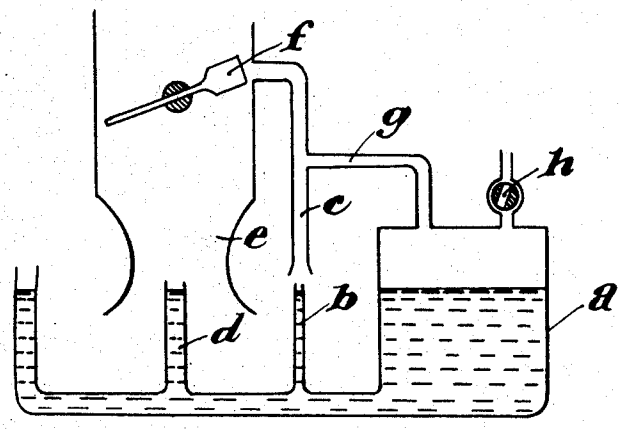
Dec. 16, 1930. F. GOUDARD 1,785,681

CARBURETOR

Filed March 5, 1926

Fig. 1.



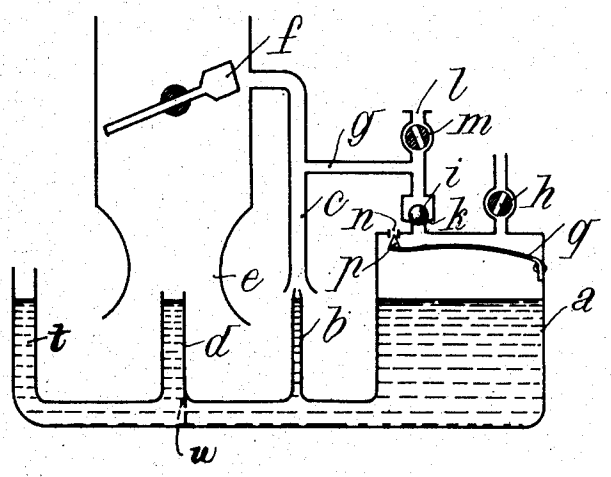


Fig. 2.

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CARBURETOR

Application filed March 5, 1926, Serial No. 92,596, and in Belgium March 14, 1925.

This invention relates to carburetors of the type whose float chambers have a constant fuel level, which feeds two or more nozzles successively according to increasing speeds of the motor.

It relates more particularly to carburetors of the so called submerged nozzle type equipped with a main feed nozzle and an auxiliary slow speed nozzle.

One of the objects of the invention is to provide means for regulating the supply from each of the nozzles at the point where the feed from one nozzle begins to supplement that of the one already in action. In carburetors of the submerged nozzle type having main and auxiliary feed nozzles, it aims to suppress the excess feed of fuel at the moment when the main nozzle begins to supplement the feed from the auxiliary or slow speed nozzle.

Another object of the invention is to provide means for automatically and simultaneously regulating the pressure on the nozzle in action and the pressure in the float chamber before, during and after the moment when a second nozzle enters in action.

Other objects will appear in the course of the following detailed description which will be given with reference to the accompanying drawings in which:

Fig. 1 represents, diagrammatically, a section of the carburetor structure.

Fig. 2 represents, in a diagrammatic way a section through the same type of apparatus as that shown in Fig. 1 with thermostatic and pressure controls attached to the float chamber.

Turning to Fig. 1 of the drawings, a carburetor is shown comprising a constant fuel level float chamber a, a venting well t, an auxiliary or slow speed nozzle b and a main nozzle d. The submerged well t has the usual function of such wells in carburetors of the so-called "submerged nozzle" type. Nozzles b and d communicate through properly arranged air intakes with corresponding mixing chamber c and e respectively. The main and auxiliary mixing chambers may be controlled by a throttle valve f preferably located so as to simultaneously open the main mixing chamber passage and uncover the terminal orifice of the auxiliary mixing chamber passage c. During the opening movement of the valve f the suction on the auxiliary nozzle c, because of the special position of the valve and also because of the direction of the opening movement of the latter, gradually increases until the moment that the main nozzle d enters into action, and as particularly set forth in my co-pending application, Serial No. 754,622, which matured to Patent 1,788,051 dated June 24, 1930. The pressure on the auxiliary nozzle b and the pressure within the float chamber a are made to vary in a parallel manner and in predetermined proportions by providing a tube g connecting the auxiliary chamber c to the top of the float chamber a and by further providing an adjustable valve h, open to the atmosphere, for regulating the effective pressure in the space above the fuel in chamber a. The dimensions of the nozzles should be such that the nozzle b assures a supply sufficient for idling or slow working and the nozzle d furnishes mixture sufficient in quantity for the full open positions of the valve f. The two nozzles should be further designed so that, at the point where the motor passes from idling to normal speed i. e. at the moment when main nozzle d enters into action, the total feed of fuel from both nozzles is somewhat more than is actually necessary. If desired, a constriction u may be inserted in the feed pipe of the nozzle d to regulate the flow of fuel thereto and to the well t.

With the nozzles designed as above indicated and with the valve h properly adjusted, the operation of the carburetor will be as follows:

1°. With the throttle in the closed or "idling" position, the main passage will be closed and the suction will be limited substantially to the auxiliary mixing chamber c and will be transmitted therefrom via the tube g to the float chamber a. But this suction, it will be noted, is exerted only through the restricted orifice limited by the lip of valve f and will be relatively small. Since the valve h is adjusted to be slightly open to the at-

mosphere, the pressure over the fuel in the float chamber *a* will be somewhat less than that in the auxiliary mixing chamber *c*. The feed from the nozzle *b*, it is evident, will therefore be a function of the difference in pressure existing in the float chamber *a* and in the auxiliary mixing chamber *c*.

2°. With a slight opening of the throttle valve *f*, the terminal orifice of the auxiliary passage *c* will be uncovered and the suction in the passage *c* and in the float chamber will be increased. The feed from the nozzle *b* will remain, as before, a function of the difference in the two suction values mentioned.

3°. With a further opening of the valve *f* and with the terminal orifice of the auxiliary passage completely uncovered, the suction will be transmitted not only to float chamber *a* by way of auxiliary passage *c* and tube *g*, but will also to the main mixing chamber *e*. The suction of main passage *e* and that on the float chamber *a* will, at this stage of the opening movement, be of the same order of magnitude. The suction of nozzle *b* will be at a maximum and this nozzle will still be feeding alone.

4°. If the throttle is now opened further, the suction will be increased on the main chamber *e*, and will be diminished in the auxiliary feed passage *c* since the valve will have moved well past the terminal orifice of the latter. It is evident, therefore, that the suction on the top of the float chamber will be decreased and the difference in magnitude of the suction existing in the passage *e* and that existing in the float chamber *a* will bring the main nozzle into action. It will be noted moreover, that with the present construction a progressive feed from nozzle *d* will have been assured.

5°. With still further opening of throttle, a correspondingly greater supply of fuel will be furnished by nozzle *d*, the suction on the main nozzle increasing in proportion to the throttle opening and that on the float chamber *a* decreasing, contrariwise, to a minimal quantity.

The extent to which valve *h* is opened may be fixed once for all, for any given motor operating under given conditions of temperature and pressure. The valve, may therefore be replaced by a simple calibrated orifice. It is preferable, however, to employ a valve, as shown in the device illustrated, in Fig. 1, and to regulate the opening in accordance with changes in operating conditions. When the valve *h* is to be adjusted, it is only necessary to open the valve to a maximum, to place the throttle in the position where the main and auxiliary nozzles give, together, an excess of fluid, then to gradually close the valve until the nozzles deliver the proper amount of fuel. The valve *h*, it is obvious, may be regulated once for all, or may be arranged for convenient adjustment at the dash-board in accordance with changes in temperature and pressure. In order to save fuel and to assure perfect adjustment under all operating conditions, it is, of course, preferable to provide automatic regulating means responsive to the slightest changes in the conditions of operation of the motor.

To this end, the form of construction shown in Fig. 2 has been devised. As will be seen from the drawing, this structure contains all the elements described in connection with the device shown in Fig. 1. It contains, in addition, a ball-valve *i* inserted between the top of the float chamber *a* and the tube *g*. The ball *i* is held by gravity in the seat *k* and cuts off communication between the float chamber and the auxiliary feed passage *c*, except under conditions when the suction in *c* is sufficient to lift the ball. When the motor is very rapidly accelerated, the sudden opening of the throttle almost completely suppresses the suction on the carburetor. Under such conditions, the ball *i* will fall into the seat *k*, the sudden change in the suction will not be transmitted to the float chamber and the feed of the two nozzles will not be affected. The ball-valve will therefore function automatically to cut out the regulating effect of tube *g* and an excess feed of fuel will be maintained until the suction will have become again sufficient, with increasing speeds of motor, to elevate the ball *i*. In order to regulate the lifting of ball *i*, an orifice *l*, adjustably controlled by valve *m*, is provided open to the atmosphere in a position somewhat downstream of the valve *i* along the tube *g*. The section of orifice *l* is preferably made very small as compared to orifice *h*, so as to not interfere with the functioning of the latter.

The apparatus shown in Fig. 2 is further provided with a thermostatic device, responsive to changes in temperature within the motor, and comprising a bimetallic strip *q* having a pointed extremity *p* extending into an orifice *n* open to the atmosphere and independent of the orifice *h*. The orifice *n* is made sufficiently large so that, when unobstructed, it is able to compensate completely and to annul the effect of the suction transmitted through tube *g* to float chamber *a*. The element *p* is of the usual type of strip deformable with change of temperature and is arranged so as to open orifice *n* at low temperatures and to obstruct it at high temperatures. The thermostatic device here described cuts out automatically, during low temperature operation, the pressure control system obtained by the use of tube *g*, and, with the progressive closing of orifice *n*, as the temperature of motor rises, gradually reestablishes the regulating effect of this tube.

It is to be understood that either the ball valve control for tube *g* or the temperature responsive device above described may each

be used alone in connection with the carburetor shown in Fig. 1 or both devices may be attached thereto. The complete structure shown in Fig. 2 constitutes a unit capable of automatically adjusting itself to all ordinary changes in operating conditions.

What I claim is:

1. A carburetor comprising in combination a main nozzle, an auxiliary nozzle, a main mixing chamber, an auxiliary mixing chamber communicating with said mixing chamber and with the auxiliary nozzle, a throttle valve operable to simultaneously control the outlets of the main and auxiliary mixing chambers, a chamber provided with means for maintaining a liquid at a substantially constant level therein, and a conduit connecting said auxiliary mixing chamber to the upper part of the last-named chamber.

2. A carburetor comprising in combination a main nozzle, an auxiliary nozzle, a main mixing chamber, an auxiliary mixing chamber communicating with the main mixing chamber and with the auxiliary nozzle, a throttle valve operable to simultaneously control the outlets of the main and auxiliary mixing chambers, a fuel supply chamber provided with means for maintaining a liquid at a constant level and having an orifice opening to the atmosphere and a conduit connecting the upper part of said fuel supply chamber to said auxiliary mixing chamber.

3. A carburetor comprising in combination a throttle valve, a main nozzle, an auxiliary nozzle, a main mixing chamber, an auxiliary mixing chamber, a float chamber, a conduit connecting the dome of said float chamber to said auxiliary mixing chamber, a ball valve adapted to obstruct or open communication between said conduit and the float chamber in accordance with change of pressure differential between the conduit and the float chamber, and an air inlet in said conduit located between the ball valve and the auxiliary mixing chamber.

4. A carburetor comprising a main nozzle, an auxiliary nozzle, said main and auxiliary nozzles coacting with independent air intakes, a main mixing chamber, an auxiliary mixing chamber communicating with said main mixing chamber and with the auxiliary nozzle, a throttle valve operable to simultaneously control the outlets from the main and auxiliary mixing chambers, a fuel chamber provided with means for maintaining a liquid at a substantially constant level therein, and a conduit connecting said auxiliary mixing chamber to the upper part of the fuel chamber.

In testimony whereof I have hereunto set my hand.

FÉLIX GOUDARD.