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CARBURETOR

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FIG. 1

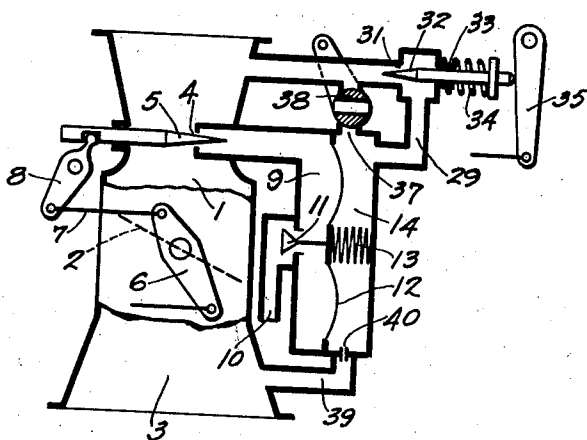
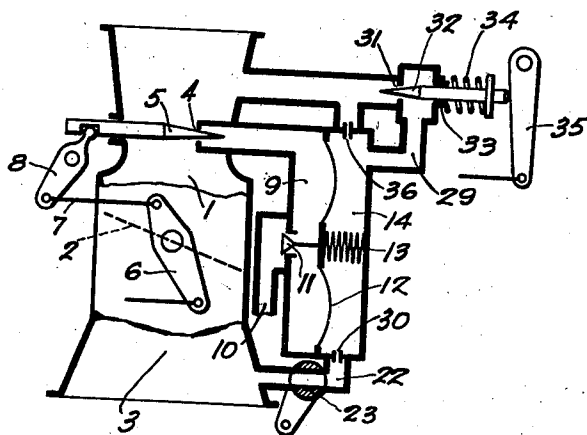


FIG. 2

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CARBURETOR

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3 Claims. (Cl. 261—69)

The present invention relates to carburetors for internal combustion motors comprising an induction passage controlled by a throttle valve and supplied with fuel by a fuel reservoir comprising a yieldable wall or membrane, the membrane being connected to a valve which controls the admission of fuel to the reservoir in such manner as to control the fuel pressure within the same.

The object of the invention is to provide a carburetor of this type provided with an arrangement permitting it to stop the motor.

As a general rule in internal combustion motors provided with electric ignition the throttle valve cannot be closed beyond a certain position which corresponds to the idling speed of the motor. In order to stop the motor, the ignition is cut off with the throttle valve in idling position; the mixture supplied to the motor ceases to burn and the motor stops. Under actual conditions in certain motors and particularly in certain air-cooled motors the temperature at certain points in the cylinder walls is sufficiently high to cause automatic ignition of the fuel mixture supplied to the motor, even after the ignition has been cut off, so that the motor continues to operate through self-ignition sometimes for a considerable period of time. A carburetor in accordance with this invention comprises a chamber separated from the fuel reservoir by a membrane, or by a yieldable wall (membrane or piston) connected mechanically to said membrane. Said chamber is connected to the induction passage posterior to the throttle valve through a suction passage and also through an air passage to the carburetor air intake or to atmosphere. If the section of the suction passage is increased or the section of the air passage is diminished, the depression transmitted to the chamber is increased; in other words the pressure in said chamber is lowered. The pressure in the fuel reservoir will vary with the pressure in said chamber in such a manner that when the pressure falls in the chamber it will fall equally in the fuel bowl and the output of fuel supplied to the carburetor will diminish correspondingly. It is known, however, that the mixture of air and fuel cannot ignite unless the fuel contained in the mixture exceeds a certain ratio. In accordance with the present invention, the carburetor comprises a controlling arrangement placed in one of said two passages permitting either the suction passage to be increased or the air passage to be reduced, in such a proportion that the amount of fuel supplied to the suction passage by the fuel reservoir will be below the minimum required to form an inflam-

mable mixture. When this arrangement is in operation, the motor, no longer receiving an inflammable mixture, stops.

In actual practice, the stoppage of the motor is not always instantaneous. It happens often that the intake manifold contains liquid fuel which, vaporizing in air, is capable of maintaining the operation of the motor for a certain length of time. For example, in certain motors equipped with superchargers, it is found that after the shut-off of fuel the condensed fuel contained in the intake passage is capable of keeping the motor running approximately for ten seconds. It is evident then that even if the output of fuel is reduced to a quantity which of itself is insufficient to form an inflammable mixture with the air, this quantity added to the condensation may be sufficient to keep the motor running and thereby retard the stopping of the motor. It is therefore preferable in order to render the invention most efficient to cut off completely the supply of fuel or at least to reduce it to its minimum value. To this end, according to the preferred application of the invention, a shut-off arrangement is provided in the air passage permitting the same to be closed completely. In this manner the entire suction is transmitted to the membrane or the movable wall which encloses the chamber.

In the Belgian Patent No. 404,966, dated August 30, 1934, relating to altitudinal carburetor correction, there is described a carburetor of the type to which the present invention applies. In this carburetor the altitudinal correction is obtained by adjusting the relative sections of a suction passage and of an air passage connecting a chamber both to the suction passage and to the air intake or atmosphere, said chamber being operated from the fuel reservoir by a membrane enclosing the same or being enclosed by a movable wall (membrane or piston) connected mechanically to said membrane. The carburetor described in the patent differs from that of the present invention in that the operation of the altitudinal corrector does not allow the pressure in the fuel reservoir to be reduced in a proportion sufficient to bring the fuel output below the minimum quantity necessary to form a non-inflammable mixture. The same carburetor may also include the altitudinal correction provided in Belgian Patent No. 404,966 in the arrangement for causing the stoppage of the motor which is the object of the present invention.

The following description relating to the attached drawing, is given as an example for a bet-

ter understanding of the application of the invention:

Figures 1 and 2 show schematically in longitudinal section the application of the invention to a carburetor comprising an altitudinal corrector as disclosed in Belgian Patent No. 404,966.

The carburetor shown in Figure 1 comprises an induction passage which is controlled by a throttle valve 2 and supplied with air through air intake 3. The suction passage 1 is supplied with fuel by a fuel jet 4 located posterior to the throttle valve. The fuel jet is controlled by needle 5 mechanically connected to the throttle valve by means of lever 6, link 7 and lever 8.

Fuel jet 4 is supplied with fuel by a fuel reservoir 9, which is supplied with fuel under pressure through passage 10. Admission of fuel to reservoir 9 is controlled by valve 11 connected to membrane 12 which forms a wall of the reservoir. Membrane 12 is subjected to the pressure of a spring 13, although this spring may be omitted if desired.

Membrane 12 separates reservoir 9 from chamber 14, which communicates with air intake 3 through air passage 22 and with induction passage 1 through conduit 29. The air passage 22 comprises a calibrated orifice 30 while the conduit 29 comprises a calibrated orifice 31. A needle 32 passing through guide 33 and held by spring 34 against actuating lever 35 permits the adjustment of the effective cross section of orifice 31.

The pressure in reservoir 9 is such that the pressure exerted by the fuel on membrane 12 balances the pressure of the air in chamber 14 on the opposite face of membrane 12 plus the pressure of spring 13. The pressures existing in reservoir 9 and in chamber 14 are subject to the same variations.

By operating lever 35, the relative effective cross sections of orifice 31 and of orifice 30 may be varied so that the depression transmitted to chamber 14 and the discharge of fuel is correspondingly varied. This arrangement permits the incorporation in the fuel discharge of an altitudinal correction in accordance with Belgian Patent No. 404,966; that is, permits the fuel discharge to be readily varied in accordance with the altitude. The air passage 22 is controlled by valve 23 which remains open during the normal operation of the motor. In order to stop the motor, the valve 23 is closed, since the chamber 14 then communicates only with the induction passage 1, the total depression posterior to the throttle is transmitted to membrane 12. If spring 13 is so adjusted that its pressure is insufficient to permit fuel discharge at fuel outlet 4 when the motor is stopped, the closing of valve 23 will nevertheless provide a complete shut-off of the fuel. If, on the contrary, spring 13 has sufficient pressure to permit the discharge of fuel at fuel outlet 4 when the motor is stopped, that is, if the fuel outlet 4 is supplied under certain pressure due to the action of spring 13, the discharge of fuel will not be completely interrupted by the closing of valve 23 but will be reduced to its minimum value and the residual output is usually very low in practice.

For example, spring 13 may be adjusted so that fuel outlet 4 is supplied under pressure of 10 grams per square centimeter. The depression to which the fuel outlet 4 is subjected at idling is about 600 grams per square centimeter and the mixture delivered by the carburetor is then correct when fuel outlet 4 discharges under a pres-

sure drop of 610 grams per square centimeter. When valve 23 is closed, fuel outlet 4 discharges under a pressure drop of only 10 grams per square centimeter, that is, under a pressure drop which is about one-sixtieth of the normal pressure drop. The residual fuel discharge is consequently but one-seventh to one-eighth of that fuel discharge which, when mixed with the inducted air, forms a normal mixture. It is obvious that under these conditions the discharge of fuel at outlet 4 falls far below the minimum quantity which, mixed with the inducted air, is capable of forming an inflammable mixture. The motor stops upon receiving a mixture too lean to ignite. In order that this action take place, it is necessary that chamber 14 communicate effectively with induction passage 1. Such communication is assured by providing a small section orifice 36 which constitutes a fixed communication between chamber 14 and induction passage 1. In this way the closing of valve 23 causes stoppage of the motor even if orifice 31 is completely closed by needle 32. If valve 23 were open, the total opening of orifice 31 obtainable by the movement of needle 32 would not permit the discharge of fuel to be decreased sufficiently to render the mixture uninflammable and cause the motor to stop. Theoretically it is possible to make the effective cross section in relation to section of orifice 31 of such size as to obtain this result, but in such case the small effective aperture between orifice 31 and needle 32 in order to effect altitudinal correction would not be controlled in a practicable manner, since it is well-known that it is impossible to regulate small sections by means of a large needle controlling a large orifice. Furthermore, it appears frequently that the altitudinal correction means are controlled automatically, which makes it impossible to utilize such altitudinal corrector for the purpose of stopping the motor.

In order to stop the motor by increasing the section of the depression passage, an arrangement is required as shown in Figure 2. In this arrangement the induction passage 1 communicates with chamber 14 both through passage 29 and orifice 31 controlled by needle 32, and also by a bypass 37 controlled by valve 38. Chamber 14 communicates also with air intake 3 through a passage 39 in which is incorporated calibrated orifice 40. During the operation of the motor, valve 38 remains closed and the carburetor functions in the same manner as the carburetor shown in Figure 1. To stop the motor the valve 38 is opened, the effective cross section of bypass 37 being of sufficient size in relation to the section of orifice 40 to cause the motor to stop.

Although the figures show carburetors in which the fuel is discharged into the induction passage posterior to the throttle valve, it is pointed out that the invention is equally applicable to carburetors in which the normal discharge of fuel is anterior to the throttle valve.

It is obvious that instead of having the depression which is adapted to cause the stoppage of the motor act directly on the membrane of the fuel reservoir, this depression may equally well be made to act on a second membrane connected mechanically to the first membrane. By making the membrane closing the suction chamber larger than that closing the fuel chamber it would be possible to apply sufficient force to the fuel valve to positively close the valve for stopping the engine.

I claim:

1. In a carburetor for an internal combustion engine, an induction passage, a throttle controlling the same, a fuel nozzle discharging into said induction passage, a fuel reservoir supplying fuel to said nozzle and comprising a movable wall, a valve connected to said wall and controlling the inflow of fuel to said reservoir, a pressure chamber controlling the position of the movable wall, two passages leading from the pressure chamber to separate points at opposite sides of the throttle, a valve for completely closing one of the two passages, and a mixture control valve for varying the effective cross section of the other of the two passages.

2. In a carburetor for an internal combustion engine, an induction passage, a throttle controlling the same, a fuel nozzle discharging into said induction passage, a fuel reservoir supplying fuel

to said nozzle and comprising a wall movable under the influence of pressure, a fuel valve actuated by said wall and controlling the inflow of fuel to said reservoir, a pressure chamber controlling the position of the wall, a suction conduit connecting the pressure chamber to the induction passage posterior to the throttle, a second conduit connecting the pressure chamber to the induction passage anterior to the throttle, a valve operative independently of throttle position to completely close the second conduit to thereby substantially close said fuel valve, and a mixture control valve for varying the effective cross section of the suction conduit.

3. The invention defined in claim 2, wherein the suction conduit comprises in addition a restricted bypass around the mixture control valve.

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