Dec. 23, 1969 G. S. FUCHS 3,485,482

ATOMIZING DEVICE FOR CARBURETORS

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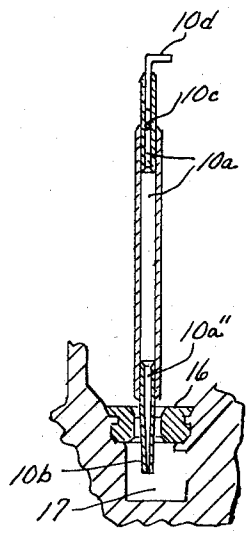


FIG. 1

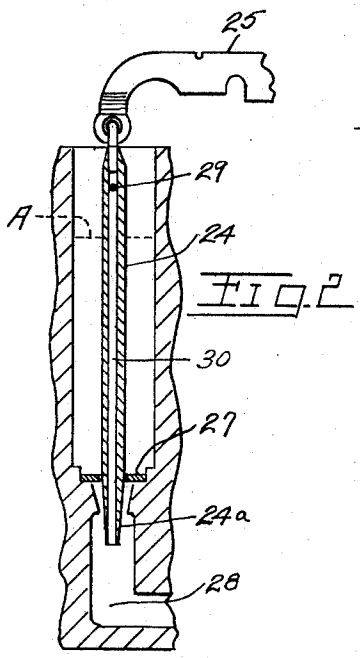


FIG. 2

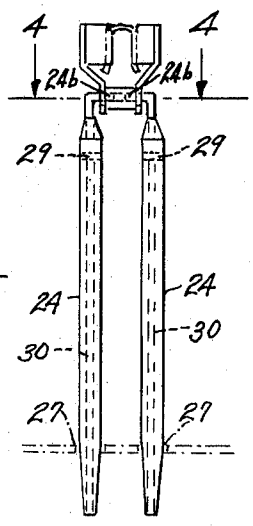


FIG. 3

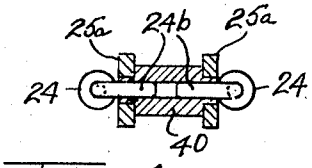


FIG. 4

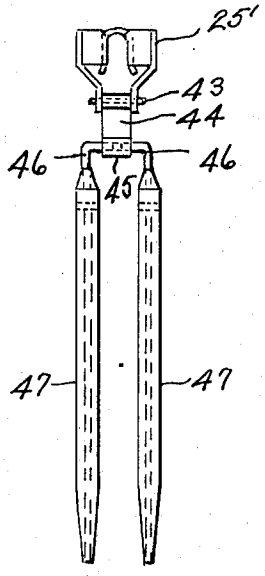


FIG. 7

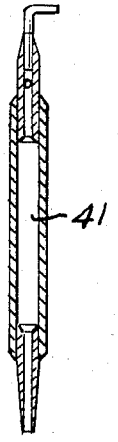


FIG. 5

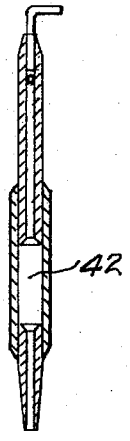


FIG. 6

INVENTOR.
GYULA S. FUCHS

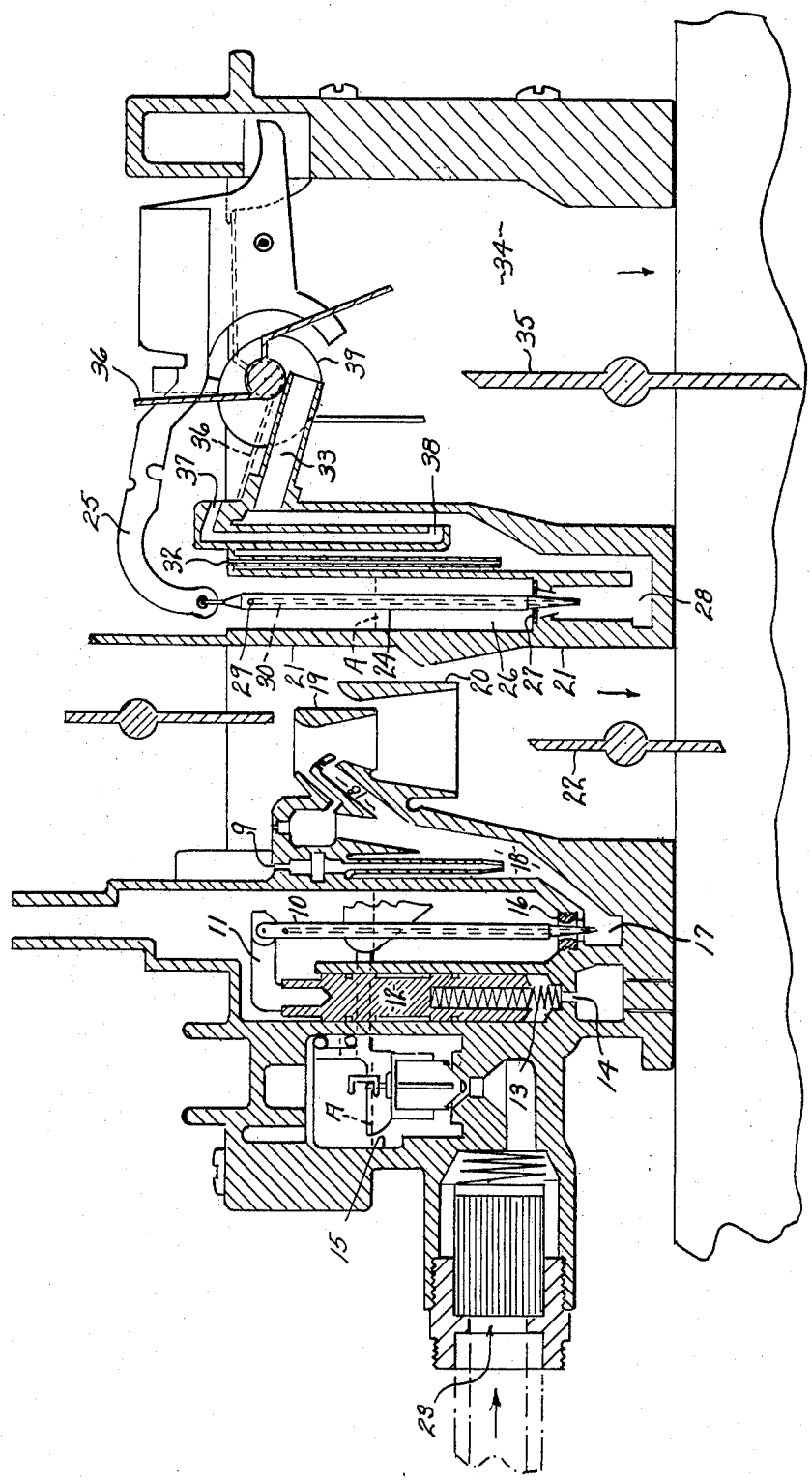
BY
Baldwin, Doran & Egan
ATTORNEYS

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FIG. 1



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ATOMIZING DEVICE FOR CARBURETORS

Gyula S. Fuchs, 1422 Grace Ave.,
Lakewood, Ohio 44107

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U.S. Cl. 261—23 5 Claims

ABSTRACT OF THE DISCLOSURE

In a carburetor for an internal combustion engine using gasoline fuel and having the usual bowl providing a reservoir of gasoline communicating at the bottom with a fuel well through a metering orifice, a metering rod is provided having an external diameter increasing upwardly from the lower tip of the rod to coact with the orifice in the usual manner with varying engine loads, and means is provided for atomizing the gasoline as it is leaving the metering orifice by injecting a jet of air into it there. The invention shows a passageway through the rod from the tip thereof to a point above the level of gasoline in the bowl so that manifold vacuum effective in the fuel well will suck air through the passageway in the metering rod, thus providing the atomizing jet of air.

This invention relates to a pre-atomization of gasoline as soon as it reaches the influence of the manifold suction so that whatever gasoline is drawn into the manifold to continue to the various cylinders of the engine, is in a more finely divided state than is presently available. As the piston of an engine starts on its suction stroke, with present carburetion it gets too much gas with too little air. An object of the present invention is to see that every bit of gas which is drawn into the engine is mixed with air in a finely divided manner. Also, when a carburetor gets hot, the gasoline vaporizes easily and raw gasoline, or gasoline with insufficient air is fed to the engine with present carburetors.

Another object of the present invention is to provide air immediately when gasoline reaches the fuel well so that it cannot pass to the engine without air mixed with it.

The invention will be described with reference to the drawings and the essential features will be set forth in the appended claims.

In the drawings,

FIG. 1 is a central sectional view through the metering rod of this invention in combination with a metering orifice and a fuel well;

FIG. 2 is a sectional view of a similar structure utilizing an orifice in a metering plate sometimes used in connection with secondary metering rods;

FIG. 3 is a front elevation taken from the left-hand side of FIG. 2 showing the arrangement of two metering rods side by side;

FIG. 4 is a fragmental sectional view, enlarged, taken along the line 4—4 of FIG. 3;

FIGS. 5 and 6 are central sectional views through other embodiments of the metering rod of this invention;

FIG. 7 is a view similar to FIG. 3 showing a double hinge arrangement for suspending the metering rods of this invention from a supporting and manipulating arm; while

FIG. 8 is a sectional view through a four barrel carburetor adapted to use the present invention.

Referring first to FIG. 8, there is shown somewhat diagrammatically a section through a four barrel carburetor used on the Oldsmobile "98," Toronado, or Cutlass. This carburetor would use four of the metering rods of this invention, but it will be understood that any internal combustion engine utilizing one or more metering rods is covered hereby and the invention need not be applied

to an automobile engine, but might be applied to other internal combustion engines, such as airplane engines.

At the left-hand side of FIG. 8, there is seen a primary main metering rod **10** and the reader will understand that there are two of these side by side hanging on horizontal pivots in a support arm **11** which in this case is manipulated by a piston **12** whose position depends upon the interplay between a compression spring **13** and the vacuum in chamber **14** which is connected with the engine manifold. High vacuum will hold the piston **12** down, while low vacuum will permit it to move up. This is well known in the art. It is assumed hereinafter that the highest level of gasoline in the carburetor bowl or reservoir **15** is at the broken line A. The metering rod **10** of this invention is suspended in the reservoir of gas and communicates at the bottom through a metering orifice **16** with the fuel well **17**. This communicates in the usual manner through passageway **18** with a smaller Venturi **19** and a larger Venturi **20** in the bore **21** which leads downwardly in the direction of the arrow to the engine manifold controlled by throttle valve **22**. The gasoline inlet is at **23**.

When engine speed is increased to a point where the primary side of the carburetor cannot supply sufficient air and fuel requirements, the secondary side of the carburetor is used. This is seen at the right-hand side of FIG. 8. Here a pair of metering rods, one of which is seen at **24**, are suspended from actuator arm **25** in the reservoir of gasoline **26**. The tapered lower end of these metering rods coacts with an orifice like that shown at **27** to vary the amount of gasoline allowed to enter the secondary fuel well **28**. Here, as on the primary side, as soon as suction occurs in the secondary fuel well **28**, air is sucked through the transverse bore **29** near the top of metering rod **24** and passes downwardly through the longitudinally extending passageway **30** and out the lower end or tip of the metering rod to mix there immediately with the gasoline flowing through the orifice **27** to atomize it. This mixture of air and gasoline then passes through passageway **31** and picking more air from the air bleed tube **32**. The gasoline and air mixture then passes out tube **33** to the bore **34** leading to the engine manifold under the control of throttle valve **35**. It should be understood that the secondary throttle valves are actuated by connecting linkage to the primary throttle lever. With the throttle valves open, a vacuum is created beneath the air valve **36** which is spring loaded to the broken line position shown in FIG. 8. Atmospheric pressure on top of this valve forces the valve to the open position shown in full lines allowing the required air to flow through the throttle bores to meet the engine demands. As the air valve **36** opens, the upper edge passes the accelerating well port **37** causing a vacuum at that point.

Due to the high temperature at the base of the carburetor during hot engine operation, the fuel begins to boil thus evaporating the fuel out of the fuel well. The secondary metering rods **24** have a small vertical slot, not shown, milled in the side at the tip to keep the fuel wells full at all times so that there will be a supply of fuel for the accelerating ports, thus giving immediate fuel delivery. The fuel from the accelerating ports **37** prevents a momentary hesitation and provides an immediate charge of fuel until the air-fuel mixture begins to flow from the secondary discharge orifices **27**.

As the air valve **36** opens, it rotates cam **39** attached to the main air valve shaft. This cam lifts the actuator arm **25** to raise the metering rods **24** out of their coacting orifice plates **27**.

This invention does not relate to the carburetor design per se, but instead to the design and arrangement of the metering rods so as to give pre-atomization of the fuel where it passes through the metering orifice. Referring to

FIG. 1, metering rod **10** is shown as having a longitudinally extending passageway **10***a* which extends from the tip **10***b* upwardly to a lateral cross bore **10***c* which is located high enough to be at all times above the level A of the gasoline in the bowl or reservoir. The tip of the rod is of increasing diameter upwardly either by tapering or by steps, or by both, so as to vary the opening in the orifice **16** as the metering rod is raised and lowered. The L-shaped projection **10***d* at the upper end of the rod is for the purpose of supporting the metering rod by the horizontal portion thereof so that the rod may oscillate slightly about the axis **10***d*. In this particular metering rod an intermediate portion **10***a'* of the vertically extending longitudinal passageway is of greater cross section than those portions above and below it. It results from this particular construction that air is drawn through the bore **10***c* and passing downwardly will expand somewhat in the enlarged cross sectional area **10***a'* so that its further passage through the lower portion **10***a''* will be at increased velocity and give a greater atomizing effect in the gasoline.

FIG. 2 is an enlarged view in section of the metering rod **24**. This has the longitudinally extending passageway **30** extending from the tip **24***a* upwardly to a cross bore **29** above the level of the gasoline A in the bowl. Obviously, raising and lowering the rod **24** in the orifice will vary the flow of gasoline out of the bowl through the orifice **27** into the well **28** where it is immediately atomized by the air jet coming down the longitudinal passageway **30**. FIGS. 3 and 4 show two of the rods **24** suspended from the arm **25** with L-shaped projections **24***b* snugly but oscillatably received in a sleeve **40** which is held between bifurcated arms **25***a* of the support arm **25**. This permits the metering rods to accommodate themselves in the orifices **27** as support arm **25** oscillates slightly.

FIGS. 5 and 6 show other forms of metering rods adapted for carrying out this invention which have enlarged passageway portions **41** and **42**, respectively, at intermediate portions of the longitudinally extending passageway extending from the tip of the metering rod upwardly to a lateral cross bore at the top of the longitudinal passageway.

FIG. 7 shows a metering rod support arm **25'** which supports on hinge pin **43** a rigid link **44** which at its outer end has a sleeve **45** receiving the L-shaped projections **46** of the metering rods **47** in the same manner and for the same purpose as the suspensions at **24***b*, **40**, in FIG. 4. There is sometimes a tendency for the metering rods to become dislocated from the sleeve **40** in the structure shown in FIGS. 3 and 4 and the structure shown in FIG. 7 overcomes this difficulty.

In one form of this invention, the cross bores **10***c* and **29** are 1/8 inch diameter, the passageway at **10***a'* is 1/8 inch diameter, while the passageways **10***a* and **10***a''* above and below the intermediate portion are 3/32 inch diameter. The passageway **30** in FIG. 2 is 3/32" in diameter. Obviously, the air passageways through the metering rod must be proper for the engine with which the rod is to be used. However, those skilled in this industry will have no difficulty arranging such air passage sizes.

The operation of this invention should now be clear from the above description. When the internal combustion engine is operating, there is negative air pressure in the wells **17** and **28** at the lower ends of metering rods **10** and **24**, respectively. At all times when the engine is demanding fuel, air is drawn from above the fuel level in the carburetor bowl down through the passageway in the metering rod with sufficient velocity to mechanically break up the solid liquid flowing through the metering orifice so as to atomize it sufficiently so as to prevent raw gas or gasoline with insufficient air to be carried to the engine manifold. This improves fuel combustion which results in improved performance of the vehicle with better power and mileage. At the same time, it provides more perfect combustion, thus decreasing air pollution.

What is claimed is:

1. Carburetor apparatus for an internal combustion engine utilizing gasoline fuel or the like, comprising a carburetor having primary and secondary sides and including an air bore inlet to the manifold of said engine subject to suction when said engine is operating, each of said sides having a fuel well and a passageway connecting said well to an air inlet portion of said bore and having a fuel supply reservoir above said well, there being a metering orifice communicating between each said reservoir and its associated well, a generally vertical primary metering rod suspended from its upper end in each said reservoir and having a tapered lower end tip coacting with said metering orifice to vary the flow of fuel therethrough, the upper end of each rod extending above the level of fuel in its associated reservoir, means to raise and lower each said rod relative to said orifice, and means for introducing an air jet directly into said fuel immediately after passage of said fuel through each said metering orifice comprising a passageway extending through each said rod from the tip end thereof to an inlet point above the level of fuel in said reservoir providing a passageway through which air may be sucked by suction in said well, whereby fuel-vapor-laden air is drawn from the space above said fuel and mixed immediately with fuel passing through each said orifice to atomize said fuel there.

2. Carburetion apparatus as defined in claim **1**, wherein said passageway extends from the center of the tip end of said rod centrally and longitudinally through said rod, and at said inlet point a diametrically extending bore through said rod communicates with said longitudinally extending passageway.

3. Carburetion apparatus as defined in claim **2**, wherein said passageway is of substantially uniform cross section throughout.

4. Carburetion apparatus as defined in claim **2**, wherein said passageway has an intermediate portion between said tip end and said inlet point of greater cross section than the end portions of said pasageway.

5. Carburetion apparatus as defined in claim **1**, wherein said means to raise and lower said rod includes a movable arm, a rigid link having one end hingedly connected to said arm, and said link at its other end having a horizontal bore opening outwardly and embracing an L-shape extension at the top of said rod.

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TIM R. MILES, Primary Examiner

U.S. Cl. X.R.

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