

United States Patent

Diehl

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[54] **LOW SILHOUETTE DUAL FLOW STAGE CARBURETOR**
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[57] **ABSTRACT**

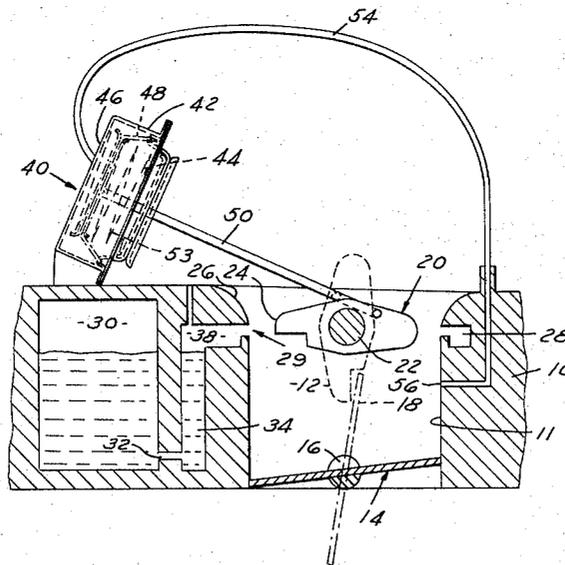
A downdraft type carburetor induction passage has essentially a constant cross-sectional area with a rounded edge air inlet, the rounded edge cooperating with a rotatable member having its peripheral surface in the form of an inverted semi-venturi so as to form an inverted venturi whose area varies as a function of the rotation of the member to provide high fuel metering signals at low air flows and high air flow potential.

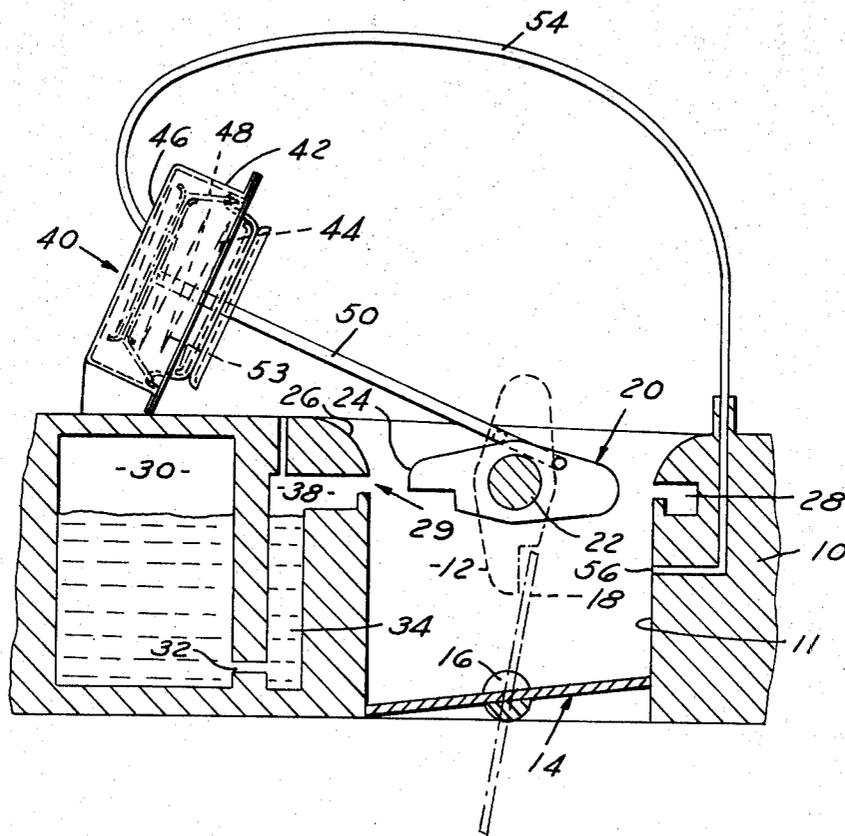
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10 Claims, 1 Drawing Figure





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LOW SILHOUETTE DUAL FLOW STAGE CARBURETOR

This invention relates, in general, to the construction of a carburetor for a motor vehicle type internal combustion engine. More particularly, it relates to a carburetor having a low silhouette and of the dual stage type.

The lower hood lines on present automobiles and the predicted yet lower hood lines requires some modification in the designs of carburetors so that they can continue to be installed on top of the internal combustion engine without interference from the vehicle hood, and yet supply the air flow requirements of the engine. With some engines, a dual stage type carburetor generally is desirable, the first stage providing high fuel metering at low air flows, a second stage assuring adequate air flow volume at the higher engine performance range.

Most carburetors meeting the above requirements require either two separate throttle bores or induction passages, or if a single passage is provided, the height of the passage generally is considerable. For a single bore, the primary stage of the carburetor generally requires a fixed area venturi section with one or more concentrically mounted booster venturies to provide the desired fuel metering signals at low air flows. The conventional throttle valve generally is located posterior of the venturi section. The secondary stage would be mounted above the venturi section and controlled by an air valve or similar device. In order to provide the primary air flow, an additional air inlet to the venturi generally would be necessary since in most instances the air valve would remain closed below a certain flow volume.

The above indicates that a single throttle bore, dual stage carburetor would be considerably taller than would be permitted to be installed on a conventionally-shaped engine in vehicles with low hood lines.

It is a primary object of the invention, therefore, to provide a low silhouette dual stage carburetor with two stages of flow providing high fuel metering signals at low air flows and high air flow potential at wide open throttle position.

It is another object of the invention to provide a low silhouette carburetor in which a fixed area venturi is integrated with a movable air and fuel flow controlling member, which in its movement varies the venturi area and air flow through the carburetor.

It is still another object of the invention to provide a dual stage carburetor construction that comprises a single induction passage of essentially constant cross sectional area with a rounded edge air inlet portion cooperating with an inverted semi-venturi profiled member to define a variable area venturi for controlling fuel metering and fulfilling air flow requirements of the engine.

Other objects, features and advantages of the invention will become more apparent upon reference to the succeeding detailed description thereof, and to the drawing illustrating a preferred embodiment thereof; wherein, the FIGURE schematically illustrates a cross sectional view of a portion of a downdraft carburetor incorporating the invention.

As stated above, it is a primary object of the invention to provide a carburetor construction with a low silhouette and yet one that provides high air flow potential at wide open throttle positions and high fuel metering signals at low air flows. The FIGURE illustrates

schematically a portion 10 of the main body of a downdraft type carburetor generally used in connection with a motor vehicle internal combustion engine.

The main body 10 includes a large diameter central bore 11 of constant cross-sectional area that defines the conventional induction passage 12. The main control of flow through the passage is provided by a throttle valve 14 that is fixed to a shaft 16 rotatably mounted in the walls of the body 10, in a manner not shown. Throttle valve 14 is rotatable from the full line position 16 shown, essentially blocking the main flow of air and fuel through passage 12, to the essentially wide open throttle dotted line position 18 offering a minimum of resistance to flow of fuel and air through passage 12.

Located above throttle valve 14 is a profiled annular or disc-like member 20 fixed on a shaft 22 rotatably mounted in the main body 10 in a manner similar to that of the throttle valve shaft 16. The peripheral surface 24 of member 20 has a semi-torodial like profile that corresponds to one half of an inverted venturi. The profiled surface 24 is adapted to cooperate with the rounded edge inlet air passage portion 26 formed on main body 10 so that together surfaces 26 and 24 form a complete inverted venturi section.

As member 20 is rotated clockwise progressively, it will be clear that the area of the venturi defined between surfaces 24 and 26 will increase progressively, thereby progressively varying the fuel metering signal, to be described, and increasing the air flow through passage 12.

The fuel in this case is adapted to be discharged through an annular slot 28 in the peripheral portion of the body 10, the slot being located at or adjacent the throat 29 of the venturi defined between surfaces 24 and 26. The fuel discharge port 28 in this case is shown connected schematically to a main fuel bowl 30 through the conventional main discharge venturi 32, a main fuel bowl well 34, and a connecting chamber 38.

The counterclockwise movement of profiled member 20 to increase the air flow and also vary the venturi area is accomplished by a vacuum controlled servo 40. The latter is mounted on the carburetor, and has a conventional shell 42 with a hollow interior. The latter is divided into an atmospheric air chamber 44 and a vacuum chamber 46 by an annular flexible diaphragm 48.

The diaphragm 48 is fixed to a lever 50 pivotally offset connected at 52 to member 20, a spring 53 normally biases rod 50 and member 20 to the full line position shown. The servo vacuum chamber 46 is connected by a vacuum line 54 to an induction passage port 56 between the member 20 and throttle valve 14.

Other details of construction and operation of the carburetor are not shown since they are known and believed to be unnecessary for an understanding of the invention. The carburetor could, for example, use a conventional idle system in which fuel would be drawn from the well 30 to a discharge port below the closed position of the throttle valve 14 so as to supply engine idling speed fuel when the throttle is in its closed speed position.

In operation, with the throttle valve 14 in its essentially closed position 16 shown, there will be essentially no flow of fuel from the discharge nozzle 28 or any air flow past the throttle valve 14. All fuel and air flow at

this time will pass into the engine by way of the idle system, not shown. Both servo chambers 46 and 44 will be at atmospheric pressure, and, therefore, member 22 will be in the minimum venturi area shown, for high fuel metering signals.

As soon as the throttle valve 14 is rotated counter-clockwise slightly, air flow through the inverted venturi begins, providing a high metering signal at the discharge nozzle 28 so as to draw fuel from the main well 30 and discharge it into the passage 12, in a known manner. The fixed area of the venturi provided at this time by the stationary surfaces 26 and 24 provides a high fuel metering signal and, therefore, a finite schedule of flow of fuel at these times. The vacuum signal at this time at port 56 is low, and the force of servo spring 53 chosen such that member 20 will remain in the position shown until the throttle valve 14 has rotated approximately 40°, for example. At this point, the vacuum level at port 56 will be high enough to actuate the servo and begin moving member 20.

As the movement of the throttle valve progresses, therefore, towards a wide open position 18, the increase in manifold vacuum signal acting on the servo 40 will begin to rotate the member 20 so as to progressively increase the area of the venturi and also increase the air flow through passage 12. This action continues until the throttle valve 14 reaches the wide open throttle position 18, at which time the member 20 will have rotated to its dotted line position 58. Thus it will be seen that the member 20 provides a maximum area venturi at wide open throttle valve position and a maximum air flow potential by its rotation to a nearly vertical position.

From the foregoing, therefore, it will be seen that the invention provides not only a low silhouette carburetor for use with low vehicle hood lines, but also one that provides dual stages of air flow operation with high venturi fuel metering signals at low air flows and high air flow potentials.

I claim:

1. A low silhouette dual flow stage carburetor having an air/fuel induction passage with an essentially constant area at one end, and adapted to be connected to an engine intake manifold at its other end, said inlet having a rounded inlet edge, a throttle valve rotatably

mounted in said passage for movement between closed and wide open positions to control flow through said passage, a fuel and air flow control member rotatably mounted anterior of said valve and spaced from the walls of said passage, said member having an arcuate contour so as together with said air inlet rounded edge define a variable area venturi varying in area as a function of the rotative movement of said control member, and a fuel nozzle opening into said passage at a point adjacent said venturi so as to be subject to the varying pressure signal therein for the flow of fuel at times therefrom into said passage, said member being variably movable from an initial stage minimum venturi area position at low throttle valve angle positions and low air flows providing a high venturi fuel metering signal, to a second stage maximum venturi area position at wide open throttle valve position providing high air flow through said passage.

2. A carburetor as in claim 1, said fuel nozzle comprising a peripheral discharge slot in the wall of said main body.

3. A carburetor as in claim 1, said fuel nozzle being located in the wall of said body defining said passage.

4. A carburetor as in claim 1, the peripheral surface of said member having a semi-torodial like profile of essentially a semi-venturi.

5. A carburetor as in claim 1, said member having a recessed portion receiving an edge of said throttle valve in a nested manner upon rotation of said valve to its wide open position and rotation of said member to its maximum air flow position.

6. A carburetor as in claim 1, said induction passage having an essentially constant cross-sectional area throughout its length.

7. A carburetor as in claim 1, said fuel nozzle opening into the throat of said venturi.

8. A carburetor as in claim 1, said member being concentrically mounted within said passage.

9. A carburetor as in claim 1, including means operatively acting on said member effecting opening movement of said member in response to rotation of said throttle valve beyond a predetermined angle.

10. A carburetor as in claim 1, the peripheral surface of said member having the profile of one-half of an inverted venturi.

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