

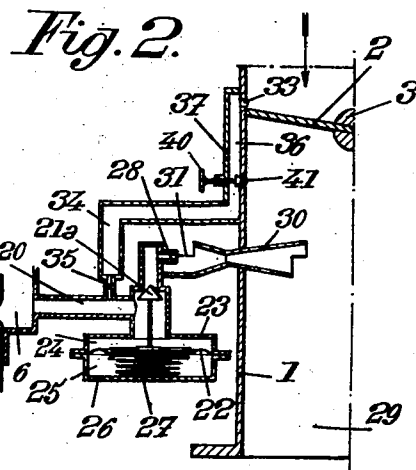
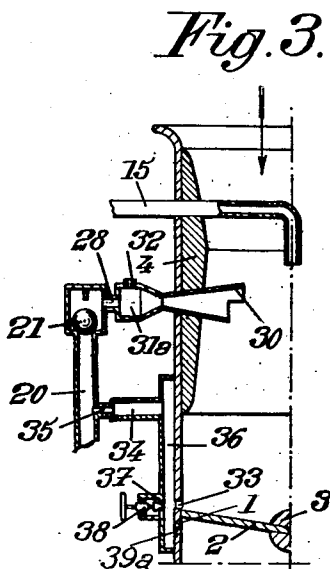
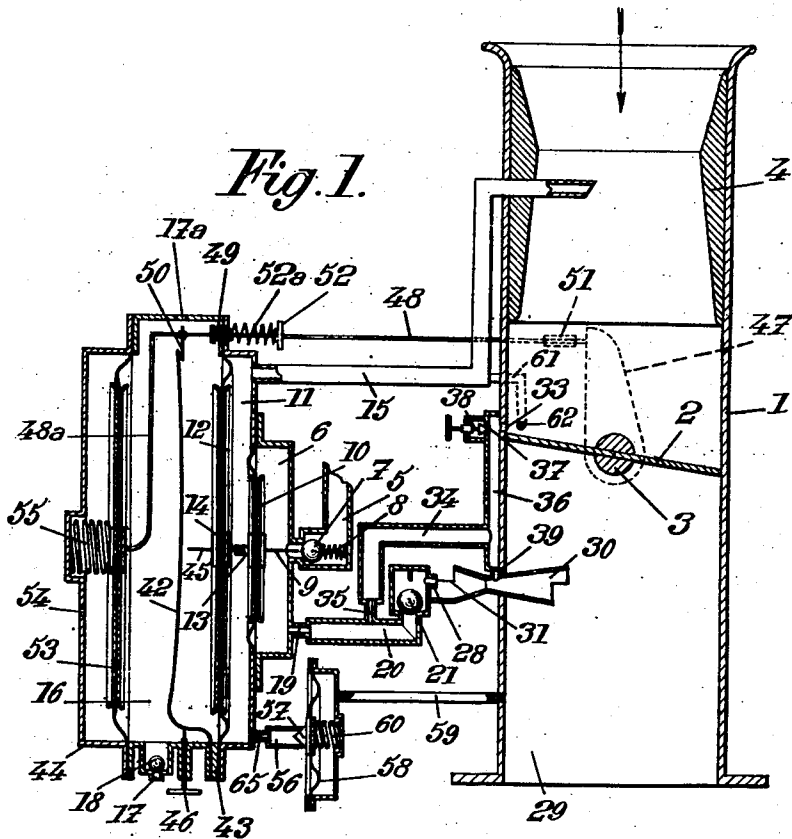
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FUEL INJECTION CARBURETOR

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FUEL INJECTION CARBURETOR

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The present invention relates to fuel injection carburetters, that is to say carburetters without a constant level device and in which the fuel is injected under the action of a pressure which varies automatically with and in the same way as the suction existing in the engine induction conduit on the upstream side of the throttle member which determines the useful section of flow through said conduit.

In the U. S. Patent No. 2,392,055, filed in the name of Marcel Mennesson for "Carburetters of the Fuel Injection Type," was already described a carburetter of this kind in which the fuel injection pressure is regulated by means of a valve controlled by means of two diaphragms of different areas and the opposed surfaces of which are simultaneously subjected to the suction existing in the engine induction conduit, on the upstream side of the throttle member, the outer face of the larger diaphragm being exposed to atmospheric pressure (or to the pressure existing in the carburetter inlet), whereas the outer face of the smaller diaphragm constitutes one of the walls of the chamber into which fuel is admitted after flowing past the valve which serves to regulate its pressure, said chamber supplying fuel, through one or several calibrated orifices, to the jet used for running the engine under load. This jet is substantially protected against the suction existing in the engine induction pipe due to the fact that it opens into a nozzle, provided either on the downstream or on the upstream side of the throttle member and the inlet of which, exposed to the atmosphere, is at a substantial distance from said jet.

The object of my invention is to provide a carburetter of this type which is better adapted to meet the requirements of practice than those provided up to now.

It consists chiefly in making the main jet, when it opens on the downstream side of their throttle member, substantially free from the action of the suction existing in the engine induction conduit so that the flow rate therethrough varies as a function of the flow rate of air through the carburetter, whereas the idling jet is operated by the action exerted directly upon the fuel by at least a portion of the suction existing in the carburetter body, on the downstream side of the throttle, when the engine is idling and said throttle is very little opened in order to cause the control valve provided at the inlet of the fuel chamber to open more or less according to the value of this suction.

According to a second feature, I provide in the conduit through which fuel is fed to the normal working jet and on the downstream side of the

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branch leading to the idling jet, a check valve arranged to permit the flow of fuel toward the normal working jet but to prevent any flow in the opposite direction, in particular that of air under the effect of the suction that is transmitted through the idling jet under idling running conditions and when the throttle member is very little opened.

According to a third feature, I provide the differential action diaphragm system of the carburetter with adjustable elastic means capable of urging said system in the direction corresponding to opening of the valve through which the fuel injection pressure is regulated, provided that the throttle has moved beyond a predetermined opening position, said means being inoperative on said system for lower degrees of opening of said member and during idling running.

According to a fourth feature, the chamber through which the external face of the larger diaphragm is subjected to atmospheric pressure has a wall constituted by a deformable part (diaphragm) or a movable part (piston) connected to the throttle member control in such manner that when said member is suddenly moved from its closed position to its open position, the volume of said chamber is reduced, and, consequently, the pressure exerted on the larger membrane is temporarily increased, thus increasing the degree of opening of the valve which controls the fuel injection pressure.

Preferred embodiments of my invention will be hereinafter described with reference to the accompanying drawings, given merely by way of example and in which:

Fig. 1 shows, in diagrammatic axial section, an injector-carburetter made according to the invention, fuel being supplied into the induction conduit on the downstream side of the throttle member;

Fig. 2 shows a modification of a part of this carburetter;

Fig. 3 shows a portion of such a carburetter in which fuel is supplied into the induction conduit on the upstream side of the throttle member.

The carburetter shown by the drawing includes a body 1 through which the gases flow, for instance, downwardly and in the direction of the arrows of Figs. 1 to 3. In this body 1 is housed a throttle 2, mounted on a spindle 3 operated from a distance, and also a Venturi-shaped choke tube 4 which is preferably located on the upstream side of throttle 2.

Fuel under pressure, supplied for instance by a pump (not shown), is conveyed through a conduit 5 to a fuel chamber 6, the outlet of said conduit 5 being controlled by means of a valve 7, for

instance a ball valve, urged toward its seat by a spring 8. Valve 7 is controlled by a differential action diaphragm system, to be hereinafter described. The degree of opening of valve 7 determines the pressure under which fuel is injected into the carburetter.

Valve 7 is controlled by a rod 9 fixed to the central portion of a diaphragm 10 which constitutes one of the walls of fuel chamber 6. On the other side of the diaphragm is provided a pneumatic chamber 11 limited by a second diaphragm 12 parallel and coaxial with the first one but of greater area. Diaphragms 10 and 12 may be positively interconnected or else, as shown by Fig. 1, may mount on the inner face of the small diaphragm 10 a central sleeve 13 in which is freely engaged a rod 14 fixed on the inner face of the large diaphragm, whereby a unidirectional connection is provided between these two diaphragms.

The pressure existing in the inlet of the carburetter, preferably close to the throttled portion of choke tube 4, where the suction is maximum, is transmitted through a conduit 15 to pneumatic chamber 11. Eventually, this suction might be increased through the action of a multi-diffuser, in the known manner.

The large diaphragm 12 also constitutes a portion of the wall of a chamber 16 which communicates with the atmosphere or with the carburetter air intake through a permanently open small orifice 17a and, preferably, through a second orifice 17 closed by a check valve (ball 18) which opens toward the inside of chamber 16.

Owing to the differential effect obtained through the two unequal diaphragms 10 and 12, valve 7 is caused to open more or less according to the value of the suction existing in the carburetter air intake, valve 7 being opened against the action of spring 8 and the fuel pressure in conduit 5 by the combined effects of the suction in chamber 11 and the atmospheric pressure in chamber 16 acting upon the external face of diaphragm 12.

Fuel chamber 6 feeds, through a main jet 19, a conduit 20 leading to a jet 28, through which fuel is injected into conduit 29 during normal operation.

In conduit 20 is provided a check valve consisting, for instance and as shown on Figs. 1 and 3, of a ball 21 urged toward its seat by its own weight or by a return spring or, as shown by Fig. 2, of a needle valve 21a controlled by a diaphragm 22 which divides a box 23 into two chambers one of which, 24, communicates freely with feed conduit 20 so as to be subjected to the fuel pressure existing in chamber 6 while the other, 25, is connected to the atmosphere through an orifice 26, this chamber 25 containing a spring 27 which tends to apply needle valve 21a upon its seat. The effect thus obtained can be amplified by connecting chamber 25 not with the atmosphere but with choke tube 4 or with pneumatic chamber 11, whereby needle valve 21a is closed when chamber 6 is subjected to the action of a suction and is open when said chamber is subjected to the action of a pressure.

The normal working jet 28 is provided opposite the inlet of a nozzle 30 which opens into the engine induction pipe 29 either on the downstream side of throttle 2 (Figs. 1 and 2) or on the upstream side thereof (Fig. 3). When this nozzle opens into conduit 29 on the downstream side of the throttle (Figs. 1 and 2) jet 28 is made free from the action of the suction existing in

induction pipe 29, by being exposed to the action of atmospheric pressure. For this purpose, I may cut, in the inlet portion of nozzle 30, an aperture 31 through which atmospheric air can act and the area of which is substantially larger than the section of the neck portion of nozzle 30. When the nozzle opens into conduit 29 on the upstream side of throttle 2 (Fig. 3), I may proceed in the same manner but it is preferable to constitute the nozzle inlet by a chamber 31a which is connected with the atmosphere through one or several orifices 32, of small section, so that a suction of the same order of magnitude as that existing in choke tube 4 acts upon jet 28.

Fuel supply, when the engine is idling or running under very low loads, is ensured through an idling jet 35, branching off from feed conduit 20 on the downstream side of main jet 19 (Fig. 1) and in this case, only the cross section of main jet 19 is of significance to determine the fuel flow rate when running under load if jet 28 is of a section substantially larger than that of main jet 19.

Idling jet 35 may also (Fig. 2) be connected directly with fuel chamber 6 and in this case the respective outputs of both jets 28 and 35 are added to each other to ensure the feed of the engine during normal working or working under load.

By suitably determining the dimensions of jets 19 and 28, it is possible to obtain a whole range of solutions intermediate between those indicated in the first place and in the second place.

Conduit 34 opens into an idling conduit 36 which, preferably, communicates with the atmosphere through an orifice 37, either of constant section (Fig. 2) or adjustable by means of a needle valve 38 (Figs. 1 and 3).

The idling orifice 33, provided close to the edge of throttle 2, passes from the upstream to the downstream side thereof when, starting from the idling position, the throttle is slightly opened.

As shown by Fig. 1, the idling conduit 36 is connected through a calibrated orifice 39 with nozzle 30, into which opens the normal working jet 28.

In the embodiment of Fig. 3, a calibrated orifice 39a connects idling conduit 36 directly with the downstream side of the throttle.

Instead of acting through needle valve 38 on the orifice 37 through which primary air is admitted to the idling conduit, in order to adjust the richness of the idling mixture (Figs. 1 and 3) I may have recourse to a needle valve 40 which adjusts the section of an auxiliary idling jet 41 through which a portion of said mixture is introduced into induction conduit 29. In this case, the idling air inlet 37 can be given either a constant (Fig. 2) or an adjustable section.

The device thus constituted works in the following manner. When the engine is idling, valve 7 is urged toward its seat by the pressure of the fuel acting in conduit 5 and, eventually by that of its spring 8, which tends to prevent the inflow of fuel into chamber 6. As the suction existing at this time in choke tube 4 and, consequently, in pneumatic chamber 11, is practically zero, no effect is exerted on the system of diaphragms 10 and 12 that would tend to open valve 7. On the contrary, the suction that exists on the downstream side of throttle 2 is very high and is exerted, at least partly, upon idling jet 35, being transmitted through this jet to chamber 6. This action is transmitted to diaphragm 10, and tends to move it toward the right hand side of Fig. 1

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and thus to open valve 7. The fuel supplied by jet 35 is thus automatically replaced in chamber 6.

Displacement of diaphragm 10 is facilitated, in these conditions, by the unidirectional connection 13-14 provided between diaphragms 10 and 12, which enables diaphragm 12 to remain in fixed position when the small diaphragm 10 is thus sucked out. During idling operation, valve 21 (Figs. 1 and 3) or needle valve 21a (Fig. 2) prevents air from entering conduit 20 through jet 23, which inflow of air would prevent a good working of the idling means.

When throttle 2 is gradually opened, a suction takes place in choke tube 4 and this suction, which increases as the throttle is being opened more and more and the engine speed is increasing, is transmitted through conduit 15 to pneumatic chamber 11. The large diaphragm 12 is thus sucked in and moves toward the right hand side of Fig. 1 and it pushes, through connection 13-14, the small diaphragm 10 in the same direction, which causes, through rod 9, valve 7 to open. Fuel can therefore enter chamber 6. When the pressure transmitted to chamber 6 from inlet conduit 5 becomes higher than the pressure that tends to apply valve 21 or needle valve 21a upon its seat, fuel starts circulating in feed conduit 20 either through jets 19 and 23 or through jets 23 and 35, according to the value of the suction existing in the choke tube 4 of the carburetter, that is to say according to the rate of flow of air therethrough.

As the pressure under which fuel is supplied to conduit 5 is, in most cases, very high, a relatively strong force tends to keep valve 7 applied upon its seat and to this force is added that exerted on said valve 7 or on diaphragms 10 and 12 by return spring 3, which avoids accidental opening of valve 7 when the engine is stopped or idling. These forces, which oppose opening of valve 7, may, in some cases, exaggerately delay the time at which jet 19 or 23 is primed and thus disturb the operation of the carburetter.

In order to remedy this drawback, I provide in chamber 16, which communicates with the atmosphere or with the intake of the carburetter, an elastic member, for instance an elastic plate 42, which is located close to the external face of the large diaphragm 12, opposite the central portion thereof. One end of the plate, at 43, is fixed in the lateral wall of the casing 44 in which diaphragms 10 and 12 are housed and plate 42 is given a curvature such that, when it is left free, it bears upon a finger 45 which projects from the center of the external face of large diaphragm 12, with a tendency to push the latter toward the right hand side of Fig. 1. The effect of this thrust can be adjusted by means of a screw 43 acting upon a bent portion of plate 42 close to its point of fixation 43. The resistances that oppose opening of valve 7 can thus be compensated, at least partly, by the action of elastic plate 42. If necessary, this compensating effect may even become higher than the antagonistic efforts if it is desired to enrich the mixture supplied to the engine, at low speeds of operation of said engine.

In order to prevent the action of elastic plate 42 from being able to cause flooding of the apparatus when the engine is stopped or is running at low speed, I provide means through which the thrust of plate 42 is automatically eliminated when the throttling member or butterfly 2 comes close to its idling position. For this purpose, I may, for instance, fit on the control spindle 3 of

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the throttle an arm 47 acting upon a rod 48 freely slidable in a sleeve 49 extending through the wall 44 of the diaphragm casing at a place such that a finger 50 fixed on said rod, is located in the plane of displacement of the free end of plate 42 and can push back this end toward the left hand side of Fig. 1 (out of contact with the finger 45 of diaphragm 12) when throttle 2 gets close to its idling position. In this way the thrust of elastic plate 42 on diaphragms 12 and 10 and on obturator 7 is cancelled, either wholly or partly. Advantageously the connection between the arm 47 of the throttle valve and the finger 50 that pushes back or retains plate 42 is unidirectional.

For this purpose, body 1 carries a guiding sleeve 51 in which is freely engaged the end of rod 48, the latter being provided with an annular abutment 52 cooperating with a spring 52a, engaged on rod 48 and bearing upon fixed wall 44.

For the same purpose I may also (Fig. 1) connect, either directly or indirectly, chamber 11 with conduit 29 through a channel 61 opening, for instance, on the one hand, into conduit 15 and, on the other hand, into the carburetter body 1 at a point 62 on the upstream side of throttle 2, when the engine is idling, and on the downstream side of said throttle when the throttle is opened to a certain degree. Thus when the engine is idling, orifice 61 is without action but, after a certain opening of throttle 2, this orifice passes on the downstream side thereof and the suction existing in conduit 29 acts, to a certain degree, in conduit 15 and in chamber 11, thus facilitating displacement of diaphragm 12 toward the right, and therefore the opening of valve 7.

When throttle 2 is suddenly opened (when the engine is to pick up) it may be necessary or useful temporarily to increase the richness of the mixture supplied to the engine. For this purpose I make use of a third diaphragm 53 or analogous member (piston), provided in chamber 16 and which is parallel and coaxial with large diaphragm 12. The external face of diaphragm 53 is subjected to the effect of atmospheric pressure through an orifice 54. Rod 48, above mentioned, carries an arm 48a the free end of which is in contact, when the engine is idling and for small degrees of opening of the throttle, with the central portion of diaphragm 53 the external face of which is urged by a spring 55 bearing against the end wall of casing 44.

When throttle 2 is in its idling position, the diaphragm is pushed by arm 48a toward the left hand side of Fig. 1 and compresses spring 55. When the throttle is suddenly shifted from this position diaphragm 53 is pushed by spring 55 toward the right hand side of Fig. 1. I thus obtain a reduction of the volume of chamber 16 and, consequently, a temporary increase of the pressure existing in this chamber since outflow of air from this chamber through hole 17a is impeded by the small dimensions of this hole while air outflow through orifice 17 is prevented by the presence of check valve 18. This pressure acts upon diaphragm 12 and therefore causes valve 7 to open and fuel to be introduced into chamber 6 at a pressure higher than that existing during normal operation, when valve 7 is controlled solely by the suction acting in pneumatic chamber 11. When throttle 2 is again closed, diaphragm 53 is pushed back toward the left and check valve 18 opens automatically to permit the inflow of air into chamber 16, which prevents the formation of a depression or suc-

tion in this chamber, which might have a detrimental action upon the degree of richness of the mixture.

In some cases it may be advantageous to supply the engine with a richer mixture when throttle 2 is wide open and with a leaner and more economical mixture when running under light load, for instance by reducing the suction existing in pneumatic chamber 11 so as thus to reduce the pressure of injection of the fuel and, therefore, the richness of the mixture.

For this purpose, chamber 11 includes an auxiliary air inlet 56 provided with a needle valve 57 controlled by a diaphragm 58 or analogous element, subjected to the action of the suction existing in induction conduit 29 on the downstream side of throttle 2. This suction is transmitted through a conduit 59 connecting conduit 29 with the box which contains diaphragm 58. A spring 60 tends to apply needle valve 57 upon its seat. The other face of diaphragm 58 is subjected to atmospheric pressure or to the pressure existing in the air intake of the carburetter.

When the suction in induction conduit 29 reaches a predetermined value, diaphragm 58 is pulled toward the right hand side of Fig. 1 against the action of spring 60, which more or less opens air inlet 56 to reduce the suction existing in chamber 11, and therefore to make the mixture fed to the engine leaner. A calibrated orifice 65, interposed between chamber 11 and air inlet 56, permits of limiting this effect.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of my invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

What I claim is:

1. A carburetter which comprises, in combination, an induction conduit having an air intake, a throttle in said conduit, a venturi in said conduit, a fuel chamber having at least one wall portion movable in response to pressure variations therein, a fuel feed pipe leading into said chamber adapted to be supplied with fuel under pressure, valve means for controlling the flow section from said pipe to said chamber, said valve means being operatively connected with said movable wall portion to reduce said section when the pressure in said chamber increases and vice-versa, a pneumatic chamber having at least one wall portion movable in response to pressure variations therein, means for transmitting to said pneumatic chamber the suction existing in said venturi, means for mechanically interconnecting said two wall portions so that an increase of this suction tends to increase said flow section and vice-versa, the second mentioned wall portion being of greater area than the first one, a fuel nozzle opening into said induction conduit, communication means interposed between said fuel chamber and said nozzle including a main jet arranged to be uninfluenced by suction variations in said conduit on the downstream side of said throttle, idling means forming a fuel outlet opening into said conduit and communication means connecting said idling fuel outlet and said fuel chamber to transmit the suction in said conduit on the downstream side of said throttle to said fuel

chamber to control said valve means, said communication means including an idling jet.

2. A carburetter which comprises, in combination, an induction conduit having an air intake, a throttle in said conduit, a venturi in said conduit, a fuel chamber having at least one wall portion movable in response to pressure variations therein, a fuel feed pipe leading into said chamber adapted to be supplied with fuel under pressure, valve means for controlling the flow section from said pipe to said chamber, said valve means being operatively connected with said movable wall portion to reduce said flow section when the pressure in said chamber increases and vice-versa, a pneumatic chamber adjoining said fuel chamber so that said movable wall portion is common to both of said chambers, the wall of said pneumatic chamber that is located opposite said movable wall portion being itself movable, means for transmitting to said pneumatic chamber the suction existing in said venturi, means for mechanically interconnecting said two movable wall portions, the second mentioned wall portion being of larger area than the other one, a fuel nozzle opening into said induction conduit, communication means interposed between said fuel chamber and said nozzle including a main jet arranged to be uninfluenced by suction variations in said conduit on the downstream side of said throttle, idling means forming a fuel outlet opening into said conduit and communication means connecting said idling fuel outlet and said fuel chamber to transmit the suction in said conduit on the downstream side of said throttle to said fuel chamber to control said valve means, said communication means including an idling jet.

3. A carburetter which comprises, in combination, an induction conduit having an air intake, a throttle in said conduit, a venturi in said conduit, a fuel chamber having at least one wall portion movable in response to pressure variations therein, a fuel feed pipe leading into said chamber adapted to be supplied with fuel under pressure, valve means for controlling the flow section from said pipe to said chamber, said valve means being operatively connected with said movable wall portion to reduce said flow section when the pressure in said chamber increases and vice-versa, a pneumatic chamber adjoining said fuel chamber so that said movable wall portion is common to both of said chambers, the wall of said pneumatic chamber that is located opposite said movable wall portion being itself movable, means for transmitting to said pneumatic chamber the suction existing in said venturi, means for mechanically interconnecting said two movable wall portions, the second mentioned wall portion being of larger area than the other one, a fuel nozzle opening into said induction conduit on the downstream side of said throttle, communication means interposed between said fuel chamber and said nozzle including a main jet, the portion of said communication means between said jet and the outlet of said nozzle being provided with an orifice opening into the atmosphere and of a section larger than that of the neck of said nozzle, idling means forming a fuel outlet opening into said conduit and communication means connecting said idling fuel outlet and said fuel chamber to transmit the suction in said conduit on the downstream side of said throttle to said fuel chamber to control said valve means, said communication means including an idling jet.

4. A carburetter which comprises, in combination, an induction conduit having an air intake, a throttle in said conduit, a venturi in said conduit, a fuel chamber having at least one wall portion movable in response to pressure variations therein, a fuel feed pipe leading into said chamber adapted to be supplied with fuel under pressure, valve means for controlling the flow section from said pipe to said chamber, said valve means being operatively connected with said movable wall portion, to reduce said flow section when the pressure in said chamber increases and vice-versa, a pneumatic chamber adjoining said fuel chamber so that said movable wall portion is common to both of said chambers, the wall of said pneumatic chamber that is located opposite said movable wall portion being itself movable, means for transmitting to said pneumatic chamber the suction existing in said venturi, means for mechanically interconnecting said two movable wall portions, the second mentioned wall portion being of larger area than the other one, a fuel nozzle opening into said induction conduit on the upstream side of said throttle, communication means interposed between said fuel chamber and said nozzle including a main jet, the portion of said communication means between said jet and the outlet of said nozzle being provided with at least one small orifice opening into the atmosphere so as to subject said jet to a suction approximating that existing in said air intake, idling means forming a fuel outlet opening into said conduit and communication means connecting said idling fuel outlet and said fuel chamber to transmit the suction in said conduit on the downstream side of said throttle to said fuel chamber to control said valve means, said communication means including an idling jet.

5. A carburetter which comprises, in combination, an induction conduit having an air intake, a throttle in said conduit, a venturi in said conduit, a fuel chamber having at least one wall portion movable in response to pressure variations therein, a fuel feed pipe leading into said chamber adapted to be supplied with fuel under pressure, valve means for controlling the flow section from said pipe to said chamber, said valve means being operatively connected with said movable wall portion to reduce said flow section when the pressure in said chamber increases and vice-versa, a pneumatic chamber adjoining said fuel chamber so that said movable wall portion is common to both of said chambers, the wall of said pneumatic chamber that is located opposite said movable wall portion being itself movable, means for transmitting to said pneumatic chamber the suction existing in said venturi, means for mechanically interconnecting said two movable wall portions, the second mentioned wall portion being of larger area than the other one, a fuel nozzle opening into said induction conduit, a main communication passage between said fuel chamber and said nozzle including a main jet arranged to be uninfluenced by suction variations in said conduit, idling means comprising a fuel outlet opening to said conduit, an idling passage branching off from said main passage and leading to said idling fuel outlet to transmit the suction in said conduit on the downstream side of the throttle valve to said fuel chamber to control said valve means, said idling passage including an idling jet, and valve means in said main communication passage, on the downstream side of the branching of said

idling passage, arranged to permit fluid flow from fuel chamber to nozzle and to prevent it in the opposite direction.

6. A carburetter according to claim 5 in which said last mentioned valve means consist of an automatic check valve.

7. A carburetter according to claim 5 in which said last mentioned valve means include a needle valve, a box, a diaphragm rigidly connected with said needle valve and dividing said box into two chambers, one of said chambers being connected with the atmosphere and the other with said main communication passage on the upstream side of said valve.

8. A carburetter which comprises, in combination, an induction conduit having an air intake, a throttle in said conduit, a venturi in said conduit, a fuel chamber having at least one wall portion movable in response to pressure variations therein, a fuel feed pipe leading into said chamber adapted to be supplied with fuel under pressure, valve means for controlling the flow section from said pipe to said chamber, said valve means being operatively connected with said movable wall portion to reduce said flow section when the pressure in said chamber increases and vice-versa, a pneumatic chamber adjoining said fuel chamber so that said movable wall portion is common to both of said chambers, the wall of said pneumatic chamber that is located opposite said movable wall portion being itself movable, means for transmitting to said pneumatic chamber the suction existing in said venturi, means for mechanically interconnecting said two movable wall portions, the second mentioned wall portion being of larger area than the other one, a fuel nozzle opening into said induction conduit, communication means interposed between said fuel chamber and said nozzle including a main jet arranged to be uninfluenced by suction variations in said conduit on the downstream side of said throttle, idling means forming a fuel outlet opening into said conduit, communication means connecting said idling fuel outlet and said fuel chamber to transmit the suction in said conduit on the downstream side of said throttle to said fuel chamber to control said valve means, said communication means including an idling jet, spring means for urging said large area movable wall portion in the direction tending to open said valve means, and means operatively connected with said throttle for preventing said spring means from acting on said large area movable wall portion as long as said throttle is opened below a given degree of opening.

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