

E. P. NOYES.
 AUTOMATIC REGULATION FOR CARBURETERS.
 APPLICATION FILED OCT. 12, 1911.

1,037,833.

Patented Sept. 3, 1912.

Fig. 2.

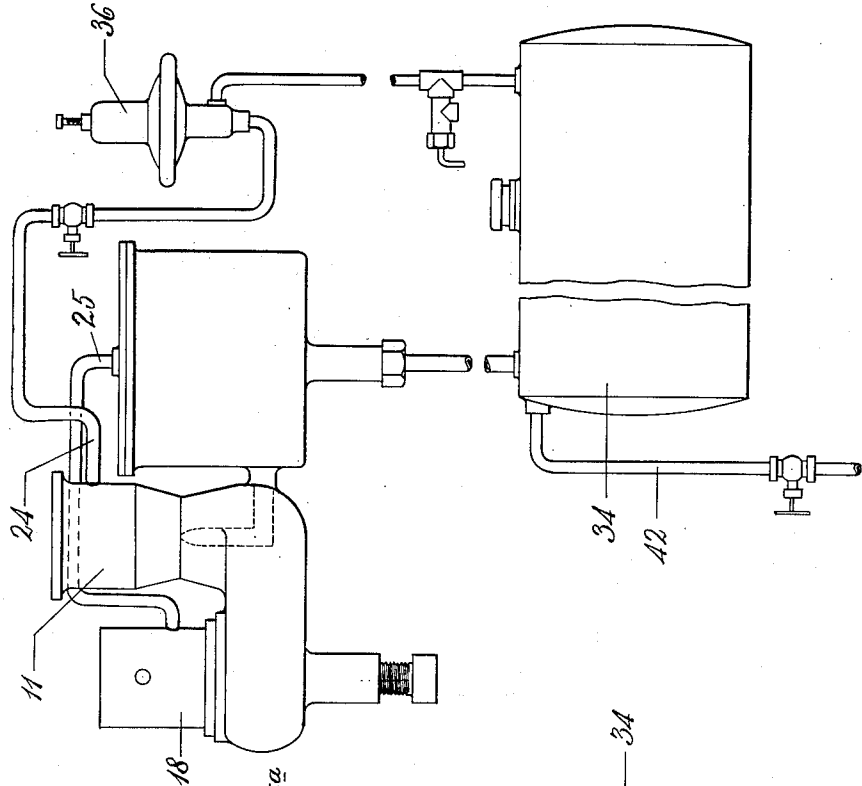
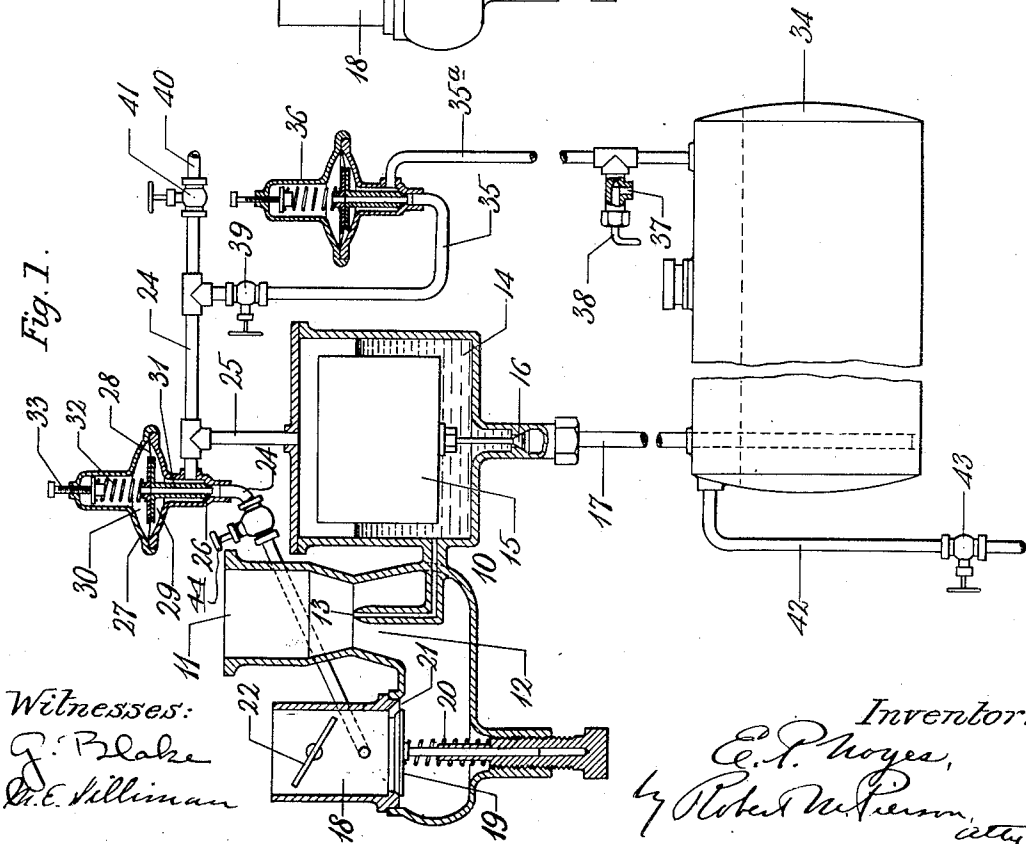


Fig. 1.



Witnesses:
 J. Blake
 D. E. Killman

Inventor:
 E. P. Noyes,
 by Robert M. Pearson, atty.

UNITED STATES PATENT OFFICE.

EDWARD P. NOYES, OF WINCHESTER, MASSACHUSETTS.

AUTOMATIC REGULATION FOR CARBURETERS.

1,037,833.

Specification of Letters Patent.

Patented Sept. 3, 1912.

Application filed October 12, 1911. Serial No. 854,238.

To all whom it may concern:

Be it known that I, EDWARD P. NOYES, a citizen of the United States, residing at Winchester, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Automatic Regulation for Carbureters, of which the following is a specification.

This invention relates to means for obtaining selected differences of air pressure for the purposes of producing a flow of liquid fuel in carbureting and fuel-feeding systems, and it relates more particularly to jet atomizers in which a partial vacuum or reduced air pressure is maintained in the constant-level fuel reservoir as well as in the carbureting chamber, and is made variable over a considerable range by the adjustment of an anterior throttling device which controls the main air supply. An example of this class is shown in my prior Patent No. 993,097.

The object of my present invention is to control, preferably in an automatic manner, the relation between the pressure in the carbureter reservoir and that of a throttled main-air supply to the mixing-chamber, or between the first-said pressure and that in the fuel-supply tank, or to control both relations,—this being accomplished by means of a regulating device or devices located in the path of an auxiliary current of air induced by the suction of the motor. Thereby the motor vacuum may be utilized to raise fuel to the carbureter from a tank located below the level of the latter, without imposing an excessive feeding pressure when there is a strong vacuum in the carbureter, and it is also possible to conveniently regulate the pressure for expelling the fuel into the carbureting chamber.

Of the accompanying drawings, Figure 1 represents a sectional diagrammatic view of a carbureter and fuel-supply system provided with my improved pressure-regulating means, and Fig. 2 represents an elevation showing a modification.

10 is the carbureter having a carbureting chamber 11 provided with an air inlet 12 which embraces the fuel inlet or jet-nozzle 13, the latter communicating with a fuel reservoir, or float-chamber 14 having the usual constant-level float 15 and valve 16 for regulating the admission of fuel from a supply pipe 17.

18 is a passage leading to the air inlet 12,

and 19 is an automatic valve in the path of the air current, loaded by a spring 20. 21 is a small primary air opening past said valve which is not closed when the valve is fully seated.

The carbureter thus described, and selected for purposes of illustration, is one in which all of the air supply passes the fuel jet, but the invention would apply to various other well-known types.

22 is a throttling device located in passage 18 and controlling the degree of vacuum established in chamber 11 by the suction of the motor. As shown, the said device is an ordinary butterfly valve and is adapted to control the performance of the motor in place of the usual posterior throttle valve, but it may be of any suitable character, automatic or otherwise. The chamber or passage 18 intervening between the valve 22 and the valve 19 and opening 21 may conveniently be termed the "vestibule", being an anterior passage or entrance for the variably-throttled main air supply.

24 is a vacuum duct connecting with the vestibule 18, and by a branch 25 with the upper part of float-chamber 14. A small auxiliary current of air is or may be drawn through this duct from either of the two atmospheric inlets hereinafter described, and choked in its passage by a valve 26 forming part of the automatic device 27, which further includes a diaphragm or septum 28 having a chamber 29 below it open to the pressure anterior to the valve tending to open the latter, a chamber 30 on its upper side open to the pressure posterior to the valve received through a passage 31 in the valve stem and tending to close the valve; and a spring 32 also tending to close the valve and provided with an adjusting device 33. This mechanism operates to maintain a substantially constant difference of air pressure between the float chamber 14 and the vestibule 18, whose amount depends upon the weight of the moving parts and the tension of spring 32, and it will be evident that this pressure differential is subject to adjustment by means of the device 33 so as to feed the fuel with any desired force into the mixing chamber 11. The duct 24 is preferably choked at its inlet from the atmosphere, as hereinafter described, so that the pressure in float chamber 14 will be substantially atmospheric. The device 27 is mechanically independent of the throttle valve 22 but

nevertheless acts in harmony therewith to maintain those conditions which are desirable for securing uniformity of mixture composition at all degrees of throttling of the main air supply.

34 is a fuel-supply tank which may be located below the level of the carbureter 10, and feeds the latter through the pipe 17. With the upper space of this tank, vacuum duct 24 communicates through an extension 35 containing a differential regulator 36 similar in all respects to the regulator 27. The anterior section 35^a of this duct extension is virtually a part of the air-space of tank 34, and is provided with an atmospheric inlet 37 controlled by a needle-valve 38. Duct extension 35 contains a stop-valve 39 which on being closed cuts the regulator 36 out of action, and if valve 38 be then open in any degree, full atmospheric pressure will exist in tank 34. In order that regulator 27 shall remain operative under such conditions, duct 24 may then have an atmospheric inlet at 40 under control of a stop-valve 41 which will ordinarily be closed when regulator 36 is in operation.

42 is a pipe through which tank 34 may be charged from some external source of supply, said pipe having a stop-valve 43.

Assuming valve 39 to be wide open, valve 41 closed, and valve 38 opened by a very small amount, the suction of the motor, through a partial closure of valve 22, may then be made to draw down the pressure in tank 34 sufficiently, if desired, to cause said tank to be charged through the pipe 42 by atmospheric pressure acting on the body of fuel at the primary source of supply (not shown). The valve device 36 insures that this vacuum pressure shall nevertheless be higher than that in the float chamber 14 by an amount sufficient to raise the fuel from the tank to the float-chamber, and it operates to maintain this difference of pressure substantially constant regardless of what the general pressure level may be as determined by the set of valve 22. Valve device 36 could of course perform its functions without the presence of the device 27, but if any substantial resistance is interposed in the vacuum duct between the float chamber 14 and the vestibule 18, this resistance should preferably, when the vacuum varies greatly, be of an automatic character, as furnished for example by the device 27.

In some instances either or both of the automatic regulators 36 and 27 might be replaced by a hand-controlled adjusting valve (such as 39 alone in duct 35 and 44 in duct 24), as for example where the vacuum does not vary widely, or where means other than the pressures themselves are provided for causing the duct valve or valves to vary their opening conformably with the throttle opening.

The valve device or regulator 27 could

also be employed to maintain a substantially constant difference of pressure between float-chamber 14 and vestibule 18, without the regulator 36 and regardless of the mode of feeding fuel to said float-chamber, but its special purpose is to act as an auxiliary to the regulator 36.

It will be noted that the air inlet 12 has its sides contracted around the nozzle 13 and is further restricted at 21, both of which expedients are well known and either or both of which may be employed for the usual purpose of promoting the flow of fuel into the carbureting chamber, this purpose being further accomplished, if desired, by the employment of the regulator 27 as above set forth.

Various modifications may be made. Fig. 2, for example, shows the vacuum duct 24 connected with a different part of the main air-passage—namely with the carbureting-chamber 11 instead of the vestibule 18, and it also omits the regulator 27.

I claim:—

1. In a suction carbureter, the combination of a carbureting-chamber having a restricted air-inlet, a main air vestibule thereto having a throttling device at its entrance, a liquid-fuel reservoir having a fuel outlet to said carbureting-chamber, a vacuum duct connecting said vestibule with the upper space of said reservoir and having an inlet from the atmosphere, and an automatic regulator in said duct including a valve differentially controlled by the pressures anterior and posterior to itself.

2. In a suction carbureter, the combination of a carbureting-chamber having a restricted air-inlet, a main air vestibule thereto having a throttling device at its entrance, a liquid-fuel reservoir having a fuel outlet to said carbureting-chamber, a vacuum duct connecting said vestibule with the upper space of said reservoir and having an inlet from the atmosphere, and an automatic regulator located in said duct between said reservoir and vestibule and differentially controlled by the respective pressures therein for maintaining the reservoir pressure a substantially constant amount higher than the vestibule pressure.

3. In a carbureting and fuel-feeding system, the combination of a suction carbureter having an air-passage including a carbureting-chamber, a liquid-fuel reservoir having a fuel outlet to said carbureting-chamber, a fuel-supply tank located below the level of said reservoir, a vacuum-duct connection between said passage and the air spaces of the reservoir and tank, and means in said connection for controlling the relation between the air pressures in the tank and reservoir.

4. In a carbureting and fuel-feeding system, the combination of a suction carbureter having a liquid-fuel reservoir, a fuel-supply

tank connected with said reservoir, and means controlled by the respective air-pressures in said tank and reservoir for maintaining said pressures in a predetermined relation.

5. In a carbureting and fuel-feeding system, the combination of a suction carbureter having a liquid-fuel reservoir, a tank located below the level of said reservoir for supplying fuel to the latter, a duct connecting the air spaces of said reservoir and tank and adapted to have a flow of air induced through it by the vacuum in the carbureter, and an automatic pressure regulator including a valve located in said duct and differentially controlled by the pressures in said tank and reservoir.

6. In a carbureting and fuel-feeding system, the combination of a suction carbureter having an air passage which includes a carbureting-chamber and is provided with an anterior throttling device, a liquid-fuel reservoir having an outlet to said carbureting-chamber, a fuel-supply tank located below the level of said reservoir for furnishing fuel to the latter, a duct connection between said passage and the air spaces of said reservoir and tank for carrying a secondary air current, and an automatic regulator located in said connection between the tank and reservoir and responsive to the respective pressures therein for maintaining the tank pressure at a predetermined point above the reservoir pressure.

7. In a carbureting and fuel-feeding system, the combination of a suction carbureter having an air passage which includes a carbureting-chamber and is provided with an anterior throttling device, a liquid-fuel reservoir having an outlet to said carbureting-chamber and provided with a constant-level device, a fuel-supply tank located below the level of said reservoir and having an atmospheric inlet provided with an adjusting valve, a vacuum duct connecting said passage with the air spaces of said reservoir and tank, and an automatic regulator located in said duct between the reservoir and tank and including a valve, and a septum controlling said valve and subject differentially to the pressures anterior and posterior to the valve for maintaining the anterior pressure a substantially constant amount higher than the posterior.

8. In a carbureting and fuel-feeding system, the combination of a suction carbureter having an air passage provided with an anterior throttling device and including a carbureting-chamber, a liquid-fuel reser-

voir having a fuel outlet to said carbureting-chamber, a fuel-supply tank located below the level of said reservoir, a vacuum-duct connection between said passage and the air spaces of the reservoir and tank, means in said connection for controlling the relation between the air pressures in said reservoir and passage, and means in said connection for controlling the relation between the air pressures in said tank and reservoir.

9. In a carbureting and fuel-feeding system, the combination of a suction carbureter having an air passage provided with an anterior throttling device and including a carbureting-chamber, a liquid-fuel reservoir having a fuel outlet to said carbureting-chamber, a fuel-supply tank located below the level of said reservoir, a vacuum-duct connection between said passage and the air spaces of the reservoir and tank, an automatic valve located in said connection between the reservoir and air passage and differentially controlled by the respective pressures therein, and a second automatic valve located in said connection between the tank and reservoir and differentially controlled by their respective pressures.

10. In a carbureting and fuel-feeding system, the combination of a suction carbureter having a carbureting-chamber provided with a restricted air-inlet, a main air vestibule thereto having a throttling device at its entrance, a liquid-fuel reservoir having a fuel outlet to said carbureting-chamber, a fuel-supply tank located below the level of said reservoir and having an atmospheric inlet to its air space provided with an adjusting valve, a vacuum duct connecting said vestibule with the air spaces of said reservoir and tank, an automatic regulator located in said duct between the reservoir and vestibule and differentially controlled by the respective pressures therein for maintaining a substantially constant difference between said pressures, and a second automatic regulator located in said duct between the tank and reservoir and differentially controlled by the respective pressures therein for maintaining a substantially constant difference between the last-said pressures.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses, this 10th day of October, 1911.

EDWARD P. NOYES.

Witnesses:

P. W. PEZZETTI,
H. L. ALLEN.