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3,149,184

CARBURETOR

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3 Sheets-Sheet 1

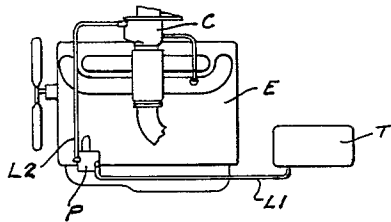


FIG. 1.

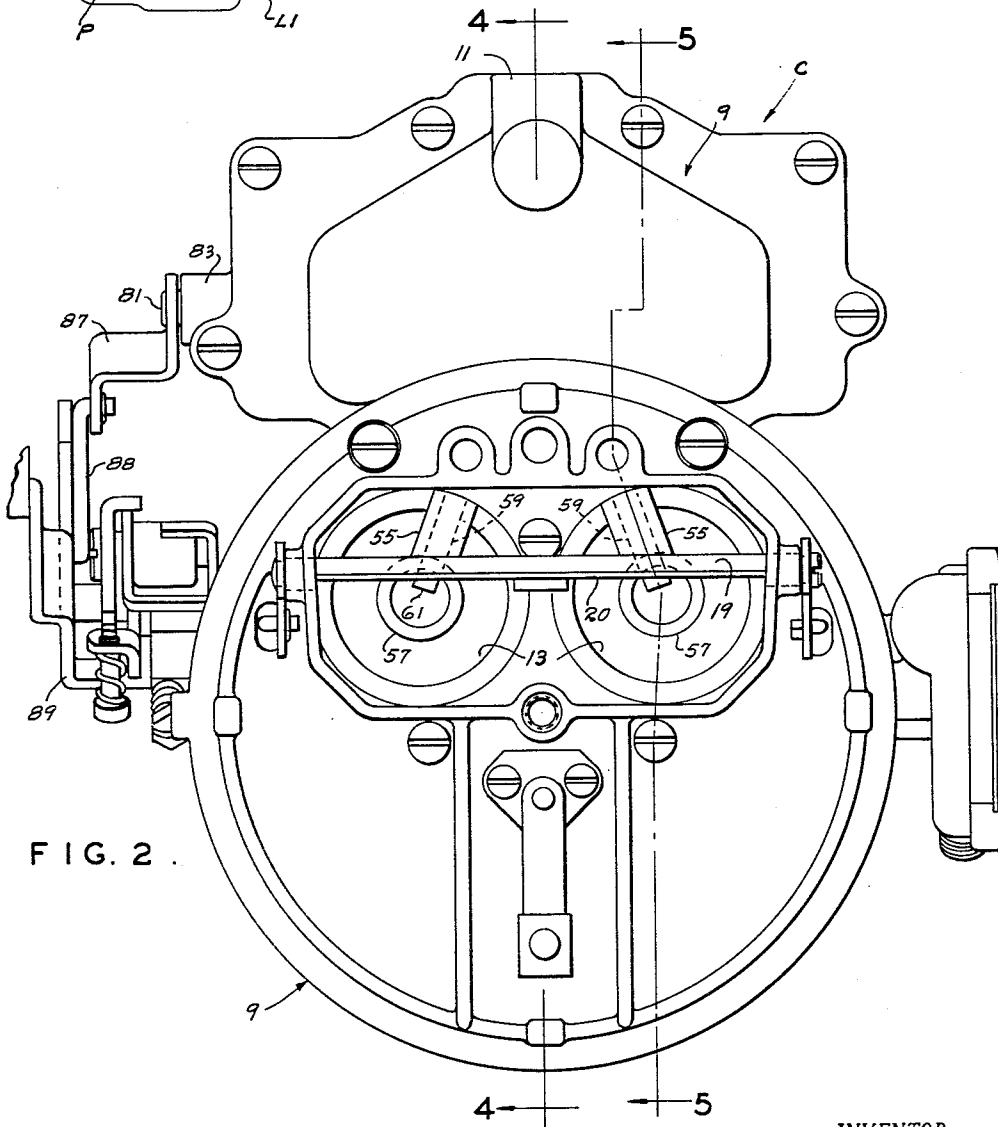


FIG. 2.

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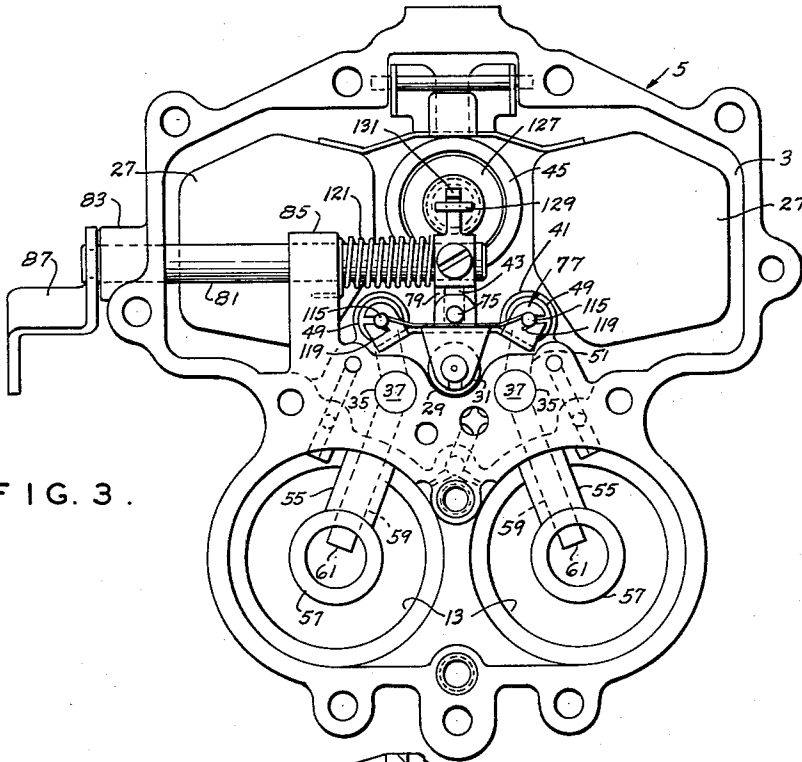


FIG. 3.

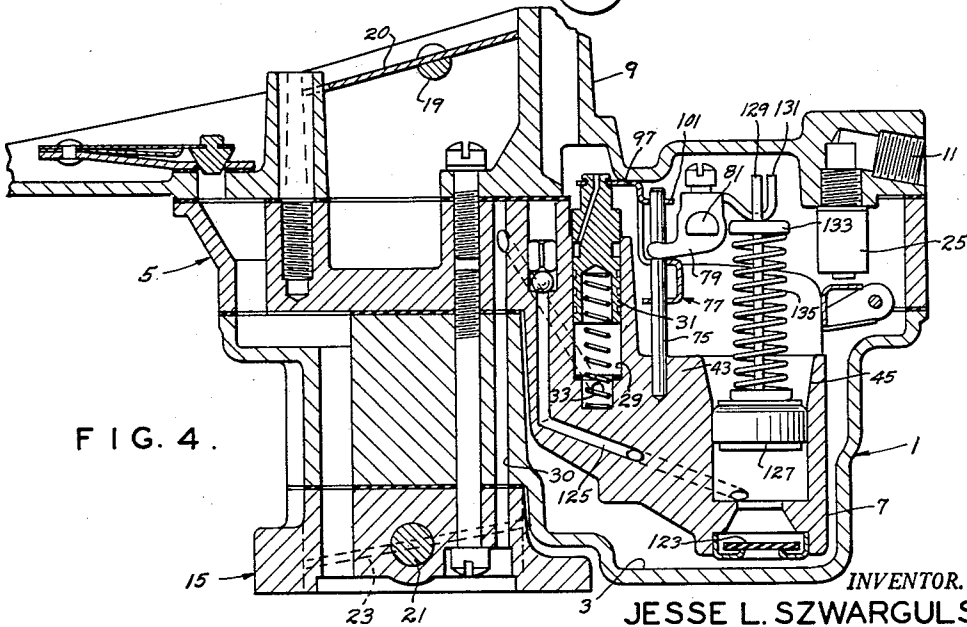


FIG. 4.

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3 Sheets-Sheet 3

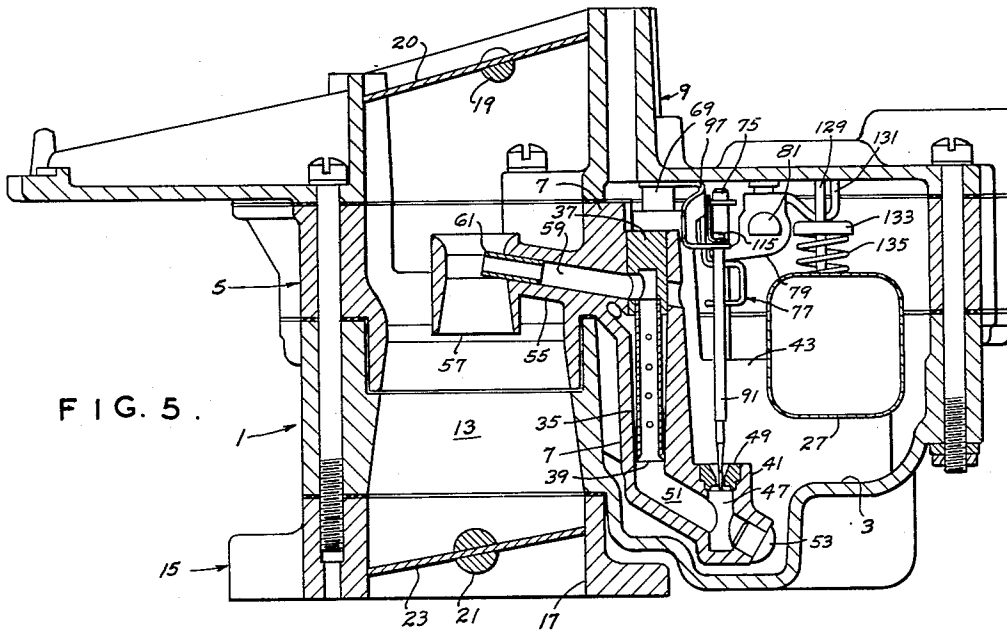


FIG. 5.

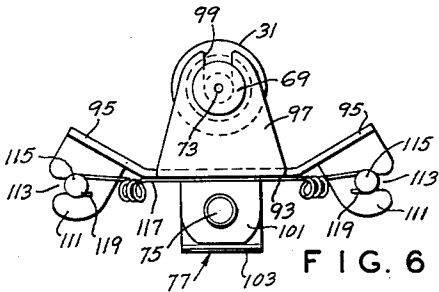


FIG. 6

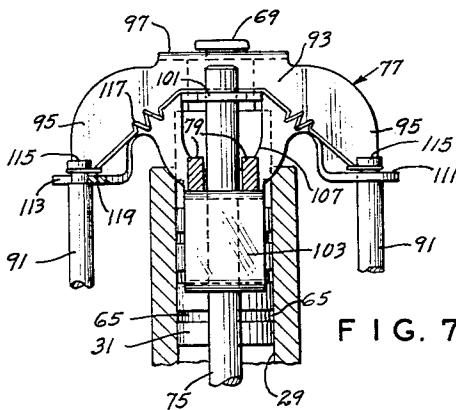


FIG. 7.

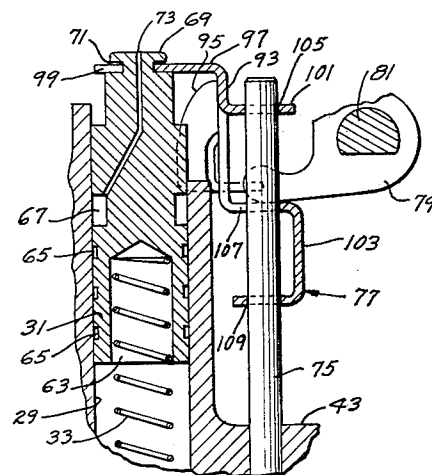


FIG. 8

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6 Claims. (Cl. 261—23)

This invention relates to carburetors, and more particularly to carburetors for internal combustion engines which have so-called metering rods for metering flow of fuel.

The invention is especially concerned with a carburetor of the type having two mixture conduits and a throttle shaft carrying two throttles, one for each conduit. This type of carburetor is referred to as a dual carburetor, and the invention is herein illustrated as it pertains to such a carburetor, but it will be understood that the invention may be utilized in other types of carburetors.

In a typical dual carburetor, there are two so-called high speed fuel delivery systems or circuits for delivering fuel from the fuel bowl of the carburetor to the respective mixture conduits. Each of these systems includes an upwardly opening metering jet located in the fuel bowl below the level of fuel in the bowl, and a metering rod having a stepped lower end movable up and down in the jet for metering flow of fuel from the bowl to the respective mixture conduit.

In the carburetor of the present invention, the metering rods are actuated in response to vacuum developed in the intake manifold of the engine on which the carburetor is used, and controlled by a control arm on a shaft which is actuated by the throttle shaft. The vacuum control comprises a vacuum piston movable in a vacuum cylinder in the carburetor, the metering rods being carried by the piston. The construction of the carburetor is such that the control arm cannot be made to act on the axis of the piston, but must act at a point offset from the axis of the piston, so that it tends to cant the piston in its cylinder. Among the several objects of this invention may be noted the provision in the carburetor of a metering rod mechanism which avoids such canting of the piston, thereby avoiding any tendency for the piston to bind in the cylinder, and the provision of such a mechanism which does not interfere with proper operation of the metering rods. In general, this is accomplished by providing guide means in the carburetor extending parallel to the axis of the vacuum cylinder, and a metering rod carrier movable with the vacuum piston and slidably guided by the guide means to guide the piston for axial movement in the cylinder. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

FIG. 1 is a view in elevation of an automotive engine having a carburetor of this invention thereon;

FIG. 2 is a plan view of the carburetor on a much larger scale than FIG. 1;

FIG. 3 is a plan view of the carburetor with an air horn section thereof removed;

FIG. 4 is a vertical section taken on line 4—4 of FIG. 2;

FIG. 5 is a vertical section taken on line 5—5 of FIG. 2; and

FIGS. 6—8 are detail views of the vacuum piston-metering rod carrier assembly.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to the drawings, there is indicated at E in

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FIG. 1 the internal combustion engine of an automotive vehicle. A dual carburetor C of this invention is shown mounted on the intake manifold of the engine. The fuel tank of the vehicle is indicated at T. Fuel is delivered from tank T through a line L1 to the inlet of a fuel pump P, thence through a line L2 to the carburetor.

As shown in FIGS. 2—5, carburetor C comprises a main body or fuel bowl section 1 formed to provide a fuel bowl 3. On top of the main body 1 is an intermediate body or section 5 having a portion 7 which reaches over and extends down into the fuel bowl. On top of the intermediate section 5 is an air horn section 9 formed to provide a cover for the fuel bowl, and having a fuel inlet at 11 (to which is connected the line L2). Sections 1 and 5 are formed to provide two mixture conduits, each designated 13, located side-by-side at one side of the fuel bowl. As appears in FIG. 5, each mixture conduit is formed as a venturi. Secured to the bottom of the main section 1 is a throttle body section 15, formed to provide two throttle bores 17 in continuation of the mixture conduits. Extending across the air horn section 9 is choke valve shaft 19 carrying choke valve 20. Extending across the throttle bores 17 is a throttle shaft 21 carrying two throttle valves, one for each bore, each designated 23. Delivery of fuel to the fuel bowl 3 is controlled by a float-controlled valve 25 at fuel inlet 11, the floats which control this valve being indicated at 27.

Portion 7 of intermediate section 5 is formed with a vacuum cylinder 29 extending down from its top located in a vertical plane which extends centrally between the two mixture conduits and adjacent the mixture conduit side of the fuel bowl. This cylinder is open at the top. At 30 is indicated a vacuum passage for transmitting vacuum from the intake manifold of the engine to the lower end of cylinder 29. A metering rod piston 31 is vertically slidable in this cylinder and is biased upward by a coil compression spring 33 reacting from the lower end of the cylinder. In section 5 at opposite sides of the vacuum cylinder are two fuel wells, each designated 35, one for one of the mixture conduits 13, and the other for the other mixture conduit. A recessed plug 37 is provided in the upper end of each fuel well, and a fuel tube 39 extends down from the plug into the fuel well. Portion 7 of intermediate section 5 has a horizontal extension 41 at its lower end in the fuel bowl adjacent the bottom of the fuel bowl. This has an upwardly extending central web 43 and an upwardly extending pump cylinder 45 at the outer portion of the web. In extension 41 at opposite sides of the central web are two downwardly extending vertical holes 47. These are closed at the bottom. A metering jet 49 is fixed in the upper end of each hole 47. Two angled holes 51 are drilled in extension 41, one intersecting the hole 47 and the lower end of fuel well 35 on one side of center, and the other intersecting the hole 47 and the lower end of the fuel well 35 on the other side of center. The outer end of each hole 51 is plugged as indicated at 53. Each group of holes 47 and 51 forms a fuel passage from the fuel bowl to the respective fuel well 35, with a metering jet 49 at the entrance to the passage.

Intermediate section 5 is formed with two arms 55 extending into the respective mixture conduits 13 with a boost venturi 57 on the outer end of each arm. Each plug 37 and each arm is passaged as indicated at 59 for flow of fuel from the upper end of the respective fuel tube 39 to and through a fuel nozzle 61 which opens into the respective boost venturi.

An accelerating pump cylinder 45 has a check-valved inlet 123 and an check-valved pump delivery passage is indicated at 125. The pump piston is indicated at 127. This has a flat bar 129 extending upward therefrom. A pump-operating arm 131 extends toward the right from

shaft 81 into a vertical slot in bar 129. Arm 131 engages a washer 133 on bar 129, and a coil compression spring 135 surrounds bar 129 extending between washer 133 and the pump piston. It will be understood that the carburetor includes two conventional idle systems, which are not shown since they have no bearing on this invention.

The metering rod piston 31 has a recess 63 in its lower end receiving the upper end of spring 33, and is shown with annular grooves such as indicated at 65 (see FIGS. 7 and 8) in its lower recessed portion. Above recess 63 it has a wider annular groove 67. At its upper end it has a reduced-diameter extension 69 provided with an annular groove 71. There is a passage 73 between groove 67 and the upper end of extension 69.

In accordance with this invention and at 75 (see FIGS. 3 and 4) is a rod extending vertically, hence parallel to the axis of vacuum cylinder 29, adjacent the vacuum cylinder and within the fuel bowl. This rod has its lower end fixed in a hole in web 43 and extends upward therefrom. It constitutes guide means for slidably guiding a metering rod carrier or slider 77 which extends laterally outward from the upper end of metering rod piston 31 to constrain the piston in axial position in the cylinder. Slider 77 is engageable with a forked metering rod control arm 79 on a horizontal rockshaft 81 journaled in a bearing 83 formed on the wall of section 5 at one end of the fuel bowl and in a bearing 85 on section 5 within the fuel bowl. Shaft 81 has an arm 87 on its outer end connected by a link 88 to an arm 89 on one end of the throttle shaft 21, the arrangement being such that as throttles 23 are opened, control arm 79 is swung clockwise as viewed in FIGS. 4 and 5 away from its closed-throttle position shown therein. Slider 77 carries a pair of metering rods 91 which extend vertically downward into the metering jets 49. As shown in FIG. 5, each metering rod has three steps at its lower end, the middle step being a tapered step. Thus, when the metering rods are raised, fuel delivery is increased, and when the metering rods are lowered, fuel delivery is decreased.

Slider 77, as herein shown, is constituted by a sheet metal blank bent to have a vertical web 93 with angled ends 95. A central horizontal ear 97 extends laterally in one direction from the top of the web. This ear has a notch 99 and is loosely received in the annular groove 71 at the upper end of piston 31. Slider 77 also has a central horizontal ear 101 extending laterally outward in the opposite direction from web 93 below the top of the web, and a central C-shaped portion 103 at the bottom of the web 93 below ear 101. Ear 101 has a hole 105, the top of the C-shaped part has a slot 107, and the bottom of the C-shaped part has a hole 109 for receiving the rod 75. Holes 105 and 109 are sized for a sliding fit on the rod 75. The angled ends 95 of web 93 have horizontal ears 111 at the bottom which are notched as indicated at 113 for receiving the metering rods 91. Each metering rod has a head 115, and the metering rods are held in notches 113 by a spring wire fastener 117 having hooked ends 119 which hook around the rods underneath the heads.

The forked control arm 79 extends toward the left from shaft 81 as viewed in FIGS. 4 and 5, straddling the rod 75. Its free end is adapted for engagement by the bottom of ear 101 on slider 77. With the engine stopped (no vacuum in the lower end of cylinder 29), and the throttles 23 closed, spring 33 biases piston 31 in the raised position of FIGS. 4 and 5 determined by engagement of the horizontal ear 97 of slider 77 with the fuel bowl cover portion of air horn section 9. Arm 79 occupies the retracted position in which it appears in FIGS. 4 and 5, its free end being below ear 101. This position is determined by the closed position of throttles 23 to which they are biased by a throttle return spring aided by coil spring 121 positioned on shaft 81 (FIG. 3) and fixed between the shaft 81 and the carburetor body portion 5,

to bias shaft 81 in a counterclockwise position as viewed in FIG. 5.

When the engine E is in operation, and vacuum is thereby developed in its intake manifold, the vacuum is transmitted to the lower end of vacuum cylinder 29, and consequently the piston 31 moves downward to lower the slider 77 and the metering rods 91. The slider may move downward to the point where ear 101 on the slider engages the free end of control arm 79 (whatever the position of this arm may be as determined by throttle position). When the throttles are then opened (or further opened), arm 79 is swung clockwise and may then push up on ear 101 to raise the slider, the metering rods and piston 31. Since the force of arm 79 is applied to ear 101 at a point offset from the axis of piston 31, the piston would tend to cant and bind in cylinder 29, except for the constraint of rod 75 on the slider 77, which has ears 101 and 109 bearing on rod 75 and prevent canting of the slider and piston. In this respect, the ears 101 and 109 of the slider slidably engage the rod 75 at relatively widely spaced points along the length of the rod. This effectively prevents canting, without interfering with the sliding of the slider.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In a carburetor having a fuel bowl, a mixture conduit, a throttle for the mixture conduit mounted on a shaft for rotation, a fuel system for delivery of fuel from the bowl to the mixture conduit including an upwardly opening metering jet in the bowl below the level of fuel therein, a vertical vacuum cylinder in the carburetor open at the top, a vacuum connection to the lower end of the cylinder, a piston slidable in the cylinder and extending out of the upper end of the cylinder, a spring biasing the piston upward, a guide rod fixed in vertical position in the carburetor, a slider extending laterally from the upper end of the piston and slidably guided by the guide rod to guide the piston for axial movement in the cylinder, said slider having an upper horizontal portion extending laterally outward from the upper end of the piston, a portion extending downward from said upper horizontal portion, and vertically spaced horizontal portions on said downwardly extending portion having holes receiving the guide rod and slidably engaging the guide rod at spaced points along the length of the guide rod, a metering rod carried by the slider extending down into the metering jet, and an arm operatively connected to the throttle shaft and engageable by the slider laterally of the piston.

2. In a carburetor as set forth in claim 1, said slider further having a horizontal portion having a notch receiving the upper end of the metering rod, the latter having a head, and spring fastener means under the head holding the metering rod in the notch.

3. In a dual carburetor having a fuel bowl, two vertical mixture conduits located side-by-side at one side of the bowl, a throttle in each conduit mounted on a shaft for rotation, two fuel systems for delivery of fuel from the bowl to the respective mixture conduits, each including an upwardly opening metering jet located in the bowl below the level of fuel therein, the metering jets being located on opposite sides of a vertical plane extending centrally between the mixture conduits, a vertical vacuum cylinder in the carburetor located in said plane adjacent the mixture conduit side of the bowl, said cylinder being open at the top, a vacuum connection to the lower end of the cylinder, a piston slidable in the cylinder and extending out of the upper end of the cylinder, a

spring biasing the piston upward, a vertical guide rod fixed in vertical position in the carburetor, a slider extending laterally from the upper end of the piston and slidably guided by the guide rod to guide the piston for axial movement in the cylinder, a pair of metering rods carried by the slider extending down into the respective metering jets, and an arm laterally of the piston operatively connected to the throttle shaft and engageable by the slider, said slider having portions extending laterally at opposite sides of said guide rod carrying said metering rods, an ear extending horizontally from the upper end of the piston in the direction toward the fuel bowl, a vertical portion extending down from the ear in the fuel bowl, and vertically spaced guide portions on said vertical portion having holes receiving the guide rod, said arm being engaged by the upper of said vertically spaced guide portions.

4. In a carburetor as set forth in claim 3, said vertical portion having laterally extending end portions provided with horizontal ears having notches receiving the upper ends of the metering rods, each metering rod having a head, and a spring fastener having hooked ends hooked around the metering rods underneath the heads to hold the metering rods in the notches.

5. In a carburetor having a fuel bowl, a mixture conduit, a throttle for the mixture conduit mounted on a shaft for rotation, a fuel system for delivery of fuel from the bowl to the mixture conduit including an upwardly opening metering jet in the bowl below the level of fuel therein, a vertical vacuum cylinder in the carburetor open at the top, a vacuum connection to the lower end of the cylinder, a piston slidable in the cylinder and extending out of the upper end of the cylinder, a spring biasing the piston upward, elongate guide means in the carburetor extending in a generally vertical direction, a slider extending laterally from the upper end of the piston and slidably guided by the guide means to guide the piston for axial movement in the cylinder, a metering rod carried by the slider extending down into the metering jet, and an arm operatively connected to the throttle shaft and

engageable by the slider laterally of the piston, said guide means having vertically spaced guide portions slidably engaged by the slider at spaced points along the length of the guide means thereby to prevent canting of the piston.

6. In a dual carburetor having a fuel bowl, two vertical mixture conduits located side-by-side at one side of the bowl, a throttle in each conduit mounted on a shaft for rotation, two fuel systems for delivery of fuel from the bowl to the respective mixture conduits, each including an upwardly opening metering jet located in the bowl below the level of fuel therein, the metering jets being located on opposite sides of a vertical plane extending centrally between the mixture conduits, a vertical vacuum cylinder in the carburetor located in said plane adjacent the mixture conduit side of the bowl, said cylinder being open at the top, a vacuum connection to the lower end of the cylinder, a piston slidable in the cylinder and extending out of the upper end of the cylinder, a spring biasing the piston upward, elongate guide means in the carburetor extending in a generally vertical direction, a slider extending laterally from the upper end of the piston and slidably guided by the guide means to guide the piston for axial movement in the cylinder, a pair of metering rods carried by the slider extending down into the respective metering jets, and an arm operatively connected to the throttle shaft laterally of the piston and engageable by the slider, said guide means having vertically spaced guide portions slidably engaged by the slider at spaced points along the length of the guide means thereby to prevent canting of the piston.

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