A. L. PAYTON.

CARBURETER.

APPLICATION FILED APR. 14, 1915.

1,173,378.

Patented Feb. 29, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

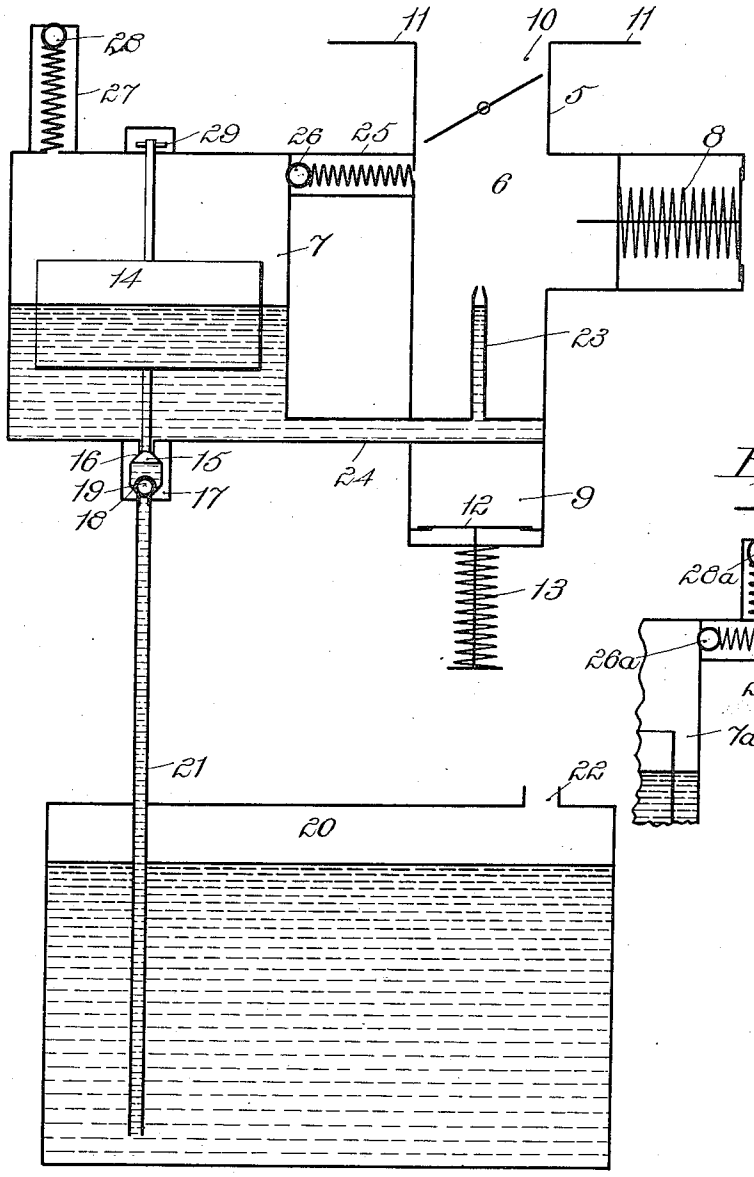


Fig. 3.

Witnesses:
Robert F. Brack
Albin C. Ahlberg

Inventor
Arthur L. Payton
By Williams & Bradbury
Attorneys

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2 SHEETS—SHEET 2.

Fig. 2.

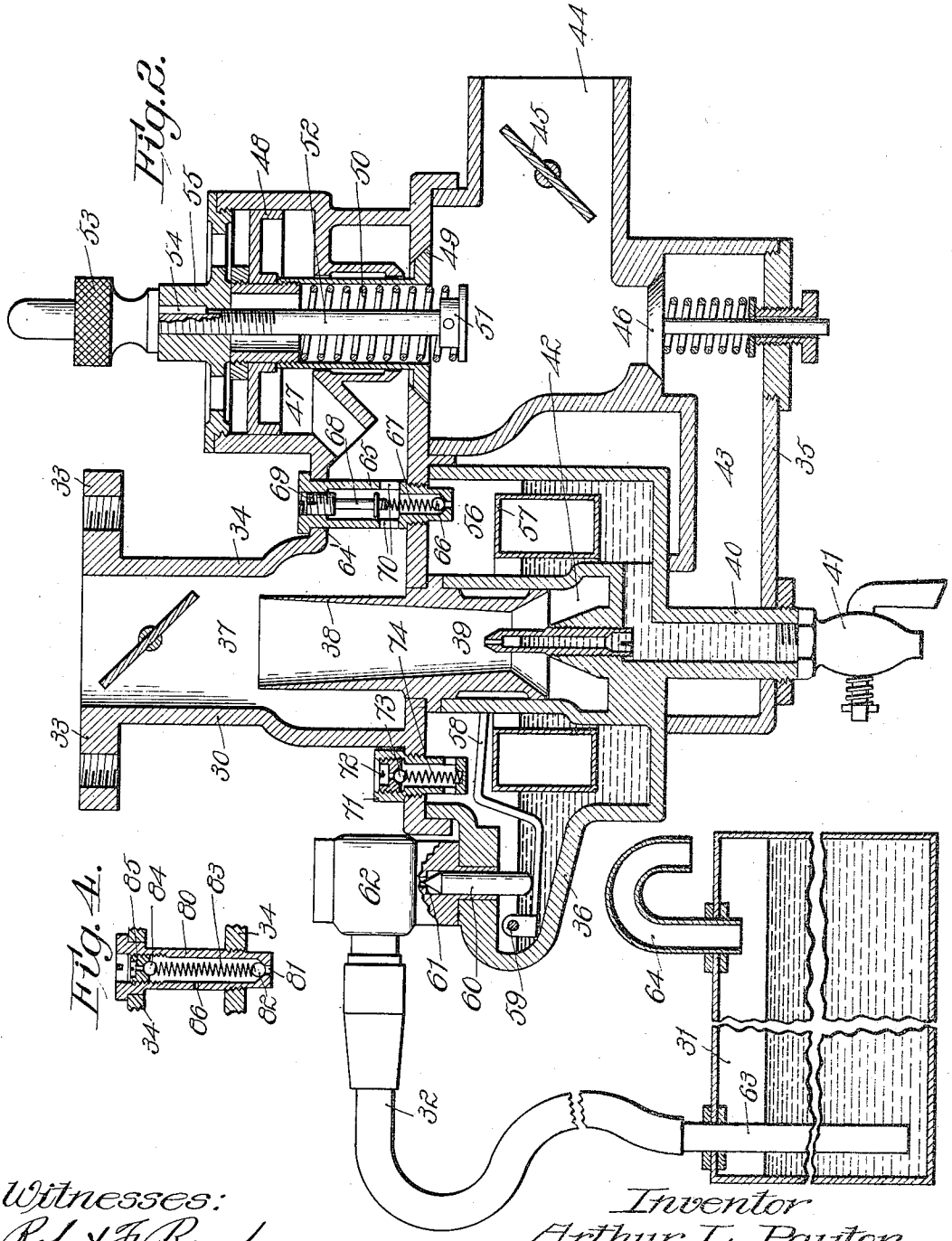


Fig. 4.

Witnesses:
Robert F. Bracke
Albin C. Ahlberg

Inventor
Arthur L. Payton
By Williams & Bradbury
Attorneys.

UNITED STATES PATENT OFFICE.

ARTHUR L. PAYTON, OF CHICAGO, ILLINOIS.

CARBURETER.

1,173,378. Specification of Letters Patent. Patented Feb. 29, 1916.

Application filed April 14, 1915. Serial No. 21,182.

To all whom it may concern:

Be it known that I, ARTHUR L. PAYTON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Carbureters, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to carbureters, and has for its object the provision of means whereby a constant fuel level is maintained in the float chamber of a carbureter from a fuel reservoir located below the plane of the carbureter without the employment of auxiliary supply apparatus, mechanical pump mechanism or pressure above atmospheric pressure within the fuel reservoir, as has been done in the past.

The object of my invention is to utilize the suction or vacuum created in the carbureter for providing and maintaining a difference of pressure between the supply reservoir and the float chamber, the supply reservoir being provided with a vent so as to subject atmospheric pressure upon the fuel within the reservoir. To provide for this difference in pressure between the float chamber and fuel reservoir the float chamber is arranged, by means of a passage way, to communicate with the mixing chamber of the carbureter. As the air is, therefore, drawn through the carbureter to the internal combustion engine in the usual manner, air will also be drawn through the above-mentioned passage way from the float chamber thereby decreasing the pressure, or causing a vacuum within the same. It is to be understood that the word vacuum herein used is intended to mean any pressure below atmospheric pressure. This vacuum within the float chamber causes a difference in pressure between it and the supply reservoir and thereby permits gasolene to flow upwardly from the reservoir to the carbureter. The usual valve mechanism is employed in the float chamber so that after a pre-determined level of fuel is reached in the chamber the intake port will be closed. In order to prevent an excessive vacuum from being produced within the float chamber I provide a passage way leading from the float chamber to the atmosphere, this passage way being provided with valve mechanism which opens after a pre-determined vacuum has been produced within the float chamber. It will readily be seen that by means of this valve a constant vacuum can be maintained. This valve is arranged to be adjusted so that it will be operated after a pre-determined vacuum has been reached, and I have found that by adjusting this valve to operate at a one pound vacuum within the float chamber effective operation of the fuel feed is secured.

These and other features of my invention will be more clearly brought out in the following description, reference being made to the accompanying drawings in which,

Figure 1 is a diagrammatic view of a carbureter, supply reservoir and pipe connection between the carbureter and the reservoir, illustrating the principle of operation of my invention. Fig. 2 is a longitudinal sectional view of a carbureter and supply reservoir, the carbureter being provided with the passageways and valves of my invention. Fig. 3 is a diagrammatic view illustrating the principle of operation of a modified form of my invention; and Fig. 4 is a fragmentary sectional view of a modified form of valve, the operation of which is somewhat similar to the operation of the valve mechanism illustrated in Fig. 3.

Similar characters of reference refer to similar parts throughout the several views.

Referring first to Fig. 1, a carbureter is diagrammatically illustrated at 5 which consists in a mixing chamber 6, float chamber 7, auxiliary intake valve 8, inlet 9, outlet 10 and flanges 11—11 to permit the carbureter to be secured to the intake manifold of the internal combustion engine. The intake 9 may be provided with either a restricted opening or a normally closed valve 12 held in position by means of a spring 13. The object of this valve will be hereinafter pointed out. The float chamber 7 carries the usual float 14 which carries a downwardly extending valve member 15 coöperating with the valve seat 16 carried by the extension 17 of the float chamber. This extension 17 also carries a valve seat 18 arranged to coöperate with the ball check valve 19 disposed within the extension 17 between the valve 15 and the seat 18.

The supply reservoir is illustrated at 20 and is arranged to communicate with the

float chamber through piping 21. This pipe 21 is preferably arranged to extend downwardly near the bottom of the reservoir. To permit atmospheric pressure to act upon the fuel within the reservoir I provide a vent at 22. The usual spray nozzle is illustrated at 23 positioned within and communicating with the mixing or suction chamber 6. Connection between this nozzle and the float chamber is made by the pipe 24. To provide a vacuum within the float chamber by means of the suction created in the mixing chamber of the carbureter, as above referred to, the float chamber 7 and mixing chamber are connected by means of a passageway 25 within which is disposed a spring pressed valve, here illustrated in the form of a ball 26, this valve seating against pressure within the float chamber. Screwthreaded, or otherwise secured to one of the walls of the float chamber 7, is a second valve member 27 which carries a spring pressed ball valve 28 seating against atmospheric pressure.

The operation of the device illustrated in Fig. 1 is as follows: The carbureter being attached to the intake manifold of an internal combustion engine, as has been pointed out, by means of the flanges 11—11, the suction created within the cylinders of the engine causes a partial vacuum to be created within the mixing chamber 6. This partial vacuum, as is well known in the art, causes air to be taken in through the intake opening 9 and fuel to be taken out of the spray nozzle 23. On account of the restricted inlet opening or valve mechanism employed at the intake the vacuum within the mixing chamber will not be immediately satisfied. The valve 26, will, therefore, be caused to open due to the difference in pressure between the mixing chamber and the float chamber 7, and thereby cause air to be extracted from within the float chamber. As the operation of the internal combustion engine continues fuel is extracted from the fuel nozzle 23, and, therefore, the float chamber, and lowers the level of the fuel therein. This lowering of the fuel level causes the float to move downwardly, the downwardly movement of which may be limited by means of a pin 29 carried by the float, and thus open the valve 15 permitting a free passage between the supply reservoir and the float chamber. Air having been taken out of the float chamber 7 by means of the vacuum produced in the mixing chamber a difference of pressure is had between the float chamber and the supply reservoir which is subjected to atmospheric pressure. Since the fuel within the supply reservoir is, therefore, under greater pressure than the fuel within the float chamber 7, and since the valve 15 is opened the fuel will be forced from the reservoir 20 through the pipe 21 into the float chamber 7 to reëstablish the predetermined fuel level whereupon the float 14 is moved upwardly to again close the valve 15 shutting off communication between the supply reservoir and the float chamber. It will readily be seen, therefore, that a constant fuel level is maintained within the carbureter.

It is desirable and, in fact, necessary that the pressure reduction within the fuel, or float, chamber 7 be always equal to a predetermined amount which is sufficient to lift the fuel the required distance, that is, from the main tank to the carbureter float chamber. For this purpose it would not matter if the vacuum or pressure reduction exceeded a predetermined amount, but in order that the vacuum will not be so great as to prevent the proper flow of gasolene through the spray nozzle into the atomizing chamber of the carbureter it has been found important to prevent the degree of pressure reduction from exceeding a predetermined amount. Between these limits, therefore, the carbureter operates satisfactorily.

By means of the restricting valves 8 and 12 of Fig. 1, and 46 and 49 of Fig. 2, the pressure reduction within the carbureting chamber is maintained always as great as the pressure reduction necessary for lifting the gasolene from the supply tank to the float chamber. However, at high speeds the pressure reduction in the atomizing chamber of the carbureter becomes considerably greater than that in the float chamber, thus serving to draw through the atomizing nozzle a greater amount of fuel. Ordinarily the float chamber of a carbureter is open to atmospheric pressure and the air intake restrictions are so slight that at low speeds the amount of pressure reduction within the atomizing chamber is very slight. By the arrangement of valves with which my carbureter is provided the pressure reductions in the float chamber and in the atomizing chamber are substantially proportional so that the entire system may be said to be maintained at a slight pressure reduction. The operation, therefore, is the same as the operation of the usual carbureter excepting for the pressure reductions in the float and atomizing chambers. I have found that a one pound pressure reduction in the float chamber is sufficient to raise the fuel for a distance of about thirty inches, which is sufficient for most purposes where the carbureter is used in connection with automobiles. Let us assume that a one pound vacuum is necessary, or desirable, to effectively cause the fuel to be transmitted from the reservoir to the float chamber, the valve 28 being arranged then to open after a one pound vacuum has been established within the float chamber. If now a high vacuum is produced within the mixing or suction chamber 6, as would be the case if the inter-

nal combustion engine were operating at a high rate of speed, a greater than one pound vacuum will tend to be produced within the float chamber 7. As soon as this pre-determined vacuum, therefore, is secured within the float chamber the valve 28 opens and provides a free air passage way from the atmosphere to the mixing chamber 6 through the float chamber 7 and the passage way 25. The valve mechanism illustrated at 18 and 19 serves to prevent the fuel within the carbureter from returning to the supply reservoir after it has once been delivered to the float chamber.

In Fig. 2 I have illustrated my invention adapted to a standard carbureter in which the carbureter is illustrated at 30, the supply reservoir at 31, and piping providing communication between the reservoir and the float chamber at 32. The carbureter is provided with the usual flanges 33—33 adapted to be secured to the intake manifold of an internal combustion engine. The carbureter comprises a top casing 34, bottom casing 35, and float casing 36 interposed between the casings 34 and 35. The casing 34 is provided with a mixing or suction chamber 37 which connects with a Venturi tube 38, which is held in position between the float chamber casing 36 and the casing 34. Extending upwardly into the Venturi tube is a nozzle 39 screw threaded into the casing 36 and adapted to be adjusted longitudinally by means of a tool which may be inserted through the opening provided in the downwardly extending boss 40 of the casing 36. The opening in this downwardly extending boss is normally closed by means of a cock 41 which allows the fuel within the float chamber to be drained off. Communicating with the lower end of the Venturi tube 38 is a passageway 42 in the casing 36 which communicates with the passageway 43 of the casing 35. This last mentioned passageway connects with the atmosphere at 44 at which point a valve 45 may be inserted to restrict the air intake.

As pointed out in connection with Fig. 1, it is desirable to have the air intake restricted in some way and I have, therefore, illustrated a spring pressed valve 46 which is interposed between the passageway 43 and the intake 44. This valve is adjustable so that any desired restriction may be placed upon the incoming air.

The mixing chamber 37 communicates with the chamber 47 disposed under a piston 48 carried by an auxiliary valve 49. This valve 49 is held in its closed position by means of a spring 50 interposed between it and an enlarged portion 51 carried by the rod 52 extending upwardly and screw threaded into a nut 53. The rod 52 carries a longitudinal keyway in which is inserted a key 54 carried by a spider 55 so as to prevent angular movement of the rod 52. The enlarged portion 51 which serves as an abutment for the spring 50 may be adjusted longitudinally by means of the nut 53, and thus allow any tension of the spring 50 to be placed upon the valve 49. As a vacuum is created within the chamber 47, due to the suction of the internal combustion engine, the piston 48 will be moved downwardly to open the auxiliary valve 49 and thus permit a free passage of air from the intake 44 into the mixing chamber 37.

Positioned within the float chamber 56 is an annular float 57 coöperating with the lever 58 pivoted at 59 to the casing 36. The lever 58 coöperates with a plunger valve 60 coöperating with the valve seat 61 provided in the extension 62 which is connected to the piping 32 communicating with the pipe 63 carried by the fuel reservoir and extending downwardly to a position near the bottom. A vent is shown at 64 to permit the atmosphere to act upon the fuel within the reservoir. Inserted in an aperture 64′ in the upper wall of the casing 34 and screw threaded into the lower wall of this casing is a valve 65 which connects with the float chamber 56. This valve comprises a ball 66 seating against pressure within the float chamber and normally held in position by means of the spring 67 abutting against an adjustable rod 68 screw threaded at 69 within the upper portion of the valve. By means of adjusting the rod 68 any desired spring tension may be placed upon the ball 66. The valve 65 is cut away, as illustrated, at 70—70 so that communication is made between the mixing chamber 37 and the float chamber 56 when the valve 66 is open.

Screw threaded into the wall of the casing 34 and connecting with the atmosphere is a second valve 71 which carries an adjustable valve seat 72 coöperating with the ball 73 held in position by means of a spring 74. By adjusting the valve seat 72 any desired spring tension may be placed upon the ball 73, and thus cause the valve to open at the desired time, as has been described in connection with Fig. 1. The valve 61 is here shown above the level of the fuel within the float chamber and it is, therefore, unnecessary to provide means for preventing the flow of the fuel from the float chamber back into the fuel reservoir after it has once been delivered to the same.

The operation of the device illustrated in Fig. 2 is similar to the operation of that illustrated in Fig. 1, that is, as suction is created within the mixing chamber 37 air is drawn from within the valve 65 due to the restriction placed upon the incoming air by means of the valve 46. As this vacuum is produced within the valve 65 the ball 66 is opened and a vacuum created within the float chamber 56. As the fuel is emitted

from the float chamber through the nozzle 39 the float will open the plunger valve 60 and permit fuel to be delivered from the reservoir to the float chamber due to the difference in pressure between the reservoir and float chamber. As the vacuum within the float chamber 56 is increased above a pre-determined amount the valve 73 will open and thus permit air to be taken into the float chamber so that a constant vacuum is maintained.

In the modification illustrated in Fig. 3 the float chamber is illustrated diagrammatically at 7^a, the mixing chamber at 6^a, the passage way communicating with the float chamber and mixing chamber at 25^a, and the valve within the same at 26^a. A second valve is provided at 28^a, which connects the passage way 25^a and the atmosphere, the valve 28^a being seated against atmospheric pressure. This valve serves the same purpose as the valve 28 illustrated in Fig. 1, that is, after a certain pre-determined vacuum is produced within the float chamber 7^a, the valve 28^a will be opened and thus permit air to be taken in from the atmosphere to the mixing chamber instead of the air within the float chamber. This construction may be desirable in that it does not produce within the float chamber a mixture which may be ignited from the combustion within the internal combustion engine, as no continuous passage of air is had through the float chamber to produce an ignitible mixture. The spring cooperating with the valve 28^a may be arranged so as to operate at a slightly greater pressure than is necessary to operate the valve 26^a.

Fig. 4 illustrates a valve incorporating substantially the same principles of operation as that illustrated in Fig. 3. This valve comprises a tubular member 80 screw threaded into the lower wall of the casing 34 and communicating at 81 with the interior of the float chamber. Seated against pressure within the float chamber is a ball 82 held in position by means of a spring 83 abutting against a second valve ball 84 coöperating with an adjustable valve seat 85 screw threaded into the upper portion of the tubular valve member 80. An aperture 86 serves to provide communication between the mixing chamber 37 and the interior of the valve member 80. This aperture is preferably restricted, as illustrated, the object of which is to provide an opening to the valve member 80 of a size such that a vacuum will not be produced within the valve member which cannot satisfactorily be accommodated by the valves 82 and 84. The opening adjacent the ball 82 is slightly larger than the opening adjacent the ball 84. By means of this construction the ball 82 is subjected to a larger area of pressure from within the float chamber than the pressure subjected to the ball 84 by means of the atmosphere. By means of this construction it will be seen that when the vacuum is produced within the valve member 80 the ball 82 will open before the ball valve 84. After a certain pre-determined vacuum has been produced within the float chamber the pressure upon the ball 84 will preponderate over the pressure exerted upon the ball 82 and will, therefore, open to permit atmosphere to enter the valve, and, therefore, into the mixing chamber. By means of the adjustable valve seat 85 any tension may be placed upon the ball valves 82 and 84.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A carbureter comprising an atomizing chamber, a fuel chamber provided with two passage-ways directly communicating with the atomizing chamber, one above and the other below the fuel level in the fuel chamber, a throttle posterior and an automatic pressure reducing valve anterior of said atomizing chamber, a supply reservoir, piping for connecting said reservoir with the fuel chamber and opening into the fuel chamber at a point above the fuel level therein, and means for maintaining a substantially uniform reduced pressure within the fuel chamber during wide variation of pressure reduction in the atomizing chamber.

2. A carbureter comprising a suction chamber, a float chamber provided with an inlet port and with a fuel passage way communicating with the suction chamber, a float for controlling said port, a supply reservoir, piping for connecting said reservoir with the inlet port, and a pair of pressure reducing valves, one communicating with the atmosphere and the other with the upper part of the float chamber for maintaining a substantially uniform constant vacuum within the float chamber during large decreases in pressure in the suction chamber.

3. A carbureter comprising a suction chamber, a fuel chamber provided with a fuel passage way communicating with the suction chamber, a supply reservoir, piping for connecting said reservoir with the fuel chamber, and means for maintaining a substantially uniform pressure reduction within the fuel chamber during operation, said means comprising a restricted passage way connecting the top of the fuel chamber with the atmosphere, and a second restricted passage way connecting the suction chamber with the top of the fuel chamber.

4. A carbureter comprising a suction chamber, a fuel float chamber provided with an inlet port and with a passage way communicating with the suction chamber, a float for controlling said port, a supply reservoir,

piping for connecting said reservoir with the inlet port, and means for maintaining a substantially uniform pressure reduction within the float chamber during operation, said means comprising a pair of pressure reducing valves, one communicating with the atmosphere and the other with the upper part of the float chamber.

5. A carbureter comprising a suction chamber, a posterior throttle therefor, a fuel chamber provided with a passage-way above its fuel level communicating with the suction chamber, valve mechanism within said passage-way seated against pressure in the fuel chamber, a supply reservoir, piping for connecting said reservoir with the fuel chamber, and means for preserving a predetermined pressure reduction with reference to atmospheric pressure within the fuel chamber throughout wide variation of pressure reduction in the suction chamber.

6. A carbureter comprising a suction chamber, a float chamber provided with an inlet port and with a passage-way above the fuel level communicating with the suction chamber and a float for controlling said port, automatic valve mechanism within said passage-way seated against pressure within the float chamber, a supply reservoir, piping for connecting said reservoir with the inlet port, and means including said automatic mechanism for maintaining a substantially uniform pressure reduction relative to the atmosphere within the fuel chamber throughout wide variation of pressure reduction in the suction chamber.

7. A carbureter comprising a suction chamber, a fuel chamber provided with a passage way above the fuel level communicating with the suction chamber, automatic valve mechanism within said passage way seated against pressure within the fuel chamber, a supply reservoir, piping for connecting said reservoir with the fuel chamber, and means for maintaining a pressure reduction within the fuel chamber, said means comprising the said automatic valve mechanism and a passage way connecting the fuel chamber with the atmosphere, together with additional automatic valve mechanism within the latter passage way seating against atmospheric pressure.

8. A carbureter comprising a suction chamber, a float chamber provided with an inlet port and with a passage way above the fuel level communicating with the suction chamber, a float for controlling said port, automatic valve mechanism within said passage way seated against pressure within the fuel chamber, a supply reservoir, piping for connecting said reservoir with the inlet port, and means for maintaining a pressure reduction within the float chamber, said means comprising the said automatic valve mechanism and a passage way connecting the float chamber with the atmosphere together with additional automatic valve mechanism within the latter passage way seating against atmospheric pressure.

9. A carbureter having a suction chamber and an atomizing nozzle therein, an air passage surrounding said nozzle, an auxiliary air passage the air from which enters the suction chamber at a point remote from said nozzle, a float and fuel reservoir, and a restricted passage communicating between said suction chamber and the upper part of said float and fuel reservoir, together with reducing valve mechanism between the atmosphere and the float chamber for preserving uniform pressure reduction in the float and fuel chamber with respect to the atmospheric pressure, during both slight and excessive pressure reductions in the suction chamber.

10. A carbureter comprising a carbureting chamber, a float chamber provided with an inlet port and with an air passage communicating with the carbureting chamber, a single automatic valve mechanism within said passage way seated against pressure within the float chamber and opened by a difference in pressure between the float and the carbureting chamber, a float within the float chamber for controlling said port, a supply reservoir, and means connecting said reservoir with the inlet port of the float chamber.

11. A carbureter provided with a suction chamber and a float chamber, a reducing valve communicating between the atmosphere and the float chamber, and a restricted passage way communicating between the float chamber at a point above the fuel level thereof and the suction chamber.

12. A carbureter having a float chamber and a carbureting chamber in which the reduction of pressure is variable, an air passage between said float chamber above the level of the liquid therein and said carbureting chamber, a valve in said passage permitting a continuous passage of air from said float chamber to said carbureting chamber, means to maintain a constant difference between the atmospheric pressure and that in the float chamber whenever the difference between the atmospheric pressure and that in the suction chamber is greater than the desired difference between the atmospheric pressure and that in the float chamber, a fuel intake port for the float chamber, the difference in pressure between the atmosphere and the contents of the chamber serving to force fuel through said port.

13. A carbureter provided with a suction chamber and a float chamber and having at one point a single wall separating said chambers and a passage-way through said wall communicating with the float chamber

at a point above the fuel level therein, and pressure reducing valve mechanism in said passage.

14. A carbureter of the suction type provided with a mixing chamber and with a float chamber, means separating said chambers provided with a small opening communicating with the upper part of the float chamber and the mixing chamber, whereby the suction means for the carbureter causes a reduction of pressure in the float chamber, means for preserving a substantially constant pressure reduction in the float chamber below that of the external atmosphere during wide variation of pressure reduction in the mixing chamber.

15. A carbureter having a suction chamber and an atomizing nozzle therein, a float and fuel reservoir, a restricted passage communicating between said suction chamber and the float and fuel reservoir at a point above the level of the fuel therein, together with reducing valve mechanism for preserving substantially constant pressure reduction in the float and fuel chamber relative to the atmosphere.

16. A carbureter for internal combustion engines of the suction type, a throttle between the intake manifold of the engine and the atomizing chamber of said carbureter, a float and fuel reservoir for the carbureter, a passageway between the carbureting chamber and the float and fuel reservoir above the level of the fuel in the fuel reservoir, together with reducing valve mechanism for preventing the pressure reduction in the float and fuel chamber exceeding a predetermined maximum.

17. A carbureter provided with an atomizing chamber and a gasolene reservoir adjacent thereto, a pair of automatically operating valves serially included in a path for air from the atmosphere to said atomizing chamber, said valves being arranged to coöperate to maintain a substantially constant depression in the space between them, and each serving as a path for all of the air which passes the other, the space between said valves being in direct communication with the surface of the gasolene in said reservoir.

In witness whereof, I hereunto subscribe my name this 8th day of April A. D. 1915.

ARTHUR L. PAYTON.

Witnesses:
ROBERT F. BRACKE,
ALBIN C. AHLBERG.