Dec. 16, 1952 | W. J. LINDSTEADT | 2,621,911

CARBURETOR

Filed Dec. 30, 1947 | 2 SHEETS—SHEET 1

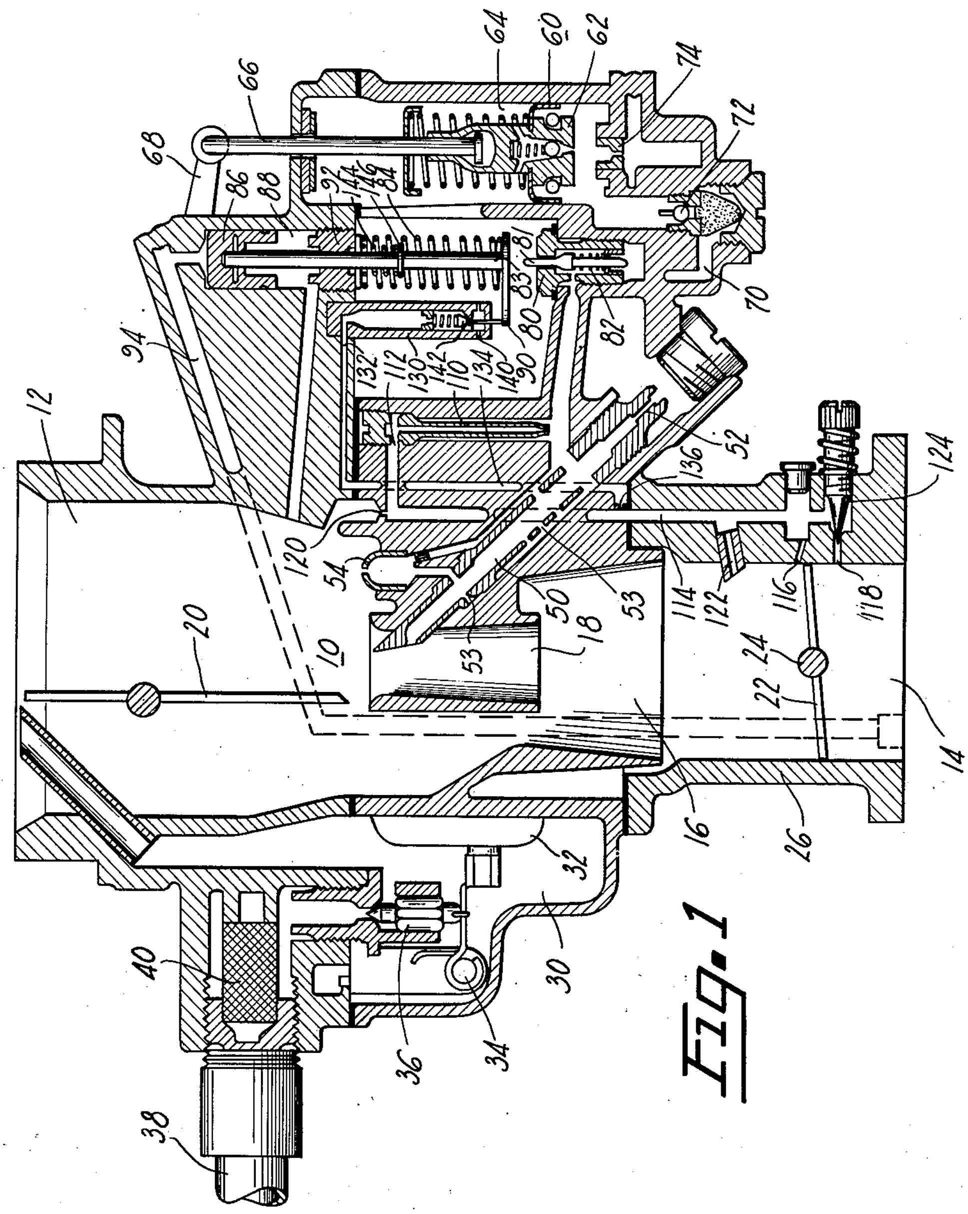

Fig. 1

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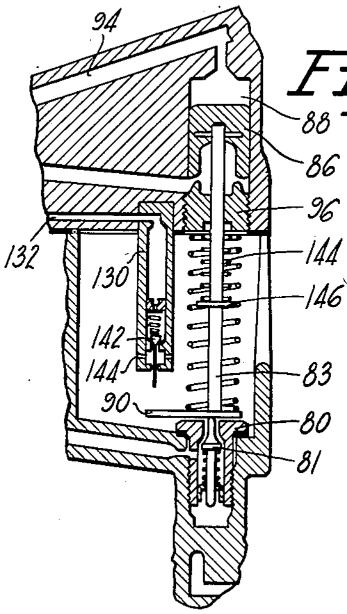

Fig. 2

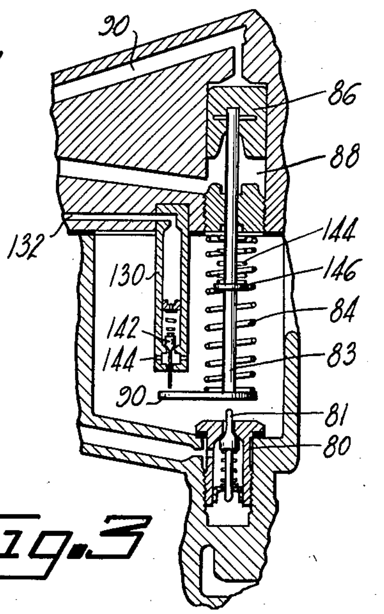

Fig. 3

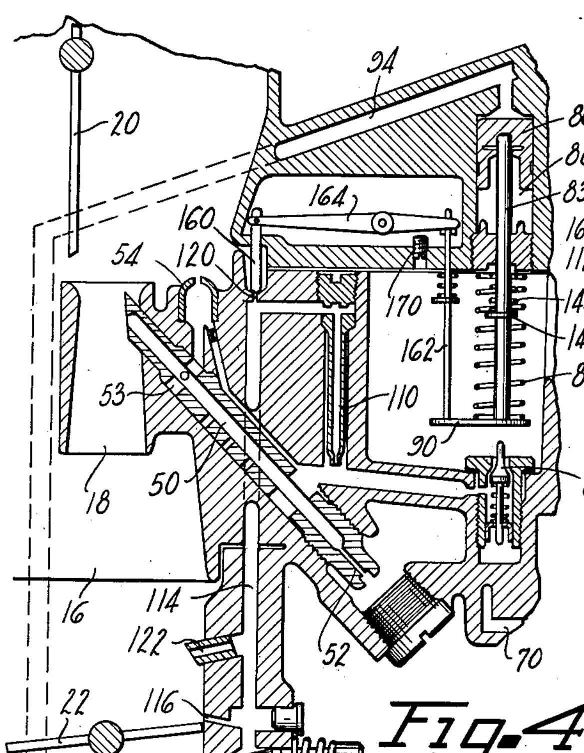

Fig. 4

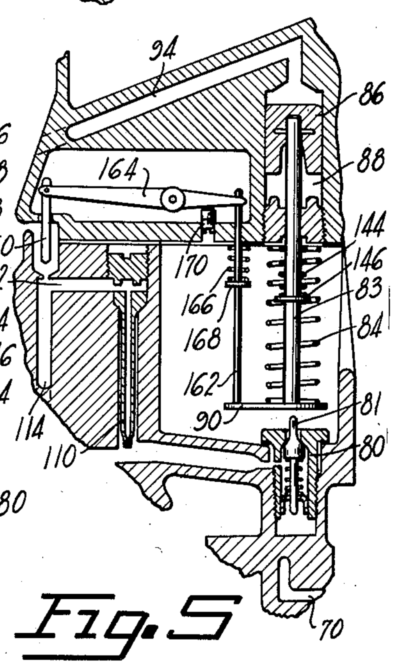

Fig. 5

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CARBURETOR

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11 Claims. (Cl. 261—41)

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The present invention relates to charge forming devices, and more particularly to carburetors for internal combustion engines.

One of the principal objects of the present invention is to provide a carburetor for an internal combustion engine which is adapted to minimize backfiring in the exhaust pipe and muffler when the engine is decelerated.

Another object of the invention is to provide a fuel system in a carburetor for forming a combustible mixture during the entire time the engine is operating with the throttle valve in closed or in nearly closed position.

Another object of the invention is to provide a means in an engine carburetor for enriching the idle mixture while the engine is decelerating.

Further objects and advantages of the invention will be apparent from the following description and accompanying drawings, wherein two specific embodiments of my invention are disclosed. In the drawings:

Figure 1 is a vertical cross-section of a carburetor showing some of the elements thereof rearranged to more clearly show their operative relationship;

Figure 2 is a vertical cross-section of a portion of the carburetor shown in Figure 1;

Figure 3 is another vertical cross-section of the portion shown in Figure 2;

Figure 4 is a vertical cross-section of a modification of the invention; and

Figure 5 is a vertical cross-section of a portion of the carburetor shown in Figure 4.

Referring more specifically to the drawings, in Figure 1, numeral 10 designates the induction passage of a downdraft carburetor which may be either a single or double barrel type, numeral 12 an air inlet, 14 a mixture outlet, 16 a large venturi, 18 a small venturi, 20 a choke valve disposed in the air inlet 12, and 22 a throttle valve mounted on shaft 24 in throttle body 26. A fuel bowl 30 contains a float 32 mounted on float pivot 34 adjacent float needle valve assembly 36. The fuel is admitted at the fuel inlet 38 and passes through screen 40 and valve assembly 36 into the fuel bowl. The fuel is delivered from the fuel bowl through the main discharge jet 50 which extends from a point near the bottom of the fuel bowl to the throat of the small venturi 18 and includes a main metering jet 52 and air inlet orifices 53 through which air from the high speed air bleeder 54 is admitted. As the fuel passes from the fuel bowl through main metering jet 52 upwardly through the main discharge jet, air from the high speed bleeder is

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mixed with said fuel, forming an emulsion which is discharged into the throat of the small venturi.

An accelerating pump generally shown at 60 includes a manually actuated piston 62 operated in cylinder 64 by the movement of the throttle valve through rod 66, lever 68 and a linkage (not shown) connecting lever 68 with the throttle valve actuating mechanism. The fuel for the accelerating pump is drawn from the fuel bowl 30 through inlet passage 70 and check valve 72 into cylinder 64 beneath piston 62, and is discharged through accelerating pump jet 74 into the induction passage through a special jet (not shown).

During the operation of the engine at high speeds and under high power output, an auxiliary fuel by-pass jet 80 controlled by a valve 81 is opened to admit additional fuel into the main discharge jet posterior to main metering jet 52 for enriching the fuel-air mixture delivered to the engine. Valve 81 is opened in opposition to a spring 82 by reciprocable rod 83 actuated in the direction to open said valve by a spring 84 and in the opposite direction by a vacuum piston 86 mounted in cylinder 88 at the upper end of said rod. Spring 84 reacts between a plate 90 mounted on the lower end of said rod and plug 92 inserted in the lower end of cylinder 88. The upper end of cylinder 88 is connected by a conduit 94 with the induction passage on the engine side of the throttle valve so that manifold vacuum will hold piston 86 and rod 83 in the position shown in Figure 1 during idling and cruising. When the throttle valve is opened for high speed or high power output, the manifold vacuum becomes insufficient to hold rod 83 in its lifted position in opposition to spring 84 and thus permits rod 83 and plate 90 to move downwardly, opening valve 81 and admitting additional fuel from the fuel bowl into the main discharge jet.

When the throttle valve is in closed or nearly closed position, the engine operates on the fuel supplied by the idle system consisting of idle tube 110, through which the fuel for idling is metered, horizontal conduit 112 and vertical conduit 114. The fuel is discharged through ports 116 and 118 above and below the throttle valve, respectively, under certain idling conditions and only through port 118 under other idling conditions. When the throttle valve is closed or substantially closed, the charge, i. e. the fuel-air emulsion formed in the idling system is discharged through port 118, and air is bled into the idle system through port 116. As the throttle valve is moved from closed position to a partly open position, the edge of the throttle valve passes port 116 so that both ports 116 and 118 function as discharge ports for the idling mixture. An idle air bleed 120 at the upper end of vertical conduit 114 and a secondary idle air bleed 122 near the lower end of conduit 114 supply air to the idle system to form the fuel-air emulsion which is discharged through ports 116 and 118, as described. The quantity of fuel-air emulsion delivered to the engine is regulated by adjustable needle valve 124.

The present invention is primarily concerned with a means for preventing backfiring in the exhaust pipe and muffler, which sometimes occurs when the throttle valve is closed while the vehicle is traveling at a rather high rate of speed. This backfiring is principally caused by the formation of a mixture in the cylinders too lean to be ignited by the spark, and the passing of this lean mixture into the exhaust pipe and muffler where it is ignited by subsequent firing of the engine. The lean mixtures are usually produced by the return of exhaust gases from the manifold to the cylinders when the intake manifold vacuum is high. The present invention overcomes the conditions producing the backfiring by providing an additional quantity of fuel to enrich the fuel-air mixture supplied the engine when the intake manifold vacuum is exceptionally high. This enriched mixture remains a combustible charge even after being diluted by the exhaust gases returned to the cylinders. This additional fuel is supplied to the idling system through a cylindrical stem 130, horizontal conduit 132 and vertical conduit 134 which communicates with vertical conduit 114 at port 136 near the central portion of conduit 114. Cylindrical member 130 includes a plurality of ports 140 which are below the level of the fuel in the fuel bowl, and a spring loaded valve 142 which is actuated by an extension on plate 90 when vacuum piston 86 is lifted to its uppermost position. Since the backfiring occurs only when there is an extremely high manifold vacuum such as between 21 and 24 inches of mercury, this auxiliary idling system does not become operable until the high vacuum is reached. This is accomplished by including a spring 144 mounted on rod 83 and supported by collar 146. This spring rides on rod 83 and functions as an abutment to determine the upper limit of the movement of rod 83 for normal manifold vacuum. It is seen in Figure 3 that the extension on plate 90 has not engaged the stem of valve 142 so that said valve remains closed for normal manifold vacuum. When the manifold vacuum rises above a predetermined value, such as 21 inches of mercury, spring 144 becomes compressed, permitting the extension on plate 90 to open valve 142 and thereby permit additional fuel to flow into the idling system through conduits 132 and 134. When the manifold vacuum again becomes normal, spring 144 returns rod 83 and plate 90 to the position shown in Figure 3, permitting valve 142 to close so that the idle system again functions normally. Should the manifold vacuum further decrease so that spring 84 is able to overcome the effect of said vacuum on piston 86, rod 83 and plate 90 are lowered to the position shown in Figure 2 wherein power enrichment valve 80 is held open to permit additional fuel to pass into the main discharge jet.

In the modification shown in Figure 4, the idling mixture is enriched for high manifold vacuum operation by the closing of the idle air bleed 120. This is accomplished by a valve 160 which is actuated by vacuum piston 86 through rod 83, plate 90, rod 162 and pivoted lever 164. Spring 144 functions as an abutment for rod 83 to prevent plate 90 from engaging the lower end of rod 162 for normal engine operation, as shown in Figure 5. When plate 90 is not in contact with rod 162, valve 160 is held in its open position, as shown in Figure 5, by a relatively weak spring 166 mounted on rod 162 and reacting between a fixed collar 168 and a portion of the fuel bowl cover. The opening movement of valve 160 is limited by a set screw 170 which functions as an abutment for one end of pivoted lever 164. When the manifold vacuum is too low to overcome the force of spring 84, plate 90 engages the stem of valve 80 and opens said valve to permit additional fuel to pass into the main discharge jet 50. As the manifold vacuum is increased when the throttle valve is moved to closed position, piston 86 is moved upwardly, carrying therewith rod 83 and plate 90, thus disengaging said plate from the stem of valve 80 and permitting said valve to close. At this increased manifold vacuum, rod 83 and plate 90 assume the position shown in Figure 5, wherein spring 144 is functioning as an abutment. Should the manifold vacuum rise above a predetermined value, such as 21 inches of mercury, spring 144 is compressed, permitting the extension of plate 90 to engage the lower end of rod 162 and move said rod and lever 164 in the direction to close valve 160. The decreased quantity of air thus admitted into the idling system causes an increase in the richness of the idling fuel-air mixture delivered to the engine.

Many other arrangements of the two modifications disclosed herein may be made to suit requirements.

I claim:

1. In a fuel supply system for an engine having an induction passage with a throttle valve therein, a source of fuel, a conduit connecting said source of fuel with the induction passage on the engine side of the throttle valve for supplying said engine with fuel while the throttle valve is in closed or nearly closed position, a passageway connecting said source of fuel with said conduit for admitting additional fuel into said conduit, and a valve mechanism in said passageway adapted to be opened in response to high manifold vacuum for controlling the flow of fuel through said passageway.

2. In a fuel supply system for an engine having an induction passage with a throttle valve therein, a source of fuel, a conduit connecting said source of fuel with the induction passage on the engine side of the throttle valve for supplying said engine with fuel while the throttle valve is in closed or nearly closed position, a metering restriction in said conduit, a passageway connecting said source of fuel with said conduit posterior to said restriction for admitting additional fuel into said conduit, and a valve mechanism in said passageway openable in response to high manifold vacuum for controlling the flow of fuel through said passageway.

3. In a fuel supply system for an engine having an induction passage with a throttle valve therein, a fuel bowl, a conduit connecting said fuel bowl with the induction passage on the engine side of the throttle valve for supplying said engine with fuel while the throttle valve is in

closed or nearly closed position, a metering restriction in said conduit, a passageway connecting said fuel bowl with said conduit posterior to said restriction for admitting additional fuel into said conduit, and a valve mechanism in said passageway adapted to be opened only in response to high manifold vacuum for controlling the flow of fuel through said passageway.

4. In a carburetor for an internal combustion engine, an induction passage, a throttle valve in said induction passage, a source of fuel, a main fuel conduit connecting said source of fuel with said induction passage, a power enrichment jet connecting said source of fuel with the main fuel conduit, a valve for controlling said jet, an idle system including a conduit connecting the source of fuel with the induction passage on the engine side of the throttle valve, a fuel passageway connecting the source of fuel with the idle system conduit, a valve mechanism in said passageway, and a pressure responsive spring-loaded means adapted to open the power enrichment valve when the manifold vacuum is low and to open the passageway valve when the manifold vacuum is high.

5. In a carburetor for an internal combustion engine, an induction passage, a throttle valve in said induction passage, a fuel bowl, a main fuel conduit connecting said fuel bowl with said induction passage, a power enrichment jet connecting said fuel bowl with the main fuel conduit, a valve for controlling said jet, an idle system including a conduit connecting the fuel bowl with the induction passage on the engine side of the throttle valve, a metering restriction in said idle system conduit, a fuel passageway connecting the fuel bowl with the idle system conduit posterior to said restriction, a valve mechanism in said passageway, and a pressure responsive spring-loaded means adapted to open the power enrichment valve when the manifold vacuum is low and to open the passageway valve when the manifold vacuum is high.

6. In a fuel supply system for an engine having an induction passage with a throttle valve therein, a source of fuel, a conduit connecting said source of fuel with the induction passage on the engine side of the throttle valve for supplying said engine with fuel while the throttle valve is in closed or nearly closed position, an air bleed for said conduit, and a valve mechanism actuated in response to high manifold vacuum for controlling said air bleed.

7. In a fuel supply system for an engine having an induction passage with a throttle valve therein, a fuel bowl, a conduit connecting said fuel bowl with the induction passage on the engine side of the throttle valve for supplying said engine with fuel while the throttle valve is in closed or nearly closed position, a metering restriction in said conduit, an air bleed for said conduit posterior to said restriction, and a valve mechanism actuated in response to high manifold vacuum for closing said air bleed.

8. In a carburetor for an internal combustion engine, an induction passage, a throttle valve in

said induction passage, a fuel bowl, a main fuel conduit connecting said fuel bowl with said induction passage, a power enrichment jet connecting said fuel bowl with the main fuel conduit, a valve for controlling said jet, an idle system including a conduit connecting the fuel bowl with the induction passage on the engine side of the throttle valve, an air bleed for said idle system conduit, and a pressure responsive spring loaded means adapted to open the power enrichment valve when the manifold vacuum is low and to close the idle air bleed valve when the manifold vacuum is high.

9. In a fuel system for an engine having an induction passage with a throttle valve therein: a fuel bowl, a passageway for delivering fuel-air emulsion to the induction passage on the engine side of the throttle valve, said passageway having two branch conduits, one for connecting said passageway to said fuel bowl and the other for connecting said passageway to a source of air, and a valve mechanism in one of said conduits actuated only in response to a higher manifold vacuum than exists during normal engine idling for enriching the fuel-air emulsion supplied by said passageway to the induction passage.

10. In a fuel system for an engine having an induction passage with a throttle valve therein: a source of fuel, a passageway for delivering fuel-air emulsion to the induction passage adjacent the throttle valve, said passageway having two branch conduits, one for connecting said passageway to the source of fuel and the other for connecting said passageway to a source of air, and a valve mechanism in one of said conduits actuated only in response to a higher manifold vacuum than exists during normal engine idling for enriching the fuel-air emulsion supplied by said passageway to the induction passage.

11. An idle fuel system in a carburetor having an induction passage with a throttle valve therein comprising: a source of fuel, a passageway for delivering fuel-air emulsion to the induction passage on the engine side of the throttle valve, said passageway having two branch conduits, one for connecting said passageway to the source of fuel and the other for connecting said passageway to a source of air, and a valve mechanism in one of said conduits actuated only in response to a higher manifold vacuum than exists during normal engine idling for enriching the fuel-air emulsion supplied by said passageway to the induction passage.

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