

W. R. CLARK.
CARBURETER.

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1,172,432.

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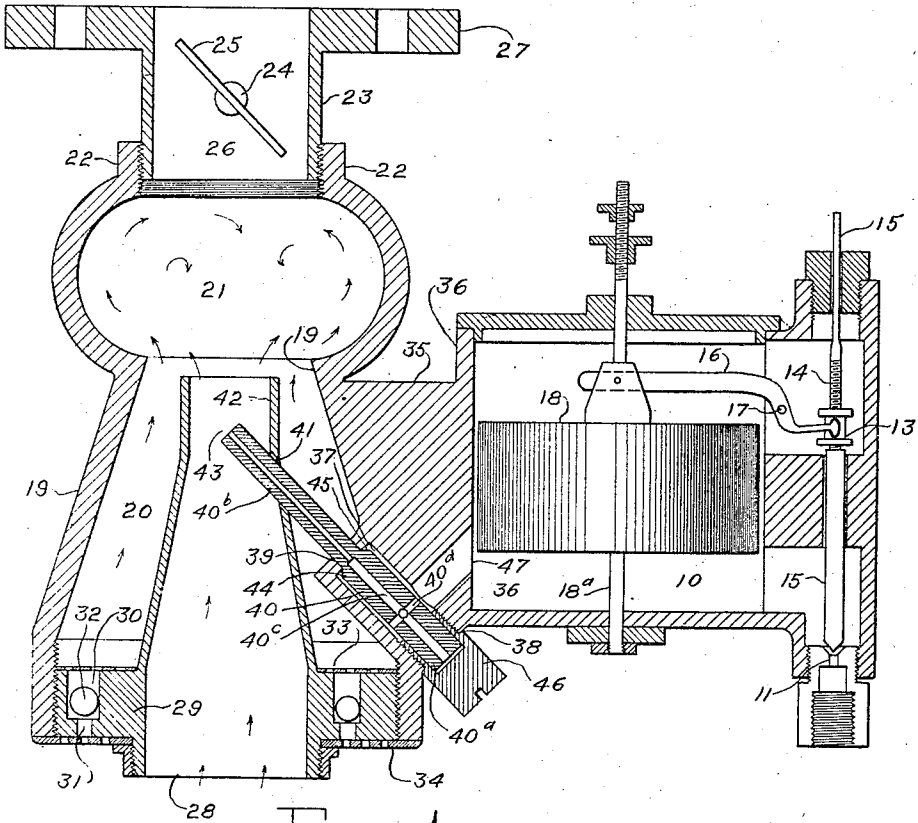


Fig. 1

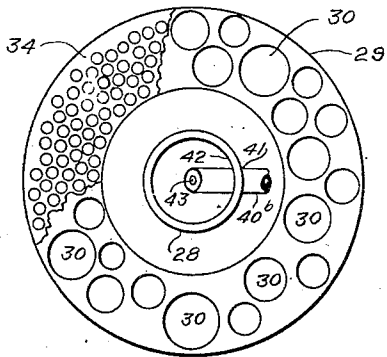


Fig. 2

WITNESSES

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CARBURETER

1,172,432.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM R. CLARK, citizen of the United States of America, residing at Spokane, in the county of Spokane and State of Washington, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

This invention pertains to carbureters and has for its object to provide an improved construction and arrangement whereby the range of internal combustion engine operation is greatly increased, so that the carbureter will respond to all variations in operating conditions of the engine to automatically cause the preparation of the proper gas supply for each condition. I have provided a very simple construction whereby a carbureter may be readily adjusted from the operation of an engine and when once adjusted to an engine is adjusted for all conditions for such engine as relates to speed, atmospheric or other conditions.

My improved device will be hereinafter particularly described and illustrated in the accompanying drawings, in which—

Figure 1, is a vertical sectional view of the device and of a float feeding mechanism, and Fig. 2, is a broken-away top view of the internal construction of the device.

There is provided a fuel receptacle having a chamber 10 into which the liquid fuel, such as gasoline, is fed through an opening 11 controlled by a needle valve 15 having a threaded portion 14 to which there is applied a nut 13 embraced by one end of a lever 16 pivoted at 17. The other end of the lever is attached to a float 18 mounted loosely upon a stem 18'. The float and float chamber, together with the parts controlled by and controlling the float, may be taken as indicative of any suitable structure for maintaining a substantially constant level of fuel.

The carbureter proper has a body portion 19 inclosing a chamber 20 tapering toward one end, and, as it is customary to install the carbureter in an upright position, the chamber 20 may be described as tapering toward the upper end, and other expressions of position will be used with regard to the installed position of the carbureter. The upper end of the chamber 20 opens into a mixing chamber 21 which is materially enlarged in comparison with the smaller upper end of the chamber 20 and is of generally

oblate spheroidal form with the polar diameter in line with the longitudinal axis of the chamber 20 and considerably less than the equatorial diameter of the chamber 21. The chamber 21 is provided at the end remote from the chamber 20 with a tubular neck 22 into which there is inserted a tubular member 23 which may be screwed into the neck 22, or be attached thereto in any suitable manner, and this tubular member 23 terminates at the end remote from the chamber 21 in a laterally extending flange 27, by means of which the carbureter may be attached to an engine or to a manifold leading to an engine. The tubular member 23 has a passage 26 extending therethrough, and in this passage there is mounted a throttle disk or valve 25 upon an operating shaft 24, as is customary, for regulating the passage of the explosive mixture from the mixing chamber to the engine.

The lower wide end of the body portion 19 of the carbureter has an annular plug 29 inserted therein, usually by appropriately threading both the plug and the interior wall of the body portion 19 of the carbureter. This annular plug 29, which may be of disk form, has an air opening at the lower face and carries a tubular member 28 rising through the chamber 20 approximately concentric therewith and terminating in a portion 42 of smaller diameter at the upper end close to the opening of the chamber 20 into the chamber 21. This tubular member 28 may be described as a Venturi tube.

Extending through the plug 29 is a series of passages 31 counterbored at their upper ends, as indicated at 30, each counterbore receiving a ball 32 of a size to move freely in the counterbore, but of greater diameter than the respective passage or bore 31, so that each ball 32 serves as a valve for the respective bore 31. The counterbores 30 and corresponding balls 32 vary in size and the balls correspondingly vary in weight. The lower ends of the passages 31 open to the atmosphere through a perforated plate or screen 34, while the upper ends of the counterbores 30 are covered by a perforated plate or screen 33, the latter serving to hold the balls in the counterbores from escape therefrom, while not interfering materially with the passage of air therethrough.

The float chamber casing is indicated at 36, and this chamber is connected to the

body portion 19 of the carbureter by a web 35. Extending at an upward angle through the web 35 is a passage 37 having the lower end 38 threaded for the reception of a screw plug 46, and this passage 37 opens into the chamber 20 through an aperture 39. Adapted to the passage 37 is a tube 40 having one end 40^a larger than the aperture 39 and the other end 40^b of reduced diameter, and of a length to project through a passage 41 in the tube 28, while the end 40^b is of a length to terminate at about the longitudinal center line of the tube 28. Where the tube 40 is reduced to the portion 40^b there is formed a shoulder 44 adapted to bear against a seat 45 to form a gas tight joint, being there held by the plug 46 shaped to receive the end of the tube 40 remote from the extension 40^b, and center the tube in the passage 37, which latter is of larger diameter than the tube to form an annular chamber thereabout, which chamber is in communication with the chamber 10 by a passageway 47. Extending through the tube 40 is a central passageway 40^c communicating with the exterior of the tube through laterals 40^d so situated as to be on a line with the passageway 47 when the tube 40 is seated in the passage 37. Liquid fuel such as gasolene, finds its way from the float chamber 10 through the passage 47 into the passage 37, and from thence through the laterals 40^d into the passage 40^c, while the level of fuel within the chamber 10 is such as to reach closely to the opening 43 of the passage 40^c at the upper end thereof.

The mixing chamber is so placed and constructed that the direct or primary air is drawn in through the Venturi tube by the suction of the engine, and passing across the opening 43 of the fuel tube or nozzle which is placed at a forty-five degree angle to the longitudinal center line of the Venturi tube, thereby causes the fuel, which for convenience of description may be considered as gasolene, to form into a spray, which spray because of the angle of the tube and the speed of the air at the contracted end of the tube closely approaches what may be termed a perfect spray.

The inlet end of the Venturi tube at the bottom of the plug ring 29 is of the same diameter as the passage 26 through the member 23 containing the butterfly valve 25. As soon as the air stream with the gasolene spray passes the contracted upper end of the Venturi tube it expands into the mixing chamber and there because of the curved sides of the mixing chamber and the greater diameter thereof than either the mouth of the Venturi tube or the passage 26 the mixture of direct air and gasolene expands and rolls or whirls around becoming thoroughly mixed, while the total amount discharged into the mixing cham-

ber does not pass to the engine, but temporarily remains in said mixing chamber, this being due to the considerably smaller diameter of the outlet passage 26 with respect to the diameter of the mixing chamber. In the next suction stroke of the engine more air and gasolene are drawn into the mixing chamber becoming intermixed with the air and gasolene already therein, and this action is repeated on every pulsation of the motor forming a very intimate and thorough fuel mixture.

The indirect or secondary air is drawn into the mixing chamber as needed at the same time that the primary air and gasolene spray are drawn into it through the Venturi tube, but the secondary air is drawn in through the series of ball valves, and passes up and around the outside of the Venturi tube and into the mixing chamber and there takes the same whirling or rolling motion as the primary air and gasolene spray. This secondary air is admitted through the ball valves in accordance with the suction demands of the motor. When the engine is running at low speed and the throttle valve is only partly opened, but a limited number of balls are lifted from their seats allowing a corresponding amount of secondary air to pass to the mixing chamber. When the throttle valve is further opened and more air is required, a larger number of balls is lifted from the seats, and so on, until the engine is running at its full speed and power, and the reverse of this is also true. The screens prevent access of any particles through the ball valve openings which would be harmful to the engine.

By having the balls of different sizes and weights there is secured such a fine adjustment of air that a perfect mixture is obtained automatically, so that the motor may be slowed down to so slow a speed, yet retaining its power, that it is almost noiseless in running and its vibration is reduced to a minimum.

It has been found from actual experience that gasolene drawn from a perpendicularly placed nozzle does not form into a spray because the air stream flowing under sub-atmospheric pressure entirely surrounds the nozzle and the gasolene is drawn from the nozzle as a continuous stream rather than as a spray, but when the nozzle enters the air stream at an angle of substantially forty-five degrees to the flow of the air stream the desired spray is produced.

The nozzle is a one-piece structure with a longitudinal hole of relatively large diameter bored through the larger portion of the nozzle, and from thence to the tip of the nozzle the hole is of such size as will best suit the size of the motor to be run. By making the nozzles interchangeable the proper size of nozzle for the engine can be

installed in a carbureter, and thereafter no change is necessary, there being no valves at all to adjust except the throttle valve at the outlet end of the carbureter, while the passage through the nozzle is wholly free and unimpeded. The carbureter will operate equally well regardless of latitude or climatic conditions, and there are no adjustments to be made either for air or gasoline. The side walls of the chamber approach toward the mixing chamber, and hence the secondary air is forced around and over the mouth of the Venturi tube.

The nozzle is held in place by the cup-like plug 46 which is freely accessible at all times outside the body of the carbureter, and on the removal of this plug the nozzle will either gravitate from the carbureter or may be very easily removed therefrom and another nozzle put in its place if such be needed.

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

1. A carbureter for explosion engines provided with a Venturi tube having the larger end freely open to the atmosphere, a fuel nozzle entering the tube near the smaller end and directed theretoward at an angle to the longitudinal center line of the tube, a laterally expanded mixing chamber at substantially the entrance end of which the smaller end of the Venturi tube terminates and freely communicates, and a secondary air duct surrounding the Venturi tube from the inlet of the latter to and communicating with the entrance end of the expansion chamber in surrounding relation to the outlet end of the Venturi tube.

2. A carbureter for explosion engines comprising a body portion inclosing a chamber tapering toward one end and then laterally expanding to form a mixing chamber in turn contracting toward the end remote from the first-named chamber, a Venturi tube extending centrally through the tapering portion of the first-named chamber with its smaller end terminating substantially at and discharging freely into the entering end of the laterally expanded mixing chamber in spaced relation to the walls of the smaller end of the first-named chamber, and means for introducing fuel into the Venturi tube.

3. A carbureter comprising a body portion inclosing a chamber tapering toward one end, a substantially oblate spheroidal mixing chamber into which the smaller end of the tapering chamber opens, a Venturi tube extending substantially centrally through the tapering portion of the first-named chamber with its smaller end stopping close to and discharging freely into the entering end of the mixing chamber in spaced relation to the walls of the small

end of the first-named chamber, and means for introducing fuel into the Venturi tube.

4. A carbureter comprising a body portion inclosing a chamber tapering toward one end, a substantially oblate spheroidal mixing chamber into which the smaller end of the tapering chamber opens, a Venturi tube extending substantially centrally through the tapering portion of the first-named chamber with its smaller end stopping close to and discharging freely into the entering end of the mixing chamber in spaced relation to the walls of the small end of the first-named chamber, and means for introducing fuel into the Venturi tube, said fuel introducing means being in the form of a nozzle entering the Venturi tube in substantially forty-five degree relation to the longitudinal axis of the Venturi tube and terminating adjacent to the smaller open end of the Venturi tube.

5. A carbureter for explosion engines comprising a body portion inclosing a chamber tapering toward one end, and a laterally expanded mixing chamber in free communication with the small end of the tapering chamber, an annular plug at the larger end of the first-named chamber carrying a centrally located Venturi tube terminating with its small end closely adjacent to the entering end of and freely opening into the mixing chamber and there spaced from the inner wall of the small end of the first-named chamber, the plug having means for the entrance of air therethrough into the first-named chamber, and means for the introduction of fuel into the Venturi tube.

6. A carbureter for explosion engines comprising a body portion inclosing a chamber tapering toward one end and a laterally expanded mixing chamber into which the small end of the first-named chamber opens, an annular plug at the larger end of the first-named chamber carrying a centrally located Venturi tube terminating with its small end closely adjacent to and freely opening into the mixing chamber and spaced from the inner wall of the small end of the first-named chamber, said plug having passages through it around the inlet end of the Venturi tube, ball valves in said passages of different responsiveness to air pressure, and means for the introduction of fuel into the Venturi tube.

7. A carbureter for explosion engines comprising a body portion inclosing a chamber tapering toward one end and a laterally expanded mixing chamber into which the small end of the first-named chamber freely opens, an annular plug at the larger end of the first-named chamber carrying a centrally located Venturi tube terminating with its small end closely adjacent to and discharging freely into the entering end of the mixing chamber and spaced from the inner wall

of the small end of the first-named chamber, said plug having an annular series of passages through it around the inlet end of the Venturi tube, and said passages being provided with valves differently responsive to air pressure, and means for the introduction of fuel into the Venturi tube.

8. A carbureter for explosion engines comprising a one-piece body portion inclosing a chamber tapering toward one end and a substantially oblate spheroidal mixing chamber into which the small end of the first-named chamber freely opens, an annular plug at the larger end of the first-named chamber carrying a centrally located Venturi tube in one piece with the plug and terminating with its small end closely adjacent to and freely discharging into the mixing chamber and there spaced from the inner wall of the small end of the first-named chamber, said plug having passages through it around the air inlet of the Venturi tube, and said passages having ball valves of different sizes and different responsiveness to air pressure, a fuel nozzle entering the Venturi tube and terminating adjacent to the small end thereof, said nozzle being directed toward the outlet end of the Venturi tube at an angle thereto, and a tubular neck at the outlet end of the mixing chamber, said neck being of substantially the diameter of the inlet end of the Venturi tube.

9. A carbureter for explosion engines comprising a body portion inclosing a chamber tapering toward one end and a substantially oblate spheroidal mixing chamber into which the small end of the first-named chamber freely opens, an annular plug at the larger end of the first-named chamber carrying a centrally located Venturi tube ter-

minating with its small end adjacent to and freely opening into the mixing chamber and there spaced from the inner wall of the small end of the first-named chamber, said plug having passages through it around the air inlet of the Venturi tube, and said passages having ball valves of different sizes and different responsiveness to air pressure, a fuel nozzle entering the Venturi tube and terminating adjacent to the small end thereof, said nozzle being directed toward the outlet end of the Venturi tube at an angle thereto, and a tubular neck at the outlet end of the mixing chamber, said neck being of substantially the diameter of the inlet end of the Venturi tube, and said neck being provided with a throttle valve.

10. A carbureter provided with a Venturi tube having the larger end freely open to the atmosphere and constituting the sole inlet for primary air to the carbureter, a fuel nozzle entering the Venturi tube and terminating at the smaller end of said tube, a laterally expanded mixing chamber into which the Venturi tube freely discharges, a secondary air duct surrounding the Venturi tube and also freely discharging into the mixing chamber in surrounding relation to the discharge end of the Venturi tube, and a series of ball valves of different responsiveness to air pressure and located at the inlet end of the secondary air duct in surrounding relation to the primary air inlet end of the Venturi tube.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM R. CLARK.

Witnesses:

GEO. E. CANFIELD,
WILLIAM H. KAYE.