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J. C. HANSEN-ELLEHAMMER

FUEL SUPPLY DEVICE FOR EXPLOSION MOTORS

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Fig. 1.

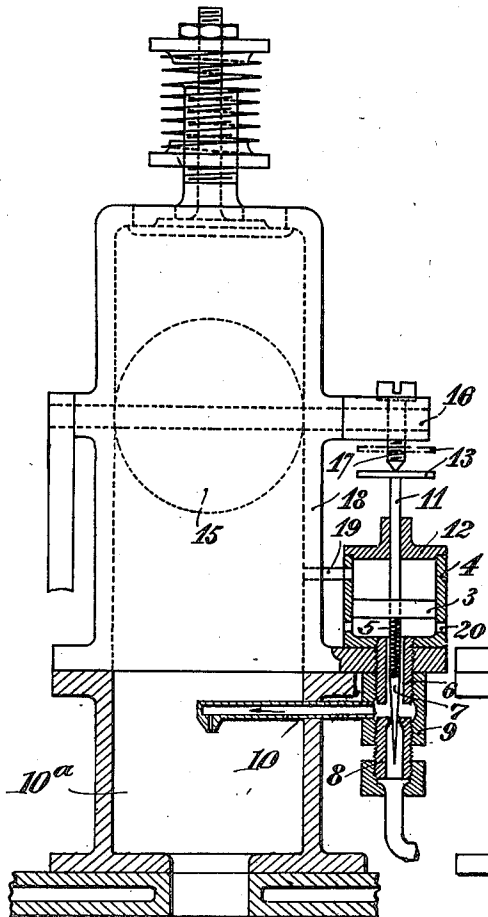


Fig. 2.

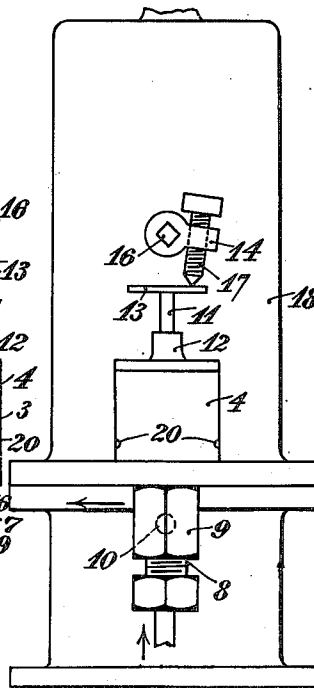
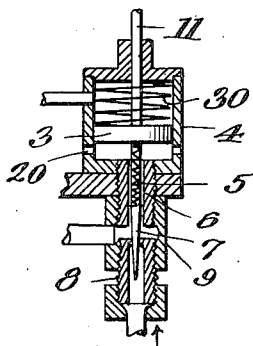


Fig. 3.

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FUEL-SUPPLY DEVICE FOR EXPLOSION MOTORS.

Application filed March 25, 1918. Serial No. 86,701.

To all whom it may concern:

Be it known that I, JACOB CHRISTIAN HANSEN-ELLEHAMMER, residing at Copenhagen, in the Kingdom of Denmark, have invented certain new and useful Improvements in or Relating to Fuel-Supply Devices for Explosion Motors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to reference numerals marked thereon, which accompany this specification.

This invention refers to a device for fuel supply for explosion motors, in which a regulating member in the fuel supply pipe is made dependent upon the adjustment of the commonly used air-regulating member. This is effected by disposing, between the regulating members, a pneumatic mechanism whose action is dependent upon the suction or exhaust of the motor, and which is a substitute for the float device used in the ordinary carburetors. According to this regulating system, in which the fuel supply is regulated quite automatically, depending upon the air supply, there is obtained an essential increase of the regulating capacity of the motor, as well as convenient and economical adjustment according to the different speeds and loads.

A form of construction of the pneumatic mechanism in accordance with this invention and its connections with the air and fuel regulating members is shown by way of example in the drawing, in which Figures 1 and 2 are respectively a vertical section and a side view, and Figure 3 is a fragmentary vertical section through the valve controlling cylinder and adjacent parts, showing a slight modification. In the construction here shown, it is assumed that the mechanism acts by means of the suction of the motor. While the present disclosure is for utilizing the suction of the motor, various modifications may be made within the scope of the claims for otherwise operating the device.

A piston 3 in a cylinder 4 is, by means of a preferably flexible intermediate part 5, which is freely disposed in a pipe 6 fastened in the bottom of the cylinder, connected with a needle valve 7 with its seat on the top of a pipe 8 leading from the

fuel tank or tanks (not shown in the drawing). A pipe coupling 9 on the pipes 6 and 8 forms a valve casing, and from here a fuel pipe 10 leads to the mixing chamber 10^a.

The piston rod 11 is passed through the cover 12 of the cylinder 4 and outside the cylinder the piston rod is furnished with a head 13 which forms a contact for the arm 14 on the shaft 16 of the air-regulating damper 15. In order that the contact may be adjusted, the contact point of the arm 14 may, for instance, be the end of a screw 17.

The carbureter body 18 in which the damper 15 is disposed, has a mixing chamber 10^a and is placed above the engine and on this side, that is to say, on the inner side of the damper, this hollow body is for instance connected by means of a pipe 19 with the top of the cylinder 4, which at its bottom has one or more air-holes 20.

Thus the suction of the motor will be transmitted to the cylinder 4 with the result that the piston 3, whose lower side is acted upon by the atmospheric pressure (through the holes 20) tries to rise, and always rises as high as the arm 14, 17 permits. It is presupposed that this arm moves upward more and more as the damper 15 is opened more and more, and when the motor is in operation, the head 13 will cling to the arm as if it were mechanically connected with it, thus following its upward movement, whereby the valve 7, at the same time that the damper 15 opens more and more to the supply of air, itself automatically opens more and more to the fuel supply through the pipes 8 and 10. On the other hand, when the motor is stopped, for instance, by interruption of the igniting current thus causing the suction effect to cease, the members 13, 11, 3, 5, 7, no matter what height they may have risen to, i. e. no matter how much or how little the damper may have been opened, will at once fall, and the valve 7 will automatically shut off the fuel supply.

When the motor is running, its suction effect is not only communicated to the parts 18, 4, but also to the fuel pipe 10, and from here on through the pipe 6 (outside of the flexible valve rod 5) up to the air holes 20, so that a small quantity of air can thus be sucked in. The fact that a small quantity of air is sucked in from the pipes 10 and

6 through the holes 20 does not, of course, disturb the pressure conditions on both sides of the piston 3, since much more air can pass in through the holes 20 than can be sucked away through the pipes 6 and 10, so that the pressure under the piston will always be that of the atmosphere.

If the motor is to be "throttled down", it is only necessary to close the damper 15 more and more; the arm 14, 17 will then (against the pressure acting on the lower side of the piston 3) force the members 13, 11, 3, 5, and 7 farther and farther downward. If the throttling is so strong that the damper 15 and the valve 7 are practically closed, the suction effect of the motor (through the fuel pipe 10) which is still running will be relatively strong, so that, together with the very small quantity of fuel oozing out through the valve 7 a relatively great quantity of air will be sucked in through the pipe 6, and thus a suitable charge is automatically obtained.

Also in starting, it is only necessary to adjust the air-regulating damper. When the crank shaft of the motor is turned, the suction produced will cause the aforesaid members 13, 11, 3, 5, and 7 to rise and begin action.

All details shown in the drawings are of no significance to the invention and may be altered in many ways. The air for the spray can be obtained elsewhere than through the holes 20. The flexibility of the valve rod 5 is of importance in the form of construction here set forth, because the valve 7 thereby hangs free, so that it cannot be given an oblique action, but falls straight into its seat. The moving-direction of the valve 7 and the piston 3, etc., does not need to be up and down, since the force which counteracts the effects of the air pressure on the one side of the piston may be some other force than that of gravity, for instance the force of a spring 30 shown in Figure 3.

Other modifications may be resorted to within the spirit and scope of the invention, as defined in the appended claims.

I claim:

1. In a fuel supply device, an air supply regulating means, and a fuel supply regulating means including a valve and a yieldable connection for the valve adapted to engage said air supply means for limiting the opening of the fuel valve when the air supply means is closed, said yieldable con-

nection for the fuel supply valve permitting automatic opening of the valve by pressure increasing proportionately to the closing of the air supply means and adapted to operate independently within said limit of the air supply means.

2. A fuel supply device for internal combustion engines, having an air regulating member, a fuel regulating member, a cylinder communicating at one end with the suction chamber of the engine, a piston normally urged in one direction in the cylinder and adapted to be moved in an opposite direction by reduction in air pressure in said chamber, a fuel nozzle leading from said fuel regulating member, a by-pass between the other end of said cylinder and said nozzle to the exclusion of said fuel regulating member, said other end of the cylinder having openings therein leading to the atmosphere for admitting pressure to the piston and air to the nozzle for ejecting fuel therefrom, one-way operating means between the piston and the air regulating member for limiting the operation of the piston under action of the reduced pressure in said chamber, and permitting normal operation of the piston when normal pressure is restored in said chamber, and a flexible connection between the fuel regulating member and the piston.

3. In a carbureter, a fuel supply valve, an air supply valve, a cylinder, a piston in the cylinder having a rod projecting beyond the cylinder, an adjustable stop carried by the air valve for engaging said piston rod to limit the operation of said piston under reduction of pressure and flexible connection between said piston and said fuel supply valve for opening the same upon the operation of the piston and arranged to be closed upon the release of the piston, the reduction of pressure being adapted to feed the fuel and open said valve proportionately to the amount of air admitted to the suction chamber, said flexible connection permitting automatic adjustment of the fuel supply valve on its seat to insure shutting off of the fuel supply when the piston is released.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

JACOB CHRISTIAN HANSEN-ELLEHAMMER.

Witnesses:

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