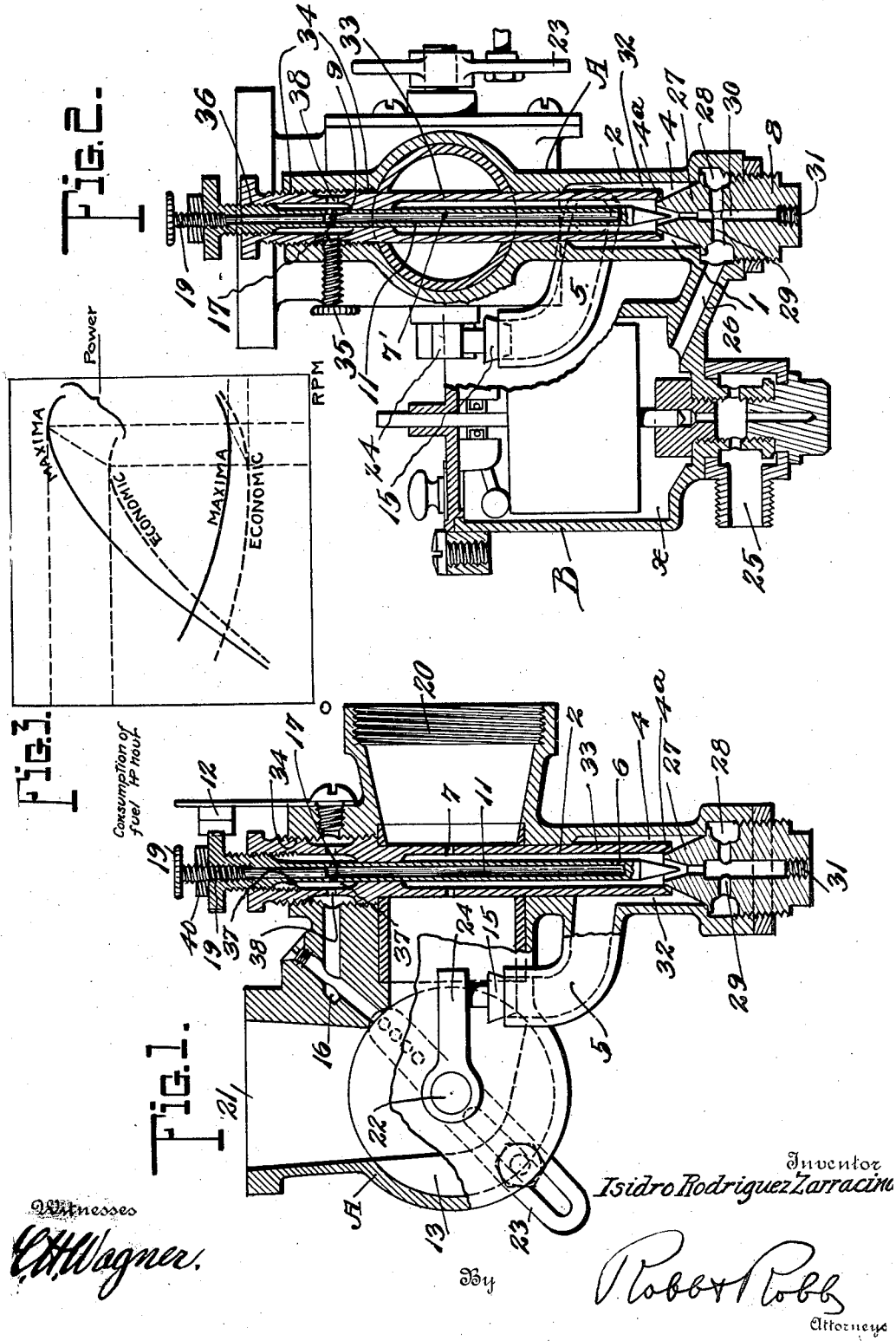
Jan. 13, 1925. 1,523,095

I. R. ZARRACINA

CARBURETOR

Filed June 21, 1919



Witnesses

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UNITED STATES PATENT OFFICE.

ISIDRO RODRIGUEZ ZARRACINA, OF VALLADOLID, SPAIN.

CARBURETOR.

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(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, ISIDRO RODRIGUEZ ZARRACINA, a subject of the King of Spain, and residing at Valladolid, Spain, have invented new and useful Improvements in Carburetors, of which the following is a specification.

Patents for this invention have been obtained in a number of foreign countries.—

In Spain an application was filed on May 27, 1918, and Patent No. 67,141 was issued on August 30, 1918.

In France an application was filed on Aug. 7, 1919, and Patent No. 502,284 was issued on Feb. 18, 1920.

In England an application was filed on May 27, 1919, and Patent No. 127,579 was issued on Oct. 27, 1920.

In Italy an application was filed on May 27, 1919, and Patent No. 176,950 was issued on Sept. 13, 1921.

In Belgium an application was filed on May 27, 1919, and Patent No. 281,700 was issued on May 20, 1920.

In Switzerland an application was filed May 21, 1919, and Patent No. 90,381 was issued on Sept. 1, 1921.

In Germany an application was filed on Oct. 22, 1919, and I am advised that a German patent will issue soon.

The present invention relates to certain new and useful improvements in carburetors, and has for its object to provide a device of this character which embodies novel features of construction whereby the proper mixture for obtaining the maximum power and efficiency under different working conditions is supplied to the motor.

A further object of the invention is to provide a carburetor which is so constructed as to provide for varying the richness of the mixture which is supplied to the engine when the throttle is wide open, thereby enabling the proper mixture for the most efficient operation of the engine to be supplied thereto. This varying of the richness of the mixture is accomplished by manipulation of the same control member which is used for moving the throttle valve and the necessity of providing separate control or adjustment elements thereby avoided.

The invention further contemplates the provision of novel means for supplying a rich mixture to the engine for starting the same before the throttle valve is opened.

One embodiment of the invention is illustrated by the accompanying drawings in which:—

Figure 1 is a vertical sectional view through a carburetor which is constructed in accordance with the invention;

Figure 2 is a similar view taken on a plane at right angles to that of Figure 1; and

Figure 3 is a diagram illustrating the characteristics of power and fuel consumption which are obtained with the new idea in carburetor construction.

Corresponding parts are referred to in the following description and indicated in all of the views of the drawings by like reference characters.

Specifically describing the embodiment of the invention illustrated by the drawings, the reference character A designates the body of the carburetor which is tubular and substantially in the form of an elbow, the end 20 of the body constituting the main air inlet, while the end 21 is the carburetor outlet and is intended to be connected to the manifold of the engine in the usual manner. A throttle valve 13 is located at the angular portion of the elbow shaped body, said throttle being in the form of a rotary valve which turns upon the axis 22. An operating lever 23 is rigidly connected to the throttle valve and provides a means for turning the same. An arm 24 is also rigid with the throttle valve so as to move therewith, and this arm carries a valve 15 which controls the mouth of an air inlet tube 5 in a manner which will be presently described.

Located at one side of the body A is a float valve chamber B which is of the usual construction. The liquid fuel is supplied to the float valve chamber through a feed pipe which is connected in the well known manner to the nipple 15 at the bottom thereof, and the float valve operates to maintain the liquid fuel at a constant level within the chamber. A feed passage 26 leads from the float valve chamber to a nozzle 27 which is removably secured in the bottom of the carburetor body A and has a tapered discharge end. The feed passage 26 communicates with an annular chamber 28 surrounding the

nozzle 27, and lateral passages 29 lead from this annular chamber 28 to the central opening 30 of the nozzle. This central opening is shown as extending entirely through the nozzle being closed at its lower end by a plug 31.

The nozzle 27 projects into a lower chamber 32 which communicates with the air inlet tube 5, and an induction tube 33 extends downwardly through the main air inlet of the carburetor body to the nozzle. The lower end of the induction tube 33 projects downwardly into the chamber 32 and surrounds the tapered end of the nozzle 27. The upper end of the induction tube is threaded at 34 in the carburetor body and the induction tube can be screwed in or out to regulate the distance between the lower end thereof and the nozzle. A proper adjustment can thus be made for obtaining the best results with different kinds of fuel and in connection with different types and makes of engines. A set screw 35 is provided for locking the induction tube in an adjusted position. The aspirator tube extends across the main air inlet 20 of the carburetor and is provided with lateral openings 7 which communicate with the air inlet and through which the liquid fuel emerges when the carburetor is in operation, the liquid fuel being caught by the main body of air as it flows from the opening 7 and carried into the manifold of the engine.

A needle valve 11 extends axially through the induction tube 33 and the lower end thereof cooperates with the flared mouth of the nozzle to regulate the flow of liquid fuel therethrough under different conditions. The upper end of the needle valve is threaded at 36 in the induction tube so that proper adjustment can be made by rotation of the needle valve. A spring detent 12 engages a head at the upper end of the needle valve and cooperates therewith to hold the needle valve in an adjusted position and prevent accidental rotation thereof.

The needle valve is hollow or tubular from a point just above the pointed lower end thereof through its upper end. A lateral opening 6 disposed toward the lower end of the needle valve communicates with the interior of the induction tube 33, while lateral openings 17 in the upper end of the needle valve communicate with a chamber 37 in the upper end of the induction tube. This chamber communicates in turn through lateral openings 38 with an outer annular chamber 39 and a passage 16 which enters the interior of the carburetor body A at the elbow portion thereof so that it is controlled by the throttle valve 13. A regulator 19 is threaded in the upper end of the tubular needle valve 11 and has a stem extending downwardly into the upper end of the needle valve and adapted to control the flow of fuel through the openings 17. By adjusting the member 19 the supplying of fuel and the richness of the mixture which is obtained when starting the engine can be regulated. A jam nut 40 provides for locking the member 19 in an adjusted position. The nozzle 27 is located at a point below the level of the liquid fuel in the float valve chamber B and constitutes what may be termed a submerged nozzle. When starting the engine the throttle valve 13 is turned just a sufficient amount to uncover the passage 16, the main passage through the carburetor body A being closed. The suction of the engine will then operate through the passage 16 and interior of the tubular needle valve 11 to draw a very rich mixture of fuel and air into the engine cylinders. When the throttle valve is in this position the mouth of the tube 5 is completely open, although the arrangement is such that the necessary rich mixture for starting will be supplied to the engine. After the engine has started the throttle is opened so as to uncover more or less of the cross sectional area of the air passage. Air is drawn through the tube 5 by the suction of the engine and passes into the induction tube 33 through the space between the lower end of the said tube and the nozzle. In its upward passage through the tube this air carries more or less of the liquid fuel, depending upon the adjustment of the needle valve 11. The air and fuel thus carried upwardly through the induction tube emerge through the lateral openings 7 thereof into the main air inlet of the carburetor where the fuel mixes with the main body of the air. The induction tube 33 and needle valve 11 are adjusted to produce the best results for the grade or character of fuel which is being used, as well as for use in connection with the particular kind of engine. After the throttle valve 12 is fully opened it will be observed that it can still be moved or rotated a certain distance with the main passage through the carburetor open to its fullest extent and without any throttle action. In other words, the valve is so constructed that it is capable of being moved or rotated within a certain angle while the valve is open to its fullest extent. When the valve first reaches a full open position the small valve member 15 which is carried by the arm 24 is brought into a position adjacent to the open end of the air tube 5 so that any further movement of the throttle valve will cause the small valve 15 to partially or entirely close the air tube 5.

The opening or closing of the air inlet tube 5 with the throttle valve fully open enables the richness of the mixture to be controlled within certain limits and by means of the same control lever or element which is utilized for operating the throttle

valve. The supply of liquid fuel through the induction tube 33 and lateral outlets 7 thereof is caused by the partial vacuum which is transmitted through the induction tube from the engine cylinders to the nozzle. The extent of this partial vacuum is controlled by the quantity of air entering the carburetor through the air inlet tube 5. When the valve 15 leaves the air inlet tube 5 entirely open the supply of air through this tube will diminish the partial vacuum of the induction tube to the maximum extent and there will be a minimum supply of fuel through the induction tube and openings 7. Under these conditions it will be obvious that a lean or impoverished mixture will be supplied to the engine. As the valve 15 closes the quantity of air entering the induction tube from the tube 5 will decrease and the partial vacuum of the induction tube will be diminished to a lesser extent, with the result that a richer mixture will be supplied to the engine, the richest mixture being obtained when the valve 15 completely closes the air inlet tube 5 and there is no outside influence permitted to diminish the partial vacuum transmitted to the induction tube from the engine. As before stated, the throttle valve 13 is constructed and so mounted that it can be moved or rotated within a limited angle after it is fully opened and without having any closing action. The rotation of the throttle valve under these conditions, however, does regulate the position of the valve 15 and cause the same to more or less effectively close the air inlet tube 5. At one position of the throttle valve when it is fully opened, the valve 15 is fully open, while at another position of the throttle valve the valve 15 is fully closed. These two extreme positions of the valve 15, as well as of intermediate positions thereof are obtainable when the throttle valve is fully opened and, as has just been described, this enables the richness of the mixture supplied to the engine to be varied within certain limits while the throttle valve is maintained wide open. Furthermore, this is accomplished by manipulating the same lever or element which is used for opening and closing the throttle valve. There is no possibility of an unexperienced operator becoming confused and manipulating the wrong element, as is the case where separate control levers or elements are provided for making different adjustments. The operating lever 23 which is rigid with the throttle valve is operatively connected in any conventional manner with a control element or lever located at any desired point, and suitable stops may be provided for limiting the movements of the lever in the necessary manner.

Figure 3 is a diagram which shows the two extreme characteristics of power and fuel consumption which are obtainable with the present carburetor construction by regulating the richness of the mixture with the throttle valve fully open. The full lines show the maximum power which is obtained with the richest mixture, while the dotted lines have reference to the more economical operation with the leaner or impoverished mixture. The first set of lines corresponds to the closing of the air tube 5, while the second set applies to the opening thereof. Depending upon the position of the valve 15 it is evident that any desired results intermediate the lines of either set can be obtained by properly manipulating the throttle valve, and that a change can be made almost instantly from one extreme to the other. This gives the engine a high degree of flexibility and enables it to be operated in such a manner as to produce the maximum of power with a minimum of fuel consumption under varying conditions.

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

1. A carburetor including a throttle valve mounted to have a degree of movement without any opening or closing action, and means controlled by the said movement of the throttle valve for varying the richness of the mixture produced by the carburetor.

2. A carburetor including a throttle valve mounted to have a degree of movement while fully opened and without any opening or closing action, and means controlled by the said movement of the throttle valve for varying the richness of the mixture produced by the carburetor.

3. A carburetor including a casing formed with a mixture passage which is provided with a main air inlet and within which a partial vacuum is produced by the engine, a fuel nozzle, an induction tube cooperating therewith and provided with an auxiliary air inlet, a throttle valve interposed between the fuel nozzle and the engine, means for actuating the throttle valve, an arm rigid with the throttle valve, and a valve mounted upon and carried by the arm and controlling the auxiliary air inlet whereby the richness of the mixture supplied to the engine is regulated.

4. A carburetor including a casing formed with a mixture passage having a main air inlet at one end thereof and adapted to communicate at the opposite end thereof with the intake of an engine, a fuel nozzle, an induction tube associated with the fuel nozzle, and extending across the mixture passage to feed fuel into the said passage, said induction tube having an auxiliary air inlet associated with the fuel receiving end thereof, a rotary throttle valve

for the mixture passage, a swinging arm movable with the throttle valve, and a valve mounted upon and carried by the swinging arm for controlling the auxiliary air inlet to regulate the quantity of fuel drawn through the induction tube and the richness of the mixture.

5. A carburetor including a casing formed with a mixture passage having a main air inlet at one end thereof and adapted to communicate at the opposite end thereof with the intake of an engine, a fuel nozzle, an induction tube associated with the fuel nozzle, and communicating at the inlet end thereof with an auxiliary air inlet passage, a throttle valve for the mixture passage mounted to have a degree of movement while fully opened without any opening or closing action, an arm movable with the throttle valve and a valve carried by the arm and controlling the effective size of the before mentioned auxiliary air inlet passage during the said movement of the throttle valve, whereby the richness of the mixture can be varied without varying the effective size of the passage controlled by the throttle valve.

6. A carburetor including a casing formed with a mixture passage which is provided with a main air inlet and within which a partial vacuum is produced by the engine, a fuel nozzle, an induction tube cooperating with the fuel nozzle and communicating at its inlet end with an auxiliary air inlet passage, a throttle valve mounted to have a certain degree of movement while fully opened and without any opening or closing action, means for actuating the throttle valve, and means controlled by the said throttle valve actuating means for varying the effective size of the auxiliary air inlet opening during the said movements of the throttle valve while the latter is fully opened to control the flow of fuel through the induction tube and regulate the richness of the mixture, the auxiliary air inlet being fully opened at all other positions of the throttle valve.

7. A carburetor including a casing, a throttle valve mounted within the casing and constructed to have a limited extent of movement while in a fully opened position without any opening or closing action, and means controlled automatically by the said limited movement of the throttle valve for varying the richness of the mixture supplied to the engine, whereby the richness of the mixture may be varied by a movement of the throttle valve while fully opened.

8. A carburetor including a casing provided with a throttle valve, said throttle valve being mounted to have a degree of movement while fully open and without any opening or closing action, liquid fuel supply means, and means controlled automatically by the said movement of the throttle valve to govern the action of the liquid fuel supply means, whereby the quantity of liquid fuel entering the mixture can be increased or decreased by movements of the throttle valve while fully opened.

In witness whereof I have hereunto set my hand in presence of a witness.

ISIDRO RODRIGUEZ ZARRACINA.

Witness:

STGO. B. BLASCO.