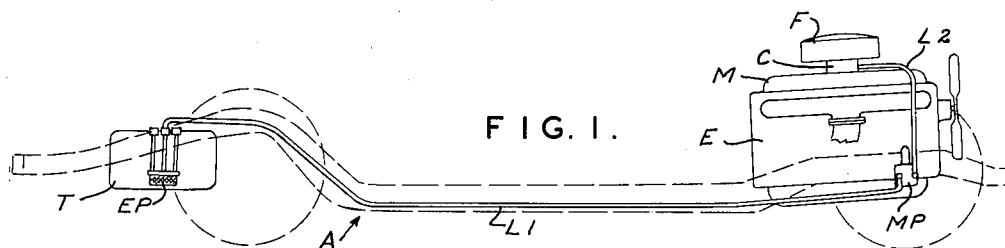
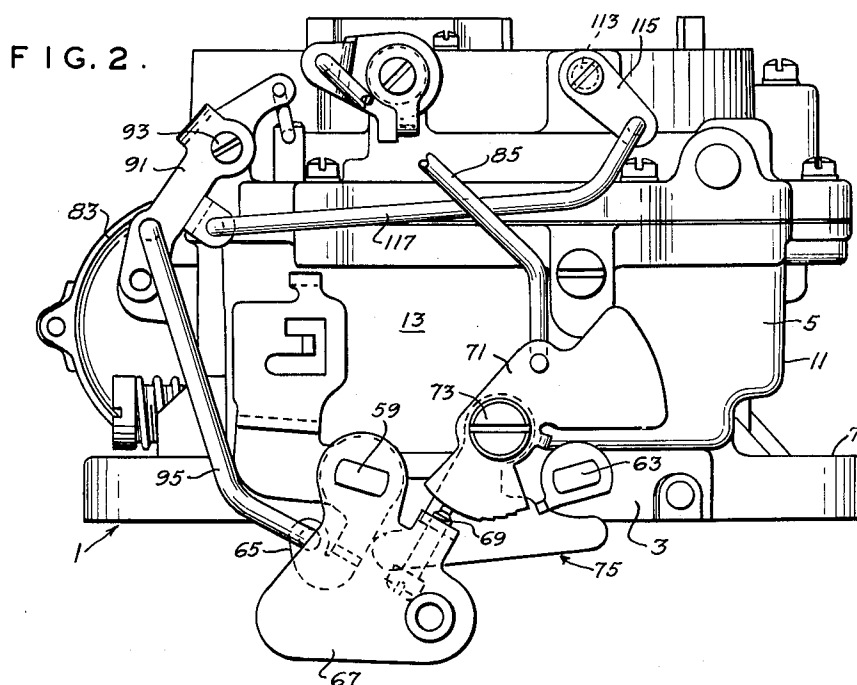


A. L. ROUX ET AL

THROTTLE-OPERATED INSIDE CARBURETOR VENTS

Filed July 6, 1959

3 Sheets-Sheet 1



INVENTORS
ARTHUR L. ROUX
ALBERT W. ZUB

BY

AGENT

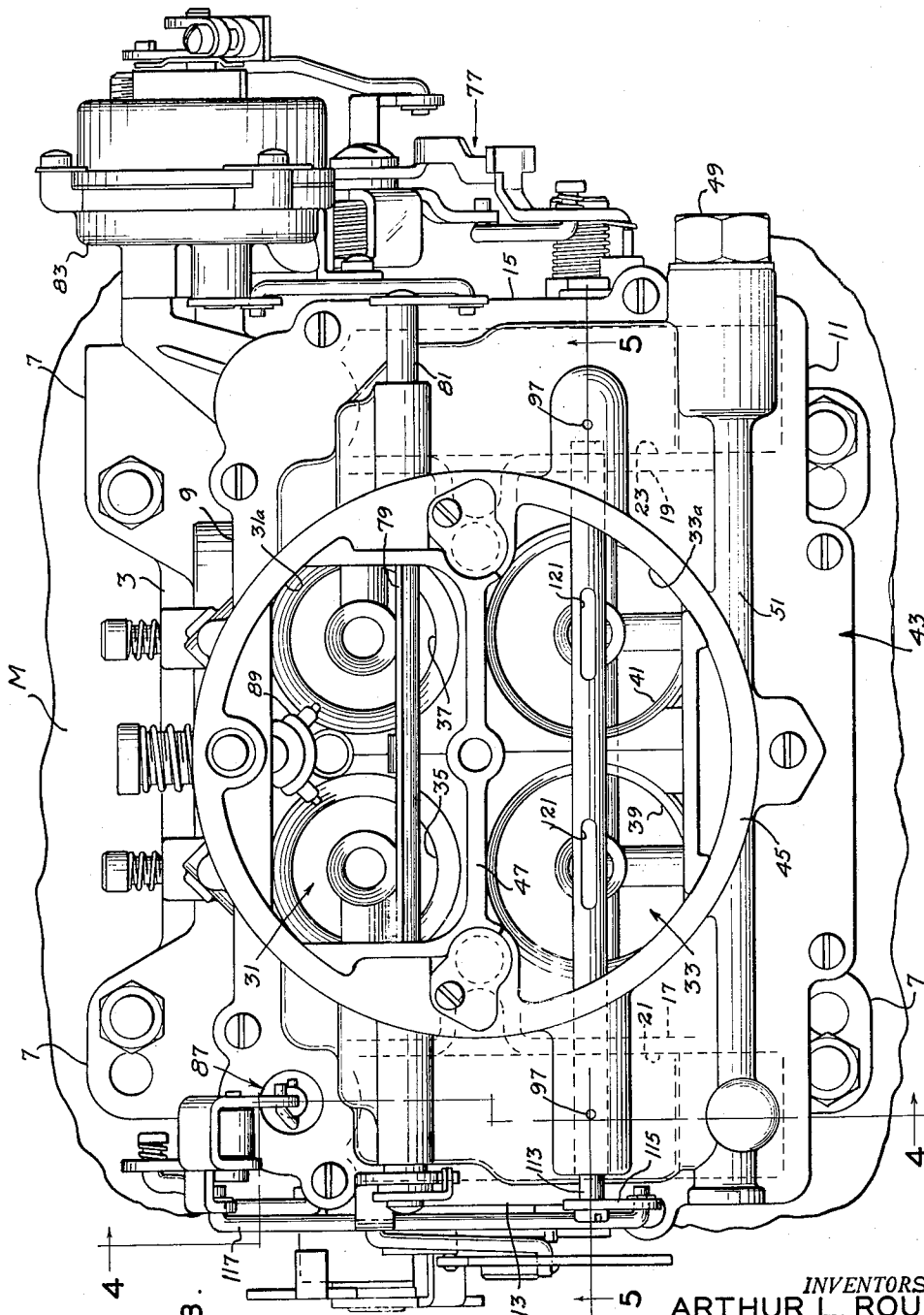
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A. L. ROUX ET AL

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THROTTLE-OPERATED INSIDE CARBURETOR VENTS

3 Sheets-Sheet 2



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INVENTORS
ARTHUR L. ROUX
ALBERT W. ZUB

BY

AGENT

March 28, 1961

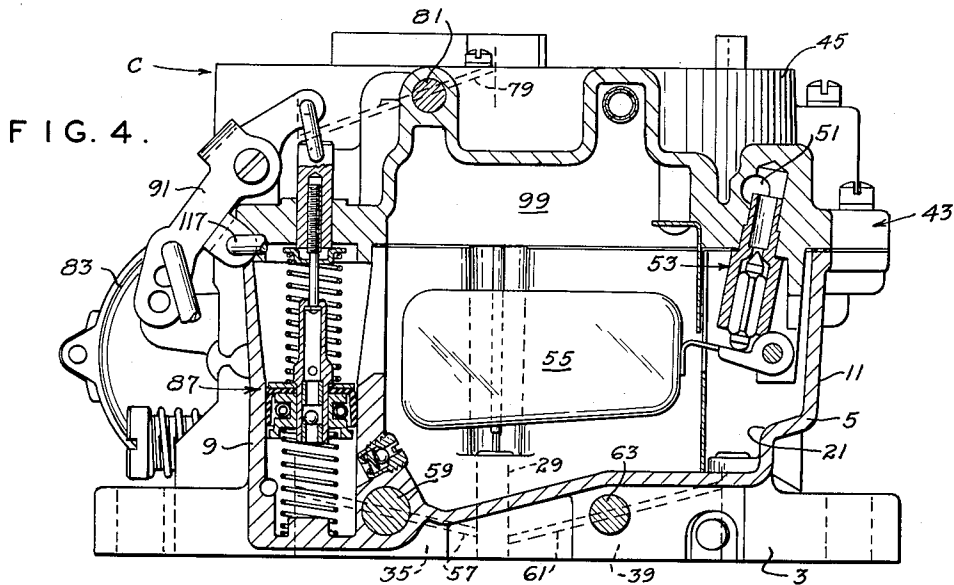
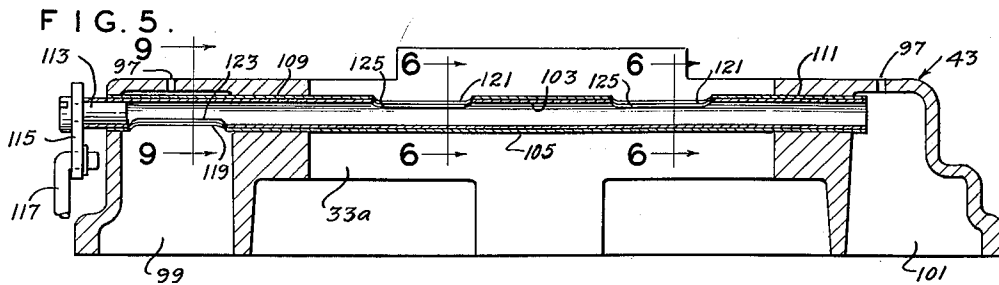
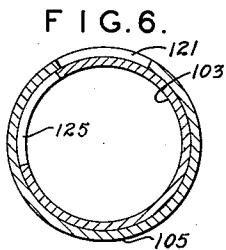
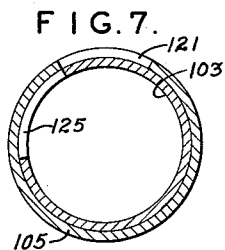
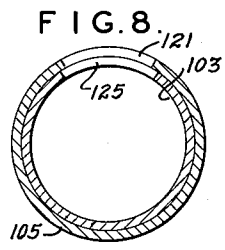
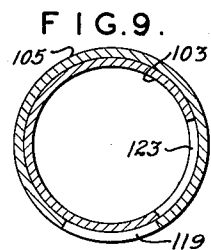
A. L. ROUX ET AL

2,977,102

THROTTLE-OPERATED INSIDE CARBURETOR VENTS

Filed July 6, 1959

3 Sheets-Sheet 3



INVENTORS
ARTHUR L. ROUX
ALBERT W. ZUB

BY *Frederic B. Johnson*
AGENT

1

2,977,102

THROTTLE-OPERATED INSIDE CARBURETOR VENTS

Arthur L. Roux and Albert W. Zub, St. Louis, Mo., assignors to ACF Industries, Incorporated, New York, N.Y., a corporation of New Jersey

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13 Claims. (Cl. 261—42)

This invention relates to carburetors for internal combustion engines, and more particularly to throttle-operated inside carburetor fuel bowl vents.

It will be understood that a carburetor may have so-called outside bowl vents providing for communication between the fuel bowl (or bowls) of the carburetor and the outside atmosphere and so-called inside bowl vents providing communication between the fuel bowl and the air inlet (the air horn) of the carburetor. Such vents are provided to allow air to enter or leave the fuel bowl as the level of fuel in the bowl changes and to vent fuel vapors from the bowl. When the engine is in operation, there is a draft of air through the bowl, this air entering the bowl through the outside vents and passing from the bowl through the inside vents to the air horn, carrying fuel vapors with it to the intake manifold of the engine. Under some circumstances, inside venting occurring during idling of the engine may result in the air/fuel mixture supplied to the engine being excessively rich, causing rough idling.

Accordingly, an object of this invention is the provision of an improved bowl venting means adapted to provide inside venting only at engine speeds above idle, inside venting being cut off at idle, bowl venting then being provided by means of the outside bowl vents which are effective at idle speed as well as speeds above idle.

Essentially, the bowl venting means of this invention comprises a pair of relatively rotatable coaxial vent tubes, one inside the other, extending from the upper part of the fuel bowl of the carburetor into the mixture conduit of the carburetor, and means for effecting relative rotation of the tubes in response to movement of the throttle of the carburetor, the tubes having openings which are out of register when the throttle is at idle to block communication through the tubes from the bowl to the mixture conduit and which come into register as the throttle is opened from idle to establish communication through the tubes from the bowl to the mixture conduit.

The invention is particularly applicable to a multi-stage carburetor, such as a four-barrel carburetor having a body formed to provide a fuel bowl at one end and a fuel bowl at the other end, primary mixture conduits located side-by-side between the bowls, primary throttles for the primary conduits, secondary mixture conduits located side-by-side between the bowls, secondary throttles for the secondary conduits, a cover for the bowls formed to provide an air horn, and outside vents for the bowls. As to such a carburetor, there is provided means for venting both bowls to the air horn comprising a pair of relatively rotatable coaxial vent tubes, one inside the other, extending from the upper part of one bowl across the air horn to the other bowl, and means for effecting relative rotation of the tubes in response to movement of the primary throttles, the tubes having openings which are out of register when the primary throttles are at idle to block communication through the tubes from the bowls to the air horn, and which come into register as the

2

primary throttles are opened from idle to establish communication through the tubes from both bowls to the air horn.

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 illustrating a carburetor in which this invention is incorporated mounted on the engine of an automotive vehicle;

Fig. 2 is a view in elevation of the left end of the carburetor;

Fig. 3 is a plan view of the carburetor;

Fig. 4 is a vertical section taken on line 4—4 of Fig. 3;

Fig. 5 is a vertical section through the bowl cover only of the carburetor taken on line 5—5 of Fig. 3;

Fig. 6 is an enlarged vertical section taken on either of lines 6—6 of Fig. 5 in a closed position;

Figs. 7 and 8 are views similar to Fig. 6 showing different positions of an inside tube; and,

Fig. 9 is an enlarged vertical section taken on line 9—9 of Fig. 5 in a closed position.

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

Referring to the drawings, there is indicated at A in Fig. 1 an automotive vehicle having an engine E on which is a carburetor C. Fuel is supplied to the carburetor C from the fuel tank T of the vehicle. As shown there is an electric pump EP in the fuel tank for pumping fuel from the tank through a line L1 to a mechanical fuel pump MP on the engine. Pump MP is operated by the engine and is adapted to pump fuel to the carburetor through a line L2. As appears in Fig. 3, the carburetor C is of the type having two primary mixture conduits or barrels and two secondary mixture conduits or barrels, referred to as a four-barrel carburetor. It is mounted on the intake manifold M of the engine with the two primary barrels toward the front and the two secondary barrels toward the rear. An air filter F is mounted on the air horn of the carburetor.

Carburetor C comprises a main body casting 1 which is formed to provide a throttle body section 3 and a fuel bowl section 5 on the throttle body section. The latter has lugs 7 for attachment to the intake manifold of the engine on which the carburetor is used. The bowl section 5 is generally of rectangular shape in plan, its front and back walls being designated 9 and 11, and its left and right end walls being designated 13 and 15. Partitions 17 and 19 extend between the front and back walls adjacent the end walls 13 and 15 to define two fuel bowls 21 and 23, one at each end of bowl section 5. A partition 29 extends between the bowls dividing the space bounded by the front and back walls 9 and 11 and partitions 17 and 19 into a primary section 31 and a secondary section 33. The primary section is formed to provide two side-by-side primary mixture conduits or barrels 35 and 37, and the secondary section is formed to provide two side-by-side secondary mixture conduits or barrels 39 and 41. Secured to the top of the fuel bowl section is a bowl cover 43 formed to provide a circular air horn 45. The horn has a diametrical partition 47 coplanar with partition 29 dividing the horn into a primary air inlet 31a above section 31 and a secondary air inlet 33a above section 33.

The cover 43 has a fuel inlet 49 and an inlet passage 51 connecting the inlet to the two fuel bowls 21 and 23. Entry of fuel to the bowls from passage 51

is controlled by two float valves 53, one for each bowl (see Fig. 4). Each of these valves is controlled by a float 55 in the respective bowl. The valves and floats may be of any suitable construction, their details not being critical so far as this invention is concerned. The left-hand bowl 21 supplies fuel to the left-hand primary barrel 35 via a low speed (idling) system and a high speed system and supplies fuel to the left-hand secondary barrel 39 via a secondary fuel system. The right-hand bowl 23 supplies fuel to the right-hand primary barrel 37 via a low-speed (idling) system and a high speed system and supplies fuel to the right-hand secondary barrel 41 via a secondary fuel system. These systems may be of any suitable known character so far as this invention is concerned. Reference may be made, for example, to the copending coassigned application of Dwight M. Gordon, Serial No. 752,979, filed August 4, 1958 (case 1008) for details.

Each of the primary barrels 35 and 37 has a primary throttle valve 57 at its lower end, the two primary throttle valves being fixed on a primary throttle shaft 59 journaled in the throttle body section 3 of the carburetor body 1. Each of the secondary barrels 39 and 41 has a secondary throttle valve 61 at its lower end, the two secondary throttle valves being fixed on a secondary throttle shaft 63 journaled in the throttle body section 3. Fixed on the left end of the primary throttle shaft are inner and outer primary throttle arms 65 and 67. The outer arm 67 carries a fast idle adjusting screw 69 engageable with the usual fast idle cam 71 pivoted at 73 on the left end wall 13. At 75 is indicated the usual secondary throttle lockout mechanism for maintaining the secondary throttle valves 61 closed until the engine has warmed up and the fast idle cam backs off from its fast idle position to its normal idle position.

At 77 in Fig. 3 is indicated the usual mechanism for operating the secondary throttle shaft 63 from the primary throttle shaft 59. In the primary air inlet 31a of the air horn 45 is the usual choke valve 79 on choke shaft 81. The usual automatic choke control is indicated at 83. At 85 is indicated the connection between the choke shaft 81 and the fast idle cam 71. At 87 is indicated the usual accelerator pump for supplying fuel to the primary barrels 35 and 37 in response to opening of the primary throttles via a pump discharge jet cluster 89 (see Fig. 3). The pump is operated by a rocker arm 91 pivoted at 93 on the bowl cover 43 adjacent its left end, a link 95 being provided between the inner primary throttle arm 65 and the rocker arm 91.

The bowl cover 43 is provided with outside vents 97 for venting each of the fuel bowls 21 and 23 to atmosphere (outside the air horn 45). In accordance with this invention, the carburetor is also provided with means for venting both bowls to the air horn only at engine speeds above idle, this inside venting being cut off at idle, and bowl venting then being provided by the outside vents. The bowl cover 43 is formed to provide a recess or dome 99 above the left-hand bowl and a corresponding recess or dome 101 above the right-hand bowl (see Figs. 4 and 5). The inside venting means comprises a pair of coaxial tubes 103 and 105, tube 103 being located inside tube 105, extending from the recess 99 across the secondary air inlet 33a of the air horn 45 to the recess 101. The outer tube 105 has its left end received in a hole 107 in the left end of the bowl cover 43, extends across the recess 99, through a hole 109 in the annular wall of the air horn and across the air horn, its right end being received in a hole 111 in the annular wall of the air horn diametrically opposite hole 109. The right end of tube 105 may project slightly into the recess 101 as shown in Fig. 5, and is open to recess 101. Tube 105 has a tight fit in holes 107, 109 and 111 and is fixed against rotation. Tube 103 is some-

what longer than tube 105 and projects from the left end of tube 105.

Tube 103 is rotatable in tube 105 on the axis of the tubes. A plug 113 is fixed in the left end of the inside tube 103 and closes it. An arm 115 is secured to the outer end of the plug. A link 117 interconnects the pump rocker arm 91 and arm 115, the arrangement being such that upon rotation of the throttle arm 65 in the direction to open the primary throttles (which is clockwise as viewed in Figs. 2 and 4), with resultant clockwise rotation of the pump rocker arm 91, link 117 rotates arm 115 and tube 103 counterclockwise. The portion of the outer tube 105 within recess 99 has a downwardly directed elongate opening 119 (see Figs. 5 and 9). The portion of the outer tube 105 within the air horn 45 has two upwardly directed elongate openings 121 centered in respect to the vertical axes of the two secondary barrels 39 and 41 (see Figs. 3, 5 and 6-8). The portion of the inner tube 103 within recess 99 has an elongate opening 123 (see Figs. 5 and 9) and the portion of tube within the air horn has two elongate openings 125 (see Figs. 5-8). Openings 119 and 123 are centered with respect to a vertical transverse plane of the tubes. One of openings 121 and one of openings 125 are centered with respect to a vertical transverse plane of the tubes which includes the axis of the left-hand secondary barrel 39. The other opening 121 and the other opening 125 are centered with respect to another vertical transverse plane of the tubes which includes the axis of the right-hand secondary barrel 41.

When the screw 69 is engaged with the fast idle cam 71, the arm 115 occupies a position such as shown in Fig. 2. When the fast idle cam backs off to permit the primary throttles 57 to assume their normal idle position, arm 115 will then occupy a fully retracted idle position slightly to the right of its Fig. 2 position. With arm 115 in its fully retracted position, the inner tube 103 occupies the idle position in which it appears in Figs. 6 and 9 wherein opening 123 is out of register with hole 119 (see Fig. 9), and openings 125 are out of register with openings 121 (see Fig. 6). When tube 103 rotates approximately 5° counterclockwise from its idle position, opening 123 comes into register with opening 119 and openings 125 start to come into register with openings 121 (see Fig. 7). Upon further rotation of the tube 103 away from idle position, opening 123 remains in register with opening 119 and openings 125 remain in register with openings 121 as shown in Fig. 8 to the limit of rotation of tube 103 (which corresponds to the limit of rotation in opening direction of the primary throttles 57).

From the above, it will be apparent that the fuel bowls 21 and 23 are always vented to the outside by the outside vents 97. When the primary throttles 57 are in normal idle position, communication between the bowls and the air horn 45 is blocked by the inner tube 103, which is then in such angular position relative to the outer tube 103 that openings 119 and 121 in the outer tube are blocked. When the primary throttles 57 are opened about 5°, the inner tube 103 turns to an angular position wherein opening 123 in tube 103 starts coming into register with opening 119 in tube 105 and openings 125 in tube 103 start coming into register with openings 121 in tube 105. Accordingly, inside venting of the fuel bowls to the air horn is initiated. This inside venting occurs from the left fuel bowl 21 via recess 99, opening 119 in tube 105, opening 123 in tube 103, the tube 103 itself, and primarily via the left opening 125 in tube 103 and the left opening 121 in tube 105. It occurs from the right fuel bowl 23 via recess 101, the open right end of tube 103, tube 103 itself, and primarily via the right opening 125 in tube 103 and the right opening 121 in tube 105. Upon continued opening of the primary throttles 57, inside venting is continued at an increasing

5

rate on up to about sixty percent of full primary throttle opening, for example, at which point the secondary throttles 61 start to open, and then openings 123 and 119 and openings 125 and 121 remain in full register (i.e., fully open) throughout the remainder of the opening movement of the primary throttles for maximum inside venting.

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.

We claim:

1. In a carburetor having a fuel bowl, an open outside vent for continuously venting the bowl to atmosphere, a mixture conduit and a throttle for the mixture conduit, means for venting the bowl to the mixture conduit comprising a pair of relatively movable coaxial vent tubes, one inside the other, extending transversely from the upper part of the bowl through the mixture conduit anterior to said throttle, and means for effecting relative movement of the tubes in response to movement of the throttle, said tubes having openings which are out of register when the throttle is at idle to block communication through the tubes from the bowl to the mixture conduit and which come into register as the throttle is opened from idle to establish communication through the tubes from the bowl to the mixture conduit.

2. In a carburetor as set forth in claim 1, said tubes extending generally horizontally from the upper part of the bowl into the upper part of the mixture conduit, said tubes having a pair of openings at the upper part of the bowl for entry of vapors from the bowl to the tubes, and a pair of openings at the upper part of the mixture conduit for exit of vapors to the mixture conduit, the openings of at least one of said pairs being out of register when the throttle is at idle and coming into register as the throttle is opened from idle.

3. In a carburetor as set forth in claim 2, the openings of both pairs being out of register when the throttle is at idle and coming into register as the throttle is opened from idle.

4. In a carburetor having a fuel bowl, an open outside vent for continuously venting the bowl to atmosphere, a mixture conduit and a throttle for the mixture conduit, means for venting the bowl to the mixture conduit comprising a pair of coaxial vent tubes, one inside the other, extending transversely from the upper part of the bowl through the mixture conduit anterior to said throttle, one of the tubes being fixed and the other being rotatable on the axis of the tubes, means interconnecting the throttle and the rotatable tube for rotating the latter on movement of the throttle, said rotatable tube occupying an idle position when the throttle is at idle and rotating away from idle position as the throttle is opened, and said tubes having openings which in the idle position of the rotatable tube are out of register to block communication through the tubes from the bowl to the mixture conduit and which come into register as the rotatable tube rotates away from idle position on opening of the throttle to establish communication through the tubes from the bowl to the mixture conduit.

5. In a carburetor as set forth in claim 4, said tubes extending generally horizontally from the upper part of the bowl into the upper part of the mixture conduit, said tubes having a pair of openings at the upper part of the bowl for entry of vapors from the bowl to the tubes, and a pair of openings at the upper part of the mixture conduit for exit of vapors to the mixture conduit, the openings of at least one of said pairs being out of register

6

when the rotatable tube is in idle position and coming into register as the rotatable tube rotates away from idle position.

6. In a carburetor as set forth in claim 5, the openings of both pairs being out of register when the rotatable tube is in idle position and coming into register as the rotatable tube rotates away from idle position.

7. In a carburetor as set forth in claim 4, the outer tube being the fixed tube and the inner tube being the rotatable tube, the outer end of the rotatable inner tube being plugged and having an arm thereon, said interconnecting means comprising a linkage on the outside of the carburetor interconnecting the throttle and said arm.

8. In a carburetor as set forth in claim 7, said tubes extending generally horizontally from the upper part of the bowl into the upper part of the mixture conduit, said tube having a pair of openings at the upper part of the bowl for entry of vapors from the bowl to the tubes, and a pair of openings at the upper part of the mixture conduit for exit of vapors to the mixture conduit, the openings of at least one of said pairs being out of register when the rotatable tube is in idle position and coming into register as the rotatable tube rotates away from idle position.

9. In a carburetor as set forth in claim 8, the openings of both pairs being out of register when the rotatable tube is in idle position and coming into register as the rotatable tube rotates away from idle position.

10. In a carburetor having a body formed to provide a fuel bowl at one end and a fuel bowl at the other end, primary mixture conduits located side-by-side between the bowls, primary throttles for the primary conduits, secondary mixture conduits located side-by-side between the bowls, secondary throttles for the secondary conduits, a cover for said bowls formed to provide an air horn, and open outside vents for continuously venting said bowls to atmosphere, said cover having a recess above one bowl and a recess above the other bowl, and means for venting both bowls to the air horn comprising a pair of relatively movable coaxial vent tubes anterior to said secondary throttles, one inside the other, extending from the recess above one bowl across the air horn to the recess above the other bowl, and means for effecting relative movement of the tubes in response to movement of the primary throttles, said tubes having openings which are out of register when the primary throttles are at idle to block communication through the tubes from the bowls to the air horn, and which come into register as the primary throttles are opened from idle to establish communication through the tubes from both bowls to the air horn.

11. In a four-barrel carburetor having a body formed to provide a fuel bowl at one end and a fuel bowl at the other end, two primary barrels located side-by-side between the bowls, primary throttles for the primary barrels, two secondary barrels located side-by-side between the bowls, secondary throttles for the secondary barrels, a cover for said bowls formed to provide an air horn, and open outside vents for continuously venting the bowls to atmosphere, said cover having a recess above one bowl and a recess above the other bowl, and means for venting both bowls to the air horn comprising a pair of coaxial vent tubes anterior to said secondary throttles, one inside the other, extending from the recess above one bowl across the air horn above the secondary barrels to the recess above the other bowl, one of the tubes being fixed and the other being rotatable on the axis of the tubes, means interconnecting the primary throttles and the rotatable tube for rotating the latter on movement of the primary throttles, said rotatable tube occupying an idle position when the primary throttles are at idle and rotating away from idle position as the primary throttles are opened, and said tubes having openings which in the idle position of the rotatable tube are out of register to block communication through the tubes from the bowls to the

air horn, and which come into register as the rotatable tube rotates away from idle position on opening of the primary throttles to establish communication through the tubes from both bowls to the air horn.

12. In a four-barrel carburetor as set forth in claim 11, said tubes having a pair of openings adjacent one end thereof in the recess above one bowl for entry of vapors from said one bowl to the tubes, said tubes being open at their other end to the other recess, a pair of openings above one secondary barrel and a pair of openings above the other secondary barrel, the openings of each pair being out of register when the rotatable tube is in idle position and coming into register as the rotatable tube rotates away from idle position.

13. In a four-barrel carburetor as set forth in claim 12, the outer tube being the fixed tube and the inner tube being the rotatable tube, said one end of the inner tube being plugged and having an arm thereon, said interconnecting means comprising a linkage on the outside of the carburetor interconnecting the primary throttles and said arm.

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