A. G. IONIDES.

CARBURETER.

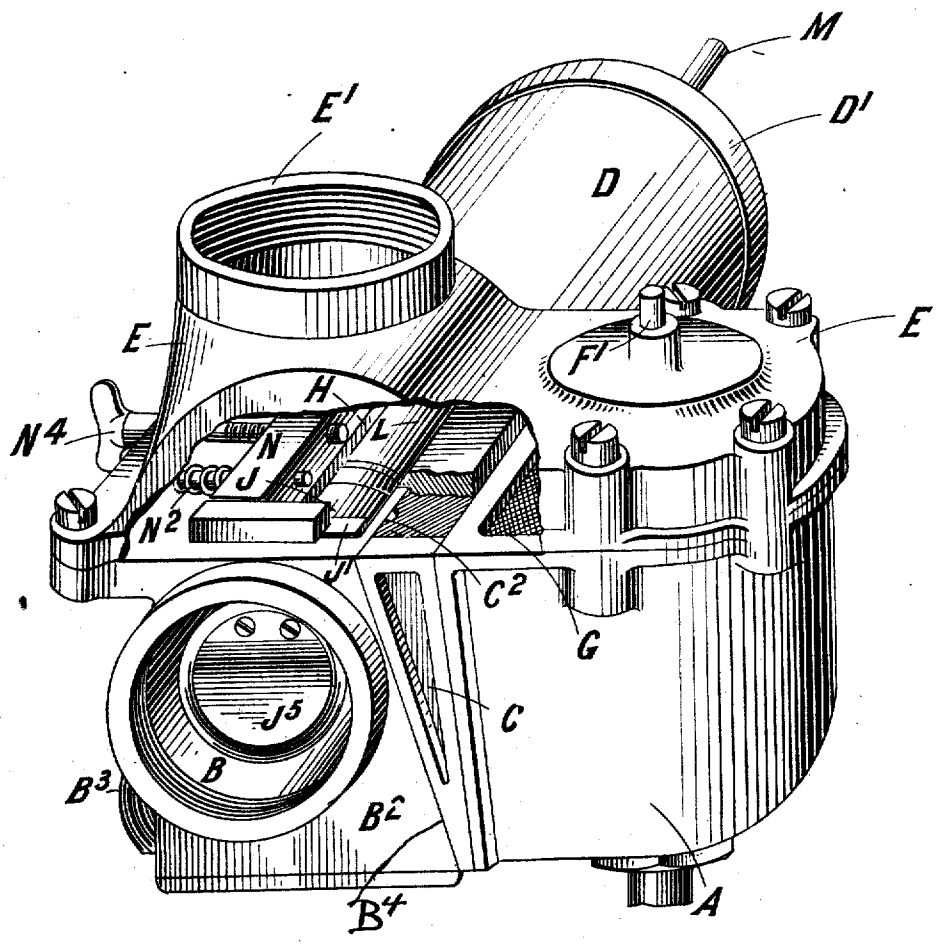
APPLICATION FILED JAN. 26, 1909.

1,011,960.

Patented Dec. 19, 1911.

4 SHEETS—SHEET 1.

FIG. 1.



Witnesses:

Elizabeth Griffith

Thomas Durant

Inventor

Alexander G. Ionides,

by Church & Church

his Attys.

A. G. IONIDES.

CARBURETER.

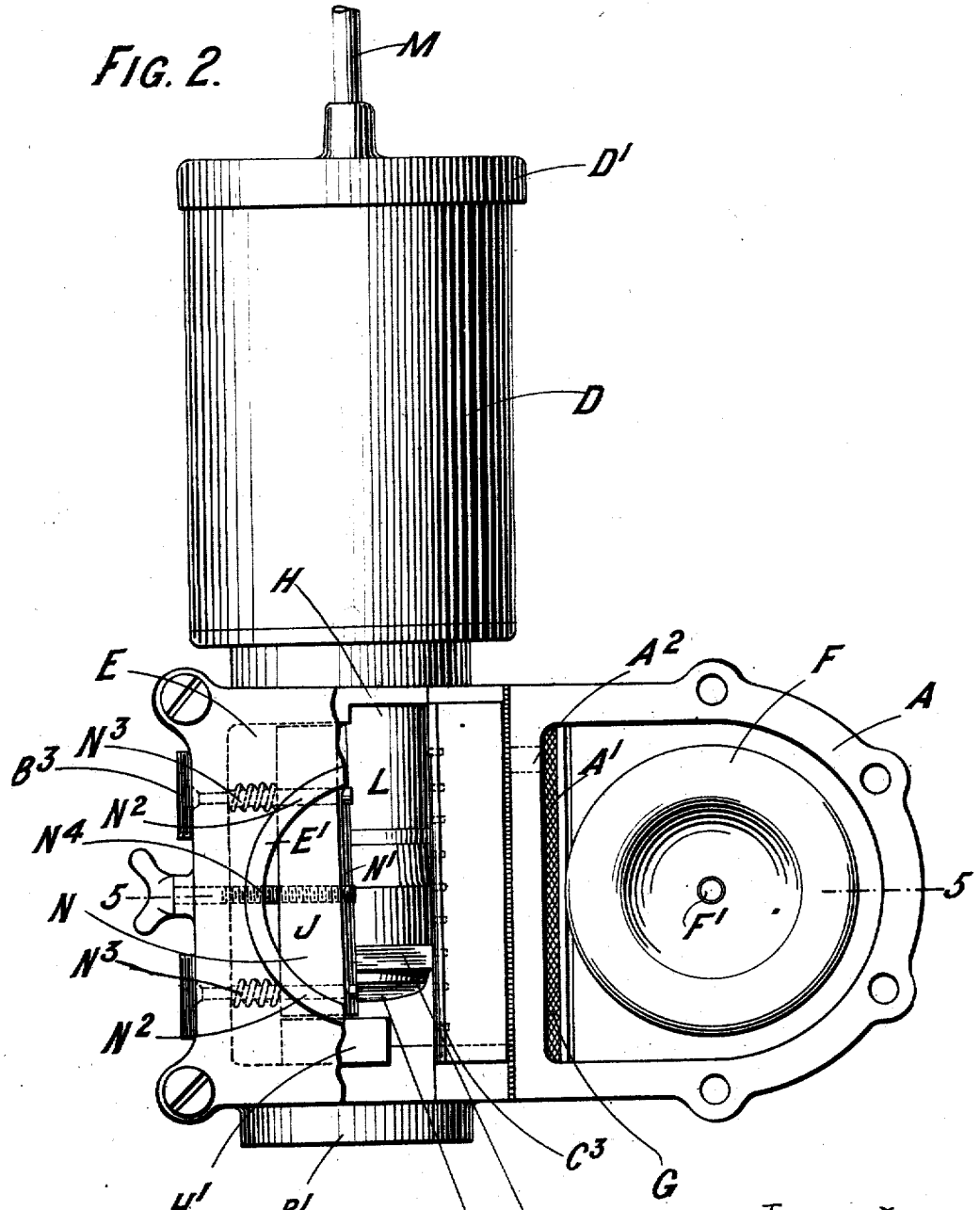
APPLICATION FILED JAN. 26, 1909.

1,011,960.

Patented Dec. 19, 1911.

4 SHEETS—SHEET 2.

FIG. 2.



Witnesses

Elizabeth Jaffet

Thomas Durant

Inventor

Alexander G. Ionides.

by Church & Church

his Attys

A. G. IONIDES.

CARBURETER.

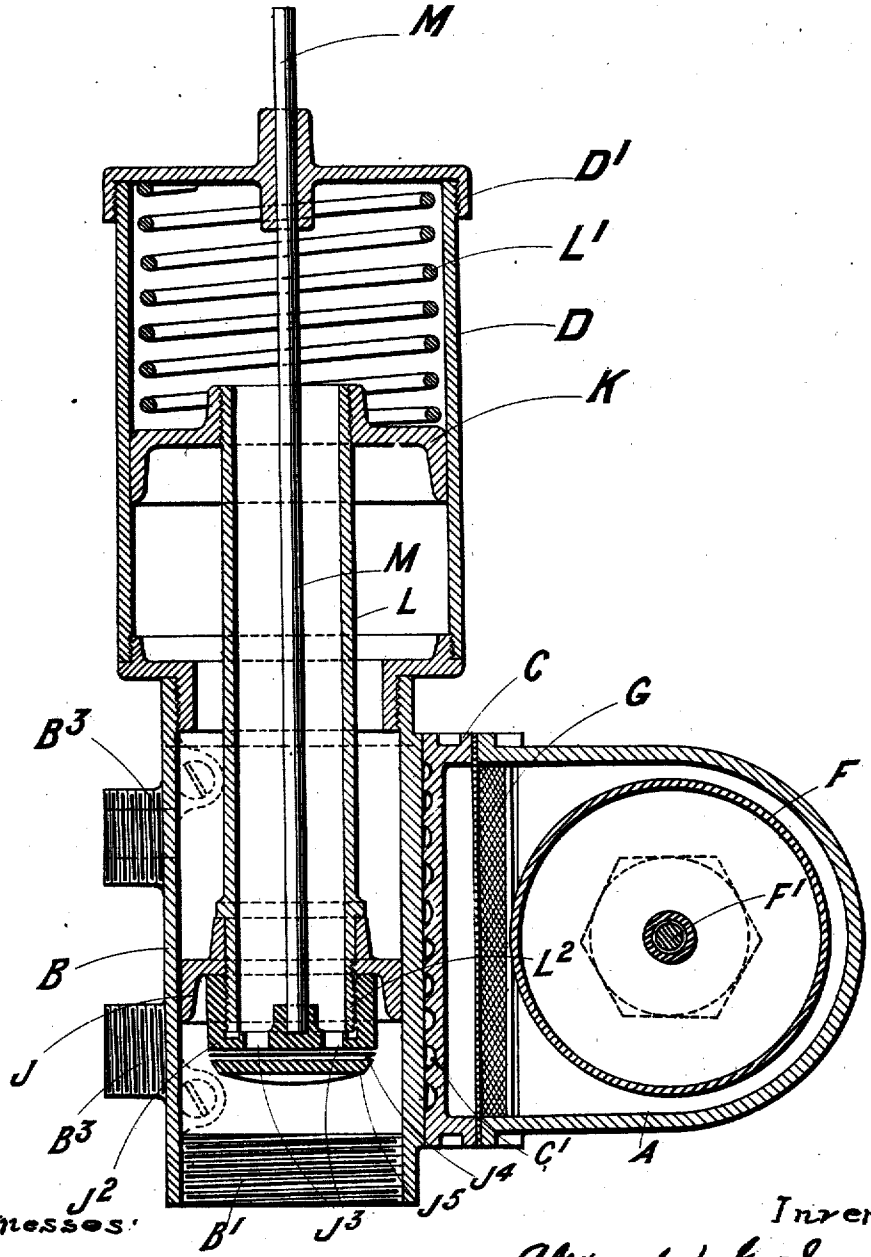
APPLICATION FILED JAN. 26, 1909.

1,011,960.

Patented Dec. 19, 1911.

4 SHEETS—SHEET 3.

FIG. 3.



Witnesses:

Elizabeth Griffith

Thomas Durant

Inventor

Alexander G. Ionides

by Church & Church

his Attys.

A. G. IONIDES.

CARBURETER.

APPLICATION FILED JAN. 26, 1909

1,011,960.

Patented Dec. 19, 1911.

4 SHEETS—SHEET 4.

FIG. 4.

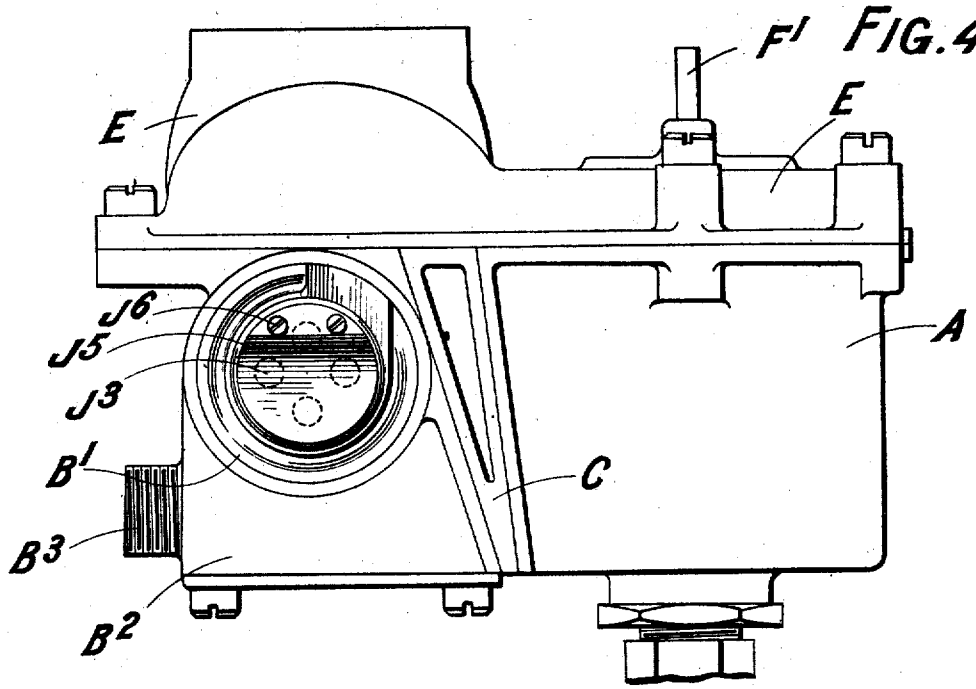
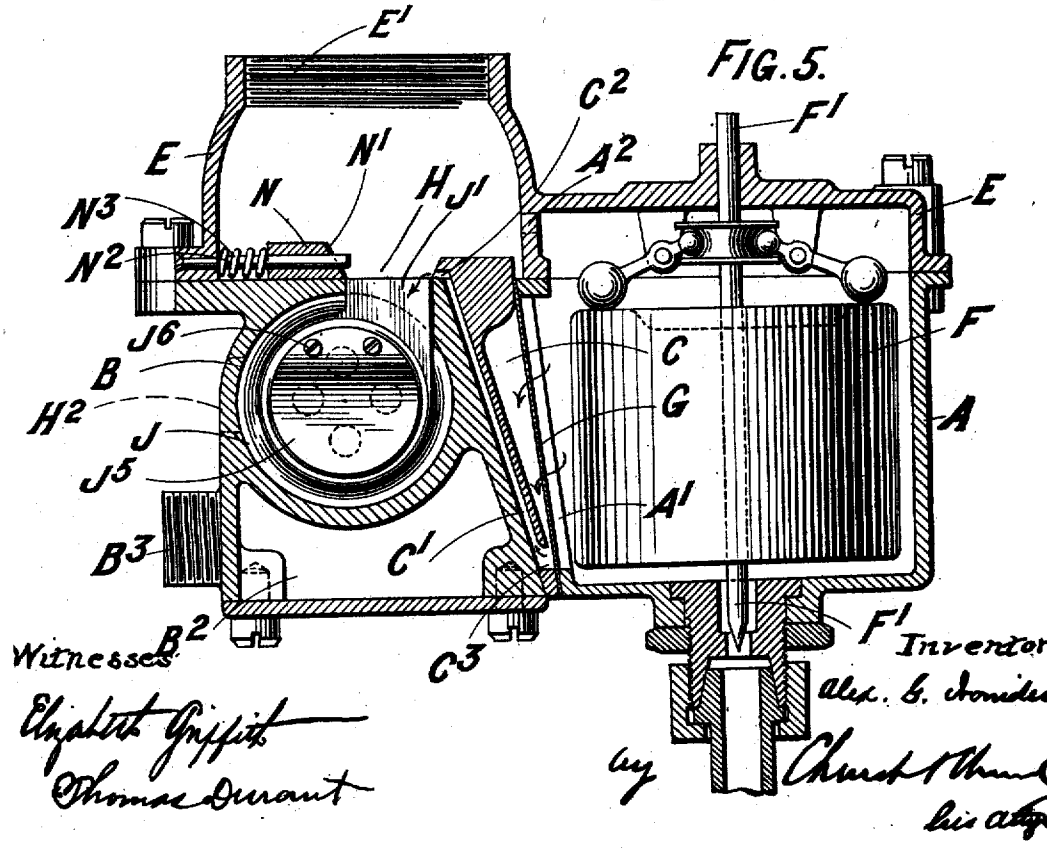


FIG. 5.



Witnesses

Elizabeth Griffith

Thomas Durant

Inventor

Alex. G. Ionides

by Church & Church

his attys

UNITED STATES PATENT OFFICE.

ALEXANDER GEORGE IONIDES, OF LEICESTER, ENGLAND, ASSIGNOR OF ONE-THIRD TO JOSEPH WALLACE GODDARD AND ONE-THIRD TO DENZIL JOHN JARVIS, BOTH OF LEICESTER, ENGLAND.

CARBURETER.

1,011,960. Specification of Letters Patent. Patented Dec. 19, 1911.

Application filed January 26, 1909. Serial No. 474,354.

To all whom it may concern:

Be it known that I, ALEXANDER GEORGE IONIDES, a subject of the King of England, residing at Leicester, Leicestershire, in England, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to carbureters for internal combustion engines and has for its object to construct a carbureter which will automatically maintain approximately constant the proportions of fuel and air in the combustible mixture during variations in the engine speed, while the fuel is also delivered into the carbureter in such a way as to insure satisfactory vaporization.

In the present construction the fuel enters a chamber provided with some known form of float or other device for maintaining a constant level and passes thence through a filter and jet orifices into the mixing chamber.

In the accompanying drawings Figure 1 is a perspective view of the improved carbureter, part of the covering and other portions being broken away; Fig. 2 is a plan with part of the covering broken away; Fig. 3 is a longitudinal sectional plan; Fig. 4 is an end elevation looking toward the outlet, and Fig. 5 is a section on the line 5—5 of Fig. 2, the piston in the carbureter being shown in elevation.

Like letters of reference indicate the same parts throughout the drawings.

According to this invention the mixing chamber has a yielding member disposed within or forming part of it and so constructed and arranged as to control the dimensions of the effective portion of the air inlet opening to the chamber. The fuel jets are so disposed as for example in a continuous row contiguous to the air inlet opening, that variation of the dimensions of the effective air opening causes a greater or less number of fuel jets to become operative so that the number of jets operative and therefore the amount of fuel issuing from these jets is always proportionate to the quantity of air which passes through the opening into the mixing chamber. A convenient construction is to make the mixing chamber of cylindrical form the yielding member being a piston movable within it so as to uncover a greater or less amount of the inlet opening which is arranged as a longitudinal slot in the side of the cylinder. The outlet from the mixing chamber is preferably disposed at one end of the cylinder. The effective portion of the inlet opening may appropriately be termed the throat of the carbureter inasmuch as the air is slightly throttled in passing therethrough and to a great extent mingled with the fuel before the mixture enters the chamber, which for convenience is herein referred to as the mixing chamber. Any fuel not vaporized falls on the preferably heated lower surface of the mixing chamber and is there evaporated. The dimensions of the throat opening are not only variable by the movement of the yielding member which may take place automatically or otherwise but there is also provided a positive adjustment whereby the width of the slot constituting the throat opening may be varied.

It is to be understood that the yielding member or piston does not close or cover any of the fuel passage, but merely restricts the area of the air passage and the fuel opening or openings will be acted upon only by the air or suction in the open part of the throat.

At the end of the mixing chamber opposite to the outlet therefrom and on the other side of the yielding member or piston this chamber opens into another chamber conveniently also of cylindrical form. In this chamber is disposed a yielding member conveniently in the form of a piston which is connected to the yielding member in the mixing chamber the second piston having an area larger than that of the piston in the mixing chamber. The two pistons or yielding members are pressed toward the outlet opening by means of a spring or by gravity acting through a cord over a pulley and a weight. The connection between the two pistons is conveniently in the form of a tube so as to allow of communication being established between the portions of the two chambers which are on the sides of the pistons remote from each other. This communicating passage is conveniently provided with a non-return valve operative to allow air to flow from behind the larger piston in the direction of the fuel outlet from the mixing chamber. The construction is such that when suction takes place in the mixing chamber the yielding member moves so as to uncover or increase the dimensions of the

throat opening this movement of the yielding member resulting from the difference of pressure which exists on either side of the throat opening. This difference of pressure results in unequal forces acting on the two pistons which move and enlarge the throat opening until the difference in pressure is reduced to that corresponding with the tension of the spring as the demand from the engine increases. As the opening is enlarged so is the supply of fuel and air increased, the former owing to a greater number of fuel jets being brought into operation and the supply of a greater quantity of air naturally resulting from the increased size of the opening. The general dimensions of the throat opening bear such a relation to the areas of the jet orifices that the proportions of fuel and air remain constant throughout the range of variation in the dimensions of the throat opening effected by the movement of the yielding member. The area of each of those few jet openings which are first uncovered may however be made slightly in excess of the remaining jet openings which are preferably all similar, but I do not wish to be understood as limiting the invention to this particular construction as other arrangements will at once suggest themselves which will give a richer mixture when the engine is running at slow speed or being started.

On the air inlet side of the throat opening there may be a passage communicating with the upper part of the float chamber so that when suction is taking place any decrease in pressure in what may be termed the air inlet chamber is communicated to the float chamber thereby allowing unrestrained flow of fuel through those jets which are unmasked by the movement of the yielding member and simultaneously preventing issue of fuel from those jets which have not yet been unmasked.

The jets through which the fuel issues may be constructed in some convenient manner. Passages lead to the jet orifices from a chamber one side of which is formed by a sheet of wire gauze or other suitable filtering material which in turn lies over a correspondingly shaped opening in the side of the float chamber. The size of the openings in the filter is such that it is not possible for any particle to be carried through the filter which cannot pass freely through the jet orifices.

It is to be noted that the fuel jets are so disposed contiguous to the throat opening that the orifices of all these jets are always open. The terms "operative" or "inoperative" as applied to these jets are therefore used not as in any way indicating that certain of these jets have their orifices uncovered while others are closed but that according to the position of the yielding member or piston certain of the jets are brought under the influence of the lower pressure or suction existing at or toward one end of the throat opening as the yielding member moves in the manner described. On the other hand those jets which lie along the edge of that portion of the throat opening through which air cannot at the time pass are "inoperative" by reason of their lying outside the influence of the reduced pressure consequent on the suction from the engine. The cause therefore of the jets becoming "operative" or "inoperative" in the sense in which they are so here described is their being brought within or kept without the range of influence of the engine suction as air is drawn through the throat opening and as the dimensions of this opening vary.

In the particular embodiment of the invention illustrated a float chamber A is disposed at one side of the mixing chamber B a piece C being disposed between them for the purpose of a convenient construction of the fuel passages between the float chamber and mixing chamber. The mixing chamber B is conveniently formed cylindrical and has mounted co-axially with it and at the opposite end to the outlet B′ the auxiliary chamber D. A cover E closes in the top of the float chamber and forms the air inlet E′. Within the float chamber A is disposed the usual float F controlling the fuel inlet valve F′ in some known manner. In the side of the float chamber adjacent to the mixing chamber is formed a large opening A′ which is covered by a sheet of metal gauze G or other filtering material carried by the piece C. This piece C is of wedge shape having formed in one face a series of grooves C′ which at the upper end terminate in jet passages C^2 formed in the base of the wedge while at the other end these grooves open into a longitdinal slot C^3. The back or float chamber side of the wedge piece C is hollow the slot or opening C^3 forming a communication between the lower portion of the space in the hollow back and the grooves C′. The gauze G covers in the back of the wedge piece. The face of the wedge in which are formed the grooves C′ lies against a flat side B^4 of the mixing chamber B, the grooves C′ thus forming ducts through which the fuel can pass to the jets C^2 finding its way from the float chamber through the gauze G and down through the opening C^3 which is situated on a level with the bottom of the float chamber. To prevent clogging the dimensions of the jet openings must bear such relation to the size of the openings in the gauze or filtering material G that any particle which can pass through this gauze shall be able to pass freely through the jets. The grooves C′ forming the fuel ducts are conveniently of good size so as to allow the fuel to pass freely to the jets. Though it is

convenient to form the fuel ducts C' in this manner and employ the wedge piece C it will be appreciated that these ducts might be formed in the face of the flat side B^4 of the mixing chamber or in some other way the piece C being formed otherwise than of wedge shape or dispensed with entirely the ducts and filtering gauze or other material being disposed otherwise as found convenient between the float chamber and mixing chamber. Also though the jets are here described and shown as plain holes, yet they may be formed in some other manner which will enable jets of sufficient fineness to be obtained.

The mixing chamber B is conveniently cylindrical with an inlet opening in the form of a longitudinal slot H this opening being so arranged in relation to the jet orifices that the latter are contiguous to the opening through its length. Within the chamber B is a yielding member in the form of a piston J having a projection J' which fits within the opening H the upper edge or face of this projection however being so arranged as to lie just below the plane of the jet openings and thus clear of them. The piston J with its projection J' forms a yielding member or wall of the chamber B such that as the piston moves within the chamber B the size of the opening H is varied while simultaneously a larger or smaller number of jets become operative or exposed to the air passing in through the throat H.

The auxiliary chamber D practically forms an extension of the chamber B there being free communication between the two chambers. In the auxiliary chamber is disposed a piston K which is connected with the piston J by a tube L, this tube affording a means of communication between that portion of the chamber B which lies on the side of the piston J adjacent to the outlet B' and the outer end of the auxiliary chamber D which lies on the remote side of the piston K. In this outer portion of the chamber D is disposed a spring L' which bears against the face of the piston K. The end of the tube L which carries the piston J is closed by a non-return valve. A convenient construction of the arrangement of this valve and the formation of the projection J' on the piston J being to extend the end of the tube L through the piston J as at L^2. This extended portion is screw-threaded and carries a cap J^2 which is formed in one with the projection J'. This cap is perforated as at J^3 these perforations being closed by a flap valve J^4 constituting a valve whose outward movement is limited by the curved plate J^5. This guard plate J^5 and the flap valve J^4 are attached to the cap J^2 at some point J^6 which is adjacent to the opening H this being desirable so that air drawn through the opening shall not interfere with the operation of the valve. A rod M is attached to the center of the cap J^2 and extends through the tube L out through the head D' of the chamber D the rod passing freely through the cylinder head or cover D' but fitting so closely as to prevent excessive leakage. The object of this rod is twofold as in the first place in the event of any grit or foreign matter getting into either of the chambers B or D and causing the pistons to jam they can be forcibly moved and freed by means of the rod M. Further this rod can be marked or otherwise arranged to constitute an indicator which will show the position of the piston J in the chamber B thus serving to enable the power developed by the engine to be ascertained as will be appreciated from the explanation of the operation of the mechanism hereinafter given.

The general dimensions of the throat opening H can be varied by the adjustment of the plate N which is disposed along the side of the opening opposite to the jets. The forward edge N' of this plate is conveniently inclined with relation to that edge of the opening H over which it lies so that when this plate N is advanced over the opening H the general dimensions of the latter will be reduced in such a way that the reduction is at first greater toward the end of the opening which is first effective the reduction being graduated toward the opposite end. The plate N is conveniently carried on pins N^2 on which are springs N^3 tending to force the edge N' of the plate N over the opening H. The movement of the plate N is however controlled by a screw N^4 operated from the outside of the casing or by some similar means as for example a wire connection with a handle or the like disposed conveniently for the driver of the engine. The principal use of the plate N is to enable an adjustment of the carbureter to be made with a view to suiting varying atmospheric conditions.

As it is desirable to obtain an increased richness of the mixture at low powers when the effective portion of the opening H is of small dimensions it is convenient to form that end of the opening H adjacent to the outlet B' narrower or otherwise constrict it as for example by arranging a plate H' which will lie across a portion of this opening and limit the initial area of the opening to the necessary extent. Those jets which are adjacent to this restricted portion of the throat opening are preferably so formed as to allow of the passage of a larger amount of fuel than the remainder or the majority of the jets as is indicated by the varying size of the passage C' in Fig. 3.

Free communication is established between the chamber formed by the casing E leading from the inlet opening E' and the interior of the float chamber A by a hole

A^2 so that there will practically be uniformity of pressure on the main inlet opening side of the throat opening H in the communicating portions of the chambers B and D which lie between the pistons J and K and in the float chamber A.

The operation of the carbureter is as follows:—When suction from the engine takes place through the outlet opening B′ for the combustible mixture the pressure in that part of the chamber B which lies on the outlet side of the piston J is reduced, this reduction of pressure being communicated through the valve J^3 J^4 and tube L to the farther end of the auxiliary chamber D behind the piston K. This pressure is naturally below that which exists within the casing E and consequently in the communicating parts of the chambers B and D between the pistons J and K so that the difference of these pressures causes movement of the pistons J and K in their respective chambers the movement of the piston J being away from the outlet opening B′. This movement causes the projection J′ of the piston J to open a portion of the throat opening H at that portion of this opening which is adjacent to the outlet B′. The jets contiguous to this portion of the opening H are immediately free to deliver fuel into the effective portion of the opening and the suction through the opening causes the fuel to issue from the jets in such a state that a fairly intimate mixture with the air takes place actually in the throat opening and a thorough admixture is assured before the combustible mixture passes through the outlet B′ to the engine. It will be seen that as the rate of suction increases the piston K will be so moved as to increase the dimensions of the inlet or throat opening H. Simultaneously additional jet openings are brought into position or allowed to become operative so that the proportions of fuel and air in the combustible mixture are maintained constant during variations in the engine speed. It will be appreciated that this variation takes place automatically in accordance with the variations in the engine demand and as a result of these variations in demand and consequent variations in the rate of suction which cause the yielding member or piston to vary the size of the throat opening. Therefore when suction from the engine takes place the effective part of the opening H will be enlarged until the reduction of pressure due to the flow of air through this opening attains the value determined by the tension of the spring. The rate of suction of an engine during each suction stroke usually is not constant and the valve J^4 is so arranged that the mean vacuum or reduction of pressure in the outer end of the cylinder D is approximately that corresponding to the maximum vacuum or reduction of pressure in the engine intake B′ during the suction stroke of the engine with the result that the effective size of the opening H corresponds approximately to the maximum demand during each stroke and therefore allows the engine to draw in a charge with a mean reduction in pressure for the whole charge considerably below the maximum. The described arrangement obviously allows a larger charge to be drawn in than would be possible without the use of this valve or some equivalent in the form perhaps of a dashpot. It will be clear that only those jets which are opposite the effective throat are operative since the pressure on the remainder of the jets is the same as that in the float chamber.

Beneath the chamber B or arranged otherwise in relation thereto as may be found convenient is a jacket B^2 provided with inlets and outlets B^3. Heated air gases or water can be passed through this jacket if desired so as to vaporize any fuel which has not been properly broken up by spraying from the jets. The float chamber A may also be jacketed to enable it to be heated in the same way.

It will be understood that though in the above described construction the yielding member or piston J in the chamber B is arranged to be operated automatically by the difference of pressure yet in some instances it may be convenient to provide positive operation and consequent regulation of the dimensions of the opening H by hand or otherwise than automatically.

The operation of the present carbureter I think is perfectly clear from the specification and drawings for, while the fuel opening or openings always remain open and uncovered, the portion of it, (*i. e.*, said fuel opening) which is active is determined entirely by the area of the throat opening through which the air is admitted to the engine intake. That portion of the fuel opening which is back of the partition J′, *i. e.*, remote from the opening in the throat is not exposed to the air passing in through the throat nor to the suction of the engine and, consequently, no fuel is drawn in through the same, the active area of the fuel opening being limited to the open portion of the throat.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a carbureter, the combination of a mixing chamber having a throat opening for the admission of air and fuel and a delivery opening for the mixture, a plurality of fuel passages in communication with a source of fuel supply, said passages opening near one side of the throat opening and always remaining open and uncovered, a member movable in the mixing chamber and act-

ing as a partition to cut off or shield from the action of the air passing through the throat opening those fuel passages which are on that side of it remote from the delivery opening, and a piston operated by the suction of the engine for moving the movable member to vary the number of fuel passages which are exposed to or shielded from the air passing through the throat.

2. In a carbureter, the combination of a mixing chamber having a throat opening for the admission of air and fuel and a delivery opening for the mixture, a plurality of fuel passages in communication with a source of fuel supply, said passages opening near one side of the throat opening and always remaining open and uncovered, a member movable in the mixing chamber and acting as a partition to cut off or shield from the action of the air passing through the throat those fuel passages which are on that side of it remote from the delivery opening, a piston, operated by the suction of the engine and an operative connection between the piston and movable member for moving the movable member to vary the number of fuel passages which are exposed to or shielded from the action of the air passing through the throat.

3. In a carbureter, the combination of a mixing chamber having a throat opening for the admission of air and fuel and a delivery opening for the mixture, means for varying the dimensions of the whole throat opening, a plurality of fuel passages in communication with a source of fuel supply, said passages opening near one side of the throat opening and always remaining open and uncovered, a member movable in the mixing chamber and acting as a partition to cut off or shield from the action of the air passing through the throat those fuel passages which are on that side of it remote from the delivery opening, a piston operated by the suction of the engine and an operative connection between the piston and the movable member in the mixing chamber.

4. In a carbureter, the combination of a mixing chamber having a throat opening for the admission of air and fuel and a delivery opening for the mixture, a plurality of fuel passages in communication with a source of fuel supply, said passages opening near one side of the throat opening and always remaining open and uncovered, an auxiliary or extension chamber in communication with the mixing chamber, a member movable in the mixing chamber and acting as a partition to cut off or shield from the action of the air passing through the throat those fuel passages which are on that side of it remote from the delivery opening, a movable member in the auxiliary chamber of greater area than the member in the mixing chamber, an operative connection between the member in the mixing chamber and the member in the auxiliary chamber, and a communicating passage between the remote portions of the mixing chamber and auxiliary chamber so that the outer faces of the two members are acted upon by the suction of the engine.

5. In a carbureter, the combination of a mixing chamber having a throat opening for the admission of air and fuel and a delivery opening for the mixture, a plurality of fuel passages in communication with a source of fuel supply, said passages opening near one side of the throat opening and always remaining open and uncovered, an auxiliary or extension chamber in communication with the mixing chamber, a member movable in the mixing chamber and acting as a partition to cut off or shield from the action of the air passing through the throat, those fuel passages which are on that side of it remote from the delivery opening, a movable member in the auxiliary chamber of greater area than the member in the mixing chamber, an operative connection between the member in the mixing chamber and the member in the auxiliary chamber; a communicating passage between the remote portions of the mixing chamber and auxiliary chamber so that the outer faces of the two members are acted upon by the suction of the engine, and means in the auxiliary chamber tending to move the members in a direction opposite to that in which they are moved by the suction.

6. In a carbureter, the combination of a mixing chamber having a throat opening for the admission of air and fuel and a delivery opening for the mixture, a plurality of fuel passages in communication with a source of fuel supply, said passages opening near one side of the throat opening and always remaining open and uncovered, an auxiliary or extension chamber in communication with the mixing chamber, a member movable in the mixing chamber and acting as a partition to cut off or shield from the action of the air passing through the throat those fuel passages which are on that side of it remote from the delivery opening, a movable member in the auxiliary chamber of greater area than the member in the mixing chamber, an operative connection between the member in the mixing chamber and the member in the auxiliary chamber, a communicating passage between the remote portions of the mixing chamber and auxiliary chamber so that the outer faces of the two members are acted upon by the suction of the engine, a non-return valve in such passage, and means in the auxiliary chamber tending to move the members in a direction opposite to that in which they are moved by the suction.

7. In a carbureter, the combination of a

mixing chamber having a throat opening for the admission of air and fuel and a delivery opening for the mixture, a source of fuel supply controlled by a float valve, a plurality of fuel passages communicating with the source of fuel supply, said passages opening near one side of the throat opening and always remaining open and uncovered, an air inlet to the float chamber, a member movable in the mixing chamber and acting as a partition to cut off or shield from the action of the air passing through the throat those fuel passages which are on that side of it remote from the delivery opening, a piston operated by the suction of the engine and an operative connection between the piston and the movable member in the mixing chamber, whereby the said member is moved to vary the number of fuel passages which are exposed to or shielded from the air passing through the throat.

8. In a carbureter, the combination of a mixing chamber having a throat opening for the admission of air and fuel and a delivery opening for the mixture, a source of fuel supply controlled by a float valve, a plurality of fuel passages communicating with the source of fuel supply, said passages opening near one side of the throat opening and always remaining open and uncovered, a passage connecting the chamber containing the float valve and the space leading to the throat opening, a member movable in the mixing chamber and acting as a partition to cut off or shield from the action of the air passing through the throat those fuel passages which are on that side of it remote from the delivery opening, and means operated by the suction of the engine for moving the movable member to vary the number of fuel passages which are exposed to or shielded from the action of the air passing through the throat.

9. In a carbureter, the combination of a cylindrical mixing chamber having a throat opening whose length is greater than its breadth formed lengthwise in one side of the mixing chamber for the admission of air and fuel and a delivery opening for the mixture at one end of the cylindrical mixing chamber, a plurality of fuel passages in communication with a source of fuel supply, said passages opening near one side of the throat opening and always remaining open and uncovered, and a piston movable in the mixing chamber and controlled and operated by the suction of the engine, such piston being so formed as to act as a partition to cut off or shield from the action of the air passing through the throat those fuel passages which are on that side of it remote from the delivery opening.

10. In a carbureter, the combination of a cylindrical mixing chamber having a throat opening whose length is greater than its breadth formed lengthwise in one side of the mixing chamber for the admission of air and fuel and a delivery opening for the mixture at one end of the cylindrical mixing chamber, a plate positioned at one of the long sides of the throat opening and movable over the whole length of the opening to vary the dimensions of the whole of this opening, means for moving this plate and retaining it in various positions, a plurality of fuel passages in communication with a source of fuel supply, said passages opening near one side of the throat opening and always remaining open and uncovered, and a piston movable in the mixing chamber and controlled and operated by the suction of the engine, such piston being so formed as to act as a partition to cut off or shield from the action of the air passing through the throat those fuel passages which are on that side of it remote from the delivery opening.

11. In a carbureter, the combination of a cylindrical mixing chamber having a throat opening whose length is greater than its breadth formed lengthwise in one side of the mixing chamber for the admission of air and fuel and a delivery opening for the mixture at one end of the cylindrical mixing chamber, a plurality of fuel passages in communication with a source of fuel supply, said passages opening near one side of the throat opening and always remaining open and uncovered, a piston movable in the mixing chamber and so formed as to act as a partition to cut off or shield from the action of the air passing through the throat those fuel passages which are on that side of it remote from the delivery opening, a cylindrical auxiliary chamber co-axial with the mixing chamber and in communication with that end of the latter opposite to the delivery opening, a piston movable within the auxiliary chamber the area of the piston being greater than the area of the piston in the mixing chamber, and a tubular connection between the two pistons so that their outer faces are acted upon by the suction of the engine.

12. In a carbureter, the combination of a cylindrical mixing chamber having a throat opening whose length is greater than its breadth formed lengthwise in one side of the mixing chamber for the admission of air and fuel and a delivery opening for the mixture at one end of the cylindrical mixing chamber, a plurality of fuel passages in communication with a source of fuel supply, said passages opening near one side of the throat opening and always remaining open and uncovered, a piston movable in the mixing chamber and so formed as to act as a partition to cut off or shield from the action

of the air passing through the throat those fuel passages which are on that side of it remote from the delivery opening, a cylindrical auxiliary chamber co-axial with the mixing chamber and in communication with that end of the latter opposite to the delivery opening, a piston movable within the auxiliary chamber the area of this piston being greater than the area of the piston in the mixing chamber, a tubular connection between the two pistons so that their outer faces are acted upon by the suction of the engine, and a non-return valve in the tube.

13. In a carbureter, the combination of a cylindrical mixing chamber having a throat opening whose length is greater than its breadth formed lengthwise in one side of the mixing chamber for the admission of air and fuel and a delivery opening for the mixture at one end of the cylindrical mixing chamber, a plurality of fuel passages in communication with a source of fuel supply, said passages opening near one side of the throat opening and always remaining open and uncovered, a piston movable in the mixing chamber and so formed as to act as a partition to cut off or shield from the action of the air passing through the throat those fuel passages which are on that side of it remote from the delivery opening, a cylindrical auxiliary chamber co-axial with the mixing chamber and in communication with that end of the latter opposite to the delivery opening, a piston movable within the auxiliary chamber the area of this piston being greater than the area of the piston in the mixing chamber, a tubular connection between the two pistons so that their outer faces are acted upon by the suction of the engine, a non-return valve in the tube, and a spring in the auxiliary chamber tending to move the pistons in a direction opposite to that in which they are moved by the suction of the engine.

14. In a carbureter, the combination of a cylindrical mixing chamber having a throat opening whose length is greater than its breadth formed lengthwise in one side of the mixing chamber for the admission of air and fuel and a delivery opening for the mixture at one end of the cylindrical mixing chamber, a plurality of fuel passages in communication with a float chamber to which fuel is supplied, said passages opening near one side of the throat opening and always remaining open and uncovered, a casing with air inlet forming an air chamber over the throat opening, a passage forming a communication between the air chamber and the float chamber, a filter so disposed that the fuel must pass therethrough on its way from the float chamber to the passages, means for heating the mixing chamber, a plate positioned at one of the long sides of the throat opening and movable over the whole length of the opening to vary the dimensions of the whole of the opening, means for moving this plate and retaining it in varying positions, a piston movable in the mixing chamber and so formed as to act as a partition to cut off or shield from the action of the air passing through the throat those fuel passages which are on that side of it remote from the delivery opening, a cylindrical auxiliary chamber co-axial with the mixing chamber and in communication with that end of the latter opposite to the delivery opening, a piston movable within the auxiliary chamber the area of this piston being greater than the area of the piston in the mixing chamber, a tubular connection between the two pistons so that their outer faces are acted upon by the suction of the engine, a non-return valve in the tubular connection, and a spring in the auxiliary chamber tending to move the pistons in a direction opposite to that in which they are moved by the suction of the engine.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALEXANDER GEORGE IONIDES.

Witnesses:

WALTER W. BALL,

F. HOOD.