June 7, 1932. F. W. SCHAFFNER 1,862,434

CARBURETOR

Filed Sept. 3, 1931 3 Sheets-Sheet 1

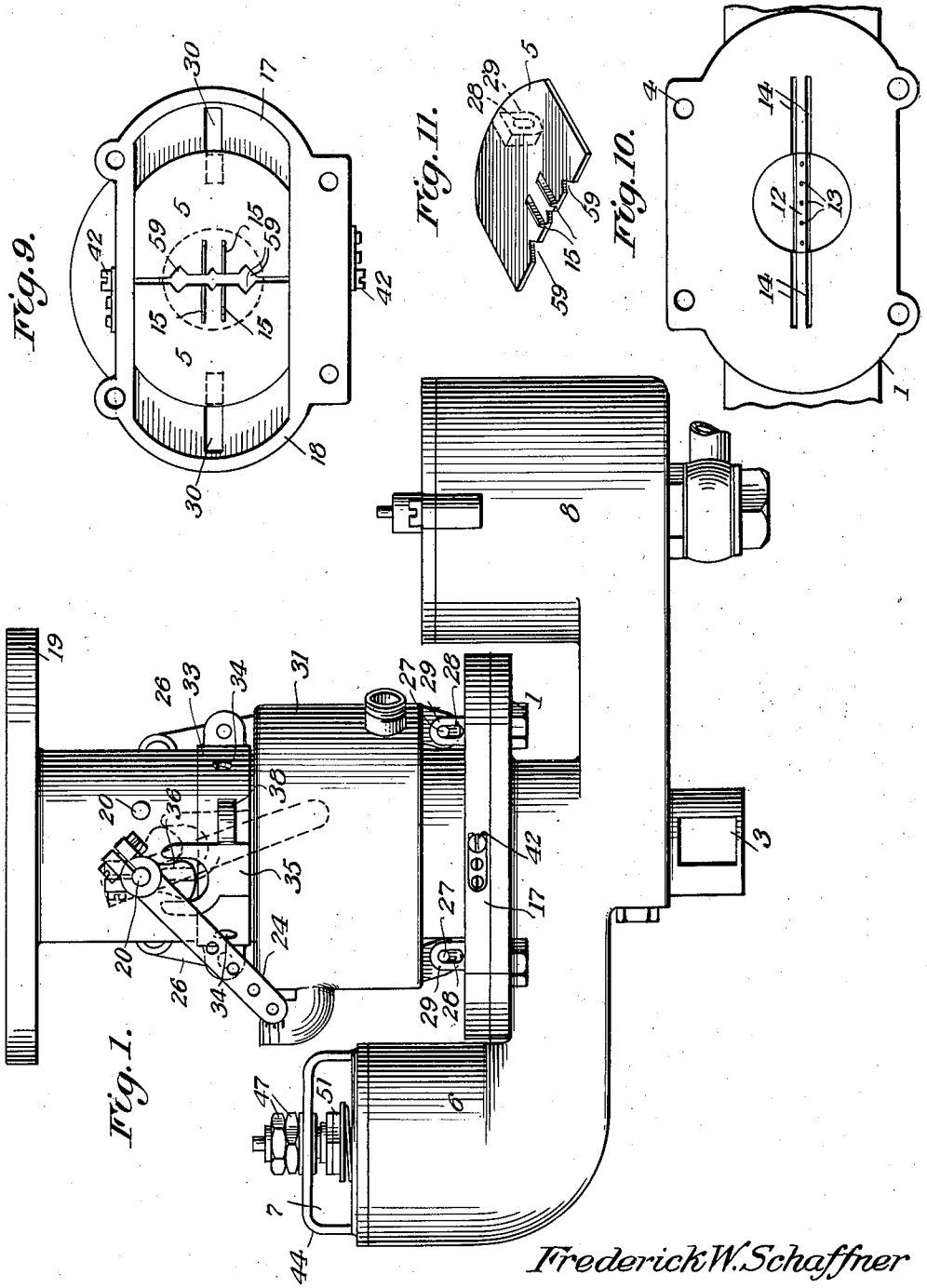


Fig. 1.

Fig. 9.

Fig. 11.

Fig. 10.

Frederick W. Schaffner
INVENTOR

BY Victor J. Evans and Co.
ATTORNEYS

June 7, 1932. F. W. SCHAFFNER 1,862,434

CARBURETOR

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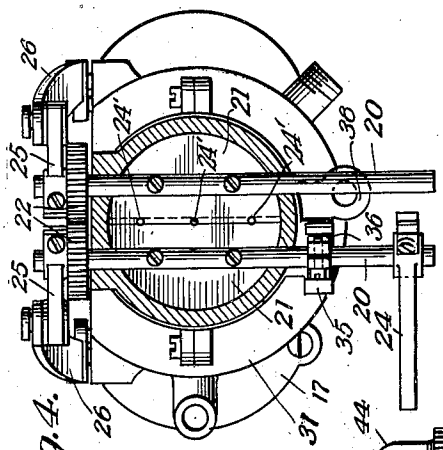


Fig. 4.

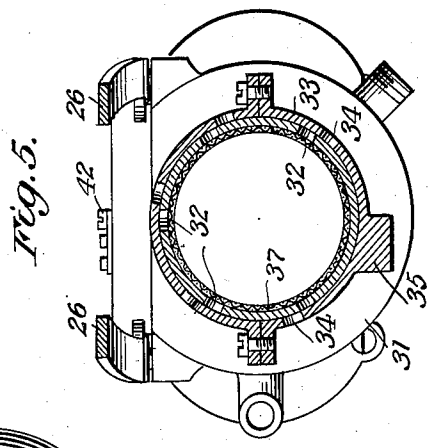


Fig. 5.

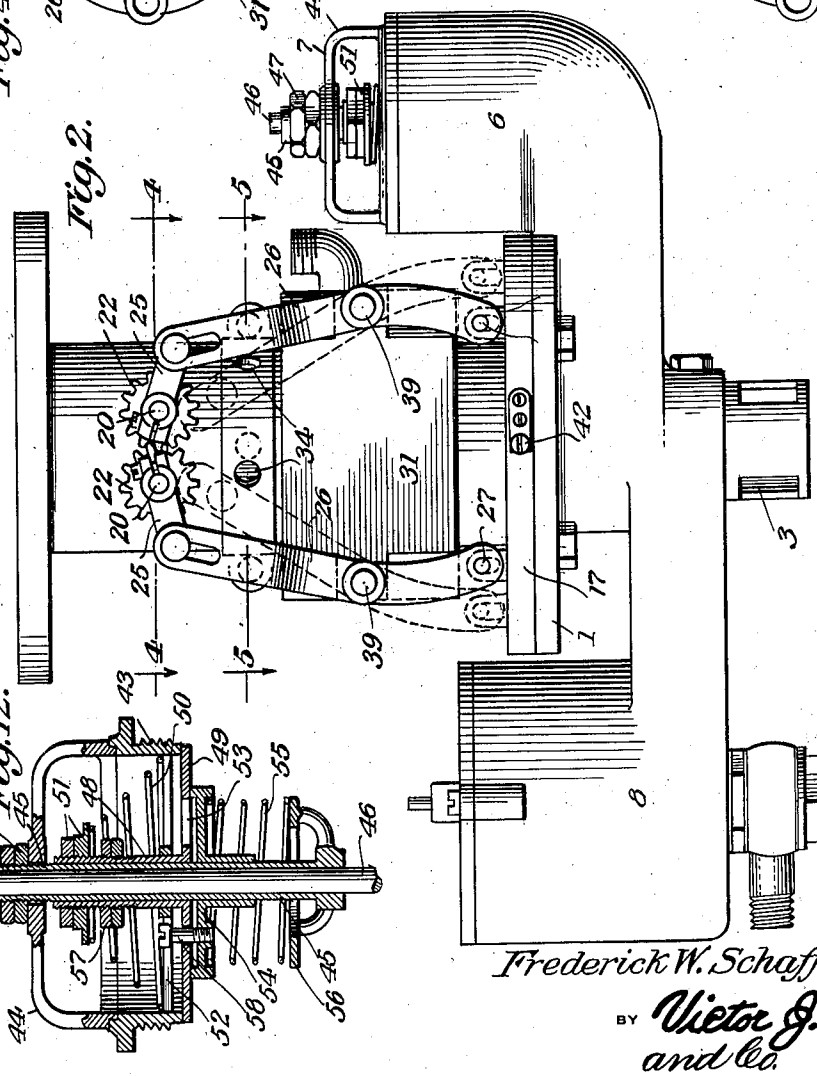


Fig. 2.

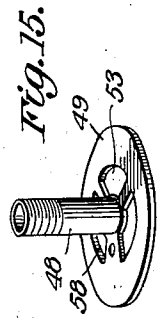


Fig. 15.

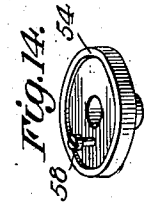


Fig. 14.

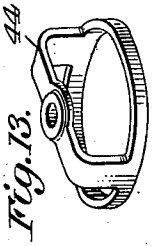


Fig. 13.

Fig. 12.

Frederick W. Schaffner INVENTOR

BY Victor J. Evans and Co. ATTORNEYS

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CARBURETOR

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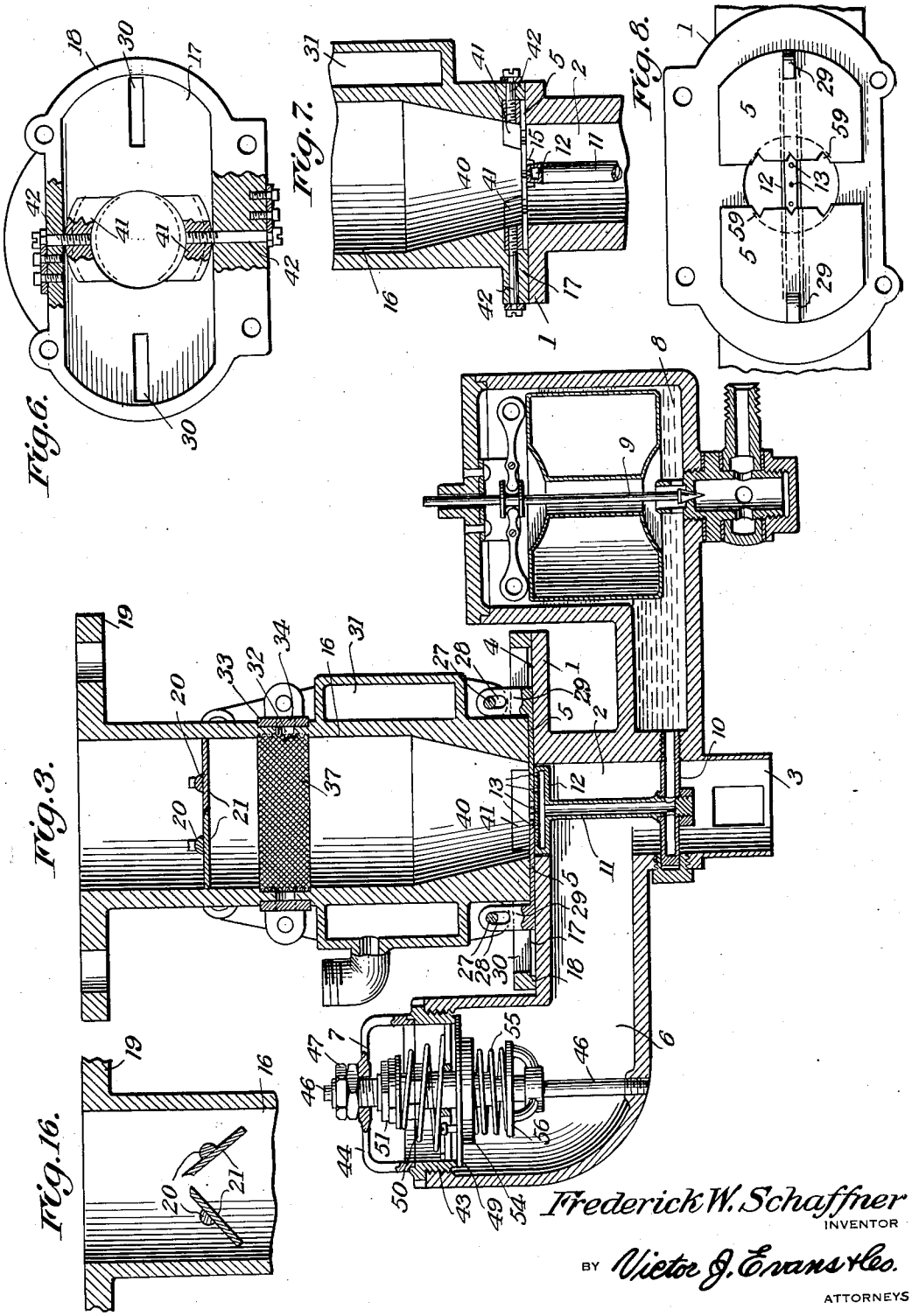


Fig. 6.

Fig. 7.

Fig. 8.

Fig. 3.

Fig. 16.

Frederick W. Schaffner
INVENTOR

BY Victor J. Evans & Co.
ATTORNEYS

Patented June 7, 1932 1,862,434

UNITED STATES PATENT OFFICE

FREDERICK W. SCHAFFNER, OF BROOKLYN, NEW YORK

CARBURETOR

Application filed September 3, 1931. Serial No. 561,068.

This invention relates to carburetors for internal combustion engines and has for the primary object, the provision of a device of the above stated character which will increase the efficiency of a conventional type of engine, as to power and mileage derived from a given amount of fuel and acceleration and smoothness of operation.

Another object of this invention is the provision of a carburetor which will thoroughly mix fuel and air in proper proportion to insure maximum power from a minimum consumption of fuel and deliver to the firing chambers of the engine the fuel in a highly vaporized condition so that the possibility of liquefied fuel entering the engine is obviated thereby retarding the accumulation of carbon and dilution of the lubricant of the engine, so that the operation of the engine will be raised to the highest degree of efficiency and reduce the maintenance and the operation of the engine to a minimum.

A further object of this invention is the provision of an improved means for regulating both the fuel and air to a mixing chamber in accordance with the opening and closing of the throttle valve so that the most volatile fuel possible will enter the engine.

A further object of this invention is the provision of an adjustable double valve for the air supply medium to the mixing chamber for automatically increasing and decreasing the supply of air in accordance with the suction of the engine to provide an increased efficiency of acceleration and smoothness of operation of the engine and provide more power from a given amount of fuel.

A further object of this invention is the provision of an auxiliary air supply to the mixing chamber having a control medium simultaneously operated with the control means of the auxiliary chamber so that as the supply of fuel is increased to the engine additional air may be admitted giving greater power and more efficiency of operation.

A still further object of this invention is the provision of a main air adjustment for the air to the mixing chamber which provides a positive control over the air and is capable of varied adjustments to suit the carburetor to different engines.

A still further object of this invention is the provision of an improved fuel jet to the mixing chamber which is so constructed and operates in connection with the control mediums of the mixing chamber that the amount of fuel admitted to the mixing chamber will be increased and decreased with the opening and closing of the throttle valve.

With these and other objects in view, this invention consists in certain novel features of construction, combination and arrangement of parts to be hereinafter more fully described and claimed.

For a complete understanding of my invention, reference is to be had to the following description and accompanying drawings, in which

Figure 1 is a side elevation illustrating a carburetor constructed in accordance with my invention.

Figure 2 is a similar view showing the opposite side of the carburetor.

Figure 3 is a vertical showing view illustrating the carburetor.

Figure 4 is a sectional view taken on the line 4—4 of Figure 2.

Figure 5 is a similar view taken on the line 5—5 of Figure 2.

Figure 6 is a detail sectional view illustrating a seat for slidable gate valves of the mixing chamber and also showing the main air adjustment.

Figure 7 is a detail sectional view illustrating the main air adjustment and its association with the fuel nozzle.

Figure 8 is a fragmentary plan view illustrating the gate valves associated with the fuel nozzle and in a partly open position.

Figure 9 is a similar view showing the gate valves in substantially closed position or the position occupied during the idling of the engine.

Figure 10 is a view similar to Figure 9 with the gate valves removed and showing the fuel nozzle.

Figure 11 is a perspective view illustrating one of the gate valves.

Figure 12 is a detail sectional view illus-

trating the adjustable double valve for one of the air mediums of the mixing chamber.

Figure 13 is a perspective view illustrating a frame constituting a portion of the double valve.

Figure 14 is a perspective view illustrating one of the valve elements of the double valve.

Figure 15 is a perspective view illustrating another valve element of the double valve.

Figure 16 is a fragmentary sectional view illustrating the throttle valve in a partly open position.

Referring in detail to the drawings, the numeral 1 indicates a base for a carburetor having a chamber 2 opening outwardly through the bottom thereof to provide a main air intake 3 which may have the conventional type of exhaust stove or heater attached thereto for the purpose of furnishing heated air. The top wall of the base is in the form of a flat plate providing a seat 4 to slidably support gate valves 5 which control or open and close the upper end of the chamber 2 which extends through the top plate.

An air intake chamber 6 forms an integral part of the base 1 and is in communication with one side of the chamber 2. The air chamber 6 is of substantially L-shape with its air receiving end disposed uppermost and internally threaded to receive an adjustable double control valve 7. A fuel chamber 8 is formed integral with the base 1 and is of the conventional type, that is, employing a float control valve mechanism 9 for maintaining a desired amount of fuel therein at all times and receivable from the usual fuel supply tank. A tube or pipe 10 is removably secured to the base and traverses the chamber 2 and has one end in communication with the fuel chamber 8 and supports a T-shaped fuel jet 11 receiving fuel from the fuel chamber 8. The head portion 12 of the jet 11 is located within the opening of the top plate of the base just below the gate valves 5. The upper wall of the head 12 of the fuel jet is slidably engaged by the gate valves 5 and is provided with a series of openings 13 for permitting fuel to escape from the jet. By referring to Figure 3 it will be seen that the gate valves 5 control the openings 13 and when said gate valves are in their closed position all of the openings 13 are closed except the intermediate opening which remains uncovered to furnish sufficient fuel for the engine during idling speed.

The valve seat 4 or top plate of the base is provided with a pair of spaced grooves 14 to receive guide lugs 15 of the gate valves 5 and by referring to Figure 10 it will be seen that the head 12 of the T-shaped fuel jet is arranged in alignment with the grooves.

A mixing chamber 16 is mounted upon the base 1 or top plate thereof and the lower end thereof has an integral plate 17 corresponding in shape to the top plate of the base and provided with marginal flanges 18 which have a tight fit with the top plate of the base. The marginal flanges 18 provide guides for the gate valves 5 thus it will be seen that the gate valves control both the fuel and air to the mixing chamber 16. The upper end of the mixing chamber 16 is flanged as shown at 19 for attaching said mixing chamber to the usual intake manifold of an engine. Shafts 20 are journalled to the mixing chamber slightly below the attaching flange 19 thereof and carry semi-circular shaped disks or plates 21 cooperating with each other in providing a throttle valve. One of the plates has its straight edge concave while the corresponding edge of the other plate is convex so that when said plates are moved in a position for closing the upper end of the mixing chamber they have an overlapping connection with each other and said edges of the plates are provided with notches 24′ registering with each other when the plates are in a position for closing the chamber 16 so that sufficient fuel may be sucked from the mixing chamber by the engine to maintain the engine running at idling speed and obviates any possibility of the engine choking when operating at said idling speed due to the fact that sufficient fuel may always be obtained. The shafts 20 are connected together by gears 22 and one of said shafts is provided with an arm 24 to which the usual throttle control is connected. By having the shafts connected by the gears they move in unison in opposite directions by the throttle control. Arms 25 are adjustably secured to the shafts 20 adjacent the gears and have pivotal and slidable connection with the upper ends of pivotally mounted levers 26 and the lower ends of the levers carry rods 27 fitting in slats 28 or ears 29 formed integral with the gate valves 5 and which ears operate within slots 30 formed in the plate 17 of the mixing chamber. Thus it will be seen that the gate valves move in unison with the throttle valve. It is to be understood that the mixing chamber 16 is detachably secured to the base in any desired manner and said mixing chamber is surrounded by a jacket 31 for receiving a heating medium for aiding in vaporizing fuel and mixing the latter with air within the mixing chamber.

A plurality of apertures 32 are formed in the walls of the mixing chamber 16 below the throttle valve and provide an auxiliary air intake and are opened and closed by an annular member 33 having openings 34. The annular member 33 has formed thereon a forked member 35 receiving a lug 36 carried by one of the shafts 20 for the purpose of operating the annular member during the

operation of the throttle valve and also the gate valves. As the throttle valve is moved toward an open position, the annular member 33 is moved to bring the apertures or openings 34 thereof in registration with the openings 32 to provide an additional amount of air to the mixing chamber at high speeds or when the engine is operating at open throttle. By this arrangement the amount of air admitted to the mixing chamber is increased and decreased as the throttle valve is opened and closed. Foraminous material 37 is disposed over the openings 34 to prevent dirt and foreign matter from entering the mixing chamber.

The lug 36 is adjustably secured to its respective shaft 20 and if desired may be disconnected from the fork 35 should it not be desired to operate the annular member 33 in unison with the throttle valve as sometimes it may be desirable to operate the annular member manually and to facilitate such an operation, the lug 38 is provided on the annular member to which a control may be attached. The levers 26 are pivotally mounted to the mixing chamber as shown at 39.

The lower end of the mixing chamber 16 is tapered or provided with a conical shaped wall to provide a venturi 40 in alignment with the chamber 2 of the base and disposed over the gate valves 5 which control the passage of fuel and air into the mixing chamber by way of the venturi. To regulate the size of the venturi, segmental shaped elements 41 are provided and are adjustable relative to each other by set bolts 42. The segmental elements 41 provide a positive means for varying the amount of fuel and air that may enter the mixing chamber and permits this device to operate successfully on different sized engines.

The adjustable double control valve 7 includes a cage 43 threaded on the mouth of the air chamber 6 and carries a bridge 44 slidably receiving a tubular sleeve 45 slidably mounted on a stem 46 carried by the chamber 6 and the sleeve 45 is screw threaded to receive adjusting nuts 47 engaging the upper face of the bridge 44. A sleeve 48 is slidably mounted on the sleeve 45 and is formed integral with the valve element 49 having seating engagement with the cage 44 and normally urged in engagement therewith by a coiled spring 50 bearing against adjusting nuts 51 at one end while its opposite end bears against a spider 52 carried by the sleeve 48. The adjusting nuts 51 permit the tension of the spring 50 to be varied. The valve element 49 is provided with a series of openings 53 closed by a valve element 54 slidably mounted on the sleeve 45. The valve element 54 is urged in engagement with the valve element 49 by a coiled spring 55 which seats upon a support 56 carried by the sleeve 45. The strength of the spring 55 is less than the strength of the spring 50 so that it requires less suction to unseat the valve element 54 for opening the ports or openings 53 than it requires to unseat the valve element 49 from its seat on the cage 43. A stop 57 is threaded to the sleeve 48 for limiting the amount the valve element 49 may be unseated and by adjusting the stop 57 on the sleeve 48 the amount which the valve element 49 may open can be easily varied. The valve element 54 carries a headed stud 58 for limiting the movement of said valve element 54 relative to the valve element 49. By adjusting the nuts 47 on the sleeve 45, the tension of the spring 55 may be varied.

During the operation of the device the valve element 54 is the first to open by the suction of the engine due to the strength of the spring 55 and as the suction of the engine increases, the valve element 49 is opened in accordance with the amount of air in the chamber 6, thus it will be seen that an efficient air control has been provided for the chamber 6 in accordance with the amount of suction received from the engine so that as the suction of the engine increases the amount of air will be increased proportionately to insure a proper combustible mixture reaching the engine under all working conditions of the engine.

The adjacent edges of the gates 5 are provided with notches 59 to prevent the entire cutting off of the supply of fuel and air to the mixing chamber when said gates are in a closed position along with the closing of the throttle valve. The notches 59 cooperate with each other in forming openings of sufficient size to permit the proper amount of air and fuel to the mixing chamber 16 during the idling of the engine. It is to be understood that when the gate valves 5 are in closed position all of the apertures of the fuel nozzle are closed except one which supplies sufficient fuel along with the air that may pass through the notches of the gate valves to keep the engine operating at proper idling speed.

In operation the opening of the throttle valve causes a simultaneous opening of the gate valves admitting air and fuel to the mixing chamber in proper portions and in accordance with the suction from the engine and the fuel and air become thoroughly mixed to form a very high volatile mixture when entering the firing chambers of the engine and as the throttle valve moves toward an open position, the annular member or control 33 is moved to admit an additional amount of air to the mixing chamber. This air enters the mixing chamber at right angles to the flow of air and fuel coming from the chamber 2 thereby bringing about a thorough agitation of the fuel and air prior to entering the engine. Due to the throttle valve being constructed from segmental shaped plates or disks a thorough mixing of the fuel and air is caused by interrupting or changing

the course or flow of the air from the mixing chamber to the intake manifold of the engine. As the throttle valve is open the suction of the engine first opens the valve element 54 and as the suction of the engine increases by further opening of the throttle valve, the valve element 49 becomes unseated admitting an additional amount of air, thus it will be seen that the air admitted is in proportion to the suction of the engine and also the fuel will be in proportion to the amount of air obtained as the gate valves 5 admit more fuel as the throttle valve is opened. As the gate valves move toward an open position they create a slight suction on the head of the fuel jet to position small particles of fuel on the head for an instant before being taken up by the suction of the engine thereby assuring a proper supply of fuel to the mixing chamber when a quick acceleration of the engine is made by a quick opening of the throttle valve.

A device constructed in accordance with the foregoing will render a large saving in the consumption of fuel by delivering a combustible mixture to the engine in proper explosive condition, thus insuring an increased power and a more efficient operating engine besides reducing to a minimum the accumulation of carbon and the dilution of the lubricant of the engine.

While I have shown and described the preferred embodiment of my invention, it will be understood that minor changes in construction, combination and arrangement of parts may be made without departing from the spirit and scope of my invention, as claimed.

Having thus described my invention, what I claim is:

1. A carburetor comprising a base having an air chamber, a fuel supply means on the base, a mixing chamber secured to the base and connected to an engine and having a venturi in communication with the air chamber, an air supply means for the chamber, a T-shaped nozzle located in the air chamber and in communication with the fuel supply means and having a plurality of apertures located adjacent the venturi, a throttle valve in the mixing chamber, and gate valves in sliding contact with said T-shaped nozzle for controlling the fuel from the apertures and the air from the air chamber to the mixing chamber in proportions in accordance with the positions occupied by the throttle valve and operating means between the throttle valve and the gate valves to cause said valves to move in unison.

2. A carburetor comprising a base having an air chamber, a fuel supply means on the base, a mixing chamber connected to an engine and to the base and having a venturi in communication with the air chamber, a T-shaped hollow member connected to the fuel supply means and located in the air chamber with the headed portion thereof located adjacent the venturi and provided with a series of openings to form a plurality of fuel jets, and air supply means for the air chamber, a throttle valve in the mixing chamber, slidable gate valves on the base in wiping contact with the T-shaped member for controlling the fuel jets and the passage of air from the air chamber to the mixing chamber, and operating means between the gate valves and the throttle valve to cause said valves to move in unison.

3. A carburetor comprising a base having an air chamber, a fuel supply means on the base, a mixing chamber connected to an engine and to the base and having a venturi in communication with the air chamber, a T-shaped hollow member connected to the fuel supply means and located in the air chamber with the head portion thereof located adjacent the venturi and provided with a series of openings to form a plurality of fuel jets, an air supply means for the air chamber, a throttle valve in the mixing chamber, slidable gate valves on the base for controlling the fuel jets and the passage of air from the air chamber to the mixing chamber, operating means between the gate valves and the throttle valve to cause said valves to move in unison, and an auxiliary air supply means for the mixing chamber and controlled by the movements of the throttle valve.

4. A carburetor comprising a base having an air chamber, a fuel supply means on the base, a mixing chamber connected to an engine and to the base and having a venturi in communication with the air chamber, a T-shaped hollow member connected to the fuel supply means and located in the air chamber with the head portion thereof located adjacent the venturi and provided with a series of openings to form a plurality of fuel jets, an air supply means for the air chamber, a throttle valve in the mixing chamber, slidable gate valves on the base for controlling the fuel jets and the passage of air from the air chamber to the mixing chamber, operating means between the gate valves and the throttle valve to cause said valves to move in unison, said mixing chamber having a plurality of air ports, a control member for said ports and operated by the movements of the throttle valve.

5. A carburetor comprising a base having an air chamber, a fuel supply means on the base, a mixing chamber connected to an engine and to the base and having a venturi in communication with the air chamber, a T-shaped hollow member connected to the fuel supply means and located in the air chamber with the head portion thereof located adjacent the venturi and provided with a series of openings to form a plurality of fuel jets, an air supply means for the air chamber, a

throttle valve in the mixing chamber, slidable gate valves on the base for controlling the fuel jets and the passage of air from the air chamber to the mixing chamber, operating means between the gate valves and the throttle valve to cause said valves to move in unison, said mixing chamber having a plurality of air ports, and a control member for said ports and operated by the movements of the throttle valve and a screen overlying the ports.

6. A carburetor comprising a base having an air chamber, a fuel supply means on the base, a mixing chamber connected to an engine and to the base and having a venturi in communication with the air chamber, a T-shaped hollow member connected to the fuel supply means and located in the air chamber with the head portion thereof located adjacent the venturi and provided with a series of openings to form a plurality of fuel jets, an air supply means for the air chamber, a throttle valve in the mixing chamber, slidable gate valves on the base for controlling the fuel jets and the passage of air from the air chamber to the mixing chamber, operating means between the gate valves and the throttle valve to cause said valves to move in unison, said mixing chamber having a plurality of air ports, a control member for said ports and operated by the movements of the throttle valve, a screen overlying the ports, and a jacket for the mixing chamber to receive a heating medium.

7. A carburetor comprising a base having an air chamber, a fuel supply means on the base, a mixing chamber connected to an engine and to the base and having a venturi in communication with the air chamber, an air supply means for the air chamber, a throttle valve in the mixing chamber, a T-shaped jet in communication with the fuel supply means and having a plurality of apertures in the head portion and located adjacent the venturi, gate valves slidable on the base for controlling the apertures of the jet and the passage of air from the air chamber to the mixing chamber, means for causing the gate valves to move in unison with the throttle valve, said gate valves having notches in their adjacent edges to permit one of the apertures of the jet to remain uncovered when said gate valves are in full closed position and to permit air to pass from the air chamber to the mixing chamber.

8. A carburetor comprising a base having an air chamber, a fuel supply means on the base, a mixing chamber connected to an engine and to the base and having a venturi in communication with the air chamber, an air supply means for the air chamber, a throttle valve in the mixing chamber, a T-shaped jet in communication with the fuel supply means and having a plurality of apertures in the head portion and located adjacent the venturi, gate valves slidable on the base for controlling the apertures of the jet and the passage of air from the air chamber to the mixing chamber, means for causing the gate valves to move in unison with the throttle valve, said gate valves having notches in their adjacent edges to permit one of the apertures of the jet to remain uncovered when said gate valves are in full closed position and to permit air to pass from the air chamber to the mixing chamber, said throttle valve including pivotally mounted semi-circular shaped plates and having notches in their adjacent edges to prevent complete closure of the mixing chamber to the engine when said throttle valve is in a fully closed position.

9. A carburetor comprising a base having an air chamber, a fuel supply means on the base, a mixing chamber connected to an engine and to the base and having a venturi in communication with the air chamber, an air supply means for the air chamber, a throttle valve in the mixing chamber, a T-shaped jet in communication with the fuel supply means and having a plurality of apertures in the head portion and located adjacent the venturi, gate valves slidable on the base for controlling the apertures of the jet and the passage of air from the air chamber to the mixing chamber, means for causing the gate valves to move in unison with the throttle valve, said gate valves having notches in their adjacent edges to permit one of the apertures of the jet to remain uncovered when said gate valves are in fully closed position and to permit air to pass from the air chamber to the mixing chamber, said throttle valve including pivotally mounted semi-circular shaped plates having notches in their adjacent edges to prevent complete closure of the mixing chamber to the engine when said throttle valve is in a fully closed position, one of said semi-circular plates having a concave edge and the other semi-circular plate having a convex edge, said edges adapted to fit one within the other when the throttle valve is in a closed position.

10. A carburetor comprising a base having an air chamber, a fuel supply means on the base, a mixing chamber connected to an engine and to the base and having a venturi in communication with the air chamber, air supply means for the air chamber, a fuel nozzle in communication with the fuel supply means and located adjacent the venturi, gate valves for controlling the passage of fuel from the nozzle to the mixing chamber and air from the air chamber to the mixing chamber, shafts journalled in the mixing chamber, gears connecting said shafts, semi-circular plates carried by the shafts and co-operating with each other to provide a throttle valve for the mixing chamber, means for connecting one of the shafts to a control, arms adjustably secured to said shafts,

levers pivoted to the mixing chamber and pivotally and slidably connected to said arms, means connecting the levers to the gate valves to cause movement of the latter in unison with the throttle valve.

11. A carburetor comprising a base having an air chamber, a fuel supply means on the base, a mixing chamber connected to an engine and to the base and having a venturi in communication with the air chamber, air supply means for the air chamber, a fuel nozzle in communication with the fuel supply means and located adjacent the venturi, gate valves for controlling the passage of fuel from the nozzle to the mixing chamber and air from the air chamber to the mixing chamber, shafts journalled in the mixing chamber, gears connecting said shafts, semi-circular plates carried by the shafts and cooperating with each other to provide a throttle valve for the mixing chamber, means for connecting one of the shafts to a control, arms adjustably secured to said shafts, levers pivoted to the mixing chamber and pivotally and slidably connected to said arms, means connecting the levers to the gate valves to cause movement of the latter in unison with the throttle valve, an auxiliary air supply device for the mixing chamber and having a forked portion, and a lug fitting in the forked portion and adjustably secured to one of the shafts for causing operation of the auxiliary air supply device in accordance with the movements of the throttle valve.

12. A carburetor comprising a base having an air chamber, a fuel supply means in the base, a mixing chamber adapted to be connected to an engine and connected to the base and having a venturi in communication with the air chamber, air supply means for the chamber, a fuel nozzle between the fuel chamber and the venturi, a throttle valve in the mixing chamber, control means for controlling air and fuel from the air chamber and nozzle respectively to the mixing chamber in proportions in accordance with the positions occupied by the throttle valve, the walls of the venturi having oppositely disposed arcuate shaped grooves, segmental shaped elements slidable in the grooves for varying the size of the venturi, adjusting elements journalled in the walls of the venturi and having threaded engagement with said segmental shaped elements for moving the latter toward and from each other, and means for locking the adjusting elements against rotation.

13. In a carburetor, a venturi, a fuel supply tube located therein and having a cross head provided with jet openings, and oppositely disposed slidable gate valves to successively close said openings and to vary the size of the venturi, said valves movable into abutting engagement and having notches in the abutting edges thereof to permit one of the openings of the cross head to remain opened.

14. In a carburetor, a venturi, a fuel supply tube located therein and having a tubular cross head arranged radially of the venturi and having jet openings, oppositely disposed slidable gate valves having movements which are parallel with the axis of the cross head, each of said valves having a centrally disposed notch adapted when the valves are closed to permit one of the jet openings to remain opened.

15. In a carburetor, a venturi, a fuel supply tube located therein and having a tubular cross head arranged radially of the venturi and having jet openings, oppositely disposed slidable gate valves having movements which are parallel with the axis of the cross head, each of said valves having a centrally disposed notch adapted when the valves are closed to permit one of the jet openings to remain opened, said valves having notches at the sides of the first mentioned notches to permit some air to enter the venturi when the valves are closed.

16. In a carburetor, a venturi, a fuel supply tube located therein and having a tubular cross head arranged radially of the venturi and having jet openings, oppositely disposed slidable gate valves having movements which are parallel with the axis of the cross head, each of said valves having a centrally disposed notch adapted when the valves are closed to permit one of the jet openings to remain opened, guide grooves formed radially in the wall of said venturi, and guides on said valves cooperating with said grooves to guide the valves in said movements.

In testimony whereof I affix my signature.

FREDERICK W. SCHAFFNER.