

H. W. HYDE.
 CARBURETER FUEL CONTROLLING DEVICE.
 APPLICATION FILED MAY 19, 1916.

1,259,518.

Patented Mar. 19, 1918.

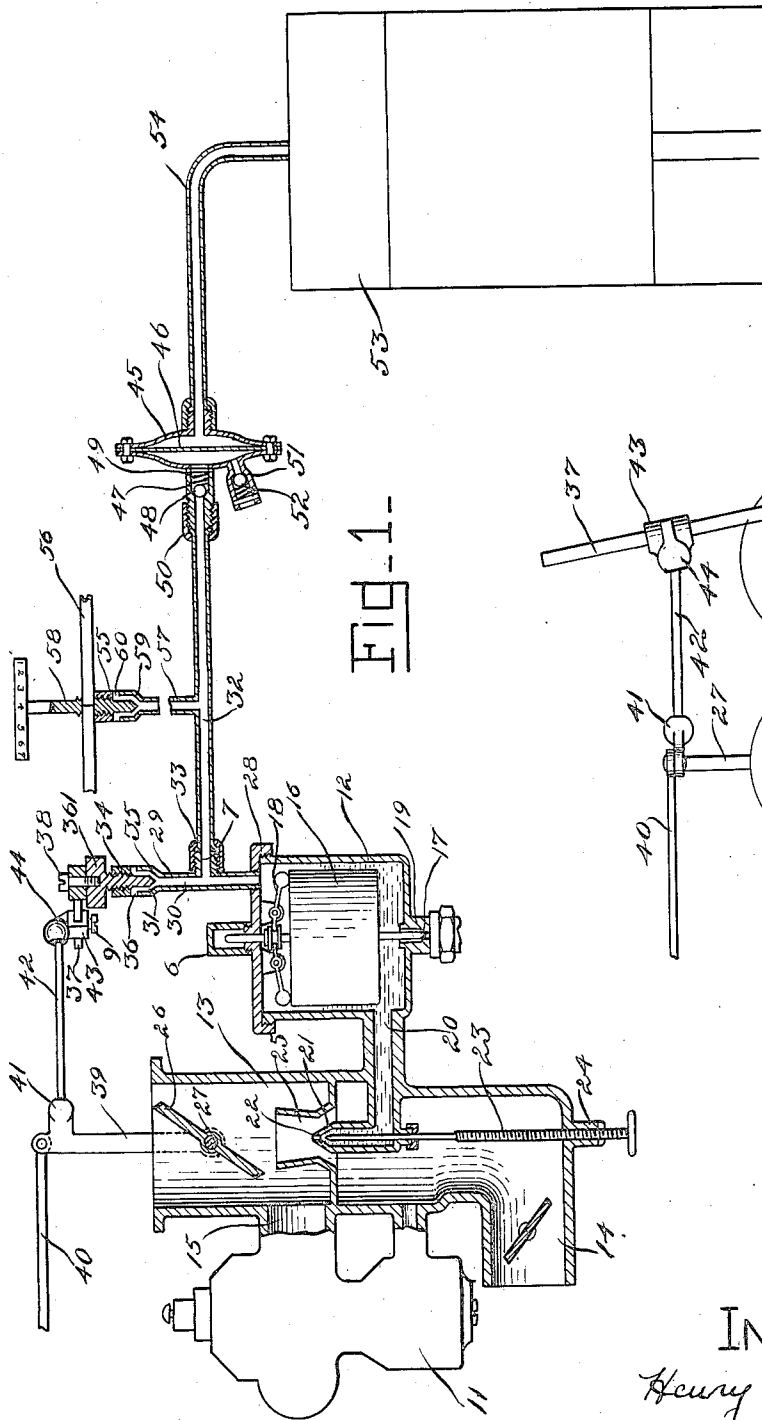


Fig. 1-

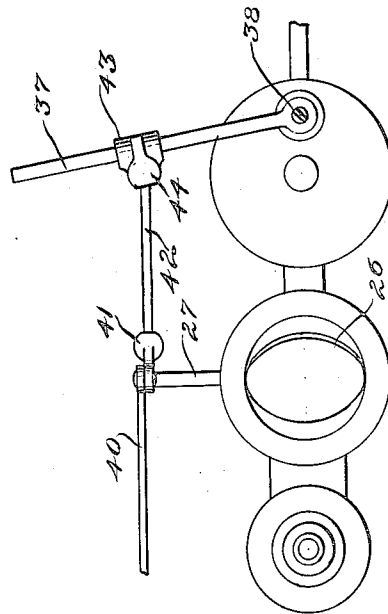


Fig. 2-

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CARBURETER FUEL-CONTROLLING DEVICE.

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Specification of Letters Patent. Patented Mar. 19, 1918.

Application filed May 19, 1916. Serial No. 98,703.

To all whom it may concern:

Be it known that I, HENRY WEBB HYDE, a citizen of the United States, residing at North Cohasset, county of Norfolk, State of Massachusetts, have invented a certain new and useful Improvement in Carbureter Fuel-Controlling Devices, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention has for its object a device which is designed to be used in connection with any common form of automobile carbureter to automatically vary the mixture in proportion to the torque of the engine and thereby to effect an economy in fuel. As is well known to those skilled in the art, mixtures of air and fuel vapor are explosive over a relatively wide range. It is also well known that the normal mixture, which gives the maximum mean effective pressure, does not necessarily give the greatest thermal efficiency under all conditions, for when the engine is working under a comparatively light load, it has been found that a mixture which is thinner than the normal mixture will give greater efficiency per heat unit than the normal mixture. This is due to the fact that at medium and low engine torque the volume of the mixture does not equal the cylinder capacity. Accordingly it is possible to increase the proportion of air in the mixture without displacing the fuel vapor. On the other hand when the engine is working at full capacity it is not possible to use a thinner mixture than normal because the volume is limited by the cylinder size and a thin mixture would necessarily contain fewer heat units than the normal mixture and consequently the mean effective pressure would be decreased.

The device embodying my invention is designed to automatically regulate the carbureter so that the mixture is varied in proportion to the torque and thereby to effect a material saving in fuel. The device is further designed so that it may be inexpensively produced and readily applied to any common form of carbureter.

My invention will be fully understood when taken in connection with the accompanying drawings and the novel features thereof will be pointed out and clearly defined in the claims at the close of this specification.

In the drawings, Figure 1 is a view partly in section showing a carbureter, an engine

cylinder and a device embodying my invention in connection therewith.

Fig. 2 is a detail plan view of a carbureter and a portion of the mechanism embodying my invention.

Having reference to the drawings there is shown at 11 a carbureter of any common form provided with a float chamber 12, a mixing chamber 13, an air inlet 14 and an auxiliary air inlet 15. The float chamber 12 is provided with a top 28 and with the usual float 16 which is operatively connected to a float valve 17 by the usual toggle levers 18 and thereby controls the flow of fuel into the carbureter through the inlet pipe 19 and maintains the fuel at a given level in the chamber. The upper end of the valve member 17 projects through the top 28 and is surrounded by a cap 6 which is threaded to the top 28, so that air leakage into the chamber 12 is substantially eliminated. A pipe 20 leads from the carbureter 12 to a nozzle 21 having a fuel orifice 22 of common form in connection with which is a fuel valve 23 making a threaded connection with a lug 24 by which it may be adjusted as required. The mixing chamber 13 has a Venturi tube 25 and the usual throttle valve 26 mounted on a shaft 27. While I have shown and described in detail one form of carbureter in connection with which my device is used, as will be hereinafter described, it will be understood that any common form of carbureter may be equally well employed.

The top 28 of the carbureter float chamber 12 is connected with a valve 29 preferably in the form of a casting as shown, in which is a passage 30 connecting with the interior of the float chamber 12. The valve 29 is also provided with a passage 7 which opens into the passage 30 and is connected with a pipe 32 by any suitable connection 33. The upper end of the valve 29 is provided with a needle valve member 34 which is threaded into the valve 29 and is designed to act in conjunction with a seat 35. At the sides of the valve member 34 are ports 36 which connect the passage 30 with the outside air by means of a passage 31.

The valve member 34 is arranged to be operated in conjunction with the throttle valve 26 so that when the throttle valve closes the needle valve closes and vice versa. Mechanism for connecting the valve 29 to the throttle valve 26 preferably consists of a lever 27 adjustably secured to the cap 361

of the valve member 34 by means of a suitable set screw 38. The shaft 27 on the throttle valve 26 is provided with a rod 39 pivotally connected at its free end to a throttle lever 40 and connected at 41 by a universal joint to the lever 37 by means of a link 42. In order that the valve member 34 and throttle valve 26 may be readily adjusted with relation to each other, I provide a block 43 loosely mounted on the lever 37 and connected to the link 42 by a universal joint 44, a suitable set screw 9 being employed to secure the block 43 on the lever 37 as desired.

A diaphragm pump 45 of any common form has a suitable diaphragm 46 which is adapted to operate back and forth under varying pressures in the usual manner. A valve 47 is secured to the diaphragm pump 45 at one side of the diaphragm and is provided with an inlet check valve 48 preferably backed by a light spring 49, the other end of the said valve 47 being connected to the pipe 32 by a connection 50. At that side of the diaphragm pump 45 at which the check valve 47 is located is an outlet check valve 51 having a suitable ball check 52 similar in operation to the check 48. The diaphragm pump 45 is connected to a cylinder 53 of the engine of the automobile in connection with which the device is employed by means of a pipe 54 so that the pump 45 functions once for each cycle of the cylinder.

The mechanism hereinabove described is also preferably provided with a hand regulated valve 55 which may be located in any convenient position on the automobile. It is here shown as located on the dash 56 of the machine and is connected to the pipe 32 by a pipe 57. The valve 55 has a valve stem 58 of the usual type which acts in conjunction with a seat 59 and is provided with a plurality of ports 60 which connect with the pipe 57. The valve 55 is not essential to the system but serves as an additional means of adjusting it convenient to the operator.

The operation of the device is as follows:

As the engine operates the cylinder 53 causes the diaphragm 46 of the pump 45 to be moved to the right, as shown in Fig. 1 at the suction stroke of the engine, and to be moved to the left at the compression stroke and at the explosion of the engine, and in this manner to function once for each cycle of the cylinder. The pump, therefore, will be responsive to engine speed and by means of the check valves 47 and 51 will cause air to pass through the pipe 32 in proportion to the speed of the engine so long as the flow of air into the pipe 32 is unrestricted. Normally the air pressure on the fuel in the float chamber 12 is atmospheric. The flow of fuel through the feed opening 22 in the nozzle 21 is proportional

to the square root of the difference of the pressures at the feed opening and in the float chamber 12. Accordingly the flow of fuel from the jet 22 can be varied by varying the pressure in the float chamber. Since the float chamber is connected to the valve mechanism 29 and through this to the pipe 32, the pressure in pipe 32 is always the same as the pressure in the float chamber. The pressure in pipe 32 is the same as atmospheric pressure so long as either or both needle valves 36 and 58 are open a sufficient amount to allow a quantity of air to pass freely into the pipe 32 equal to the quantity passing through the pump. When, however, the needle valves are closed sufficiently to restrict the flow of air there will be a drop in pressure below that of the atmosphere the amount of which is dependent on the speed of the pump or in other words the speed of the engine, and on the amount of restriction.

As is well known to those skilled in the art, the torque of the engine depends upon two factors, namely, the speed of the engine and the quantity of fuel supplied. For a given quantity of fuel the torque decreases as the engine speed increases, or on the other hand for a given rate of revolution the torque decreases as the fuel decreases. The pressure in pipe 32 for a given position of the needle valves 34 and 58 decreases as the engine speed increases. This acting through the float chamber decreases the amount of fuel supplied at the jet and accordingly decreases the fuel as the torque decreases. The pressure in pipe 32 also varies for a given engine speed as the needle valve 36 is opened or closed. As this needle valve is operatively connected with the throttle of the carbureter to close as the throttle closes, and vice versa, the pressure in pipe 32 for any given engine speed will decrease as the quantity of fuel supply decreases and accordingly as the torque decreases.

In order to obtain the proper reduction in pressure in pipe 32 occasioned by the relation of the restriction of needle valve 36 to the flow of air occasioned by the pump, it is preferable to provide means for adjusting this relation. This may be done by either varying the relation between the throttle and the valve 36 by the sliding adjustment of block 43 on lever 37, or by varying the amount of air supplied to pipe 32 through valve 55. The valve 55 is preferably employed for this purpose for it may be located conveniently to the operator of the machine and may be arranged so that it is possible to obtain a very fine adjustment.

I wish it to be understood that while I preferably employ a diaphragm pump in connection with the device described herein, I do not necessarily wish to limit myself to this particular form of pump for any other

well known form of pump mechanism may be employed.

What I claim is:

5 1. In combination, a carbureter having a float chamber, a fuel supply pipe and a fuel feed opening in connection with said chamber, an engine, mechanism responsive to the speed of said engine for decreasing the pressure of the fuel in the fuel feed opening, a
10 throttle, and means controlled by said throttle to counteract the effect of said mechanism in proportion to the throttle opening throughout the throttle movement.

15 2. In combination, a carbureter having a float chamber, a fuel supply pipe and a fuel feed opening in connection with said chamber, an engine, a pump responsive to engine speed for reducing the air pressure in said float chamber, a throttle, and means controlled by said throttle to counteract the effect of said pump in proportion to the throttle opening.

20 3. In combination, a carbureter having a float chamber, a fuel supply pipe and a fuel

feed opening in connection therewith, an engine, mechanism responsive to engine speed for reducing the air pressure in the said float chamber, a throttle, and a relief valve in connection with said float chamber which is operated in connection with said throttle. 25 30

4. In combination, a carbureter having a float chamber, a fuel supply pipe, and a fuel feed opening in connection with said chamber, an engine, a pump responsive to engine speed for reducing the air pressure in said float chamber, a throttle, and a relief valve for said float chamber which is operatively connected to said throttle and which increases or decreases said relief opening accordingly as said throttle is opened and closed. 35 40

In testimony whereof I affix my signature, in presence of two witnesses.

HENRY WEBB HYDE.

Witnesses:

CAMERON MACLEOD,
ALICE H. MORRISON.