

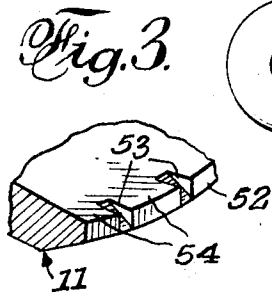
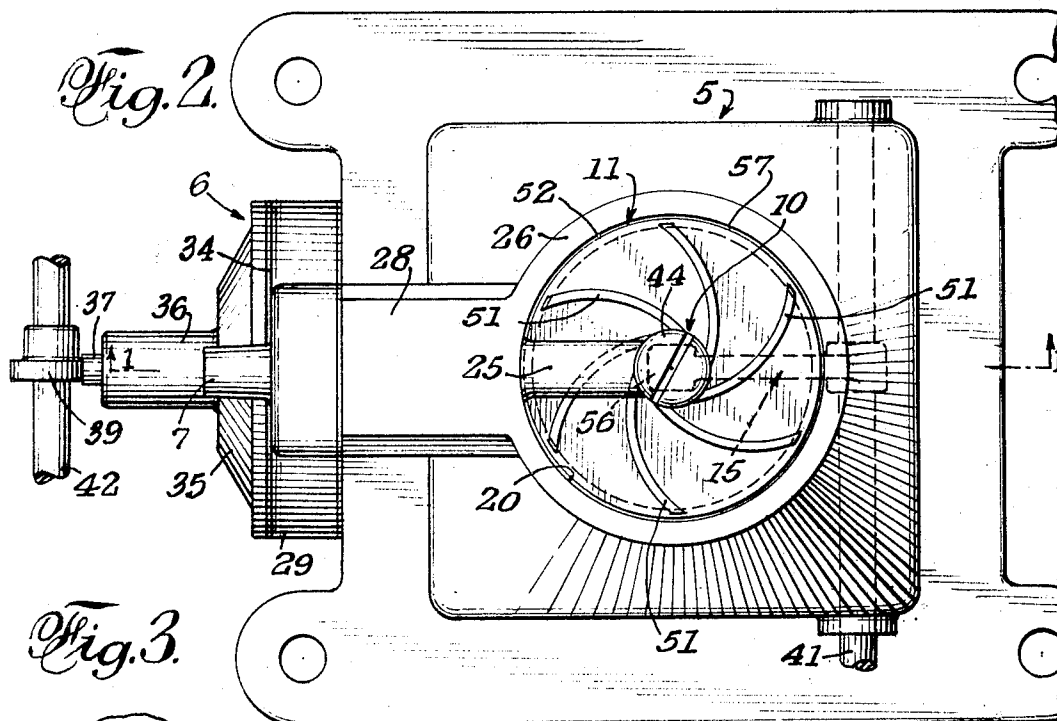
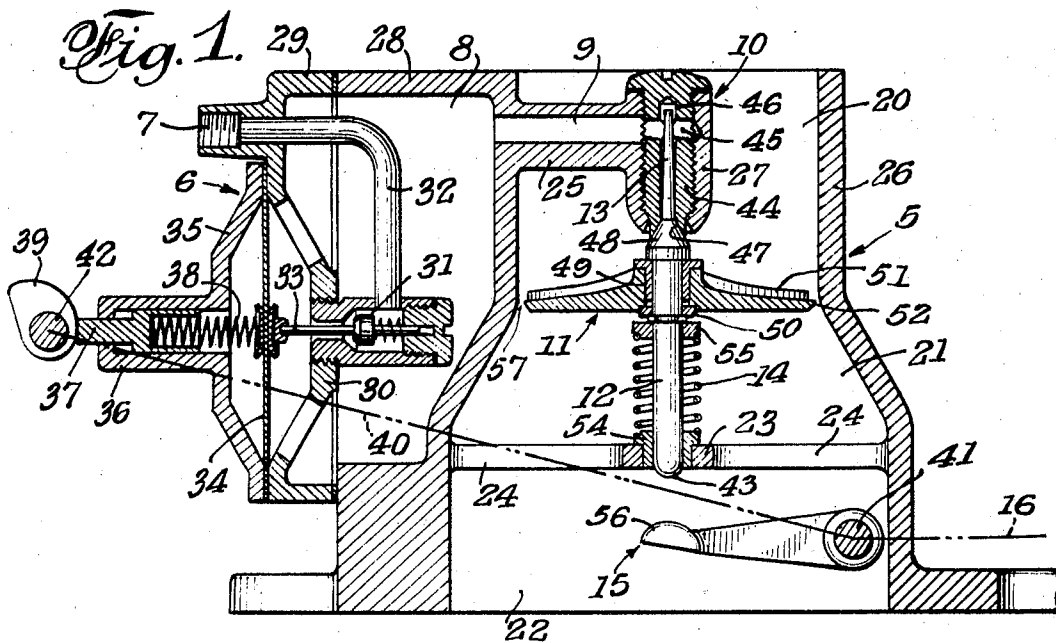
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CARBURETOR

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3,439,903

CABURETOR

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3 Claims

ABSTRACT OF THE DISCLOSURE

A carburetor having a housing with a passage smaller at the top than at the bottom and having a flared intermediate part, a fuel-metering valve mounting a disc rotational on the valve and diametrically smaller than the smaller passage part and which, when closed, locates the disc at the lower end of the latter passage part to allow limited inlet air flow downwardly through an annular space formed between the disc and the passage, the disc and valve being resiliently biased to a closed position of the latter, the lower face of the disc being subject to engine suction from below to cause downward movement of the disc into the flared part and increase of said annular space according to the degree of said suction, vanes on the top face of the disc to mix fuel and air in the passage part above the disc, and a throttle-controlled stop to limit the opening movement of the valve.

Background of the invention

The following United States Letters Patent are noted as of interest in the present matter: McCurdy, 2,718,388, Sept. 20, 1955; Schneider, 2,774,374, Dec. 18, 1956.

McCurdy discloses a carburetor that automatically adjusts itself to control the air-fuel mixture. The elements of this carburetor that effect such control are a non-rotative ball valve 32, guide means 22 and 36 for said valve so the same, in response to the pressure of air flow into the casing 10, shifts in a direction to move a needle valve 20 to control fuel flow, accordingly. The carbureted air, after passing through a constriction between said ball valve 32 and the casing 10, flows through a passage in said casing to a throttle valve 12.

Schneider discloses a fuel-pulsation-smoothing valve that serves to regulate pressure. This patent is of interest in that the present carburetor is provided with a pressure regulator that is preferably built-in, the same eliminating the need for the usual carburetor bowl, float and valve, and also the need for vents to atmosphere.

These examples of the prior art, by comparison, point up the simplicity of the present carburetor, which eliminates unneeded elements, of which vacuum control means such as a throttle valve, bowls, vents, are examples, and also raw fuel leakage due to overflowing. By providing for a single fuel orifice for fuel for all ranges of engine speed with a single-fuel metering needle, the above indicated problems of prior carburetors are solved in a simple and efficient manner.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description, which is based on the accompanying drawing. However, said drawing merely shows, and the following description merely describes, preferred embodiments of the present invention, which are given by way of illustration for example only.

In the drawing, like reference characters designate similar parts in the several views.

Description of the invention

FIG. 1 is a vertical sectional view of a carburetor ac-

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cording to the present invention, the same being taken on the line 1-1 of FIG. 2.

FIG. 2 is a plan view.

FIG. 3 is a fragmentary perspective view of a modification.

The carburetor that is illustrated comprises, generally, a housing 5 that is adapted to be connected at the top to an air intake, and at the bottom to the suction or intake of an internal combustion engine; a pressure regulator 6 mounted on one side of said housing, provided with a liquid fuel inlet 7, a chamber 8, and an outlet passage 9 from said chamber; a fuel-metering valve 10 at the outlet end of the passage 9; a freely rotational air-and-fuel-metering disc 11 disposed in the interior of said housing 5, mounted on a guided stem 12 that, at its upper end, is formed as a needle 13 comprising part of the valve 10, a spring 14 biasing said stem in a direction to close the valve 10 and to position the periphery of the disc 11 at a point providing maximum flow restriction downwardly through the housing 5; and a limiting accelerator arm 15 pivotally carried by the housing and connected, as by conventional linkage 16, to a throttle or accelerator pedal, to be depressed, upon depression of said pedal, to increase the distance that the stem 12 may lower due to engine vacuum applied to the bottom of the disc 11.

The housing 5 is formed with an air inlet passage 20 of preferably cylindrical form, a downwardly flared intermediate frusto-conical extension 21 at the lower end of said passage, and an enlarged lower extension passage 22 on the extension 21. A spider 23 having a passage 24 therethrough, communicates the passages 21 and 22. A radial extension 25 of the outer wall 26 of the housing has the passage 9 formed therein, the same being provided, at the axial center of the air inlet passages 20, with a tubular hub 27 in which the metering valve 10 is housed. The chamber 8, above mentioned, is formed by a portion of the housing wall 26 and laterally extending wall portion 28, defining a lateral opening that is enclosed by the pressure regulator 6.

The pressure regulator 6 that is illustrated comprises a housing 29 in the upper portion of which the fuel inlet 7 is provided, and which is formed with a concave wall 30 with fuel passages therethrough, a check valve 31 mounted on the wall 30 and extending into the chamber 8, and a flow tube 32 connecting the fuel inlet and the inlet side of the valve 31. A stem 33 of the poppet of valve 31 is engaged with a diaphragm 34 that is disposed between the wall 30 and an opposite bowed wall 35. A tubular extension 36, coaxial with the stem 33, houses a plunger 37 that is outwardly biased by a spring 38 and is engaged with the side of the diaphragm opposite to the side engaged by the stem 33. Means such as a cam 39 is provided for depressing the plunger 37, thereby increasing the bias of spring 38 on the diaphragm 34, causing the same to flex or bow in a direction to open the valve 31 when closed, or to open said valve further from a restricted open position. Conventional linkage 40 connects the shaft 41 of the arm 15 and the shaft 42 in a manner to cause the cam 39 to depress the plunger 37 when the arm 15 is moved in a direction increasing the gap between it and the lower end 43 of the stem 12. The fuel reaching the chamber 8 through the passages in wall 30 fills the same, as well as the passage 9. The metering valve 10, being normally closed due to the bias of spring 14, will arrest flow from said chamber 8 until the valve 10 is opened. It will be clear that a fuel pump or other fuel-feeding means will bypass until flow through valve 10 is instituted.

The valve 10 is shown as a valve member 44 that is threadedly seated in the hub 27, is provided with transverse ports 45 that are in communication with the passage 9, and with an elongated axial bore 46 that receives fuel

flow from said ports 45. The lower end of said bore 46 terminates in a tapered valve seat 47. The mentioned needle 13 extends into the bore 46, and a conical valve portion 48, that integrally connects the needle 13 and the stem 12, fits said seat 47 and controls flow from the bore 46 according to the volume permitted by the needle. Thus, the valve portion 47 closes the valve 10 while the needle, due to its taper, controls the rate of flow according to the retracted position of the needle.

The disc 11 is carried by the stem 12, on a bushing 49, between the seat 47 and a thrust collar 50, the same, as indicated, being freely rotational on said bushing. Said disc has a peripheral size to fit the passage 20 with minimum clearance and is preferably formed of porous ceramic or metal, although non-porous material may be used with but little loss of efficiency. The pores of the disc tend to absorb fuel thereinto, thereby reducing such liquid to small particles that evaporate readily in the operation of the carburetor.

The disc 11, as shown in FIGS. 1 and 2, may be provided with impeller vanes 51 on the upper face thereof, the form of such vanes being suitable to promote rotation of the disc under the pressure of air flow into the passage 20. In practice, the disc may reach rotational speeds of several hundred revolutions per minute and, thereby, creates centrifugal forces on the fuel-air mixture that impinges on the disc that directs the same toward the annular space between the disc and the wall 26.

Optionally, the vanes 51 may be omitted, if spinning of the disc is not desired. Whether or not vanes 51 are provided, the peripheral edge 52 of the disc may be provided with radial grooves or notches 53, the same being open to the top face of the disc and defining vanes 54 that serve as mixing jets that promote mixing of the air and fuel moving downwardly in the passage 20.

The lower end 43 of the stem 12 extends through a guide bushing 54, which also comprises a fixed abutment for one end of the spring 14, a collar 55 on the stem, immediately below the disc 11, serving as the other abutment of said spring.

The arm 15 has an end 56 that is in the path of downward movement of the stem end 43. The same, according to its position as controlled by pressure of the throttle pedal, limits such movement of the stem and the disc carried thereby. In the fully retracted position of the disc 11, as in FIG. 1, the periphery 52 thereof is in register with the lower end of passage 20, thereby providing minimum flow through the annular space 57 around the disc periphery. Upon downward movement of the disc, said space 57 increases, due to the downwardly flaring form of the intermediate passage 21, thereby providing increased flow of carbureted air to the outlet passage 22 at the bottom of the housing 5.

When the engine is shut off and not in use, the valve 10 is held closed by the spring 14. The arm 15 is normally spaced below the stem end 43 thereby permitting the valve 10 to open thus allowing full flow for starting and idling the engine without any movement of the accelerator device.

The valve 31 has a normally open position that permits replenishment of the chamber 8 during engine idling, as well as during normal use.

Operation

Upon actuation of the throttle pedal, the linkage 16 will move the arm 15 to a retracted position forming a limit stop according to the degree of pedal actuation. Thus, the valve 10 can open to fuel flow that is in ratio to the size of the passage formed by the needle 13 in its bore 46. The engine vacuum, effective in the passages 20, 21 and 22, acts on the disc 11 to depress the same against the bias of the spring 14 to open valve 10, and on the inlet air entering passage 20 and which intermixes with the fuel flowing from the valve seat 47. If vanes 51 are provided on the disc, this flow of carbureted air sets

the latter in spinning rotation, centrifugally propelling this air toward the annular space 57. If porous, the disc 11, on its upper face, will absorb and, therefore, break up fuel droplets; such absorption and subsequent release from the pores by evaporation combines with the turbulences induced by the mentioned centrifugal action to provide efficient carburetion of the charge of fuel moving toward the engine intake.

When the arm 15 arrests the depression of the stem 43, the space 57 will be of such increased size as to proportion the metering of the valve 10, and of such space 57, to maintain an air-fuel mixture accordingly. Thus, through the full range of engine speed, from idling to maximum, the operation of the carburetor is controlled by the limit stop position of the arm 15.

The linkage 40 provides for actuation of the cam 39 in concert with the arm 15 so that greater demand for fuel flow through the valve 10 is provided by a correspondingly increased supply flow past the check valve 31.

While the foregoing has illustrated and described what is now contemplated to be the best mode of carrying out the invention, the constructions are, of course, subject to modification without departing from the spirit and scope of the invention. Therefore, it is not desired to restrict the invention to the particular forms of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

In the claims:

1. A carburetor for an internal combustion engine comprising:

(a) housing having a passage with an upper smaller cylindrical portion to receive air, a lower larger and uniformly cylindrical portion open to the vacuum of an internal combustion engine, and a downwardly and increasingly flared intermediate frusto-conical portion connecting the upper and lower portions,

(b) means to provide a flow of liquid fuel to said passage,

(c) a valve to control said flow having a downwardly directed bore terminating in a valve seat, a valve member to control flow through said bore and seat and provided with a tapered needle extension disposed in said bore to proportion fuel flow according to the position thereof in the bore,

(d) a disc largely closing and in all positions thereof being spaced from the upper smaller passage and freely rotationally mounted on the valve member.

(e) means imposing a resilient bias on said valve stem in a direction to close said valve,

(f) a lower extension of the valve member, and

(g) means movable toward and from said extension by the accelerator device of an internal combustion engine providing the mentioned vacuum, to provide a stop to engage said lower extension to limit the position of the disc when moved downwardly against the spring bias by said engine vacuum,

(h) the periphery of the disc and the flaring passage portion defining an annular space for flow downwardly of air carbureted by fuel entering the upper passage portion, said annular space uniformly increasing in size as the disc moves downwardly in the frusto-conical portion of the passage in the housing, and the part of the frusto-conical portion below the disc, in all positions thereof, having increasing size larger than the largest size of the annular space and, at its largest being approximately the size of the lower larger passage portion.

2. A carburetor according to claim 1, provided with means mounting the disc rotationally on the valve member, and means on the disc for spinning the same on the axis of said member responsive to pressure of air flowing

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downwardly in the upper smaller portion of the passage.
 3. A carburetor according to claim 2, in which the disc-spinning means comprises vanes on the upper face of the disc.

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U.S. Cl. X.R.

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