

Oct. 31, 1933.

M. J-B. BARBAROU

1,933,360

CARBURETOR

Filed July 28, 1930

2 Sheets-Sheet 1

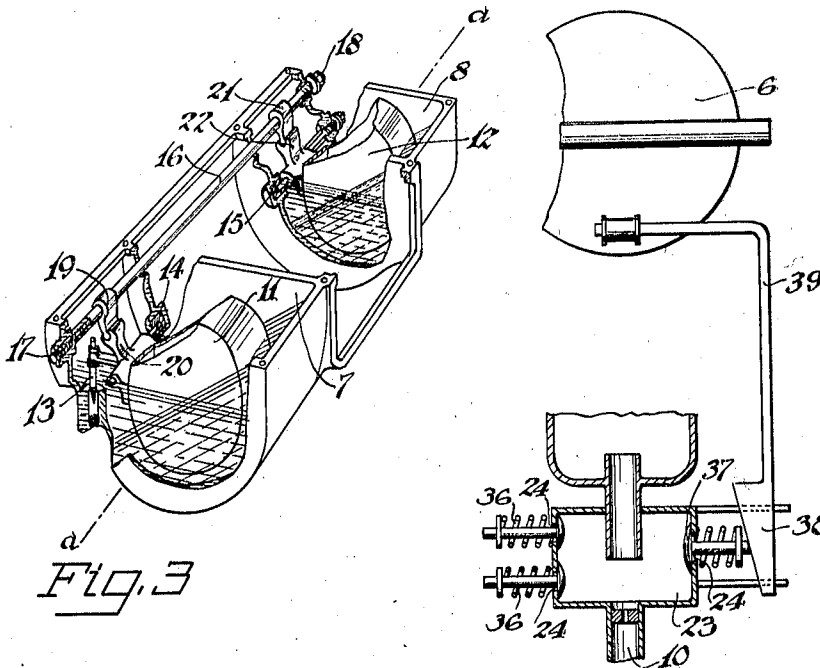
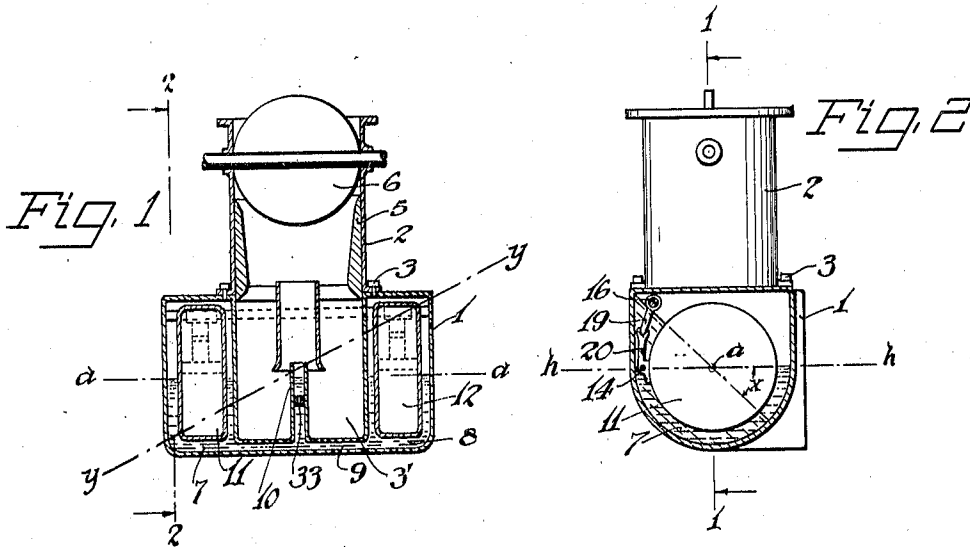


Fig. 6

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2 Sheets-Sheet 2

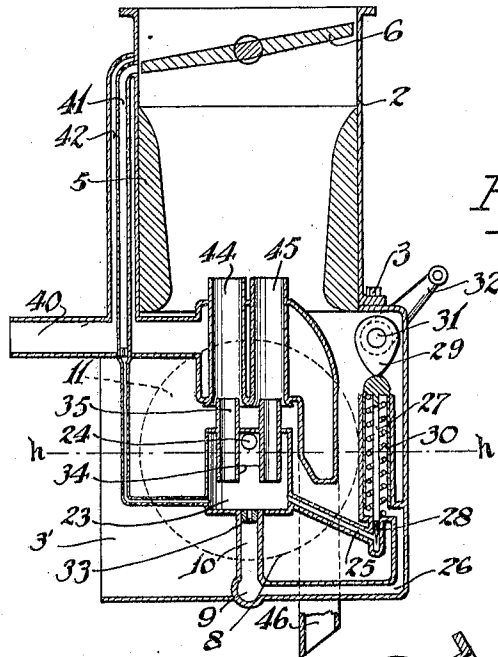


Fig. 4

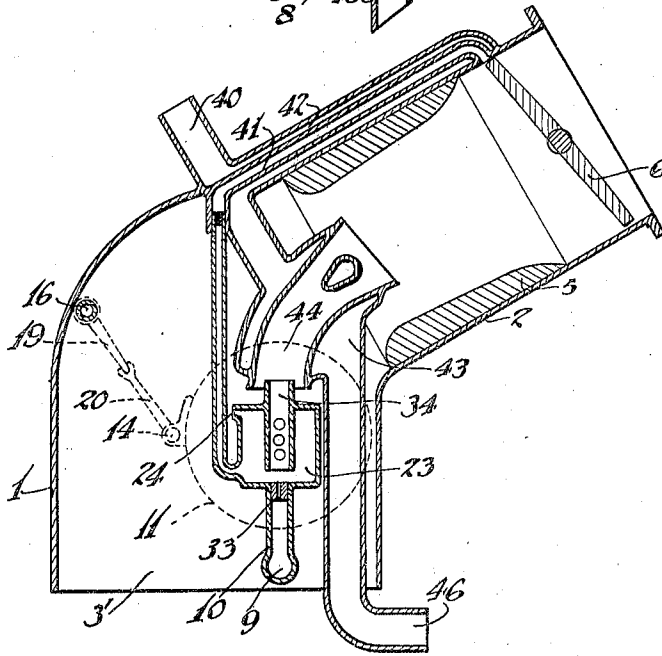


Fig. 5

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1,933,360

CARBURETOR

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and in France August 6, 1929

8 Claims. (Cl. 137-104)

This invention relates to carburetors and more particularly has reference to carburetors for airplane engines.

It is necessary in carburetors for aero engines that the liquid fuel be maintained at a substantially constant level with respect to the orifice of the main jet and regardless of the inclination or position of the carburetor. This is essential in order to insure a uniform operation of the main jet in all positions and to avoid leakage of liquid fuel and consequent fire hazard.

In order to fulfill this condition in the case where the main nozzle is very close to the axis of the primary or secondary Venturi throat, it has been proposed to provide around the main air intake an annular fuel chamber having a float mounted on a horizontal axis and controlling a needle valve in the usual manner. A liquid fuel conduit extending diametrically across the air intake feeds the jet which discharges into the venturi. Such a system, however, is attended by certain serious disadvantages: First, it is adapted only for vertical carburetors. Second, it extends to too great a height when it is desired to lead back the main air intake horizontally, i. e., parallel to the normal flight of the airplane. Third, the liquid fuel level is only correct at the moment when it passes through the upper edge of the float. This extends to a great height with respect to its diameter which is itself necessarily great as the float surrounds the air intake which usually has a diameter at least twice that of the inlet of the primary venturi.

An object of my invention is to devise a constant level airplane carburetor which obviates the above mentioned difficulties by employing a plurality of floats arranged on both sides of the air intake and joined together by a shaft above the liquid level.

Another object of my invention is to provide a carburetor for airplanes which embodies a novel means for controlling the mixture with changes of altitude.

Still another object of my invention is to provide an airplane carburetor which will not frost at high altitudes.

With these and other objects in view which may be incident to my improvements, my invention consists in the novel combination and arrangement of elements hereinafter described and illustrated in the accompanying drawings, of which:

Figure 1 is a diagrammatic vertical section on the line 1-1 of Figure 2 of my improved carburetor;

Figure 2 is a vertical section on the line 2-2 of Figure 1;

Figure 3 is a perspective view showing the whole of the liquid fuel tank and floats;

Figure 4 is a vertical section on a larger scale of a modified form of my carburetor showing a heating device and an altitude mixture control device, the air inlet being horizontal;

Figure 5 is a similar view of another modification in which the air inlet is horizontal; and

Figure 6 is a fragmentary elevational view of a modification of the primary mixing chamber illustrated in Figure 5 showing the air inlets controlled by valves.

According to the constructional form shown in Figs. 1-3, the carburetor comprises a body 1 upon which a stack 2 is mounted by suitable bolts 3. In the central part of body 1 is an air intake 3' which extends up through a Venturi throat 5 located in stack 2. Mounted above venturi 5 is a butterfly throttle valve 6. In the body 1 on both sides of air intake 3' are arranged two tanks 7 and 8 which are parallel and joined at their lowest points by a pipe 9, extending diametrically across the air intake 3 and communicating with a main nozzle 10.

Two flat-sided cylindrical floats 11 and 12 are provided in tanks 7 and 8 respectively and have their axes $a-a$ perpendicular to the longitudinal axis of the airplane. One of the floats, 11 for example, operates a needle valve 13 (Fig. 3) which controls the admission of liquid fuel into tanks 7 and 8. Floats 11 and 12, which are pivoted upon their respective axes 14 and 15, are caused to move in unison by a shaft 16 mounted upon adjustable pivots 17 and 18 and connected to the floats by articulated links 19, 20, 21 and 22 (Fig. 3), links 19 and 21 being fixed with respect to shaft 16, and links 20 and 22 being fixed with respect to the floats 11 and 12 respectively. In this manner, the floats are connected together in such a way that the movement of each affects the movement of the other and yet the coupling shaft 16 is placed high enough so that it is not in the liquid fuel and passes freely above each tank whereby its dismounting is greatly facilitated. Since the two tanks with flat-sided floats are arranged one on each side of the air intake 3', the latter may be either horizontal as in Figs. 1-4, or vertical as in Fig. 5.

The essential advantage of this arrangement resides in the fact that for longitudinal inclinations, the liquid level $h-h$ may assume a relatively large inclination X (Fig. 2) since it passes through the axis $a-a$ of the floats. For trans-

verse inclinations which are less, since an air-plane turns in a plane perpendicular to the direction of the resultant of its weight and centrifugal force, the liquid level may assume an inclination γ (Fig. 1) equal to those admitted with the present annular floats.

In order to reduce the feed of liquid fuel to compensate for the decrease in air density which results from increased altitude, I have provided an altitude mixture control device adapted to be operated manually at will by the pilot. According to the constructional form shown in Fig. 4, there is mounted upon the main nozzle 10 and in the middle of the air intake 3', a primary mixing chamber 23 which is in communication with the air inlet 3' through a plurality of orifices 24. Liquid fuel is supplied to chamber 23 by the main nozzle 10 and also through an auxiliary nozzle 25 which communicates with pipe 9 through a branch conduit 26. The flow of liquid fuel through nozzle 25 is controlled by a needle valve 27 which seats in a port 28 and always bears on a control cam 29 by means of a spring 30. Cam 29 is mounted upon a shaft 31 journaled in the walls of body 1 and carries at one end outside the carburetor an operating arm 32 which is connected to a manual control from the cockpit (not shown). Needle valve 27 is arranged so that it never completely closes port 28 even when in its lower-most position as shown in Fig. 4, but in this position, the flow of liquid fuel through nozzle 25 is most restricted to correspond to highest altitude operation.

Air enters primary mixing chamber 23 through orifices 24 which obviously can be made as many in number as required and carries port 34 up through a plurality of flues 35, the liquid fuel fed into chamber 23 as above described. If there are more than two flues, they may be advantageously arranged circularly, the air being admitted to chamber 23 in the center of the circle to insure uniform distribution.

One or more of the orifices 24 may be arranged below the liquid level $h-h$ in chamber 23 and the air entering therethrough may be regulated by adjustable check valves 36 as shown on the left in Fig. 6. Also the air entering chamber 23 may also be coordinated to the opening of the throttle valve 6 by the arrangement shown on the right in Fig. 6. Here the valve 37 controlling opening of the orifice 24 is moved by a cam 38 on an arm 39 pivotally attached to the throttle valve.

Another essential feature of my invention is the arrangement or means for heating the emulsion before its mixture with the main air in order to prevent frosting which is always produced at the points where the cold emulsion, very rich in non-vaporized liquid fuel, meets the main air which is then chilled by the extraction of the quantity of heat necessary for the complete vaporization of the emulsion.

According to the forms shown in Figs. 4 and 5, the exhaust gases from the engine are admitted to the carburetor through a conduit 40 and heat up to the edge of the throttle valve 6, the idling emulsion which is supplied through pipe 41 in conduit 42 wherein the exhaust gases circulate. These exhaust gases then pass into a jacket 43 which surrounds the secondary venturils 44 and 45 through which the emulsion from flues 34 and 35 are distributed. Finally, the exhaust gases escape through a discharge pipe 46.

A plurality of secondary venturils 44 and 45 (the number of which may be greater if desired) for heating the emulsion are shown in Fig. 4 and a single conical and bent Venturi tube 44 is shown in Fig. 5 which heats and leads into the constricted part of the primary venturi 5 the emulsion distributed through flue 34.

While I have shown and described the preferred embodiment of my invention, I wish it to be understood that I am by no means to be limited to the forms disclosed as changes may obviously be made in the combination and arrangement of elements by one skilled in the art without departing from the spirit of the invention or exceeding the scope of the appended claims.

I claim:

1. In a carburetor, a plurality of float chambers each having a float therein, said floats being independently pivoted upon aligned axes and means whereby said floats operate in unison to control the admission of liquid fuel to said float chambers.

2. In a carburetor, a plurality of float chambers each having a float therein, said floats being independently pivoted upon aligned axes and means whereby the movement of each float is transmitted to a common valve controlling the admission of liquid fuel to said chambers.

3. In a carburetor, a plurality of float chambers each having a float therein, said floats being independently pivoted upon aligned axes and a shaft connecting said floats whereby they are made to move together.

4. In a carburetor, a plurality of float chambers each having a float therein, said floats being independently pivoted upon aligned axes, a valve controlling the admission of fuel to said chambers and a shaft connecting said floats together whereby they act as a unit to operate said valve.

5. In a carburetor, a plurality of float chambers each having a float therein, said floats being independently pivoted upon aligned axes, a valve controlling the admission of fuel to said chambers and a shaft connecting said floats together whereby they act as a unit to operate said valve, said shaft being always above the liquid level in said chambers.

6. In a carburetor, a plurality of float chambers each having a float therein, said floats being pivoted upon aligned axes, a shaft parallel to said axes and always above the liquid level in said chambers and links independently connecting each of said floats to said shaft whereby the movement of each float is transmitted to the other.

7. In a carburetor, a plurality of float chambers each having a float therein, said floats being pivoted upon aligned axes, a shaft parallel to said axes and always above the liquid level in said chambers, independently pivoted connections between said floats and shaft whereby the movement of each float is transmitted to the other, and a fuel inlet valve connected to one of said floats.

8. In a carburetor, a pair of interconnected float chambers, a float pivoted on an axis in each chamber, a fuel inlet valve controlled by one of the floats, a shaft rotatably mounted adjacent the float chambers, and pivoted links independently connecting the shaft to the floats to cause them to move in unison about their axes.

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