

APPLICATION FILED DEC. 5, 1907.

Patented July 1, 1913

5 SHEETS—SHEET 1.



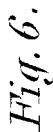
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5 SHEETS—SHEET 2.



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CARBURETER.

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1,065,948.

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5 SHEETS—SHEET 3.

Fig. 3.

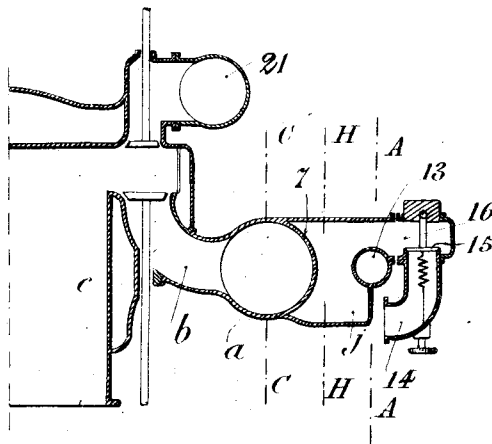
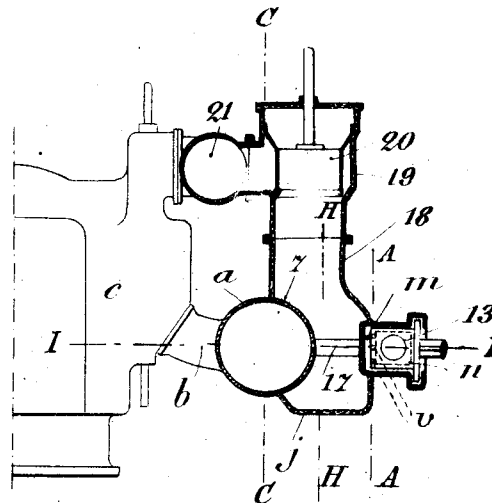


Fig. 4.



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5 SHEETS—SHEET 4.

Fig. 5.

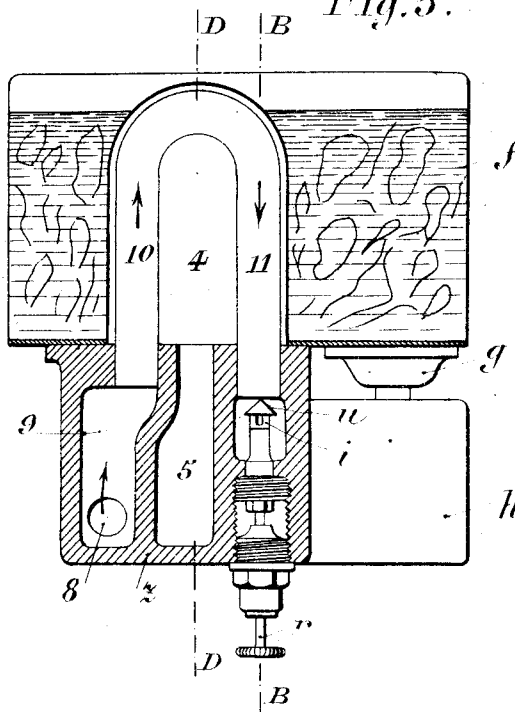
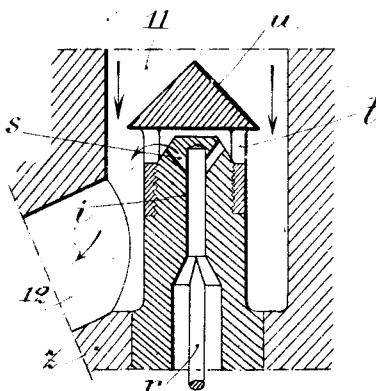


Fig. 7.



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5 SHEETS—SHEET 5.

Fig. 11.

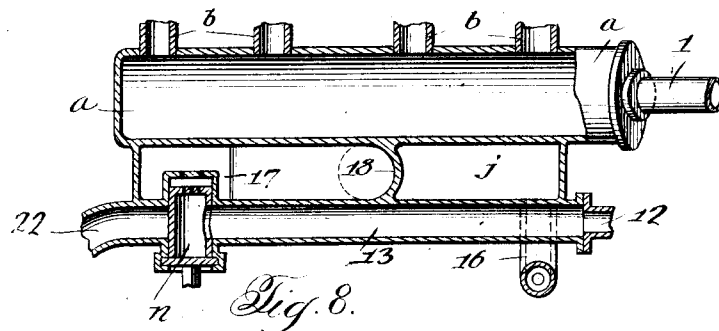


Fig. 8.

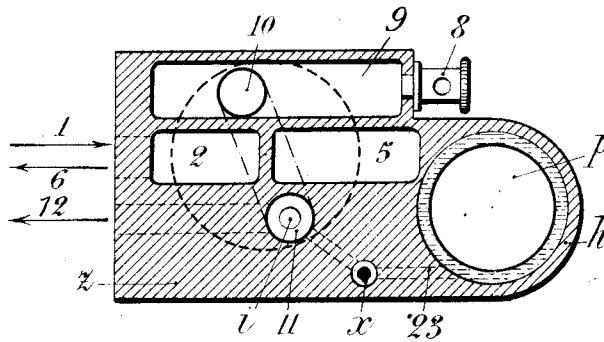


Fig. 9.

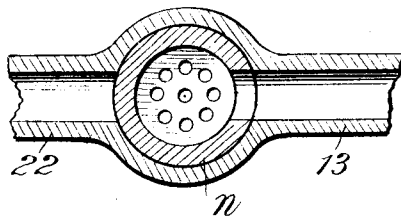
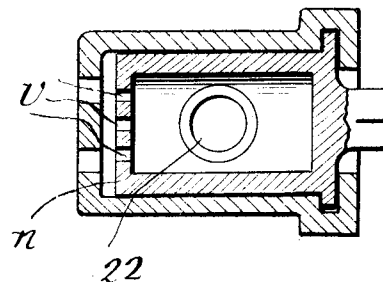


Fig. 10.



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UNITED STATES PATENT OFFICE.

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1,065,948.

Specification of Letters Patent.

Patented July 1, 1913.

Application filed December 5, 1907. Serial No. 405,259.

To all whom it may concern:

Be it known that we, GASTON PAUL JEAN LION and AUGUSTE EUGENE BRILLIÉ, citizens of the Republic of France, residing, respectively, at Levallois-Perret, Seine, France, and Paris, France, have invented Improvements in Carbureters, of which the following is a specification.

This invention relates to charge forming devices for internal combustion engines and has for its object to provide means whereby the heat of the exhaust gases is utilized to increase or facilitate the volatilization and vaporization of the fuel, particularly hydrocarbons which are solid or but slightly volatile. Such means embody heating apparatus comprising a chamber adapted to form a collector of the exhaust gases from the motor and an extension, shunt or branch of which is arranged to form a hearth for the fusion and vaporization of the hydrocarbon; and an adjoining chamber one wall of which at least also constitutes a wall of the first mentioned or collecting chamber, this second chamber serving for the supply, circulation and heating of the air utilized for the formation of the explosive mixture.

A practical form of apparatus embodying this invention is illustrated by way of example in the accompanying drawings in its application to the utilization of a solid hydrocarbon such as naphthalene.

Figure 1 is a vertical section of the heater and of the parts contained therein, the section corresponding partly to the lines A—A of Figs. 3 and 4 and partly to the line B—B of Fig. 5. Fig. 2 is a longitudinal section corresponding to the lines C—C of Figs. 3 and 4 and D—D of Fig. 5; Fig. 3 is a transverse section corresponding to the lines F—F of Figs. 1 and 2; Fig. 4 is a transverse section corresponding to the lines G—G of Figs. 1 and 2; Fig. 5 is a transverse section corresponding to the lines E—E of Figs. 1 and 2; Fig. 6 is a longitudinal section corresponding to the lines H—H of Figs. 3 and 4; Fig. 7 is a sectional detail view of the atomizer. Fig. 8 is a horizontal sectional view taken on the line X—X of Figs. 1 and 2, and Figs. 9 and 10 are detail views of the valve *z*. Fig. 11 is a horizontal section taken on line I—I of Fig. 4.

The heater comprises a chamber *a* into which open the exhaust pipes *b* of the four cylinders *c* of the motor as shown in Figs.

2, 3 and 4 of the drawings. Connected to a branch *d* of the chamber *a* is a pipe *e* through which the gases after their utilization in the heater escape. Arranged in or upon a loop-like extension or shunt 1, 2, 3, 4, 5, 6 of the chamber *a*, in a body *z* integral with this extension, are the receiver *f* for the solid hydrocarbon, the distributor *g* and the receiver *h* for the fused combustible, and the atomizer *i*. The receiver *f* is so arranged that the solid hydrocarbon it contains shall be fused by the heat of the exhaust gases circulating through the loop-like extension 1—6. The branch 6 of the extension or shunt may, in some cases, open into the atmosphere or into a silencer, instead of back into the chamber *a*.

j is the second chamber of the heater, the wall 7 of which is common with the first chamber *a* (Figs. 3 and 4). The chamber *j* serves for the supply, circulation and heating of all the air utilized for the formation of the explosive mixture.

A branch inlet *m* is arranged as shown in Figs. 1, 4 and 6, for permitting the air which has been charged with naphthalene vapor to enter the chamber *j*. This air is mixed with the naphthalene vapor in a conduit preferably heated by being located within or by contact with the two chambers *a* and *j*. This conduit comprises a chamber 9 having an adjustable admission fitting 8 therein, see Figs. 2, 5 and 8, said chamber 9 preferably arranged adjacent the chambers 2 and 5 of the extension or shunt 1—6; and a curved pipe 10, 11, extending from the chamber 9 and communicating with a pipe 12, 13, which is connected to the wall of the branch inlet *m*, and a wall of which branch inlet is preferably common with the chamber *j*. At the junction of the pipes 10, 11 and 12, 13 is located the atomizer *i*, which is arranged to extend into the pipe 11.

A branch 16 is provided, as shown for instance in Figs. 1 and 3, for the admission of additional air, which may be allowed to enter through a short pipe section 14 having therein an automatic valve 15. For the heating of this additional air, a downwardly directed and horizontally arranged partition or baffle 17, as shown in Figs. 1, 4 and 6, is provided within the chamber *j*, and which deflects the pure air at first toward the inlet branch *m*, where it mixes with the air already charged with naphthalene vapor and

forms with it the mixture to be utilized in the motor. This mixture then passes between the upper face of the partition 17 and the upper inside wall of the chamber *j*, and then through the branch coupling 18, into a box or chamber 19, which is furnished with a throttling valve 20, as shown for instance in Fig. 4, and through the medium of which valve the mixture is admitted to the inlet 21 of the motor.

The branch inlet *m* serves as a seat for a rotary valve plug *n*, which according to the position given to it, allows air charged with naphthalene vapor to enter the chamber *j* from the pipe 13; or air charged with spirit such as petrol from the atomizer *k* (for the starting of the motor) to enter such chamber *j* through the pipe 22.

The apparatus described works in the following manner:—The reservoir *f* being charged with naphthalene in lumps or crystals, and the plug *n* being in a position to open the branch 22, and close communication between the conduit 13 and the branch air inlet *m* the flywheel of the motor is worked by hand so as to produce in this branch an aspiration of air charged with the volatile vapor of the petrol or the like. The motor then works by this volatile vapor for a time sufficient to allow the hot exhaust gases passing into the chamber *a* of the apparatus by the ports *b* and following in part the circuit 1, 2, 3, 4, 5, 6 to heat the naphthalene reservoir *f* and the parts *g*, *h*, *i*. When these parts are sufficiently heated the cock *n* is so turned as to close communication with the branch 22 and to open communication with the branch 13, in which position it is shown in Figs. 1 and 4.

The fused naphthalene passes through the perforations *o* and past the opening cock *g* into the liquid receptacle *h* which is provided with a float *p*. When the liquid attains the desired level in the receptacle *h* the raised float closes the supply orifice by a valve *q* thereon. The liquid then passes from the receptacle *h* by the conduit 23 in which may be arranged, as shown, a ball *x* for regulating the flow, into the vertical passage of the atomizer and is drawn through the orifice or orifices *s*, Fig. 7, the delivery through which is regulated by the needle *r*. This aspiration is caused by the air descending in the reverse direction in the pipe 11 and the current of which is divided by the conical cap *u* of the atomizer, at the same time being throttled between the lower edges of this latter and the walls of the said pipe 11, while the liquid drawn in through the orifices *s* is atomized beneath the base of the cone and escapes by the openings *t*. The mixture of air and naphthalene vapor, previously heated by contact with the walls of the circuit 8, 9, 10, 11, passes through the pipes 12 and 13 into the branch inlet *m*,

through the perforations *v* in the plug *n* and diffuses in the pure air which is heated and admitted into the apparatus by the automatic valve 15 and the branch 16.

The apparatus described not only permits, as has been stated above, of a better utilization of the heat of the exhaust gases, but also offers the following advantages:—The exhaust gas collector and its extension or shunt form a hearth for the fusion of the naphthalene and at the same time a heater for the pure air and the carbureted air. It can thus receive the cock *n* for distributing the mixture of naphthalene and air or of the volatile vapor and air at will; and a single automatic air entry valve, as well as a single throttling valve, for both mixtures which enables the dimensions and the weight of the apparatus to be reduced.

What we claim is:—

1. In a carburetor for internal combustion engines, the combination with a chamber for receiving exhaust gases from the engine cylinders and a by-pass from said chamber, of a receptacle for heavy fuel arranged adjacent said by-pass, the contents of said receptacle being adapted to be heated by the exhaust gasses, the conduit extending within said by-pass and arranged to have air passing therethrough, an atomizer for injecting liquefied hydrocarbon into said air conduit, an atomizer for spirit, and means within said conduit operable to admit at will either air charged with atomized spirit or air charged with hydrocarbon vapor to the engine.

2. In a carburetor for internal combustion engines, the combination with a chamber for receiving exhaust gases from the engine cylinders and a by-pass from said chamber, of a receptacle for heavy fuel arranged adjacent said by-pass, a conduit coextensive with said chamber for a portion of its length and extending within said by-pass, an atomizer for injecting liquefied hydrocarbon into said air conduit, means for admitting air to be carbureted into said conduit, a spirit atomizer, and means in the conduit operable to admit either air charged with atomizer spirit from the spirit atomizer or air charged with hydrocarbon from the conduit to the engine.

3. In a carburetor for internal combustion engines, the combination with a chamber for receiving exhaust gases from the engine cylinders and a by-pass from said chamber, of a receptacle for heavy fuel carried by said by-pass and arranged to have its contents heated by the hot gases passing through the chamber and its by-pass, a conduit having a portion of its wall common to the wall of the gas chamber and extending into the by-pass, an atomizer for injecting hydrocarbon vapor into said air conduit, whereby the air passing through said conduit is charged

with hydrocarbon vapor, means for admitting air to be carbureted in said conduit, means for admitting additional atmospheric air to the conduit, a spirit atomizer, and means in the conduit to regulate at will the admission either of air charged with atomized spirit or air charged with hydrocarbon vapor to the engine.

4. In a carbureter for internal combustion engines, the combination with a chamber for receiving exhaust gases from the engine and a by-pass from said chamber, of a receptacle for heavy fuel arranged adjacent said by-pass, a reservoir to receive heated fuel from the receptacle, an atomizer associated with said reservoir, a conduit adapted to conduct air over said atomizer to be charged with hydrocarbon vapor produced in said reservoir, a spirit atomizer, and a valve in said air conduit to provide for the admission of either air charged with atomized spirit, or air charged with hydrocarbon vapor to the engine.

5. In a carbureter for internal combustion engines, a chamber to receive the exhaust gases from an engine, a receiver for heavy fuel, a hollow member within the receiver arranged in surface contact with the fuel but closed thereto, an air conduit within said hollow member, a collecting chamber to receive the fuel from the receiver, an atomizer for injecting the fuel from the collector into said air conduit, an extension of said conduit arranged in close contact with said chamber, an additional fuel supply opening in the said extension, and a valve between said additional fuel supply and the atomizer, said valve being constructed and operable to render the main and additional fuel sources available independently of each other.

6. In a carbureter for internal combustion engines, a chamber adapted to receive exhaust gases from the engine, a receptacle for heavy hydro-carbon adapted to be heated by hot gases in said chamber, an air chamber adjacent to said exhaust gas chamber and arranged to be heated thereby, means for admitting air to said air chamber, a conduit arranged to be heated by exhaust gases in said gas chamber, an atomizer for vapor from the hydro-carbon in said receptacle arranged to deliver vapor into said conduit to mix with the air contained therein, a valve controlled inlet branch connecting said conduit to said air chamber, an outlet branch for explosive mixture from said air chamber, and a partition in said air chamber extending from said mixture outlet branch to said inlet branch.

7. In a carbureter for internal combustion engines, a chamber adapted to receive exhaust gases from the engine, a receptacle for heavy hydro-carbon adapted to be heated by hot gases in said chamber, an air chamber

adjacent to said exhaust gas chamber and arranged to be heated thereby, means for admitting air to said air chamber, a conduit arranged to be heated by exhaust gases in said gas chamber, an atomizer for vapor from the hydro-carbon in said receptacle arranged to deliver vapor to said conduit for mixing with the air contained therein, a valve controlled branch communicating with said air chamber, a pipe connecting said conduit to said branch, an atomizer for spirit, a pipe communicating with said branch and into which said spirit atomizer delivers, an outlet branch for explosive mixture from said air chamber, and a partition in said air chamber extending from said mixture outlet branch to said inlet branch.

8. In a carbureter for internal combustion engines, a chamber adapted to receive exhaust gases from the engine, a loop-like extension of said chamber, a receiver for heavy hydro-carbon seated on said extension, an atomizer for heated hydro-carbon carried by said extension, a second chamber, a wall of which is common to the exhaust gas chamber, a valve controlled air inlet to said second chamber, an outlet for explosive mixture from said second chamber, a baffle in said second chamber adapted to guide explosive mixture toward said outlet, a valve casing communicating with said second chamber, a conduit, having walls common to said second chamber and also to said extension, communicating with said valve casing into which said atomizer of heated hydro-carbon delivers, a branch communicating with said valve casing, means for delivering spirit to said branch, and a valve in said valve casing adapted in one position to place said branch in communication with said second chamber and in another position to place said conduit in communication with said second chamber.

9. In a carbureter for internal combustion engines, a chamber adapted to receive exhaust gases from the engine, a loop-like extension of said chamber, a receiver for heavy hydro-carbon seated on said extension, an atomizer for heated hydro-carbon comprising a vertically arranged tubular body formed with discharge orifices and a conical cap upon the base of which said orifices are arranged to discharge, an air pipe located in said extension and into a vertically arranged limb of which the cap of said atomizer extends, a second chamber having a wall which is common to the exhaust gas chamber, a valve controlled air inlet to said second chamber, an outlet for explosive mixture from said second chamber, a baffle in said second chamber adapted to guide explosive mixture toward said outlet, a valve casing communicating with said second chamber, a conduit, having walls common

with said second chamber and with said extension, communicating with said valve casing and into which said air pipe delivers air and vapor, a branch communicating with
5 said valve casing, means for delivering spirit to said branch, and a valve in said valve casing adapted in one position to place said branch in communication with said second chamber and in another position

to place said conduit in communication with 10 said second chamber.

Signed at Paris, France this 22nd day of November 1907.

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