(No Model.)

E. D. DEBOUTTEVILLE & L. P. C. MALANDIN.

APPARATUS FOR CARBURETING AIR.

No. 407,998. Patented July 30, 1889.

FIG. 1.

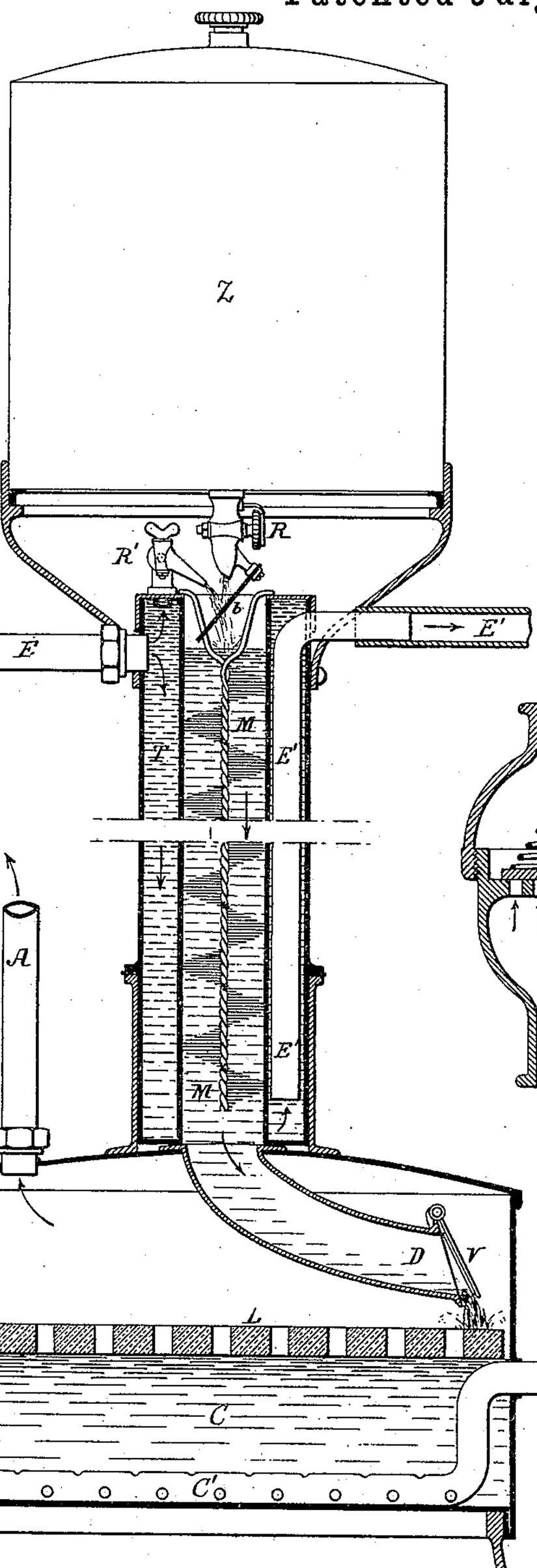


FIG. 2.

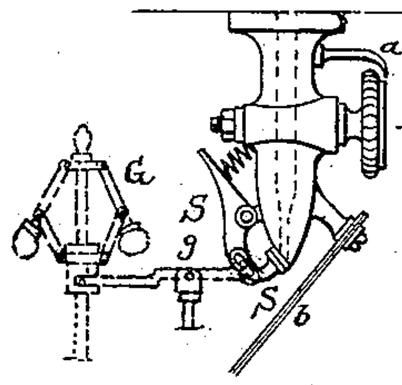


FIG. 3.

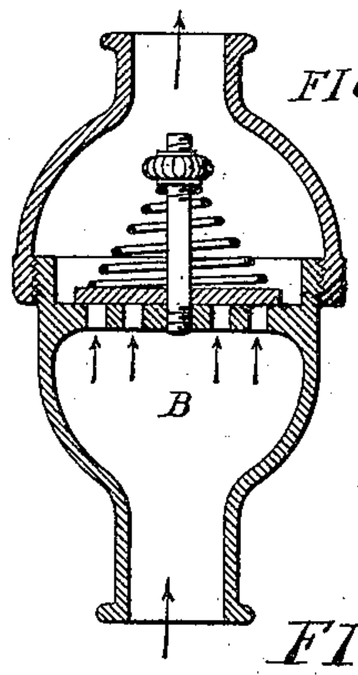
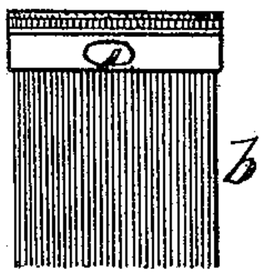


FIG. 4.



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UNITED STATES PATENT OFFICE.

EDOUARD DELAMARE DEBOUTTEVILLE AND LEON PAUL CHARLES MALANDIN, OF FONTAINE-LE-BOURG, FRANCE.

APPARATUS FOR CARBURETING AIR.

SPECIFICATION forming part of Letters Patent No. 407,998, dated July 30, 1889.

Application filed October 5, 1886. Serial No. 215,384. (No model.) Patented in France June 29, 1886, No. 174,641; in England July 26, 1886, No. 9,598, and in Germany November 4, 1886, No. 37,550.

To all whom it may concern:

Be it known that we, EDOUARD DELAMARE DEBOUTTEVILLE and LEON PAUL CHARLES MALANDIN, both citizens of France, residing at Fontaine-le-Bourg, Seine-Inférieure, France, have invented certain Improvements in Apparatus for the Carbureting of Air, (for which we have obtained British Patent No. 9,598, dated July 26, 1886; German Patent No. 37,550, dated November 4, 1886, and French Patent No. 174,641, dated June 29, 1886,) of which the following is a specification.

Our invention relates to the carbureting of air, more especially such as is to be supplied to carbureted-air engines, although our invention may be applied to the carbureting of air for illuminating or other purposes.

The object of our invention is to facilitate or accelerate the volatilization of the hydrocarbon, while preventing excessive cooling of the liquid at the time of its evaporation; to maintain the evaporation constant; to keep the gaseous mixture at a uniform temperature, and to cleanse the hydrocarbon and thereby produce a gaseous mixture free from deleterious solid matters. The main feature of our invention, by which these results are accomplished, consists in means for intimately mixing hot water with the hydrocarbon in a finely-divided state and simultaneously passing the air through it. For this purpose the hot water and the hydrocarbon are simultaneously directed in jets onto a brush-like surface or surfaces, through or over which the air to be carbureted passes, as hereinafter described. The two liquids are thus thoroughly divided, distributed, and mixed, and the hydrocarbon cleansed and evaporated at a uniform temperature.

In the accompanying drawings, Figure 1 is a vertical section of our improved carburetor. Fig. 2 is a view of a detail detached. Fig. 3 is a sectional view, drawn to an enlarged scale, of a valve in the air-pipe leading from the carburetor; and Fig. 4 is a view of a preliminary mixing-brush.

The carburetor illustrated in Fig. 1 consists of three principal parts: first, a reservoir or supply vessel Z of the hydrocarbon; secondly, the jacketed carbureting-tube T, with its mixing-brushes, through or over which the air to be carbureted passes and by which the hydrocarbon and hot water are intimately mixed, and, thirdly, a receiving-tank C, in which the gaseous mixture and liquids are received and from which the carbureted air and the liquids are drawn off through separate outlets.

The hydrocarbon-reservoir Z is provided at its lower part with a cock R, by which the quantity of hydrocarbon supplied to the carburetor can be regulated. Where the carburetor is to be used for supplying carbureted air to a gas-engine, the nozzle of this cock may also be provided with an automatic regulating-valve S, as shown in Fig. 2. This valve is carried by a pivoted lever *s*, and is normally pressed to its seat by a spring; but it is connected by suitable means—such as a lever *g*—to the gas-engine governor G, whereby the amount of hydrocarbon supplied to the carburetor will only be in proportion to the consumption of the carbureted air by the engine. The jet of hydrocarbon thus supplied falls onto the dividing or distributing surface simultaneously with a jet of hot water from a cock R′. This preliminary dividing-surface preferably consists of a flat brush *b*, Figs. 1 and 4, in the mouth of the jacketed carbureting-tube T, which also contains a helical brush M nearly throughout its length. The jacket of this tube is heated by hot water entering at E and discharging through the outlet-pipe E′. At the bottom of this tube T is a discharge-spout D, opening into the receiving-tank C, and provided with a check-valve V to prevent escape of vapor to the outside. The receiving-tank is provided at its upper part with an outlet A for the carbureted air, and at its lower part with a trapped outlet-pipe C′ for the liquids.

The hot water and hydrocarbon, which are projected in jets onto the brush *b*, are finely divided and distributed in a thin stream or film over the entire surface of the helical brush M, which completes the mixing and facilitates the evaporation as the air passes or is drawn through the tube T. The liquids

remaining unevaporated and the carbureted air pass through the spout D to the receiving-tank C, and the carbureted air thence passes though the pipe A to the engine or other point where it is to be utilized, while the liquids are drawn off through the tube C′. The warm water in the jacket of the tube T, as well as the hot water mixed with hydrocarbon, insure a uniform temperature and a constant evaporation or carbureting action, while the hot water introduced with the hydrocarbon has also the effect of cleansing the latter from solid matters in suspension, which, if carried over in the gaseous mixture, would be apt to clog the engine to which it was supplied. By this means we utilize the hydrocarbon to the maximum degree, and are enabled to work carbureted-air engines much more economically than with ordinary carburetors; and we are, furthermore, enabled to work with poorer qualities of petroleum or other hydrocarbons without liability of having the working parts of the engine clogged with deposits of deleterious solids.

Where the carburetor is used in connection with and for supplying an air or gas engine, the heated water from the jacket of the engine-cylinder may be used to supply the jacket of the tube T through the pipe E, and the cock R may, as shown in the drawings, draw its supply from the said jacket. The receiver C is also provided with a free float L, preferably of cork, which is for the purpose of preventing splashing or disturbance of the liquid as the engine draws in its supply of air through the carburetor. We also in such case provide the pipe A with a valve B, Fig. 3, between the engine and carburetor, to avoid danger of the flame at the engine getting back into the supply-pipes.

The forms and dimensions of the apparatus shown may be varied according to the purpose for which the carburetor is to be used without departing from our invention.

We claim as our invention—

1. The combination of a hydrocarbon-supply vessel and hot-water-supply pipe with a dividing or distributing brush for the liquids and a tube containing the brush and having an inlet and outlet for the air to be carbureted, substantially as specified.

2. The combination of a hydrocarbon-supply vessel and hot-water-supply pipe with a jacketed tube having an inlet and outlet for the air and a distributing-brush within the tube, and onto which the hot water and hydrocarbon may be directed, substantially as set forth.

3. The combination of the hydrocarbon-supply vessel and hot-water-supply pipe with a jacketed tube containing a spiral brush, onto which the hot water and hydrocarbon may be directed, said tube having an inlet and outlet for the air, substantially as set forth.

4. The combination of the hydrocarbon-supply vessel, the hot-water-supply pipe having discharge-cocks, with a tube T open at opposite ends and containing a spiral brush M, and a brush *b*, onto which the hot water and hydrocarbon may be projected, substantially as described.

5. The combination of the hydrocarbon-supply vessel, having a discharge cock and valve S therefor, with a tube containing a distributing-brush, onto which the hydrocarbon may be projected, and with the governor of a carbureted-air engine controlling said valve, substantially as described.

6. The combination of the hydrocarbon-supply vessel and tube having a distributing-brush for the hydrocarbon, and a check-valve V at the lower end of the tube, with a receiving-tank, into which the check-valve end of the tube projects, and a pipe for the exit of the carbureted air from the tank, all substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

EDOUARD DELAMARE DEBOUTTEVILLE.
LEON PAUL CHARLES MALANDIN.

Witnesses:
JOSEPH EMILE DURANDO,
WILLIAM T. POWELL.