

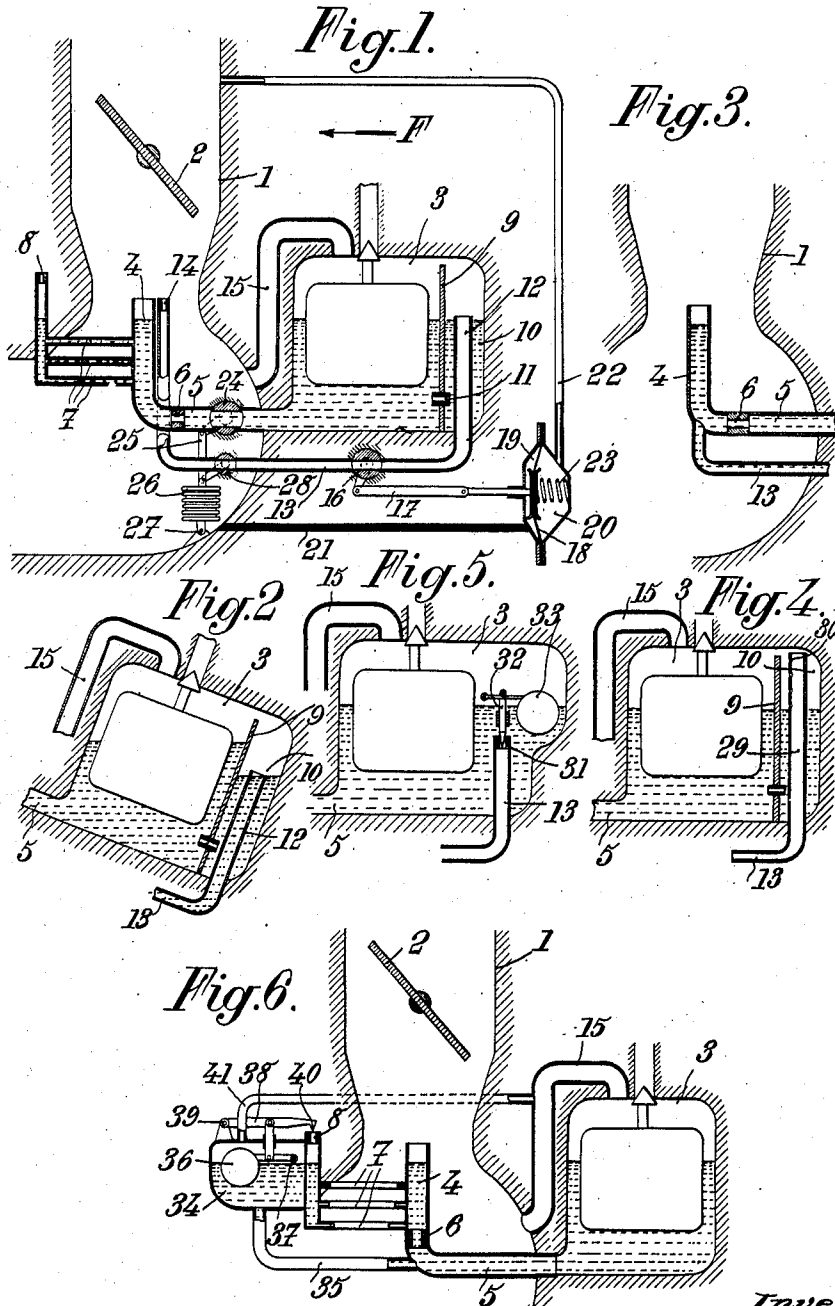
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CARBURETOR

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CARBURETOR

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The invention relates to carburetor for internal combustion engines.

It is known that in certain cases, where the power to be furnished by an internal combustion engine is to be increased, it is necessary to enrich the mixture. In particular, such a device is of special interest in the case of aircraft engines, principally of the air-cooled type, for which the cooling becomes insufficient when the machine is rising and when, in consequence, its speed is insufficient to cool the engine properly, especially as an additional load is imposed upon this latter during the ascent.

The present invention has for its object to provide a carburation device, for engines of the kind in question, by which an automatic enrichment of the carburetted mixture is obtained when the engine is caused to assume an inclined position with respect to its normal position, this enrichment being all the greater as the inclination is the greater.

The invention consists, principally, in making carburation devices of the kind in question comprise means adapted to enrich the combustible mixture and of which the putting into or out of action is determined by the height of the level of the fuel at a suitably chosen point of the constant level chamber of the carburetor, this height itself being a function of the inclinations of the carburetor.

It consists, apart from this principal arrangement, in certain other arrangements which will be more explicitly mentioned hereafter.

These include a second arrangement consisting in acting on the delivery of fuel, furnished by the means adapted to enrich the combustible mixture, by any known device correcting the value of this delivery as a function of the pressure which exists at the air inlet of the carburetor, this correction being effected, preferably, by the same device as that which acts on the delivery of the principal fuel-supply, so as always to obtain an optimum mixture, whatever may be the pressure which exists in the air inlet.

They also include a third arrangement, consisting in constituting the means adapted to enrich the mixture by a communication established between the inlet conduit and an orifice opening into a well, above the normal fuel level of the carburetor, this well being supplied with fuel through a calibrated orifice.

They further include a fourth arrangement consisting in forming the means adapted to enrich the combustible mixture by a communication established between the inlet conduit and several orifices, opening at different heights into a well above the normal fuel level of the carburetor, this well being supplied with fuel through a calibrated orifice.

They also include a fifth arrangement, consist-

ing in constituting the means adapted to enrich the combustible mixture by a calibrated communication established between the inlet conduit and an orifice opening into a chamber below the level of the fuel, the opening of this communication being controlled by an auxiliary float, distinct from the float which determines the constant level of the carburetor.

Additionally, they include a sixth arrangement consisting in constituting the means adapted to enrich the combustible mixture so that they can cause variations in the passage section of a calibrated orifice forming an emulsion air inlet, the said means being actuated by an auxiliary float distinct from the float which determines the constant level in the carburetor.

They further include a seventh arrangement consisting in providing the means adapted to enrich the combustible mixture with an obturator controlled by hand, by the controlling member for the gases, or automatically by barometric or manometric means.

They also include an eighth arrangement, consisting in providing the means adapted to enrich the combustible mixture with an obturator controlled by a manometric device, for example, a diaphragm or a piston, the position of which is a function of the differences of pressure between two suitably chosen points of the inlet pipe of the engine downstream and upstream of the regulating valve located in the said inlet pipe.

They also include a ninth arrangement, consisting in providing the means adapted to enrich the combustible mixture with an obturator controlled by a barometric capsule subjected to the pressure of a suitably chosen point of the inlet pipe, either upstream, or downstream of the regulating valve located in the said inlet pipe.

In order that the invention may be better understood, it will now be described with reference to the accompanying drawing, which is given by way of example only and in which:

Fig. 1 shows, in diagrammatic vertical section, a carburetor constructed according to the invention and in which the mixture-enriching device opens into the inlet pipe of the carburetor.

Fig. 2 shows, similarly, a part of this same device in a position other than its normal position.

Fig. 3 shows, similarly, a variation of this device for which the mixture-enriching device opens into the principal nozzle system of the carburetor.

Fig. 4 shows, similarly, another variation of the device shown on Fig. 1.

Fig. 5 shows, similarly, a part of a carburetor comprising a mixture-enriching device acting on the fuel and controlled by an auxiliary float.

Fig. 6 shows, similarly, a carburetor comprising a mixture-enriching device acting on the emulsion air and also controlled by an auxiliary float.

On Fig. 1 there has been shown diagrammatically a carburetor comprising a body 1, a regulating valve 2, a constant level chamber 3 and a principal nozzle system constituted by a well 4 supplied with fuel by a conduit 5 with calibrated orifice 6 and the emulsion system of which is inclined by conduits 7 opening at different levels into the well 4 and which are supplied with air through a calibrated orifice 8. As the retarding device does not intervene in the operation, it has not been shown on the drawing.

In the constant level chamber 3, there is formed, with the aid of a partition 9, a well 10 supplied with fuel by a calibrated orifice 11 located at a certain distance below the normal level of the carburetor. At the upper edge of the partition 9 there is provided an orifice sufficiently large to permit an adequate air supply to the well 10. This device permits of obtaining, in the well 10, a level the height of which is more constant and the surface calmer than in the chamber 3. Into the well 10 opens, a little above the normal level, a conduit 12 which is extended by a conduit 13 opening, through a calibrated orifice 14, at a suitably chosen point of the inlet pipe, for example in the venturi of the carburetor. This orifice 14 is, in consequence, subjected to the suction which exists in this venturi. A conduit 15 connects the upper part of the chamber 3 to the principal air inlet of the carburetor in order to assure the air supply to the said chamber. In the conduit 13 is located an obturator 16 connected by a rod 17 to a diaphragm 18 separating two chambers 19 and 20 connected respectively by tubes 21 and 22 to suitably chosen points of the inlet pipe of the carburetor upstream and downstream of the regulating valve 2. In the chamber 20 is housed a spring 23 which constantly presses on the diaphragm 18.

If it is supposed that the carburetor is mounted on an aircraft engine, it is necessary to provide a device which corrects the richness of the mixture as a function of the altitude. For this purpose, there is located in the conduit 5 and between the calibrated orifice 6 and the chamber 3, an obturator 24, controlled by a rod 25 connected to a barometric capsule 26 the fixed point of which is pivoted at 27. The rod 25 is also connected to an obturator 28 capable of partly obturating the conduit 13. The barometric capsule 26 is subjected to the pressure which exists in the air inlet of the carburetor.

The device, shown on Fig. 1, functions in the following manner supposing that the aircraft, on which it is mounted, moves in the direction of the arrow F.

When the engine is in the horizontal position, which is that shown on Fig. 1, it is seen that the combustible mixture is assured by the air which enters through the inlet pipe and by the fuel supplied by the principal nozzle 4 of the carburetor.

The respective dimensions of the calibrated orifice 14 and of the conduit 15 are such that, for such a position, the depression, which might occur in the chamber 3 when the obturator 16 remains open, is negligible.

If the aircraft is rising, the engine and, in consequence, the carburetor tilt in the direction shown on Fig. 2. At this moment, the level rises in the well 10 since there is free communication between this well and the chamber 3 through the calibrated orifice 11 and the fuel penetrates by overflowing into the conduit 12. In consequence of the suction which is exerted in the conduit

12 and the piping 13 through the orifice 14 if the obturator 15 is open, the fuel is immediately aspirated by the engine, in addition to the fuel normally aspirated by the principal nozzle system 4 which continues to function. There is consequently obtained an enrichment of the combustible mixture introduced into the engine. The value of this enrichment is determined by the dimension of the calibrated orifice 11 and, in addition, a slight variation of the delivery by this orifice takes place according as the immersion of this latter is more or less great. In particular, the more the inclination increases the greater the immersion, with the result that the delivery through the orifice 11 becomes greater. An increase of the enrichment thus takes place when there is an increase of the inclination. If the engine resumes its normal position the level again drops below the inlet of the conduit 12 and the enrichment ceases.

It should be observed that in order to have, during the ascent, that is to say whilst the ascent enricher is in action, a mixture of constant proportions, it is necessary to correct, as a function of the pressure which exists in the air inlet, the delivery of the principal nozzle 6 and the delivery of the enricher which takes place through the conduit 13.

For this purpose, there has been shown on Fig. 1 a corrector which has been assumed to be automatic and in which a barometric capsule 26, which expands when the pressure in the air inlet drops, acts on a rod 25 in order again to close the obturator 24 so as to throttle the delivery of fuel which passes through the piping 5. Naturally, it is supposed that the regulation of this capsule and of this obturator are such that the combustible mixture, introduced into the engine, is always correct whatever may be the altitude.

The capsule 26 also acts, by the rod 25, on the obturator 28 which regulates the delivery of the fuel passing through the conduit 13. The correction takes place in the same way, that is to say that when the pressure at the air inlet diminishes, the capsule 26 expands, which has for effect again to close the obturator 28 while diminishing the delivery of fuel which passes through the conduit 13, this diminution of delivery being all the greater as the pressure is weaker at the air inlet of the carburetor. The obturator 28 and the capsule 26 are regulatable so as to obtain, for all the pressures at the air inlet, a suitable quantity of fuel delivered by the enricher. Obviously, any other known automatic or non-automatic altimetric correction system can be utilised.

The obturator 16, located in the piping 13, is provided in order that the enrichment shall only take place when the engine works in the neighbourhood of a certain power, for example full power. It is in fact when one is in the neighbourhood of full power that the engine has need of this enrichment called "ascent enrichment" and it may be that for the mean powers this enrichment is unnecessary. With this object, the obturator 16 is connected to the diaphragm 18 which is urged by the spring 23 in a direction for which this diaphragm tends to cause the opening of the obturator 16, the two chambers 19 and 20 being connected respectively by conduits 21 and 22 to two suitably chosen points of the inlet pipe, upstream and downstream of the regulating valve 2. In this way, if the mean powers of the engine are utilised, the valve 2 is

not opened wide and a pressure difference is set up between the chambers 19 and 20, which is sufficient to compress the spring 23 and to close the obturator 16. At this moment, whatever may be the inclination, it is not possible to effect the enrichment of the combustible mixture.

Of course, instead of acting by a diaphragm on the obturator 16, this latter could equally be controlled by a piston or by a barometric capsule, subjected to the pressure of a suitably chosen point of the inlet pipe, either upstream, or downstream of the regulator valve.

Everything relating to Fig. 1, as also to the following figures, is of course applicable if the engine utilised is an engine charged by a compressor, located upstream or downstream of the carburetor.

Fig. 3 shows a device analogous to that of Figs. 1 and 2 but for which the piping 13 opens into the nozzle system 4 of the carburetor. The functioning of such a device is exactly the same as that explained above.

Fig. 4 shows a variation of the arrangement according to Figs. 1 and 2 for which the conduit 12 which opens freely into the well 10 has been replaced by a conduit 29 pierced with several calibrated orifices 30 situated at different heights above the normal level of the carburetor.

This device permits a greater variation of the enrichment to be obtained, as a function of the inclination. In fact, it is obvious that if the engine inclines and takes a position similar to that of Fig. 2, the aspiration of the fuel is obtained first of all through the lowest orifice 30, then through two, then through three, and so on, in proportion as the inclination increases. By suitably calibrating the orifice 11 and the orifices 30 it is thus possible to obtain any desired progression for the enrichment.

It is also possible to locate in the conduit 13 an obturator similar to that designated by 16 on Fig. 1, and to control it in a similar manner.

Fig. 5 shows a device also constituted by a constant level chamber 3 supplied with air by a conduit 15. Into this chamber opens, below the normal level, the conduit 13 terminated by a calibrated orifice 31 forming the seat of a needle valve 32. This needle valve can be raised by an auxiliary float 33 pivoted to a fixed point. The other extremity of the conduit 13 opens either into the venturi as on Fig. 1, or into the principal nozzle system as on Fig. 3.

The operation of this device is as follows:

If the engine is inclined in the same direction as for Fig. 2, the fuel raises the auxiliary float 33 which operates the needle valve 32 in such a way that the fuel can enter the conduit 13 in order to enrich the mixture admitted to the engine.

It should be observed that the more the carburetor is inclined, the more the calibrated orifice 31 will be immersed and, in consequence, the greater will be the enrichment.

Here again, there can be located in the conduit 13 an obturator 16 similar to that shown on Fig. 1.

Fig. 6 shows an enricher device acting on the emulsion air. In this case there is provided by the side of the emulsion system 7, supplied with air through the calibrated orifice 8, a small auxiliary chamber 34 supplied with fuel by a conduit 35 connected to the conduit 5 so that the

level which is set up in the chamber 3, is the same as that of the chamber 34. This chamber serves to house a float 36, pivoted to a fixed point 37 and capable of actuating a rocker 38 pivoted at 39 the free extremity of which carries a needle valve 40 which can more or less obturate the calibrated orifice 8. A tube 41 allows the auxiliary chamber 34 to be supplied with air.

The operation of this device is as follows:

When the engine occupies its normal position, the auxiliary float 36 occupies a position such that the needle valve 40 leaves the calibrated orifice 8 free and allows a maximum air admission into the emulsion system. If the engine is inclined in the direction shown on Fig. 2, the level in the chamber 34 drops, the float 36 carries along the rocker 38 and the needle valve 40 engages in the calibrated orifice 8, diminishing the aeration of the emulsion, which results in an increase in the richness of the mixture by an increase of suction on the calibrated orifice 6. The greater the inclination becomes, the greater the obturation of the orifice 8 and, in consequence, the greater the enrichment.

Of course the carburetor shown on Fig. 6 can also be provided with a device similar to that of Fig. 1 and which comprises an obturator 16 with its control. In the case of Fig. 6 the diaphragm, the piston or the capsule would act on the rocker 38 for example by displacing the pivoting point 39 so that the enrichment cannot take place under certain pressure conditions, such as those which have been explained with reference to Fig. 1.

In all the embodiments described above, it is obvious that the obturator 16 or its equivalent for Fig. 6 could likewise be controlled by hand or by a positive connection to the control of the regulating valve 2.

What I claim is:

1. In combination with a vehicle having an internal combustion engine for driving the same, a carburetting device for said engine comprising an induction conduit fuel outlet means in said induction conduit, a constant level chamber, means to supply fuel under normal conditions from said constant level chamber to said fuel outlet means, a well located to the rear of said constant level chamber, means providing a restricted fuel communication between said well and said constant level chamber and an air communication large enough to maintain substantially equal pressures in the spaces above the liquid in said well and chamber, whereby when the carburetting arrangement is inclined by uphill movement of the vehicle the level of fuel in said well increases, a normally open conduit having its inlet in said well at a level higher than the normal fuel level in said float chamber and well, and its outlet connected to said fuel outlet means, for enriching the fuel mixture, said conduit being controlled only by the height of the level of fuel in said well, said height being itself a function of the inclination of the carburetting device and consequently of the motor and of the vehicle.

2. A device as claimed in claim 1, said normally open conduit having a plurality of inlets at different heights above the normal fuel level in said float chamber and well.

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