W. C. CARTER.

CARBURETER.

APPLICATION FILED APR. 12, 1910.

1,010,116.

Patented Nov. 28, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

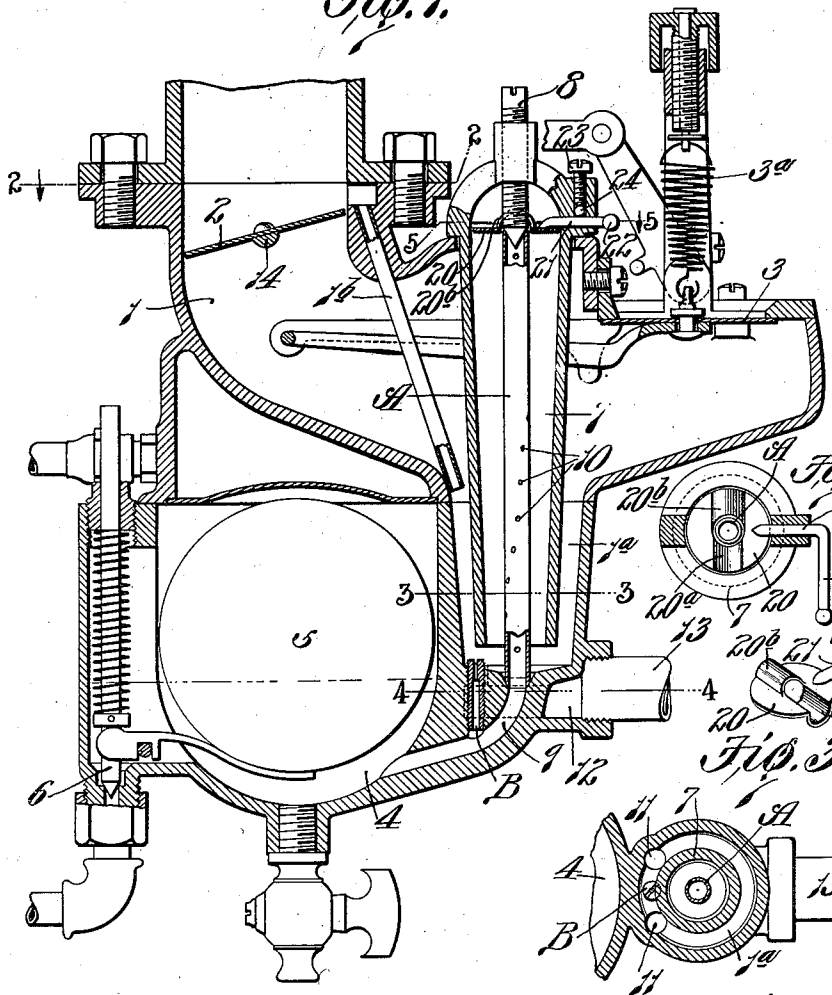


Fig. 5.

Fig. 6.

Fig. 3.

Fig. 4.

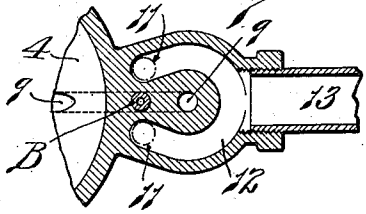
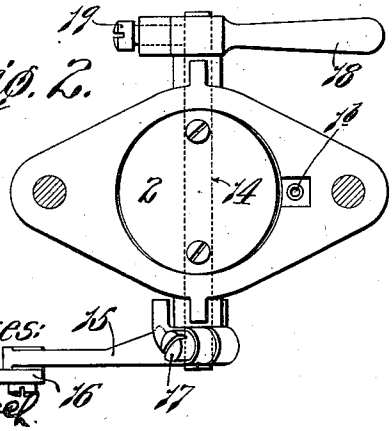


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 7.

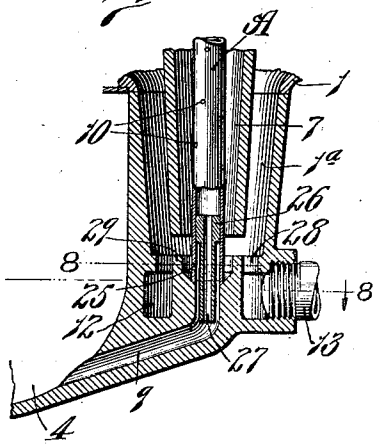
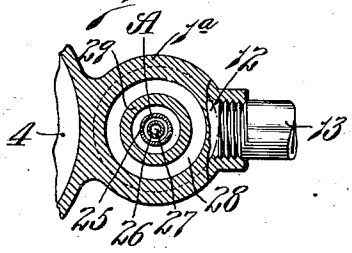


Fig. 8.



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UNITED STATES PATENT OFFICE.

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CARBURETER.

1,010,116. Specification of Letters Patent. Patented Nov. 28, 1911.

Application filed April 12, 1910. Serial No. 554,978.

To all whom it may concern:

Be it known that I, WILLIAM C. CARTER, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Carbureters, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to carbureters, and particularly to carbureters of that type which comprise a vertically disposed multiple jet tube in which the liquid fuel rises and falls as the speed of the motor varies.

The main object of my present invention is to provide a carbureter that is economical in the consumption of fuel and which will produce a uniform mixture at different speeds of the motor.

Another object is to provide a carbureter that is equipped with a primary jet which supplies fuel to the mixing chamber up to a certain speed of the motor, and a multiple jet which comes into service automatically and supplies varying quantities of fuel when the motor is running above a certain speed. And still another object is to provide a carbureter which is so designed that the operator can adjust the throttle valve accurately and with very little trouble.

Other objects and desirable features of my invention will be hereinafter pointed out.

I have herein illustrated my present invention embodied in a carbureter of the construction described in my pending application Serial No. 526,823, filed November 8, 1909, but I wish it to be understood that the invention is not limited to a carbureter of the exact construction shown in said pending application as the particular design of the mixing chamber, the air valve and the float chamber are immaterial so far as my broad idea is concerned.

Figure 1 of the drawings is a vertical sectional view of a carbureter embodying my present invention; Fig. 2 is a top plan view of a portion of said carbureter, said view being taken on approximately the line 2—2 of Fig. 1; Fig. 3 is a horizontal sectional view taken on approximately the line 3—3 of Fig. 1; Fig. 4 is a horizontal sectional view taken on approximately the line 4—4 of Fig. 1; Fig. 5 is a horizontal sectional view taken on approximately the line 5—5 of Fig. 1; Fig. 6 is a perspective view of the air valve that is arranged at the upper end of said pipe; Fig. 7 is a vertical sectional view of a modified form of my invention; and Fig. 8 is a horizontal sectional view taken on the line 8—8 of Fig. 7.

Referring to the drawings which illustrate the preferred form of my present invention, 1 designates the mixing chamber of the carbureter, 2 the throttle valve, 3 the auxiliary air valve that supplies air to the mixing chamber, 3^a the spring that holds said valve seated, 4 the float chamber, and 5 the float in said chamber which governs the valve 6 that controls the supply of liquid fuel to the float chamber. An open-ended air pipe 7, which projects into a contracted portion 1^a of the mixing chamber, surrounds a vertically disposed multiple jet tube A whose upper end is closed by a screw or plug 8 and whose lower end communicates with a fuel duct 9 that leads to the float chamber so as to permit liquid fuel to pass up into said jet tube and escape laterally through the ports or perforations 10 therein. The air pipe 7 is spaced away from the side walls and from the bottom of the contracted portion 1^a of the mixing chamber so as to provide a passageway through which air can travel from the lower end of the air pipe up around same and into the mixing chamber, said air pipe 7 being preferably tapered slightly, as shown in Fig. 1, so as to cause the velocity of the air to increase as it approaches the lower end of said pipe. The carbureter herein shown is provided with a conduit 1^b that establishes communication between the mixing chamber and the intake pipe of the motor above the throttle valve so as to insure sufficient suction in the mixing chamber when the motor is throttled down to cause the air to travel through said mixing chamber quickly enough to prevent the fuel from becoming deposited on the walls thereof.

The carbureter is equipped with a primary jet B for supplying fuel to the mixing chamber up to a certain speed of the motor, and in the construction herein shown said primary jet communicates with the fuel duct 9 and is so arranged that it injects a jet of fuel into the contracted portion 1^a of the mixing chamber adjacent the lower end of

the air pipe 7. Said primary jet B is preferably mounted in a screw-threaded opening in the bottom of the contracted portion 1^a of the mixing chamber so that it can be gotten at and removed easily by taking off the casting that forms the top of the float chamber and the enlarged or upper portion of the mixing chamber. Two air ports 11 are formed in the bottom of the contracted portion 1^a on opposite sides of the primary jet B, as shown in Fig. 3, so as to cause currents of air to travel upwardly past the opening in the jet B when a suction is created in the mixing chamber and thus suck a jet of liquid fuel out of the jet B upwardly into the contracted portion of the mixing chamber, said jet of liquid fuel becoming vaporized or converted into a gas by the air which enters through the air ports 11. The air ports 11 can be arranged in various ways without departing from the spirit of my invention but I prefer to have said ports communicate with a horizontally disposed air passageway 12 to which air is supplied by means of a pipe 13 that projects laterally from the casting in which the contracted portion 1^a of the mixing chamber is formed, as shown in Figs. 1 and 4.

When the motor is running at slow speed, say, for example, speeds up to twenty miles an hour, the fuel that is supplied by the primary jet B and vaporized by the air that enters the mixing chamber through the air ports 11, produces a mixture of the proper richness. At such times, namely, when the motor is running at slow speed, the multiple jet tube A is inoperative because the quantity of air that is drawn down through the air pipe 7 is not great enough to cause the liquid fuel to be sucked up into said jet tube, this being due to the fact that the air ports 11 establish direct communication between the mixing chamber and the atmosphere. When the motor exceeds this speed, however, or when the suction in the mixing chamber exceeds a certain degree the quantity of air that travels downwardly through the air pipe 7 becomes so great that the air in the jet tube A will be sucked out of same and thus produce a partial vacuum in said tube which causes the liquid fuel to be sucked up into same from the fuel duct 9. The fuel that rises in the jet tube A escapes laterally through the perforations 10 therein in the form of a fine spray or plurality of jets which are vaporized or converted into a gas by the air that passes downwardly through the air pipe 7 and into the mixing chamber. As the motor builds up speed the fuel rises higher in the jet tube A and thus brings more of the ports 10 in said tube into service, thereby automatically increasing the supply of fuel as the suction in the mixing chamber increases, the fuel rising and falling in the jet tube A according to the intensity of the suction in the mixing chamber. The air valve 3 is so designed that it automatically increases or diminishes the supply of air to the mixing chamber as the speed of the motor increases or diminishes so as to cause the air supply to vary automatically as the supply of fuel varies and thus produce a uniform mixture.

A carbureter of the construction above described is economical in the consumption of fuel, owing to the fact that the primary jet B supplies a comparatively small quantity of fuel to the mixing chamber when the motor is running at slow speed, and the multiple jet tube A supplies a greater quantity of fuel when the motor builds up speed, the air ports 11, air pipe 7, and air valve 3 being so designed that just the proper proportion of air is supplied to the mixing chamber to produce a uniform mixture at different speeds of the motor. The multiple jet tube A comes into service automatically as the speed of the motor increases or exceeds what is commonly termed "slow speed," and as the level of the fuel in the jet tube A rises and falls as the suction in the mixing chamber varies, the quantity of liquid fuel that escapes from said jet tube will vary automatically as the speed of the motor varies.

From the foregoing it will be seen that my improved carbureter not only produces a uniform mixture at different speeds of the motor but it is also easy to start as a slight suction in the mixing chamber causes air to be drawn into same through the ports 11 which are so arranged relatively to the primary jet B that a jet of fuel will be sucked up through said jet and into the path of the air which is traveling into the mixing chamber. The primary jet B is mounted in such a manner that it can be removed easily so that it is a very simple matter to clean the jet or substitute a jet having a different-sized opening.

The primary jet B and air ports 11 that coöperate with same could be arranged in various other ways than herein shown without departing from the spirit of my invention, and while I prefer to have the primary jet B communicate with the fuel duct 9 that supplies fuel to the multiple jet A, it will, of course, be obvious that independent fuel ducts could be provided for supplying fuel to said primary jet and multiple jet. Furthermore, my broad idea is not limited to a carbureter having a primary jet that introduces fuel into a contracted portion of the mixing chamber for, if desired, the primary jet could be so arranged as to introduce fuel into some other portion of the mixing chamber. While I have herein used the term "slow speed" to designate speeds up to twenty miles an hour, I wish it to be understood that this term is only used relatively as the operation of the carbureter will vary

with different motors and according to the size of the primary jet that is used.

The throttle valve 2 is connected to a rock shaft 14 which is provided with an operating arm 15 that is connected by a system of links 16 and levers to a controlling device or mechanism located some distance from the carbureter. The operating arm 15 has a bifurcated portion which embraces the shaft 14, and a screw 17 is mounted in said bifurcated portion so as to draw the parts thereof together and thus securely clamp the arm 15 to the rock shaft 14. In view of the fact that it is necessary for the controlling device or mechanism and the throttle valve to be connected together in such a manner that the valve is either wide open or closed when the controlling mechanism is in its extreme positions, it is desirable to provide some means for enabling the operator to adjust the throttle valve shaft 14 relatively to the arm 15 when the motor is running and thus set the throttle valve in its closed position when the throttle valve controlling mechanism is in one of its extreme positions. The means herein shown for adjusting the throttle valve consists of an arm 18 that is detachably connected to the shaft 14 by means of a set screw or similar device 19, the arm 15 being connected to the opposite end of said shaft. To adjust the throttle valve, the operator first loosens the screw 17 and then sets the throttle valve controlling mechanism at its extreme position. He then grasps the handle 18 and turns the throttle valve 14 until the throttle valve reaches such a position that the motor stops, thus setting the throttle valve in such a position that the mixture cannot escape from the mixing chamber when the throttle valve controlling mechanism is in its extreme position, the screw 17 being thereafter tightened so as to securely clamp the operating arm 15 to the throttle valve shaft.

A valve 20 is arranged at the upper end of the air pipe 7 for varying the quantity of air that enters said pipe, and thus varying the height of the fuel in the jet tube. In the construction herein shown said valve is journaled in the upper end of the air pipe 7 and is provided with an opening through which the multiple jet tube A passes, said valve being provided on its under and upper sides with semi-circular-shaped pressed portions 20^a and 20^b, respectively, that conform to the shape of the jet tube A and thus form a clearance for said tube when the valve is wide open. The valve 20 is carried by a rock shaft 21 which is provided with a handle 22, and some suitable means is provided for locking said shaft and valve in adjusted position, the means herein shown consisting of a screw 23 which forces a friction device 24 tightly against the shaft 21, as shown in Fig. 1. While the valve 20 is herein shown in its closed position, it will, of course, be understood that in practice said valve is adjusted so as to permit sufficient air to travel downwardly through the air pipe 7 at high speed to produce a mixture of the proper richness.

The combination of an air pipe surrounding a vertically disposed multiple jet tube, and means for controlling the amount of air that enters the upper end of said air pipe is a very desirable feature in a carbureter of the type herein described for it permits the supply of fuel to be controlled accurately and easily. When the valve 20 at the upper end of the air pipe 7 is partly closed a certain suction in the mixing chamber will raise the fuel a certain height in the jet tube and when said valve is opened further the same suction in the mixing chamber will not raise the fuel in the jet tube to so great a height. Consequently, the valve 20 controls the height of the fuel in the jet tube and overcomes the necessity of adjusting the air intake valve of the mixing chamber or substituting a jet tube provided with a different number of ports or openings each time the carbureter is installed.

As previously stated, the particular construction of the primary jet is immaterial so far as my broad idea is concerned, and in Figs. 7 and 8 I have illustrated a slightly modified form of my invention which embodies the same principles as the construction illustrated in Fig. 1. In the construction shown in Figs. 7 and 8 the multiple jet tube A is provided at its lower end with a hole 25 which constitutes a primary jet and also a plug 26 having a reduced portion which is of less diameter than the interior of said jet tube A so as to form a passageway through which the liquid fuel can travel from the fuel duct 9 to the jet opening 25. The plug 26 is provided with a central bore 27 that establishes communication between the fuel duct 9 and the jet tube A so as to permit the fuel to pass up into said jet tube when the motor exceeds a certain speed, as previously described. The air passageway 12 which supplies air to the primary jet 25 is provided in its top wall with a ring-shaped slot 28 through which the air can escape instead of only two air ports 11, as shown in Fig. 1, and a circular flange 29 is arranged adjacent the primary jet 25 so as to form a baffle which causes the liquid fuel that emerges from the primary jet 25 to be spread in a thin film over the baffle and over the outer surface of the jet tube A. When the motor is running below a certain speed a current of air will be drawn upwardly around the lower end of the air pipe 7 through the ring-shaped air slot 28, and this current of air will suck the liquid fuel out of the primary jet 25 in practically the same manner previously described in connection

with Fig. 1, the liquid fuel traveling through the passageway between the reduced portion of the plug 26 and the interior of the jet tube A. When the motor builds up speed a sufficient quantity of air will be drawn down through the air pipe 7 to create a partial vacuum in the upper portion of the jet tube A, and when this condition exists the liquid fuel will be drawn up through the bore 27 in the plug into the jet tube and escape laterally through the perforations 10 in said tube.

The primary jets in both forms of my invention are arranged far enough above the normal level of the fuel in the float chamber to prevent the liquid fuel from escaping from said jets when the motor is not in operation but as soon as a slight suction is created in the mixing chamber the current of air that rushes upwardly through the air ports 11 in the form shown in Fig. 1 and through the air slot 28 in the form shown in Figs. 7 and 8, causes the liquid fuel to be sucked upwardly out of said primary jets.

While both forms of my invention are very efficient and produce excellent results, the form illustrated in Figs. 7 and 8 effects a quicker and more complete vaporization of the fuel owing to the fact that the baffle 29 spreads the fuel out into a thin film which is directly exposed to a ring-shaped current of air which passes upwardly around the air pipe into the mixing chamber.

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

1. A carbureter provided with a primary jet which supplies liquid fuel at all speeds of the motor, a multiple jet which automatically supplies varying quantities of liquid fuel when the motor is running above a certain speed, said multiple jet consisting of a hollow tube provided with a number of small orifices, and means for creating a partial vacuum of varying intensity in the upper portion of said tube when the motor is running above a certain speed so as to cause liquid fuel to rise and fall in said tube and escape through the orifices therein.

2. A carbureter provided with a primary jet for supplying fuel when the motor is running at slow speed, and a multiple jet which comes into service automatically and supplies varying quantities of fuel when the motor is running above a certain speed, said multiple jet consisting of a hollow perforated tube in which the liquid fuel rises and falls as the suction in the mixing chamber varies above a certain speed.

3. A carbureter provided with a vertically disposed jet tube having a plurality of fine ports through which the liquid fuel escapes, the upper end of said tube being closed and the lower end of said tube communicating with a supply of liquid fuel, and means separate and distinct from the fine jets in said tube for supplying fuel to the mixing chamber of the carbureter.

4. A carbureter provided with a single primary jet, and a multiple jet which automatically supplies varying quantities of fuel to the mixing chamber, said multiple jet consisting of a vertically disposed perforated tube that is arranged in such a manner that liquid fuel rises and falls in same automatically as the speed of the motor varies, when the motor is running above a certain speed.

5. A carbureter provided with a vertically disposed jet tube having its upper end closed and provided with perforations or ports arranged at different levels, means for supplying liquid fuel to the lower end of said jet tube, means for creating a vacuum of varying intensity in the upper portion of said tube so as to cause the fuel to rise and fall therein, and means independent of said jet tube for supplying fuel to the mixing chamber of the carbureter.

6. A carbureter provided with a vertically disposed jet tube whose upper end is closed and whose lower end communicates with a supply of liquid fuel, said tube being provided with a plurality of fine jets, an air pipe surrounding said jet tube and communicating with the mixing chamber of the carbureter, and a primary jet separate and distinct from the fine jets in said jet tube for supplying fuel to the mixing chamber.

7. A carbureter provided with a jet tube having its upper end closed and its lower end communicating with a supply of liquid fuel, said tube having a number of ports located at different levers, means for causing a current of air to pass downwardly adjacent said tube so as to create a partial vacuum therein and thus cause the fuel to rise automatically in said tube and escape through the parts therein, and means separate and distinct from said jet tube for supplying fuel to the mixing chamber of the carbureter.

8. In a carbureter, a jet tube provided with ports arranged at different levels and having its lower end communicating with a supply of liquid fuel, a member which surrounds said jet tube to form an air passageway, the upper end of said member being of greater diameter than the lower end of same, a mixing chamber communicating with the lower end of said member, and a primary jet for supplying fuel to said mixing chamber.

9. In a carbureter, a vertically disposed jet tube provided with a plurality of orifices or perforations and having its lower end communicating with a supply of liquid fuel, a primary jet separate and distinct from said jet and communicating with a supply of liquid fuel, and means for causing air to travel adjacent said jet tube and said pri-

mary jet for causing the fuel to emerge from same, the jet tube being so arranged that fuel does not escape therefrom when the motor is traveling at a comparative slow speed.

10. A carbureter provided with a mixing chamber, a primary jet for supplying fuel to said mixing chamber, means for causing a current of air to pass adjacent said jet and suck the fuel out of same when a suction is created in the mixing chamber, a vertically disposed jet tube provided with a plurality of ports and having its lower end communicating with a supply of fuel, and an air pipe surrounding said jet tube and communicating with the mixing chamber.

11. A carbureter provided with a mixing chamber, a primary jet that supplies fuel to said mixing chamber, an air supply port arranged adjacent said jet for establishing communication between the mixing chamber and the atmosphere, a multiple jet tube communicating with a supply of fuel and provided with a plurality of perforations arranged at different levels, and an air pipe surrounding said jet tube and communicating with the mixing chamber.

12. In a carbureter, a mixing chamber, a primary jet for supplying fuel to said mixing chamber, a plurality of air ports arranged on opposite sides of said primary jet for supplying air to the mixing chamber, a multiple jet, and an air passageway surrounding said multiple jet and communicating with the mixing chamber.

13. A carbureter provided with a mixing chamber, an automatic air valve for admitting air to said mixing chamber, a vertically disposed jet tube communicating with a supply of liquid fuel and having its upper end closed, said tube being provided intermediate its end with a plurality of ports through which the fuel escapes, an air pipe surrounding said vertically disposed jet tube and communicating with the mixing chamber, and a primary jet for supplying fuel to the mixing chamber.

14. A carbureter provided with a mixing chamber having a contracted portion, an open-ended air pipe that projects into the contracted portion of the mixing chamber and whose lower end is spaced away from the walls of said contracted portion, a multiple jet tube arranged in said air pipe, a primary jet for introducing fuel into the contracted portion of said mixing chamber, means for supplying fuel to said primary jet and multiple jet tube, and air supply ports that admit air to the mixing chamber adjacent said primary jet.

15. A carbureter provided with a mixing chamber having a contracted portion, an open-ended air pipe that projects into the contracted portion of the mixing chamber and whose lower end is spaced away from the walls of said contracted portion, a multiple jet tube arranged in said air pipe, a primary jet for introducing fuel into the contracted portion of said mixing chamber, means for supplying fuel to said primary jet and multiple jet tube, a plurality of air ports that terminate adjacent said primary jet, and an air passageway for establishing communication between said ports and the atmosphere.

16. A carbureter having a mixing chamber that is provided with a contracted portion, a throttle valve for controlling the passage of the mixture from said chamber, an air valve for supplying air to said chamber, an open-ended air pipe whose lower end terminates inside of the contracted portion of the mixing chamber, a vertically disposed jet tube arranged in said air pipe and provided with a plurality of ports, a fuel supply duct communicating with the lower end of said jet tube, a primary jet communicating with said fuel duct for introducing fuel into the contracted portion of the mixing chamber, and air ports arranged adjacent said primary jet for supplying air to the mixing chamber.

17. In a carbureter, a mixing chamber having a contracted lower portion that is provided with a bottom, the upper portion or enlarged portion of said mixing chamber being formed in a casting that is detachably connected to the casting in which the contracted portion of the mixing chamber is formed, a primary jet removably mounted in the bottom of the contracted portion of the mixing chamber, an air port formed in the bottom of the contracted portion of the mixing chamber adjacent said primary jet, and a multiple jet tube projecting upwardly from the bottom of the contracted portion of said mixing chamber.

18. A carbureter provided with a vertically disposed multiple jet tube having its upper end closed and its lower end communicating with a supply of liquid fuel, a primary jet at the lower end of said jet tube, and means for causing air to travel downwardly around said jet tube and upwardly past said primary jet so as to suck the liquid fuel from same and vaporize it.

19. A carbureter provided with a verti cally disposed hollow jet tube in which the liquid fuel rises and falls when the motor exceeds a certain speed, said tube being provided with a number of small orifices through which the fuel escapes, an air pipe surrounding said jet tube and communicating with the mixing chamber of the carbureter, the upper end of said tube being closed so that the air which passes down said air pipe will create a partial vacuum in the upper part of said tube, and a primary jet which supplies liquid fuel to the mixing chamber at all speeds of the motor.

20. A carbureter having a vertically disposed jet tube provided with ports arranged at different levels through which the fuel can escape, means for supplying liquid fuel to the lower end of said jet tube, an open-ended air pipe surrounding said jet tube and communicating at its lower end with the mixing chamber of the carbureter so that the suction in said mixing chamber will cause air to rush down through said air pipe and thus create a partial vacuum in the upper part of the jet tube which causes the fuel to rise therein, and means for regulating and varying the quantity of air that enters the upper end of said air pipe.

21. A carbureter provided with a vertically disposed jet tube in which the liquid fuel rises and falls, an air pipe surrounding said tube and communicating with the mixing chamber, and a valve arranged in said pipe and having an opening through which said jet tube passes, said valve having bent portions that conform to the shape of said jet tube so as to provide a clearance for same when the valve is wide open.

22. A carbureter provided with a vertically disposed jet tube in which the liquid fuel rises and falls, an air pipe surrounding said tube and communicating with the mixing chamber, a valve arranged in said pipe and having an opening through which said jet tube passes, said valve having bent portions that conform to the shape of said jet tube so as to provide a clearance for same when the valve is wide open, a rock shaft which carries said valve, and a device that locks said shaft in adjusted position.

23. In a carbureter, a vertically disposed jet tube having its lower end communicating with a supply of liquid fuel said tube being provided intermediate its ends with ports through which the fuel escapes, a tapered air pipe surrounding said tube and communicating with the mixing chamber of the carbureter so that the suction in the mixing chamber will cause air to be drawn down through said pipe, the upper end of said air pipe being of greater diameter than the lower end of same, and means for varying the quantity of air that enters the upper end of said air pipe.

24. In a carbureter, a vertically disposed multiple jet tube having its lower end communicating with a supply of liquid fuel, a tapered air pipe surrounding said jet tube and having its lower contracted end communicating with the mixing chamber of the carbureter, and an adjustable baffle at the upper end of said air pipe for varying the quantity of air that enters said pipe and thus regulating the height of the fuel in the jet tube.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this ninth day of April 1910.

WILLIAM C. CARTER.

Witnesses:
WELLS L. CHURCH,
GEORGE BAKEWELL.