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CARBURETOR

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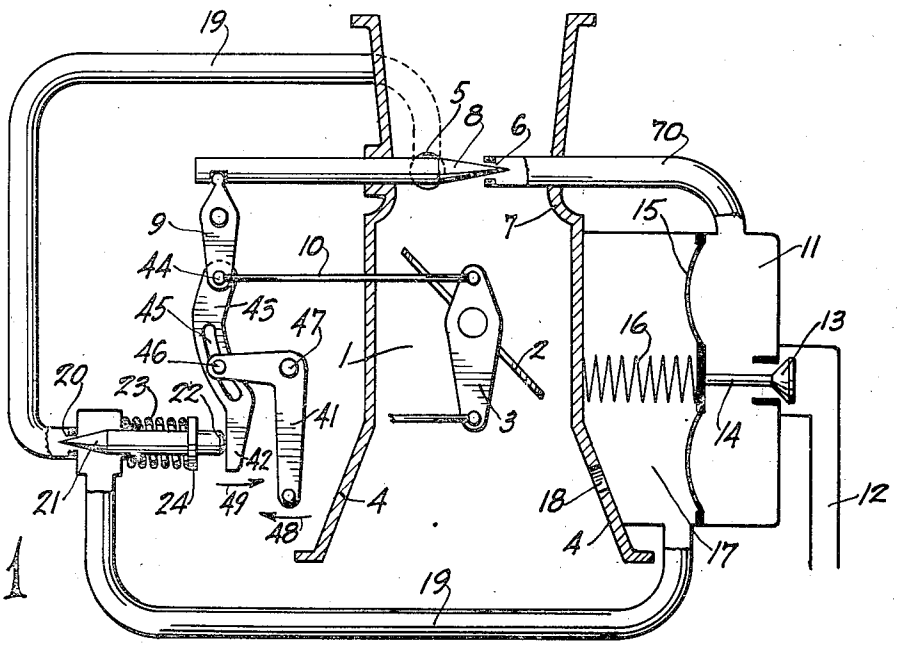

Fig. 1

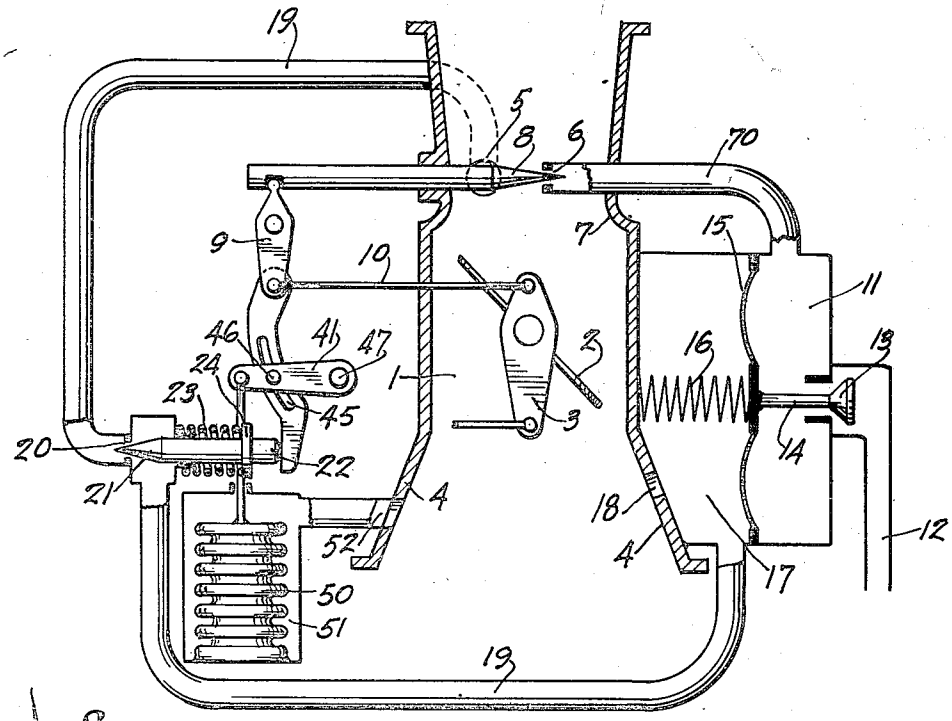

Fig. 2

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CARBURETOR

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Original application August 22, 1935, Serial No. 37,274. Divided and this application August 4, 1939, Serial No. 288,278. In Belgium August 30, 1934

5 Claims. (Cl. 261—50)

The present invention relates to an altimetric control device applicable to carburetors fed with fuel from a fuel chamber in which the pressure is adjusted by means of a diaphragm forming one of the walls of said chamber and operatively connected with the valve that controls the inflow of fuel to said chamber.

This application is a division of my copending application, Serial Number 37,274, filed August 22, 1935, which issued March 4, 1941, as Patent No. 2,234,001.

The altimetric control device according to the present invention comprises a chamber connected both with the induction passage of the carburetor and with the atmosphere or the air intake of the carburetor through two separate passages, the relative sections of which can be varied by means of a manually or barometrically controlled valve. This chamber is separated from the fuel chamber by the diaphragm above referred to, or by a movable wall (diaphragm or piston) which is mechanically connected with said diaphragm.

Adjustment of the mixture richness to compensate for changes in air density due to changes in altitude is accomplished by actuating said movable wall in accordance with the pressure in the induction passage adjacent the main fuel jet, said pressure being modified by the position of the valve.

It has already been suggested, in Barbarou Patent 2,084,377 and elsewhere, to cause a suction varying in accordance with the degree of opening of the throttle to act on the outer surface of the diaphragm closing the fuel chamber. This known arrangement, in which the suction acting on the diaphragm depends merely upon the degree of opening of the throttle, does not permit of varying the fuel pressure when the altitude varies, and therefore does not permit of attaining an altimetric control.

In the present invention, the valve which varies the relative sections of the respective passages that connect the chamber with the induction passage of the carburetor and with the atmosphere or the air intake respectively, is adapted to be actuated both by the means for controlling the position of the throttle and by control means acting independently of said throttle, thereby providing an altimetric control device.

The following description, with reference to the appended drawing, given merely by way of example, will explain how the invention may be carried out.

Figures 1 and 2 are diagrammatic views of two embodiments of the present invention.

The carburetor shown in Figure 1 is of the anterior throttle type and includes an induction passage 1 controlled by a throttle valve 2 through a lever 3. Passage 1 is fed with air through an air intake 4 and with fuel through a fuel outlet 6 opening into the venturi 7 posterior to the throttle 2. The fuel outlet 6 is controlled by a needle 8, the position of which is controlled by a lever 3 through a lever 9 and a connecting rod 10. This fuel outlet receives fuel through a conduit 70 connected to the outlet of chamber 11.

The chamber 11 receives fuel through a conduit 12, the inflow of fuel to said chamber being controlled by a valve 13. The valve 13 is connected to a rod 14 with the diaphragm 15 which serves to control the fuel pressure in chamber 11. The diaphragm 15 is loaded by a spring 16, and separates the chamber 11 from a chamber 17. The chamber 17 is connected on the one hand with the air intake 4 through an orifice 18, and on the other hand with the induction passage of the carburetor through a conduit 19. The conduit 19 opens at 5 into the venturi adjacent the fuel outlet 6. The end 5 of the conduit 19 is thus subjected to a suction which is substantially the same as that acting on fuel outlet 6. In the conduit 19 there is provided an orifice 20 controlled by a valve 21. The head 22 of the valve 21 is subjected to the action of a compression spring 23 bearing upon a collar 24 so as to urge said head against the extension 42 of lever 43. The lever 43 is pivoted at 44 to the connecting rod 10 and the lever 9 and is provided with a slot 45 in which is engaged a pin 46 carried by a lever 41 pivoted about a pin 47. The valve 21 is thereby adapted to be controlled jointly by the lever 3 that controls the throttle valve and needle 8, and by the independent lever 41. The lever 41 can be connected at its lower end by a cable or link thereby to permit remote control of said lever from the pilot's cockpit.

The fuel outlet 6 is fed under the pressure existing in the chamber 11 and its rate of feed depends upon this pressure. The pressure existing in the chamber 11 depends upon the pressure existing in the chamber 17, since the diaphragm 15 and the valve 13 take a position of equilibrium for which the pressure exerted by the fuel of chamber 11 on diaphragm 15 balances the combined action of the spring 16 and the pressure exerted by the air present in the chamber 17 on the outer face of the diaphragm 15.

The conduit 19 transmits suction to the chamber 17, but this suction is lower than the suction at point 5 of the venturi due to the provision of

the orifice 18 between the chamber 17 and the atmosphere. For any given operating condition, the suction transmitted to the chamber 17 increases as the relative section of the orifice 20 is made greater with respect to the section of orifice 18. As the suction transmitted to the chamber 17 is increased the fuel pressure in chamber 11 is reduced, which produces a reduction in the rate of fuel feed through the outlet 6 and a consequent reduction in the mixture richness.

When the lever 41 occupies a fixed position and the pilot actuates the lever 3 in a direction to close the throttle valve 2, the movement of the lever 3 is transmitted through the connecting rod 10, on the one hand to the lever 9 which produces a displacement of the needle in the direction that reduces the section of the fuel outlet 6, and on the other hand to the lever 43. This lever pivots about the pin 46 in such manner as to cause the valve 21 to move away from the orifice 20, under the action of its spring, thus increasing the section of flow through said orifice 20. An increased depression is thus transmitted to the chamber 17.

When the pilot operates the lever 41 in the direction of the arrow 48, the pin 46 moves in the slot 45 causing the lever 43 to pivot about the pivot pin 44 in the direction of the arrow 49. The valve 21 is moved in the direction that increases the section of flow through the orifice 20 and the suction transmitted to the chamber 17 increases. This operation therefore corresponds to an increased altitude. The reverse operation would correspond to a reduced altitude.

At the same time as the pin 46 moves in the slot 45 and therefore causes the valve 21 to be moved away from its seat, it modifies the ratio of the two arms of lever 43 on either side of the pin 46. It therefore modifies the axial displacement of the valve 21 that corresponds to a given displacement of the throttle valve 2. The modification of this ratio is such that, when the position of the lever 41 has been adjusted for a given altitude, the composition of the mixture remains correct for all positions of the throttle valve at that altitude.

In Figure 2, the lever 41 is automatically controlled according to the altitude by means of a barometric capsule 50 mounted in a chamber 51 connected to the air intake of the carburetor through a passage 52.

The invention is obviously not limited to any particular form of carburetor or of diaphragm chamber, as these elements are known in themselves and do not constitute the invention. Although there is shown a carburetor in which the liquid fuel is fed to a single fuel outlet mechanically controlled in accordance with the position of the throttle valve and located posterior to said throttle valve, the invention may also be applied to other kinds of carburetors, for instance to carburetors having one or more fuel outlets, fed either with liquid fuel or with aerated fuel located either anterior or posterior to the throttle, and to carburetors having no mechanical regulating means.

In a like manner the fuel chamber may include several diaphragms connected with one another and with the fuel valve through suitable mechanical connections. Although the diaphragm has been shown as subjected to the action of a spring, this spring may be eliminated. Finally, the invention is not limited to the specific embodiments shown in the drawing. The mechanical connections as well as the shape of the expansible capsule or of the members that control the valve sections of flow may be modified in various manners without departing from the principle of the invention; for instance, instead of varying the section of the orifice of communication with the induction passage of the carburetor, as shown by the drawing, the section of the passage of communication with the atmosphere or the air intake, or both of these passages simultaneously, may be varied.

I claim:

1. A charge forming device for an internal combustion engine comprising an induction passage, a throttle therein, a fuel duct discharging into the passage, a fuel chamber communicating with said duct, a variable pressure chamber, valve means controlling the inflow of fuel to said fuel chamber to thereby control the supply of fuel to the engine, means including a diaphragm responsive to the pressures in said chambers for controlling the valve means, conduits connecting said variable pressure chamber to a region of depression in said passage and to a source of substantially atmospheric pressure, throttle operated valve means for varying the relative effective cross sections of said conduits, and means operable independently of the throttle for varying the position of the last-named valve means at a given position of the throttle to thereby vary the rate at which the relative effective cross sections of the conduits are varied by the throttle operated means.

2. A charge forming device for an internal combustion engine including an air supply passage, a throttle therein, a fuel chamber closed by a diaphragm, a fuel duct leading from the fuel chamber to the air passage, a throttle controlled variable restriction in said duct arranged to be subjected to suctions derived from the restricting effect of said throttle, a suction chamber closed by said diaphragm, a valve connected to said diaphragm for controlling the admission of fuel to the fuel chamber, passages connecting said suction chamber to the air passage respectively anterior to the throttle and to a point adjacent said variable restriction thereby to subject said last named passage and the variable restriction to substantially equal or proportional suctions, valve means for varying the relative areas of said passages to thereby vary the suction in the suction chamber, and means controlled conjointly by manually operated means actuated independently of the throttle and by means actuated by the throttle for controlling said valve means.

3. In a charge forming device for an internal combustion engine, an induction passage, means including a throttle for creating a region of depression in said passage, a fuel passage discharging into said region, a throttle controlled variable restriction in said fuel passage and subjected to suction derived from said region, a fuel chamber communicating with said fuel passage, a variable pressure chamber, a conduit leading from the variable pressure chamber and having an outlet in one of said passages whereby the variable restriction and said outlet will be subjected to substantially proportional suctions, a conduit for bleeding air into the variable pressure chamber, valve means for varying the relative flow capacities of said conduits, means adapted to be moved without corresponding movement of the throttle for positioning said valve means, means actuated by the throttle for

modifying the position of the valve means as determined by said last named means upon change in the position of the throttle, and means responsive to the pressures in the fuel chamber and in the variable pressure chamber for controlling the inflow of fuel to the fuel chamber.

4. A charge forming device for internal combustion engines comprising a throttle controlled air passage, a fuel chamber having an inlet, a fuel duct leading from said chamber to the passage posterior to the throttle for supplying fuel thereto, and means for variably restricting the inflow of fuel to said chamber to control the richness of the mixture comprising a valve in said inlet, a variable pressure air chamber, diaphragm means responsive to the pressures in said air and fuel chambers for controlling said valve, means connecting said variable pressure air chamber with a region of depression in the induction passage, air bleeding means for partially destroying the depression in said air chamber, and means for varying the relative effectiveness of said bleeding means and said connecting means to control the pressure in the air chamber comprising a sealed capsule having a movable wall responsive to variations in the density of the air in the induction passage anterior to the throttle, a member movable with the throttle, and valve means controlled by said movable wall and said member.

5. A charge forming device for an internal combustion engine, including an air supply passage, flow restricting means including a throttle in said passage, a fuel nozzle discharging in said air passage, a fuel chamber supplying fuel to said nozzle and provided with an inlet, and means for variably restricting the inflow of fuel to said chamber to control the richness of the mixture comprising a valve in said inlet, a variable pressure air chamber, diaphragm means subjected to the pressures in said fuel and air chambers for actuating said valve, means for transmitting suction from a region of depression in said air passage to the variable pressure chamber, means for bleeding air into said chamber, and means for varying the relative effectiveness of said transmitting means and said bleeding means to control the pressure in the air chamber comprising a sealed chamber having a yielding wall responsive to variations in the density of the air in the supply passage resulting from variations in altitude, a member controlled in accordance with throttle position, and valve means actuated by said yielding wall and by said member whereby the pressure in the air chamber will be varied by change in altitude and by change in throttle position.

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