July 14, 1959 J. T. WENTWORTH 2,894,736

CARBURETOR VENT SYSTEM

Filed March 26, 1958

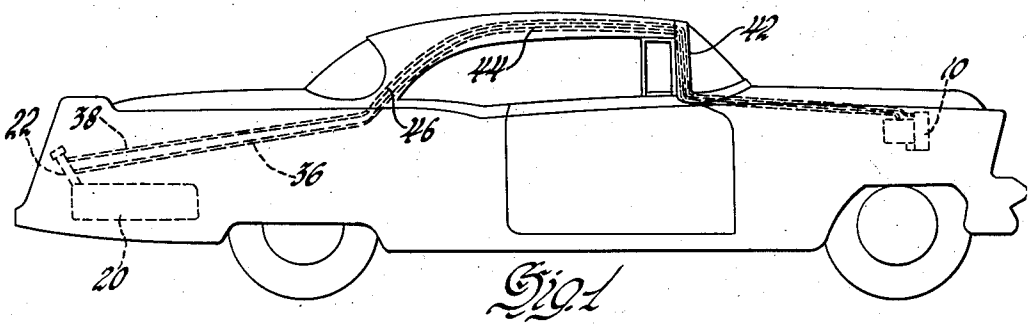


Fig. 1

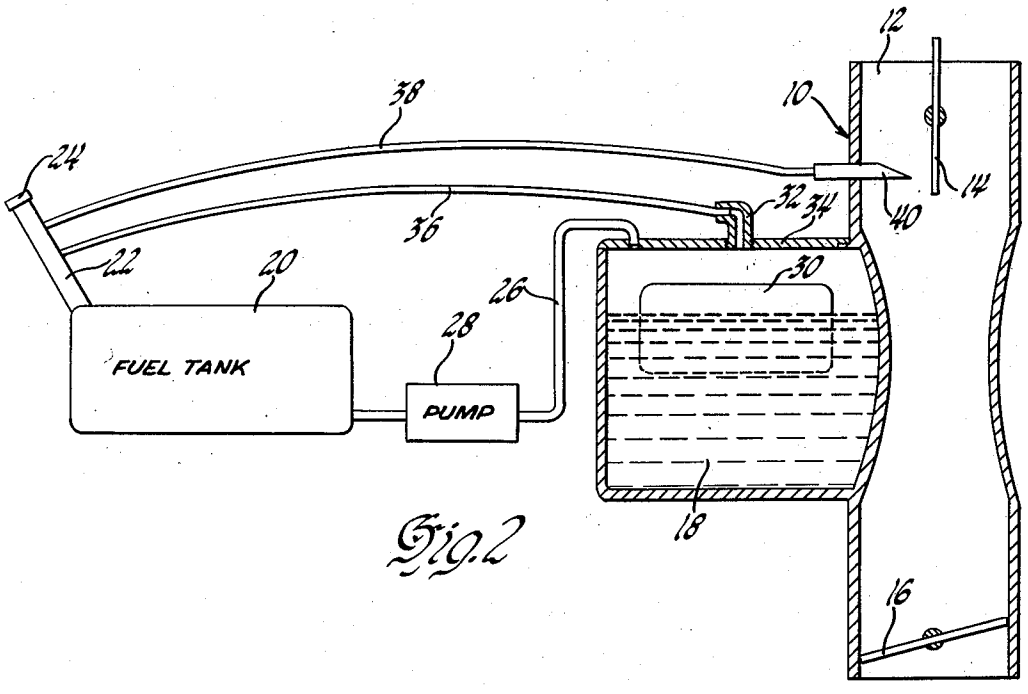


Fig. 2

INVENTOR.

Joseph T. Wentworth

BY

R. P. Barnard

ATTORNEY

United States Patent Office 2,894,736 Patented July 14, 1959

2,894,736

CARBURETOR VENT SYSTEM

Joseph T. Wentworth, Royal Oak, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application March 26, 1958, Serial No. 724,092

8 Claims. (Cl. 261—72)

The present invention relates to a closed venting system for an internal combustion engine.

In a non-pressurized carburetion system it is necessary to provide some means for venting the carburetor float bowl, particularly when a hot engine is stopped, in order to prevent the build-up of vapor pressures therewithin which otherwise might force fuel through the fuel nozzle into the induction passage of the carburetor causing the same to flood and making starting difficult.

To overcome this problem carburetors frequently have both internal and external venting devices. With an internal vent and the vehicle running, float bowl fuel vapors are vented into the carburetor induction passage and thus consumed by the engine. When the vehicle is parked or idling, on the other hand, it is common to externally vent the fuel vapors. The external venting of fuel vapors frequently results in the vehicle compartment being permeated by fuel vapor odors to the discomfiture of the passengers.

The present invention provides a closed or completely internally vented carburetor whereby the fuel vapors are returned to the vehicle gas tank where they are either condensed and become part of the liquid supply of gasoline or pass to a venting passage leading to the carburetor induction passage.

A first advantage of the present system is the elimination of obnoxious fuel vapor odors. Secondly, the loss of externally vented fuel vapors is avoided since all vapors are either returned to the fuel tank in liquid form or pass in vapor form into the carburetor and in either event are ultimately utilized by the engine.

Other objects and advantages of the present invention will be apparent from a perusal of the detailed description which follows.

In the drawings:

Figure 1 illustrates the subject venting system as incorporated on an automobile; and

Figure 2 is an enlarged detail view of the venting system.

Referring to the drawings, a schematic representation of a carburetor is shown generally at **10** and includes an induction passage **12** having choke and throttle valves **14** and **16** respectively pivotally mounted therewithin. A carburetor float bowl is indicated generally at **18**. A fuel tank **20** includes a filler pipe **22** closed by a cap **24**.

In general, the fuel tank is located at the rear of a vehicle and below the level of the carburetor although this relationship is not critical. Fuel is normally supplied from tank **20** to the carburetor fuel bowl **18** through a conduit **26** by a conventional fuel transfer pump **28**. The quantity of fuel admitted to fuel bowl **18** is controlled by a conventional float controlled valve mechanism only the float **30** of which is shown.

Due to its inevitable proximity to the engine, the fuel in the float bowl **18** is subjected to considerable heat. The result is, of course, that particularly the lighter ends of the fuel are vaporized and the vapors collect within the float bowl above the fuel level. The

vapors must be vented to reduce the propensity for vapor lock and also to prevent the vapor pressure from forcing fuel through the fuel nozzle particularly during hot soak conditions.

It has been the normal practice to provide means whereby these vapors are vented to the carburetor induction passage and consumed by the engine in the course of normal operation. However, it is found that when the engine is idling or even sitting under hot ambient conditions, the engine is unable to consume such vapors with the result that there is a tendency of the fuel pressure to build up within the fuel reservoir and force the liquid fuel through the fuel nozzles and through the induction passage causing flooding of the engine. As already noted, it has been the practice to provide means for externally venting these vapors when the throttle **16** is closed. For such an external venting mechanism see Patent 2,771,282 Olson et al.

The effect of internal vents on hot weather idling has not been given enough attention in the past. In hot weather, city driving, bowl temperatures as high as 20 to 40° above ambient operating temperatures are common. In other words, it is possible with ambient temperatures between 70 and 90° F. to have bowl temperatures in the vicinity of 110 to 130°. It is apparent that at such temperatures considerable fuel vaporization will take place with current type fuels. At idle, of course, the fuel consumption rate is at its lowest point and, in an internally vented system, the bowl vapor is most likely to be an appreciable portion of the metered fuel resulting in a rich air-fuel ratio. Consequently, good hot weather idling cannot be obtained, particularly on present summer fuel blends, if all the vapor from the carburetor bowl is fed to the engine.

As the result of tests it has been found that a normal internally vented engine under hot weather idle conditions may increase its idle fuel flow rate by approximately 15%. Most of this 15% increase is attributable to internally vented vapor. The aforenoted fuel flow rate increase results in extremely rough idling operation due to overenrichment. With the subject venting system the increase in fuel flow rate under similar hot idling conditions was negligible resulting in good hot idling engine operation.

In the present device a suitable boss **32** is formed on the float bowl cover **34** and communicates through a conduit **36** with the fuel tank filler pipe **22**. Since pipe **22** is relatively cool fuel vapor from bowl **18** and conduit **36** will condense and return to tank **20** in liquid form.

An additional conduit **38** communicates the filler pipe **22** with a vent tube **40** disposed within induction passage **12** posteriorly of choke valve **14**. In this way provision is made for the lighter fuel vapors, which do not condense, to pass to the carburetor induction passage where they will be ultimately consumed by the engine or else pass off in relatively small quantities. Since vapors remaining in the filler pipe will collect near the upper end thereof, it is preferable to dispose the conduit **38** nearer the upper end of filler tube **22** than is conduit **36**.

An important feature of the present invention is that the conduits **36** and **38** are disposed, in relation to fuel tank **20** and carburetor **10**, so as to prevent pockets of fuel collecting therewithin which might otherwise create back pressures rendering the venting system ineffective. To this end, it will be noted that the conduits **36** and **38** have been disposed above either or both the fuel tank and the carburetor in such a way that any liquid fuel which might condense in the conduits will run downwardly either to the fuel tank or to the carburetor but cannot collect in the conduits in any quantity sufficient to inhibit the venting function.

As a practical matter, the most likely disposition of the conduits 36 and 38 would be to have them pass from under the vehicle hood upwardly through the body front corner posts 42 along the vehicle roof 44 and then downwardly through the rear corner posts 46 to the fuel tank filler pipe. In this way no portion of the conduits would be disposed below both the fuel tank and the carburetor and accordingly the conduits would be free of liquid fuel in any detrimental quantities.

I claim:

1. A charge forming device for an internal combustion engine comprising an air induction passage, a fuel bowl associated with said induction passage, a fuel tank for supplying fuel to said fuel bowl, said fuel tank including a filler pipe extending therefrom, a first conduit communicating said fuel bowl above the fuel level with said filler pipe, and a second conduit communicating said filler pipe with said induction passage.

2. A charge forming device for an internal combustion engine comprising an air induction passage, a fuel bowl associated with said induction passage, a fuel tank for supplying fuel to said fuel bowl, said fuel tank including a filler pipe extending therefrom, a first conduit communicating said fuel bowl above the fuel level with said filler pipe, and a second conduit communicating said filler pipe with said induction passage, said second conduit connected to said filler pipe above the connection thereto of said first conduit.

3. A charge forming device as set forth in claim 2 in which all points on said conduits are disposed above either said fuel tank or said fuel bowl.

4. A charge forming device for an internal combustion engine comprising an air induction passage, a fuel bowl associated with said induction passage, a fuel tank for supplying fuel to said fuel bowl, said fuel tank including a filler pipe extending therefrom, a first conduit communicating said fuel bowl above the fuel level with said filler pipe, and a second conduit communicating said filler pipe with said induction passage, all points on said conduits being disposed vertically above either said fuel tank or said fuel bowl.

5. A fuel venting system for a vehicle employing an internal combustion engine comprising, a charge forming device disposed near one end of said vehicle, said device including an air induction passage, and a fuel bowl associated with said passage and adapted to supply fuel thereto, a fuel tank disposed near the other end of said vehicle, pump means for supplying fuel from said tank to said bowl, said tank including a filler pipe extending therefrom, a first conduit communicating said fuel bowl above the fuel level with said filler pipe, and a second conduit communicating said filler pipe with said induction passage, said conduits being disposed within the vehicle so that all points of said conduits are disposed above either said fuel tank or said fuel bowl.

6. A fuel venting system as set forth in claim 5 in which said second conduit is connected to said filler pipe above the connection thereto of said first conduit.

7. A fuel venting system as set forth in claim 5 in which at least a portion of said conduits is supported within the roof of the vehicle body.

8. A fuel venting system for a vehicle utilizing an internal combustion engine comprising a charge forming device comprising an air induction passage, a fuel bowl associated with said induction passage, a fuel tank, pump means for supplying fuel from said tank to said fuel bowl, said fuel tank including a filler pipe extending therefrom, a first conduit communicating said fuel bowl above the fuel level with said filler pipe, and a second conduit communicating said filler pipe with said induction passage.

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