W. SHAKESPEARE, JR. & W. SCHMID.

CARBURETER.

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1,237,395. Patented Aug. 21, 1917.

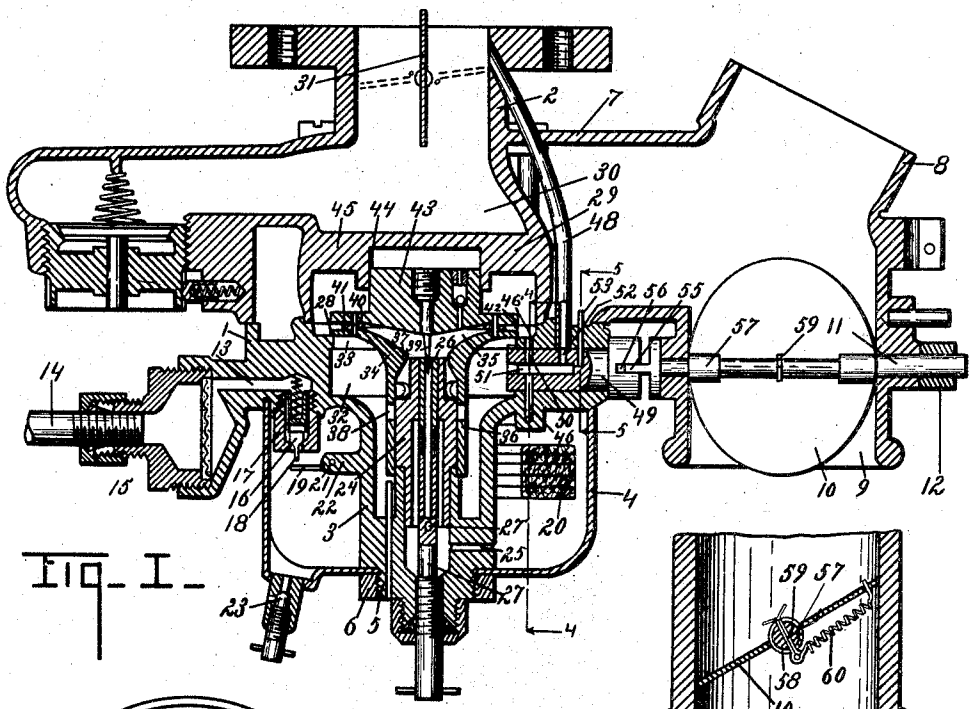

Fig. I.

Fig. III.

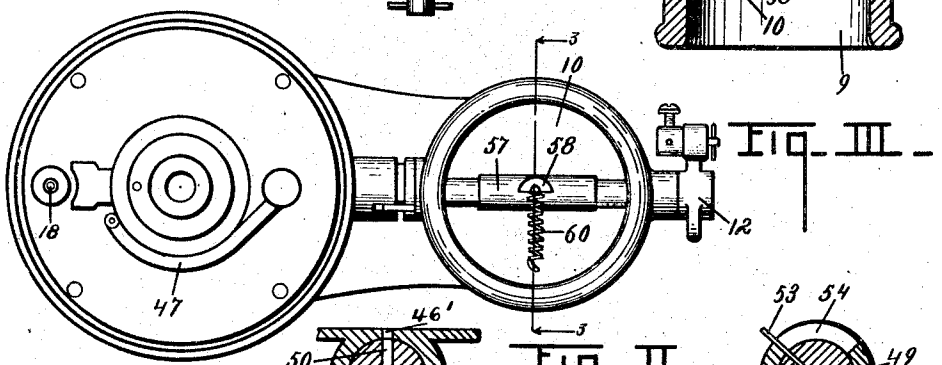

Fig. II.

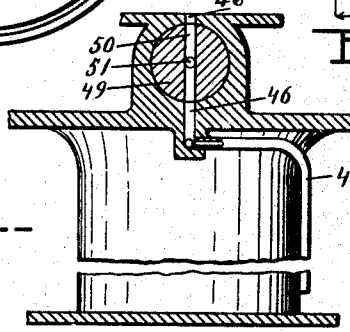

Fig. IV.

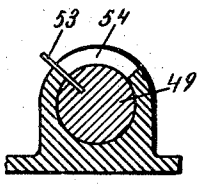

Fig. V.

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CARBURETER.

1,237,395. Specification of Letters Patent. Patented Aug. 21, 1917.

Original application filed November 27, 1915, Serial No. 63,747. Divided and this application filed April 10, 1916. Serial No. 90,241.

To all whom it may concern:

Be it known that we, WILLIAM SHAKESPEARE, Jr., and WILLIAM SCHMID, citizens of the United States, residing at the city and county of Kalamazoo, 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 priming or starting means and are especially designed by us for use in our improved carbureters, such as are shown in our applications for Letters Patent, Ser. Nos. 53,747 and 63,747, filed October 2, 1915, and November 27, 1915, respectively, the present application being a division of Ser. No. 63,747 and a continuation of the priming features of Ser. No. 53,747. Certain features of our improvements are, however, of quite general application and capable of being readily embodied in structures which vary considerably from that illustrated herein and in our said applications.

The main objects of this invention are:

First, to provide in a carbureter an improved primer means which is well adapted for the starting of an engine under varying conditions.

Second, to provide a carbureter having priming or starting features which is very efficient.

Third, to provide an improved primer which is very simple and convenient to use.

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 vertical central section through a carbureter embodying the features of our invention, certain parts being shown in full lines for convenience in illustration.

Fig. II is an inverted detail with the fuel reservoir removed.

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

Fig. IV is a detail vertical section on a line corresponding to line 4—4 of Fig. I, showing details of the primer valve and its fuel connections.

Fig. V is a detail section on a line corresponding to line 5—5 of Fig. I, showing details of the primer valve stop.

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 and a top body member 2 suitably secured together, the body being made in sections for convenience in manufacture. The body member 1 has a centrally depending tubular portion 3 upon which the oil reservoir 4 is mounted, the reservoir having an opening in its bottom to receive the reduced threaded portion 5 of the part 3 and being clamped thereon by the nut 6.

The top member 2 is provided with an air inlet passage 7 having a nipple or mouth 8 adapted to be connected to a means for supplying heated air, the means not being illustrated, and a cold air mouth or inlet 9 open to the atmosphere. The mouth 9 is controlled by the butterfly valve 10. The stem 11 of the valve 10 is arranged in suitable bearings in the walls of the inlet 9, one end extending to the outside for connection to the operating lever 12 and the other for connection to the priming valve, as will be hereinafter described.

The body member 1 is provided with a fuel inlet passage 13 connected to a suitable supply pipe 14 by the coupling 15. The fuel inlet passage is controlled by the valve 16 arranged within the casing or cage 17, the valve being provided with a stem 18 projecting downwardly through the bottom

of the cage to coact with the lever 19 of the float 20. The float is pivotally mounted at 21 on an ear 22 projecting from the tubular portion 3 of the body member 1.

The reservoir is provided with a drain valve 23. A tubular nozzle member 24 projects upwardly within the tubular portion 3 of the body member 1 and is connected with the fuel reservoir by means of the fuel passage 25. The fuel nozzle 26 is provided with a stem 27 having transverse openings 27′ communicating with the passage 25. The stem 27 is threaded at its lower end for adjustment.

The body member 1 is provided with an annular valve seat 28 embraced by the depending mixing chamber wall 29 within the body member 1. The discharge of the mixing chamber 30 is controlled by the throttle 31. The operating connections for the throttle are not illustrated as they will be readily understood.

The mixing chamber walls are disposed in a spaced relation between the walls of the top member so that air may circulate from the passage 7 about the same and pass downwardly around the valve seat through the openings 32 below it and upwardly through the port 33 thereof to the mixing chamber. When heated air is supplied to the carbureter the mixing chamber is heated thereby. The suction or air actuated member 34 seats on the valve seat 28 and is automatically actuated by the suction within the mixing chamber and the air passing thereto and constitutes a mixing chamber valve. This air actuated member 34 has a carbureting chamber 35 therein and a tubular depending portion 36 slidably embracing the nozzle member 24 so that the nozzle member constitutes a guide for the suction actuated member and the nozzle delivers centrally to the carbureting chamber. The member 34 is provided with a conical valve 37 coacting with the nozzle member and constituting an air inlet valve for the carbureting chamber.

Air inlet openings 38 are grouped about the sleeve portion 36.

The needle fuel valve 39 is carried about the sleeve actuated member 34 and projects into the fuel nozzle to coact therewith. The carbureting chamber top piece 40 is supported in a spaced relation to the bottom portion by the spaced blocks 41 to provide an annular slot-like discharge orifice or opening 42 delivering at the edge or periphery of the member 34. With the parts thus arranged, when the air actuated member is lifted from its seat an annular unobstructed port is provided for the mixing chamber and the carbureting chamber delivers into this air at the periphery of the valve through this annular slot-like discharge port, so that the carbureted air is discharged in the manner to be most effectively mixed with the air passing to the mixing chamber.

The suction actuated member 34 is preferably provided with a dash-pot plunger 43 coacting with a cylinder 44 formed in the cross piece 45 in the mixing chamber. This dash-pot serves as a guide to the upper end of the air actuated member and, thus disposed, is subject to the variations of air pressures in the mixing chamber. These parts are shown in detail in our aforesaid application for Letters Patent, Ser. No. 63,747.

Our improved priming device comprises a fuel passage 46, 46′ opening or delivering into the mixing chamber at the rear of or on the inner side of the mixing chamber inlet valve.

A fuel tube 47 depends into the reservoir below the normal fuel level thereof and constitutes an extension of the fuel passage 46, 46′. This fuel tube is, in the structure illustrated, curved about the tubular portion 3 of the body member 1, so that it does not interfere with the float.

A conduit or passage 48 is arranged to deliver above the throttle valve 31. These priming passages 46, 46′ and 48 are controlled by the rotary valve 49 having a transverse fuel port 50 therein and a longitudinal port or passage 51, which opens into this fuel port 50 and into the air inlet chamber of the carbureter below the mixing chamber valve and into the port 52 which opens into the primer passage or conduit 48 when the primer valve is opened. The priming valve is shown in Fig. I in its open position, although, during the normal running of the engine it is closed.

To start the engine the valve 49 is opened to bring its port 50 into register with the passage 46, 46′, which permits fuel to be drawn through the passage 46, 46′, thereby providing a rich initial or starting mixture. If the throttle valve is closed or substantially closed the priming mixture is delivered above the throttle and in view of the relatively high vacuum above the throttle when the throttle is closed a sufficient quantity of fuel is delivered above the throttle to produce a suitable initial or starting mixture. The suction of the engine, however, when the throttle is opened actuates the automatic or suction actuated member 34, opening the main fuel valve and taking up fuel and providing a suitable carbureted supply of air, so that the primer valve can be turned off. It can be turned off gradually as the engine warms, if desired.

The stop pin 53 projecting from the priming valve through the slot 54 limits the movement of the primer valve. For convenience in operation the primer valve is connected to the means for operating the

cold air inlet valve 10. This connection, in the structure illustrated, consists of the tongue 55 on the stem projecting into a slot 56 in the priming valve 49. The valve 10 has a lost motion connection to its stem, the valve being provided with a hub portion 57 through which the stem is arranged, the central portion being slotted at 58 to receive the pin 59, thus permitting a limited lost motion connection between the valve and its stem. A spring 60 is connected to this pin and the valve and normally supports the valve on its stem so that the end of the slot 58 normally engages the pin. This permits the turning of the stem after the valve 10 is closed and the connections for the primer are positioned so that the priming valve is opened after the air valve is closed, thus permitting cutting off the cold air supply when the priming valve is in use. This also has the further advantage of utilizing the operating connections for the priming and air inlet valve.

With the parts thus arranged, we are able to secure a proper priming under various weather conditions in a carbureter having an automatically actuated fuel inlet valve. For instance, in warm weather it is found that proper priming is effected by the opening of the throttle and the primer valve. In cool weather better results are obtained by closing the throttle and opening the priming valve. While our improved primer mechanism is particularly adapted and desirable for use in our improved carbureter illustrated, it is also well adapted for use in structures departing considerably therefrom in structural details.

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 an air valve, a rotary primer valve, an air valve stem alined with said primer valve and having a tongue and slot connection therewith, said air valve being mounted for limited rotative movement on its stem, a spring for holding said air valve yieldingly in its forward position on its stem, and means for actuating said air valve stem whereby said primer valve may be opened and closed while the air valve is closed.

2. In a carbureter, the combination of an air valve, a primer valve, an air valve stem operatively connected to said primer valve, said air valve being mounted for limited rotative movement on its stem, a spring for holding said air valve yieldingly in its forward position on its stem, and means for actuating said air valve stem whereby said primer valve may be opened and closed while the air valve is closed.

3. In a carbureter, the combination of an air valve, a rotary primer valve, and an air valve stem operatively connected to said primer valve, said air valve having a lost motion connection to its stem including a spring for holding it yieldingly in its forward position on its stem and permitting actuation of the stem while the air valve is closed for opening and closing the primer valve.

4. In a carbureter, the combination of an air valve, a rotary primer valve, and an air valve stem operatively connected to said primer valve, said air valve having a lost motion connection to its stem, permitting actuation of the stem while the air valve is closed for opening and closing the primer valve.

5. In a carbureter, the combination of a body having an air valve seat therein, the chamber above said valve seat constituting a mixing chamber and the chamber below an air inlet chamber, a throttle valve for said mixing chamber, a suction actuated member constituting a mixing chamber air inlet valve coacting with said valve seat and having a carbureting chamber therein delivering to said mixing chamber, a fuel reservoir, a fuel nozzle communicating with said reservoir and delivering to said carbureting chamber, there being a priming passage comprising a tube depending into said fuel reservoir and delivering to said mixing chamber above said mixing chamber air inlet valve seat, a fuel valve carried by said suction actuated member and coacting with said nozzle, a carbureting chamber air inlet valve carried by said suction actuated member, and a rotatable valve for said priming passage having a transverse port therein and a longitudinal passage communicating with said port and opening into said air inlet chamber.

6. In a carbureter, the combination of a body having an air valve seat therein, the chamber above said valve seat constituting a mixing chamber and the chamber below an air inlet chamber, a suction actuated member constituting a mixing chamber air inlet valve coacting with said valve seat and having a carbureting chamber therein delivering to said mixing chamber, a fuel reservoir, a fuel nozzle communicating therewith and delivering to said carbureting chamber, a fuel valve carried by said suction actuated member and coacting with said nozzle, a carbureting chamber air inlet valve carried by said suction actuated member, there being a priming passage from said fuel reservoir delivering to said mixing chamber above said air inlet valve seat and an air passage connecting said priming passage with said air inlet chamber, and a valve for said passages.

7. In a carbureter, the combination of a body provided with an air inlet chamber and a mixing chamber, a suction actuated air inlet valve for said mixing chamber, a carbureting chamber delivering to said mixing chamber, a carbureting chamber air inlet

valve actuated by said mixing chamber valve, a fuel reservoir having delivery connections to said carbureting chamber, there being a priming passage from said fuel reservoir delivering to said mixing chamber above said mixing chamber valve, a fuel valve for said carbureting chamber fuel delivery connections actuated by said mixing chamber valve, and a rotatable valve for said passage having a transverse port therein and a longitudinal passage communicating with said port and opening into said air inlet chamber.

8. In a carbureter, the combination of a body provided with an air inlet chamber and a mixing chamber, a suction actuated air inlet valve for said mixing chamber, a carbureting chamber delivering to said mixing chamber, a carbureting chamber air inlet valve actuated by said mixing chamber valve, a fuel reservoir having delivery connections to said carbureting chamber, there being a priming passage from said fuel reservoir delivering to said mixing chamber above said mixing chamber inlet valve and an air passage connecting said priming passage with said air inlet chamber, and a valve for said passages.

9. In a carbureter, the combination of a mixing chamber, a carbureting chamber delivering to said mixing chamber, a throttle valve for said mixing chamber, a suction actuated member constituting an air inlet valve for said mixing chamber, carbureting chamber and fuel valves carried by said air actuated member, a fuel reservoir having delivery connections to said carbureting chamber, there being a priming passage from said fuel reservoir delivering to said mixing chamber above its air inlet valve, and a rotatable valve for said passage having a transverse port therein and a longitudinal air inlet passage opening on the outside of said mixing chamber.

10. In a carbureter, the combination of a suction actuated air inlet valve, a fuel valve actuated thereby, a fuel reservoir, there being a priming fuel passage delivering at the rear of said air inlet valve, and a rotatable valve for said passage having a transverse port therein and a longitudinal air inlet passage opening in front of said air inlet valve.

11. In a carbureter, the combination of a body provided with an air inlet chamber and a mixing chamber, a throttle valve for said mixing chamber, a suction actuated air inlet valve for said mixing chamber, a fuel reservoir, a fuel feed valve actuated by said mixing chamber valve, there being a priming passage connecting said fuel reservoir with said mixing chamber above said mixing chamber valve and a priming conduit delivering above said throttle, and a priming valve controlling said passage and having an air passage connecting said air inlet chamber with its fuel passage, said mixing passage and conduit being open simultaneously.

12. In a carbureter, the combination of a body provided with an air inlet chamber and a mixing chamber, a throttle valve for said mixing chamber, a suction actuated air inlet valve for said mixing chamber, a main fuel feed valve actuated by said mixing chamber valve, a fuel feed reservoir, there being a priming conduit delivering above said throttle, and a priming valve controlling said conduit and having an air passage connecting said air inlet chamber with its fuel passage.

13. A carbureter comprising a suction actuated air inlet valve, a throttle valve at the rear of said air inlet valve, a fuel reservoir, there being a priming fuel passage delivering at the rear of said air inlet valve and a priming conduit delivering at the rear of said throttle valve, and a valve for said passage and conduit.

14. In a carbureter, the combination of a suction actuated air inlet valve, a throttle valve at the rear of said air inlet valve, a fuel valve actuated by said air inlet valve, a fuel reservoir, by-passes, one of the by-passes delivering at the rear of the air actuated inlet valve and the other at the rear of said throttle valve, and a common valve for said by-passes provided with an air passage communicating with its fuel passage.

15. In a carbureter, the combination of a suction actuated air inlet valve, a throttle valve at the rear of said air inlet valve, a fuel valve actuated by said air inlet valve, a fuel reservoir, by-passes, one of the by-passes delivering at the rear of said suction actuated air inlet valve and the other at the rear of said throttle valve, and a common valve for said by-passes.

16. In a carbureter, the combination of a suction actuated air inlet valve, a throttle valve at the rear of said air inlet valve, a fuel valve actuated by said air inlet valve, a fuel reservoir, a by-pass delivering at the rear of the said throttle valve, and a valve for said by-pass provided with an air passage communicating with its fuel passage.

17. In a carbureter, the combination of a suction actuated air inlet valve, a throttle valve at the rear of said air inlet valve, a fuel valve actuated by said air inlet valve, a fuel reservoir, there being a by-pass for said fuel reservoir delivering at the rear of and adjacent to the throttle valve when it is in its closed position, and a valve for said by-pass having an air passage communicating with its fuel passage.

18. In a carbureter, the combination of a suction actuated air inlet valve, a fuel valve actuated by said air inlet valve, a priming passage connected to a source of fuel supply independently of said fuel valve and

delivering at the rear of said air inlet valve, and a valve for said priming passage provided with means for admitting air to said passage.

19. In a carbureter, the combination of a suction actuated air inlet valve, a throttle valve at the rear of said air inlet valve, a fuel valve actuated by said air inlet valve, a priming passage connected to a source of fuel supply independently of said fuel valve delivering at the rear of said throttle valve, and a valve for said priming passage provided with means for admitting air to said passage.

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.