June 12, 1928.

1,672,923

I. R. ZARRACINA

CARBURETOR

Filed Nov. 29, 1922

2 Sheets-Sheet 1

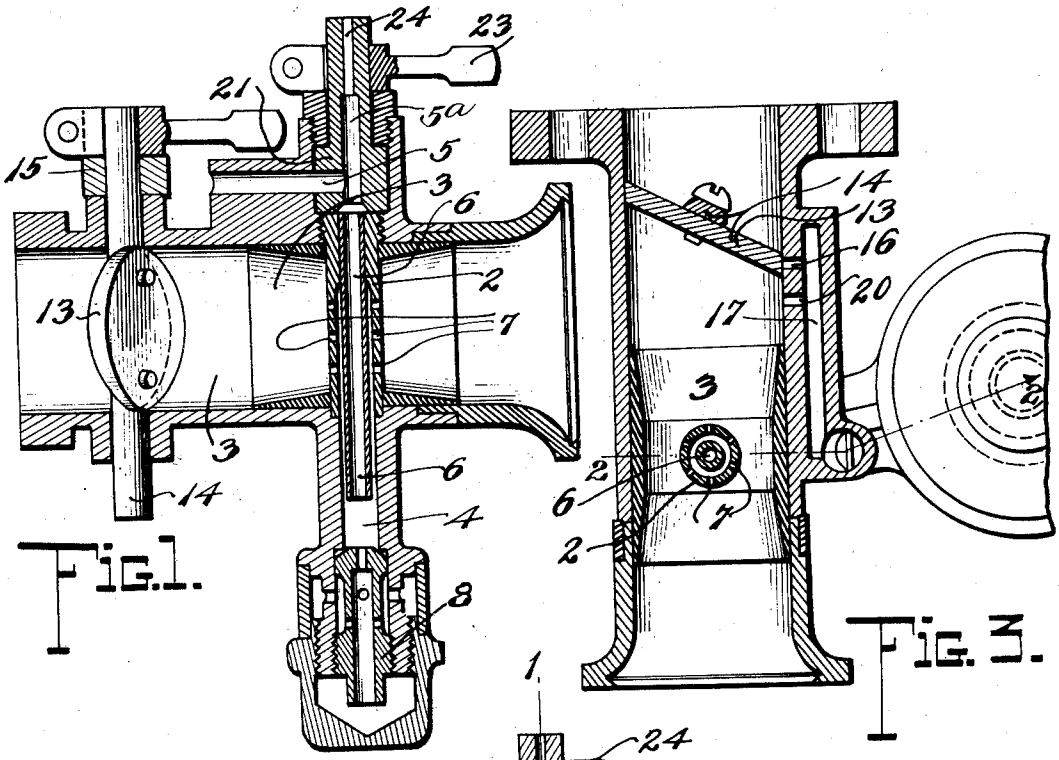

Fig. 1.

Fig. 3.

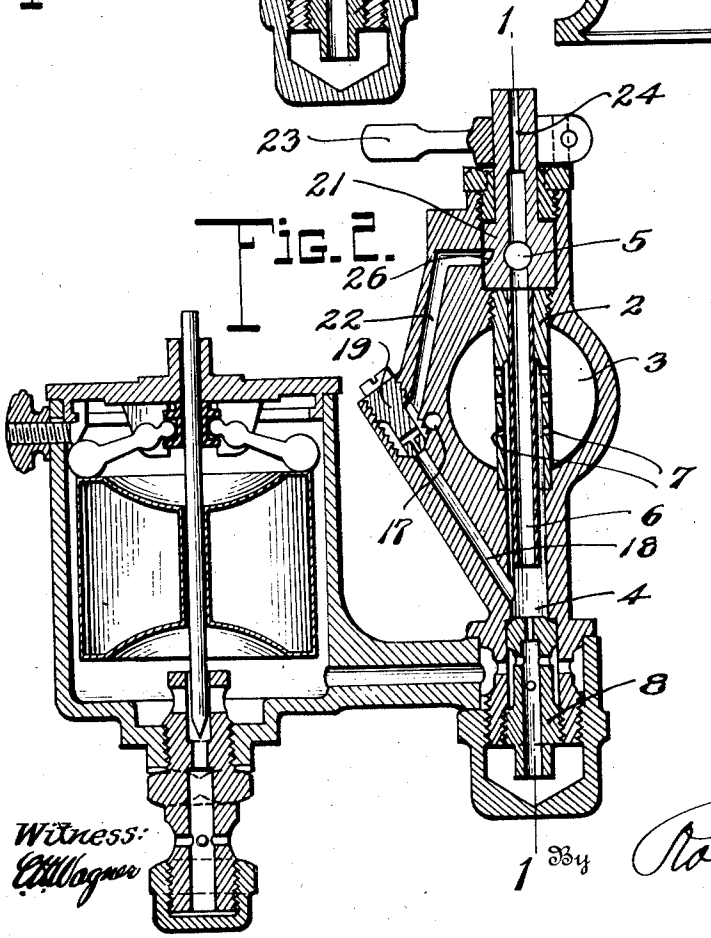

Fig. 2.

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Fig. 4.

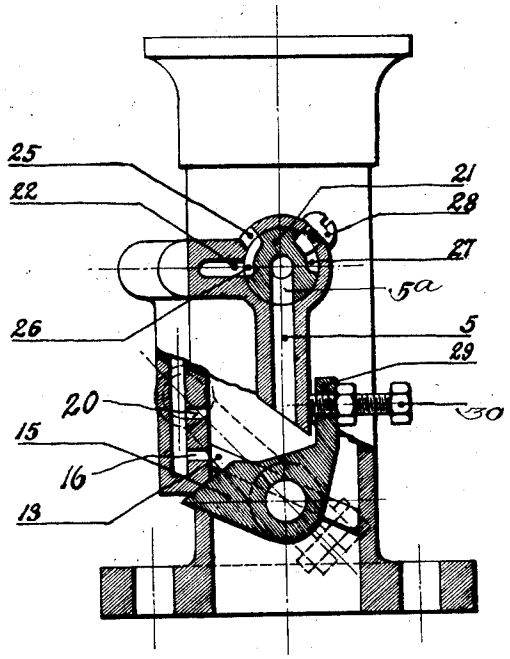
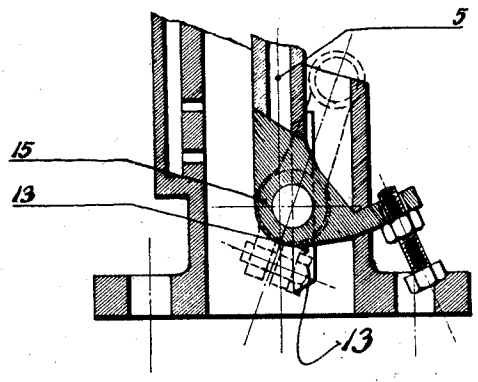


Fig. 4-A.



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UNITED STATES PATENT OFFICE.

ISIDRO RODRIGUEZ ZARRACINA, OF VALLADOLID, SPAIN.

CARBURETOR.

Application filed November 29, 1922, Serial No. 604,028, and in Spain May 12, 1922.

This invention relates to an improvement in or modification of the invention described in my prior Patent No. 1,523,095 of January 13, 1925.

In the said patent the throttle valve 13 of the carburetor is provided with an extension or tail 15 secured thereto which is provided with a valve adapted to close an additional air supply passage, so as to control the suction at the jet or nozzle, when the throttle valve is fully open.

According to the present invention the throttle valve is replaced by a butterfly valve, to the spindle of which there is secured a shutter, which, when the butterfly valve is fully open, closes the additional air supply passage in order to control the suction at the main jet. The principle of enriching the mixture according to the present invention is the same as in my earlier applications, but solely when the throttle valve is in the fully open position.

The invention will now be described with reference to the accompanying drawings wherein:—

Fig. 1 is a longitudinal sectional elevation of the carburetor.

Fig. 2 is a cross sectional view taken about on the plane indicated by the line 2—2 of Figure 3.

Fig. 3 is a sectional plan, and

Figs. 4 and 4A show sections with the shutter in two different positions.

In these drawings, 8 is the main jet, with a constricted opening, which is supplied with fuel maintained at a constant level in the float chamber. The outlet orifice of the main jet or nozzle 8 is disposed at a lower level than the level of the fuel in the float chamber.

Between the main jet and the lower end of a tube 6 is formed the preliminary fuel well 4 in which air and fuel are mixed together. This chamber communicates with the main mixing chamber 3 of the carburetor, by means of a tubular atomizing member 2 provided over the whole of its periphery with openings 7. The tube 6 is arranged concentrically within the member 2 and the fuel well 4, this tube 6 being in communication with the atmosphere by a passage 5 for the supply of additional air. Between the tubular member 2 and the induction pipe of the engine is provided the throttle valve 13, to the shaft of which is secured a shutter 15 adapted to close the auxiliary air passage 5 when the throttle valve is fully open.

In the chamber 4 above the main jet or nozzle 8, terminates a passage 18 into the outer end of which is screwed the slow running jet or nozzle 19. A passage 17 is adapted to connect the slow running jet with openings 16 and 20 provided in the main mixing chamber 3 near the throttle valve. The opening 16 is the suction opening and the opening 20 the compensating opening.

In the upper part of the carburetor is mounted a rotary valve 21 in which a passage 5^a adapted to register with the passage 5 is provided. The valve 21 is also provided with a groove or recess 26 adapted to connect a passage 22 with a passage 25, for the supply of air when the engine is running at a slow speed. The angular movement of the valve 21 is limited by a set screw 28 engaging in a groove 27.

The shutter 15 is provided with an extension 29 through which passes a set screw 30, with a lock nut, which shutter is used for idle running and for limiting the opening of the throttle valve.

The parts of the carburetor having thus been described, the operation thereof is as follows:—

When the engine is started the throttle valve 13 is almost completely closed, a small clearance space being left so as to expose the opening 16 for slow running. By reason of the strong suction around this opening air will be drawn through the opening 20 and at the same time a powerful suction action will be produced around the fuel jet or nozzle 19 for slow running. The fuel will rise in the passage 18. A suction action will also occur, at the same time, in the passage 22, and the degree of suction in this passage can be varied by varying the position of the valve 21, the position of this valve allowing more or less air to pass freely through the groove 26 and the opening 25. It will be seen that in this manner the suction around the jet or nozzle 19 for slow running can be controlled very accurately and the best result for slow running thus obtained. The compensating opening 20 is adapted to avoid sudden changes in the suction between idle running and slow running under small loads, and the action of the opening 20 ceases when the edge of the throttle valve is opposite the opening 20.

When the throttle valve is being opened

for the purpose of increasing the power of the engine, the suction in front of the openings 16 and 20 decreases, but increases around the tubular member 2 so as to produce an intimate mixing of the the fuel, which passes from the jet or nozzle 8, and the air, drawn through the passage 5 and the tube 6, in the well 4. This mixture, which is finely vapourized, passing into the mixing chamber 3 through the openings 7 in the tubular member 2. As these openings are disposed over the whole periphery of the tubular member 2, a second vaporization is produced in the latter by reason of the fact that in consequence of the cinetic energy of the air, this latter passes into those openings 7 facing the main air inlet, then out through the lateral openings and those facing toward the engine intake. The mixture which has now been vapourized twice, is again vapourized for the third time on its passage into the mixing chamber 3, so that an air-fuel mixture is formed which is extremely efficient for good combustion.

As long as the throttle valve 13 is not moved into its fully open position, the passage 5 remains open and air can pass therethrough into the fuel well 4, the passage of air being controlled by suitably positioning the valve 21, so that a mixture is formed which is found to be the most suitable for an economical running of the engine. Under these circumstances and by reason of the position of the jet or nozzle 8 and the energetic passage of the main stream of air through the mixture passing through the openings 7, it will be seen that as the speed of the engine increases the proportion of fuel and air in the mixture will not remain constant, but the proportion of fuel will be reduced as the speed of the engine increases so that the engine will run more economically.

As however, it is of great importance to be able to obtain from the engine, at any moment, with the admission fully open, its maximum efficiency by simply operating the throttle valve 13, a shutter is keyed to the shaft of the throttle valve, this shutter being adapted to close completely the passage 5 when the throttle valve is fully open (Fig. 4[A]) so that the action controlled by the valve 21 ceases as air is prevented from passing into the fuel well 4, and consequently more fuel will be drawn in so that a richer mixture is produced which contains the required amount of fuel for running the engine at a higher efficiency.

The well 4 and tube 6 form a liquid seal which it would be difficult to overcome by weak suction actions produced when running at low speeds and the throttle valve should be opened quickly; in order to overcome this difficulty and to remove the liquid seal quickly, the shaft of the valve 21 is provided with a constricted passage which allows a constant quantity of air to pass into the well 4 independently of the position of the shutter 15.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:—

1. A carburetor including a casing provided with a main passage and a fuel well, an atomizing tube extending transversely of said passage to said well and having discharge outlets into the passage, a main fuel nozzle in said well, a by-pass separate from the atomizing tube and opening at one end laterally into the main passage and at the other end into the well adjacent the main fuel nozzle, so as to supply fuel to said passage during idling operation, and an auxiliary air passage extending through the atomizing tube to said well so as to supply air to both the atomizing tube and the by-pass, and throttle means in the main passage including means to control the auxiliary air passage when the by-pass is inoperative.

2. A carburetor including a casing provided with a main passage and a fuel well, a main fuel nozzle in said well, a by-pass in the wall of said casing communicating at one end with the well adjacent the nozzle and at the other end opening laterally into the main passage, a branch passage communicating with the by-pass at one end and with the atmosphere at the other end, an idling nozzle disposed at the juncture of the by-pass and said branch passage, an auxiliary air tube extending through the casing to the well, and a valve member common to the branch passage and said auxiliary air tube.

3. A carburetor including a casing provided with a main passage and a fuel well, an atomizing tube extending transversely of said passage to said well and having discharge outlets into the passage, a main fuel nozzle in said well, a by-pass separate from the atomizing tube and opening at one end laterally into the main passage and at the other end into the well adjacent the main fuel nozzle, so as to supply fuel to said passage during idling operation, an auxiliary air tube mounted in the atomizing tube and substantially spaced therefrom to provide passage therebetween, a passage in the casing communicating with the air tube and having an air intake, a throttle member in the main passage, and means movable with the throttle member to coact with the air intake of the passage to the air tube in certain positions of the throttle, said throttle member being disposed to coact with the said opening of the by-pass into the main passage in certain other positions of the throttle whereby the richness of the fuel mixture

may be regulated under idling, normal running, and heavy load conditions by varying the positions of the throttle.

4. In a carburetor, the combination with fuel supply and mixing means and an engine intake-discharge port therefor, of a control valve for said port, a rock shaft for actuating the valve, an air intake port for the mixing means extending substantially parallel to the intake-discharge and having an exposed inclined terminus adjacent the shaft, and a closing member having a face inclining oppositely to the inclination of the air intake port and carried by the rock shaft for closing the air intake port as the shaft is oscillated toward the maximum open position of the control valve.

5. The combination, with carbureting apparatus for internal combustion engine fuel, a control valve therefor, and an actuator for the control valve, of an air supply tube communicating with the interior of the carbureting apparatus for assisting in attenuating the fuel being carbureted, the said tube having an inclined exposed intake terminus, and a closure for said terminus having a corresponding, opposite incline actuated by the control valve actuator to move in the arcuate path to and from a position contacting with and closing the intake end of said tube.

In testimony whereof I affix my signature.

ISIDRO RODRIGUEZ ZARRACINA.