

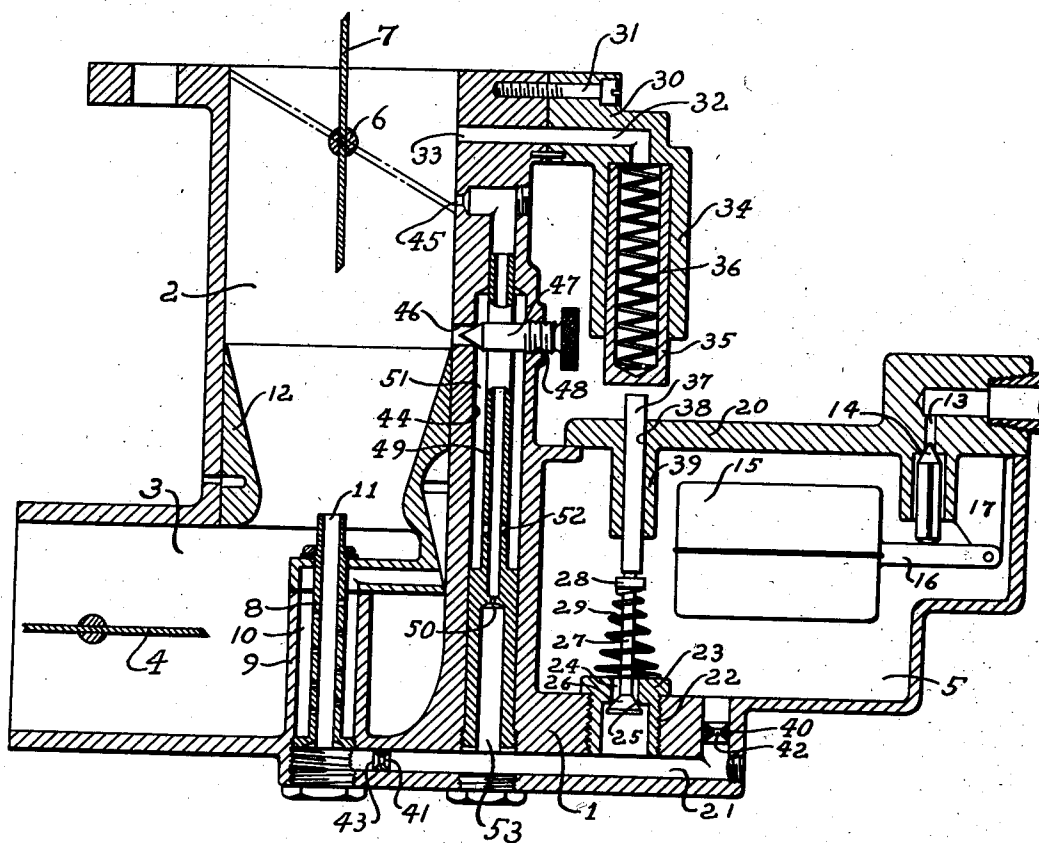
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CARBURETOR

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CARBURETOR

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This invention relates to an improved carburetor, and particularly to an improved fuel metering and step-up system and idling by-pass therefore.

5 Heretofore, in feeding fuel from a fuel reservoir to the nozzle and idling by-pass of a carburetor it has been customary to regulate the flow of fuel by providing two metering orifices, each communicating
10 through a separate passage with the reservoir, one called an economy orifice which is normally open at all times and the other a power orifice which is closed by a valve when the manifold vacuum is high, and
15 open when the vacuum is low. As the power orifice in a carburetor of this type is relied upon to merely augment the supply of fuel fed through the economy orifice by a small amount, the orifice is necessarily
20 very restricted in size and thus it is susceptible of being clogged by relatively small particles of foreign matter.

It has also been found that when the fuel for the idling by-pass is taken from a passage
25 after passing through the metering orifice or orifices, a fault develops in the wide open mixture ratio characteristic because of a reversal in the flow in the by-pass. Normally the flow is from the metered fuel passage to
30 the by-pass but under some conditions this flow is reversed and when the inlet of the by-pass communicates with the metering fuel passage in advance of the metering orifice, this reversal in the flow upsets the
35 metering characteristics.

The main objects of the invention are to provide an improved system for feeding fuel from the reservoir of a carburetor to the
40 nozzle, nozzle annulus and idling by-pass thereof; to provide a system of this kind which has a pair of series connected metering orifices, one for independently metering the fuel for the economy mixture and the
45 other for independently metering the fuel for the power mixture so as to obviate the necessity of employing an excessively small metering orifice to produce the power mixture by merely augmenting the supply of fuel from the economy orifice; to provide an
50 unrestricted fuel passage leading directly

from the reservoir to the power metering orifice which is normally closed under high vacuum operation of the carburetor; to provide means for opening the unrestricted
55 passage when the carburetor vacuum is relatively low; and to provide metering orifices of this kind which are large enough to prevent clogging of the system by small particles of foreign matter.

Further objects of the invention are to
60 provide an improved fuel system in a carburetor in which the inlet of the idling by-pass thereof is properly located with respect to the nozzle and power metering orifice so as to prevent variation of the power
65 mixture ratio by the action of the by-pass during operation of the carburetor under relatively low vacuum conditions, as for example, when the throttle is in a relatively
70 open position; to provide a fuel system of this kind in which the fuel ratio of the idling mixture can be varied without effecting the fuel ratio of the power mixture; to provide an idling by-pass which has an inlet
75 located between the economy and power metering orifices and receives fuel directly from the fuel reservoir when the power orifice is the metering factor and from the economy orifice thereof when the latter is
80 the metering factor so as to maintain the fuel richness substantially uniform at low and high speed relatively open throttle operations respectively; and to assure feeding of a predetermined aggregate amount of
85 fuel from the nozzle and by-pass at relatively closed throttle high vacuum operation.

An illustrative embodiment of our invention is shown in the accompanying drawing, in which:

The figure is a vertical section of a carburetor embodying our invention.

In the form shown our invention is illustrated in connection with a carburetor of the up draft type which includes a body part 1,
90 a mixing chamber 2 having a communicating air inlet 3 in which a choke valve 4 is mounted and a fuel reservoir 5. Journaled in the mixing chamber 2 at the outlet end portion thereof is a shaft 6 on which a
95 throttle valve 7 is secured.
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Mounted in the air inlet passage 3 of the mixing chamber is a differential nozzle 8 which is surrounded by a casing 9 and annulus 10. The discharge end 11 of the nozzle is located substantially at the maximum constriction of the Venturi throat 12 in the mixing chamber.

The reservoir 5 has a fuel inlet 13 which is controlled by a float actuated valve 14 so as to maintain the level of the fuel in the reservoir at a predetermined elevation. The valve actuating mechanism is of conventional form and includes a float 15 which is pivotally secured by a lever 16 to a bracket 17 on the cover or closure 20 of the reservoir. Formed in the body part 1 of the carburetor is a passage 21 which communicates at one end with the reservoir 5 and at the other end with the interior of the fuel nozzle 8. The reservoir 5 is also provided with an aperture 22 which communicates with the passage 21 intermediate the ends thereof. Mounted in the aperture 22 is a threaded plug 23 having a central aperture 24 and a valve seat 25. The aperture 24 of the plug communicates with the interior of the reservoir 5 forming a port through which fuel may be admitted into the passage 21.

The port 24 of the reservoir is normally closed by a valve 26 mounted on one end of a valve stem 27 which has a collar 28 on its other end. A spring 29 bears between the end of the plug 23 and the collar 28, normally retaining the valve 26 in a closed position.

The carburetor is provided with step-up mechanism of the type used in increasing the richness of the fuel mixture by admitting larger quantities of fuel into the mixing chamber under predetermined operating conditions of the carburetor. The step-up actuating apparatus illustrated includes a bracket 30 mounted on the wall of the mixing chamber 2 by a bolt 31 and having a passage 32 therein communicating with the mixing chamber between the throttle valve 7 and the outlet of the mixing chamber through a passage 33 in the wall of the latter. Integrally formed on the bracket 30 is a cylinder 34 having a piston, or plunger 35 slidably mounted therein and normally urged outwardly with respect to the cylinder by a spring 36 which bears between the inner end of the cylinder and the piston 35. A tappet rod 37 is slidably mounted in an aperture 38 and guide 39 of the cover 20 of the reservoir 5 having an inner end seated upon the valve stem 27 and an outer extremity registering with the plunger 35.

The fuel passage 21 of the body part 1 is provided with a pair of spaced restrictions 40 and 41 having metering orifices 42 and 43 therein respectively. The metering orifice 42 of the restriction 40, called the economy orifice, has a smaller capacity than the

metering orifice 43 of the restriction 41, called the power orifice. The metering orifice 42 is located at the inlet end of the fuel passage 21 so as to control the flow of fuel from the reservoir into the passage 21 when the valve 26 is closed. The power orifice is located at the discharge end of the fuel passage 21 and is adapted to regulate the flow of fuel from the passage and to the nozzle 8 when the valve 26 is opened, the port 24 in which the valve 26 is located being adapted to admit fuel from the reservoir into the passage 21 in advance of the economy orifice 42.

Formed in the body part 1 and wall of the mixing chamber 2 is a passage 44 which communicates at its upper end with the interior of the mixing chamber through an opening 45 and at its intermediate part through an air bleed opening 46, the opening 45 being located substantially at elevation of the closed position of the periphery of the throttle 7. A needle valve 47 is threaded in an aperture 48 in the wall of the mixing chamber and extends into the air bleed 46 for controlling the capacity of the latter.

A by-pass tube 49 having a constriction 50 in its lower end portion is located in the passage 44 and communicates at its upper end with the opening 45. This tube is smaller in diameter at its intermediate part than the diameter of the passage 44, thereby forming an annulus 51 which communicates with the air bleed 46. The tube 49 is also provided with apertures 52 which communicate with the annulus 51 and the lower end portion of the tube communicates, at 53, with the fuel passage 21 at a point located between the economy and power orifices. With this construction, fuel is fed from the reservoir 5 directly into the inlet 53 of the idling by-pass when the valve 26 is open and the power orifice 43 is the dominant metering factor. When the valve 26 is closed, the economy orifice 42 controls the aggregate amount of fuel which is supplied to the nozzle 8 and by-pass 49.

The valve 26 may be operated by mechanical step up mechanism of the type which is connected with the throttle valve actuating apparatus as shown in our co-pending application Serial No. 410,581 filed November 29th, 1929.

In operation, when the throttle is in the substantially closed position shown in the drawing, a relatively high vacuum is created above the throttle and in the cylinder 34 holding the plunger 35 in its upper position against the action of the spring 36. The valve 26 is held in a closed position by the spring 29 and the fuel entering the fuel passage 21 is metered by the economy orifice 42. The fuel admitted through the economy orifice 42 is discharged into the mixing cham-

ber through the nozzle 8 and through the idling by-pass. When the throttle is open sufficiently to reduce the vacuum in the mixing chamber between the throttle and manifold and in the cylinder 34, the plunger 35 is urged downwardly by the spring 36 pressing the tappet rod 37, valve stem 27 and valve 26 downwardly so as to open the port 24.

Fuel from the reservoir 5 flows freely through the unrestricted port 24 and fills the fuel passage 21. The power orifice 43 becomes the metering factor when the port 24 is open and due to its larger capacity produces a power mixture of higher fuel richness. When the step up valve 26 is closed the idling by-pass is fed at a point in the system which is in advance of the effective metering orifice thereof and when the valve 26 is open the idling by-pass is fed at a point between the effective metering orifice and the fuel reservoir. With this construction the fuel ratio of the idling mixture may be predetermined by manipulation of the needle valve 47 without changing or otherwise effecting the characteristics of the power mixture which is produced when the orifice 43 is the controlling metering factor.

The metering orifices 42 and 43 are connected in series with each other and with the reservoir and fuel nozzle so that it is not necessary to employ an exceedingly small orifice of the type heretofore used for augmenting the capacity of the economy orifice in systems in which the metering orifices are connected in parallel from the reservoir.

Although but one specific embodiment of this invention has herein been shown and described, it will be understood that various changes including the size, shape and arrangement of parts may be made without departing from the spirit of our invention and it is not our intention to limit its scope other than by the terms of the appended claims.

We claim:

1. A carburetor including a fuel reservoir and a fuel nozzle, a combined power and economy fuel passageway communicating with said reservoir and nozzle, a restriction having a metering orifice therein located in the inlet end portion of said passageway, a restriction having a metering orifice therein located in the outlet end portion of said passageway, the metering orifice of the inlet restriction being smaller than the orifice of the outlet restriction, a port in said reservoir communicating with said passage between said restrictions, a normally closed valve in said port, and means responsive to the performance of said carburetor for holding said valve open only during power performance thereof.

2. In a carburetor, a fuel reservoir, a fuel

nozzle, a combined power and economy fuel passageway communicating with said reservoir and nozzle, means in the inlet end portion of said passageway for metering the flow of fuel thereinto so as to form an economy mixture, a port in said reservoir communicating with said passageway for bypassing fuel around said means, a mechanism for controlling said port including a valve and actuating means responsive to performance of said carburetor, and means in said passageway for metering the flow of fuel into said nozzle when said port is open so as to form a predetermined power mixture, the metering means in the inlet end portion of said passageway being more restricted than the other metering means.

3. A carburetor including a fuel reservoir, a mixing chamber having a fuel inlet communicating through a combined power and economy fuel passage with said reservoir, a pair of spaced metering elements in said passage, each having different capacities, the element of lower capacity normally being the metering factor, and apparatus operable by the vacuum in said mixing chamber for admitting fuel into said passage in advance of the element of smaller capacity so as to produce a power mixture of fuel and air under predetermined operating conditions of said carburetor.

4. In a carburetor including a fuel reservoir, a mixing chamber having a normal fuel inlet communicating through a passage with said reservoir, an economy metering element in said passage for regulating the flow of fuel thereinto, a port in said reservoir for admitting fuel into said passage in advance of said economy metering device, a valve in said port, a cylinder communicating with the discharge end of said mixing chamber, a piston in said cylinder adapted to unseat said valve when the vacuum in the discharge end of said mixing chamber decreases below a predetermined amount, and a power metering element in said passage for controlling the flow of fuel therefrom when said valve is open.

5. A carburetor including a body part having a fuel reservoir, a mixing chamber therein, a fuel inlet in said mixing chamber communicating with said reservoir through a passage in said body part, said passage having an economy metering orifice at its inlet end and a power metering orifice at its discharge end of larger capacity than said economy orifice, an idling by-pass in said body part having an inlet communicating with said passage between said orifices, and means for flooding the portion of the passage between said orifices with fuel from said reservoir so as to feed fuel directly to the inlet of said by-pass and to

said power orifice independently of said economy nozzle.

6. In a carburetor having a mixing chamber and fuel reservoir, a fuel passageway communicating with said mixing chamber and reservoir having a pair of spaced metering orifices therein, a port in said reservoir communicating with said passageway between said orifices, step up mechanism
10 for closing said port at relatively high carburetor vacuum and opening said port at relatively low carburetor vacuum, and an idling by-pass having an inlet communicating with said passageway between said
15 orifices.

7. A carburetor including a fuel reservoir, a mixing chamber having a fuel inlet communicating through a passage with said reservoir, a throttle in said mixing chamber,
20 a pair of spaced metering elements in said passage, each having different capacities, the element of lower capacity normally being the metering factor, and apparatus operable by the vacuum in said carburetor on
25 the leeward side of said throttle for admitting fuel into said passage in advance of the element of smaller capacity so as to produce a power mixture of fuel and air under predetermined operating conditions of said carburetor.
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8. A carburetor including a fuel reservoir and a mixing chamber having a fuel inlet, a combined power and economy fuel passageway communicating with said reservoir
35 and inlet having a pair of successive metering orifices therein of different capacities, the smaller orifice controlling the feeding of fuel into said passageway and substantially independently predetermining the econ-
40 omy fuel discharge and the larger orifice controlling the discharge of fuel therefrom and independently predetermining the power fuel discharge, and means responsive to a predetermined performance of said carburetor for feeding fuel into said passage-
45 way independently of the orifice of smaller capacity so as to increase the flow of fuel from said passageway substantially to the capacity of the large orifice and to step-up
50 the fuel mixture ratio of said carburetor during operation thereof.

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