June 6, 1933. R. LINDER ET AL 1,913,085

CARBURETOR

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Fig. 1

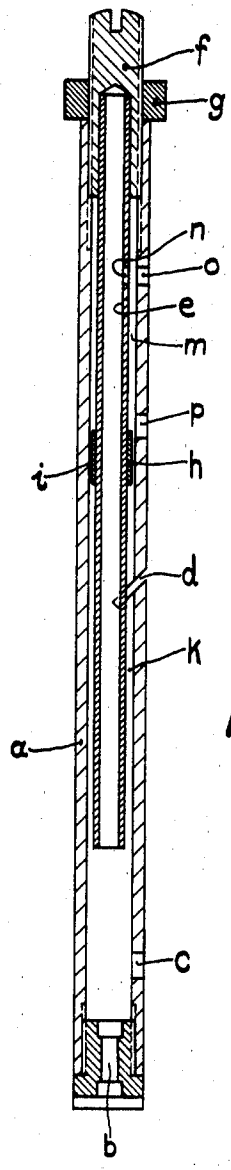


Fig. 2

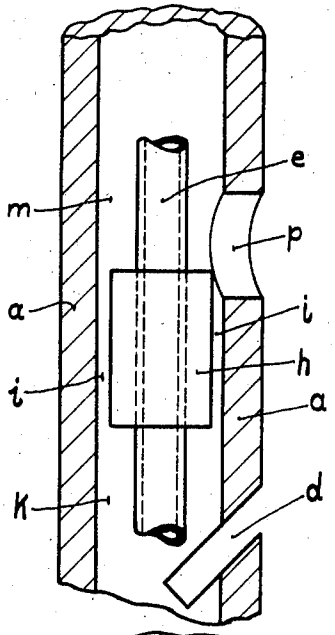
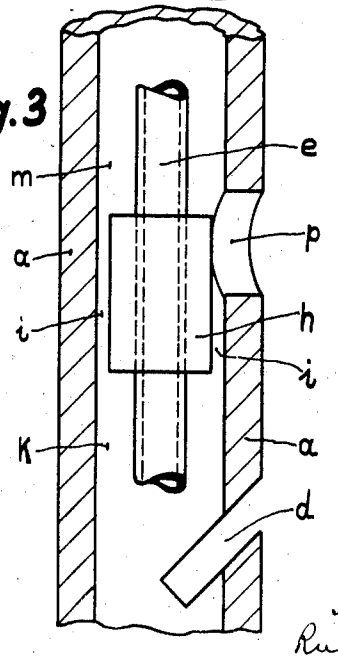


Fig. 3



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Fig. 4

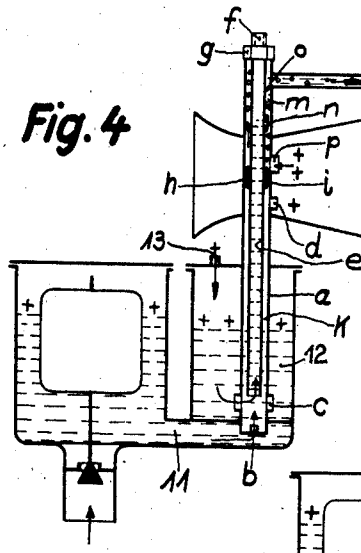


Fig. 6

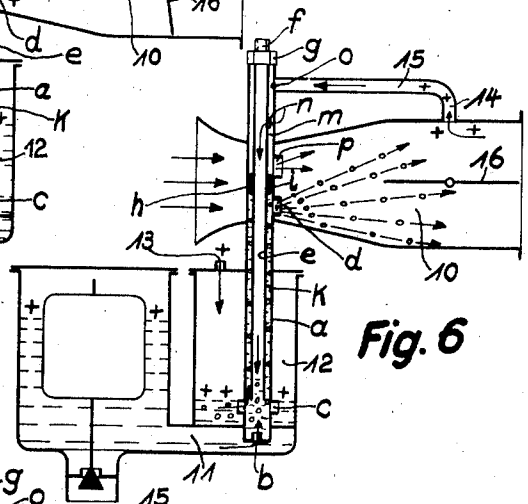
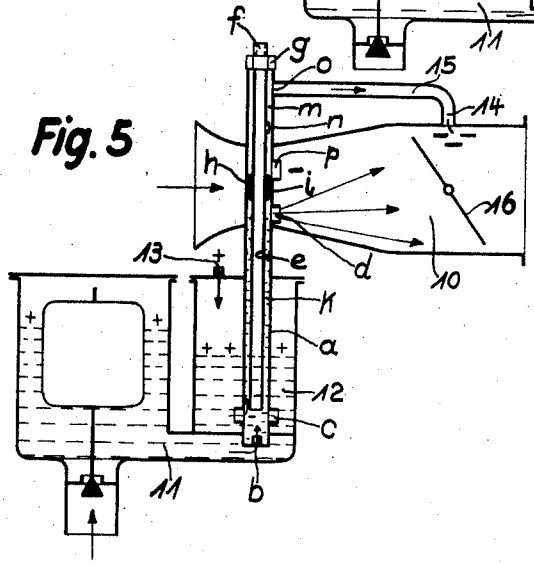


Fig. 5



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UNITED STATES PATENT OFFICE

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CARBURETOR

Application filed October 30, 1931, Serial No. 572,147, and in Germany November 8, 1930.

This invention relates to a spray carburetor, with a spraying tube passing transversely through the mixing chamber, and an axially displaceable plunger tube which forms a part of the conduit for the light-load mixture. It is known in such carburetors to divide the annular space between the spraying tube and the plunger tube by a transverse wall, so that the spraying aperture in the lower part of the spraying tube and the mixture inlet to the pilot opening are separated from one another (e. g. German Patent No. 380,276).

The present invention is characterized in that the separating wall between the spraying nozzle passage and the pilot passage of the spraying tube is arranged adjustably movable opposite an aperture connecting the pilot passage with the mixing chamber on the atmosphere side of the throttle valve, with the object of supplying auxiliary air in such a manner that the auxiliary air aperture can be more or less opened according to the need of the air.

Preferably the separating wall is connected to the axially displaceable plunger tube, so that it can be adjusted therewith in a simple manner.

The invention contemplates moreover the provision of a connection permeable to the air between the pilot passage and the spraying passage of the spraying tube, so that when strong suction occurs on the spraying nozzle, e. g. when running with full load, passage of air from the pilot passage into the spraying passage occurs, so as to dilute the full load mixture.

This arrangement renders it possible to regulate the partial load mixture so that it is moderately rich, without as was hitherto the case, obtaining on that account, a too rich full load mixture.

The method of carrying out the invention is shown in the drawings in which:—

Figure 1 is a longitudinal section through the spraying tube.

Figures 2 and 3 are partial sections on a larger scale of the spraying tube, for different positions of the separating wall.

Figures 4–6 show the operation of the car buretor for light, partial and full loads.

a is the spraying tube which traverses the mixing chamber 10 and dips at its lower end into a float chamber 11. The fuel passes through a calibrated opening *b* in the spraying tube *a*, which tube is also connected to an auxiliary fuel chamber 12 by an aperture *c*.

The auxiliary fuel chamber 12 communicates with the atmosphere by a braking air hole 13. *d* is the spraying aperture of the spraying tube *a*. In the spraying tube *a* is axially arranged a plunger tube *e* which by means of a screw head *f* may be regulably moved in and out. A lock nut *g* secures the plunger tube *e* against accidental displacement.

On the plunger tube *e* there is fixed a band *h* (e. g. a pusher on collar) which leaves free only a narrow annular air passage *i* between the collar itself and the wall of the spraying tube *a* and which divides the space between the spraying tube *a* and the plunger tube into a lower spraying passage *k* and an upper pilot passage *m*. The pilot passage *m* communicates by means of a calibrated aperture *n* in the plunger tube with the interior of the latter, by an aperture *o* in the spraying tube *a* with the pilot passage 15 which leads to the pilot aperture 14 in the outlet passage of the mixing chamber on the engine side of the throttle valve when that valve is in the closed or nearly closed position shown in Fig. 4. According to the invention, the pilot passage *m* also communicates by a further opening *p* in the spraying tube *a* with the mixing chamber on the atmosphere side of the throttle valve. The opening *p* and the band *h* are so arranged with respect to one another, that by screwing in or out of the tube *e*, the air aperture *p* can be more or less covered up by means of the band *h* (Figures 2 and 3). The throttle valve of the carburetor is denoted by 16.

The method of action of the carburetor is diagrammatically shown in Figures 4–6.

For a light load (Figure 4) the greatest lowering of pressure prevails at the pilot

aperture 14 which would, if the opening *p* be neglected, transmit itself unhindered through the calibrated opening *n* in the interior of the plunger tube and would lead to too great a supply of fuel. This is prevented by the opening *p* which allows atmospheric air to flow therethrough into the pilot passage *m* of the spraying tube. The additional air lowers the vacuum in the conduit for the light load mixture, and is mixed with the fuel sucked out of the plunger tube *e* in small amount on this account, as foam air.

With a partial load (Figure 5), spraying first occurs at the pilot aperture 14 on account of the great static lowering of pressure, fuel also emerging from the spraying aperture *d* into the air stream in the mixing chamber. With increasing throttle opening the static lowering of pressure falls at the pilot aperture 14, while the dynamic lowering of pressure at the aperture *p* increases due to the increased velocity of the air stream past the spraying tube *a* and that aperture *p* therein, until a back flow of air occurs through the pilot aperture 14 and the pilot passage 15, *m*, to the opening *p* as shown in Fig. 6.

For the full load position of the throttle, the dynamic lowering of pressure at the spraying aperture *d* increases to such an extent that auxiliary air is drawn through the annular slit *i* between the band *h* and the spraying tube *a*, out of the pilot passage *m* and into the spraying passage K, and mixed with the emerging fuel. By this air addition, the emergence of fuel is checked. On this account the partial load mixture for small throttle openings can be regulated to be very rich, to render possible a quick transition to full load and also to have an adequate mixture for low speeds of rotation.

In spite of this, the rich partial load mixture will not become too rich on passing over to the full load and high speeds of rotation because the air drawn from the pilot passage *m*, checks the fuel, so that the full load gas mixture is poorer.

We declare that what we claim is:

1. A carburetor comprising a mixing chamber, a spraying pipe traversing said chamber, a plunger tube inside said spraying pipe, partition means dividing the space between said plunger tube and said spraying pipe into a spraying passage and a pilot passage, said spraying pipe having a spraying aperture therein connecting said spraying passage with the mixing chamber, conduit means connecting said pilot passage with the mixing chamber at a point in advance of said spraying aperture, said spraying pipe being provided with an additional aperture connecting the pilot passage directly with the mixing chamber.

2. A carburetor comprising a mixing chamber, a spraying pipe traversing said chamber, a plunger tube inside said spraying pipe and an adjustably movable separating body dividing the space between said plunger tube and said spraying pipe into a lower spraying passage and an upper pilot passage, said spraying pipe having a spraying aperture therein connecting said spraying passage with the mixing chamber and also having an opening in its upper portion in the region of said body forming a direct communication between said pilot passage and the mixing chamber adjustably controlled by said body, and conduit means connecting said pilot passage with the mixing chamber at a point in advance of said spraying pipe.

3. A carburetor comprising a mixing chamber, a spraying pipe traversing said chamber, an axially displaceable plunger tube inside said spraying tube, and a movable separating body attached to said plunger tube and dividing the space between said plunger tube and said spraying pipe into a lower spraying passage and an upper pilot passage, said spraying pipe having a spraying aperture therein for delivering fuel directly from said spraying passage to the mixing chamber and conduit means connecting said pilot passage with the mixing chamber at a point in advance of said spraying pipe, said spraying pipe having an aperture in its upper portion subjecting said pilot passage to the air pressure in said mixing chamber, and said separating body being arranged displaceably with respect to said opening so that it may be more or less closed to thereby regulate the light load mixture.

4. A carburetor comprising a mixing chamber, a spraying pipe traversing said chamber and communicating with the mixing chamber by an opening in its upper portion, an axially displaceable plunger tube inside said spraying tube, and a movable separating body consisting of a band on said plunger tube dividing the space between said plunger tube and said spraying pipe into a lower spraying passage communicating with a spraying aperture and an upper pilot passage communicating with a pilot aperture and arranged displaceably with respect to said opening so that it may be more or less closed, with the object of regulating the light load mixture.

5. A carburetor comprising a mixing chamber, a spraying pipe traversing said chamber, a plunger tube inside said spraying pipe, and a separating body dividing the space between said plunger tube and said spraying pipe into a lower spraying passage and an upper pilot passage, said spraying pipe having a spraying aperture delivering fuel directly from said spraying passage to the mixing chamber, said mixing chamber having a pilot aperture in advance of said

spraying aperture, conduit means connecting said pilot passage with said pilot aperture, said separating body being formed to provide an opening between said spraying passag and said pilot passage whereby air is drawn from the mixing chamber through said pilot aperture and pilot passage aperture into the spraying passage when on full load.

6. A carburetor comprising a mixing chamber, a spraying pipe traversing said chamber and communicating with the mixing chamber by an opening in its upper portion, an axially displaceable plunger tube inside said spraying tube, and a movable separating body attached to said plunger tube dividing the space between said plunger tube and said spraying pipe into a lower spraying passage communicating with a spraying aperture and an upper pilot passage communicating with a pilot aperture, and forming a connection between said spraying passage and said pilot passage and arranged displaceably with respect to said opening.

7. A carburetor comprising a mixing chamber, a spraying pipe traversing said chamber and communicating with the mixing chamber by an opening in its upper portion, an axially displaceable plunger tube inside said spraying tube, and a movable separating body mounted on said plunger tube in a manner providing a clearance between said spraying tube and said body and dividing the space between said plunger tube and said spraying pipe into a lower spraying passage communicating with a spraying aperture and an upper pilot passage communicating with a pilot aperture, said separating body being arranged displaceably with respect to said opening so that it may be more or less closed, with the object of regulating the light load mixture.

8. A carburetor comprising a mixing chamber, a liquid fuel pipe extending from below upwardly into said chamber and having a fuel spray aperture for delivering fuel therefrom directly into said chamber, means for supplying liquid fuel to said pipe at a level below said spraying aperture, a throttle valve in said chamber on the engine side of said fuel pipe, a tube extending into said pipe from a point above said spray aperture to below the level of the fuel supply therein, said tube and pipe forming an annular passage therebetween, said tube being apertured above said spray aperture to connect its interior with said annular passage and conduit means connecting said annular passage in the region of said tube aperture to the mixing chamber on the engine side of said throttle valve in its closed or partially closed position, said fuel pipe being additionally apertured above said spray aperture to subject said annular passage to the air pressure in said mixing chamber, and space restricting means in said annular passage between said spray aperture and said additional aperture.

9. A carburetor as defined in claim 8 and in which said space restricting means is adjustable axially of said fuel pipe over said additional aperture therein.

In testimony whereof we have hereunto affixed our signatures.

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WILHELM STURM.