the well which communicates with the lower end of the idling tube. This reverse flow of fuel through the main metering jet produces a force which opposes the intake manifold vacuum tending to draw fuel through the idling jet and in severe cases this force becomes sufficient to cause stalling of the engine.

With the above in view, it is an object of this invention to overcome the tendency for the vehicle to stall upon deceleration by providing the idling tube with an air bleed situated to interrupt the fuel passage extending from the idling discharge jet to the fuel well at the bottom of the idling tube. As a result, the force tending to produce reverse flow upon deceleration is reduced to a negligible quantity in the portion of the fuel passage between the idling discharge jet and point of interruption.

It is another object of this invention to locate the air bleed as closely as possible to the normal level of the fuel in the well communicating with the lower end of the idling tube so that the maximum volume of fuel is available in the portion of the passage extending from the idling discharge jet to the air bleed. Hence, ample supply of fuel is available at the idling jet to maintain operation of the engine during the relatively short surging period of the fuel in the supply bowl.

It is a further object of this invention to locate and so proportion the size of the air bleed in the idling tube that it serves the additional purpose of enrichening the fuel mixture in the idling fuel passage at the time the main fuel nozzle begins to flow. Thus, the metering characteristics of the carburetor are improved and superior performance is assured regardless of changing conditions.

The foregoing as well as other objects will be made more apparent as this description proceeds especially

when considered in connection with the accompanying drawing, wherein:

Figure 1 is a semi-diagrammatic sectional view of a carburetor of the down draft type and embodying the features of this invention; and

Figure 2 is an enlarged sectional view of a part of the carburetor shown in Figure 1.

The carburetor selected for the purpose of illustration is of the down draft type having a housing **10** formed to provide a vertically extending passage **11** and a float bowl **12**. The lower end of the passage **11** communicates with an intake manifold of an internal combustion engine (not shown) and the upper end of the passage **11** communicates with the atmosphere or an air supply. A venturi **13** is provided in the passage **11** intermediate the ends thereof and a throttle valve **14** is supported in the passage **11** at the downstream side of the venturi **13**. A choke or air control valve **15** is suitably mounted in the passage **11** at the upstream side of the venturi **13** for regulating the amount of air drawn into the system to facilitate starting the engine when the latter is cold.

The float bowl **12** communicates with the passage **11** above the choke valve **15** and is adapted to contain a supply of fuel determined by a float **16**. Fuel is supplied to the bowl **12** through a passage **17** and the quantity of fuel admitted to the bowl **12** is regulated by a valve **18** operatively connected to the float **16** for actuation by the latter. A main metering jet or restriction **19** establishes communication between the bowl **12** and a well **20** in a manner such that the level of the fuel in the well is normally the same as the level of the fuel in the bowl **12**.

The well **20** communicates at a point above the normal level of the fuel therein with a main fuel discharge nozzle **21** positioned in the throat or restricted area of the venturi **13** to discharge fuel in a downward direction toward the throttle valve **14**. The arrangement is such that when the throttle valve **14** is opened substantially, considerable suction is produced in the Venturi throat and fuel is drawn upwardly from the well **20** through the main nozzle **21**.

When the throttle valve **14** is closed or practically closed, the suction at the Venturi throat drops considerably and very little, if any, fuel is drawn through the main nozzle **21**. In order to assure the supply of fuel required to maintain operation of the engine at closed or practically closed throttle conditions, a low speed jet or idling nozzle **22** is provided at the downstream side of the throttle valve **14** where the suction is relatively high under these conditions. A needle valve **23** is threadably supported on the housing **10** in a position to regulate the flow through the idling jet **22** in accordance with conventional practice.

Fuel is supplied to the idling jet **22** by a passage **24** formed in one wall of the housing **10** and extending upwardly from the idling jet **22** to a point above the venturi **13**. The upper end of the passage **24** extends forwardly across the passage **11** and communicates with the well **20** at a point spaced above the point of communication of the main fuel discharge nozzle **21** with the well **20**.

Fuel is admitted to the upper end of the passage **24** from the well **20** through an idling tube **25** having a head **26** at the upper end threadably mounted in the well **20** above the point of communication between the passage **24** and well **20**. The lower end of the tube **25** is reduced in diameter and projects downwardly to a point below the normal level of the fuel in the well **20**. The vertical passage through the tube **25** is indicated by the numeral **27** and terminates short of the head **26**. The head **26** has an annular groove **28** in registration with the intake end of the passage **24** and a bore **29** is formed in the side of the head to connect the groove **28** to the passage **27**.

In addition, an air bleed aperture **30** is formed in the side of the reduced lower end of the tube **25** above the level of the fuel in the well **20** so as to admit air into the fuel flowing upwardly through the tube **25** during operation of the idling jet **22**.

As stated above, when the throttle valve **14** is closed or practically closed, the manifold suction at the throat of the venturi **13** or at the main discharge jet **21** drops substantially so that very little, if any, fuel is drawn from the well **20** through the main discharge jet **21**. However, the suction in the passage **11** at the downstream side of the throttle valve **14** is increased to such an extent that fuel is drawn from the well through the idling tube **25** and passage **24** to the idling discharge jet **22**. Also, a small quantity of air is drawn into the fuel stream through the bleed **30** and the resulting emulsion is discharged into the passage **11** through the jet **22**. Supplemental jets **31** may be and preferably are provided at the upstream side of the jet **22**. The supplemental jets **31** function when the throttle valve **14** is practically closed to admit additional air into the passage **24** and when the throttle valve **14** is opened farther to admit additional fuel mixture into the passage **11**. By reason of the above arrangement, the so-called "flat spot" is eliminated in the mixture-ratio curve within the range of speeds where the delivery was taken over from the idling nozzle **22** by the main nozzle **21**.

In the present instance, the carburetor is installed with the bowl **12** in such a position that when the vehicle is rapidly decelerated, the fuel contained in the bowl **12** and well **20** surges forwardly or in a direction to cause reverse flow of fuel in the main metering jet **19**. However, the force produced by such reverse flow through the jet **19** is dissipated or materially reduced at the air bleed orifice **30** in the idling tube **25** so that it has little or no effect on the fuel mixture contained in the length of the passage extending from the idling jet **22** to the air bleed orifice **30**. Hence, any opposition that this force produces on normal flow of the fuel mixture through the idling jet **22** by the manifold vacuum is negligible. Moreover, since the air bleed **30** is located in close proximity to the normal level of the fuel in the well **20**, ample fuel mixture is available beyond the bleed orifice **30** to assure maintaining operation of the engine during the relatively short time required for the fuel to return to its normal level in both the bowl **12** and well **20**.

The location of the air bleed **30** in the side of the idling tube **25** above the normal level of the fuel in the well **20** also renders it possible to improve the metering characteristics of the carburetor. In this connection, it will be understood that when the throttle valve **14** is moved from its idling position toward its open position, the manifold vacuum at the restriction of the venturi is greatly increased with the result that the suction created at the main discharge jet **21** becomes sufficient to draw fuel upwardly from the well **20** into the venturi. In other words, the level of the fuel in the well **20** is raised to the point of communication of the main discharge jet **21** with the well **20** by the increased suction resulting from opening

the throttle valve **14**. As shown in Figure 1 of the drawing, the air bleed **30** in the idling tube **25** is positioned slightly above the point of communication of the main discharge jet **21** with the well **20**. Actually, the air bleed **30** is located in such a position with respect to the point of communication of the main discharge jet **21** with the well **20** that it bleeds the idling tube **25** with an emulsion of fuel and air at the time the main nozzle **21** starts its flow. In other words, the fuel mixture in the idling system is enriched at the time the main fuel discharge nozzle **21** becomes operative and this is desirable in that it assures more satisfactory distribution of fuel to the engine when the throttle valve **14** is opened. It will also be understood that the size of the bleed orifice **30** may be varied to obtain the most desirable metering characteristics for a given set of conditions.

What I claim as my invention is:

1. A carburetor for an internal combustion engine of an automotive vehicle comprising a body having an induction passage for fuel mixture, a float chamber in said body, a vertically elongated well in said body, a fuel metering jet connecting the chamber and well adjacent the bottom of the well, a main nozzle in said induction passage, a throttle valve in said induction passage downstream from said main nozzle, an idle tube in said well defining an annular chamber between the inner surface of said well and the outer surface of said tube, said tube having an intake opening adjacent its lower end, a main supply passage connecting said main nozzle to said annular chamber adjacent the top of said well, an idle nozzle in the side of said induction passage adjacent said throttle, an elongated idle passage connecting said idle nozzle to the top of said tube, means mounting said carburetor in position such that deceleration resulting from throttle valve closure while the vehicle is moving in a forward direction displaces fuel in said float chamber in a direction to draw fuel through said metering jet from the bottom of said well, and a bleed orifice in the side of said tube closely adjacent the juncture between said well and said main supply passage and forming a direct connection between said annular chamber and the interior of said idle tube.

2. A carburetor as defined in claim 1 in which said bleed orifice is just above the juncture between said well and said main supply passage.

References Cited in the file of this patent

UNITED STATES PATENTS

1,631,716	Bavery	June 7, 1927
1,821,012	Guthrie	Sept. 1, 1931
1,881,256	Ball et al.	Oct. 4, 1932
2,419,956	Kuzelka	May 6, 1947
2,615,696	Winkler	Oct. 28, 1952
2,628,826	Worden	Feb. 17, 1953
2,656,166	Foster	Oct. 20, 1953
2,676,004	Bimberg	Apr. 20, 1954
2,689,115	Olson	Sept. 14, 1954