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CARBURETER FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED JUNE 5, 1917.

1,383,044. Patented June 28, 1921.

Fig. 1.

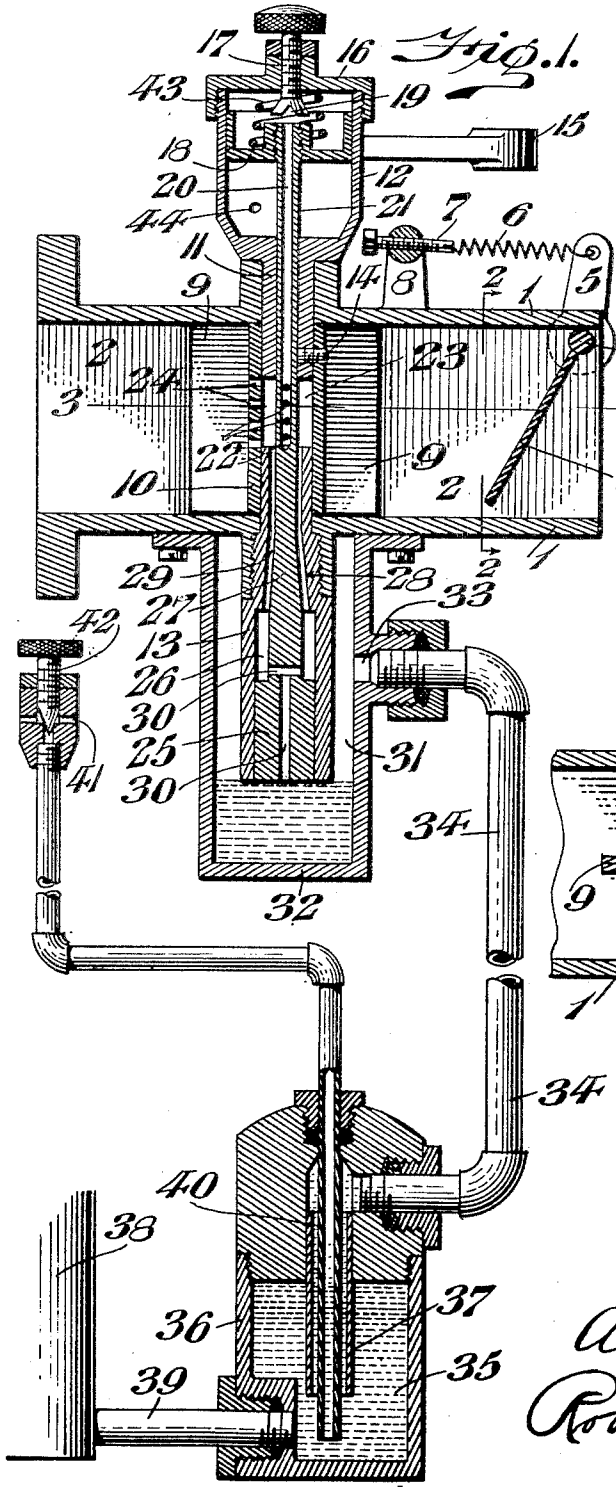


Fig. 2.

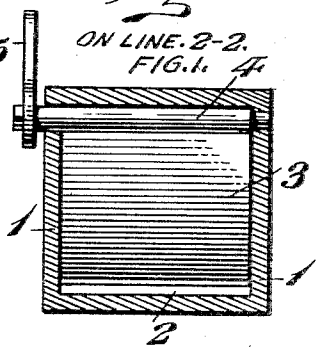
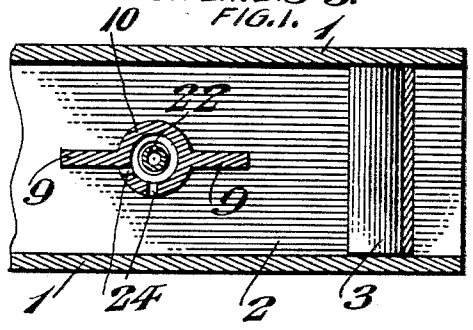


Fig. 3.



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CARBURETER FOR INTERNAL-COMBUSTION ENGINES.

1,383,044. Specification of Letters Patent. Patented June 28, 1921.

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To all whom it may concern:

Be it known that I, ALFRED WEILAND, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Carbureters for Internal-Combustion Engines, of which the following is a specification.

The present invention relates to carbureters for explosive engines and has particular reference to the feeding of fuel to the carbureter, the proper mixing of the fuel with air to form an effective explosive mixture under varying engine conditions and the automatic control of the mixture proportioning means in accordance with the demands of the engine under working conditions.

An object of the invention is to provide a carbureter wherein the carbureting chamber under operating conditions is always supplied with fuel in proper amount without the aid of a float or floats as in the ordinary construction.

A further object of the invention is to provide means for not only maintaining an available supply of liquid fuel for use in the carbureting chamber but also to regulate the quantity of fuel delivered from said supply to the mixing chamber according to the requirements of the motor as determined by the negative pressure of the motor intake.

For the purpose of illustrating my invention, I have shown in the accompanying drawings one form thereof which is at present preferred by me, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangements and organization of the instrumentalities as herein shown and described.

Referring to the drawings:

Figure 1 represents a vertical section of a carbureter embodying my invention.

Fig. 2 represents a section on line 2—2 of Fig. 1.

Fig. 3 represents a section on line 3—3 of Fig. 1.

1 designates generally the casing of the carbureter the same forming a transverse passage serving as the carbureting chamber 2, one end of which is connected to and forms part of the motor intake, while the opposite end is open to the atmosphere and forms the main air inlet. This inlet, in the present instance, is controlled by a valve 3 of the flap type which is pivoted for movement with a rock spindle 4 under the control of the exterior lever 5, as will be understood. As here shown the valve 3 is normally maintained in a predetermined open position by the provision of a spring 6 which is connected at one end to the lever 5 and at the other end to an adjusting screw 7 which is mounted in a lug 8 fixed to the casing. By this construction, the tension of the spring may be adjusted to meet requirements and is preferably always under sufficient tension to maintain the valve 3 open a predetermined amount for the passage of air, while a further opening of the valve takes place in accordance with the amount of negative pressure in the motor intake.

9 designates the throttle valve which is pivotally mounted in the carbureting chamber 2 to control the mixture in the required manner and, as here shown, is provided with a tubular body part 10 which receives at one end the sleeve extension 11 of a dash-pot cylinder 12 and at the opposite end a fuel delivery tube 13. The extension 11 is fixed to the throttle valve 9 by the pin 14 or equivalent means, so that as it is turned from one position to another by the throttle lever 15 its movement is transmitted to the throttle valve and the latter shifted in the desired manner. The cylinder 12 is of ordinary open ended construction closed by the cap 16 and this latter carries an adjustable thumb screw 17 which passes through the cap and terminates adjacent to and in the path of movement in one direction of the plunger 18, so that the latter, under certain conditions, will contact with the screw 17 and be limited in its movement. In this connection, it will be noted that the abutting end of the thumb screw is provided with a port 19 for the purpose of establishing communication between one side of the plunger 18 and a conduit 20 even though the dash-pot is in seated position against the said screw 17. The conduit 20 is formed in a tubular stem 21 and extends to approximately the central portion of the tubular body 10 of the throttle valve where it com-

municates with transverse ports 22 which open into an annular space 23 formed between the juxtaposed ends of the stem 11 and tube 13. This space has communication with the carbureting chamber by way of the openings 24. The stem 21 is constructed to pass through a portion of the tube 13 and terminates in an enlarged head portion 25 which is arranged to slide freely within the chambered portion 26 of the tube 13. That portion of the stem 21 which passes through the tube 13 forms in effect a valve, since for a portion of its length, it is tapered, as indicated at 27, to conform to a similarly tapered part of the tube 13 which forms the valve seat 28, though in actual operation, it will be understood that the valve 27 is not adapted to entirely close the opening or passageway 29 and will hereinafter be described. Thus the passage 29 and openings 24 form the fuel jet of the carbureter, and the arrangement is such that in any open position of the throttle valve 9, the fuel jet will be directly subject to the maximum negative pressure in the motor intake. The head 25 is provided with a port 30 forming a normally open passage or means of communication between the portion 26 and the auxiliary fuel reservoir 31. This latter, in the present instance, is formed in a supplemental casing 32 attached to and depending from the main casing 1, though it will be understood that this is merely for purpose of illustration and any equivalent means for forming the reservoir 31 as a part of the casing 1 may be employed.

33 designates the fuel inlet to the reservoir 31 the same being preferably formed in the wall of the casing 32 above the inlet of the port 30 in order that the liquid fuel may collect in the reservoir 31 and act, under certain conditions, as a seal for the port 30, as will be later explained. The inlet 33 has free communication by way of the pipe 34 with the chamber 35 of a receiving tank 36 and, as here shown, this communication is established by way of a tube 37 which extends an appreciable distance within the chamber 35. The main fuel supply is stored in the tank 38 which communicates directly by way of the pipe 39 with the chamber 35 and its supply of liquid fuel to the said chamber 35 may be either by gravity or by suction according to the position of the pipe 39. 40 designates a pipe passing through the delivery tube 37 and serving to conduct air under atmospheric pressure below the level of the liquid fuel supply in chamber 35 whereby the said fuel is raised through the delivery tube 37 and pipe 34 to the main reservoir 31 on the principle of an air lift pump. In order to introduce air to the pipe 40, there is a port 41 suitably formed for the purpose and the quantity of air may be regulated by an adjustable needle valve 42 arranged in any desired manner to perform the required function. In connection with the pipe 40, it should be noted that it is desirable to make this of sufficient length to bring the air valve 42 and air port 41 well above the level of the supply tank 38 and preferably located at the same level as the carbureter itself, so that there will be no danger of the liquid fuel overflowing through the port 41 under all normal operating conditions.

Before considering the operation of the carbureter, it should be noted in connection with the dash-pot construction, that the plunger 18 and its adjuncts are normally under the pressure of a spring 43 which tends to maintain the valve 27 in open position so that there is always a passage for the liquid fuel to the motor intake when the motor is in operation, though this passage may be restricted automatically according to the negative pressure in the motor-intake and to variations in this negative pressure. A port 44 or the like is provided to relieve the pressure in the cylinder 12 at the opposite side of the plunger 18 from the spring 43, as will be understood.

In the operation of the carbureter, the air valve 3 is adjusted, by properly tensioning the spring 6, to maintain an air inlet suitable for a predetermined minimum negative pressure in the motor-intake, and consequently, a condition exists which gives a mixture rich in fuel and available for starting and slow speed conditions. Thus the negative pressure of the motor-intake causes the liquid fuel to be drawn through the passage 29 to the space 23 and thence discharge into the carbureting chamber 2, where it mixes with the air from the main air inlet. The location of the ports 24 at points spaced from the walls of the chamber 2 gives a more intimate and complete mixing with the air than where such ports are in the walls of the carbureting chamber or in such close proximity thereto as to cause particles of the liquid to adhere to the walls instead of mixing directly with the body of air.

Considering conditions, when the negative pressure is increased, either by load conditions or by use of the throttle, it will be evident that the pressure at the spring side of the dash-pot plunger 18 is also reduced, since the conduit 20 forms a direct communication with the motor-intake, and acts to overcome the tension of the spring 43, thus shifting the stem 21 and causing the fuel discharge passage 29 to become restricted sufficiently to meet the change of conditions. Likewise the air valve 3 is opened in proportion to the increased negative pressure with the result that the explosive mixture is automatically proportioned as to air as well as to fuel. The automatic adjustment of the valve portion 27 of the stem 21 is an

important feature in the operation of the feeding of fuel to the carbureting chamber, since it regulates the quantity of fuel to be delivered for forming the explosive mixture and it is evident that where the negative pressure is relatively high and the throttle closed the passage 29 will be restricted owing to the fact that the tension of the spring 43 is overcome and the stem 21 is drawn toward the seat 28. An opening of the throttle to meet a change in conditions, such as an increase of the load, results in a drop in the negative pressure in the carbureting chamber, that is, the pressure approaches the atmospheric pressure, whereupon the spring 43 predominates and forces the stem 21 to a position where the passage 29 is increased and more fuel is delivered to the motor-intake. Another feature of this construction is in the provision of the head 25 with the inlet to the port 30 adjacent to or substantially at the level of the liquid fuel in the reserve reservoir 31. Since this latter has no direct communication with the atmosphere it is always subject to the negative pressure of the motor-intake, and consequently, as the increments of the fuel are drawn to the motor they will be automatically replaced by liquid fuel mixed with air drawn through the pipe 34. Under conditions where the motor is at rest, the inlet of the port 30 is submerged and is therefore liquid sealed to prevent air under atmospheric pressure from entering the reserve reservoir 31 by way of the passage 29 and thereby disturbing conditions in the pipe 34 and reserve chamber 35. Under running conditions, however, the inlet to the port 30 may or may not be sealed by the liquid since, if sealed, the negative pressure causes air to bubble through the fuel to carry fuel to the carbureting chamber, and if unsealed, the saturated air from pipe 34 passes to the carbureting chamber directly through port 30. Naturally, the submergence of the port 30 means a mixture rich in fuel and therefore the construction is designed with a view to giving the desired submergence at a time when the speed or load requires a mixture rich in fuel.

It will now be apparent that I have devised a complete unitary structure, wherein the use of a float for controlling the fuel level is dispensed with while the device in operation effectively regulates the supply of fuel and the explosive mixture in accordance with the speed and load conditions imposed upon the motor.

It will now be apparent that I have devised a novel and useful construction which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description and while I have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

What I claim is:

1. In a device of the character stated, a casing forming a carbureting chamber, having communication with the atmosphere and with the intake of a motor of the explosive type, a reservoir for liquid fuel, a movable fuel conducting means forming a communication between said reservoir and said carbureting chamber and means for submerging the inlet of said fuel conducting means in the body of fuel in said reservoir under conditions producing a decreased negative pressure in the motor intake.

2. In a carbureter, a casing forming a carbureting chamber having opposite ends respectively in communication with the atmosphere and the intake of a motor of the explosive type, a fuel reservoir, means forming a fuel conduit between said reservoir and said chamber, a reciprocable valve in said conduit having a passage therein for controlling the fuel supply to said chamber, a throttle valve arranged to control the discharge of fuel to said chamber, means to automatically regulate the supply of air to said chamber, and means arranged to submerge the inlet of said valve passage under inoperative conditions.

3. In a carbureter, a casing forming a carbureting chamber communicating at opposite ends respectively with an air supply and with the intake of a motor of the explosive type, a fuel reservoir, a fuel valve arranged to control the passage of fuel to said carbureting chamber, said valve having a passage therethrough, and means operative by pressure conditions in the motor intake for reciprocating said valve to regulate the supply of fuel under operating conditions and to hold the inlet of said valve passage submerged under inoperative conditions.

4. In a carbureter, a casing forming a carbureting chamber arranged to communicate with the atmosphere and with the intake of an internal combustion engine, a fuel reservoir, a fuel nozzle arranged to discharge fuel into said carbureting chamber and having a portion extending into said reservoir, a movable valve part for said nozzle arranged to travel toward and away from the liquid level in said reservoir, said valve part being provided with a fuel passage having an inlet normally at the level in said reservoir, and means controlled by variation of pressure in said motor intake for moving said valve part in a predetermined manner.

5. In a carbureter, a casing forming a carbureting chamber arranged to communicate

with the atmosphere and with the intake of an internal combustion engine, a fuel reservoir, a fuel nozzle extending from said reservoir into said carbureting chamber and having an inlet located in close proximity to the liquid level in said reservoir, means for varying the location of said inlet, and a throttle valve so arranged as to subject said nozzle to the maximum negative pressure of said intake in any open position of said throttle valve.

In testimony whereof I have hereunto signed my name.

ALFRED WEILAND.