W. SHAKESPEARE, JR. & W. SCHMID.

CARBURETER.

APPLICATION FILED OCT. 2, 1915.

1,234,400.

Patented July 24, 1917.

2 SHEETS—SHEET 1.

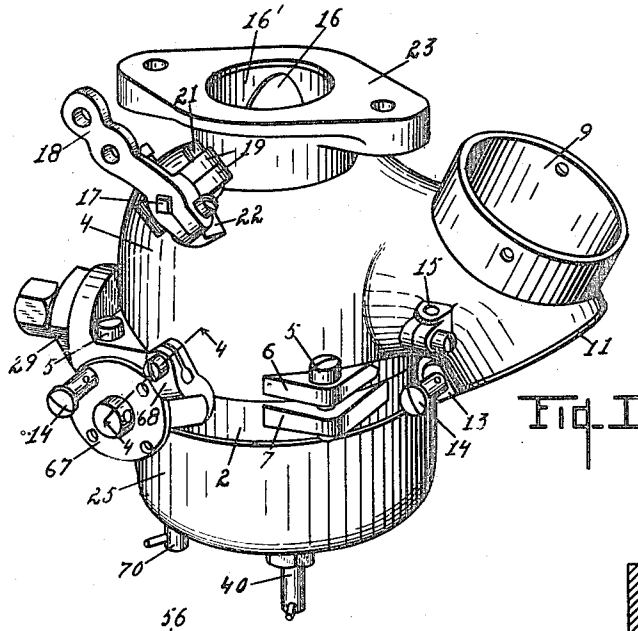


FIG. I.

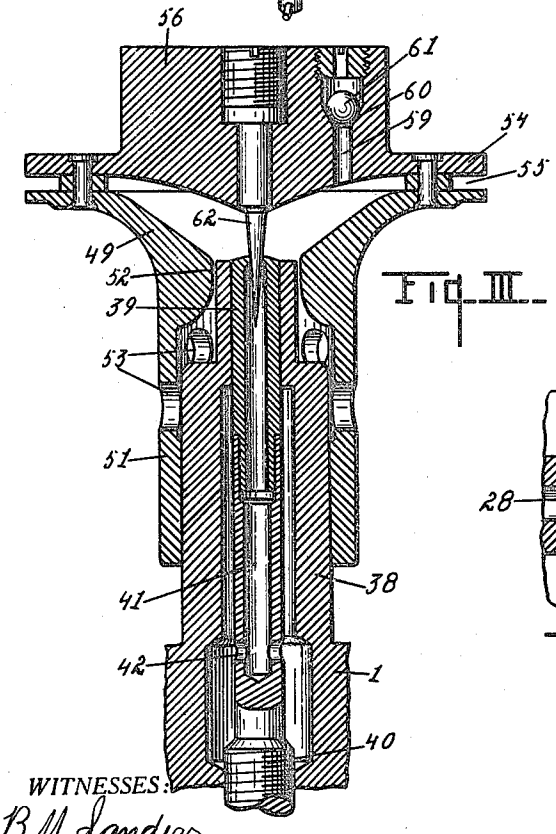


FIG. III.

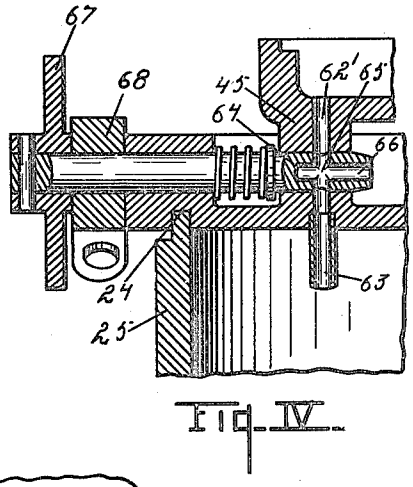


FIG. IV.

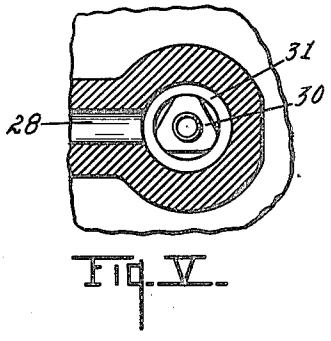


FIG. V.

WITNESSES:

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L. E. Blake.

INVENTORS

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William Schmid

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CARBURETER.

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2 SHEETS—SHEET 2.

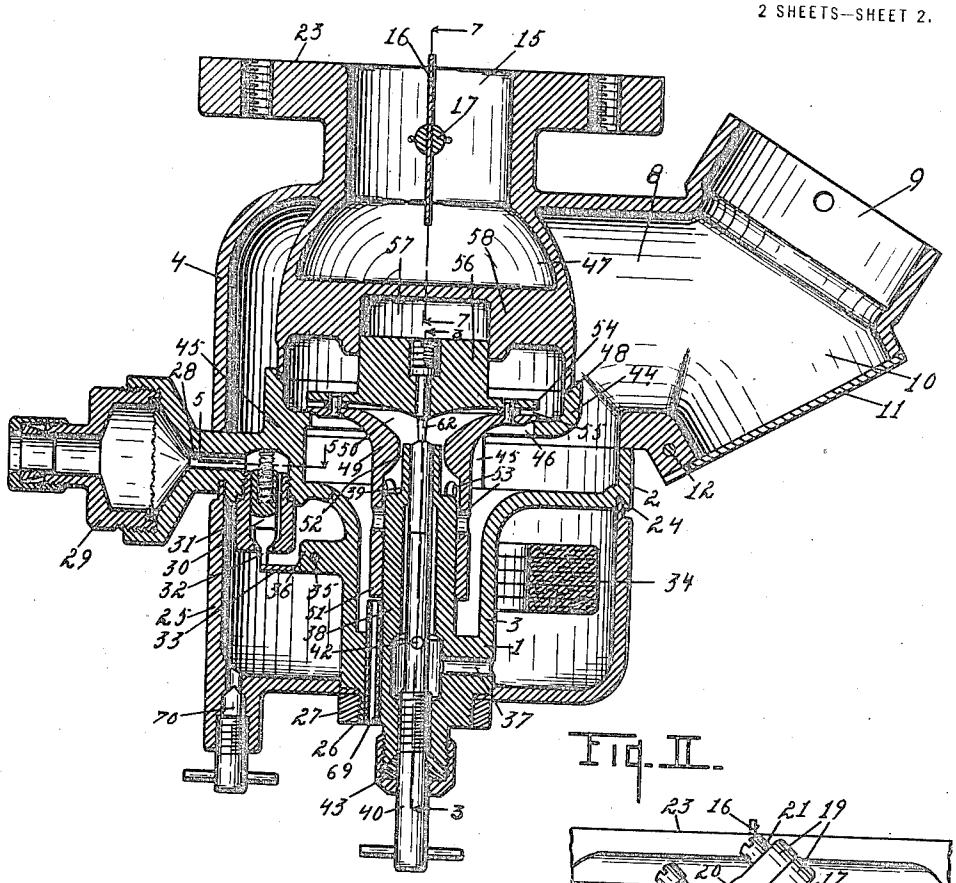


FIG. II.

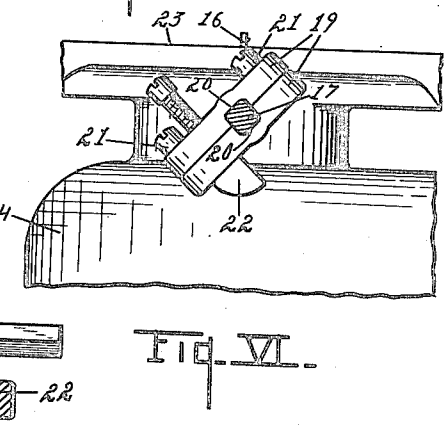


FIG. VI.

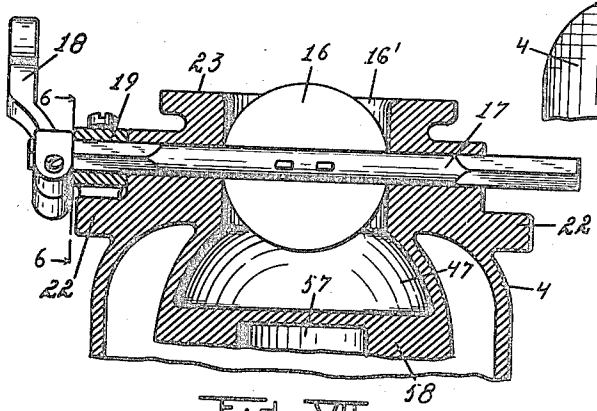


FIG. VII.

WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLIAM SHAKESPEARE, JR., AND WILLIAM SCHMID, OF KALAMAZOO, MICHIGAN, ASSIGNORS TO SHAKESPEARE COMPANY, OF KALAMAZOO, MICHIGAN.

CARBURETER.

1,234,400. Specification of Letters Patent. Patented July 24, 1917.

Application filed October 2, 1915. Serial No. 53,747.

To all whom it may concern:

Be it known that WILLIAM SHAKESPEARE, Jr., and WILLIAM SCHMID, citizens of the United States, residing at Kalamazoo, county of Kalamazoo, and State of Michigan, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to improvements in carbureters.

Our improvements relate particularly to the type of carbureter shown in our application for Letters Patent, filed December 11, 1914, Ser. No. 876,626, and are an embodiment of, and, in some respects, an improvement upon the structure illustrated therein, although certain features of our present improvements are of quite general application and capable of being readily embodied in structures which vary considerably from that illustrated in our said application.

The main objects of our invention are:

First, to provide an improved carbureter in which the proper relative proportions of fuel and air are automatically retained throughout the varying running conditions of the engine.

Second, to provide an improved throttle controlled carbureter in which the relative proportions of fuel and air are automatically maintained throughout the scope of the throttle adjustment.

Third, to provide in a carbureter, having these advantages, an improved priming means.

Fourth, to provide in a carbureter an improved valve mechanism which is not likely to get out of repair or adjustment in use and one which is very simple in its operation.

Fifth, to provide an improved structure having these advantages which is readily applied to motors of different design.

Sixth, to provide an improved carbureter having these advantages, in which the parts are comparatively simple and economical to produce and readily assembled.

Further objects, and objects relating to structural details, will definitely appear from the detailed description to follow.

We accomplish the objects of our invention by the devices and means described in the following specification. The invention is clearly defined and pointed out in the claims.

A structure which is a preferred embodiment of our invention is clearly illustrated in the accompanying drawing, forming a part of this specification, in which:

Figure I is a perspective view of our improved carbureter.

Fig. II is a vertical central section of our improved carbureter, certain parts being shown in full lines for convenience in illustration.

Fig. III is an enlarged detail vertical section on a line corresponding to line 3—3 of Fig. II.

Fig. IV is an enlarged detail section on a line corresponding to line 4—4 of Fig. I, showing details of the primer mechanism.

Fig. V is a detail section on a line corresponding to line 5—5 of Fig. II, showing details of the float controlled valve.

Fig. VI is a detail section on a line corresponding to line 6—6 of Fig. VII, showing details of the throttle stop device.

Fig. VII is a detail section on a line corresponding to line 7—7 of Fig. II, showing further details of the throttle and operating means therefor.

In the drawing similar reference characters refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

Referring to the drawings, the body of our improved carbureter consists of an intermediate body member 1 having a peripheral flange-like side wall portion 2 and a central depending tubular portion 3. The top body member 4 is adapted to fit on the upper edge of the wall portion 2 of the body member 1 and the members are secured together by the screws 5 engaging ears 6 and 7 respectively on the top and intermediate body members. The top member 4 is provided with an air inlet passage 8 at one side having a mouth 9 adapted to be connected to a means for supplying heated air and a mouth 10 opening to the atmosphere and controlled by the flap valve 11. The valve 11 is pivoted at 12 and provided with a projecting ear 13 on one side to which the operating rod is secured by the sleeve and screw coupling device, designated generally by the numeral 14. A support 15 for the operating rod is disposed above this connection, see Fig. I.

The top body member 4 is provided with a discharge 16′ controlled by the throttle

valve 16. The throttle valve 16 is supported by the stem 17 arranged through the walls of the passage to project at either end. The projecting ends of the valve stem are squared or otherwise shaped to receive the operating lever 18 and the stop 19. The stop 19 is in the form of a pair of clip-like members having opposed recesses 20 adapted to receive the ends of the stem, the clips being clamped upon the stem by the screws 21.

The stop member 19 may be mounted on either end of the throttle valve stem and adjustably secured thereon so as to coact with either side of the fixed stops 22, which are positioned in the same relation to the projecting valve stem on both sides. The operating lever is also adapted to be mounted on either end of the valve stem. This permits the positioning of the carbureter on the motor in the position found most convenient and enables the operating connections to be arranged as is found most convenient.

The top body member has a flange 23 by means of which it is secured to the manifold or other support.

The intermediate body member 1 has an annular groove 24 in its under side adapted to receive the upper edge of the fuel reservoir 25. The fuel reservoir has an opening in its bottom adapted to receive the reduced threaded portion 26 of the body member 1 and is clamped against the shoulder thereof by the nut 27. The body member 1 is provided with an inlet passage 28 connected with a suitable supply pipe by the coupling 29. The inlet passage is controlled by the valve 30 arranged in a casing 31 with a projecting stem 32 coacting with the lever 33 of the float 34, the float being pivotally mounted at 35 on the arm 36 projecting from the tubular portion 3 of the body member 1.

A tubular nozzle member 38 projects upwardly within the tubular portion of the body member 1 and is connected with the reservoir by the passage 37. The fuel nozzle 39 is provided with a stem portion 40 having a longitudinal passage 41 therein with openings 42 communicating with the fuel feed passage 37. The stem 40 is threaded into the lower end of the depending portion 3 of the body member 1 for adjusting the nozzle. The nozzle and its stem portion are shown in the structure illustrated as being formed of separate members, which is a convenience in manufacture. The nozzle stem is provided with a packing gland 43 threaded upon the lower end of the depending portion 3 of the body member 1.

The body member 1 is provided with an annular valve seat member 44 supported in an elevated position relative to the body member 1 by spaced posts or supports 45 and has a central port 46 through which the air passes to the mixing chamber 47. This mixing chamber is, in the structure illustrated, formed with the top member to depend from the top wall thereof and opens into the discharge 15. The mixing chamber walls are spaced from the walls of the top member so that air may circulate about the same and pass downwardly around the valve seat member 44 and through the port 46 thereof to the mixing chamber. When heated air is supplied to the carbureter the mixing chamber is heated.

The lower edge of the mixing chamber fits into the shoulder 48 of the valve seat member 44, see Fig. II. The suction actuated valve member 49 seats on the valve seat member 44 and constitutes a mixing chamber valve. This suction actuated valve member has a carbureting chamber 50 therein and a tubular depending portion 51 slidably embracing the nozzle member 38 so that its lower end is guided thereby. Below the carbureting chamber the suction actuated member 49 is provided with a conical restricted portion 52 constituting an annular conical valve coacting with the end of the nozzle member for controlling the delivery of air to the carbureting chamber 50 and also through the variations in aspirating effect caused by its adjustment coacting with the fuel valve in controlling the delivery of the fuel. The carbureting chamber valve is preferably so adjusted that it does not entirely cut off the air when closed. The tubular portion of the suction actuated member is provided with air inlet openings 53.

The top 54 of the suction actuated member 49 is mounted in a spaced relation to the body portion thereof to provide an annular slot-like discharge opening 55 discharging into the mixing chamber above the mixing chamber valve seat member 44. The suction actuated member 49 is provided with a dash-pot plunger 56 coacting with the dash-pot cylinder member 57 formed as a cross piece 58 in the mixing chamber. The dash-pot also serves as a guide for the upper end of the member 49. The dash-pot thus disposed is subject to the variations of air pressure in the mixing chamber.

To prevent the return of the plunger being retarded we provide a passage 59 through the plunger opening into the dash-pot cylinder. This passage has an upwardly facing valve seat 60 for the ball check valve 61. On the upward movement this valve seats so that the desired cushioning effect is secured. On the return movement of the plunger the valve 61 opens so that air is admitted to the dash-pot thereby preventing the valve member being "hung up" and quick return is secured.

A needle fuel valve 62 is carried by the mixing chamber valve to coact with the nozzle 30.

It is intended that the fuel valve shall be adjusted to its proper position in the mem-

ber 49 when the carbureter is assembled and it is not intended that it shall be adjusted by the user, the adjustment of the fuel being effected by manipulation of the nozzle 39.

The dash-pot for the valve member prevents chattering and fluttering of the valve member. By locating the dash-pot of the suction actuated member in the mixing chamber it is subject to all the variations of air pressure or degrees of vacuum therein due to throttle or engine control and the running conditions of the engine. This renders the suction actuated member very sensitive and quick acting and quickly responsive to the throttle control and the running conditions of the engine.

Were the dash-pot subject to atmospheric air pressure or to any air pressure other than that of the mixing chamber, there would be, under ordinary running conditions, a constant variation between such air pressure and the suction acting upon the suction actuated member thereby preventing uniformity in the movement of the suction actuated member under the varying suctions or degrees of vacuums in the mixing chamber. For example, if the dash-pot is subject to atmospheric air it is held toward its seat thereby at all times, and a greater suction is required for moving the valve from its seat than would be required if it were located in the mixing chamber, and where a liquid dash-pot is provided the same variations occur. When, however, the dash-pot is in the mixing chamber and is subject to the variations of air pressure therein these conditions are overcome and the suction actuated member is very sensitive and quick in its action.

A further advantage of arranging the dash-pot in the mixing chamber is that it is easy to locate it so that it constitutes an effective guide for the suction actuated member. Further, it is entirely inclosed and cannot be distorted by carelessness when the carbureter is assembled in an automobile or from accidental blows or the like while in use.

A still further advantage is that where the dash-pot is open to atmospheric air it is likely to draw in dust and dirt and become clogged thereby. When located in the mixing chamber, any dust that enters the mixing chamber with the incoming air is not likely to pass to the dash-pot, but is, owing to the velocity of the air, drawn past the dash-pot into the manifold.

A still further advantage is that when positioned within the mixing chamber it is subject to the vapors therein so that in practice it is effectively lubricated. This accomplishes a double purpose,—that of preventing wear and friction and, further, the moisture forms a suitable packing so that a free sliding fit may be had between the parts without objectionable leakage past the plunger. In fact, practical use of the structure has demonstrated that the action is very superior to that in structures in which the dash-pot is subject to atmospheric air or to structures in which the dash-pot is of the oil or liquid type.

To facilitate starting we provide a priming device comprising a fuel passage 62′ formed through one of the valve seat member posts 45 to open into the mixing chamber on the inner side of the mixing chamber valve.

The tube 63 at the lower end of the passage depends into the fuel reservoir below the normal fuel level thereof.

The passage 62′ is controlled by the rotatable valve 64 having a transverse port 65 therein. A longitudinal air inlet passage 66 opens into the transverse port and into the air inlet chamber of the carbureter or below the mixing chamber valve seat. The valve is shown in Fig. IV in its open position. During the normal running of the engine it is closed.

To start the engine the valve is opened or partially opened, which permits air to be drawn through the passage 66 and mixed with the fuel drawn from the reservoir, providing a rich initial or starting mixture. The suction of the engine, however, will actuate the valve member 49 opening the fuel, carbureting chamber, and mixing chamber valves, promptly supplying the proper mixture so that the primer valve can be turned off. It can be turned off gradually as the engine warms up if desired.

The stem of the primer valve is provided with a disk 67 to which the operating connections are made, the disk being provided with a clamping sleeve and screw device coupling 14, such as is provided for the valve 11, heretofore described.

A supporting bracket 68 is provided for the adjusting connection.

With the parts thus arranged we provide a structure in which the relative proportions of air and fuel are automatically maintained throughout the running conditions and speeds of the engine and throughout the throttle adjustments, the carbureter being controlled for normal operation entirely by the engine throttle.

By providing the priming device easy starting of the engine is secured and this permits somewhat more accurate adjustment of the fuel and air valve for the normal running of the engine.

We provide a drain tube 69 so that the fuel may escape should the carbureter become flooded through inoperation of the valve or other cause. The reservoir is preferably provided with a drain plug 70.

We have illustrated and described our improvements in one form in which we have

embodied the same for the market. We have not illustrated or described various modifications which we contemplate as we believe the disclosure made will enable those skilled in the art to embody or adapt our improvements as conditions and particular requirements may dictate.

We desire, however, to be understood as claiming our improvements specifically in the form illustrated as well as broadly within the scope of the appended claims.

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

1. In a carbureter, the combination of a mixing chamber, a suction actuated member constituting a mixing chamber valve and having a carbureting chamber therein delivering to said mixing chamber, a fuel nozzle delivering to said carbureting chamber, a needle fuel valve carried by said suction actuated member and coacting with said nozzle, an annular carbureting chamber valve carried by said suction actuated member and having a conical portion coacting with the upper end of said nozzle, and a sleeve portion slidably embracing said nozzle member and provided with air inlets, a plunger on the inner side of said suction actuated member, a dash-pot for said plunger disposed within said mixing chamber, a passage through said plunger connecting said carbureting chamber with said dash-pot, and a downwardly seating ball valve controlling said passage.

2. In a carbureter, the combination of a mixing chamber, a suction actuated member constituting a mixing chamber valve and having a carbureting chamber therein delivering to said mixing chamber, a fuel valve carried by said suction actuated member, a carbureting chamber valve carried by said suction actuated member, a plunger on the inner side of said suction actuated member, a dash-pot for said plunger disposed within said mixing chamber, a passage through said plunger connecting said carbureting chamber with said dash-pot, and a downwardly seating ball valve controlling said passage.

3. In a carbureter, the combination of a mixing chamber, a suction actuated member constituting a mixing chamber valve and having a carbureting chamber therein delivering to said mixing chamber, a fuel valve carried by said suction actuated member, a carbureting chamber valve carried by said suction actuated member, a plunger on said suction actuated member, a dash-pot for said plunger, a passage through said plunger connecting said carbureting chamber with said dash-pot, and a check valve controlling said passage.

4. In a carbureter, the combination of a mixing chamber, a suction actuated member constituting a mixing chamber valve and having a carbureting chamber therein delivering to said mixing chamber, a fuel nozzle delivering to said carbureting chamber, a carbureting chamber valve carried by said suction actuated member, a needle fuel valve carried by said suction actuated member and coacting with said nozzle, a dash-pot for said suction actuated member disposed so that it is subject to the variations of pressure on the inner side of said suction actuated member, and a dash-pot inlet valve carried by said air actuated member adapted to close on the opening movement of said mixing chamber valve and to open on the closing movement thereof.

5. In a carbureter, the combination of a mixing chamber, a suction actuated mixing chamber valve, a carbureting chamber delivering to said mixing chamber, a carbureting chamber valve carried by said suction actuated member, a fuel valve carried by said suction actuated member, a dash-pot for said suction actuated member disposed so that it is subject to the variations of air pressure on the inner side of the mixing chamber valve, and a dash-pot inlet valve carried by said suction actuated member and adapted to close on the opening movement of said mixing chamber valve and to open on the closing movement thereof.

6. In a carbureter, the combination of a mixing chamber, a throttle valve therefor, a suction actuated inlet valve, a fuel valve carried thereby, a dash-pot for said suction actuated member disposed between it and said throttle valve so that it is subject to the variations of air pressure on the inner side of the mixing chamber valve, and a dash-pot inlet valve carried by said suction actuated member and adapted to close on the opening movement of the valve and to open on the closing movement thereof.

7. In a carbureter, the combination of a suction actuated inlet valve, a dash-pot for said suction actuated inlet valve disposed on the inner side of said air inlet valve and subject to the variations in air pressure at the inner side of said valve, and an inlet valve for said dash-pot carried by said suction actuated valve and adapted to close on the opening movement of said valve and to open on the closing movement thereof.

8. In a carbureter, the combination of a chambered body provided with an annular valve seat, the chamber above said seat constituting a mixing chamber, a suction actuated member coacting with said valve seat and constituting a mixing chamber valve and providing when open an unobstructed annular port, said air actuated member being provided with a carbureting chamber having an annular delivery orifice delivering to said mixing chamber at the periphery of the suction actuated member, a fuel nozzle disposed to deliver centrally to said car-

bureting chamber, an annular carbureting chamber air inlet valve carried by said suction actuated member and surrounding said nozzle providing when open an unobstructed annular air inlet port for said carbureting chamber, and a fuel valve carried by said suction actuated member extending into the delivery orifice of said fuel nozzle providing an annular fuel port delivering to said carbureting chamber centrally of its said air inlet port.

9. In a carbureter, the combination of a chambered body provided with an annular valve seat, the chamber above said seat constituting a mixing chamber, a suction actuated member coacting with said valve seat and constituting a mixing chamber valve and providing when open an unobstructed annular port, said suction actuated member being provided with a carbureting chamber having an annular delivery orifice delivering to said mixing chamber at the periphery of the suction actuated member, a carbureting chamber air inlet valve actuated by said suction actuated member, and a fuel valve actuated by said air actuated member.

10. In a carbureter, the combination of a chambered body provided with an annular valve seat, the chamber above said seat constituting a mixing chamber, a suction actuated member coacting with said valve seat, and constituting a mixing chamber valve, said suction actuated member being provided with a carbureting chamber having a delivery orifice delivering to said mixing chamber at the periphery of the suction actuated member, a carbureting chamber air inlet valve actuated by said suction actuated member, and a fuel valve actuated by said suction actuated member.

11. In a carbureter, the combination of an intermediate body member having a peripheral flange-like side wall portion, a central depending tubular portion and provided with an annular valve seat member disposed centrally above and supported in a spaced relation to said body member by posts extending therefrom, a top member secured to said intermediate member and having an air inlet at the side and a discharge and provided with a cylindrical mixing chamber delivering to said discharge and depending within said top member to engage said valve seat member, said mixing chamber being spaced from the walls of said body member, a reservoir mounted on the depending portion of said intermediate body member, said intermediate body member having a fuel inlet passage therein delivering to said reservoir, a fixed nozzle member projecting upwardly within the tubular portion of said intermediate body member and communicating with said reservoir, a nozzle mounted for adjustment in said nozzle member, a suction actuated member constituting a mixing chamber valve coacting with said valve seat member and having a carbureting chamber therein delivering to said mixing chamber and a tubular portion slidably embracing said nozzle member and provided with air inlets, an annular carbureting chamber valve carried by said suction actuated member and having a conical portion coacting with the upper end of said nozzle, a needle fuel valve carried by said suction actuated member and coacting with said fuel nozzle, and a priming device comprising a passage arranged through one of said valve seat member posts to deliver air and fuel above said mixing chamber inlet valve independently of said carbureting chamber.

12. In a carbureter, the combination of an intermediate body member having a peripheral flange-like side wall portion, a central depending tubular portion and provided with an annular valve seat member disposed centrally above and supported in a spaced relation to said body member by posts extending therefrom, a top member secured to said intermediate member and having an air inlet at the side and a discharge and provided with a cylindrical mixing chamber delivering to said discharge and depending within said top member to engage said valve seat member, said mixing chamber being spaced from the walls of said body member, a reservoir mounted on the depending portion of said intermediate body member, said intermediate body member having a fuel inlet passage therein delivering to said reservoir, a fixed nozzle member projecting upwardly within the tubular portion of said intermediate body member and communicating with said reservoir, a nozzle mounted for adjustment in said nozzle member, a suction actuated member constituting a mixing chamber valve coacting with said valve seat member and having a carbureting chamber therein delivering to said mixing chamber and a tubular portion slidably embracing said nozzle member and provided with air inlets, an annular carbureting chamber valve carried by said suction actuated member and having a conical portion coacting with the upper end of said nozzle, and a needle fuel valve carried by said suction actuated member and coacting with said fuel nozzle.

13. In a carbureter, the combination of an intermediate body member having a peripheral flange-like side wall portion, a central depending tubular portion and provided with an annular valve seat member supported centrally above and in a spaced relation to said body member, a top member secured to said intermediate member and having an air inlet at the side and a discharge and provided with a mixing chamber delivering to said discharge and depend-

ing within said top member to engage said valve seat member, said mixing chamber being spaced from the walls of said body member, a reservoir mounted on the depending portion of said intermediate body member, a suction actuated member constituting a mixing chamber valve coacting with said valve seat member and having a carbureting chamber therein delivering to said mixing chamber, a carbureting chamber valve carried by said suction actuated member, a fuel nozzle delivering to said carbureting chamber, a needle fuel valve carried by said suction actuated member and coacting with said fuel nozzle, and a priming device comprising a passage arranged through one of said valve seat member posts to deliver air and fuel above said mixing chamber inlet valve independently of said carbureting chamber.

14. In a carbureter, the combination of an intermediate body member having a peripheral flange-like side wall portion, a central depending tubular portion and provided with an annular valve seat member supported centrally above and in a spaced relation to said body member, a top member secured to said intermediate member and having an air inlet at the side and a discharge and provided with a mixing chamber delivering to said discharge and depending within said top member to engage said valve seat member, said mixing chamber being spaced from the walls of said body member, a reservoir mounted on the depending portion of said intermediate body member, a suction actuated member constituting a mixing chamber valve coacting with said valve seat member and having a carbureting chamber therein delivering to said mixing chamber, a carbureting chamber valve carried by said suction actuated member, a fuel nozzle delivering to said carbureting chamber, and a needle fuel valve carried by said suction actuated member and coacting with said fuel nozzle.

15. In a carbureter, the combination of an intermediate body member having a central depending tubular portion and provided with an annular valve seat member supported centrally above and in a spaced relation to said body member, a top member secured to said intermediate member and having an air inlet at the side and a discharge and provided with a mixing chamber delivering to said discharge and depending within said top member to engage said valve seat member, said mixing chamber being spaced from the walls of said body member, a reservoir mounted on the depending portion of said intermediate body member, a fixed nozzle member projecting upwardly within the tubular portion of said intermediate body member and communicating with said reservoir, a nozzle mounted in said nozzle member, a suction actuated member constituting a mixing chamber valve coacting with said valve seat member and having a carbureting chamber therein delivering to said mixing chamber, a carbureting chamber valve carried by said actuated member, a needle fuel valve carried by said suction actuated member and coacting with said fuel nozzle, and a priming device comprising a passage arranged to deliver air and fuel above said mixing chamber inlet valve independently of said carbureting chamber.

16. In a carbureter, the combination of an intermediate body member having a central depending tubular portion and provided with an annular valve seat member supported centrally above and in a spaced relation to said body member, a top member secured to said intermediate member and having an air inlet at the side and a discharge and provided with a mixing chamber delivering to said discharge and depending within said top member to engage said valve seat member, said mixing chamber being spaced from the walls of said body member, a reservoir mounted on the depending portion of said intermediate body member, a fixed nozzle member projecting upwardly within the tubular portion of said intermediate body member and communicating with said reservoir, a nozzle mounted in said nozzle member, a suction actuated member constituting a mixing chamber valve coacting with said valve seat member and having a carbureting chamber therein delivering to said mixing chamber, a carbureting chamber valve carried by said suction actuated member, and a needle fuel valve carried by said suction actuated member and coacting with said fuel nozzle.

17. In a carbureter, the combination of a body member having an annular valve seat member supported above and in a spaced relation thereto, a top member having a discharge and provided with a mixing chamber delivering to said discharge and depending within said top member to engage said valve seat member, said mixing chamber being spaced from the walls of said body member, a suction actuated member constituting a mixing chamber valve coacting with said valve seat member and having a carbureting chamber therein delivering to said mixing chamber, a carbureting chamber valve carried by said suction actuated member, and a fuel valve carried by said suction actuated member.

18. In a carbureter, the combination of a body member having an annular valve seat member supported above and in a spaced relation thereto, a top member having a discharge and provided with a mixing chamber delivering to said discharge and depending within said top member to engage said valve

seat member, said mixing chamber being spaced from the walls of said body member, a suction actuated mixing chamber valve co-acting with said valve seat member and a fuel valve actuated by said suction actuated member.

In witness whereof, we have hereunto set our hands and seals in the presence of two witnesses.

WILLIAM SHAKESPEARE, JR. [L. S.]
WILLIAM SCHMID. [L. S.]

Witnesses:
LUELLA G. GREENFIELD,
MARGARET L. GLASGOW.