Jan. 31, 1933. E. MATHIEU 1,895,471

CARBURETOR

Filed May 2, 1931 2 Sheets-Sheet 1

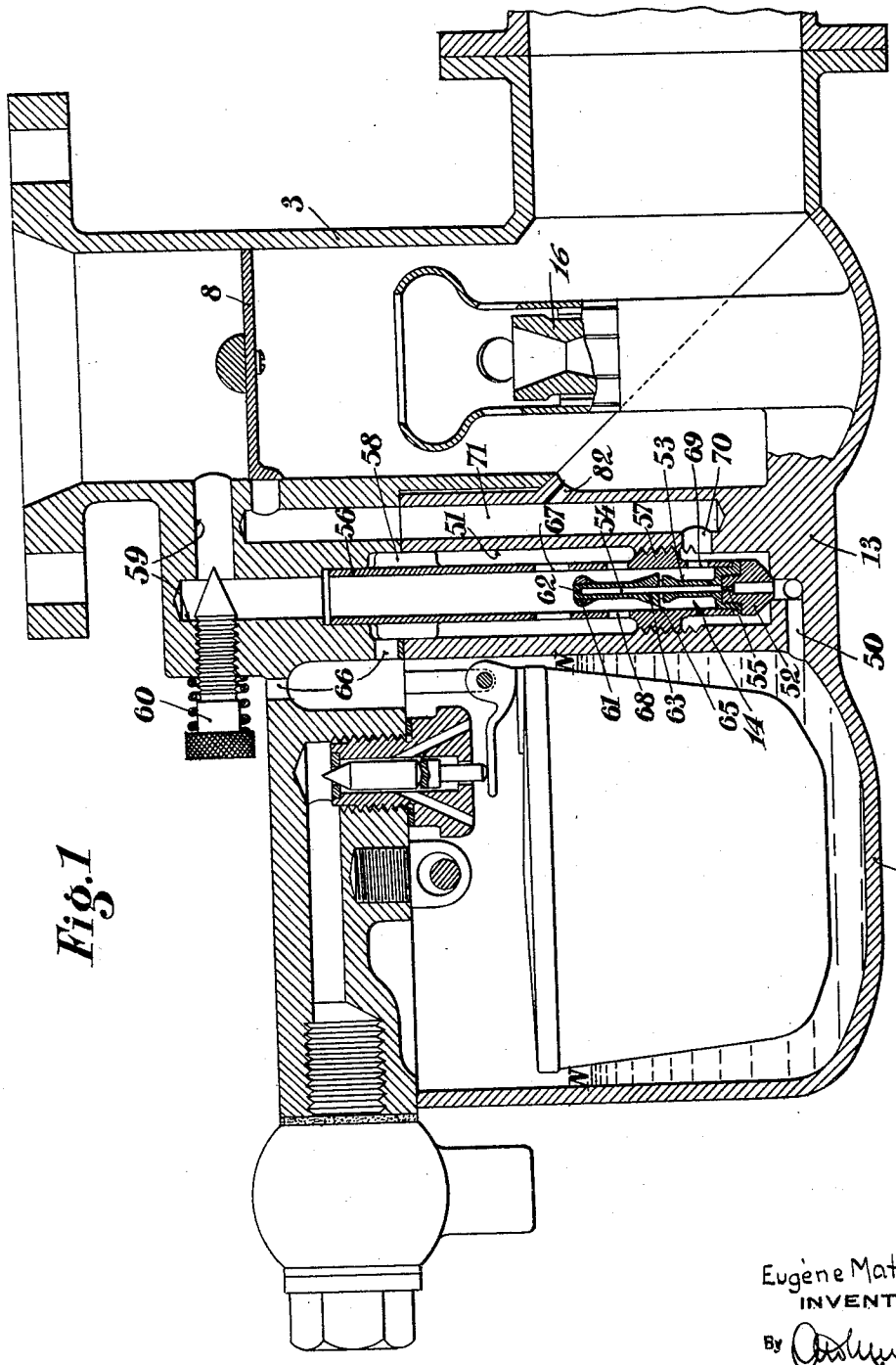


Fig. 1

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Fig.2

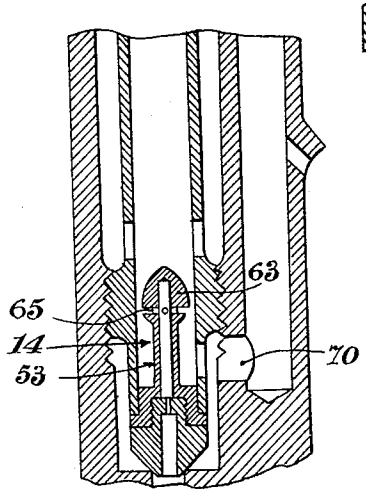


Fig.4

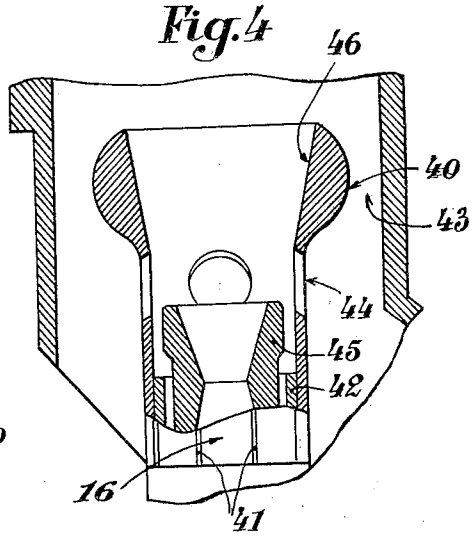


Fig.3

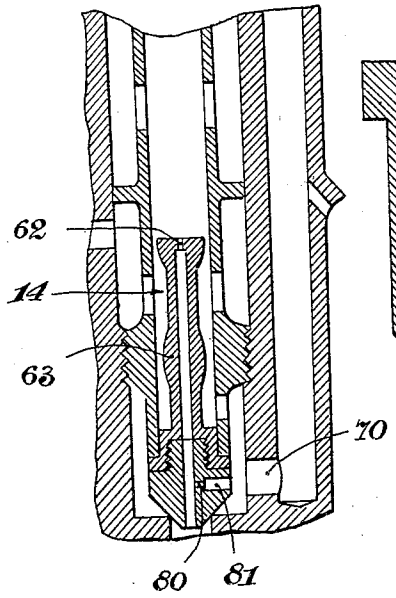
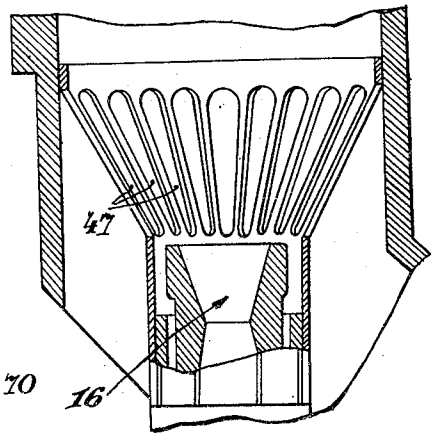


Fig.5



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Patented Jan. 31, 1933

1,895,471

UNITED STATES PATENT OFFICE

EUGÈNE MATHIEU, OF NEUILLY-SUR-SEINE, FRANCE

CARBURETOR

Application filed May 2, 1931, Serial No. 534,467, and in France May 14, 1930.

My invention relates to carburetors and it has chiefly for its object to facilitate passing from slow speed running to normal running by constantly supplying the cylinders with a mixture having the best possible composition.

The carburetor according to my invention comprises, besides the main nozzle and the idling nozzle whose conduit opens into the manifold of the engine on the engine side of the throttle or equivalent organ, when the latter is in the closed position, an intermediate nozzle which may be distinct or not from the idling nozzle and whose conduit opens opposite the edge of the throttle or equivalent organ in the closed position of the latter, said intermediate nozzle facilitating the passage from slow speed running to normal running.

When the intermediate nozzle and the idling nozzle form but one organ, said nozzle is preferably provided with jet orifices adapted to supply fuel under the preponderating effect of the head of the constant level when the primary mixture flows through the idling conduit, and to supply fuel under the preponderating effect of the depression resulting from the suction when the primary mixture flows through the intermediate conduit.

According to another characteristic of my invention, the main nozzle is provided at its end with a flaring piece forming a restricted flow section in the inlet conduit beyond said nozzle and provided with slots and orifices through which secondary air is guided above the nozzle so as to stir the secondary mixture and to atomize the reserve supply of fuel that is drawn out of the carburetor when the engine picks up.

With such an arrangement it is possible to do away with the ordinary diffuser, for the piece which, according to my invention, extends beyond the nozzle is adapted to ensure not only the atomizing of the reserve supply of fuel but also the calibrating of the flow section for the primary air.

Preferred embodiments of my invention will be hereinafter described with respect to the appended drawings, given merely by way of example, and in which;

Fig. 1 is a vertical partial section of a carburetor according to my invention;

Figs. 2 and 3 show different embodiments of the intermediate nozzle, and

Figs. 4 and 5 show different embodiments of the device mounted above the main nozzle.

Adverting to Fig. 1, 3 designates the pipe for conveying the mixture to the cylinders, said pipe being provided with its throttle 8 or any other equivalent gas controlling organ, and with its main nozzle 16, which may be of any suitable type, and for instance of the type described in my U. S. application Ser. No. 442,786, filed April 9, 1930. 12 is the float chamber in which the gasoline level is maintained at N—N.

A conduit 50 located at the bottom of float chamber 12 connects said chamber with a conduit 51 adapted to contain the combined idling and intermediate nozzle 14. Said nozzle comprises a piece 52 having a conical base, on which piece is screwed the lower part of a tube 53 provided with an axial conduit 54 mounted in line with a calibrated orifice 55 provided in piece 52. A tube 56 is fitted on said lower part of tube 53 and is provided with a threaded part 57 adapted to screw in a corresponding threaded part of conduit 51. The upper part of tube 56 is provided with guiding ribs 58. Conduit 51 communicates with an idling conduit 59 opening into pipe 3 on the engine side of throttle 8, when the latter is in the closed position. The flow section of said idling conduit is regulated through a conical screw 60.

Piece 53 is provided at its upper part with a widened part 61 having a calibrated hole 62 and which constitutes the idling nozzle, and at its middle part with a widened part 63

provided with a circular slot 65 which communicates through small orifices with conduit 54 said latter part constituting the intermediate nozzle. The part of 63 located above slot 65 has a larger diameter than the part of 63 located below said slot.

The upper part of conduit 51 is connected with the atmosphere through apertures 66 and 67, through which air passes into conduit 51 and then into tube 56 through apertures 67 and 68 located respectively above and below head 61. Tube 56 is also provided, below part 63, with a hole 69 coaxial with a conduit 70 opening into vertical conduit 71, which communicates with pipe 3 at the level of the edge of throttle 8 when the latter is in the closed position.

The operation is as follows:

During running at slow speed, throttle 8 is closed as shown in the drawings so that the depression is transmitted through conduit 59 to the inside of tube 56. Slot 65 being then below the constant level N—N, will supply fuel under head, and said fuel fills up all the cavities of the nozzle below level N—N. Calibrated orifice 62 may also be located below level N—N, but it might quite as well be located at that very level or slightly above. The depression in tube 56 produces a suction of air through orifices 66 and 67 and therefore draws in the reserve supply of fuel contained in the recesses of the nozzle and causes gasoline to spray out through calibrated orifice 62. As the level of fuel moves down, air begins to pass through orifices 68 and then moves upwardly in the calibrated annular passage between head 61 and the inner surface of tube 56, thus atomizing the fuel that flows out through idling jet 62.

When throttle 8 is then opened, the depression is transmitted to conduit 71, so that a part of the air that flows in through orifices 68 follows a downward course and eventually drives along the quantity of fuel that may still be contained in the recesses of the nozzle and the quantity that is delivered under head through slot 65. The thin tube of air that flows at great speed in the calibrated space between part 63 and tube 56 produces a depression which increases the rate of flow of the fuel through slot 65 and causes a rich mixture to be drawn into the cylinders through conduit 71.

When throttle 8 is full open, the depression is transmitted to main nozzle 16, which then works in the ordinary way.

Conduit 71 may be connected to pipe 3 through a hole 82 in order to atomize the reserve supply of fuel that is present in conduit 71 at the time of the opening of the throttle.

It will readily be understood that the device which has just been described makes it possible to provide a good transition between slow speed running and normal running and to avoid the defects in the carburation that generally occur when the engine is picking up. The carburetor according to my invention thus constantly ensures, whatever the degree of opening of the throttle, a mixture having a suitable composition for ensuring an efficient and economical running of the engine. The calibrated annular passage around head 61, and the holes 67 regulate the quantity of air that is necessary to the mixture at slow speed running, while the calibrated passage around widened part 63 provides the quantity of air that is necessary during the period of transition when normal running conditions are going to be established. The three modes of supplying the mixture to the engine are successively and gradually brought into play while the throttle is being opened and cooperate in order to ensure the formation of a mixture having the best possible composition.

Of course, the idling nozzle and the intermediate nozzle may be directly fed from the float chamber as shown in the accompanying drawings, or they may also be fed through the main nozzle. Likewise, the idling nozzle may be fed through the intermediate nozzle, or these two nozzles may be independent of each other, all kinds of combinations being possible.

Another important advantage of my invention consists in the possibility of disposing the reserve supply of fuel that is necessary for the engine to pick up at the lower part of the intermediate nozzle in order to ensure a momentary enrichment of the mixture. That reserve supply of gasoline may then be combined with that of the main nozzle, or even replace it entirely, which prevents the sudden drawing out of said reserve supply when the main nozzle is brought into action as is often the case.

It should be well understood that the embodiment that has been described has been shown merely by way of example and the central widened part of piece 53 might be given any suitable form (ovoid, spherical, stepped, and so on). The slot might be replaced by a series of radially disposed holes.

In the embodiment of Fig. 2, the part of piece 53 that is located above widened part 53 is done away with, and slot 65 delivers the quantity of fuel that is necessary for both slow speed running and intermediate running.

When the engine is running at slow speed, gasoline is fed under the preponderating influence of the head of liquid in the float chamber, while during intermediate running, gasoline is delivered under the preponderating influence of the depression resulting from the flow of air at great speed in the calibrated space surrounding head 63.

Fig. 3 shows another embodiment of my device in which the orifices that serve to deliver fuel for intermediate running are fed through a jet 80 independently of nozzle 62

that corresponds to slow-speed running. In that embodiment, the orifices 81 are provided in piece 52 opposite conduit 70, the widened part 63 serving, as in the preceding example, to calibrate the flow section of the primary air. It will be noticed that with that arrangement, orifice 80 is allowed to deliver fuel under a greater head.

In all the preceding embodiments the air that serves to atomize the fuel may be either hot or cold, and it may be caused to flow either merely by the vacuum of the engine or by any special device (pump, pressure of the exhaust gases, or the like).

According to another characteristic of my invention, main nozzle 16 is provided with a piece 40 comprising a cylindrical part provided with longitudinal slots 41 so as to permit the elastic fixation of piece 40 on a cylindrical part 42 of the nozzle. Piece 40 is formed with a flaring upper part limiting between itself and the inner surface of pipe 3 an annular passage 43. Slanting orifices 44, upwardly directed, are provided in piece 40 below that flaring part.

The operation is as follows:

When throttle 8 is open, the depression acting on the nozzle causes the primary mixture to be drawn out through the head 45 of said nozzle. At the same time, secondary air is drawn through annular space 43 and orifices 44 which lead it above the nozzle and produce a good mixing of the primary mixture with that secondary air.

When the engine is caused to pass from the slow running conditions to normal running conditions, due to the opening of throttle 8, the resulting suction first causes the supply reserve of fuel contained in the main nozzle to be drawn out, and said reserve supply is gradually caused to ascend as the depression is increasing, instead of being drawn along suddenly in the liquid state, said reserve supply flows into expansion chamber 46 inside piece 40 and is atomized and progressively drawn along by the air entering through orifices 44.

In the embodiment of Fig. 4, the internal surface of chamber 46 has a conical shape.

In the embodiment of Fig. 5, piece 40 is conical in shape and its upper end is applied against the inner surface of pipe 3. Said piece is provided with slots 47. It has been found that this particular form of the slots ensures a very intimate penetration of the secondary air into the emulsion issuing from the main nozzle.

While I have disclosed what I deem to be preferred embodiments of my invention, I do not wish to be limited thereto as there might be changes made in the arrangement disposition and shape of the parts; for instance, the hole 82 that connects the differential conduit with the pipe leading to the engine manifold might be provided at any suitable height in said conduit; in particular it might be provided through the edge of the throttle so as to connect the differential conduit to said pipe, in the closed position of the throttle, on the carburetor side of said throttle.

What I claim is:

1. A carburetor comprising in combination, a pipe connected to the engine manifold, a throttle in said pipe, a main nozzle disposed in said pipe on the carburetor side of said throttle, a float chamber, an idling well communicating with the atmosphere, an idling nozzle axially disposed in said well connected with said float chamber, said idling nozzle being provided with spraying orifices, a tube concentrically disposed in said well around said nozzle and provided with apertures located above said spraying orifices, said tube communicating with the above mentioned pipe on the engine side of said throttle, an annular threaded collar on said tube adapted to screw in said well, said tube being provided with an aperture in its wall below said collar, a conduit opening at its lower end opposite the last mentioned aperture of said tube and opening at its upper end into said pipe exactly at the level of the edge of said throttle when the latter is in the closed position.

2. A carburetor comprising in combination, a pipe connected to the engine manifold, a throttle in said pipe, a main nozzle disposed in said pipe on the carburetor side of said throttle, a float chamber, an idling well communicating with the atmosphere, an idling nozzle in said well communicating with said float chamber and extending up to substantially the constant level of the float chamber, a plurality of spraying orifices in the intermediate part of said nozzle, a tube concentrically disposed in said well around said nozzle and provided with apertures located above the spraying orifices of said nozzle, said tube communicating with the above mentioned pipe on the engine side of the throttle, an annular threaded collar on said tube adapted to screw in said well, said tube being provided with an aperture in its wall below said collar, a conduit opening at its lower end opposite the last mentioned orifice of said tube, and opening at its upper end into said pipe exactly at the level of the edge of said throttle when the latter is in the closed position.

3. A carburetor comprising in combination, a pipe connected to the engine manifold, a throttle in said pipe, a main nozzle disposed in said pipe on the carburetor side of said throttle, a float chamber, an idling well communicating with the atmosphere, an idling nozzle axially disposed in said well connecter to said float chamber and extending substantially up to the constant level of the fuel in the float chamber, said idling

nozzle being provided with an upper calibrated orifice, a widened part at the upper end of said nozzle surrounding said calibrated orifice, a tube concentrically disposed in said well around said nozzle and provided with apertures located both above and below the upper end of said nozzle, said tube communicating with the above mentioned pipe on the engine side of said throttle, an annular threaded collar on said tube adapted to screw in said well, said tube being provided with an aperture in its wall below said collar, a conduit opening at its lower end opposite the last mentioned aperture of said tube and opening at its upper end into said pipe exactly at the level of the edge of said throttle when the latter is in the closed position.

4. A carburetor comprising in combination, a pipe connected to the engine manifold, a throttle in said pipe, a main nozzle disposed in said pipe on the carburetor side of said throttle, a float chamber, an idling well communicating with the atmosphere, an idling nozzle axially disposed in said well connected to said float chamber and extending up to substantially the constant level of the fuel in the float chamber, said idling nozzle being provided with an upper calibrated orifice, a widened part at the upper end of said nozzle surrounding said calibrated orifice, a tube concentrically disposed in said well around said nozzle and provided with apertures located both above and below the upper end of said nozzle, a widened part in the intermediate portion of said nozzle provided with an annular slot, said slot communicating through radial ducts with the inside conduit of said nozzle, said tube communicating with the above mentioned pipe on the engine side of said throttle, an annular threaded collar on said tube adapted to screw in said well, said tube being provided with an aperture in its wall below said collar, a conduit opening at its lower end opposite the last mentioned aperture of said tube and opening at its upper end ito said pipe exactly at the level of the edge of said throttle when the latter is in the closed position.

5. A carburetor comprising in combination a pipe connected to the engine manifold, a throttle in said pipe, a main fuel nozzle disposed in said pipe on the carburetor side of said throttle, an idling fuel nozzle, a conduit for connecting said idling nozzle to said pipe on the engine side of said throttle, an intermediate fuel nozzle and an intermediate conduit for connecting said intermediate nozzle to the above mentioned pipe opening thereinto opposite the edge of said throttle when closed.

6. A carburetor comprising in combination a pipe connected to the engine manifold, a throttle in said pipe, a main nozzle disposed in said pipe on the carburetor side of said throttle, a conduit opening into said pipe, on the engine side of said throttle at one end for the idling supply and opposite the edge of said throttle when the latter is in the closed position at the other end, a fuel nozzle in a lower intermediate portion of said conduit, air inlet means opening into said conduit between the idling supply end thereof and said fuel nozzle, and a restricted air passage between said nozzle and the inner wall of said conduit.

7. In a carburetor, a pipe connected to the engine manifold, a throttle in said pipe, an idling chamber, an idling nozzle provided with spraying orifices in said chamber, said chamber communicating with the above mentioned pipe on the engine side of said throttle and having a first aperture connected with the atmosphere and opening into said chamber above said spraying orifices and a second aperture below said spraying orifices, and a conduit opening at its lower end opposite said second aperture and opening at its upper end into said pipe, opposite the edge of said throttle, when the latter is in the closed position.

8. In a carburetor, a pipe connected to the engine manifold, a throttle in said pipe, an idling chamber, an idling nozzle, the intermediate part of which is provided with a plurality of orifices, said chamber communicating with the above mentioned pipe on the engine side of said throttle and having a first aperture connected with the atmosphere and opening into said chamber above said spraying orifices and a second aperture below said spraying orifices, and a conduit opening at its lower end opposite said second aperture and opening at its upper end into said pipe, opposite the edge of said throttle, when the latter is in the closed position.

9. In a carburetor, a pipe connected to the engine manifold, a throttle in said pipe, an idling chamber, an idling nozzle in said chamber provided at its upper end with a widened part and a calibrated orifice, said chamber communicating with the above mentioned pipe on the engine side of said throttle, having apertures connected with the atmosphere and opening into said chamber both above and below the upper end of said nozzle and an aperture below said first mentioned apertures and a conduit opening at its lower end opposite the last mentioned aperture and opening at its upper end into said pipe, at the level of the edge of said throttle, when the latter is in the closed position.

10. In a carburetor, a pipe connected to the engine manifold, a throttle in said pipe, an idling chamber communicating with the above mentioned pipe on the engine side of said throttle, an idling nozzle in said chamber having at its upper end a widened part and a calibrated orifice and, in its intermediate portion, a widened part provided with an

annular slot communicating with the inside conduit of said nozzle, said chamber having apertures connected with the atmosphere and opening into said chamber both above and below the upper end of said nozzle and an aperture below said slot, and a conduit opening at its lower end opposite the last mentioned aperture and opening at its upper end into said pipe at the level of the edge of said throttle when the latter is in the closed position.

In testimony whereof I have signed my name to this specification.

EUGÈNE MATHIEU.