United States Patent

Mennesson

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[54] CARBURETORS FOR INTERNAL COMBUSTION ENGINES

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[51] **Int. Cl.** **F02m 7/22**

[58] **Field of Search** ..... 261/DIG. 19, 41 D, 39 A, 69 R, 261/121 A; 123/97 B

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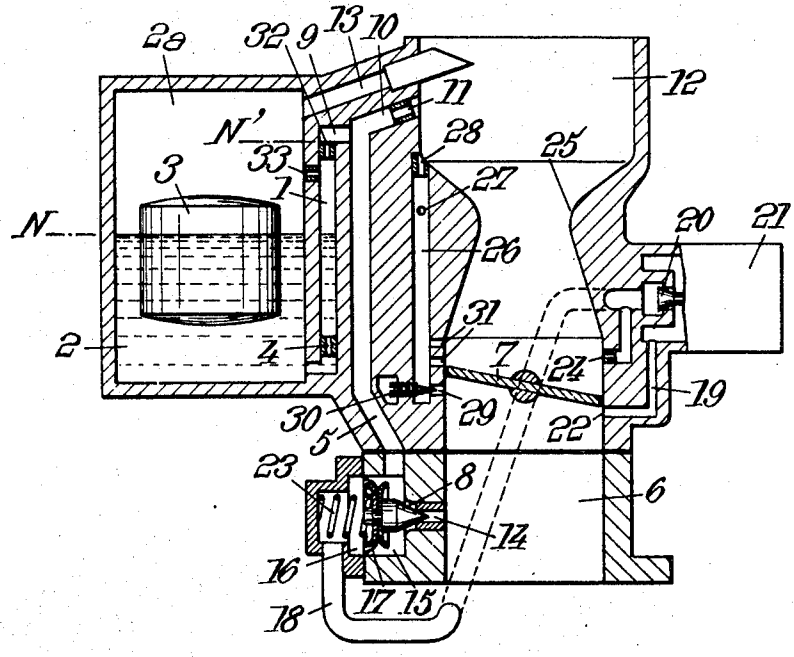
[57] **ABSTRACT**

The carburetor has a fuel/air mixture supply circuit constituted by the sequence of an ascending channel connected to a float chamber through an immersed calibrated orifice and a descending channel with an opening into the intake pipe of the carburetor downstream of the main throttle member of this pipe. The descending channel is controlled by a member which opens it only during periods of deceleration of the engine. The linking zone between the two channels is above the constant level of the float chamber and connected through an air passage having a second calibrated orifice, to an air intake zone of the carburetor other than that connected to the upper portion of the float chamber. The ascending channel has a further calibrated orifice above the constant level and communicates with the space above the constant level through a passage of small cross-section opening into the ascending channel between its two calibrated orifices and also itself above the constant level. The assembly reduces the suction in the ascending channel to an extent insufficient or sufficient to stop the fuel being sucked into the descending channel according as the closure member is open or not.

1 Claim, 1 Drawing Figure



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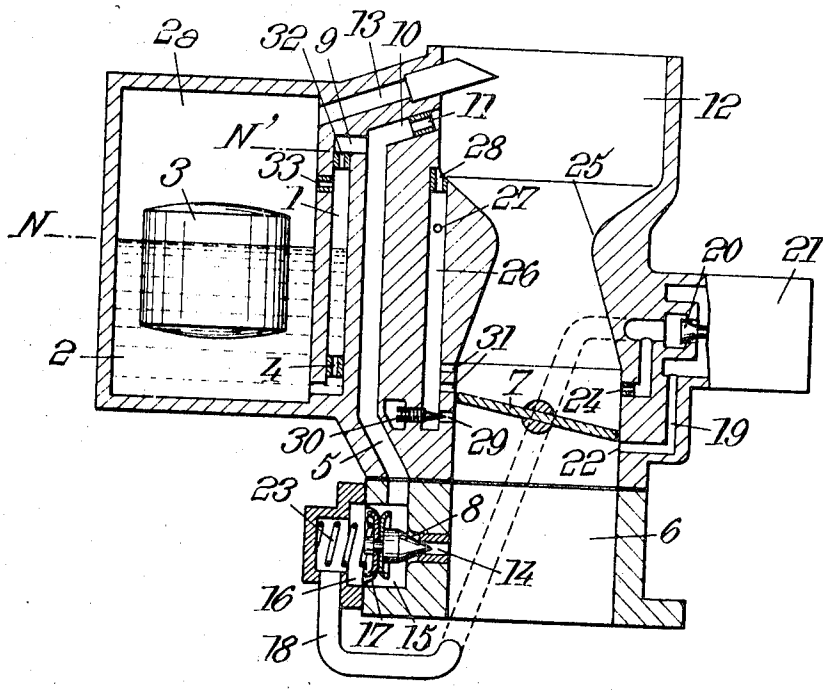

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CARBURETORS FOR INTERNAL COMBUSTION ENGINES

The invention relates to carburetors, for internal combustion engines, of the type which comprise a circuit for supplying fuel mixed with air constituted by the succession of an ascending channel which is connected to a float chamber through an immersed calibrated orifice and of a descending channel which ends in the intake pipe of the carburetor downstream of the main throttle member of this pipe and which is controlled by an obturating member adapted to free it only during periods of deceleration of the engine, the linking zone between the two channels being situated above the constant level of the float chamber and connected, through an aerating passage provided with a second calibrated orifice, to an air intake zone of the carburetor different from that by which the upper portion of the float chamber is connected to this air intake by an equilibrating passage in order to be subjected to a pressure substantially equal to atmospheric pressure.

Of course, during periods of deceleration of the engine or of the engine-driven vehicle, i.e. during periods when the main throttle member occupies its minimal opening position and when the engine is driven at a relatively high speed and in any case greater than idling speed, it is generally advantageous, in order to reduce atmospheric pollution by the exhaust gas, to send to the engine a quantity of air/fuel mixture greater than that which would be sent by the carburetor on idling. For this purpose it has already been proposed to provide the carburetor with the above-said supply circuit of which the descending channel is controlled by an obturating member adapted to free it only during the periods of deceleration of the engine, the main throttle member remaining then in its idling position.

It is also known that the periods of deceleration, on one hand, have in common with normal operation, a high engine speed but are distinguished therefrom by the closing of the main throttle member and, on the other hand, have this closing in common with the idling periods, but are distinguished therefrom by a distinctly greater engine speed. One of the two following solutions is generally adopted to actuate the above-said obturating member.

According to French Pat. No. 1,547,734 and its additions No. 93,856, No. 93,915 and No. 94,331 this obturating member is actuated by a capsule adapted to be connected, to the zone of the intake pipe of the carburetor situated downstream of its main throttle member, by an electromagnetic valve controlled by an electronic device sensitive to the speed of the engine or, at least, of the vehicle driven normally by this engine. The assembly is then such that the above-mentioned obturating member is only open when, simultaneously, the electronic device registers a high speed and the capsule a strong suction which corresponds to the closing of the main throttle member.

According to U.S. Pat. application Ser. No. 14,456 filed on Feb. 26, 1970, in the name of Michel E. Pierlot, the abovesaid obturating member is actuated by a first capsule sensitive to the suction which exists in the zone of the intake pipe of the carburetor situated downstream of its main throttle member and which itself is transmitted through a second capsule sensitive to the suction existing at a point of the intake pipe situated so as to pass from downstream to upstream of the main throttle member when the latter is partly opened, the first capsule being arranged so as to be subjected to atmospheric pressure when the said obturating member is closed.

It will hence be observed that, in a carburetor of the type defined above, the supply circuit, during periods of deceleration when the obturating member is consequently open, delivers a mixture of fuel taken from the float chamber through the ascending channel and of air taken through the air passage in the air intake of the carburetor. Now, it can happen that by reason of the different positions or of the shapes of the outlets of the equilibrating and of the aerating passages above-mentioned, the upper portion of the float chamber occurs at a pressure greater than that of the linking zone between the ascending and descending channels of the abovesaid supply circuit. As a result, outside periods of deceleration, fuel can be sucked up to this linking zone and thus fill the descending channel to its obturating member. The fuel thus accumulated is sucked into the intake pipe at the beginning of periods of deceleration and, for this reason, the mixture supplied through the carburetor is too rich for the exhaust gas to respect anti-pollution standards.

It is an object of the invention to overcome this drawback.

To this end, the carburetor of the type defined above is characterized, according to the invention, by the fact that the ascending channel comprises, in addition to the immersed calibrated orifice, a calibrated orifice situated above the constant level of the fuel in the float chamber and communicates with the portion of the float chamber situated above this level through a passage of small section opening into this channel between its two calibrated orifices and situated itself also above the constant level, the assembly being such that the said passage reduces the suction existing in the ascending channel to an extent insufficient or sufficient to prevent the fuel from being sucked up to the descending channel according as the obturating member of the latter is open or not respectively.

In order that the invention may be more fully understood, one embodiment of a carburetor according to the invention is described below, purely by way of illustrative and non-limiting example, with reference to the accompanying drawing in which the single FIGURE shows, in vertical section, an embodiment of a carburetor constructed according to the invention.

According to the invention and more particularly according to that of its methods of application, as well as according to those of its methods of production of its various parts, to which it would appear that preference should be given, in order to construct a down-draft carburetor for an automobile vehicle engine, procedure is as follows or in analogous manner.

As regards the carburetor as a whole, it is constructed in any suitable manner such that is comprises a supply circuit for fuel mixed with air constituted by the succession of an ascending channel **1**, connected to a constant level N reservoir **2**, (this level being generally regulated by a float **3**) through an immersed calibrated orifice **4**, and by a descending channel **5** which ends in the intake pipe **6** of the carburetor downstream of the main throttle member (or butterfly valve) **7** of this pipe and which is controlled by an obturating member or needle valve **8** adapted to free this channel **5** during periods of deceleration of the engine. The linking zone **9** between the channels **1** and **5** is situated above the level N and connected, through an aerating passage **10** provided with a calibrated orifice **11**, to an air intake zone **12** of the carburetor different from that through which the upper portion of the reservoir **2** is connected to this air intake, through an equilibrating passage **13**, in order to be subjected to a pressure substantially equal to atmospheric pressure.

The obturating member **8** is placed between a calibrated orifice **14** opening into the pipe **6** and a chamber **15** where the descending channel **5** ends. This member **8** is actuated by a capsule constituted for example by a chamber **16** bounded by a diaphragm **17** which bears the member **8**, this chamber **16** being connected through two successive channels **18** and **19** to a zone of the pipe **6** situated downstream of the throttle member **7** at least when the latter is closed. Between the two channels **18** and **19** is placed an obturating member **20** controlled by means **21** such that it does not make the channels **18** and **19** communicate between themselves except when the speed of the engine exceeds a certain limit. These means which are known per se, can be arranged according to one of the two solutions mentioned previously. In the two cases, the origin **22** of the channel **19** is preferably situated so as to pass from downstream to upstream of the main throttle member **7** when the latter is moved from the idling position shown. A spring **23** acts on the diaphragm **17** in the direction opposite to the suction existing in the chamber **16** and tends thus to close

the obturating member **8** and an air intake regulated through a calibrated orifice **24** is provided on the channel **18** and/or the chamber **16** so that atmospheric pressure is established there when the obturating member **20** is closed (i.e. at low or nil speeds of the engine).

The carburetor also includes:

for normal operation, a main jetting circuit (not shown) constituted by a channel, supplied with fuel by the reservoir **2**, which opens into the pipe **6** upstream of the main throttle member **7** and at the level of a venturi **25**;

for idling speed, a channel **26** taking fuel through an orifice **27** and generally in the main jetting circuit and air through an orifice **28** in the air intake **12**, which channel opens into the pipe **6**, on one hand, through an idling orifice **29** regulated by a screw **30** and opening downstream of the main throttle member **7** and, on the other hand, by orifices called "transfer" orifices **31** situated so as to pass from upstream to downstream of this member **7** when the latter is partly opened.

Of course, during periods of deceleration, the obturating member **8** frees the orifice **14**, which thus allows to pass into the pipe **6** a mixture of air and fuel arriving respectively through the orifices **11** and **4**, which mixture is added to that delivered through the idling orifice **29** to improve the combustion conditions in the cylinders of the engine and thus to reduce the emission of pollutant products in the exhaust gas.

Outside periods of deceleration, the obturating member **8** is closed. Pressure in the zone **9** is slightly less than that which exists in the reservoir **2**, due to the fact that the orifice **11** and the equilibrating passage **13** are not situated and oriented in the same manner in the air intake **12**. As a result, the level N' of the fuel in the ascending channel **1** rises into this zone **9** and, from there, flows into the descending channel **5** where it accumulates. At the beginning of the deceleration period which follows, the pipe **6** receives the unmixed quantity of fuel which is thus accumulated and which unduly enriches the mixture admitted into the cylinders of the engine.

To overcome this drawback, according to the invention, the ascending channel **1** comprises, in addition to the immersed calibrated orifice **4**, a calibrated orifice **32** situated above the constant level N in the reservoir **2** and communicates, with the portion **2***a* of the reservoir situated above this level N, through a passage of small section or a calibrated orifice **33** opening into the channel **1** between its two calibrated orifices **4** and **32** and situated itself also above the level N, the assembly (and especially the cross-sections of the orifices **4**, **32** and **33**) being such that the said passage **33** reduces the suction existing in the ascending channel **1** to an extent insufficient or sufficient to prevent the fuel from being sucked up to the descending channel **5** according as the obturating member **8** of the latter is respectively open or not.

It will be observed that outside periods of deceleration (the obturating member **8** being consequently closed), the fuel can no longer then ascend to the level N', whatever the differential pressure existing between the equilibrating passage **13** and the orifice **11**, which indeed eliminates the above-indicated drawback. On the other hand, during periods of deceleration (the orifice **14** being freed by the obturating member **8**), the suction existing in the descending channel **5**, and consequently in the ascending channel **1**, increases strongly and causes each time the jetting, through the orifice **14**, of a primary mixture formed of fuel metered by the immersed orifice **4** and of air metered through the orifice **11**.

As it is self-evident and as emerges already from the preceding description, the invention is in no way limited to those of its methods of application, nor to those of its methods of production of its various parts, which have been more especially indicated; it encompasses, on the contrary all variations.

I claim:

1. Carburetor for internal combustion engines, which comprises a circuit for the supply of fuel mixed with air constituted by the sequence of an ascending channel which is connected to a constant level chamber through an immersed calibrated orifice and of a descending channel with an opening into the intake pipe of the carburetor downstream of the main throttle member of this pipe and which descending channel is controlled by an obturating member adapted to free it only during periods of deceleration of the engine, the linking zone between the two channels being situated above said constant level and connected, through an air passage provided with a second calibrated orifice, to an air intake zone of the carburetor different from that by which the upper portion of the float chamber is connected to this air intake zone through an equilibrating passage in order to be subjected to a pressure substantially equal to atmospheric pressure, characterized by the fact that the ascending channel comprises, in addition to the immersed calibrated orifice, a calibrated orifice situated above the constant level of the fuel in the reservoir and communicates with the portion of the reservoir situated above said constant level through a passage of small section opening into said ascending channel between its two calibrated orifices and itself situated also above the constant level, the assembly being such that said passage reduces the suction existing in the ascending channel to an extent insufficient or sufficient to prevent the fuel from being aspirated to the descending channel according as the obturating member of the latter is open or not respectively.

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