(Model.)

W. W. WALMSLEY.

Carbureter.

No. 238,818. Patented March 15, 1881.

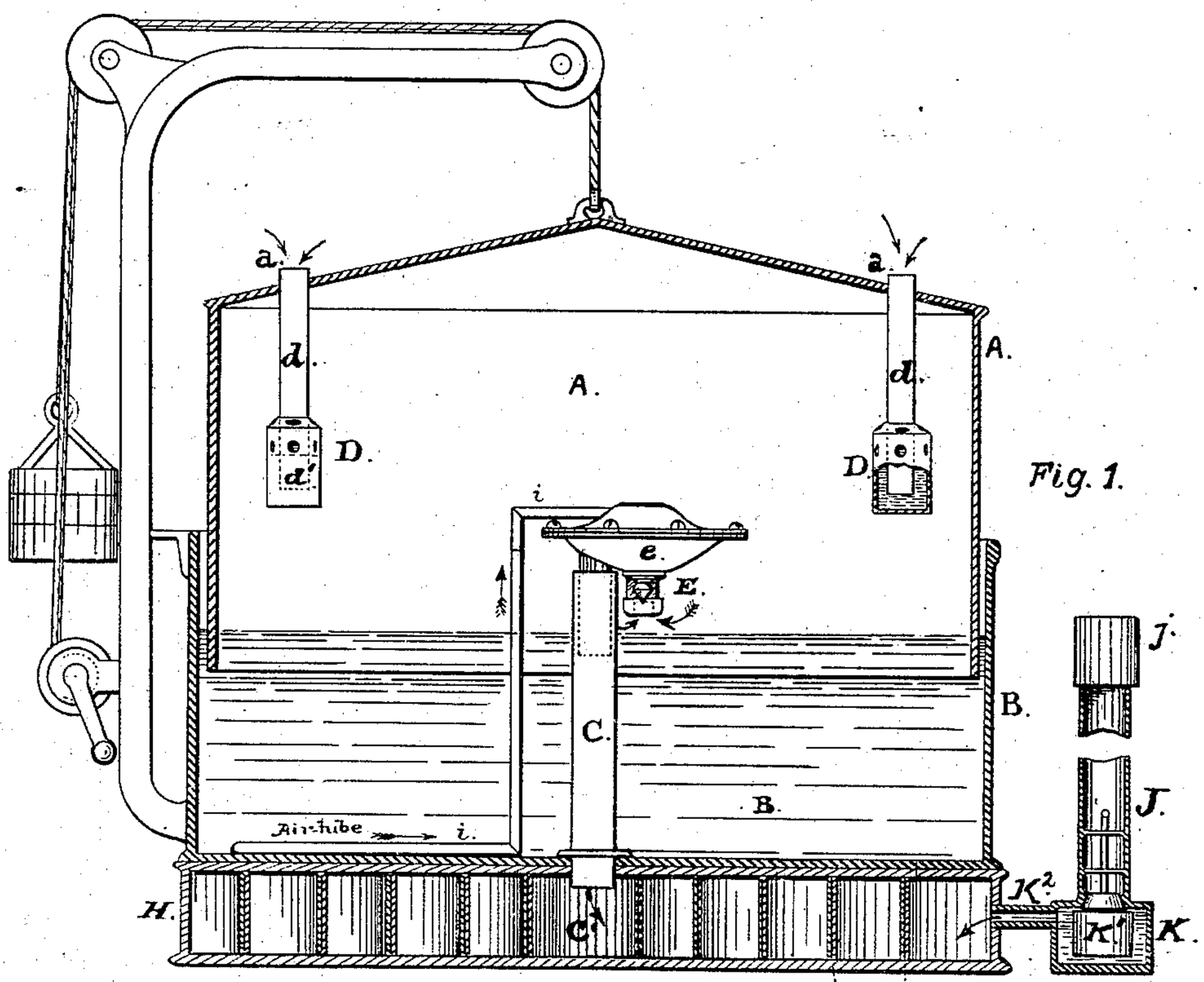


Fig. 1.

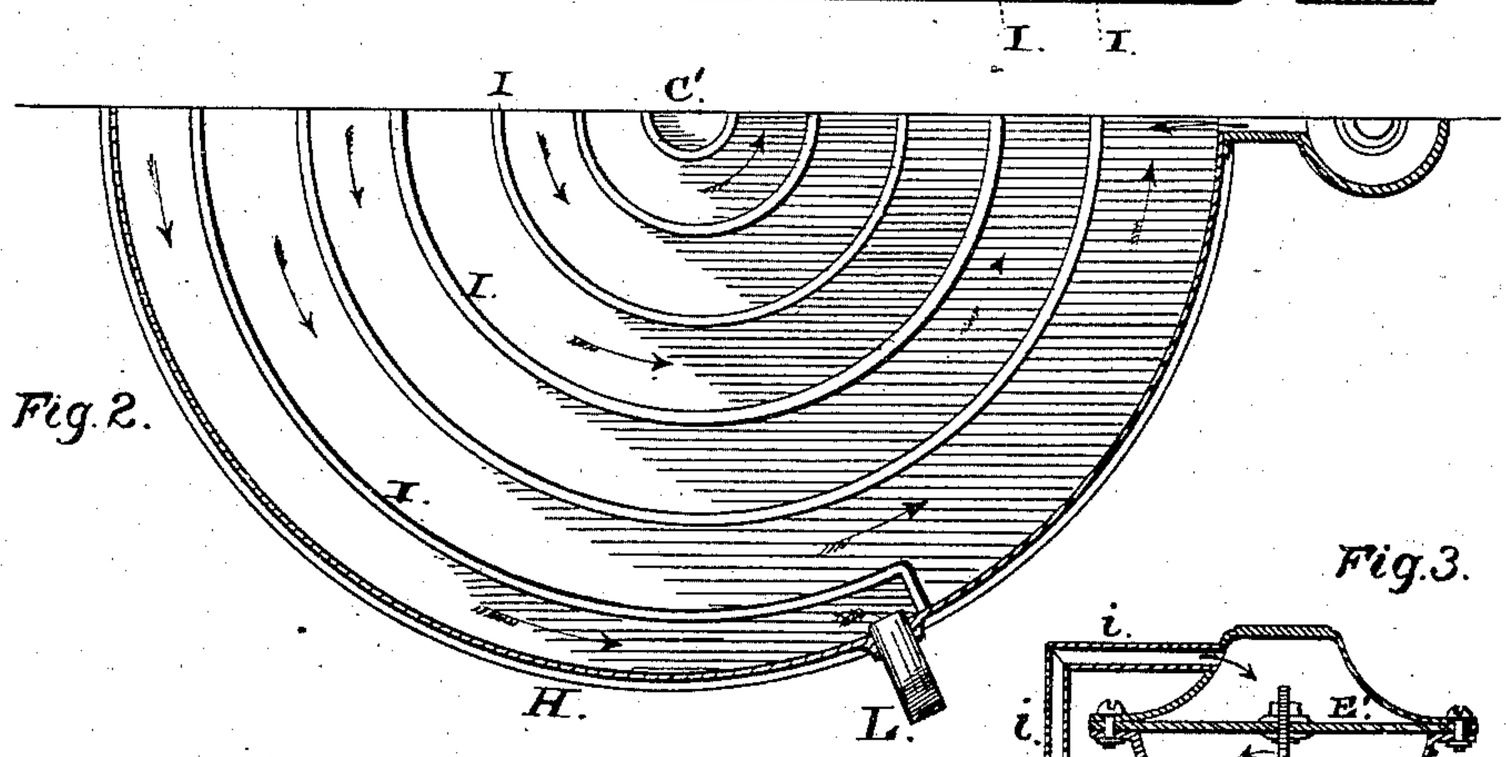
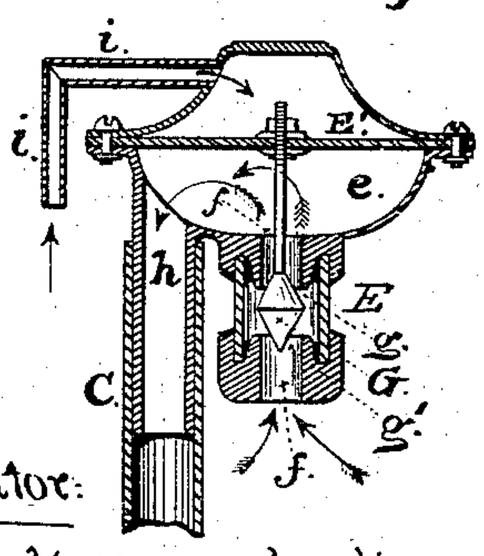


Fig. 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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CARBURETOR.

SPECIFICATION forming part of Letters Patent No. 238,818, dated March 15, 1881.

Application filed December 30, 1880. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM W. WALMSLEY, of the city and county of San Francisco, in the State of California, have invented certain new and useful Improvements in Carburetors; and I do hereby declare that the following is a full, clear, and exact description of my said invention, reference being had to the accompanying drawings.

The employment of carbureting apparatus to produce and supply gas for illuminating purposes has always been attended with many difficulties, both in regulating and adjusting the gas production to have it always in proportion to the consumption, in obtaining the required pressure to force the air into the carburetor without the trouble and expense of power, and in preventing the improper escape of inflammable vapors from parts of the apparatus. For these reasons, as well as the need of constant attention and carefulness, and the amount of space required for such apparatus, many apparatus now in existence cannot be used in or about dwellings either with safety or with economy.

My invention has for its object to provide and combine with the carbureting chamber or compartment a means for supplying and forcing a stream of air with a regular and continuous pressure into and through such chamber without the use of a pump or other mechanical contrivance; also, to make the supply of air and the production of gas to be controlled automatically by the consumption thereof, so that the carbureting process shall be accelerated or retarded or arrested altogether, according as the consumption of gas is varied or is stopped altogether, and this without the need of special adjustment or attention. In addition to these objects and purposes of this invention I also provide thereby for the complete and automatic control of the air and hydrocarbon inlets of the carburetor, that no escape of gas or inflammable air can possibly take place from any of the openings.

Referring to the accompanying drawings, Figure 1 shows my invention, the air-holder, the carburetor, and the air and hydrocarbon inlets being in vertical section. Fig. 2 is a view of the carbureting-chamber with its top removed, the same being a half plan view. Fig. 3 is a detail view of the regulating and check valve that is applied to the air-supply pipe.

I construct an air-holder which works without a pump or other mechanism requiring power to supply and force air in a regular and continuous stream into and through a carburetor. I make this holder of an inverted cylinder, A, and a water-tank, B, the former having its lower edge immersed in the water to form an air-space between the top or roof and the water-level. This cylinder being suspended within its tank by a cord or chain and weight, I give it a greater weight, instead of having it counterbalanced, so that by pressure upon the body of confined air beneath it shall act to force the same in a steady stream through an outlet-pipe, C, which connects with the carburetor. This portion of the holder is like the ordinary gas-holders in construction; but in connection therewith I provide one or more air inlets, *a a*, which operate in such a manner that in elevating the cylinder A after it has descended and forced out all the air therein they will admit a new charge of air to fill the vacuum. When the cylinder is elevated to its highest position these inlets are automatically closed to confine the air.

In combination with each of the inlets in the top of the cylinder I employ an automatic hydraulic valve, D, which consists of the inlet-tube *d*, opening through the cylinder-top, and the water-cups *d'*, fixed to the under side of the cylinder in a position to cover and seal with water the lower ends of these tubes; and I place their cups *d'* low enough to allow them to dip into and take water from the body of water in the tank every time the air-cylinder descends into it. In this manner I cause the valves to work automatically and to be always in working condition. The operator can also employ both hands to elevate the air-cylinder in recharging it, and the employment of stop-cocks or ordinary valves would, moreover, demand constant attention, and they could not be operated as promptly to shut in and confine the air while the cylinder is being raised. This air-holder operates only to force and supply air to the carburetor, and not as a gas holder or reservoir. By increasing or reduc-

ing its counter-weight it can be regulated to give greater or less pressure and velocity to the stream of air.

To cause the pressure and flow of air to be constant and in proportion to the consumption of gas from the carburetor, I employ, in connection with the air-supply pipe, a regulating-valve, which I locate between the air-outlet from the holder and the inlet thereof into the carburetor. This valve consists of a valve-chamber, E, having above it a diaphragm-chamber, *e*, containing a flexible diaphragm, E′, to which is secured, by a vertical spindle, the valve G. This diaphragm receives against its bottom surface the pressure of the air that enters through the inlet *f* from the holder and passes up through the valve-seat *g* to the outlet-tube *h*, leading from the chamber *e*. Against the upper surface of this diaphragm is brought the pressure of the atmosphere, either by leading from the top of the chamber and to the atmosphere through an air-tube, *i*, when the valve is located within the air-space of the holder A, or else by having a proper opening above the diaphragm in the top of the valve-chamber when the valve is connected to the air-pipe outside of the air-holder. In both cases the air from the holder is forced up through the valve-opening and the pipe *h* connected to the supply-pipe of the carburetor, and its pressure is brought against the under side of the diaphragm. I so adjust and regulate this valve that the pressure of the air in passing to the carburetor will hold it open and clear from its seat *g*, against the atmospheric pressure above the diaphragm, as long as the outflow of the gas from the carburetor or points beyond is free and unchecked; but if at any time this outflow be checked or retarded so that the air cannot pass from the outlet-pipe of the air-holder with proper velocity, the increased pressure of air accumulating beneath the diaphragm will distend it, and by raising the valve G it will reduce the size of the air-passage; and also, if the flow of gas is entirely shut off, the increased pressure of air against the under side of the diaphragm will completely shut and hold up the valve. In this manner the production of gas is automatically regulated by the consumption thereof; for, as a greater or less number of burners is employed at any time, the outflow of gas from the carburetor is increased or diminished, and in consequence the flow of air from the holder through the valve is accelerated or retarded to a like degree; and by its change in pressure against the under side of the diaphragm it causes the air-inlet to be enlarged or contracted. The supply of air to the carburetor is thus always kept in proportion to the consumption or withdrawal of gas therefrom. I cause this valve to serve and operate also as a check-valve by making the valve G of a double-conical shape to act against a lower seat, *g′*, and by bringing upon its diaphragm the atmospheric pressure or any other means to throw the valve down whenever the pressure against the under side of the diaphragm is removed.

In raising the air-cylinder A to refill it the vacuum produced would tend to draw back from the carburetor the air or inflammable vapors contained in it; and to prevent this action I operate the valve by pressure upon its diaphragm to close the pipe or outlet communicating with the carburetor as often as the pressure is removed from beneath the diaphragm. In the operation of refilling the air-holder all connection between the air-cylinder and the part of the apparatus containing the hydrocarbon liquid and vapors is automatically shut off.

I prefer to construct the carbureting-chamber H of a cylindrical form and of about equal diameter with the cylindrical air-holder, as I thereby give a more compact form to the machine or apparatus, and also dispense with outside connection-pipes between the holder and the carburetor. The cylindrical shape, moreover, is particularly adaptable to the peculiar manner in which I form the carbureting channel or passage, as the entire space therein is entirely utilized and converted into a continuous spiral passage. I divide this space in the chamber into a helical passage by employing a strip or partition, I, which I bend in the form of a regularly-increasing spiral, and secure to and between the bottom and the top of the compartment, so that it shall fill the vertical space between them, beginning at the center of the chamber, or where the air-inlet C′ is located, and progressing outwardly to the circumference, where the inlet for the liquid and the outlet L for the gas-supply or service-pipes are placed. Before this partition is in place I cover it with a suitable absorbent surface, either of fibrous or textile material—as felt or cloth—and secure it in position to hold the spirals at uniform distances apart. This form of carbureting-passage gives a long extent of surface in a small compass, and the curvature of the passage produces, also, upon the stream of air forced in at the center a rotation of its air-particles among themselves, as well as a rapid circulation forward, such action being created by the shortness or abruptness of the curves and the friction or resistance of the covering.

The connection between the inlet C′ of this carburetor and the air-space of the holder A B above it I can make with a single pipe, C, which I lead up through the bottom of the tank B and above the water-level, and thereby dispense with additional connection-pipes and joints, which are always liable to leakage. In such case the valve-chamber E *e* is applied directly to the end of the pipe, and the whole is inclosed within the holder, as illustrated in the section, Fig. 1.

The means I employ for supplying the hydrocarbon liquid to the carburetor with safety and facility consist of an upright pipe, J, extending upward from the chamber alongside

of the air-holder, and having its end closed by a screw-cap, *j*. At the lower end of this pipe I provide a chamber, K, or an enlargement of the pipe, in which I place a float check-valve, K′. This part of the pipe communicates with the helical passage of the carburetor through the inlet-pipe K^2, and thus when the chamber is filled with the liquid the further supply will be stopped by the pressure beneath the check-valve K′. As often as the quantity is reduced the valve will drop and admit a fresh portion, and so on until the pipe J is exhausted of the hydrocarbon. No vapors can escape from any of these points to mix with the surrounding atmosphere, and the liability to danger from explosions is altogether removed, both by completely shutting in the liquid and explosive vapors, and by causing the outlets and connections between the air-holder and the carburetor to be closed automatically by the apparatus itself against any back-flow of air from the supplying-holder. The safe working of this machine is therefore not dependent upon the care or experience of an attendant.

As thus constructed and arranged, my machine is particularly adapted to dwelling-houses and like purposes, by reason of its safety and simplicity and the small amount of room it requires, and more especially by its being operated without pumps or air-forcing mechanism requiring power, and its not demanding the supervision of an experienced attendant.

I am aware that, broadly, the use of an air-regulating device located in the air-forcer chamber and communicating with the carbureting-chamber is not new.

I am also aware that, broadly, automatically-operating valves in the air holder and forcer are not new.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the air forcer and holder A, having air-valves, with the carbureting-chamber H and the water-tank B, provided with a diaphragmed valve-chamber, E *e*, having a valve, G, connected to the chamber C′, for preventing the return and back-flow of air from the carburetor, substantially as and for the purpose set forth.

2. In combination with the air holder and forcer A and the carburetor H, the air-regulating device having a flexible diaphragm, E′, a double-seated valve-chamber, E, and double cone-valve G, located within the holder, connected to the carburetor by pipe C, and provided with an air-pipe, *i*, extending outside of the holder, substantially as and for the purpose specified.

3. The combination of the air forcer and holder A, provided with the air-inlet tubes *d*, having the hydraulic valves D *d* depending within the said holder, with the carbureting-chamber H and the water-tank B, provided with a diaphragmed valve-chamber, E *e*, having a valve, G, connected by a pipe, C, to the aforesaid chamber C′, substantially as and for the purpose set forth.

In witness whereof I have hereunto set my hand and seal.

WILLIAM W. WALMSLEY. [L. S.]

Witnesses:
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