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CARBURETOR

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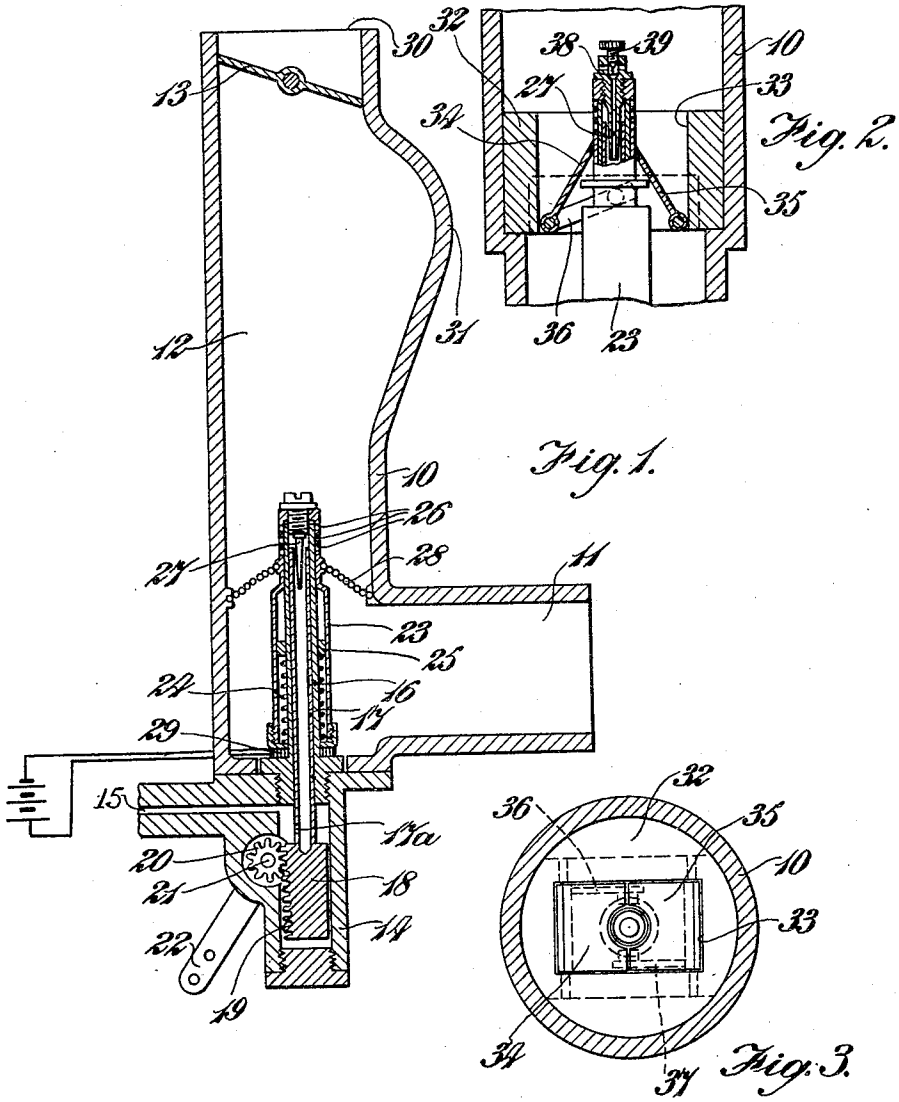

Fig. 2.

Fig. 1.

Fig. 3.

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CARBURETOR

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This invention relates to carburetors and atomizers for internal combustion engines of the kind in which the fuel passes through a jet tube having its delivery end controlled by a needle or other valve movable axially to increase and reduce the fuel passage, said needle or other valve being moved away from the end of the jet tube by means of an air valve which is opened by the suction of the engine, and the jet tube being independently adjustable axially within a fixed tube or other support, so that its position relative to the needle valve may be controlled independently of the automatic movement of said needle valve.

The object of the present invention is to provide an improved form of construction and improved fuel control and heating means adapted for use with both petrol and heavy oil engines.

According to the invention, in a carburetor or atomizer of this kind the jet tube and needle valve are so arranged that by movement of the jet tube beyond its normal working range, said tube is adapted to cut off the fuel supply and open the air valve so as to deliver uncarbureted air to the engine for cooling or braking.

Preferably, the jet tube is formed at its lower end with rack teeth adapted to engage a pinion operatively connected with external control means for causing axial movement of the jet tube.

If desired, the air valve may comprise a spiral spring of conical formation, the adjacent turns of which are adapted to move apart and so open the valve upon movement of the needle valve. Alternatively, the air valve may comprise one or more flaps pivotally mounted adjacent to the needle valve and adapted to open upon movement of the latter. Further, the needle valve may itself constitute a slow-running jet and may be carried by an outer tube disposed outside the fixed tube said outer tube being spring-influenced to cause the needle valve to enter the jet tube. The outer tube may be a sliding fit upon the upper end of the fixed tube and may be formed with one or more holes or orifices so arranged that upon upward movement of the outer tube, said holes or orifices are progressively uncovered or regulated by the fixed tube.

Preferably, the needle valve and air valve are disposed within an induction pipe or chamber which is progressively increased in cross-sectional area from a position adjacent to the needle valve and is then progressively diminished in cross-sectional area to a position at which a throttle is provided. In this case the induction pipe may be provided at one side with a bulged portion, the opposite side being straight, and the angle of divergence of the bulge being less than the angle of convergence taken in the direction of the mixture flow through the induction pipe.

The invention is illustrated in the accompanying drawing, in which:—

Figure 1 is a sectional elevation of one form of induction pipe and atomizer arrangement, the usual float chamber being omitted;

Figure 2 is a fragmentary sectional elevation of a modified form of air valve; and

Figure 3 is a plan view of Figure 2.

The form of carburetting device shown in Figure 1 is suitable more especially for use with a float chamber (not shown) of known type and for operation with heavy or crude oil.

The induction system comprises a body 10 formed with an air inlet 11 and an induction chamber 12, a throttle or other control valve 13 being provided at its upper end for control of the delivery of fuel mixture to the engine. The lower portion of the body 10 is secured to a block or fitting 14, which usually constitutes a portion of the float chamber, the liquid fuel being delivered from the latter through a passage 15. A fixed tube 16 is screwed to the upper portion of the block 14 so as to extend vertically within the induction chamber 12, a jet tube 17 being slidably mounted within the fixed tube 16, and being formed with an orifice 17a through which fuel is delivered from the passage 15. The lower end of the jet tube is in the form of a cylindrical block 18 provided at one side with rack teeth 19 adapt-

ed to engage the teeth of a pinion 20. The latter is fixed upon a spindle 21 and passes outwardly through a packing gland (not shown), so as to be operated manually by means of the lever 22, for raising and lowering the jet tube 17 within the fixed tube 16.

An outer tube 23 is slidably mounted upon the fixed tube 16 and is influenced by means of a helical spring 24 to move downwardly, the reaction being taken by a collar 25 secured to the fixed tube 16. The upper end of the outer tube 23 is formed with a number of apertures 26 which are adapted to be uncovered progressively as the outer tube 23 is raised, a tapered needle valve 27 being secured to the upper portion of the outer tube, and being adapted normally to extend within the jet tube 17.

The air valve comprises a spiral spring 28 of conical formation secured at its outer edge to the body 10, and at its centre portion to the outer tube 23 below the holes 26. Thus, the spring 28 tends to move the outer tube 23 downwardly, and the spring 28 is arranged so that when fully contracted its adjacent turns are touching, so effectively preventing the passage of air into the induction chamber 12.

For the purpose of starting, an electrical resistance coil or heating element 29 is provided at the base of the fixed tube 16 and this serves, when connected with a supply of electricity, to heat the tubes 16 and 17, and so cause the oil or fuel contained therein and also the induced air, to be warmed. When the engine is running the fuel and/or the air may be preheated by any known means.

In the operation of the device, the upper end 30 of the body 10 is connected with the induction system of the engine so that as the throttle 13 is opened, a partial vacuum is created in the chamber 12. Owing to the nature of the air valve comprising the spring 28, the atmospheric pressure causes the latter to open by extending upwardly, thus permitting air to enter the chamber 12, and at the same time raising the needle valve 27, which allows fuel to be drawn through the holes 26 and so atomized and mixed with the air.

The strength or richness of the fuel mixture may be regulated by movement of the jet tube 17 through the medium of the lever 22. Thus, as the jet tube 17 is lowered, the effective area of the tube 17 is increased, and the mixture is made correspondingly richer.

When the engine is being revolved by means of power other than its own, such for instance, as when a motor vehicle is descending an incline, the jet tube 17 is raised manually by means of the lever 22, so that the orifice 17*a* is closed by the fixed tube 16, the needle valve 27 closing the upper end of said tube 17 and then raising the outer tube 23, thus opening the air valve comprised by the spring 28, so that air only is supplied to the engine. This feature is especially useful since the deposit of liquid fuel in the induction system is effectively prevented.

The body 10 is formed at one side with a bulge 31 preferably so arranged that the divergence is rather more gradual than the convergence, as shown in Figure 1. It is found by this arrangement that on minimum speeds, the fuel mixture passes directly from the air valve 28 to the throttle 30; on greater speeds, however, a portion of the mixture flows around the bulge 31 and re-enters the main direct stream of mixture at an angle therewith and also at a lower velocity. This has the effect of causing considerable eddying and consequently vaporization and thorough mixing readily take place.

In the form of device shown in Figures 2 and 3, which show a modified form of air valve, a block 32 having a rectangular bore or aperture 33 is supported within the body 10 adjacent to the upper portion of the outer tube 23, and carries two pivoted flaps 34 and 35 provided with crank arms 36, 37, respectively, which at their innermost ends are adapted to engage in an annular groove formed in the outer tube 23. Thus, when the latter is in its lowered position, the flaps 34 and 35 meet one another along a plane containing the vertical axis of the fixed tube 16, while upward movement of the outer tube 23 raises the flaps 34 and 35 about their pivotal axes and allows air to enter the induction chamber 12.

As shown, the needle valve 27 is formed with passages 38, and provided with an adjustable regulating screw 39, so that whatever the position of the air valve 28 and needle valve 27, a small amount of fuel may be supplied through the passages 38 for the purpose of slow running.

What I claim is:—

1. A carburetor including a fuel passage having an air inlet, a jet tube controlling the fuel admission to the passage, an air valve controlling tube surrounding the jet tube, a needle valve carried by the air valve controlling tube and cooperating with the upper end of the jet tube, means for operating the jet tube to initially cooperate with the needle valve and thereafter lift the air valve controlling tube, and an air valve controlling the admission of air from the air inlet to the fuel passage and operated in the movement of the air valve controlling tube.

2. A carburetor including a fuel passage having an air inlet, a jet tube controlling the fuel admission to the passage, an air valve controlling tube surrounding the jet tube, a needle valve carried by the air valve controlling tube and cooperating with the upper end of the jet tube, means for operating the jet tube to initially cooperate with the needle valve and thereafter lift the air

valve controlling tube, an air valve controlling the admission of air from the air inlet to the fuel passage and operated in the movement of the air valve controlling tube, and means for normally influencing the air valve controlling tube to a position to maintain the air valve substantially closed.

3. A carburetor or atomizer as claimed in claim 1, wherein the air valve comprises a spiral spring of conical formation, the adjacent turns of which are adapted to move apart so as to open the air valve upon movement of the needle valve.

4. A carburetor or atomizer as claimed in claim 1, wherein the air valve comprises one or more flaps pivotally mounted adjacent to the needle valve and adapted to open upon movement of the latter.

5. A carburetor as claimed in claim 1, wherein a fixed tube is arranged intermediate the jet tube and air valve controlling tube and forms a sliding support for both said tubes.

6. A carburetor or atomizer as claimed in claim 1, wherein the needle valve is formed as a slow-running jet.

7. A carburetor or atomizer as claimed in claim 1, wherein the outer tube is formed with one or more holes or orifices arranged so that upon upward movement of the outer tube said holes or orifices are progressively uncovered or regulated.

8. A carburetor or atomizer as claimed in claim 1, wherein the needle valve and air valve are disposed within an induction pipe or chamber which is progressively increased in cross-sectional area from a position adjacent the needle valve and is then progressively diminished in cross-sectional area to a position at which the throttle is provided.

9. A carburetor or atomizer as claimed in claim 1, wherein an induction pipe is provided formed at one side with a bulged portion, the opposite side being straight, and the angle of divergence of the bulge being less than the angle of convergence taken in the direction of the mixture flow through the induction pipe.

In testimony whereof I have hereunto signed my name.

JAMES LEIGHTON WHITEMAN.