

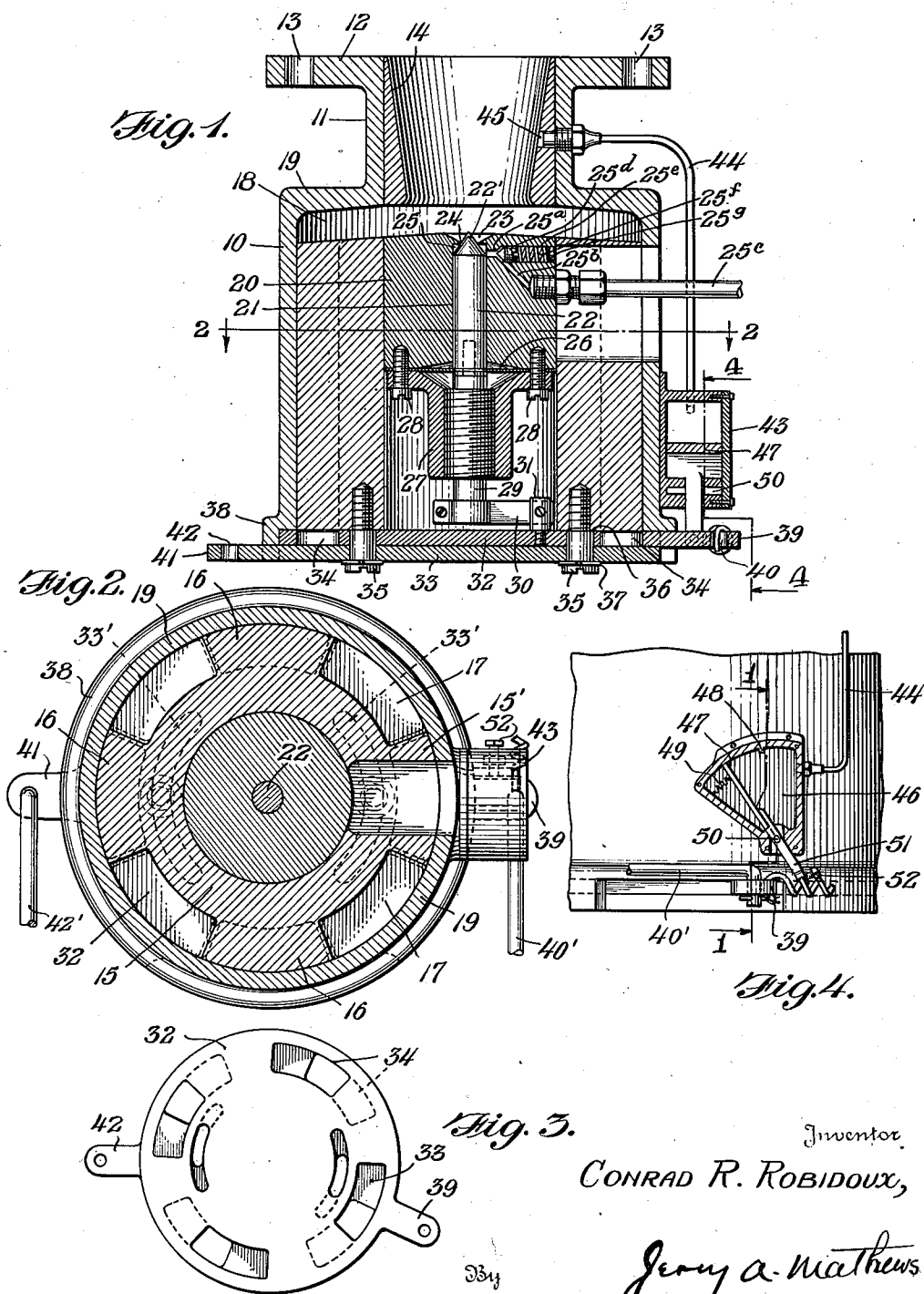
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CARBURETOR

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CARBURETOR

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This invention relates to carburetors of the type utilized in connection with internal combustion engines and particularly to that class of internal combustion engines which are employed in the automotive and aviation industry.

Prior to this invention, carburetors used for the same purposes for which this structure is designed have given considerable trouble due to the multiplicity of minute orifices, passages, etc., that are necessary for their proper operation. Then, too, the majority of the carburetors employed up to this time have been dependent upon a float valve for regulating fuel supplied to the carburetor. Additionally without the use of auxiliary equipment, such as accelerating pumps, it has been impossible to obtain smooth and rapid acceleration for the obvious reason that when an attempt is made to accelerate the motor from a slow speed to a higher speed, an improper mixture of fuel and combustion supporting air is fed to the motor. The problems encountered in obtaining a rapid vaporization of the fuel have long been recognized, and as a solution to these problems various means, such for example, as the well known "hot spot manifold" have been employed but without complete success. To employ such means would require additional bulky castings which in addition to the fact that they do not completely effect the desired results, add considerable weight to the motor which is objectionable particularly in aviation use.

Therefore, an object of this invention is the provision of an air and fuel mixing device which will be free of the aforementioned deficiencies and can be practically and economically constructed.

Another object of this invention is the provision of a carburetor which will serve as a positive fuel and air mixing device for an internal combustion engine.

Further this invention has for its object the provision of fuel and combustion supporting air regulating means that will insure a proper combustible mixture under all operating conditions.

This invention further contemplates a carburetor having a minimum of minute orifices, passages, etc., that often, due to the presence of extraneous matter in the fuel, become clogged.

Additionally, this invention has for an object the provision of a carburetor that does not depend upon a float valve for regulating the amount of gasoline supplied to the carburetor and, as a result, is especially adapted to aviation use particularly in combat planes which in maneuvering could be maintained in inverted flight for an indefinite period.

A still further object of this invention is the provision of a structure having the throttle means disposed at the bottom of the device thereby subjecting substantially the entire vacuum produced in the intake manifold by the pistons to act directly upon the fuel discharge orifice insuring maximum atomization of the fuel.

Other objects and advantages will appear from the following detailed description when considered in connection with the accompanying drawing, in which:

Figure 1 is a vertical section of my improved carburetor taken partly on line 1—1 of Figure 4;

Figure 2 is a horizontal sectional view taken along the line 2—2 of Figure 1;

Figure 3 is a detail plan view of the throttle and choke valves; and

Figure 4 is a sectional fragmentary elevation of the carburetor disclosing in detail the servomotor in section taken on line 4—4 of Figure 1 that is employed to effect a setting of the carburetor for idling whereby only sufficient fuel will be fed to the motor to cause it to operate at idling speed, and that will become effective to shut off the fuel entirely when the motor stops.

Referring to the drawing in detail, particularly Figure 1, 10 represents the outer casing of my improved carburetor. This casing may be of steel, aluminum, or the like, and the bottom portion of which may be substantially cylindrical in form. Made integrally with casing 10 and projecting from the top thereof is a neck 11, which has integrally formed with the top of neck 11, a flange 12 that is adapted to cooperate with a corresponding flange on a conventional internal combustion engine intake manifold. Flange 12 is provided with a plurality of openings 13 so arranged that they will coincide with similar openings in the intake manifold flange. The entire carburetor assembly is supported in operative position by bolts, not shown, which clamp flange 12, with proper gasket means disposed therebetween, to the flange of the conventional intake manifold. Neck 11 being substantially cylindrical in shape is adapted to receive a sleeve 14 which may be secured within the neck by the well known process of shrinking or any other suitable method. Sleeve 14 is so formed that when disposed within the neck 11, as clearly shown in Figure 1, the passageway for intake air and atomized fuel will be of the Venturi type. Disposed within the body of casing 10 and secured therein also by shrinking, or other known means, is a core member 15 having a plurality of radial vanes 16 formed on the pe-

riphery thereof which cooperate with the core and main body 10 of the casing to define a plurality of air passages 17. Air passages 17 communicate at the top of the core 15 with a chamber 18 formed by the shoulders 19 of the main body of casing 10 and the top of the core 15. Core 15 can be fabricated of metals such, for example, as aluminum, brass, cast iron or other suitable alloys, and is provided with a central cylindrical bore adapted to receive in the top thereof a plug member 20 preferably of brass. Plug 20 is also properly secured in position relative to the core 15 by the well known method of shrinking, or other suitable means, and is provided with a cylindrical central bore 21 adapted to receive the valve stem or metering pin 22, hereinafter referred to as a valve stem. Bore 21, as shown in Figure 1, extends upwardly in plug 20 to a point substantially at the top of the plug and cooperates with a larger bore 23 effected from the top surface of plug 20 to form a sharp valve seat 24. The upper end of valve stem 22 is given preferably a conical shape and cooperates with the seat 24 to shut off or regulate the amount of fuel supplied to the motor. It can readily be seen that the operation of the valve head into and out of contact with the sharp valve seat 24 is positive in action, and there will be less likelihood of extraneous matter lodging against the seat and holding the valve head out of contact therewith.

Due to the conical shape of the valve head a chamber 25 is formed between the valve head, and the sidewalls and upper extremity of the bore 21. Formed in the plug 20 are passages 25a and 25b which cooperate to introduce the fuel, from a source of supply not shown, through the conduit 25c to the chamber 25 where on movement of the valve head it is drawn upwardly and entrained in the air stream passing through the Venturi passageway and carried to the cylinders for combustion. The maximum amount of fuel supplied to chamber 25 may be manually regulated by a valve 25d. The body portion of valve 25d is provided with an exterior thread which cooperates with a similar thread in the bore 25e. To prevent valve 25d from moving from its adjusted position as a result of vibration, pressure is applied to the outer end thereof by a spring 25f and the retaining plug 25g. In order that conduit 25c may be secured to the plug 20 by suitable fittings in communication with the passageway 25b, and so that valve 25d may be made accessible for adjustment, a portion of one of the radial vanes 15' and the casing 10 is cut away, thereby giving free access to the conduit coupling fittings and the valve 25d. Valve stem 22, preferably fabricated of tool steel, is adapted to slide loosely in bore 21. As a result, gasoline fed to the chamber 25 will flow freely around the valve stem 22, and, but for adequate sealing means would fill the space in the bottom of core 15, resulting in a leakage of fuel. This, however, is prevented by a diaphragm in the form of a concave disc type spring 26. Spring 26 is secured and sealed to the lower end of valve stem 22 in any conventional manner, such for example, as by a locking screw or jam nuts threaded over the end of the valve stem and secured against the diaphragm on either side thereof. The spring diaphragm 26 is secured in operative position with adequate gasket means between plug 20 and a sleeve member 27 by bolts 28. The upper end of the sleeve 27, as shown in Figure 1, is provided with a flange

of substantially the same diameter as that of the plug 20 and has a plurality of openings through which screws 28 pass, which correspond to similar tapped openings in the bottom of plug 20. Sleeve 27 formed of gear bronze or similar material, is threaded to cooperate with the enlarged threaded portion of an operating pin 29. Obviously a greater or lesser displacement of the valve stem 22 for a definite amount of rotation of the operating pin 29 could be effected by varying the pitch of the threads on operating pin 29. Pin 29 is adapted to bear against and actuate valve stem 22 against the action of spring 26 which normally tends to bias the valve toward the open position. A bell crank 30 of conventional design is secured to the bottom end of operating pin 29. The outer end of bell crank 30 is adjustably secured to and adapted to be operated by pin 31 which may be threaded into plate 32 or made integrally therewith. Plate 32 further functions as intake air throttling means and is of similar design to plate 33 which serves as a choke. As shown in Figures 2 and 3, these plates are provided with openings 34 which correspond to and cooperate with the openings 17 between the radial vanes 16 of core 15. Both plates 32 and 33 are operatively secured to the bottom of core 15 by bolts 35 that are provided with shoulders 36 adapted to bear against the bottom face of core 15. These plates are provided with elongated openings 33' through which the bolts 35 are inserted whereby relative movement with respect to core 15 of the plates 32 and 33 in a shutter fashion to limit the intake air is made possible. In order to retain these plates in contact with each other and the upper face of plate 32 in contact with the bottom face of core 15, springs 37 are utilized between the heads of bolts 35 and the plate 33. The bottom of the main body of casing 10 is provided with an annular flange 38 which forms bearing and guide means for both the plates 32 and 33. Made integrally with plate 32 and extending to a point outside the body of the carburetor is an operating handle 39 in the form of an ear having a passageway 40 therein adapted to receive operating means, such for example, as an accelerator rod 40'. Then, too, there may be secured in opening 40 or an adjacent opening, one end of spring means not shown which tends to retain the throttle valve in its closed position. Choke plate or valve 33 is provided with a similar operating handle 41 having an opening 42 formed therein adapted to receive operating means 42' whereby the choke plate or valve may be operated to close the air passage to effect a maximum draft on the supplied fuel. Thus far it can readily be seen that by actuating the throttle plate 32, which functions as a shutter for the air passage, one simultaneously actuates the valve stem 22 to effect a proportional supply of fuel and air.

Means in the form of a servomotor indicated generally as 43 are provided whereby the fuel control valve is prevented from completely closing while the motor is in operation. A vacuum supply conduit 44 communicating with the Venturi passage at 45 tends to exhaust the chamber 46, shown in Figure 4. Due to the reduced pressure in chamber 46 when the motor is functioning the actuating element 47 moves to the right to a stop member 48 against the action of a spring 49 which normally tends to retain the element 47 in the extreme left hand portion of chamber 46. Element 47 being pivoted at 50 has

an operating lever 51 formed integrally therewith. Operating lever 51 has threaded into the lower end thereof an adjusting screw 52 against which the operating handle 39 of the throttle plate is adapted to strike to permit just sufficient fuel and air to be drawn from the carburetor to support combustion at idling speeds.

In operation fuel is supplied from a source not shown through conduit 25c, passageway 25b through the valve 25d and passageway 25a to the chamber 25. Fuel is then metered out by movement of the throttle plate 32, which through the bell crank 30 rotates the operating pin 29, to disengage the valve from its seat 24. The vacuum developed by the reciprocation of the motor pistons draws the fuel in atomized form into the Venturi passage where it is entrained with the supplied proportional amount of combustion supporting air. The combustion supporting air is drawn in through the openings 34 in the throttle plate and upwardly through the passages 17 defined by the radial vanes on the core 15 to the chamber 18 communicating with the Venturi passage. Fuel will continue to be supplied to the Venturi passage as long as throttle plate 32 is retained at any of its open positions. In order to prevent valve 22' from completely closing to permit the motor to run at idling speeds, means are provided which depend upon the operation of the motor for preventing throttle plate 32 from returning to its closed position. The vacuum developed in tube 44 and chamber 45 of the vacuum motor, draws the operating element 47 over to the stop 48 thereby advancing the adjusting screw 52, which serves as a stop member, to a position that will not permit the operating handle to return to the closed position. Therefore, it can be readily seen that at the instant the motor ceases to operate, valve 22' will engage the seat 24 and completely shut off the fuel.

Although the above described is directed solely toward the construction illustrated by the drawing, I desire it understood that the privilege is reserved of resorting to all the mechanical changes to which the device is susceptible. The invention, being designed and limited only by the terms of the appended claims.

Having thus described my invention, I claim:

1. An air and fuel mixing device for an internal combustion engine, comprising in combination a mixing chamber, an atomizing means for discharging fuel into said mixing chamber, means for controlling said atomizing means air throttling means operatively connected to said atomizing means, means having radial vanes on the periphery thereof defining air passageways for the air, said passageways communicating at their top with said mixing chamber, and means defining a Venturi passage connecting the said mixing chamber with the intake manifold of an internal combustion engine whereby supplied air will entrain atomized fuel in combustible proportions.

2. An air and fuel mixing device for an internal combustion engine comprising in combination a mixing chamber, a choke valve, an air throttling valve in contact with said choke valve, stationary means adjacent said air throttling and choke valves defining a plurality of air passageways, a fuel atomizing nozzle discharging into said mixing chamber, means associated with said atomizing nozzle whereby the fuel is atomized at a predetermined rate, means operatively associated with said control means and said

throttle valve whereby a definite proportion of air and fuel will be supplied to the mixing chamber.

3. An air and fuel mixing device for internal combustion engines comprising in combination a mixing chamber, a choke valve, an air throttling valve in contact with said choke valve, stationary means adjacent said air throttling and choke valves defining a plurality of air passageways, a fuel atomizing nozzle discharging into said mixing chamber, means associated with said atomizing nozzle whereby the fuel is atomized at a predetermined rate, adjustable means operatively associated with said control means and said throttle valve whereby a definite proportion of air and fuel will be supplied to the mixing chamber.

4. An air and fuel mixing device for internal combustion engines comprising in combination a mixing chamber, a throttle valve, a fuel atomizing nozzle discharging into said mixing chamber, operable means associated with said nozzle controlling the rate of discharge of the fuel, means operably associated with said control means and said throttle valve whereby a definite proportion of fuel and air is supplied to the mixing chamber, means dependent upon the operation of the engine for limiting the movement of the throttling valve in one direction whereby sufficient air and fuel is supplied to the mixing chamber while the engine is in operation to effect an idling speed thereof.

5. An air and fuel mixing device for internal combustion engines comprising in combination a mixing chamber, a throttle valve, a fuel atomizing nozzle discharging into said mixing chamber, operable means associated with said nozzle controlling the rate of discharge of the fuel, means effective throughout the entire range of the carburetor operably associated with said control means and said throttle valve whereby a definite proportion of fuel and air is supplied to the mixing chamber, means dependent upon the operation of the engine for limiting the movement of the throttling valve in one direction whereby sufficient air and fuel is supplied to the mixing chamber while the engine is in operation to effect an idling speed thereof.

6. A carburetor for internal combustion engines comprising in combination a casing, said casing having a neck portion formed thereon, means disposed within the neck portion of said casing defining a Venturi passage, radial vanes within said casing disposed below and spaced from said Venturi passage defining a plurality of air passageways, a fuel supply nozzle disposed centrally with respect to and below said Venturi passageway whereby supplied air entering the Venturi passage will entrain fuel discharged from the supply nozzle.

7. A carburetor for an internal combustion engine comprising in combination a casing, said casing having a neck portion formed thereon, means defining a Venturi passage disposed within said neck portion, a mixing chamber in communication with said Venturi passage, a fuel nozzle adapted to supply fuel to said mixing chamber, an air throttling valve forming a closure for the bottom of said casing, means adapted to limit the movement of said throttle valve in one direction dependent for its operation on the operation of the engine, passageway defining means connected to the Venturi passage tending to produce a vacuum in the throttle movement limiting means while the motor is in operation whereby

said throttle movement limiting means is brought into contact with the air throttling valve.

8. A carburetor for an internal combustion engine comprising in combination a casing, said casing having a neck portion formed thereon, means defining a Venturi passage disposed within said neck portion, a mixing chamber in communication with said Venturi passage, a fuel nozzle adapted to supply fuel to said mixing chamber, an air throttling valve forming a closure for the bottom of said casing, said casing having an annular flange formed on the bottom edge thereof forming a guide for said air throttling valve when rotatively operated, means adapted to limit the movement of said throttle valve in one direction dependent for its operation on the operation of the engine, passageway defining means connected to the Venturi passage tending to produce a vacuum in the throttle movement limiting means while the motor is in operation whereby said throttle movement limiting means is brought into contact with the air throttling valve.

9. A carburetor for internal combustion engines comprising in combination a casing, said casing having a neck portion formed thereon, means defining a Venturi passage disposed within said neck portion, a cylindrical core spaced from and positioned below said Venturi passage, said cylindrical core having radial vanes on the periphery thereof adapted to cooperate with said casing to secure the core to the inner walls of the casing, said radial vanes defining with the casing air passages communicating at their top with the Venturi passage, a cylindrical plug disposed within and secured to the top of the cylindrical core, said plug having a centrally disposed bore cooperating with a larger bore effected from the opposite end of said plug to form a valve seat, a valve positioned within said bore and adapted to slide freely with respect to the plug for controlling the fuel discharge, interiorly threaded means disposed below and secured to the bottom of the plug adapted to receive valve operating means, a spring type diaphragm secured to the bottom of said plug and valve stem tending to bias said valve to an open position and forming a liquid seal whereby fuel flowing around the valve stem will not be permitted access to the chamber formed in the bottom of the cylindrical core, an air throttling valve plate having openings therein adapted to coincide with the above mentioned air passages forming air throttling means, means operatively connected to said air throttling means having threads thereon of a predetermined pitch adapted to cooperate with the interiorly threaded means to effect an opening or closing of the fuel discharge valve whereby a definite proportion of air and fuel is fed to the combustion chambers.

10. An air and fuel mixing device for inter-

nal combustion engines comprising in combination a mixing chamber, an air throttling valve adapted to supply air to said mixing chamber, a fuel discharge valve adapted to supply fuel to said mixing chamber, means defining a knife edged valve seat for said fuel discharge valve, said valve seat defining with the head of said discharge valve a fuel chamber, said means further having a passageway communicating with a source of fuel supply, means whereby the fuel passing through said passageway may be restricted, resilient means for maintaining said passageway restricting means in predetermined adjustment, means operatively connecting the air throttling valve to the fuel discharge valve whereby movement of one effects an adjustment of the other to supply a predetermined proportion of fuel and air to the mixing chamber.

11. A carburetor for an internal combustion engine comprising in combination a mixing chamber, an air throttling valve adapted to supply air to said mixing chamber, a fuel discharge valve adapted to supply fuel to said mixing chamber, means operatively connecting said air throttling valve and said fuel discharge valve whereby the movement of one effects a movement of the other to supply to the mixing chamber proportional amounts of air and fuel, vacuum operated means operatively associated with said air throttling valve whereby the air throttling and fuel discharge valves are maintained in an open position to effect a supply of fuel and air which will be sufficient to operate the internal combustion engine at idling speed.

12. A carburetor for internal combustion engines comprising in combination a mixing chamber, air throttling means adapted to supply air to said mixing chamber, an operating handle for said means, fuel discharge means operatively connected with said air throttling means and adapted to supply fuel to said mixing chamber, and vacuum operated means associated with said handle which while the motor is in operation will limit the closing of said fuel discharge valve and air throttling means.

13. A carburetor for an internal combustion engine comprising in combination a mixing chamber, air throttling means adapted to supply air to said mixing chamber, fuel discharge means operatively connected with said air throttling means and adapted to supply fuel to said mixing chamber, vacuum means operatively associated with said air throttling means whereby the fuel discharge means is maintained sufficiently open to supply the requisite amount of fuel to operate the engine at idling speed, positive adjustment means for said air and fuel supply means whereby a definite proportional supply of fuel and air will be had throughout the entire range of the carburetor.

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