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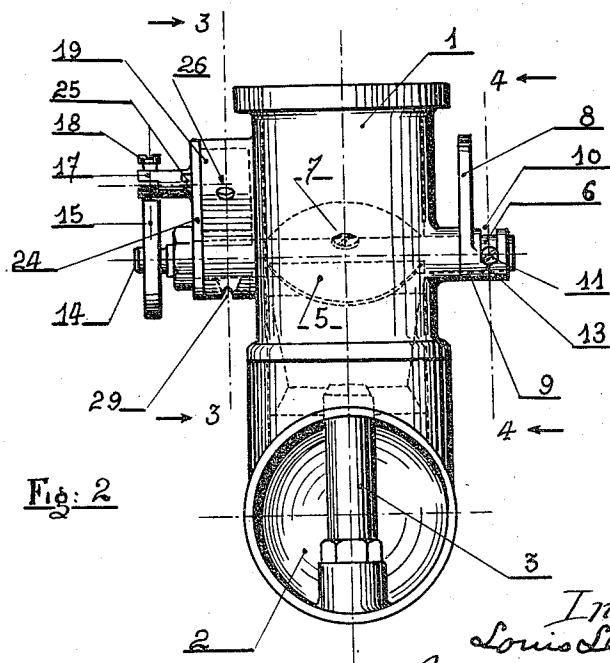
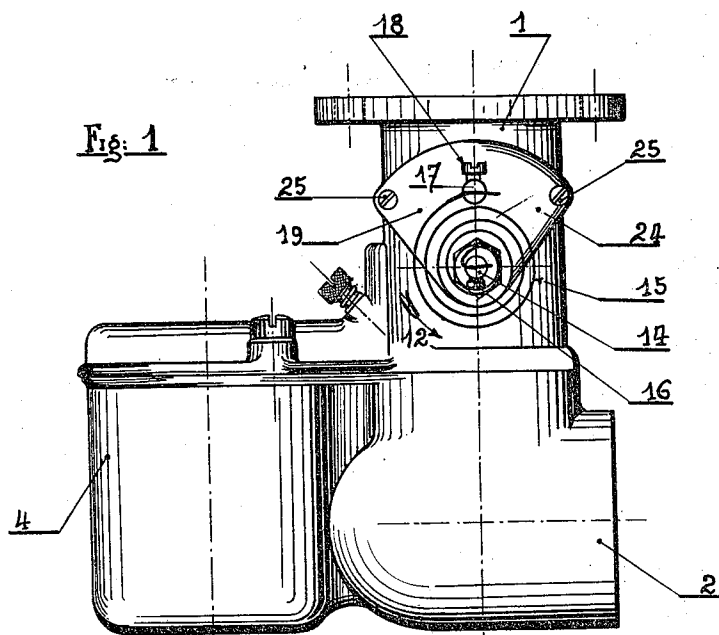
L. L. VIEL

2,013,932

SUCTION ACTUATED CARBURETOR GOVERNOR

Filed Sept. 5, 1933

2 Sheets-Sheet 1



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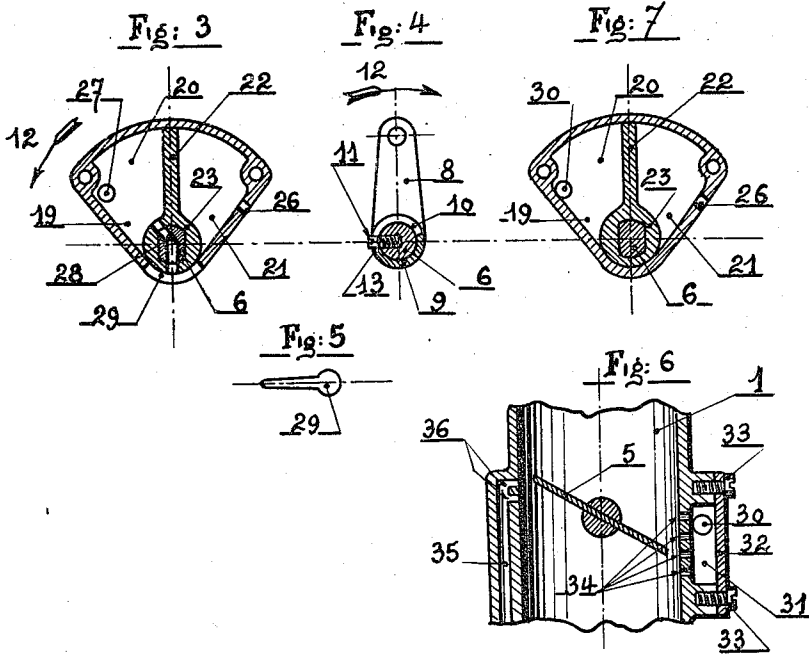
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SUCTION ACTUATED CARBURETOR GOVERNOR

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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SUCTION ACTUATED CARBURETOR
GOVERNOR

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8 Claims. (Cl. 261-72)

The present invention relates to suction actuated carburetor governors for internal combustion engines and it is more especially concerned with devices of that kind, actuated by the suction transmitted through the intake pipe of the engine, adapted to stop the normal working of the carburetor when the speed of revolution of the engine exceeds a predetermined value.

The object of the present invention is to provide a device of the kind above referred to with which it is unnecessary to use a centrifugal governor for actuating the throttle valve that controls the inflow of the fuel mixture to the engine, as is the usual practice, in engines fitted with a device for limiting the speed.

When it is desired to limit the speed of revolution of an engine in an efficient and reliable manner it is necessary that the device for limiting said speed should work not only when the throttle valve of the carburetor is wide open, but also when said throttle valve is partly closed, or even wholly closed, that is to say regulation should take place as well when the engine is running under medium loads, or even under no load, as when it is running under full load.

The governor according to the present invention essentially comprises a chamber having a movable wall (piston membrane, vane, or other element) connected to the throttle valve. Said chamber is subjected to the action of a portion of the suction in the intake pipe of the engine on the rear or engine side of the throttle valve of the carburetor with reference to the direction of flow of the fuel mixture. The fraction of the suction that is thus transmitted to the movable wall of the chamber above referred to varies according to the position of opening of the throttle valve, and these variations are obtained by means of a distributor or suction controlling means actuated by the throttle valve and interposed between said chamber and the intake pipe of the engine. For instance this chamber is provided with two orifices one of which connects it to the intake pipe of the engine, on the rear or engine side of the throttle valve, whereas the other one connects said chamber either with the intake pipe on the front side of the throttle valve, or with the atmosphere. The distributor varies the fraction of the depression produced by the suction of the engine that is transmitted to the movable wall of the chamber, by modifying the relative cross sections of said orifices according to the position of opening of the throttle valve. The distributor may also consist of the throttle valve itself, con-

trolling passages provided in the wall of the intake pipe in the vicinity of the edge of the throttle valve.

For each position of the throttle valve, the speed that the engine should not exceed is known in advance. This speed limit may be the same for all positions of the throttle valve, or it may vary with said positions. One may, in fact, allow a greater speed limit when the load of the engine is small, that is to say when the throttle valve is partly or wholly closed. The distributor will be so devised that the suction transmitted to the movable wall of the chamber may have the same value, whatever be the position of the throttle valve, when the speed of revolution of the engine reaches the limit value imposed by the position of the throttle valve.

The movable wall of the chamber may move under the action of the suction in the chamber against a resistance created, for instance, by a spring or by a weight, and adapted to balance the action of the suction when the latter has a value that corresponds to the maximum acceptable speed of revolution of the engine.

For a predetermined position of opening of the throttle valve, the suction transmitted to the chamber increases with the speed of revolution of the engine.

As long as the speed of revolution of the engine is smaller than the predetermined maximum speed, the action of the resistance is stronger than the action of the suction and the carburetor works normally. If the speed of revolution of the engine exceeds the maximum value imposed, the suction becomes stronger than the resistance, and the movable wall moves under the action of the suction and actuates the throttle valve connected with said movable wall, so that the speed of revolution of the engine is caused to drop back within the limit permitted.

According to one embodiment of the invention, the governor controls the closing of the throttle valve of the carburetor. The resistance that opposes the movements of the movable wall of the chamber under the influence of the suction in this chamber urges the throttle valve that is connected to said movable wall toward its open position. The accelerator positively acts on the throttle valve for closing it but has no action whatever on its opening. Therefore, when the speed of revolution of the engine is normal, the position of opening of the throttle valve is fixed by the accelerator; but if the speed of revolution exceeds a predetermined value, the suction that is transmitted to the chamber of the governor

overcomes the action of the resistance above referred to and the movable wall is consequently caused to move, thus closing to a certain extent the throttle valve.

Preferred embodiments of the present invention will be hereinafter described, with reference to the accompanying drawings, given merely by way of example, and in which:

Fig. 1 is an elevational view of an embodiment of the device according to the invention in which the governor controls the displacements of the throttle valve;

Fig. 2 is a side view of the device shown in Fig. 1;

Figs. 3 and 4 are sectional views on the lines 3—3 and 4—4 respectively of the device shown in Figs. 1 and 2;

Fig. 5 is the development of a detail of the device shown in Figs. 1 and 2;

Figs. 6 and 7 are sectional views of a modified distributor according to the invention.

The carburetor shown in Figs. 1 to 5 comprises, in the usual way, a mixing pipe 1 receiving air from an air intake 2 and fuel from a fuel outlet 3, a float chamber 4, the detail of which is not shown, a throttle valve 5 controlling the flow of fuel mixture through pipe 1, and, generally speaking, all the elements that a carburetor is usually provided with, such as idling jets or analogous devices.

The throttle valve 5 is mounted on a spindle 6 to which it is secured by a screw 7. Spindle 6 carries an operating lever 8, which is connected to the accelerator control (not shown in the drawings). The cylindrical portion 9 of lever 8 is journaled on spindle 6 and is provided with a slot 10 in which a screw 11 screwed in spindle 6 can move. The throttle valve 5, rigidly fixed to spindle 6, can thus be displaced in the direction of closing, indicated by arrow 12, independently of lever 8. Conversely, if the lever is displaced in the direction of arrow 12, that is to say in the direction of closing of throttle valve 5, it causes spindle 6 and throttle valve 5 to move together with it, because the edge 13 of slot 10 engages screw 11.

The end 14 of spindle 6 is secured to one of the ends of a spiral spring 15 by means of a screw 16. The other end of the spring 15 is secured at 17 to the body of the carburetor by means of a screw 18. Spring 15 tends to turn spindle 6 and throttle valve 5 in the direction of opening, so that screw 11 is normally kept in contact with the edge 13 of slot 10 and the throttle valve normally follows the movements of the operating lever 8.

The body of the carburetor is provided with a chamber 19 which has the shape of a circular sector divided into two compartments 20 and 21 by a partition 22. The spindle 23 of said partition 22 is mounted on the spindle 6 of the throttle valve to which it is locked by means of two flat parts provided on spindle 6 and corresponding to flat portions of the inner face of spindle 23. Partition 22 is mounted in chamber 19 in such a manner as to ensure at least an approximate fluidtightness between the two compartments 20 and 21. The contact between partition 22 and the inner surface of chamber 19 may be metal on metal but, preferably, partition 22 is provided with leather so as to improve fluidtightness.

Compartment 21 communicates with the atmosphere by an orifice 26, while compartment 20 communicates with the intake pipe 1 on the rear or engine side of throttle valve 5

(with reference to the direction of flow of the fuel mixture) through an orifice 27. Compartment 20 further communicates with the atmosphere through a channel 28 provided in the concentric spindles 23 and 6 of partition 22 and of throttle valve 5 respectively and through a slot 29 provided in the cylindrical portion of the wall of chamber 19 in which spindle 23 is journaled. The width of slot 29 varies along its length and its development is shown in Fig. 5. The whole of orifice 27, channel 28 and slot 29 constitutes the distributor which transmits to compartment 20 a variable fraction of the suction in the intake pipe on the rear or engine side of the throttle valve. According to the position of said throttle valve 5, the end of channel 28 is located opposite a more or less wide portion of slot 29 so that the relative sections of the passages connecting compartment 20 to the intake pipe of the engine and to the atmosphere respectively vary according to the position of the throttle valve.

When the throttle valve occupies a determined position, the suction transmitted to compartment 20 increases when the speed of revolution of the engine increases, and this suction assumes a certain value when the speed of revolution of the engine reaches the limit value that ought not to be exceeded for said position of the throttle valve. The form of slot 29 is so chosen that the suction acting on the movable partition through compartment 20 is the same whatever be the position of opening of the throttle valve, when the speed of revolution of the engine reaches its limit value. The tension of spring 15 is so chosen that it balances exactly, for the maximum speed of revolution of the engine, the action of said suction on partition 22, the two faces of which are subjected to the action of the atmospheric pressure and to that of said suction respectively.

The form of slot 29 will be determined experimentally. By way of indication, the width of the region of the slot that is located opposite conduit 28 will be smaller when the throttle valve is widely open than when it is only slightly open since, for a predetermined speed of the engine, the suction on the rear or engine side of the throttle valve is greater when said throttle valve is more widely open.

The operation of the device is as follows:

Under normal conditions of running, that is to say when the speed of revolution of the engine is below the maximum speed permissible, the force exerted on partition 22 by the suction in compartment 20 is smaller than the opposing pull of spring 15. The spring therefore tends to open the throttle valve and thus keeps screw 11 in contact with the edge 13 of slot 10 carried by operating lever 8. The opening of the throttle valve is thus controlled by lever 8, that is to say by the accelerator.

If the speed of revolution of the engine exceeds the maximum admissible speed, the action exerted by the suction on partition 22 exceeds the action exerted by spring 15 and partition 22 is caused to move, driving together with it throttle valve 5 toward the closed position, whatever be the position occupied by operating lever 8. The amount of fuel mixture delivered to the engine is thus reduced and consequently the speed of revolution of the engine is reduced and is brought back below the maximum admissible speed.

Figs. 6 and 7 show a modification of the distributor that controls the suction transmitted to compartment 20. According to this modification,

channels 27 and 28 and slot 29 are done away with and are replaced by a single conduit 30 connecting the compartment 20 to a suction chamber 31. Chamber 31 is closed by a plate 32 fixed by means of screws 33. It is connected with the intake pipe 1 of the engine through calibrated ports or holes 34 provided along the path of travel of the edge of throttle valve 5. Conduit 35 and orifices 36 are provided for feeding fuel when the engine is idling, the operation of these orifices being controlled by throttle valve 5 in the usual manner. For a given position of throttle valve 5, a part of the ports or orifices 34 is located on the rear or engine side of the throttle valve, while the remainder of these orifices or ports is located on the front side of said throttle valve. The suction in chamber 31, which is transmitted to compartment 20 through conduit 30 is then intermediate between the suction on the rear or engine side of the throttle valve and the suction on the front side thereof. The nearer the throttle valve is to its closed position, the greater the number of orifices located on the front side of said throttle valve and the smaller the fraction of the suction on the rear or engine side of the throttle valve that is transmitted to chamber 31. The position and the size of the various orifices 34 are so chosen that the suction in chamber 31 has always the same value when the speed of revolution of the engine reaches its limit value, whatever be the position of the throttle valve. The device then works in the same way as above described with reference to Figs. 1 to 5.

The present invention is not limited to the embodiments that have been described by way of example.

In particular, the invention can be applied to all types of carburetors. The carburetors that have been shown in the preceding examples include a float chamber, but it is obvious that for instance the embodiments shown in the accompanying drawings could be applied to carburetors having no float chamber. In a likewise manner, although, according to the usual practice, the throttle valve has been shown on the rear or engine side of the fuel outlet, with reference to the direction of flow of the fuel mixture, the invention could be applied to carburetors in which this arrangement is reversed.

In a general manner, while I have described what I deem to be practical and efficient embodiments of my invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of my invention as comprehended within the scope of the appended claims.

What I claim is:

1. A governing device for a carburetor for an internal combustion engine having an intake, a carburetor having a fuel feed and an air supply, comprising in combination with a throttle valve, suction controlled means for varying the flow of fuel from the fuel feed comprising a movable wall within a chamber, the chamber on one side of said wall being open to atmosphere, there being a suction connection from the other side of said wall connecting said chamber to the engine intake, manually controlled means for actuating the throttle valve, actuating connections between the throttle valve and the wall, spring means for moving the throttle valve toward its open position independent of the man-

ually controlled means and for moving the wall in one direction to close the throttle valve, and means controlled by the movement of the throttle for varying the suction effect on the wall and thereby vary the opposing force on the spring.

2. A governing device for a carburetor for an internal combustion engine having an intake, a carburetor having a fuel feed and an air supply, comprising in combination with a throttle valve, suction controlled means for varying the flow of fuel from the fuel feed comprising a movable wall within a chamber, the chamber on one side of said wall being open to atmosphere, there being a suction connection from the other side of said wall connecting said chamber to the engine intake between the engine and the throttle valve, manually controlled means for actuating the throttle valve, actuating connections between the throttle valve and the wall, spring means for moving the throttle valve toward its open position independent of the manually controlled means and for moving the wall in one direction to close the throttle valve, and means controlled by the movement of the throttle for varying the suction effect on the wall and thereby vary the opposing force on the spring.

3. A governing device for a carburetor for an internal combustion engine having an intake, a carburetor having a fuel feed and an air supply, comprising in combination with a throttle valve, suction controlled means for varying the flow of fuel from the fuel feed comprising a movable wall within a chamber, the chamber on both sides of said wall being open to atmosphere, there being a suction connection from one side of said wall connecting said chamber to the engine intake between the engine and the throttle valve, manually controlled means for actuating the throttle valve, actuating connections between the throttle valve and the wall, spring means for moving the throttle valve toward its open position independent of the manually controlled means for moving the wall in one direction to close the throttle valve, and means controlled by the movement of the throttle for varying the opening to atmosphere from the chamber on one side of the wall for varying the suction effect on the wall and thereby vary the opposing force on the spring.

4. A governing device for a carburetor for an internal combustion engine having an intake, a carburetor having a fuel feed and an air supply, comprising in combination with a throttle valve, suction controlled means for varying the flow of fuel from the fuel feed comprising a movable wall within a chamber, the chamber on both sides of said wall being open to atmosphere, there being a suction connection from one side of said wall connecting said chamber to the engine intake between the engine and the throttle valve, manually controlled means for actuating the throttle valve, actuating connections between the throttle valve and the wall, spring means for moving the throttle valve towards its open position independent of the manually controlled means for moving the wall in one direction to close the throttle valve, and means controlled by the movement of the throttle for varying the opening to atmosphere from the chamber on the suction side of the wall for varying the suction effect on the wall and thereby vary the opposing force on the spring.

5. A governing device for a carburetor for an internal combustion engine having an intake, a

carburetor having a fuel feed and an air supply, comprising in combination with a throttle valve, suction controlled means for varying the flow of fuel from the fuel feed comprising a movable wall within a chamber, the chamber on one side of said wall being open to atmosphere, there being a suction connection from the other side of said wall connecting said chamber to the engine intake, actuating connections between the throttle valve and the wall, spring means for moving the throttle valve toward its open position, and means controlled by the movement of the throttle for varying the suction effect on the wall and thereby varying the opposing force on the spring.

6. A governing device for a carburetor for an internal combustion engine having an intake, a carburetor having a fuel feed and an air supply, comprising in combination with a throttle valve, suction controlled means for varying the flow of fuel from the fuel feed comprising a movable wall within a chamber, the chamber on one side of said wall being open to atmosphere, there being a suction connection from the other side of said wall connecting said chamber to the engine intake between the engine and the throttle valve, actuating connections between the throttle valve and the wall, spring means for moving the throttle valve toward its open position and means controlled by the movement of the throttle for varying the suction effect on the wall and thereby varying the opposing force on the spring.

7. A governing device for a carburetor for an internal combustion engine having an intake, a carburetor having a fuel feed and an air supply, comprising in combination with a throttle valve,

suction controlled means for varying the flow of fuel from the fuel feed comprising a movable wall within a chamber, the chamber on both sides of said wall being open to atmosphere, there being a suction connection from one side of said wall connecting said chamber to the engine intake between the engine and the throttle valve, actuating connections between the throttle valve and the wall, spring means for moving the throttle valve toward its open position, and means controlled by the movement of the throttle for varying the opening to atmosphere from the chamber on one side of the wall for varying the suction effect on the wall and thereby vary the opposing force on the spring.

8. A governing device for a carburetor for an internal combustion engine having an intake, a carburetor having a fuel feed and an air supply, comprising in combination with a throttle valve, suction controlled means for varying the flow of fuel from the fuel feed comprising a movable wall within a chamber, the chamber on both sides of said wall being open to atmosphere, there being a suction connection from one side of said wall connecting said chamber to the engine intake between the engine and the throttle valve, actuating connections between the throttle valve and the wall, spring means for moving the throttle valve towards its open position, and means controlled by the movement of the throttle for varying the opening to atmosphere from the chamber on the suction side of the wall for varying the suction effect on the wall and thereby vary the opposing force on the spring.

LOUIS LÉON VIEL.