March 15, 1932. P. L. LEMOINE 1,849,530

CARBURETOR FOR INTERNAL COMBUSTION ENGINES

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Fig. 1

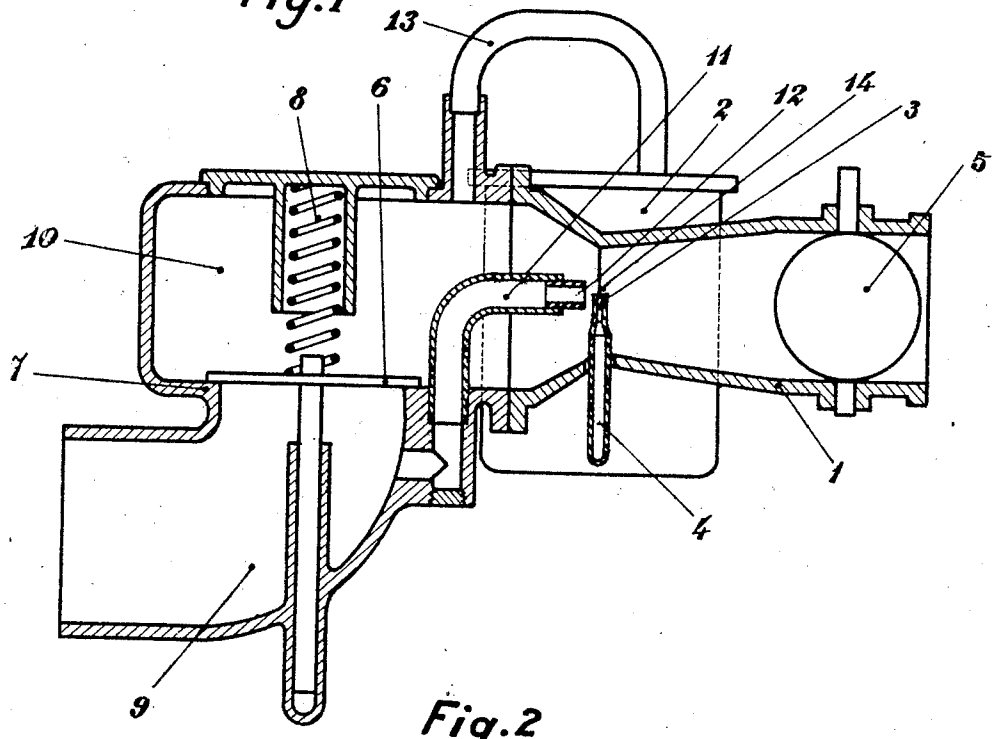
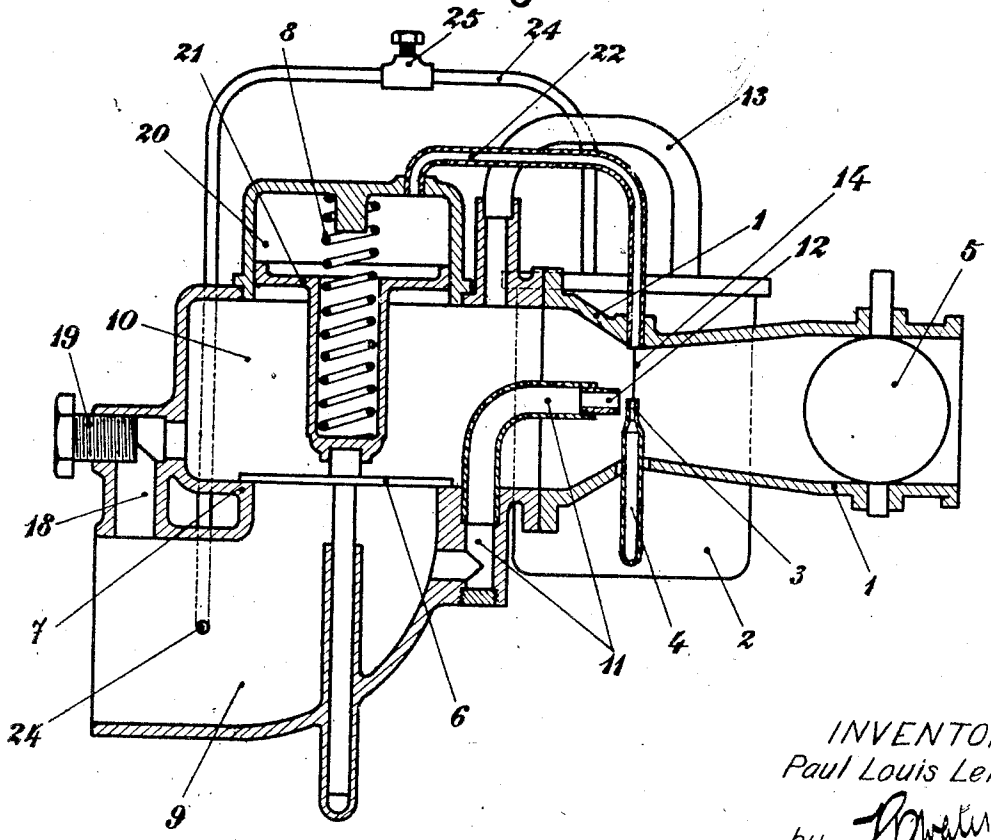


Fig. 2



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Fig. 3

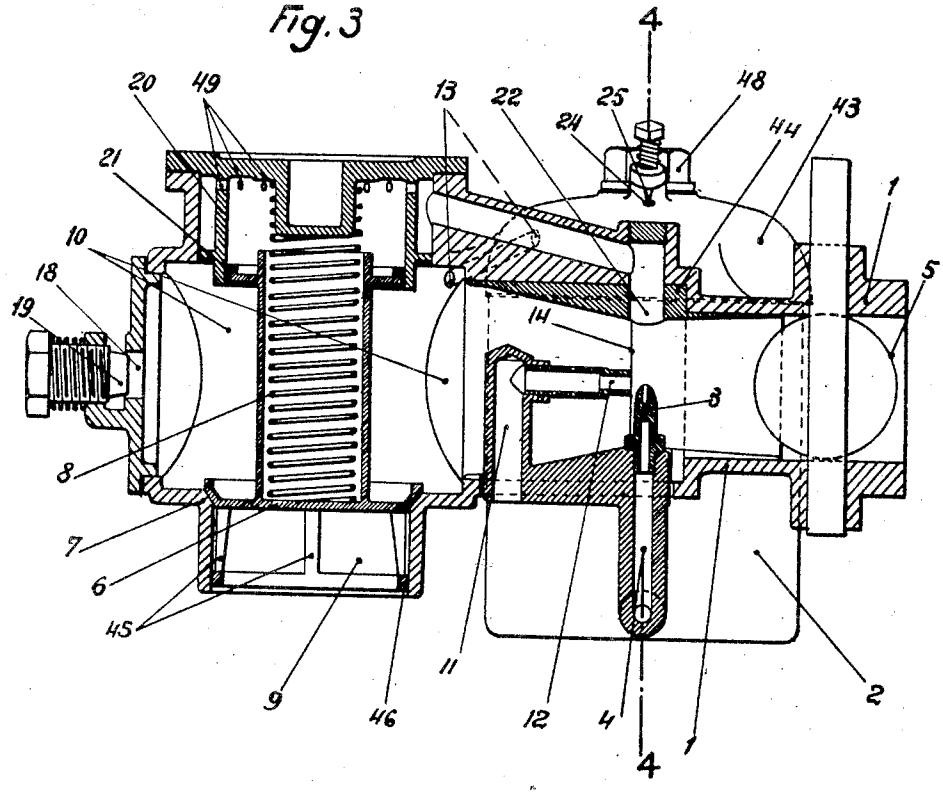


Fig. 4

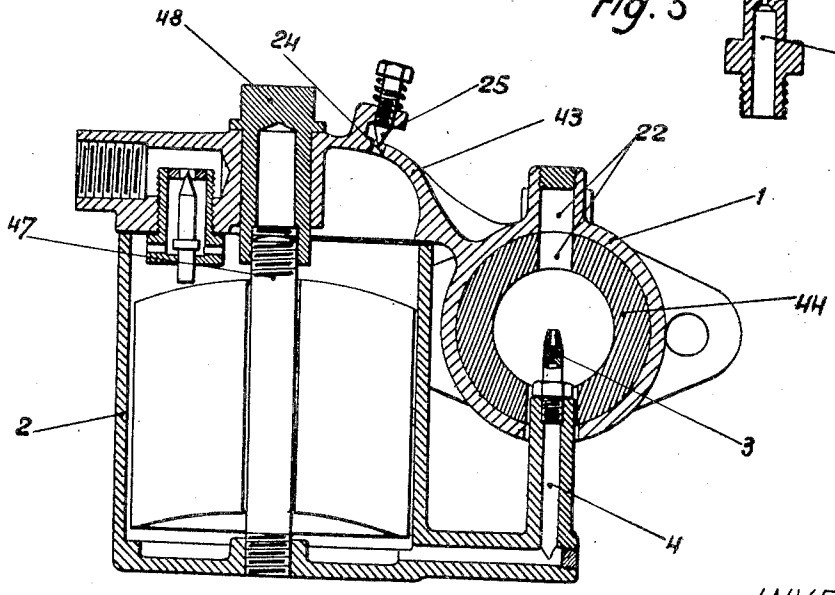
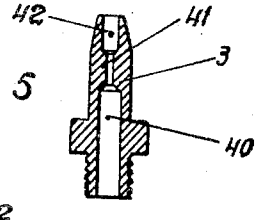


Fig. 5



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CARBURETOR FOR INTERNAL COMBUSTION ENGINES

Application filed October 5, 1929, Serial No. 397,691, and in France November 24, 1928.

The present invention relates to a carburetor for internal combustion engines, said carburetor being of the constant level and nozzle spraying type.

The object of the invention is to permit, with all engine speeds, even the lowest, the obtaining of the correct supply and the perfect atomization of the fuel, while preserving for the suction pipe a large passage area even at the restricted part so as not to reduce the power of the engine.

This object is attained by providing a carburetor, the characteristics of which are given in the following description and in particular in the claims appended at the end of this description.

The carburetor is illustrated by drawings annexed to the description and in which:—

Figure 1 illustrates diagrammatically in axial longitudinal section, a carburetor of the horizontal type provided with three devices which constitute the principal combination of the invention.

Figure 2 is similar to Figure 1, illustrating the addition of supplementary devices forming part of the invention.

Figure 3 illustrates in axial longitudinal section, a carburetor of the horizontal type provided with the devices of the invention shown in Figure 2 and provided, furthermore, with a jet having two bores arranged one after the other in accordance with the invention.

Figure 4 is a section on the line 4—4 of Figure 3.

Figure 5 is a section on a larger scale of the jet with two bores illustrated in Figures 3 and 4.

The invention can be applied to a horizontal type carburetor as well as to a vertical type, with only those modifications required by the difference of type.

In all the figures, 1 is the suction pipe; 2 is the constant level or float chamber; 3 is the jet arranged at the end of the fuel supply pipe 4 coming from the chamber 2; 5 is the throttle valve which in all the examples shown is of the butterfly type; 6 is a valve or equivalent device which in accordance with the invention is situated at the entrance of the suction pipe 1 and opens towards the said pipe. This valve which is pressed on its seat 7 by its weight or by a spring 8 or by their combined action, divides the inlet of the suction pipe into two parts, the main air inlet 9 and the main air passage 10 posterior to the valve. The inlet 9—10 constitutes the part which precedes the mixing chamber. In this inlet 9—10, the air passage is sufficiently large that the depression which corresponds to the speed of the air passing through it may be considered as negligible even at the highest speeds of the engine. 11 is a conduit which according to the invention extends from the main air inlet 9 and terminates close to the jet 3 as a nozzle 12 which occupies such a position that a jet of air leaving it meets the end of the jet 3 at substantially right angles such that it draws out the fuel which is atomized by the said jet of air. It is to be noted that most frequently the carburetor is not preceded by a supercharger, and that consequently the conduit 11 may start directly from the atmosphere, as the main air inlet is, most frequently approximately at atmospheric pressure. If the carburetor is fitted with an air filter or an air heater, the main air inlet extends from the beginning of the apparatus up to the valve 6; it is practically at atmospheric pressure, and the conduit 11 may commence either directly at the atmosphere (Figures 3 and 4) or on the apparatuses, or between these apparatuses and the valve 6 (Figures 1 and 2). 13 is a conduit which, in accordance with the invention, connects the main air passage 10 with the upper part of the constant level or float chamber 2, above the level of the fuel.

The carburetor shown in Figure 1 comprises only the three devices according to the invention which have just been enumerated, and the combination of which constitutes the principal combination of the invention, the action of which is as follows:

Assuming the motor to be stopped and the throttle valve 5 almost closed, then if a turn is given the engine, the air can only pass into the carburetor through the conduit 11 terminating at the pipe 12, if the spring 8 is suf-

ficiently powerful to oppose the lift of the valve 6.

The section of this pipe 12 being small, the speed of the air which passes at this region is high even with the small speed imparted to the engine, and this jet of air meeting at the extremity of the jet nozzle 3 at substantially right angles draws out the fuel and atomizes it at the outlet of the jet nozzle, the whole formed by the tube 12 and the jet 3 acting as the apparatuses known under the name of "fixers" used by designers. The jet of air charged with atomized fuel then passes through the small space left free by the throttle valve 5, which is almost closed, and undergoes a second atomization owing to the effect of the high speed of the air in this narrow passage. Then engine then starts running without difficulty. If the throttle valve 5 is then opened, the cylinders of the engine fill more completely and consequently the speed of the air passing through the carburetor increases, even before the speed of the engine has accelerated. If the spring 8 has been selected sufficiently strong so that the valve 6 does not rise even under this new demand all the air entering the engine passes through the blow tube 12, the output of which thus increased produces a corresponding increase in the feed of fuel at the jet 3. If the speed of the engine increases, the valve 6 rises, thus limiting the pressure under which the blow tube 12 acts, but at the same time the jet 3 situated in the suction pipe 1, generally in the vicinity of a restricted section 14, is submitted to the reduction of pressure which corresponds to the speed of the air in this pipe, in the same way as a jet nozzle is submitted thereto in an ordinary carburetor. This jet 3 therefore delivers fuel under the combined action of the jet of air leaving the blow tube 12 and of the depression existing in the suction pipe 1 at the point where the jet is situated.

The regulation is effected by acting on the following elements: The section or area of the jet 3, area of the blow tube 12, force of the spring 8, and the area of the restricted section 14.

Figure 2 illustrates the carburetor of Figure 1 with the addition of three devices which complete the principal combination of the invention.

The first of these three supplementary devices consists in a conduit 18 of adjustable area by means of a throttle valve 19, this conduit connecting the main air inlet 9 with the main air passage 10 posterior to the valve.

The effect of this arrangement is the following: At the lowest speed of the engine, the valve 6 being closed, the air drawn in by the engine passes partly through the blow tube 12 and partly through the conduit 18. By means of the throttle valve 19, the sum of these two passage area may be regulated, and consequently the speed of the air leaving the tube 12, which speed regulates the supply of the fuel.

The second of the three supplementary devices consists in a conduit 24 of area adjustable by a throttle valve 25, this conduit 24 connecting the upper part of the constant level or float chamber 2 with the main air inlet 9 (most frequently with the atmosphere). This arrangement permits of a greater pressure being obtained in the float chamber 2 than exists in the passage 10. The difference of these two pressures is capable of adjustment as desired. This arrangement which increases the supply of fuel proportionately more at small speeds than at high speeds, can consequently take part in the regulation.

The third of the three complementary devices consists in a piston 21 moving together with the valve 6. In the example given this similarity of movement is obtained by the action of the spring 8 which bears on the valve 6 through the intermediary of the piston 21. This piston 21 can move in a cylinder 20 forming part of the body of the carburetor and which this piston divides into two parts. One of these parts of the cylinder 20, the lower part, according to the example given, communicates with the passage 10, the other part, the upper part according to the example, communicates by means of the conduit 22, with the suction pipe in the vicinity of or below the restricted section 14 of this suction pipe.

When this arrangement does not exist, as is the case with the carburetor shown in Figure 1, the valve 6 creates in the passage 10 a depression which causes the cylinders of the engine to fill with air at a lower pressure than that of the main air inlet 9. This has only small importance at low engine speed, as at these small speeds it is particularly important to have a thorough atomization of the fuel. This however causes at high speeds an appreciable loss in power of the motor.

The arrangement obviates this loss of power as the depression which is produced in the vicinity of the restricted section 14, with respect to the pressure existing in the passage 10, acts on the piston 21 in the reverse manner to the action of the spring 8. This depression increases with the speed of the engine, so that at a certain speed it becomes sufficient to completely counter-balance the action of the spring 8 and that of the weight of the valve 6. This valve is then kept open, the pressure of the passage 10 becomes approximately equal to that of the main air inlet 9 and the cylinders of the engine filling completely, there is no loss of power. The speed at which the effect of the spring 8 and of the weight of the valve 6 is counter-balanced depends on the area of the piston 21 and on the point at which the conduit 22 is

connected to the inlet pipe 1, with respect to the restricted section 14.

An arrangement shown in Figures 3, 4 and 5 consists of a jet 3, the bore 41 of which, of small section which regulates the supply under the action of the low pressure existing in the carburetor, is followed by a bore 42 of larger section, which terminates the jet nozzle, receives at its extremity the current of air leaving the blow tube 12, and of which consequently the section regulates the supply of fuel which is produced under the action of this jet of air.

In the example shown by Figures 3 and 4, according to a known arrangement, the cover 43 of the constant level or float chamber 2 forms part of the suction pipe 1 and the chamber 2 is fixed under this cover by means of a screw 47 and nut 48 situated axially with respect to the chamber.

The carburetor is presumed to act with atmospheric air and consequently the conduits 11 and 24 commence at the atmosphere.

The example in Figures 3 and 4 presents the following particular constructional features:

1st. The conduit 11 connecting with the blow tube 12, and the fuel conduit 4 terminating in the jet 3, form part of the same piece attached to the chamber 2, so that the relative position of the tube 12 with respect to the jet 3 is ensured.

2nd. The valve 6 and the piston 21 are rigidly connected, and the guidance of this whole is obtained, on the one hand, by the piston 21 sliding in the cylinder 20 and, on the other hand, by a ring 46 attached to the valve 6 by vanes 45 and sliding in the upper inlet 9 which is cylindrical.

I claim:

1. Carburetor for an internal combustion engine of the constant level, jet nozzle type, having a main air inlet pipe; an automatic valve situated in this inlet, said valve being suitably loaded and opening towards the suction pipe; an air conduit connecting the mixing chamber with the air anterior to the valve; a tube at the discharge end of said conduit; a fuel supply pipe and a nozzle at the extremity of this fuel supply pipe in the mixing chamber, said tube and nozzle being disposed substantially at right-angles to one another and in such a manner that a jet of air from the tube meets the extremity of the nozzle; a substantially air tight constant level or float chamber, and a simple conduit connecting the main air passage posterior to the valve with the upper part of the float chamber above the level of the fuel; a conduit connecting the main air passage posterior to the valve with the air anterior to the valve, and control means in said last mentioned conduit for regulating the passage of air therethrough.

2. Carburetor for an internal combustion engine of the constant level, jet nozzle type, having a main air inlet pipe; an automatic valve situated in this inlet, said valve being suitably loaded and opening towards the suction pipe; an air conduit connecting the mixing chamber with the air anterior to the valve; a tube at the discharge end of said conduit; a fuel supply pipe, and a nozzle at the extremity of this fuel supply pipe in the mixing chamber, said tube and nozzle being disposed substantially at right-angles to one another and in such a manner that a jet of air from the tube meets the extremity of the nozzle; a substantially air tight constant level or float chamber, and a simple conduit connecting the main air passage posterior to the valve with the upper part of the float chamber above the level of the fuel; a conduit connecting the air anterior to the valve with the upper part of the float chamber above the level of the fuel, and control means in said conduit for regulating the passage of air therethrough.

3. A carburetor for an internal combustion engine, of the constant level jet nozzle type, including the combination, with a main air inlet pipe, of a suitably loaded automatic inlet valve arranged in the inlet pipe and opening towards the suction pipe, an air conduit connecting the mixing chamber with the atmospheric air independently of the automatic inlet valve and provided with a tube at the discharge end thereof, a fuel supply pipe terminating in a nozzle disposed in the mixing chamber at substantially right angles with the tube so that a jet of air drawn into the mixing chamber from said tube will meet the extremity of said nozzle, a substantially air tight constant level or float chamber, and a simple conduit connecting the main air passage intermediately between the automatic inlet valve and the throttle with the upper portion of the float chamber above the normal fuel level.

4. A carburetor for an internal combustion engine, of the constant level, jet nozzle type including the combination, with a main air inlet pipe, of a suitably loaded automatic inlet valve arranged in the inlet pipe and opening towards the suction pipe, an air conduit connecting the mixing chamber with the atmospheric air independently of the automatic inlet valve and provided with a tube at the discharge end thereof, a fuel supply pipe terminating in a nozzle disposed in the mixing chamber at substantially right angles with the tube so that a jet of air drawn into the mixing chamber from said tube will meet the extremity of said nozzle, a substantially air tight constant level or float chamber, and a simple conduit connecting the main air passage intermediately between the automatic inlet valve and the fuel supply nozzle with the upper portion of the float chamber above the normal fuel level.