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FLOATLESS CARBURETOR
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Fig. 1

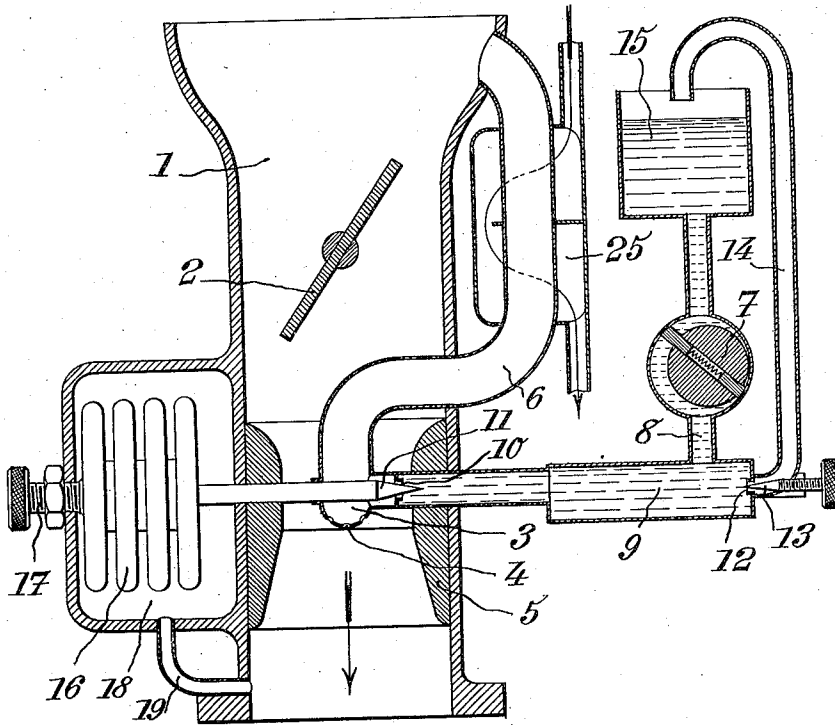
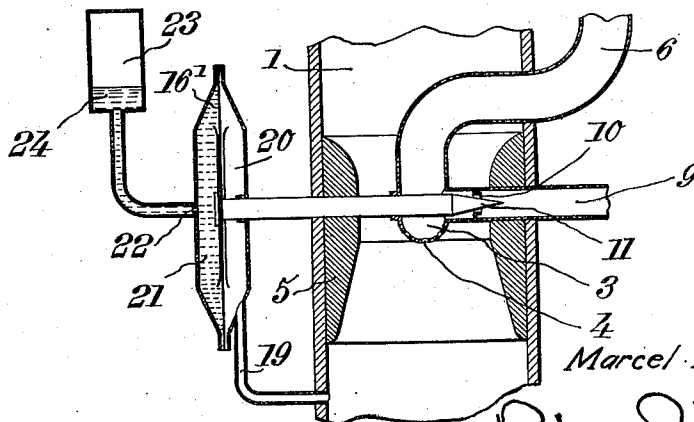


Fig. 2



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FLOATLESS CARBURETOR

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14 Claims. (Cl. 123—119)

The invention relates to floatless carburetors and more especially to those for engines for aircraft.

It has for its principal object so to construct these devices that they readily respond to the various desiderata of practice.

In general, according to the invention, carburetors of the type comprising a chamber substantially independent of the pressure in the induction pipe downstream of the throttle in which the primary mixture of fuel and air is effected, have combined therewith a pump to supply the fuel to the said chamber, the delivery from which pump is proportional to the speed of the engine. The fuel is supplied to a chamber communicating, on the one hand, by a calibrated discharge orifice, preferably controllable by hand or automatically, with the fuel feed reservoir and, on the other hand, with the primary mixing chamber by an orifice of which the free section is adapted to be modified by hand or automatically.

The invention further consists, apart from this principal arrangement, in certain other arrangements, which are preferably utilized at the same time and which will be referred to more explicitly hereafter, particularly in a second arrangement, consisting in assuring the automatic regulation of the fuel supply orifice in the primary mixing chamber, of carburetors of the kind in question, by the intermediary of means actuated by variable temporary conditions, such as the pressure existing downstream of the throttling member for the gases, the temperature, density or pressure of the atmospheric air, the supply to the engine, and the like, considered together or separately; and in a third arrangement, consisting in submitting the air, admitted into the primary mixing chamber of the carburetors of the kind in question, to a preliminary heating.

The invention will be described with reference to the accompanying drawing, which is given by way of example and in which:—

Fig. 1 shows, in diagrammatic vertical section, a carburetor constructed according to the invention.

Fig. 2 shows, similarly, a part of a carburetor constructed according to a variation of the preceding arrangement.

In the inlet pipe 1, with throttle valve 2 of the carburetor, there is located a chamber 3 of which the well is pierced with a desired number of holes 4. This chamber is located between the throttle valve 2 and the engine and, preferably, in a Venturi sleeve 5.

The chamber 3 is made to communicate with the atmospheric air or the principal air inlet of the carburetor by a conduit 6 of relatively great transverse section. There are given to the conduit 6 and to the holes 4 relative dimensions such that, in spite of the chamber 3 being located in the inlet pipe 1 downstreamward of the throttle valve, the pressure existing in the interior of the said chamber 3 is practically independent of that existing in the said pipe 1.

The chamber 3 is supplied with fuel by the intermediary of a pump 7 of which the type chosen is such that its delivery is proportional to the speed of the engine, for example a volumetric or centrifugal pump. The pump is made to deliver by a conduit 8 into a chamber 9 which, itself, communicates with the chamber 3 by a calibrated orifice 10 of which the free section can be modified by the intermediary of a needle valve 11 or the like controlled by hand or automatically by means described hereafter.

The chamber 9 communicates, on the other hand, by a calibrated orifice 12, of which the section is preferably regulatable by the intermediary of a needle valve 13 or the like, with a conduit 14 to return the fuel, delivered in excess by the pump 7, to the reservoir 15. The displacement of the needle valve 13 can be obtained by hand control or by automatic means which are a function of the pressure, of the temperature, of the density of the inlet air or of the mixture admitted to the engine, utilized separately or in combination.

The needle valve 11, which has an appropriate profile to regulate the free section of the orifice 10 and consequently the richness of the mixture, can be displaced, by hand or by an automatic control, as a function of certain conditions of operation of the engine, such as the pressure existing downstream of the throttle valve 2, the degree of supply to the engine or as a function of certain temporary exterior conditions such as the pressure, density or temperature of the atmospheric air.

In order that the effect of these variable factors can modify the position of the needle valve 11 or the like, these factors are made to act on auxiliary means such as manometric, barometric, thermometric or other devices adapted to cause the automatic displacement of the said needle valve.

In Figs. 1 and 2 is shown, by way of example, that there is made to intervene, as active factor, the pressure existing in the suction pipe of the engine downstream of the throttling member 2.

In Fig. 1 this pressure acts on a manometric capsule 16 integral with the needle valve 11 and of which the position with respect to the body of the carburetor is regulatable by the intermediary of a screw 17. As a result thereof if the position of the capsule 16 is regulated, at the same time the initial position of the needle valve 11 is modified. The capsule 16 is located in a chamber 18 which is connected by a conduit 19 to the suction pipe 1 downstream of the throttle valve 2.

In Fig. 2 the needle valve 11 is connected to a diaphragm 16¹ separating a chamber into two compartments of which one, designated by 20 and which is located on the side of the needle valve 11, is connected by a conduit 19 to the suction pipe 1. The second compartment 21 communicates by a calibrated orifice 22 with a hermetically closed receptacle 23 containing a gas at a desired pressure. Advantageously the pressure of the gas is caused to act on the diaphragm 16¹ by the intermediary of a liquid 24 in such a way as to absorb the displacements of small amplitude of the diaphragm 16¹ under the effect of the depression acting in the compartment 20.

In Fig. 1 there have also been shown means for heating the air admitted by the conduit 6 into the primary mixing chamber 3. To this end at least a part of the said conduit is located in a chamber 25 in which there is caused to pass a current of hot fluid, for example a part of the exhaust gases of the engine, or the like. In this way there is avoided, for example, the phenomenon of freezing-up which could be produced at the place of the holes 4, through which the chamber 3 delivers the combustible mixture.

The arrangement, such as described, functions as follows.

When the engine turns slowly, the pump 7 itself turns slowly, and consequently delivers little fuel. Moreover, as the depression is great in the inlet pipe 1 downstream of the throttle valve 2 (closed in this case), the needle valve 11, by being displaced by the capsule 16 (Fig. 1) or the diaphragm 16¹ (Fig. 2) obturates to the maximum the orifice 10. The section of this orifice is calculated or regulated in such a way as to allow to pass the quantity of fuel strictly necessary for permitting the engine to maintain its slow-running speed.

Owing to the relative sections of the holes 4 and of the conduit 6 there exists practically no depression in the chamber 3. In this way the delivery of fuel by the orifice 10 is never caused directly by the effect of this depression.

If the throttling member 2 is opened, the admission of air is increased, on the one hand, and the depression in the inlet pipe 1 diminished, on the other hand. As a result thereof, the capsule 16 or the diaphragm 16¹ is deformed in such a way as to increase the section of the orifice 10, which thus allows a larger quantity of fuel to escape.

As the speed of the engine increases, the delivery of the pump 7 equally increases and the profile of the needle valve 11 is calculated in such a way that for all the speeds of the engine there is obtained a delivery of fuel corresponding to the delivery of air to form a mixture having a normal richness for the good working of the said engine.

When the speed of the pump increases, the discharge pressure equally increases and to regulate this pressure one acts on the passage section

of the orifice 12 which permits the return of the excess of fuel to the reservoir 15.

If, on the contrary, the throttling member 2 is closed, the depression increases, immediately, in the suction pipe 1 in such a way that the capsule 16 or the diaphragm 16¹ is deformed forcing the needle valve 11 towards its closing position. The delivery of fuel decreases in consequence, which causes a diminution of the speed of rotation of the engine and of the pump down to the slow-running speed.

It follows from the above that there is obtained a floatless carburetor of which the operation is assured for all the positions that one can be led to give the engine on which it is fitted and which permits of obtaining a regular and rational feeding for all conditions of operation of the said engine.

What I claim is:

1. A floatless carbureting system for an internal combustion engine comprising a suction pipe, a throttling member in said suction pipe, a fuel-air mixing chamber communicating with said suction pipe through a passage having a small effective area, air inlet means having a large effective area and communicating with said mixing chamber, a fuel reservoir, a feed chamber communicating with said mixing chamber, a rotary pump connected to said reservoir and driven by said engine for delivering fuel to said feed chamber, a discharge orifice connecting said feed and mixing chambers, and conduit means connecting said feed chamber to said fuel reservoir.

2. A floatless carbureting system such as claimed in claim 1 comprising means for regulating the section of said conduit means.

3. A floatless carbureting system such as claimed in claim 1 comprising means, regulatable by hand, for controlling the section of said discharge orifice for the supply of fuel in said mixing chamber.

4. A floatless carbureting system such as claimed in claim 1 comprising means, regulatable automatically, for controlling the section of said discharge orifice for the supply of fuel in said mixing chamber.

5. A floatless carbureting system such as claimed in claim 1 comprising means, regulatable automatically by variable temporary conditions which are a function of the working of said engine, for controlling the section of said discharge orifice for the supply of fuel to said mixing chamber.

6. A floatless carbureting system for an internal combustion engine comprising a suction pipe, a throttling member in said suction pipe, a fuel-air mixing chamber communicating with said suction pipe through a passage having a small effective area, air inlet means having a large effective area and communicating with said mixing chamber, means for heating the air admitted in said air inlet means, a fuel reservoir, a feed chamber communicating with said mixing chamber, a rotary pump connected to said reservoir and driven by said engine for delivering fuel to said feed chamber, a discharge orifice connecting said feed and mixing chambers, and conduit means connecting said feed chamber to said fuel reservoir.

7. A floatless carbureting system for an internal combustion engine comprising a suction pipe, a throttling member in said suction pipe, a fuel-air mixing chamber communicating with said suction pipe through a passage having a small effective area, air inlet means having a large ef-

fective area and communicating with said mixing chamber, means for heating the air admitted in said air inlet means, said heating means comprising a source of hot fluid, a chamber surrounding a part of said air inlet means and heated by a current of hot fluid supplied by said source, a fuel reservoir, a feed chamber communicating with said mixing chamber, a rotary pump connected to said reservoir and driven by said engine for delivering fuel to said feed chamber, a discharge orifice connecting said feed and mixing chambers, and conduit means connecting said feed chamber to said fuel reservoir.

8. A floatless carbureting system for an internal combustion engine comprising a suction pipe, a throttling member in said suction pipe, a fuel-air mixing chamber communicating with said suction pipe through a passage having a small effective area, air inlet means having a large effective area and communicating with said mixing chamber, means for heating the air admitted in said air inlet means, said heating means comprising a source of hot fluid, a chamber surrounding a part of said air inlet means and heated by a current of the exhaust gases of said engine and supplied by said source, a fuel reservoir, a feed chamber communicating with said mixing chamber, a rotary pump connected to said reservoir and driven by said engine for delivering fuel to said feed chamber, a discharge orifice connecting said feed and mixing chambers, and conduit means connecting said feed chamber to said fuel reservoir.

9. A floatless carbureting system for an internal combustion engine comprising a suction pipe, a throttling member in said suction pipe, a fuel-air mixing chamber communicating with said suction pipe through a passage having a small effective area, air inlet means having a large effective area and communicating with said mixing chamber, a fuel reservoir, a feed chamber communicating with said mixing chamber, a rotary pump connected to said reservoir and driven by said engine for delivering fuel to said feed chamber, a discharge orifice connecting said feed and mixing chambers, means for regulating the section of said discharge orifice, a closed chamber communicating with said suction pipe downstream of said throttling member, a pressure responsive member located in said closed chamber and means for connecting said pressure responsive member to said means for regulating the section of said discharge orifice, and conduit means connecting said feed chamber to said fuel reservoir.

10. A floatless carbureting system for an internal combustion engine comprising a suction pipe, a throttling member in said suction pipe, a fuel-air mixing chamber communicating with said suction pipe through a passage having a small effective area, air inlet means having a large effective area and communicating with said mixing chamber, a fuel reservoir, a feed chamber communicating with said mixing chamber, a rotary pump connected to said reservoir and driven by said engine for delivering fuel to said feed chamber, a discharge orifice connecting said feed and mixing chambers, means for regulating the section of said discharge orifice, a chamber communicating with the suction pipe downstreamward of said throttling member, a pressure responsive member located in said chamber and means for connecting said pressure responsive member to said means for regulating the section of said discharge orifice, and conduit

means connecting said feed chamber to said fuel reservoir.

11. A floatless carbureting system for an internal combustion engine comprising a suction pipe, a throttling member in said suction pipe, a fuel-air mixing chamber communicating with said suction pipe through a passage having a small effective area, air inlet means having a large effective area and communicating with said mixing chamber, a fuel reservoir, a feed chamber communicating with said mixing chamber, a rotary pump connected to said reservoir and driven by said engine for delivering fuel to said feed chamber, a discharge orifice connecting said feed and mixing chambers, means for regulating the section of said discharge orifice, a closed chamber communicating with said suction pipe downstream of said throttling member, a pressure responsive member located in said closed chamber and means for connecting said pressure responsive member to said means for regulating the section of said discharge orifice, means for regulating the initial position of said pressure responsive member, and conduit means connecting said feed chamber to said fuel reservoir.

12. A floatless carbureting system for an internal combustion engine comprising a suction pipe, a throttling member in said suction pipe, a fuel-air mixing chamber communicating with said suction pipe through a passage having a small effective area, air inlet means having a large effective area and communicating with said mixing chamber, a fuel reservoir, a feed chamber communicating with said mixing chamber, a rotary pump connected to said reservoir and driven by said engine for delivering fuel to said feed chamber, a discharge orifice connecting said feed and mixing chambers, means for regulating the section of said discharge orifice, a closed chamber communicating with said suction pipe downstream of said throttling member, a manometric capsule located in said closed chamber and means for connecting said manometric capsule to said means for regulating the section of said discharge orifice, and conduit means connecting said feed chamber to said fuel reservoir.

13. A floatless carbureting system for an internal combustion engine comprising a suction pipe, a throttling member in said suction pipe, a fuel-air mixing chamber communicating with said suction pipe through a passage having a small effective area, air inlet means having a large effective area and communicating with said mixing chamber, a fuel reservoir, a feed chamber communicating with said mixing chamber, a rotary pump connected to said reservoir and driven by said engine for delivering fuel to said feed chamber, a discharge orifice connecting said feed and mixing chambers, means for regulating the section of said discharge orifice, a closed chamber, a membrane subdividing said chamber in two compartments, a connection between said membrane and said means for regulating the section of said discharge orifice, conduit means connecting said suction pipe with that of said compartments which, by a decrease of pressure, provokes the deformation of said membrane in the sense of a decrease of the section of said discharge orifice, pressure producing means acting in the other compartment on said membrane, and conduit means connecting said feed chamber to said fuel reservoir.

14. A floatless carbureting system for an internal combustion engine comprising a suction pipe, a throttling member in said suction pipe, a

fuel-air mixing chamber communicating with
said suction pipe through a passage having a
small effective area, air inlet means having a
large effective area and communicating with said
5 mixing chamber, a fuel reservoir, a feed chamber
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tary pump connected to said reservoir and driven
by said engine for delivering fuel to said feed
chamber, a discharge orifice connecting said feed
10 and mixing chambers, means for regulating the
section of said discharge orifice, a closed chamber,
a membrane subdividing said chamber in two

compartments, a connection between said mem-
brane and said means for regulating the section
of said discharge orifice, conduit means connect-
ing said suction pipe with that of said compart-
ments which, by a decrease of pressure, provokes 5
the deformation of said membrane in the sense
of a decrease of the section of said discharge ori-
fice, fluid pressure producing means acting in the
other compartment on said membrane, and con-
duit means connecting said feed chamber to said 10
fuel reservoir.

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