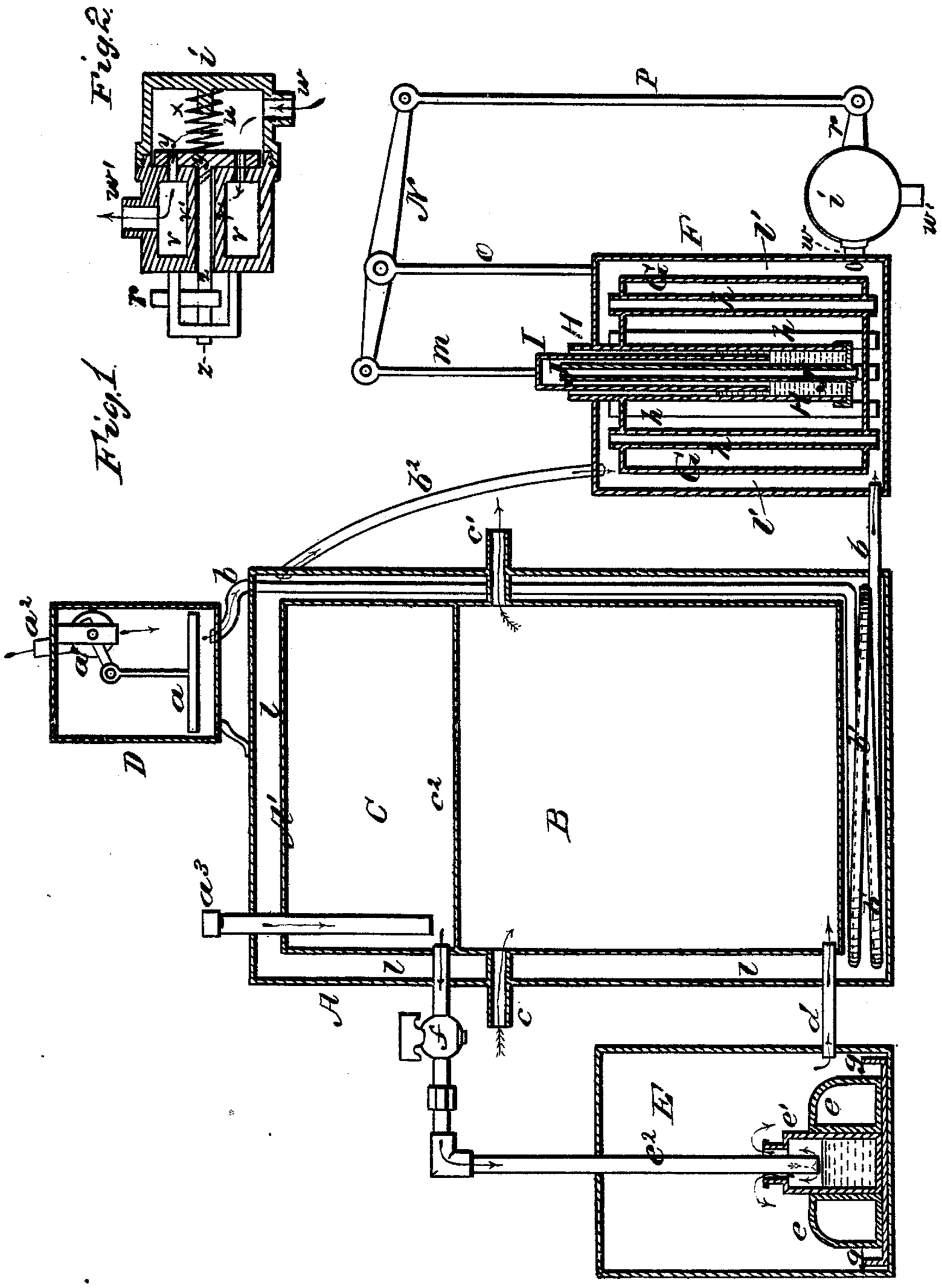
# A. W. PORTER & F. M. GRIMES.

## CARBURETER.

No. 176,349. Patented April 18, 1876.



WITNESSES

E. H. Bates

George E. Atkinson.

INVENTORS.

Alonzo W. Porter.

Francis M. Grimes.

Gilmore, Smith & Co.

ATTORNEYS

# UNITED STATES PATENT OFFICE.

ALONZO W. PORTER AND FRANCIS M. GRIMES, OF NEW YORK, N. Y.

## IMPROVEMENT IN CARBURETERS.

Specification forming part of Letters Patent No. **176,349**, dated April 18, 1876; application filed February 26, 1876.

*To all whom it may concern:*

Be it known that we, ALONZO W. PORTER and FRANCIS M. GRIMES, of New York, in the county of New York and State of New York, have invented a new and valuable Improvement in Air and Gas Carbureters; and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of a transverse vertical section of our carbureter, and Fig. 2 is a sectional detail view thereof.

This invention has relation to apparatus for carbureting air or gas for illuminating purposes; and the nature of our invention consists mainly in improved automatic means of securing a uniform temperature of the hydrocarbon fluids during the process of carbureting; also, in an improved automatic feed for supplying the hydrocarbon fluid to a carbureting vessel or chamber; and the invention further consists in improved means for additional safety in the process of equalizing the temperature of the hydrocarbon fluids and the water surrounding the carbureting-vessel, as will be hereinafter more fully set forth.

In the annexed drawings, A represents a vessel or tank, within which is contained a smaller vessel, A′, divided by a partition, $c^2$, into chambers B and C. The lower chamber, B, of this vessel A may be divided into compartments of any form or shape for the purpose of carbureting air or gas. The upper chamber, C, is designed to hold hydrocarbon fluids, and is filled by the supply-pipe $a^3$. The hydrocarbon fluid passes from the chamber C through the cock $f$, and downwardly through pipe $e^2$, into the glass bottle $e^1$, overflowing into the feed-box E, and thence through communicating pipe $d$ into the carbureting-chamber B, where the hydrocarbon fluid undergoes the ordinary evaporating process for illuminating purposes.

When the hydrocarbon fluid rises in the feed-box E, it causes the float $e$ to move vertically, carrying therewith the bottle $e^1$, thereby submerging the lower end of the feed-pipe $e^2$ in the mercury contained in the bottle $e^1$, thereby stopping the overflow of hydrocarbon. Cork, bees-wax, or any other suitable substance harder than mercury, may be used in the bottom of the bottle to assist the mercury in sealing the lower end of the pipe $e^2$. In case the mercury should ever escape from the bottle $e^1$ it would flow into the vessel or cup $g$, made of glass or "black-iron," where it would be arrested and prevented from damaging the feed-box E.

In case the mercury should need replenishing in the glass bottle $e^1$, the bottle can be lifted from its cup in the float and refilled to the required height.

Between the vessels A A′ is formed a space, $l$, filled with water flowing freely around the carbureting-vessel A. The letters F, G, and H represent the hydrothermostat, hereinafter more fully described, for maintaining the water in the space $l$ at a uniform temperature at any degree below 55° and above 32° Fahrenheit, also keeping the hydrocarbon fluid in the carbureting-vessel at the desired temperature for carbureting air or gas. A communication is formed between the space $l$ and the space $l'$, formed by the cases F and G by means of the pipes $b$ $b^2$, to allow the water to flow freely from said space $l$ of the carbureter into the said space $l'$ of the hydrothermostat, and into the vertical tubes $h$ of sealed air-box G. The water passes into the box D through pipe $a^2$ and valve $a^1$, and therefrom through the pipe $b$ and perforated coil $b^1$ into the space $l$ between the vessels at a temperature below 55° and above 32° Fahrenheit. The sealed box G contains air; the tube H contains mercury surrounding the tube J. The latter extends below the tube H, and communicates with the air-chamber in the sealed box G, as shown in Fig. 1 of the drawings. The inverted cup I forms a cap for the inner air-tube J, and is sealed at its lower end by the mercury in tube H. The upper end of this inverted cup I is provided with a rod, $m$, to which is pivoted, at its upper end, a walking-beam, N, having its fulcrum in the vertical rod $o$, and at the outer end of the walking-beam is pivoted the connecting-rod P, the lower end of which is pivoted to the crank-arm $r$ of an oscillating disk in the waste-cock $i$.

The inverted cup I is moved upward and downward by the expansion or contraction of the air in the sealed box G, which is surrounded by water in the space *l'*, and when the water becomes chilled by the evaporation of the hydrocarbon fluids in chamber B a number of degrees below the starting temperature the air contracts in the box G, which changes the temperature, lowers the inverted cup I, thereby operating the walking-beam, opening the ports of the valve, and allowing the cold water to escape through outlet *x* of the waste-cock *i*.

The pipe $a^2$ is connected with a steam-boiler or bath-boiler, and as the cold water escapes from the waste-cock, warm or hot water will follow or flow to supply the outflowing cold water, and mingle with the cold water in the space *l*, from which it passes through pipe $b^2$ into the space *l'* in the hydrothermostat, raising the temperature of the water in said space to the initial degree, thus causing the air to expand in the sealed tubular air-box G, and at the same time raising the inverted cup I, closing the ports of the valve in the waste-cock *i*, lifting the float *a* in hot-water box D, closing the ports of the valve *a'*, and, finally, arresting the flow and pressure of the water upon the carbureter. The tubular air-box G is provided with a series of vertical tubes, *h*, to distribute the heat of the water to the interior of the sealed box G, and stay or brace the heads of the box.

The waste-cock *i* (see Fig. 2) consists of the inlet and outlet chambers *u* and *v*. The chamber *u* is a detachable case provided with inlet-opening *w* and a central stud to sustain a spiral spring, *t*, pressing against a removable oscillating perforated disk, *y*, and keeping it in contact with the perforated valve-seat of chamber *v*. This valve-chamber *v* has a sleeve, *v'*, for the passage and protection of the piston *z* of the oscillating disk; also with an outlet-opening, *w'*. The main object of the coil in the water-space *b*, with its perforations, is to equally distribute the incoming hot or warm water around the carbureting-vessel as it takes the place of the escaped cold water without pressure. The advantages of using hot water over steam or hot air are threefold: first, economy, as it requires less fuel to make hot water than steam, and all the heat in the water is utilized; second, convenience. Many places are supplied with bath-boilers that have no steam-heating apparatus nor engineer; and, third, safety, because hot water is much easier to control than steam or hot air, and is less liable to overheat the apparatus.

It will be observed that the highest temperature herein indicated as maintained by the hydrothermostat is below that reached by the waters of the ocean in the month of August; but in the summer, when the apparatus is working and rapid evaporation is going on in the carbureter, the temperature of the hydrocarbon fluids will fall to a lower degree and obstruct the evaporation by the accumulation of cold. The action of the hydrothermostat is then needed to correct the difference of temperature as well as in the winter months when the apparatus has had long periods of rest.

The hydrothermostat will not operate until the apparatus is set to work and rapid evaporation recommences. These facts relate only to instances where the carbureter is used in places of larger consumption of gas During some portions of summer weather the induction-pipe may be attached to an ordinary hydrant and good results secured, inasmuch as the hydrothermostat will then insure to the hydrocarbon fluid a temperature of sufficient coolness for the requirements of the carbureting process.

This invention is an improvement on our patent granted September 21, 1875, No. 168,048.

Heretofore, prior to our invention, a water-tank or jacket entirely surrounding a carbureting-vessel and its supply-reservoir has been used, and we therefore lay no broad claim to such device.

We claim—

1. The method of maintaining a uniform temperature of hydrocarbon fluid during the process of carbureting air or gas, by means of a gradual inflow of hot water, automatically controlled, from a steam or bath boiler, substantially as and for the purpose set forth.

2. In combination with a carbureter, a hot-water box, D, having automatic float and valve for controlling the inflow of the hot water and arresting the pressure thereof, substantially as and for the purpose set forth.

3. The combination, with a hot-water box, D, of a pipe, *b*, and perforated coil *b'* for evenly distributing hot water to temper the cold water around the carbureting-vessel, substantially as and for the purpose set forth.

4. The combination, with a carbureter having a water-jacket, of a hydrothermostat having a sealed box, G, with a series of vertical tubes, *h*, substantially as and for the purpose set forth.

5. The combination, with a carbureter, of a hydrothermostat and a waste-water cock, substantially as and for the purpose set forth.

6. In a carbureter, the combination of an automatic hot-water inlet and an automatic cold-water outlet, substantially as and for the purpose set forth.

7. In combination, with a carbureter having a water-jacket, the hydrothermostat, consisting of the tubular sealed box G, inverted cup I sealed in mercury, valve *i*, and intermediate devices, operated by the heat of the water around the same, which heat controls the expansion and contraction of the contents of the sealed box, substantially as and for the purpose set forth.

8. The combination, with a carbureter, of the hydrothermostat, consisting of the tubular sealed box G, inverted cup I sealed in

mercury, valve *i*, and intermediate operating devices, operated in the manner as described.

9. In a carbureter, a waste-water valve provided with suitable inlet and outlet chambers and a removable oscillating perforated disk, *y*, the latter kept in contact with a perforated valve-seat by means of a spring, *t*, in the chamber *u*, substantially as described.

10. The combination, with a removable glass mercury-holder, of a glass or black-iron cup at the bottom of a feed-box to catch any overflow of mercury, substantially as described.

In testimony that we claim the above we have hereunto subscribed our names in the presence of two witnesses.

ALONZO W. PORTER.
FRANCIS M. GRIMES.

Witnesses:
JOHN F. ACKER, Jr.,
GEORGE E. UPHAM.

2,000 words.