

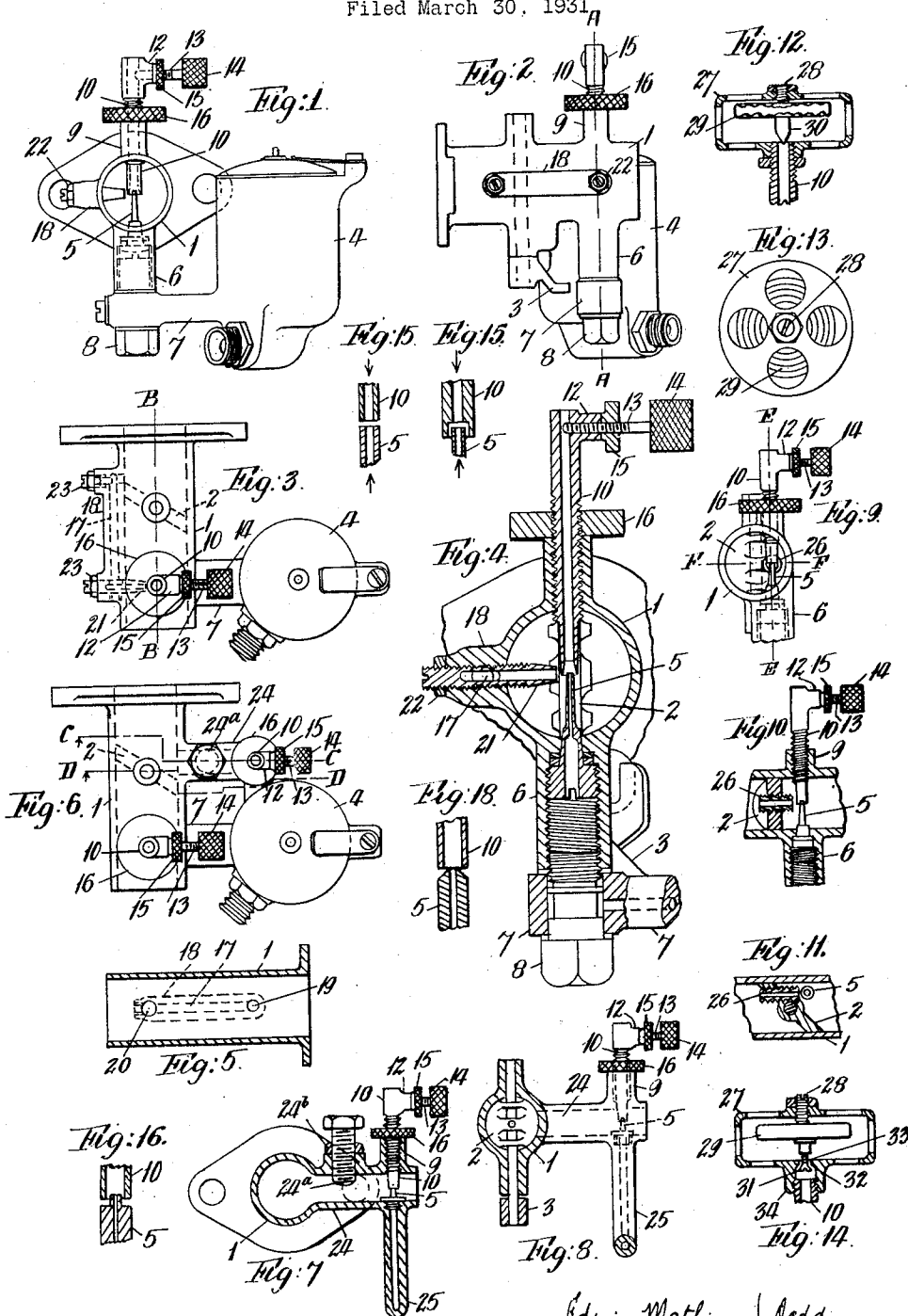
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CARBURETOR FOR LIQUID FUELS

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CARBURETOR FOR LIQUID FUELS

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This invention relates to carburetors for liquid fuels, and refers more particularly to carburetors designed for use with internal combustion engines, and it has for its object to provide improved means to proportionately retard the delivery of fuel to form the high speed mixture as the speed increases.

According to the present invention, supplementary air is supplied at such a point with respect to the point of issuance of the fuel from the jet, that when the vacuum within the choke or induction tube changes as a result of changes in engine conditions, the consequent change in the rate of flow of the supplementary air will act to control the rate of flow of the fuel from the jet, in such a manner that the fuel-air ratio may thereby be maintained constant for all engine conditions and positions of the throttle, or, the device may be set to give either a progressive increase or decrease in fuel-air ratio with increasing choke vacuum.

According to one form of the invention, a tube is provided for the supply of the supplementary air, said tube being so arranged as to admit the said air at a point adjacent the discharge orifice of the jet. Provision is preferably made for initially adjusting the size of the air outlet to the tube. The arrangement is such that the direction of flow of the incoming air is more or less opposed to that of the fuel as it issues from the jet.

In the arrangement referred to the air inlet tube is so arranged and constructed that its inner end more or less shrouds the exit for the fuel from the jet. Provision may be made whereby the position of the shroud may be adjusted with respect to the end of the jet.

In order that the invention may be the better understood, reference is had to the appended drawing in which:—

Fig. 1 is a front elevation of one form of carburetor according to the present invention.

Fig. 2 is a side elevation.

Fig. 3 is a plan.

Fig. 4 is a sectional elevation on line A—A of Fig. 2.

Fig. 5 is a sectional view along line B—B, Fig. 3.

Fig. 6 is a plan of a carburetor embodying a modification.

Fig. 7 is a section on line C—C Fig. 6.

Fig. 8 is a section on line D—D of Fig. 6.

Fig. 9 is a fragmentary view showing a further modification.

Fig. 10 is a vertical section on line E—E, Fig. 9.

Fig. 11 is a sectional plan on line F—F, Fig. 9.

Fig. 12 is a sectional view showing a modified detail of construction.

Fig. 13 is a plan.

Fig. 14 is a sectional view showing a further modified detail.

Figs. 15 and 16 are views showing modified forms of jets and supplementary air supply ducts arranged in accordance with the present invention.

Referring to Figs. 1 to 5 of the drawing, 1 indicates the choke or induction tube of the carburetor, and 2 the throttle valve which is operated in the usual manner by means of a control member attached to the lever 3, any suitable form of float, not shown, and disposed within the float chamber 4, being provided.

Located within the choke tube is a fuel jet 5, which is at its lower end screwed into the tube 6, which is formed integral with the choke tube, and into which tube the fuel flows from the float chamber by way of a tube 7 formed integral with the said float chamber, and connected to the tube 6 by means of a hollow bolt 8 through which the fuel also passes in its passage to the tube 6.

Formed upon the choke tube at a point diametrically opposite to the point at which the tube 6 is formed is a boss 9 into which is screw threaded a tube 10, the lower end of which extends into the choke tube and is disposed in close proximity to the exit end of the jet 5 or shrouds the same, according to the manner in which the said tube 10 is adjusted, the bore of this latter tube at its lower end being coned, and of a slightly larger diameter than the outer diameter of the upper end of the said jet.

The tube 10 extends upwardly beyond the boss 9, and at its upper end is provided with a plain portion upon which is formed a horizontally disposed hollow boss 12, the bore of which is screw threaded and communicates at its inner end with the upper end of the bore of the tube 10.

Disposed within the hollow boss 12 is the inner end of a screw threaded body 13, the thread of which engages with the thread within the boss, and the outer end of which is provided with a milled knob 14, whereby the body may be screwed inwardly to cause its inner extremity to enter the bore of the tube 10 to the desired extent to thereby adjust the rate of flow of air down this tube, a milled lock nut 15 being provided for locking the body 13 in its adjusted position.

From the foregoing, it will be readily seen that the tube 10 may be adjusted vertically with respect to the fuel jet by screwing the tube up or down the boss 9. In order to lock the tube 10 in its adjusted position a milled locknut 16 is provided thereon. By adjusting the tube 10 in the manner just described, it is possible to also adjust the fuel-air ratio of the mixture.

The action of the carburetor during the normal running of the engine is such that the low pressure within the choke tube 1, in addition to causing fuel to be drawn from the jet 5 in the usual manner, also causes a stream of air to be drawn in through the tube 10, the rate of flow of which stream of air increases when the pressure within the choke tube drops as a result of a change of engine condition, the result of this being that the pressure immediately around the point at which the fuel leaves the jet varies throughout a small controllable range as compared to the wider range of pressure variation within the choke tube for various engine conditions.

This form of construction provides the incidental advantage that by reason of the supplementary air and petrol streams flowing in from diametrically opposite points of the choke tube and along the same axis or diameter, a very complete atomization of the fuel takes place.

For the purpose of permitting of the idling of the engine when the throttle is closed, a by-pass duct 17 is formed within a lateral extension 18 cast along one side of the choke tube, the said duct communicating at one end with that portion of the choke tube designed to be located between the engine intake manifold and the throttle valve 2, by means of a port 19, and at the other end communicating with the portion of the choke tube adjacent the jet by means of a port 20, Figs. 3, 4 and 5.

Screwed within the port 20 and extending to within close proximity to the jet 5 is a nozzle 21, which is so arranged as to be capable of adjustment toward and away from the

jet, a suitable lock nut 22 being provided to lock the nozzle in its adjusted position, the arrangement being such that when the throttle is closed a slow running charge is drawn into the nozzle, through the duct 17, port 19, into the forward end of the choke tube and then into the engine.

From the foregoing, it will be readily seen that by adjusting the distance of the nozzle 21 from the jet 5, control of the slow running fuel-air ratio is effected.

For the purpose of effecting the adjustment of the speed of slow running, an adjusting screw 23 is provided, which is of such length as to permit of its inner end being screwed into the duct and thus in effect restricting its bore, a lock nut 23^a being provided to lock this adjusting screw in the desired position.

According to the form of construction shown in Figs. 6, 7 and 8, instead of the choke tube being provided with a by-pass, such as above described, an auxiliary choke or induction tube 24 is provided, the inner end of which is in communication with that part of the choke tube 1 which is on the engine side of the throttle valve 2.

The choke tube 24 is provided with a fuel jet and supplementary air supply tube constructed and arranged in a similar manner to that within the main choke tube and indicated by corresponding reference numerals, this choke tube, jet and supplementary air supply tube, however, being of somewhat smaller dimensions than the main choke tube, jet and supplementary air supply tube respectively, the fuel for this jet being fed from the float chamber by way of a tube 25. This auxiliary choke tube is provided with a bolt 24^a whereby the speed of slow running may be controlled, a lock nut 24^b being provided for locking the said bolt in its adjusted position.

According to the modification shown in Figs. 9, 10 and 11 instead of an auxiliary jet or by-pass being provided, the main jet and supplementary air supply tube, instead of being arranged so that their common axis intercepts the longitudinal axis of the choke tube 1, are arranged at one side of the said longitudinal axis and in closer proximity to the throttle valve 2, which is provided with a small tube 26, which extends through the throttle valve, and when the latter is closed the outer end of this tube becomes located in close proximity to the jet, and thus permits of a sufficient supply of mixture to be drawn into the engine to permit of its idling when the said valve is closed.

For the purpose of permitting the tube 26 to be initially adjusted, this tube is provided with a screw thread, as shown in Figs. 10 and 11, which engages with a corresponding thread within the valve 2.

From the foregoing it will be readily un-

derstood that adjustment of the body 13 causes an adjustment of the petrol-air ratio of the normal running mixture, while adjustment of the distance of the tube 26 from the jet controls the slow running fuel-air ratio.

The slow running devices illustrated in Figs. 1 and 9, dispense with the necessity for a fine bore pilot jet with its well known tendency to choke up. It must be understood, however, that the jet scheme described in this specification can be used with any of the ordinary types of pilot jet.

According to a further modification shown in Figs. 12 and 13, the hollow boss upon the upper end of the tube together with the body 13 is dispensed with, and screwed upon the upper end of the tube 10 is a hollow perforated body 27, mounted by means of a screw 28 within the upper portion of which body is an aneroid barometer disc 29 carrying upon its underside a needle valve 30 designed to co-act with the air entry orifice at the upper end of the tube, the arrangement being such as to automatically reduce the amount of air entering the tube as the carburetor is moved to higher altitudes, and thus cause the mixture to become richer.

The arrangement shown in Fig. 14 is designed to automatically cause the mixture to become weaker with increases of altitude, and instead of a needle valve being employed, a poppet or mushroom valve 31 is employed this valve cooperating with a seat 32 formed around the underside of an air inlet orifice 33 formed within a boss 34 which at its lower end connects the body 27 to the tube 10.

These latter arrangements are particularly advantageous when the carburetor is used upon air-craft engines, as they dispense with the necessity of employing a manually operated air bleed valve or body such as 13, previously described.

In Figs. 15 to 18 are shown alternative constructions and arrangements of jets and supplementary air supply tubes.

If desired, the invention may be applied to carburetors having submerged jets.

For fuel testing work, for which the carburetor is found to be particularly suited, the jet or jets, as the case may be may be supplied from constant level fuel cups, one or other of which can be connected to the jet or jets by means of a suitable two way cock or similar device, the various controls and adjustable parts being suitably marked or calibrated to permit of comparative tests to be readily made between two kinds of fuel.

Although in the particular forms of the invention above described, the jets and supplementary air supply tubes have been arranged with their longitudinal axes disposed at right angles with respect to the longitudinal axes of the choke tubes, it is not desired to limit the invention to this arrange-

ment, as obviously, if desired, the said axes of the jets and supplementary air supply tubes may be inclined with respect to the said axes of the choke tubes.

Furthermore, if desired, the longitudinal axes of supplementary air supply tubes may be arranged at any desired angle with respect to the longitudinal axes of the jets.

Should it be desired the carburetor may be provided with any known means, such for example the ordinary form of carburetor jet, whereby the function of the principle jet or jets, as the case may be, can be moderated to thus vary the fuel-ratio as best suits the circumstance or conditions of running, such means preferably also functioning automatically by being, for instance connected to the throttle control lever.

I claim:

1. A carburetor including: an air intake pipe; a throttle valve within said pipe; a jet within said pipe; a liquid fuel supply for said jet; a supplementary imperforate air supply tube communicating with the outer atmosphere, extending over and shrouding the outlet end of the jet and leaving an annular space between it and said jet; means for adjusting the air supply through said tube; a bye-pass having one end located adjacent the jet and the other in the intake pipe at a point upon the engine side of said throttle valve, whereby the slow running of the engine is permitted upon the closing of said throttle valve.

2. A carburetor including; an air intake pipe; a throttle valve within said pipe; a jet within said pipe; a liquid fuel supply for said jet; a supplementary imperforate air supply tube communicating with the outer atmosphere extending over and shrouding the outlet end of the jet and leaving an annular space between it and said jet; means for adjusting the air supply through said tube; a bye-pass around said throttle valve to permit of the slow running of the engine when said throttle is closed; a nozzle at one end of said bye-pass disposed adjacent the jet; and means for adjusting the position of said nozzle with respect to said jet.

3. A carburetor including: an air intake pipe; a throttle valve within said pipe; a jet within said pipe; a liquid fuel supply for said jet; a supplementary imperforate air supply tube communicating with the outer atmosphere, extending over and shrouding the outlet end of the jet and leaving an annular space between it and said jet; means for adjusting the air supply through said tube; a bye-pass around said throttle valve to permit of the slow running of the engine when said throttle is closed; a nozzle at one end of said bye-pass disposed adjacent the jet; means for adjusting the position of said nozzle with respect to said jet; means for regu-

lating the amount of fuel air mixture passing through said by-pass.

4. A carburetor including an air intake pipe; a throttle valve within said pipe; a jet within said pipe; a liquid fuel supply for said jet; a supplementary imperforate air supply tube communicating with the outer atmosphere, extending over and shrouding the outlet end of the jet and leaving an annular space between it and said jet; and means whereby the slow running of the engine is permitted upon the closing of the said throttle valve comprising a second air intake pipe connected to the engine side of the throttle valve; a jet within said pipe; a liquid fuel supply for said jet; a supplementary imperforate air supply tube communicating with the outer atmosphere, extending over and shrouding the outlet end of the jet and leaving an annular space between it and said jet.

5. An improved carburetor for internal combustion engines, consisting in the combination of an air intake pipe; a jet within said pipe; a liquid fuel supply for said jet, means for providing an air supply to proportionately retard the delivery of fuel to form the high speed mixture as the speed increases, comprising a supplementary air supply tube the wall of which is imperforate, said tube communicating with the outer atmosphere, extending over and shrouding the outlet end of the jet and leaving an annular space between it and said jet so as to reverse the direction of flow of all of the fuel as it issues from said jet; together with means whereby the amount of air admitted through said tube may be adjusted.

6. An improved carburetor for internal combustion engines, consisting in the combination of an air intake pipe; a jet within said pipe; a liquid fuel supply for said jet; means for providing an air supply to proportionately retard the delivery of fuel to form the high speed mixture as the speed increases, comprising a supplementary air supply tube the wall of which is imperforate, said tube communicating with the outer atmosphere, extending over and shrouding the outlet end of the jet and leaving an annular space between it and said jet so as to reverse the direction of flow of all of the fuel leaving said jet, said tube also being so arranged that the flow of air passing therethrough is opposed in direction to the fuel flowing through said jet; together with means whereby the amount of air admitted through said tube may be adjusted.

7. An improved carburetor for internal combustion engines, consisting in the combination of an air intake pipe; a jet within said pipe; a liquid fuel supply for said jet; means for providing an air supply to proportionately retard the delivery of fuel to form the high speed mixture as the speed increases, com-

prising a supplementary air supply tube the wall of which is imperforate, said tube communicating with the outer atmosphere, extending over and shrouding the outlet end of the jet and leaving an annular space between it and said jet so as to reverse the direction of flow of all of the fuel as it issues from said jet; means whereby the amount of air admitted through said tube may be adjusted; and means whereby the position of the end of the said tube with respect to the discharge end of said jet may be initially adjusted.

8. An improved carburetor for internal combustion engines, consisting in the combination of an air intake pipe; a throttle valve within said pipe; a jet within said pipe; a liquid fuel supply for said jet; means for providing an air supply to proportionately retard the delivery of fuel to form the high speed mixture as the speed increases, comprising a supplementary air supply tube the wall of which is imperforate, said tube communicating with the outer atmosphere, extending over and shrouding the outlet end of the jet and leaving an annular space between it and said jet so as to reverse the direction of flow of all of the fuel as it issues from said jet; means whereby the amount of air admitted through said tube may be adjusted; means whereby the position of the end of the said tube with respect to the discharge end of said jet may be adjusted; and means whereby the slow running of the engine is permitted upon the closing of said throttle valve.

9. An improved carburetor for internal combustion engines, consisting in the combination of an air intake pipe; a throttle valve within said pipe; a jet within said pipe; a liquid fuel supply for said jet; means for providing an air supply to proportionately retard the delivery of fuel to form the high speed mixture as the speed increases; comprising a supplementary air supply tube the wall of which is imperforate, said tube communicating with the outer atmosphere, extending over and shrouding the outlet end of the jet and leaving an annular space between it and said jet so as to reverse the direction of flow of all of the fuel as it issues from said jet; means for adjusting the air supply through said tube; a by-pass having one end located adjacent the jet and the other in the intake pipe at a point upon the engine side of said throttle valve, whereby the slow running of the engine is permitted upon the closing of said throttle valve, comprising a tube extending through said throttle valve.

10. An improved carburetor for internal combustion engines, consisting in the combination of an air intake pipe; a throttle valve within said pipe; a jet within said pipe; a liquid fuel supply for said jet;

means for providing an air supply to proportionately retard the delivery of fuel to form the high speed mixture as the speed increases, comprising a supplementary air supply tube the wall of which is imperforate, said tube communicating with the outer atmosphere, extending over and shrouding the outlet end of the jet and leaving an annular space between it and said jet so as to reverse the direction of flow of all of the fuel as it issues from said jet; means for adjusting the air supply through said tube; a by-pass having one end located adjacent the jet and the other in the intake pipe at a point upon the engine side of said throttle valve, whereby the slow running of the engine is permitted upon the closing of said throttle valve, comprising a tube extending through said throttle valve, and adjustable towards and away from the jet.

11. An improved carburetor for internal combustion engines, consisting in the combination of an air intake pipe; a jet within said pipe; a liquid fuel supply for said jet; means for providing an air supply to proportionately retard the delivery of fuel to form the high speed mixture as the speed increases, comprising a supplementary imperforate air supply tube communicating with the outer atmosphere, extending over and shrouding the outlet end of the jet and leaving an annular space between it and said jet so as to reverse the direction of flow of all of the fuel as it issues from said jet; together with means actuated by differences of barometric pressure whereby the amount of air admitted through said tube is automatically adjusted.

In testimony whereof I affix my signature.

EDWIN MATHIESON DODDS.

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