A. J. WEISS.

CARBURETER.

APPLICATION FILED JULY 19, 1910.

993,210.

Patented May 23, 1911.

2 SHEETS—SHEET 1.

Fig. 1

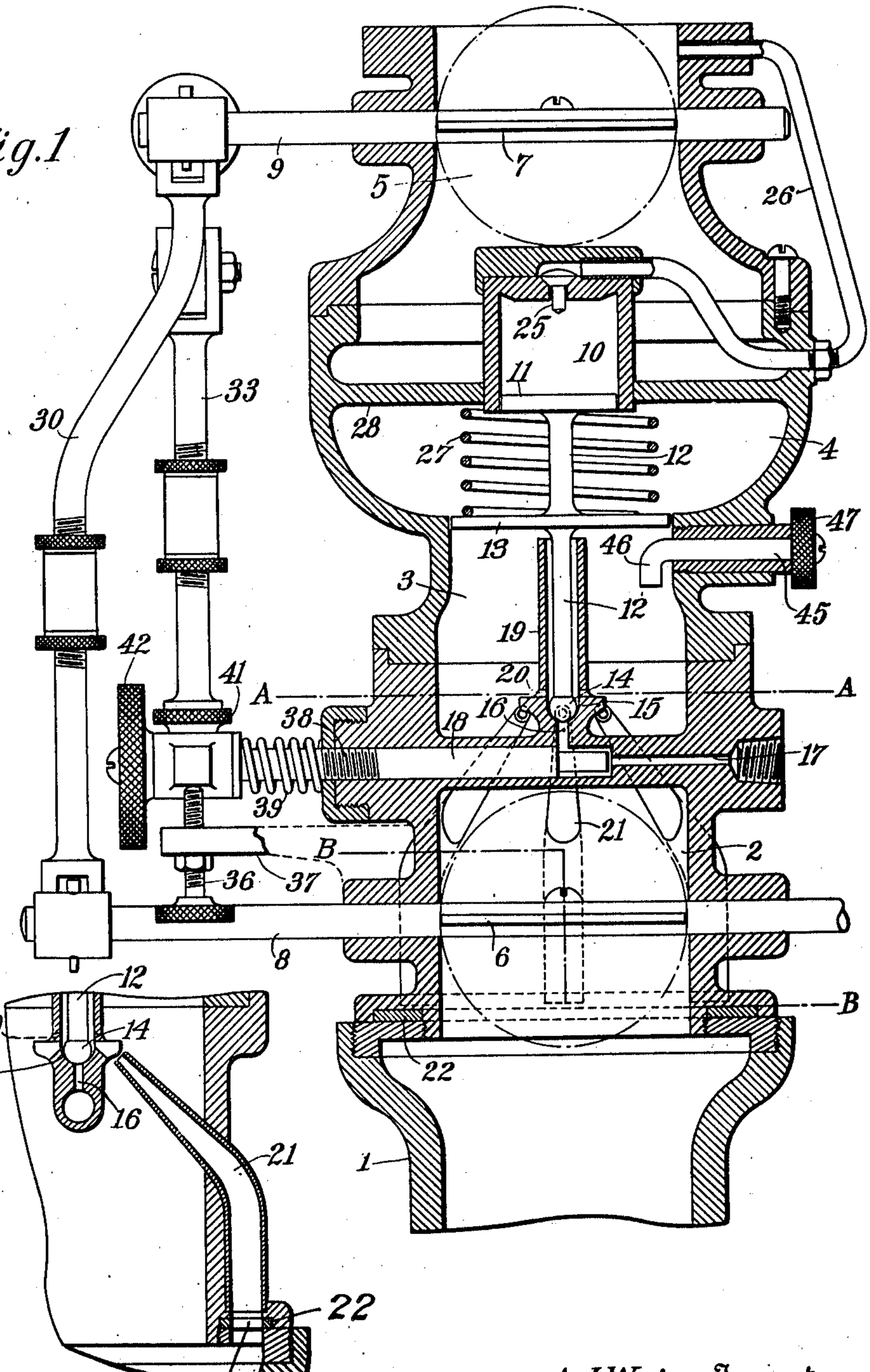

Fig. 2

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2 SHEETS—SHEET 2.

Fig.3

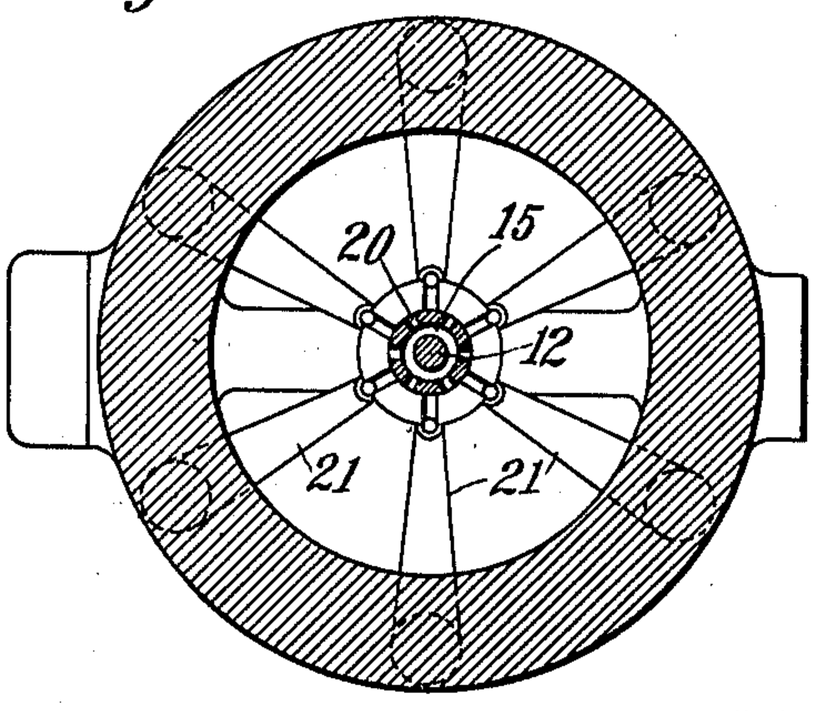


Fig.4

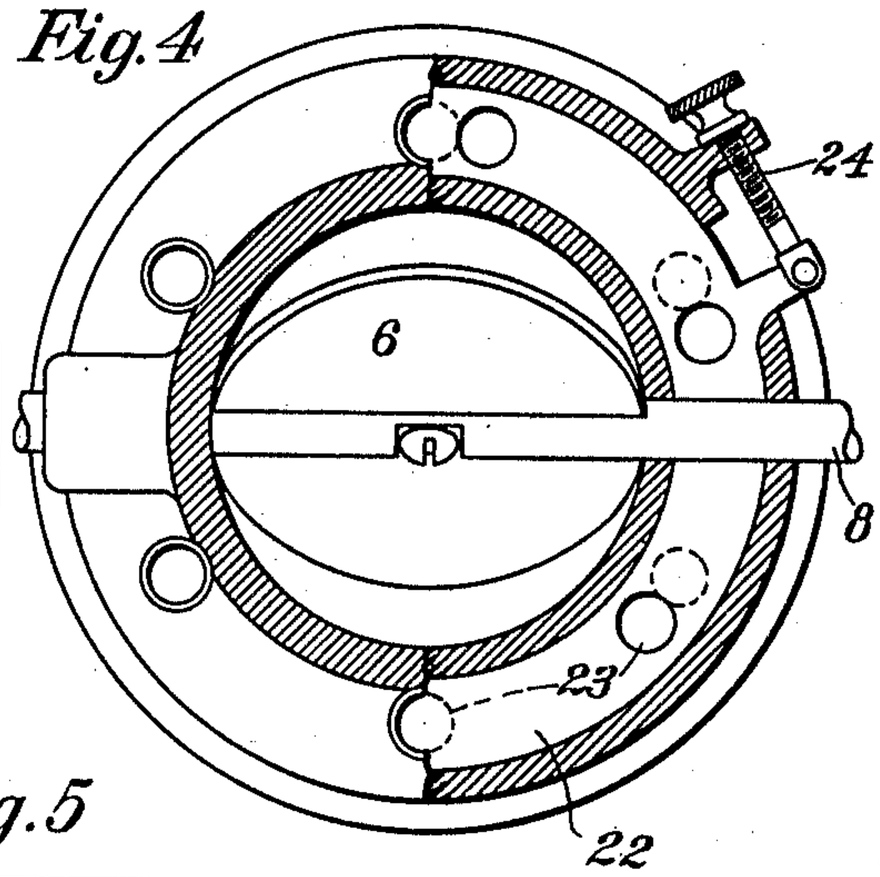


Fig.5

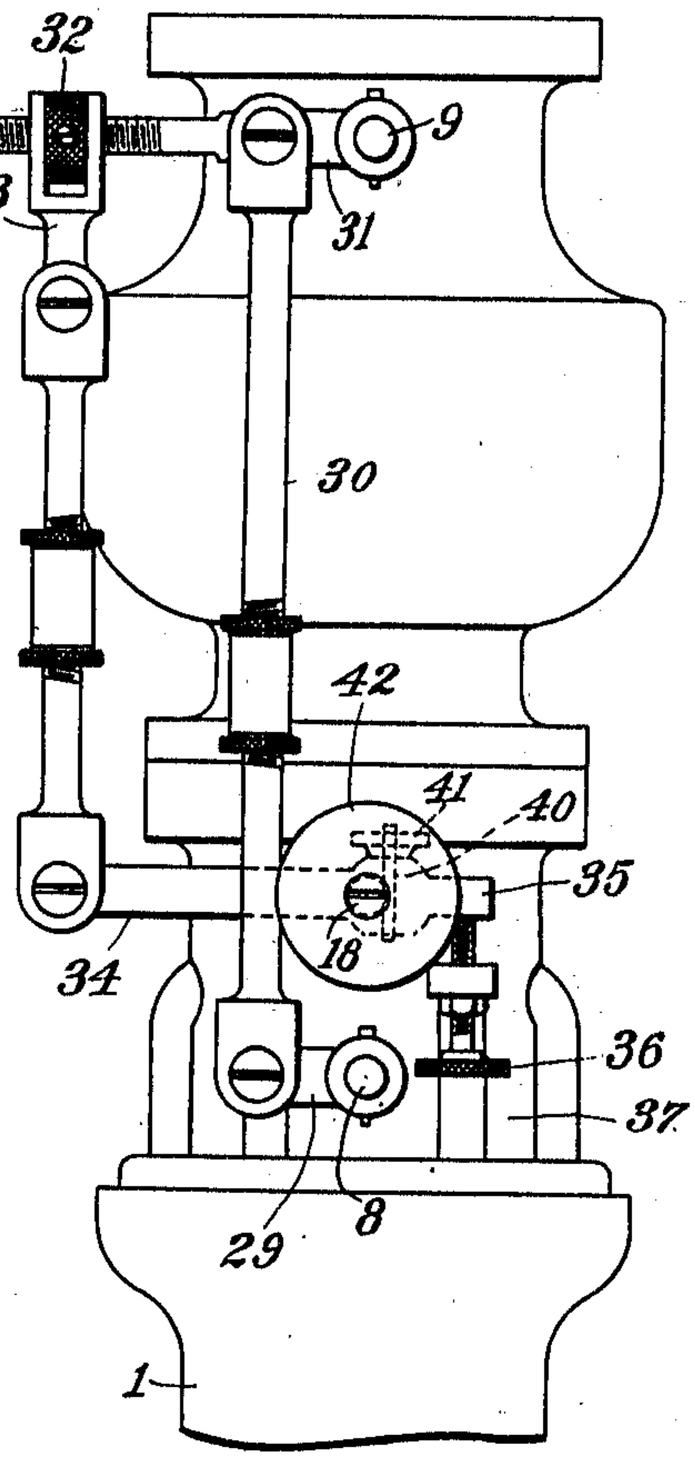


Fig.6

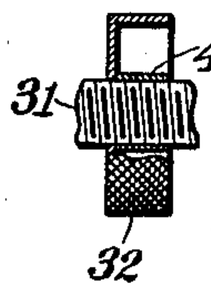
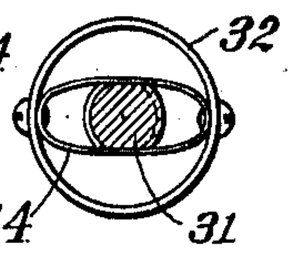


Fig.7



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UNITED STATES PATENT OFFICE.

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CARBURETER.

993,210. Specification of Letters Patent. Patented May 23, 1911.

Application filed July 19, 1910. Serial No. 572,731.

To all whom it may concern:

Be it known that I, ARTHUR J. WEISS, a citizen of the United States, residing at West Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Carbureters, of which the following is a full, clear, and complete disclosure.

The object of my invention is to provide an improved form of carbureter, and particularly one in which the necessity for a float chamber is obviated, and the devices provided are so adjusted that the initial starting impulse of the engine will automatically open the fuel supply and mix with the gasolene or other fuel the exact proportion of air for the minimum rate of running of the engine, and this on the initial starting movement of the engine resulting from the same being cranked.

Another object is to provide a construction whereby as the rate of running of the engine increases, the supply of air and the supply of fuel is positively increased and in constant proportion. The construction, moreover, is one in which once adjustments are made for a given engine, the starting conditions (by which I mean the adjustment of the fuel supply, air supply and throttle valve), are perfect for the starting of the engine and the running of the same at substantially a minimum rate. Further, the proportion of air and gas is maintained throughout all variations in amount of mixed air and gas supplied to the engine.

Other features of invention consist in providing means whereby a more effective admixture of air and gas is obtained, as also means for easily adjusting the air supply, fuel supply and throttle valve for different engines.

For a detailed description of one form of my invention, which I at present deem preferable, reference may be had to the following specification and to the accompanying drawings forming a part thereof, in which:

Figure 1 is a vertical section view of the carbureter, the external connections for operating the same being shown in elevation. Fig. 2 is a vertical sectional view of a portion of the carbureter taken at an angle to that of Fig. 1. Fig. 3 is a transverse sectional view taken substantially on the line A—A of Fig. 1. Fig. 4 is a sectional view taken substantially on the line B—B of Fig. 1. Fig. 5 is an elevation of the carbureter taken from the left-hand side of the same, as shown in Fig. 1. Fig. 6 is a view partially in section of the adjusting nut for regulating the connection between the throttle valve and the gasolene valve; and Fig. 7 is an end elevation of the same.

Referring to the drawings, the numeral 1 indicates the main source of air supply, and 2, the air inlet valve chamber for the air supply just referred to, while 3 and 4 designate respective portions of the mixing chamber, the throttle valve chamber being designated by the numeral 5. The inlet and throttle valves are preferably in the form of so-called "butterfly" valves, as indicated at 6 and 7, and these are mounted on valve stems 8 and 9, respectively, which valve stems extend through the carbureter casing and are connected with suitable parts for operating the valves hereinafter to be described.

The proper position of the valves 6 and 7 for the starting of the engine is that shown in full lines in Fig. 1, but it is to be understood that the valve 6 completely closes the air inlet supply 1, in the position shown in full lines in said figure, while the valve 7 is of such a size relatively to the chamber in which it is located that when in the position shown in full lines in Fig. 1, there is a slight clearance at its periphery which will admit of the passage of mixed air and gas to the engine in the proper quantities for the starting of the engine and its running at substantially the minimum rate of speed. Within the portion 4 of the mixing chamber is a cylinder 10 having a piston 11 from which a valve stem 12 extends downward into the mixing chamber, and carries the disk 13 which is adapted to maintain the valve stem 12 in its raised position when the engine is running at normal speed, owing to the flow of the mixture through the carbureter. The lower end of the valve stem 12 carries the ball-valve 14 adapted to be seated in the hemispherical valve-seat 15 which is connected by a passage 16 with the fuel inlet channel or passage 17, this passage 17 being manually controlled by the valve-

rod 18, to vary the amount of gasolene or other liquid fuel passing from the channel 17 to the passage or channel 16. This object is effected by connecting the valve rod 18 so that it may be operated to regulate the size of the fuel passage by being turned from the manual control at the steering-wheel, which is connected to the same manual control by which the throttle valve 7 and the air valve 6 are operated. The valve seat 15 carries an upwardly extending tube 19 in the form of a guide for the valve member 14. At the bottom of the tube 19, radial holes 20 connect the interior of the tube with the portion 3 of the mixing chamber so as to form a plurality of openings or exits for the liquid fuel passing through the channel 16.

The periphery of the valve seat 14 is radially slotted, as indicated most clearly in Fig. 3, and opposite each of the slots is located a tapering tube or nozzle 21 which passes through the wall of the carbureter and connects with the inlet port 1, these tapering tubes or nozzles constituting an auxiliary source of air supply which is always open to atmosphere and provides the proper quantity of air for the starting operation of the engine and its continued running at substantially its minimum rate of speed. When the engine is running at normal or high speed these auxiliary sources of air supply are practically inoperative, owing to the great difference between their cross-sectional area and the area of the main air inlet passage through which the air flows much more freely. These tapering tubes or nozzles have their exits adjacent the appropriate openings 20 in the fuel supply channel, and have the function of discharging the air passing through them adjacent to the opening of issuance of the liquid fuel, so that the most effective vaporization and mixture of the fuel is obtained. Means are provided at the lower ends of these tubes, whereby the opening at which the air enters may be regulated, said means consisting of a circular ring 22 having holes 23 therein registering with the ends of the tubes, said ring being adjustable circumferentially to open or close the ends of the tube by means of the pivoted screw and nut 24.

Returning now to the cylinder 10 in the chamber 4, it will be seen that the upper end of the cylinder communicates with the throttle valve chamber 5 by means of a pipe or passage 26, terminating in the valve chamber 5 at a point on the opposite face of the valve 7 so that the cylinder 10, by means of the pipe or passage 26, is in direct communication with the engine inlet valves. A check valve 25 is located in the opening in the end of the cylinder 10 and is automatically opened by the suction created by the engine intake, and automatically closed when the suction ceases, as by the stopping of the engine. The piston 11 is so proportioned to the cylinder in which it works as to permit some leakage around its edge, so that the spring 27 bearing on the disk 13 may act to seat the valve 14 when the piston 11 is not upheld by the suction through the pipe or passage 26.

The features of the construction just described, that is, the cylinder 10 with the piston 11 working therein, and the check valve passage or pipe 26, are important as they constitute means by which the fuel supply, the amount of which is determined and varied by the valve rod 18, is fully opened to the mixing chambers 3 and 4, and conversely, automatically closed when the engine in which the carbureter is used, stops running. The cylinder, piston and check valve just described perform no function as to the intermediate regulating or varying the air or gasolene or other liquid fuel which is admitted to the chambers 3 and 4, the regulating function being performed by the valve 18.

Referring to Fig. 5, it will be seen that the valve stem 8 carries an arm or lever 29, to the outer end of which is pivoted the adjustable rod 30. This rod 30 is pivoted at its upper end to the arm or lever 31 fixed to the stem 9 of the throttle valve 7. The lever 31 is extended toward the left, as shown in Fig. 5, and is screw-threaded so as to receive the adjustable thumb-nut 32 which determines the radial position of the adjustable connecting bar 33. The valve stem 18 of the regulating valve for the fuel supply carries at its upper end an arm or lever 34 which is pivotally connected with the bar 33, and said arm 34 has an extension 35 in the opposite direction. A thumb-screw 36 carried on a bracket 37 provides means for limiting the motion of the valve stem, the latter being screw-threaded, as indicated at 38, where it passes through the casing of the carbureter.

It will be understood that the parts just described are so adjusted and proportioned that the turning of the valve stem 9 from the source of manual control, which is usually at the steering wheel, will cause a movement of the valve 7, a movement of the valve 6, and also a movement of the valve 18, the proportions and adjustments of the parts being such that the proper relation of movement of the valve 6, the valve 18 and the valve 7 will be maintained from closed position to full opening, so that when the valve 7 shall have been moved to full opening, the valve 18 and the valve 6 will be also at their predetermined maximum opening, the opening movement of the three valves having been accomplished with proper relation to each other.

A spring 39 located between the casing and the arm 34 tends to keep the valve stem

18 forced outwardly and also provides sufficient friction to prevent the valve from operating too easily. The position of the arm 34 and the valve stem 18 may be varied by means of the wedge-key 40 which is held in its wedging position by means of the thumb nut 41. The knurled head 42 permits the valve stem 18 to be turned when it is necessary to adjust the latter relatively to the arm or lever 34.

The thumb nut 32 on the rod 31 is recessed and provided with an elliptical spring 44 which is adapted to engage the flattened sides of the screw-threaded portions of the lever 31 so that the said thumb screw is prevented from turning every half revolution and so retained in any position in which it may be placed.

In Fig. 1 I have shown the rod 45 passing through the casing of the carbureter and provided at its inner extremity with a right-angled portion 46, and at its outer end with a knurled head 47. This construction is simply to provide an easy means of manually opening the valve 14 if it is desired to open the fuel supply independent of the action of the engine, this being accomplished in the obvious manner of turning the head 47, thereby causing the right-angled portion 46 to come in contact with the lower portion of the disk 13 thereby lifting the valve 14.

The operation of my improved carbureter may be described as follows: The fuel supply valve 18 will be open so as to admit of the passing of gasolene or other liquid fuel in proper quantity for most effectively starting the engine with which the carbureter is used, and continue the running of the same at substantially its minimum rate of speed. The ring 22 will also have been adjusted so as to permit of the passage of air through the tapering nozzles 21 in the exact proportion necessary to mix with the fuel from the fuel supply. The air inlet valve 6 will be closed, as shown in full lines in Fig. 1. The throttle valve 7 will also be in the position shown in full lines in Fig. 1, this valve 7 being so proportioned to the chamber in which it is located as to have a clearance and permit of the passage around its edges while in the position shown in full lines in Fig. 1, of mixed air and gas in proper quantity for starting and continuing the running of the engine with which it is used at substantially the minimum rate of speed. The engine is cranked. The first movement of the engine creates a suction through the passage or pipe 26, and lifting the check valve, draws up the piston in cylinder 10, immediately effecting the full opening of the liquid fuel valve 14 through channel or passage 16 and ports 20. Simultaneously air is drawn from the air supply through the tapering nozzles 21, and by reason of these nozzles discharging their air with concentrated force adjacent the point of exit of the fuel supply, and in proper predetermined quantity, a perfect mixture of air and gas is obtained in the chambers 3 and 4, passes up to throttle valve chamber 5, past the periphery of the valve 7 to the engine cylinders so that the proper charge is admitted to the engine cylinders, the charge exploded by the spark, and the engine maintained running under these conditions at substantially its minimum rate of speed. It will be noted that the valve 14 operated by the piston 11 working in the cylinder 10, has no function of regulating the quantity of liquid fuel, acting only to fully open the fuel supply passage, and on its reverse movement, to completely close said channel. When it is desired to increase the speed of the engine, the manual control at the steering wheel is operated and the throttle valve 7, the valve 18 and the air supply valve 6, are all opened in predetermined relation to one another, the valve 6 bringing into operation the independent supply of air controlled by it, the increased suction effecting a more forcible discharge of air from the nozzles 21, the valve 18 admitting an appropriately increased supply of liquid fuel to the passage 16, the throttle valve 7 admitting of the passage to the engine of mixed air and gas in greater quantities as necessary for the increased rate of running of the engine. During these operations, the valve 14 by the suction in cylinder 10 acting on piston 11 and through the passage or pipe 26, is maintained always in its uppermost position independent of the quantity of mixed air and gas passing up through the chambers 3 and 4 and through throttle valve chamber 5. When the engine is stopped, as by cutting off the electric current creating the ignition sparks, the suction through the passage 26 to cylinder 10 ceases, the spring 27 exerts its tension, there is a leakage around the piston 11 and the valve 14 is immediately seated to close the fuel supply. Of course, the manual control at the steering wheel will be again set, positioning the valves 6, 7 and 18 again in initial position so as to establish the proper predetermined conditions for restarting.

It should be understood that the check valve 25 located in the head of the cylinder 10 has an important function in preventing, in the case of back-firing, the sudden admission of pressure to the piston 11 and the violent seating of the valve 14, which would tend to destroy the surface of said valve 14, as well as the surface of the seat 15. This check valve 25 acts in a similar way to prevent the violent seating of the valve 14 when the engine is stopped.

Having thus described this form of my invention, I do not wish to be understood as being limited to the details of form and arrangement of parts herein set forth, for

various changes may be made by those skilled in the art without departing from the spirit and scope of my invention.

What I claim as new is:

1. In a carbureter, a throttle valve, a fuel supply channel, a valve therefor, said valve comprising suction-actuated means, a passage leading from said suction actuated means to the opposite side of said throttle valve, and a check valve in said passage.

2. In a carbureter, a throttle valve, a fuel supply channel, a valve therefor, said valve comprising a cylinder and a piston working therein, a passage leading from said cylinder to the opposite side of the throttle valve, and a check valve in said passage.

3. In a carbureter, a throttle valve, a fuel supply channel, a valve therefor, means for operating said supply valve comprising a cylinder and a piston working therein, means connected with said piston for holding said supply valve substantially wide open during the normal operation of the carbureter and a passage leading from said cylinder to the opposite side of said throttle valve.

4. In a carbureter, a throttle valve, a fuel supply channel, a valve therefor, means for operating said supply valve comprising a cylinder and a piston working therein, means connected with said piston for holding said supply valve substantially wide open during the normal operation of the carbureter, a passage leading from said cylinder to the opposite side of the throttle valve, and a check valve located in said passage.

5. In a carbureter, a mixing chamber having a fuel inlet passage, a main air inlet passage and auxiliary air inlet passages of smaller cross-section than the main passage, comprising tapering nozzles entering the mixing chamber, and a fuel distributer in the mixing chamber comprising a radially slotted body having its slots communicating with the fuel inlet passage, said nozzles being directed toward the slots.

6. In a carbureter, a mixing chamber having a fuel inlet passage, a main air inlet passage, and auxiliary air inlet passages of smaller cross-section than the main passage, comprising tapering nozzles entering the mixing chamber of the carbureter and communicating with said main inlet passage, and an adjustable valve between said main inlet passage and said nozzles, said nozzles being directed toward the fuel inlet passages in said mixing chamber.

7. In a carbureter, having a mixing chamber, the combination with a main inlet air passage, of a main inlet valve for controlling the passage of air therethrough, auxiliary air inlet passages of smaller cross-section than the main passage, comprising nozzles entering the mixing chamber, and radial fuel passages in said chamber toward which said nozzles are directed.

Signed at New York, this 15th day of July, 1910.

ARTHUR J. WEISS.

Witnesses:
H. RICHARD WOBSE,
B. V. MAHAN.