W. G. HEMENWAY.

CARBURETER.

APPLICATION FILED MAR. 13, 1918.

1,398,459.

Patented Nov. 29, 1921.

3 SHEETS—SHEET 1.

Fig. 1.

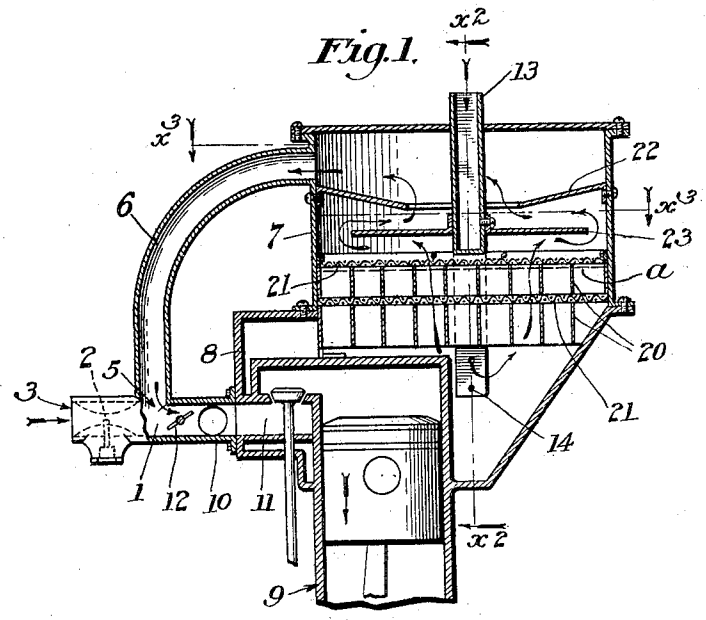
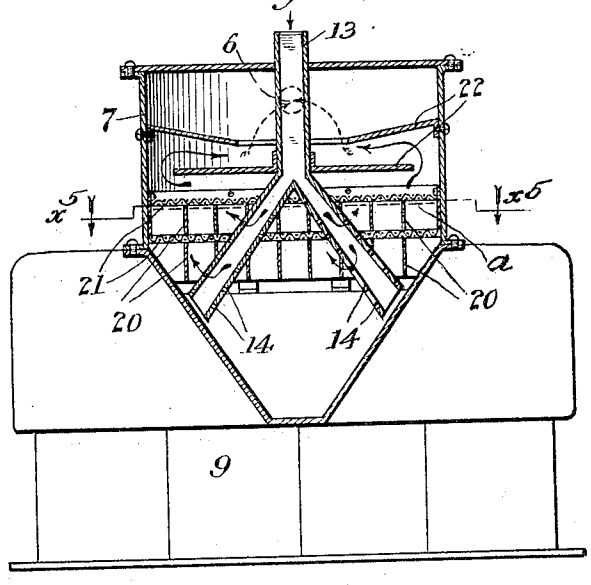


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

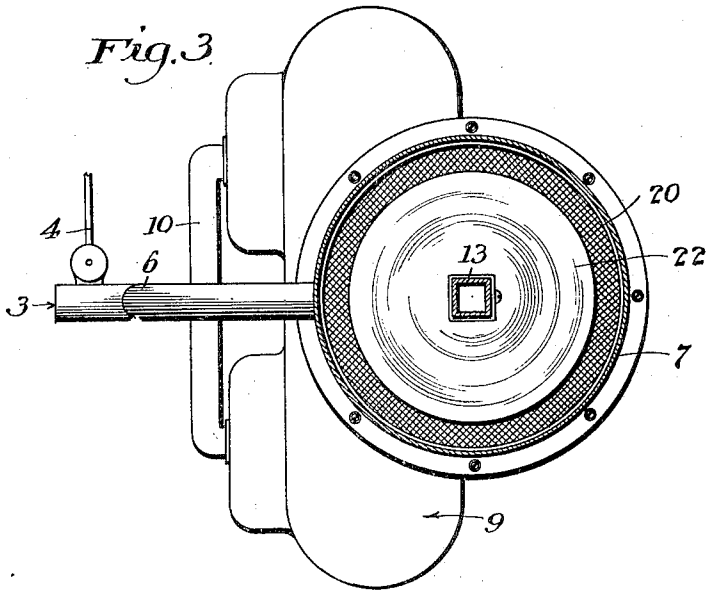


Fig. 4.

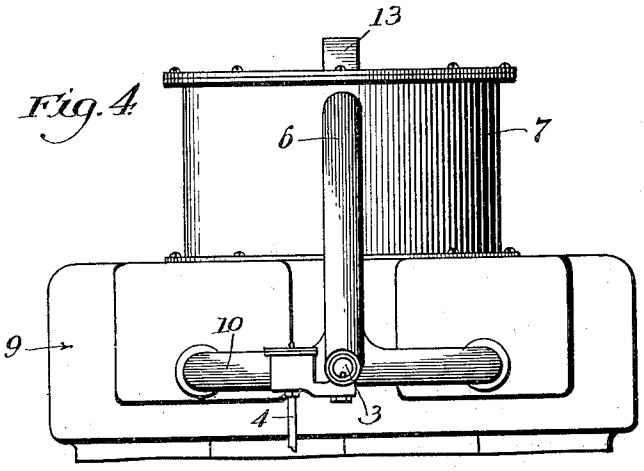
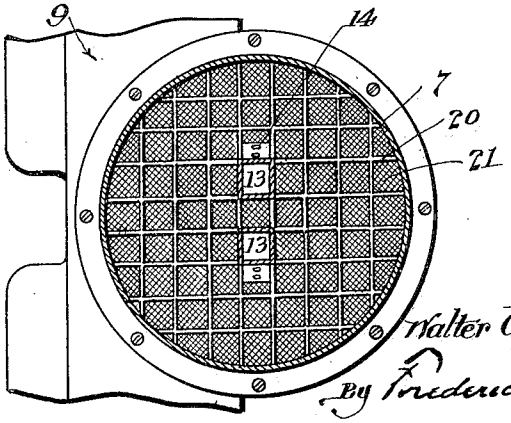


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 6.

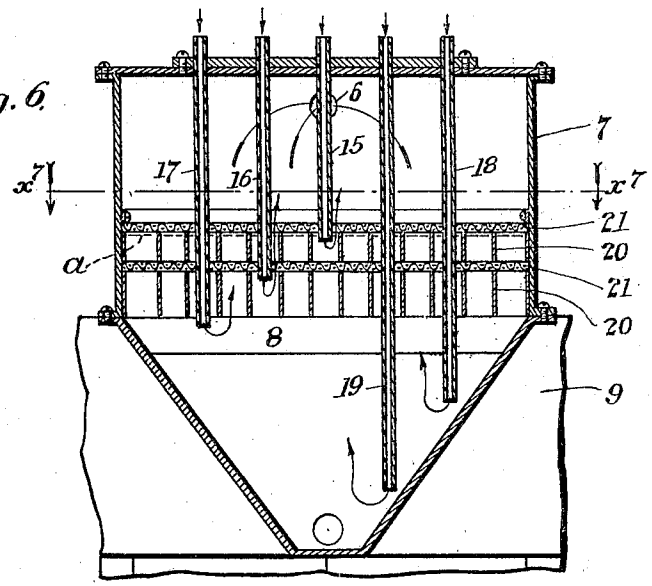
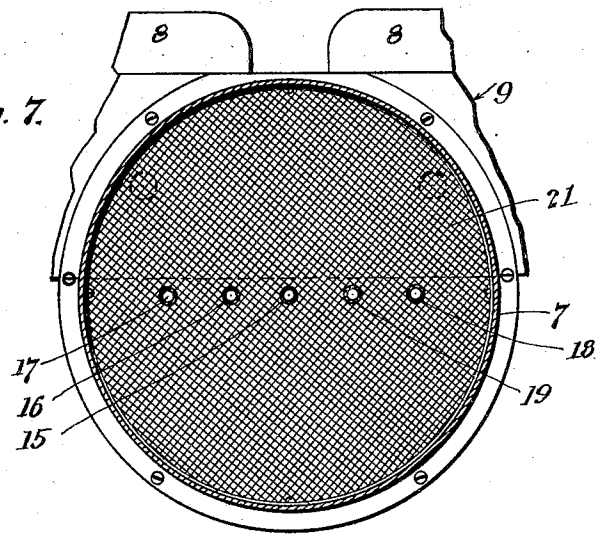


Fig. 7.



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UNITED STATES PATENT OFFICE.

WALTER G. HEMENWAY, OF LOS ANGELES, CALIFORNIA.

CARBURETER.

1,398,459. Specification of Letters Patent. Patented Nov. 29, 1921.

Application filed March 13, 1918. Serial No. 222,216.

To all whom it may concern:

Be it known that I, WALTER G. HEMENWAY, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Carbureter, of which the following is a specification.

An object of this invention is to make provision for cooling the cooling medium in the water jacket of an engine by direct contact of air with the cooling liquid.

Another object is to make provision for regulating the admission of auxiliary air to the carbureting chamber, and for this purpose employing a body of liquid.

Another object is to moisten the auxiliary air thus admitted to the carbureter.

Another object is to effect heating of the auxiliary air by direct contact of the air with the cooling liquid of the engine.

Another object is to effect the foregoing results simultaneously in a single device.

Other objects and advantages will appear in the subjoined detail description.

This is a continuation in part of my copending application for patent for air moistening for hydrocarbon engines, filed June 1, 1917, Serial No. 172,321.

The accompanying drawings illustrate the invention:

Figure 1 is an elevation mainly in vertical mid section of a device constructed in accordance with the provisions of this invention, a portion of the engine being broken away to contract the view.

Fig. 2 is a sectional elevation on line indicated by x^2—x^2, Fig. 1, the engine cylinders being shown intact.

Fig. 3 is a plan section on the irregular line indicated by x^3—x^3, Fig. 1.

Fig. 4 is an elevation of Fig. 3 from the left thereof, the lower portion of the engine cylinders being broken away.

Fig. 5 is a plan section on line indicated by x^5—x^5, Fig. 2.

Fig. 6 is a fragmental sectional elevation of a modified form of the invention.

Fig. 7 is a plan section on line indicated by x^7—x^7, Fig. 6.

There is provided a carbureting chamber 1 having projecting thereinto and terminating therein a fuel nozzle 2, said carbureting chamber being provided with a main air inlet port 3. Fuel is supplied to the nozzle 2 through a suitable pipe 4 adapted to connect to a source of fuel supply, not shown. The carbureting chamber 1 is also provided with an auxiliary air inlet port 5 connected by a tube 6 with the upper portion of a jacket or chamber 7. The chamber 7 is adapted to hold liquid, for instance water, and said water may be supplied from any suitable source and the level thereof may be regulated by any well-known means, such means being understood and therefore it is not necessary to illustrate and describe them. The level at which it is preferable that the liquid stand is indicated at *a* Figs. 1 and 6, though such level may vary somewhat in practice. In the drawings the chamber 7 is shown as being connected with or forming a portion of the water jacket 8 of an engine indicated in general by the character 9.

The carbureting chamber 1 is connected by a manifold 10 to the valve chest 11 of the engine so that the engine suction will cause spraying of the fuel from the nozzle 2 and will also produce partial vacuum in the tube 6. The chamber 1 is provided between the auxiliary air inlet 5 and the valve chest 11 with a suitable throttle valve 12 of any well known construction. This throttle valve 12 regulates the engine speed in a manner well understood.

Means are provided to admit air to the chamber or jacket 7 at different depths below the liquid level *a* and such means may be variously constructed. First referring more particularly to the construction shown in Figs. 1 and 2 such air admission means comprise a tube 13 projecting through the top of the chamber 7 and open at its upper end. The air tube 13 may be divided or branched at its lower portion as shown in Fig. 2, if desired, though the branched construction is not necessary to the working of the device, and the tube 13 below the liquid level *a* is provided with openings 14 and the lower end of the tube is open. Thus it is clear air may readily enter the tube 13 and flow from said tube at different levels, and in its broader aspects the invention contemplates the discharge of air into the chamber 7 at different levels by any suitable means.

Now referring more particularly to Fig. 6 the air admission means comprise a series of tubes 15, 16, 17, 18, 19 of different lengths projecting through the top of the chamber 7 and having their open lower ends at different levels in the chamber 7. It is readily

comprehended that I effect the same results by the construction disclosed in Fig. 6 as by that disclosed in Figs. 1 and 2.

If the engine be one used in transportation work, for instance one used in an automobile, it may be desirable to prevent too great lateral motion of the liquid in the chamber 7 and for this reason I provide, when necessary, a cellular construction 20, the cells being arranged with their longitudinal axes vertical. It is also desirable in some instances to employ a screen or screens 21 to aid in preventing lateral motion of the water and to also cause more thorough separation of the air particles as the air bubbles up through the liquid. Uniform distribution of the moisture in the air is produced as the air issues from the liquid body into the upper portion of the chamber 7. In Figs. 1 and 2 baffle plates 22 23 are shown so as to aid in causing uniformity of the moisture content of the air throughout the chamber.

In practice, assuming that the engine 9 has been started into operation in a manner well understood in the art pertaining to gas engines, and assuming that the throttle valve 12 is turned just sufficient to maintain idling operation of the engine, the suction produced by the engine in the carbureting chamber 1 will suck fuel from the nozzle 2 into said chamber and will also draw air through the main inlet port 3. A certain degree of suction is also produced in the tube 6, but the suction is so slight that atmospheric pressure will not lower the liquid level in the tube 13 in Figs. 1 and 2 below the uppermost perforations 14 nor in the tube 15 in Fig. 6 below the lower end of said tube. Thus no auxiliary air is admitted to the chamber 1 and the only air that is admitted to said chamber is that admitted directly from the atmosphere and consequently the water content of the mixture passing into the engine will only be that of the atmosphere.

If higher speed of the engine is desired, the throttle valve 12 will be opened to a greater degree and the resulting increased suction produced in the tube 6 will cause lowering of the liquid level below the uppermost perforations 14 in the tube 13 or below the lower end of the tube 15, as the case may be, thus admitting air to the chamber 7 below the liquid level *a*. The air thus admitted forms bubbles which rise through the water and are broken up by the screens 21. The bubbles thus rising through the water and passing through the screens 21 are laden with moisture and burst at the liquid level and the moist air is drawn from the chamber 7 through the tube 6 into the carbureting chamber 1 where the moisture laden air is mixed with the mixture of air and fuel already produced adjacent the nozzle 2. This mixture then passes through the manifold into the engine and is fired in a manner well understood in the art to cause continued operation of the engine.

The higher the speed desired the farther open the throttle will be adjusted, and as the throttle is opened farther and farther the liquid level in the tube 13 or tubes 15, 16, 17, 18, 19 will fall lower and lower thus admitting an increasing quantity of air to the chamber 7 which flows thence to the carbureting chamber.

From the foregoing it is clear that the body of liquid in the chamber 7 functions the same as the ordinary auxiliary valve for the admission of auxiliary air in the usual carbureter, thus the chamber 1, nozzle 2, tube 6, chamber 7 and the liquid body in the chamber 7 function the same as an ordinary carbureter and may be so termed, the liquid constituting an auxiliary air valve. Besides this the liquid in the chamber 7 moistens the auxiliary air on its way to the carbureting chamber, and furthermore, it is clear, that since the auxiliary air is caused to pass through the cooling liquid of the engine it cools said cooling liquid. Another advantage of the auxiliary air passing through the cooling liquid of the engine is that the liquid heated by operation of the engine heats the auxiliary air and thus a certain amount of the heat which is ordinarily extracted from the cooling medium and radiated by the use of the usual radiator is not lost but passes back into the engine with the fuel.

The higher the speed of the engine the greater will be the suction in the chamber 7, and consequently the hotter the engine tends to become the greater the flow of cooling air through the cooling liquid in the engine jacket so as to prevent too great heating of the engine.

In its broader aspects the invention includes the chamber 7 and the means for admitting air thereto at different levels below the liquid level whether or not said chamber constitutes a portion of or is connected with the water jacket of the engine since the moistening effect on the auxiliary air and the valve-like operation of the water will take place just as well if the chamber 7 is independent of the water jacket as when said chamber communicates with said water jacket. The invention in its broader aspects includes the means for passing air through the cooling liquid of the engine irrespective of how this is done. It also includes the sucking of the air through the cooling liquid of the engine by the operation of said engine. Furthermore, it includes the heating of the auxiliary air by direct contact of the cooling liquid therewith before said air is drawn into the engine.

It is obvious that modifications of the foregoing described constructions may be

made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In combination, a carbureting chamber having main and auxiliary air inlet ports and an outlet, a fuel nozzle terminating in the carbureting chamber, a chamber independent of the fuel nozzle adapted to hold a liquid body, means to admit air to the second chamber at different levels below the liquid level, a throttle valve between the auxiliary air inlet port and the outlet, and means to conduct air from the second chamber above the liquid level thereof to the auxiliary air inlet port.

2. In combination, means forming a passage for air, said passage having main and auxiliary air admission ports and an outlet, a throttle valve between the auxiliary air port and the outlet, a fuel discharge nozzle terminating in the passage between the main air inlet port and auxiliary air admission port, a chamber independent of the nozzle adapted to hold a liquid body, means to admit air to the chamber at different levels below the liquid level, and means to conduct air from the chamber to the auxiliary air admission port.

3. In combination, an engine having a jacket designed to hold a cooling medium, a carbureting chamber having main and auxiliary air inlets and having an outlet, a fuel nozzle terminating in the carbureting chamber, means to admit air to the jacket below the liquid level, and means to conduct air from the chamber above the liquid level thereof to the auxiliary air inlet of the carbureting chamber between the main air inlet and outlet, the nozzle being positioned between the main air inlet and the auxiliary air inlet.

4. In combination, an engine having a jacket designed to hold a cooling medium, a carbureting chamber having main and auxiliary air inlets and an outlet, a throttle valve between the auxiliary air inlet and the outlet, a fuel nozzle terminating in the carbureting chamber between the main and auxiliary air inlets, means to admit air to the jacket at different levels below the liquid level, and means to conduct air from the chamber above the liquid level thereof to the auxiliary air inlet.

5. In combination with an internal explosion engine, of means for supplying the same with fuel and air comprising a primary air inlet pipe, a fuel nozzle extending into the same, a vessel containing a non-combustible liquid which vessel communicates with the engine by a duct which does not pass the fuel nozzle, so that the pressure in the vessel is reduced correspondingly with that of the engine, a secondary air inlet pipe extending into said vessel below the normal level of the liquid therein and so apertured below said level as to admit air into the vessel in amounts that increase as the liquid level in said secondary air inlet pipe is depressed by the engine vacuum.

6. In combination with an internal explosion engine, of means for supplying the same with fuel and air comprising a primary air inlet pipe, a fuel nozzle extending into the same, a vessel containing a non-combustible liquid, which vessel is in communication with said primary air inlet pipe between the nozzle and engine so that the pressure therein is reduced correspondingly with that of the engine, and a secondary air inlet pipe extending into said vessel below the normal level of the liquid therein and so apertured below said level as to admit air into the vessel in amounts that increase as the liquid level in said secondary air inlet pipe is depressed by the engine vacuum.

7. In combination with an internal explosion engine, of means for supplying the same with fuel and air comprising a primary air inlet pipe, a fuel nozzle extending into the same, a vessel containing a non-combustible liquid, which vessel is in communication with said primary air inlet pipe between the nozzle and engine so that the pressure therein is reduced correspondingly with that of the engine, and a secondary air inlet pipe extending into the liquid in said vessel and so apertured as to admit air into the liquid in said vessel in amounts that increase as the liquid level in said secondary air inlet pipe is depressed by the engine vacuum.

8. In combination with an internal explosion engine, provided with a jacket for a cooling liquid, of means for supplying the engine with fuel and air, comprising a primary air inlet pipe having an inlet orifice of constant area, a fuel nozzle extending into the primary inlet pipe, a vessel communicating with said jacket so as to receive liquid therefrom which vessel is in communication with said primary air inlet pipe between the nozzle and the engine so that the pressure in the vessel is reduced correspondingly with that of the engine, and a secondary air inlet pipe extending into the liquid in said vessel and so apertured as to admit air into the liquid in said vessel in amounts that increase as the liquid level in said secondary air inlet pipe is depressed by the engine vacuum.

Signed at Los Angeles, California, this 5th day of March, 1918.

WALTER G. HEMENWAY.

Witnesses:
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