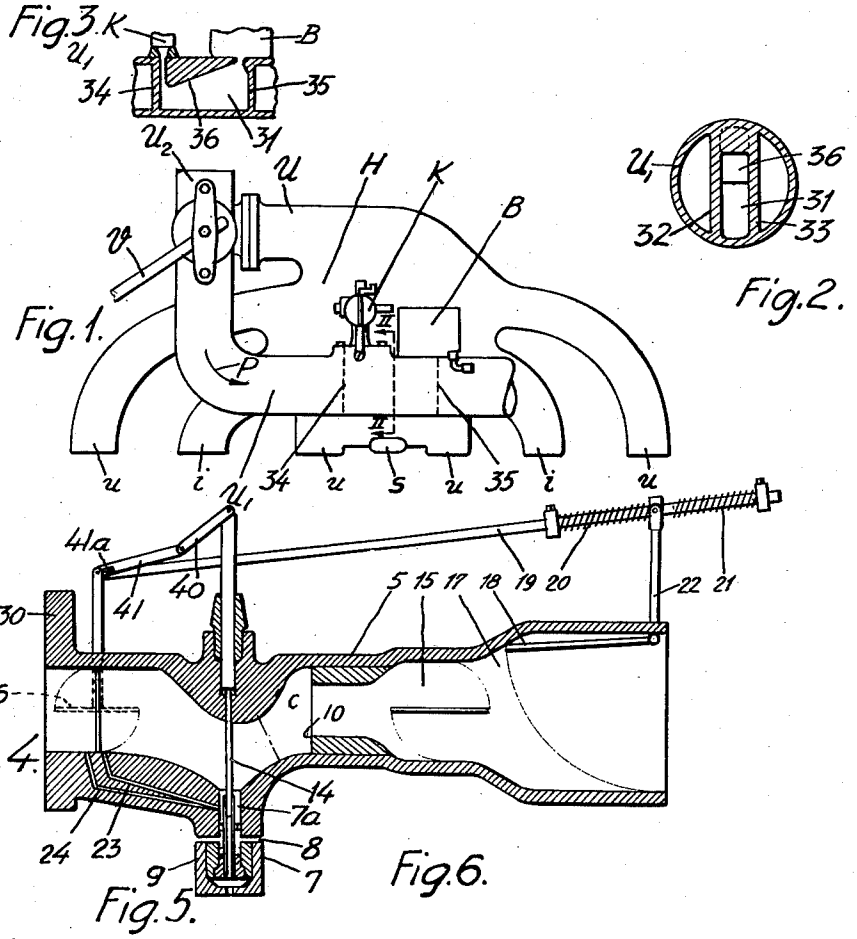
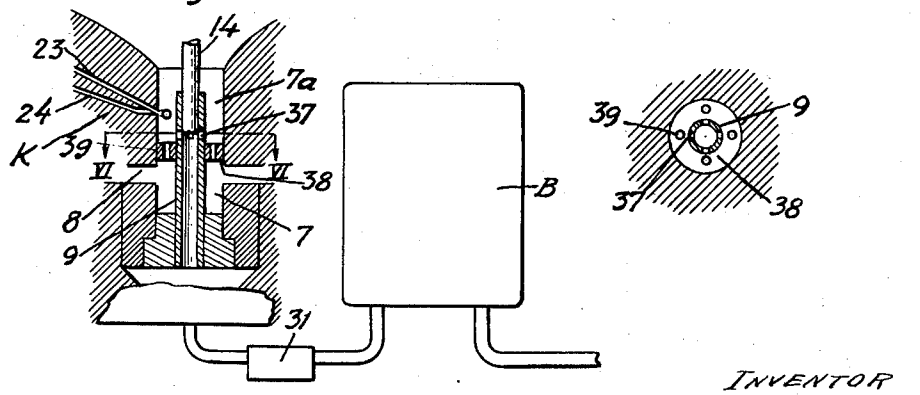
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LIQUID FUEL ATOMIZING CARBURETOR

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## LIQUID FUEL ATOMIZING CARBURETOR

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3 Claims. (Cl. 261—41)

This invention relates to carburetors for internal combustion engines of the kind in which a combustible mixture is formed by atomizing liquid fuel in the intake air.

The primary object of the invention is to construct a carburetor of this type which is of a simple and inexpensive construction and which will permit of an extremely efficient atomization of even heavier fuels such as kerosene and Diesel oil over a wide range of loads from idle-run to full load without the use of separate fuel jets for idle-run and low loads.

Another object of the invention is to provide for an automatic regulation of the fuel jet orifices in proportion to the amount of intake air so as to secure the most efficient atomization conditions.

Another object of the invention is to provide for a temporary automatic increase of suction on accelerating the engine so as to temporarily enrich the mixture during the acceleration period.

With these and other objects in view the invention consists in the special arrangements and combinations of parts described in the following description and specified in the appended claims.

The invention and certain secondary features thereof are illustrated on the accompanying drawing where

Fig. 1 shows in a purely schematic way a constructional form for a carburetor aggregate according to the invention, side view,

Fig. 2 a section after the line II—II in Fig. 1 through a branch of the exhaust pipe, containing the fuel preheating chamber,

Fig. 3 a longitudinal section through the said chamber,

Fig. 4 on a larger scale a longitudinal section through the carburetor proper,

Fig. 5 on a still larger scale part of what is shown in Fig. 4, and the fuel oil regulating tank being part of the carburetor and the connection of which to the carburetor is illustrated in a purely schematic way, and

Fig. 6 a section after the line VI—VI in Fig. 5.

In Fig. 1 the carburetor proper is marked K and its float chamber B. Between these two parts is inserted a chamber **31**, see Figs. 2 and 3, which is placed inside a branch $U_1$ of the main exhaust pipe U. As shown in Fig. 2 the chamber **31** is limited at the sides by walls **32** and **33**, while at its ends it is limited by walls **34** and **35**, which are shown by dotted lines in Fig. 1 and furthermore seen in Fig. 3. The fuel oil regulating tank B is connected to the chamber at the upper right part of the latter in Figs. 1 and 3, while the carburetor K is connected to the chamber **31** at the upper left side of the latter. Downwards the chamber **31** is limited by the wall proper of the branch $U_1$, while upwards it is limited by a wall which declines from the right side to the left in Fig. 3, i. e. from the place of supply from the fuel oil regulating tank B to the place of discharge for the carburetor, whereby the above special effect is obtained.

The exhaust gases may, as can be seen from Fig. 2, pass the chamber **31** on both sides of the latter, as they are flowing through the pipe $U_1$ in the direction marked by the arrow P in Fig. 1. The pipe $U_1$ branches off from the main exhaust pipe U by a flange connection F, outside which is placed a turning valve actuated by a handle V, and by means of which the exhaust gases may be led either to the pipe $U_1$ or to a socket $U_2$ leading direct out into the open air, or both to the pipe $U_1$ and to the socket $U_2$ in the proportion desired, determined by the regulating of the valve, by means of which it is thus made possible to regulate the preheating of the fuel oil in the chamber **31** according to the kind of fuel oil.

The construction of the jet pipe etc. of the aggregate is illustrated by the Figs. 4 and 5. In Fig. 5 the preheating chamber is shown in a purely schematic way between the fuel regulating tank B and the carburetor K. The jet pipe which is marked **9** is enclosed in an air chamber **7**, to which the outer air has access through openings **8** either direct or indirect, preferably after having first passed an air filter. Into the upper part **7***a* of the air chamber a number of holes **37** in the jet pipe are opening, and under these holes there is, in the air chamber, inserted a collar or ring **38** with holes **39**, of which there is one for each hole **37** and placed outside the corresponding hole **37**, such as can be seen from Fig. 6. In the constructional form shown the number of jet pipe holes are four, but any other number of holes may be used. The jet pipe **9** is closed at the upper end by means of a valve spindle or a cylindrical valve **14**, which projects into the jet pipe nearly to the top of the holes **37**. As shown in Fig. 4 the valve spindle **14** is through a lever mechanism **40**, **41** connected with the gas throttle **16**, so that turning of the latter will cause turning of the spindle **14** and thereby an axial displacement of the latter, the spindle being, with a part having a screw thread, carried through a fixed nut member. The lever mechanism **41** may expediently be made with a longitudinal slit **41***a*, so that the lever mecha-

nism can have a non-effective or lost motion, whereby is obtained that the opening and closing respectively of the valve **14** does not begin, as long as the gas throttle is only regulated within e. g. the central third of the scope of operation of the latter, but will only start to close gradually when the gas throttle begins to open its last third, and correspondingly begin to open when the gas throttle begins to close its last third.

At less-load or no-load running the motor is fed through less-load and no-load channels **23**, **24** respectively, opening into the upper part **7***a* of the air chamber, i. e. above the collar **38** and either direct outside, or a little under, or, as shown, a little over the side holes **37** of the jet pipe. At the other end the no-load channel **24** opens out, at fully closed throttle **16**, between the latter and the flange **30**, by which the suction pipe **1** is connected with the motor, while the less-load channel **23** opens out immediately at the other side of the throttle **16**, when the latter is wholly closed, so that the motor, when the throttle is opened only very slightly, also begins to suck from the less-load channel.

As it will be seen from Fig. 4 the supply from the jet pipe is carried up into the air suction pipe **1** of the carburetor after the narrowest place, marked C, of the latter, as reckoned in the direction of the air current.

As shown the leading face of the projection forming the contraction is made steeper than the trailing face thereof, and it can for instance consist of a replaceable liner so as to vary the atomizing qualities of the carburetor. In one type the projection may as shown be cast integrally. The significance of the deflection which the projection and the illustrated depression in the opposite wall create is explained above.

Before the contraction in which the air chamber with the fuel jet opens another contraction **5** is arranged having preferably a smaller section area than the previously mentioned contraction and being separated therefrom by an extension **6**. The contraction **5** terminates in a surface **10** transversely of the intake pipe and serving to arrest fuel particles being possibly expelled from the eddies in the intake pipe. Such fuel particles are thus rotated in the extension **6** and sucked in again. Before the contraction **5** the ordinary choke valve **15** is disposed.

The above mentioned construction together of the exhaust- and suction channels is only shown in a schematic way in Fig. 1, *u* denoting the exhaust channels leading from the various cylinders, while *i* denotes suction channels. These various channels are led together in a common casing H, the outer wall of which over a hollow space encloses the suction channels, so that the fuel mixture flowing to these from the carburetor are heated by the heat from the exhaust gases in the exhaust channels *u*. In Fig. 1 *s* denotes an exhaust opening or socket on the casing H, which may be regulated e. g. by means of a throttle, through which opening or socket a larger or smaller part of the exhaust gases may be carried away, so that the heating of the fuel oil mixture may be regulated directly thereby.

In the inlet end of the intake pipe in which the diameter is somewhat greater than in the remaining part of the pipe, into which it merges through a tapered portion **17**, a self-controlling supplementary valve **18** is arranged the controlling lever of which is slidable on the control rod **19** of the governing throttle **16** between two springs **20** and **21** thereon. The outer ends of the springs are secured axially by means of stop rings.

The operation of this throttle is as follows: On increasing the degree of opening of the governing throttle **16** the throttle valve **18** is closed wholly or partly by the yielding pressure of the spring **21**. As a result of this more or less complete closing of the supplementary valve **18** a higher vacuum is created in the intake pipe so that the supply of fuel becomes greater, and the mixture richer on fuel than corresponding to the normal adjustment of the carburetor. Hereby a quicker acceleration is obtained. Due to the increased speed of the engine the vacuum in the intake pipe increases so that the valve **18** is anew opened wholly or partly against the resistance of the spring **21**.

I claim:

1. An atomizing carburetor for internal combustion engines having in combination a main intake pipe with a throttle valve and a choke valve for starting purposes, an air chamber arranged transversely of the main intake pipe and containing a fuel jet pipe, means for passing a stream of auxiliary air into the said air chamber and along the fuel jet pipe lengthwise thereof, the said air chamber communicating directly with the main intake pipe through a channel and an idle passage leading from the channel to the intake pipe adjacent the throttle valve, a supplementary valve arranged in the main intake pipe anterior to the choke valve, said supplementary valve consisting of a flap valve pivoted on one side of said intake pipe and linkage connecting said supplementary valve and said throttle valve in such a manner as to move the supplementary valve towards closed position on increasing the degree of opening of the throttle valve, said linkage including a spring to allow the supplementary valve to be thereafter automatically re-opened by the increasing suction in the main intake pipe.

2. An atomizing carburetor for internal combustion engines having in combination a main intake pipe with a throttle valve and a choke valve for starting purposes, an air chamber arranged transversely of the main intake pipe and containing a fuel jet pipe, means for passing a stream of auxiliary air into the said air chamber and along the fuel jet pipe lengthwise thereof, the said air chamber communicating directly with the main intake pipe through a channel and an idle passage leading from the channel to the intake pipe adjacent the throttle valve, a supplementary valve arranged in the main intake pipe anterior to the choke valve, said supplementary valve consisting of a flap valve pivoted on one side of said intake pipe and linkage connecting said supplementary valve and said throttle valve in such a manner as to move the supplementary valve towards closed position on increasing the degree of opening of the throttle valve, said linkage including a spring to allow the supplementary valve to be thereafter automatically re-opened by the increasing suction in the main intake pipe, a contraction located in said main intake pipe adjacent said fuel jet pipe, and a second contraction anterior to said first contraction terminating with a steep end face substantially perpendicular to the axis of the main intake pipe so as to constitute a baffle for fuel particles otherwise expelled.

3. An atomizing carburetor for internal com-

bustion engines having in combination a main intake pipe with a throttle valve and a choke valve for starting purposes, an air chamber arranged transversely of the main intake pipe and containing a fuel jet pipe having side apertures, means for passing a stream of auxiliary air into the said air chamber and along the fuel jet pipe lengthwise thereof, the said air chamber communicating directly with the main intake pipe through a channel and an idle passage leading from the channel to the intake pipe adjacent the throttle valve, a supplementary valve arranged in the main intake pipe anterior to the choke valve, said supplementary valve consisting of a flap valve pivoted on one side of said intake pipe and linkage connecting said supplementary valve and said throttle valve in such a manner as to move the supplementary valve towards closed position on increasing the degree of opening of the throttle valve, said linkage including a spring to allow the supplementary valve to be thereafter automatically re-opened by the increasing suction in the main intake pipe, said fuel jet pipe having an adjustable plunger valve for controlling the side apertures and linkage connecting said plunger valve with the throttle valve in such manner as to increase the uncovered area of side apertures on closing the throttle valve.

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