H. R. RANDALL & O. F. BOOMER.

APPARATUS FOR AUTOMATICALLY REGULATING THE TEMPERATURE OF CARBURETERS.

No. 180,638. Patented Aug. 1, 1876.

Fig. 1.

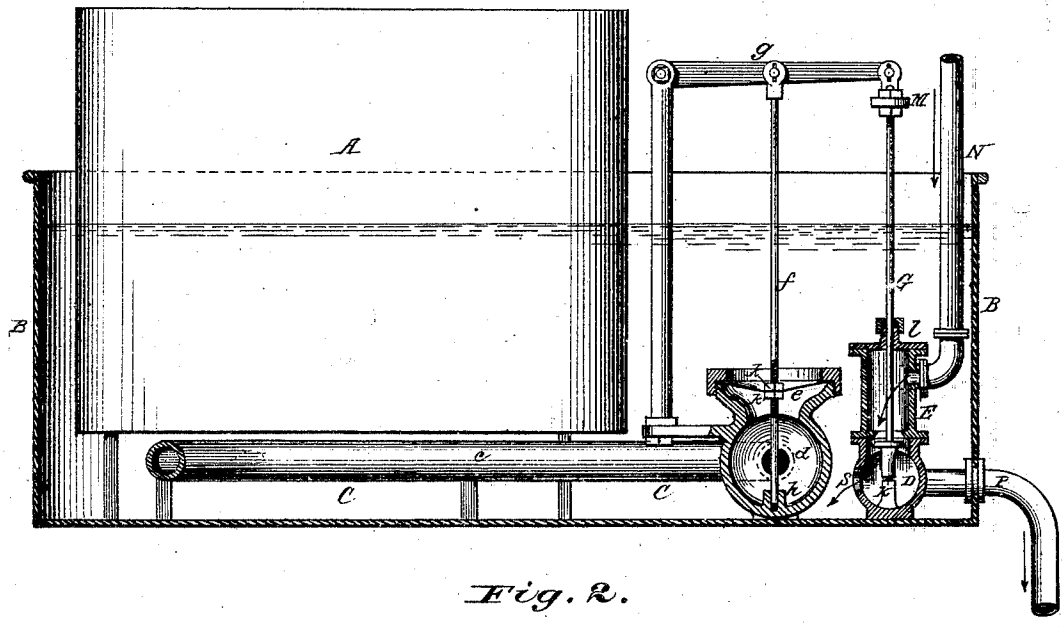
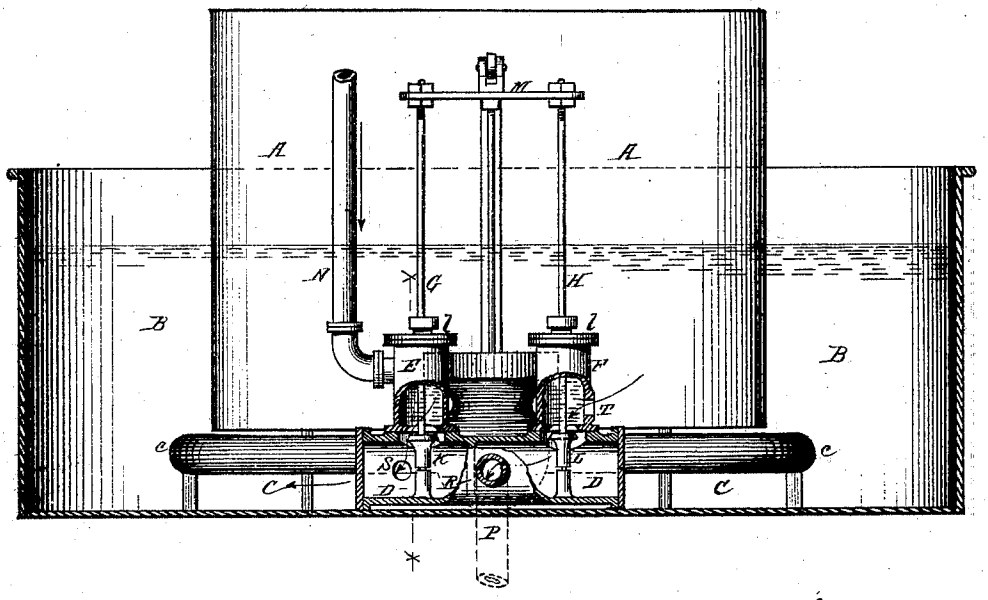


Fig. 2.



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HENRY R. RANDALL AND OSCAR F. BOOMER, OF NEW YORK, N. Y.

IMPROVEMENT IN APPARATUS FOR AUTOMATICALLY REGULATING THE TEMPERATURE OF CARBURETERS.

Specification forming part of Letters Patent No. **180,638**, dated August 1, 1876; application filed April 19, 1876.

To all whom it may concern:

Be it known that we, HENRY R. RANDALL and OSCAR F. BOOMER, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus for Automatically Regulating the Temperature in Carbureters, of which the following is a specification:

This invention relates to certain new and useful improvements in apparatus for carbureting air or gas, its object being to provide for automatically regulating and controlling the temperature of the hydrocarbon liquid in the carbureter at a proper and uniform standard throughout the entire operation of the apparatus, and thus prevent the supercarburation of the air or gas by the overheating of the hydrocarbon liquid or the deficient carburation of the same by the loss of heat caused by the rapid evaporation of said hydrocarbon liquid. This we accomplish by means of a body of water surrounding the carbureter in a tank or jacket, within which said carbureter is located, the water being discharged and renewed automatically as the temperature of the hydrocarbon is reduced by evaporation, by means of a thermostat connected with suitable valves, so as to replenish the caloric as it is taken off, and maintain the temperature of the water in the tank, and through the medium of the water the temperature of the carbureter, at a constant and uniform standard. We provide for heating the water in the tank or jacket, and thus raising the temperature in the carbureter, by means of certain chemicals, as more fully hereinafter set forth.

In the drawing, Figure 1 represents a vertical section through the tank, the thermostat, and the regulating-valves on the line *x x* of Fig. 2; and Fig. 2 a vertical section through the tank and regulating-valves.

The letter A represents a carbureter of any suitable construction, located within a cylindrical tank or jacket, B. C represents a thermostat, consisting of an annular or coiled tube, *c*, located within the tank or jacket B, below the carbureter, and communicating with a chamber, *d*, which is provided with a flexible diaphragm, *e*, on top, connected to the vertically-moving rod *f*, which is secured to a lever, *g*, at its upper end. The lower end of said valve-rod works in a guide-recess, *h*, formed in the bottom of the chamber *d*, and that-portion of said rod passing through the flexible diaphragm is screw-threaded, and provided with adjustable clamping-nuts *k*, by means of which the diaphragm is adjusted upon and fastened to the rod. The letter D represents a valve-chest, located within the tank B, in front of the chamber *d* of the thermostat. Upon the top of said valve-chamber, immediately over the valve-seats, are located two vertical cylinders or chambers, E F, provided with suitable heads or tops *l l*, through which the valve-rods G H extend, said heads being perforated and provided with suitable stuffing-boxes for the purpose. To the lower ends of the valve-rods are secured the valves K L, which work vertically toward and away from the seats in the valve-chest D. The upper ends of the valve-rods are connected to the cross-head M, secured to the lever *g* of the thermostat. The letter N represents a pipe leading from a hydrant or other water-supply to the cylinder E, and P an eduction-pipe leading from the center of the valve-chest. The valve-chest is provided with a partition, R, located between the eduction-pipe and that portion of said chest directly under the cylinder E, and with an aperture, S, leading from said portion directly into the water-tank, and the cylinder F is provided with a similar aperture, T, leading into the tank.

The operation of our apparatus is as follows: The thermostat is to be filled, or partially filled, with a volatile substance, such as ether, which will readily expand and contract under slight changes of temperature, and the pipe N connected with any suitable water-supply. The tank B is then properly filled with water, and the carbureter set in operation. As the hydrocarbon is evaporated and taken up by the air or gas the temperature is rapidly decreased by the caloric taken up in the volatilization of the hydrocarbon. This condenses the volatile fluid in the thermostat, contracting the volume of the same, and the atmospheric pressure forces the flexible diaphragm inward, depressing the rod *f* and lever *g*, opening the valves G and H. This allows the wa-

ter from the hydrant or other water-supply to flow into the tank through the cylinder E and aperture S in the valve-chest, and the displaced water to flow out through the aperture T, the cylinder F, and eduction-pipe P of the valve-chest. As the water enters the tank the temperature is gradually restored, and when it reaches the normal point or standard the volatile fluid in the thermostat expands and forces out the diaphragm, closing the valves, and stopping the flow of water.

In connection with the apparatus as described, when it is desired to elevate the temperature of the water above its normal condition, we employ certain chemicals, which possess the property of combining with water, forming hydrates, such as sulphate of baryta or the oxide of calcium. It is well known that such substances, when combining with water, develop a considerable amount of heat, and this we utilize for increasing the temperature of the water. In using such substances we place the same in the tank B surrounding the carbureter, and as the heat is developed it is taken up by the same and transmitted to the hydrocarbon, thus providing for its more rapid volatilization.

What we claim, and desire to secure by Letters Patent, is—

1. In combination with the carbureter and the water-tank surrounding the same, the thermostat C, consisting of a coiled tube and chamber, *d*, containing any suitable volatile substance, the said chamber being provided with a flexible diaphragm, *e*, which operates the valves for automatically admitting the water to the tank, and discharging the same therefrom by the expansion and contraction of the volatile substance, as set forth.

2. In combination with the water-tank B in which the carbureter is located, a thermostat, C, connected with valves K, the valve box D, and cylinders E F, with their induction and eduction apertures, and the pipe N leading from the water-supply, substantially as described.

In testimony that we claim the foregoing we have hereunto set our hands in the presence of the subscribing witnesses.

HENRY R. RANDALL.
OSCAR F. BOOMER.

Witnesses to RANDALL:
JOHN D. GRAHAM,
FOSTER B. GILBERT.
Witnesses to BOOMER:
JOS. L. COOMBS,
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