United States Patent

[11] 3,561,737

[72] Inventors **Paul E. Braun**
Bloomfield Hills;
James R. Clarke, Northville, Mich.

[21] Appl. No. **794,636**
[22] Filed **Jan. 28, 1969**
[45] Patented **Feb. 9, 1971**

[73] Assignee **Ford Motor Company**
Dearborn, Mich.
a corporation of Delaware

[54] CARBURETOR WITH FUEL BOWL EVAPORATION CONTROL MEANS

5 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **261/72**
[51] **Int. Cl.** **F02m 5/12**
[50] **Field of Search** ..... 261/70, 72, (Surge Preventers)

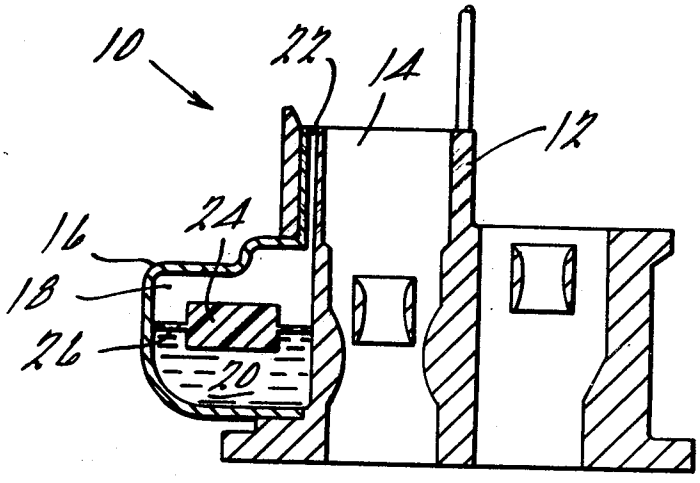
[56] **References Cited**

UNITED STATES PATENTS

699,309	5/1902	Hamilton	261/70
742,920	11/1903	Smith	261/72
1,250,163	12/1917	Becke et al.	261/72
1,529,612	3/1925	Assmus	261/72
3,020,030	2/1962	Capehart	261/72X
3,034,529	5/1962	Kittler	261/70
3,153,422	10/1964	Marsee et al.	261/70
3,202,173	8/1965	Szwargulski	261/70

Primary Examiner—Tim R. Miles
Attorneys—John R. Faulkner and E. Dennis O'Connor

ABSTRACT: A carburetor for an internal combustion engine in which evaporation of fuel in the fuel bowl is controlled to promote desired engine operating characteristics and reduce engine evaporative emissions. The fuel bowl float member is surrounded by an impervious member coextensive with the surface of the fuel present in the fuel bowl. This impervious member allows freedom of movement of the float member but minimizes evaporation from the surface of the fuel and passage of evaporated fuel to the atmosphere through the fuel bowl vent.



PATENTED FEB 9 1971

3,561,737

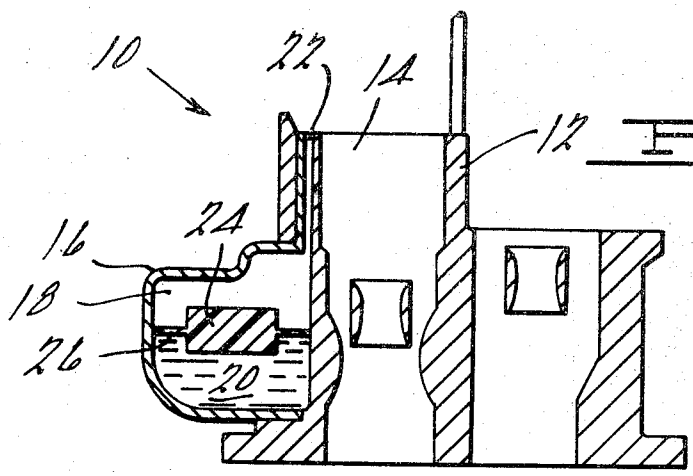


Fig. 1.

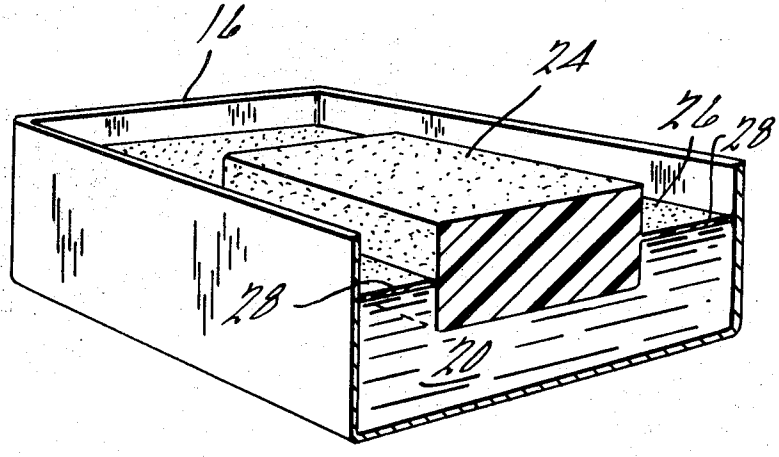


Fig. 2.

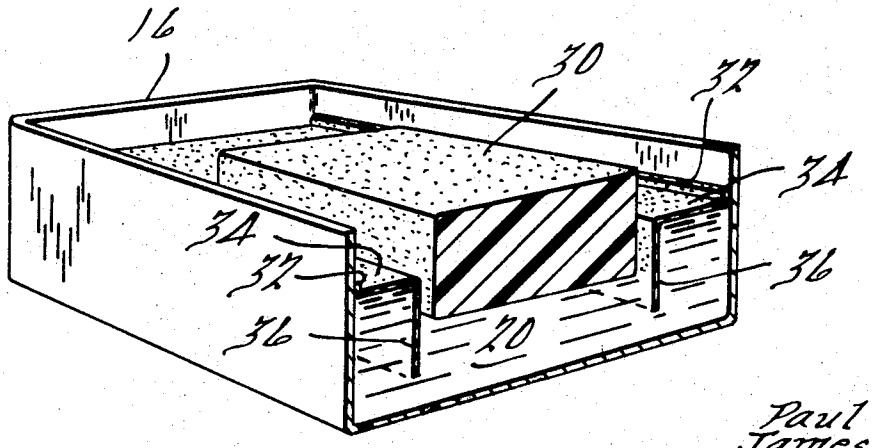


Fig. 3.

INVENTORS.
Paul E. Braun
James A. Clarke
BY John R. Faulkner
E. Dennis O'Connor
ATTORNEYS.

CARBURETOR WITH FUEL BOWL EVAPORATION CONTROL MEANS

BACKGROUND OF THE INVENTION

It long has been known in the art that evaporation of fuel in the fuel bowl of an internal combustion engine is undesirable. Historically, the objection to fuel evaporation was based upon the deleterious effects on engine operating characteristics due to a reduction by evaporation of the volume of fuel available in the fuel bowl to be directed to the engine. These effects are most pronounced if a period of high speed engine operation is desired immediately subsequent to a period of low speed engine operation.

Recently, it has become known that fuel bowl evaporation is objectionable additionally because it is a contributor to the emissions of hydrocarbons to the atmosphere by internal combustion engines.

The passage of evaporated fuel from the fuel bowl to the atmosphere is made possible by the fuel bowl vent. This vent is necessary to admit atmospheric pressure to the fuel bowl chamber. The force of this pressure acting over the surface of the fuel in the fuel bowl chamber is a requisite to the correct feeding of fuel from the fuel bowl to a carburetor induction passages. An attempt to control evaporative loss from a fuel bowl therefore must be directed primarily to preventing evaporation itself, while allowing atmospheric pressure to act on the surface of the fuel present in the fuel bowl chamber.

Previous fuel bowl designs that attempt to control fuel evaporation are typified by U.S. Pat. No. 3,020,030, issued Feb. 6, 1962. These designs include a fuel bowl float member having a horizontal cross-sectional area only slightly less than the horizontal cross-sectional area of the fuel bowl chamber in which the float member is positioned. Such arrangements reduce the fuel surface area surrounding the float member and contribute somewhat to decreased evaporative losses.

Enlarged float members of this type have proven not wholly satisfactory, however, in eliminating the fuel evaporation problem. The percentage of the horizontal cross-sectional area of the fuel bowl chamber that may be occupied by the float member is limited by the fact that the float member must be capable of moving freely in response to various volumes of fuel present in the chamber. If float member size exceeds this limit, the proximity between the periphery of the float member and the interior walls of the fuel bowl housing, coupled with the lateral forces (sometimes violent) exerted on the fuel bowl during engine operation may cause an intolerable interruption of unimpeded vertical float member movement.

In addition, no matter what the size of the float member utilized in the carburetor fuel bowl, a certain surface area of fuel will be present about the periphery of the float member. Such a surface area naturally allows fuel evaporation. During hot fuel handling conditions, fuel evaporation from even a relatively small surface area can be sufficient to be quite objectionable for the reasons discussed above.

It is an object of this invention to provide a motor vehicle carburetor having means for controlling fuel bowl evaporation. This evaporation is minimized to the extent that fuel loss from evaporation may be substantially eliminated as a factor in fuel handling considerations. Passage of vaporized fuel from the fuel bowl chamber into the atmosphere likewise is reduced. Despite these advantages, the fuel evaporation control means of this invention in no way interfere with free vertical movement of the fuel bowl float member in response to varying volumes of fuel being present in the fuel bowl chamber. Also, the fuel evaporation control means of this invention allow atmospheric pressure present in the fuel bowl chamber above the level of fuel to act on the fuel surface to allow correct feeding of fuel from the fuel bowl to carburetor induction passages.

SUMMARY OF THE INVENTION

Fuel bowl evaporation control means constructed in accordance with this invention are adapted to be included in a carburetor for an internal combustion engine. This carburetor includes a fuel bowl housing defining a chamber. This chamber is adapted to be partially filled with liquid fuel to varying levels. The housing has formed therethrough above the level of fuel vent means for admitting atmospheric pressure to the chamber. The evaporation control means include a float member partially submerged and floating in the fuel present in the chamber. Impervious means surround the float member and are coextensive with the surface area of the fuel to prevent the passage of evaporated fuel through the vent means and minimize evaporation of fuel.

These impervious means, according to a first embodiment of this invention, comprise a flexible gasket that may be either a distinct member or unitary with the float member and that is positioned upon the surface of the fuel about the float member. According to a second embodiment of this invention the impervious means comprises an impervious member that is secured to the internal wall of the fuel bowl housing.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial elevation view, in section, of an internal combustion engine carburetor that includes fuel bowl evaporation control means constructed in accordance with a first embodiment of this invention;

FIG. 2 is an isometric view, partially in section, of a portion of the fuel bowl illustrated in FIG. 1; and

FIG. 3 is a view similar to FIG. 2 but showing a second embodiment of fuel evaporation control means.

DETAILED DESCRIPTION OF THE INVENTION

Referring now in detail to the drawing, it may be seen that the numeral **10** denotes in general a carburetor with fuel bowl evaporation control means constructed in accordance with this invention. Carburetor **10** has a main casting **12** that defines an induction passage **14** therethrough. A fuel bowl housing **16** cooperates with casting **12** to define a fuel chamber **18** adapted to be partially filled with fuel **20**. A vent **22** interconnects fuel chamber **18** to the atmosphere and allows atmospheric pressure to act on the surface of fuel **20**. As is conventional, a float member **24**, constructed of material having a specific gravity less than the specific gravity of the fuel **20**, floats within the chamber **18** in fuel **20**.

It is not thought necessary to herein detail the well-known and conventional operation of an internal combustion engine carburetor fuel bowl and attendant structure. The structure illustrated in FIG. 1 and described to this point is conventional. Suffice it to say that fuel bowl chamber **18** is interconnected with a pressurized source of fuel. Admission of this pressurized fuel to chamber **18** is controlled by an input fuel valve to which float member **24** or **30** is mechanically connected by means not shown such that vertical movement of float member **24** or **30** opens and closes the input fuel valve. Also, a fluid passageway leads from a point proximate the bottom of chamber **18** to induction passage **14** such that the fuel from chamber **18** may be directed to this induction passage.

The first embodiment of fuel evaporation control means illustrated in FIGS. 1 and 2 of the drawings comprises a flexible, impervious gasket **26** that surrounds float member **24** and is coextensive with surface area **28** of fuel **20**. This area is equal to the horizontal cross-sectional area of chamber **18** less the horizontal cross-sectional area of float member **24**. As illustrated, flexible gasket **26** is integrally formed with float member **24** and constructed of like material. It readily may be appreciated however, that gasket **26** may be distinct from float **24** and derive its support upon surface **28** of fuel **20** solely from the fact that it is constructed of material that will float on this fuel.

The fact that gasket **26** is constructed of flexible material precludes the possibility that contact between the gasket **26** and the inside walls of housing **16** would impede upward and downward movement of float member **24** as the level of fuel **20** within chamber **28** varies. Since gasket **26** floats with float

member 24, this gasket always will be in contact with surface area 28 of fuel 20. This contact between the gasket and the fuel will, of course, minimize the possibility of fuel evaporation as the fuel will not be in contact with the air in that portion of chamber 18 not occupied by fuel. The presence of float 24 and gasket 26 in no way prevents atmospheric pressure, present in chamber 18 due to vent 22, from bearing on surface 28 of fuel 20.

Referring now to FIG. 3 of the drawing, there may be seen a second embodiment of fuel evaporation control means constructed in accordance with this invention. A float member 30 is positioned in fuel 20 within housing chamber 16 in the conventional manner. Surrounding float member 30 and coextensive with the surface area of fuel 20 is an impervious gasket 32 that is secured to the interior wall of housing 16. Gasket 32 is L-shaped and has a substantially horizontal leg 34 that is secured to housing 16 and a substantially vertical leg 36. The level of horizontal leg 34 should be equal to the maximum level of fuel that will be present within housing 16.

Since L-shaped gasket 32 is secured to housing 16, it need not be constructed of material that will float in fuel 20 as the position of the gasket is derived from its attachment to the housing. For purposes of reliability and long usage, gasket 32 thus may be constructed of heavy shape-retaining material that will retain its integrity over long periods of time and usage. In order to prevent the contact between gasket 32 and float member 30 from impeding free vertical movement of float member 30 as the level of liquid fuel varies, vertical leg 36 of gasket 32 extends downwardly from the surface of fuel 20. Leg 36, surrounding float member 30, provides alignment for float 30 and a channel for this float as it moves vertically in response to changes in liquid fuel level.

Gasket 32 is similar to gasket 26 in FIGS. 1 and 2 in that it is impervious. Since gasket 32 remains vertically stationary, some evaporation of fuel 20 may occur below gasket 32 when the level of liquid fuel 20 is below the level of horizontal gasket leg 34. However, such vapor is prevented by gasket 32 from reaching that portion of the fuel chamber not containing fluid and from exiting the fuel chamber to the atmosphere.

It may be seen that this invention provides evaporation control means for an internal combustion engine carburetor fuel bowl. The evaporation control means constructed in accordance with this invention prevent the evaporation of fuel within the fuel bowl and the passage of vaporized fuel through the fuel bowl vent to the atmosphere. This is accomplished without impeding free vertical movement of the fuel bowl float. Furthermore, the evaporation control means of this invention in no way prevent atmospheric pressure from acting on the surface of the fuel present within the fuel bowl.

We claim:

1. In a carburetor for an internal combustion engine, a fuel bowl housing defining a chamber, said chamber adapted to be partially filled with liquid fuel, said housing having vent means formed therethrough above the level of the fuel for admitting atmospheric pressure to said chamber, a float member partially submerged and floating in said fuel, and impervious means surrounding said float member and adapted to be in contact with and float on the surface of said fuel and being coextensive with the surface area of said fuel to prevent the passage of evaporated fuel through said vent means.

2. In a carburetor for an internal combustion engine, a fuel bowl housing defining a chamber, said chamber adapted to be partially filled with a variable volume of liquid fuel, said housing having vent means formed therethrough above the maximum level of the fuel for admitting atmospheric pressure to said chamber, a float member adapted to be partially submerged and float in said fuel, said float member having a horizontally cross-sectional area less than the horizontal cross-sectional area of said chamber, and impervious means fixedly secured to said housing having a horizontal portion coextensive with the surface area of said fuel surrounding said float member, said horizontal portion being positioned at the maximum horizontal level of said fuel, said impervious means having a depending portion adjacent said float and spaced from said housing.

3. In a carburetor for internal combustion engine, a fuel bowl housing defining a chamber, said chamber adapted to be partially filled with liquid fuel, said housing having vent means formed therethrough above the level of the fuel for admitting atmospheric pressure to said chamber, a float member partially submerged and floating in said fuel, and impervious means surrounding said float member and coextensive with the surface area of said fuel to prevent the passage of evaporated fuel through said vent means, said impervious means comprising a flexible gasket adapted to float on the surface of said fuel.

4. In a carburetor for an internal combustion engine according to claim 3, said gasket being unitary with said float member.

5. In a carburetor for an internal combustion engine according to claim 3, said impervious means comprising a flexible gasket unattached to said float member, and adapted to float on the surface of said fuel.