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

GAS AND AIR CARBURETERS.

No. 186,302. Patented Jan. 16, 1877.

Fig. 1.

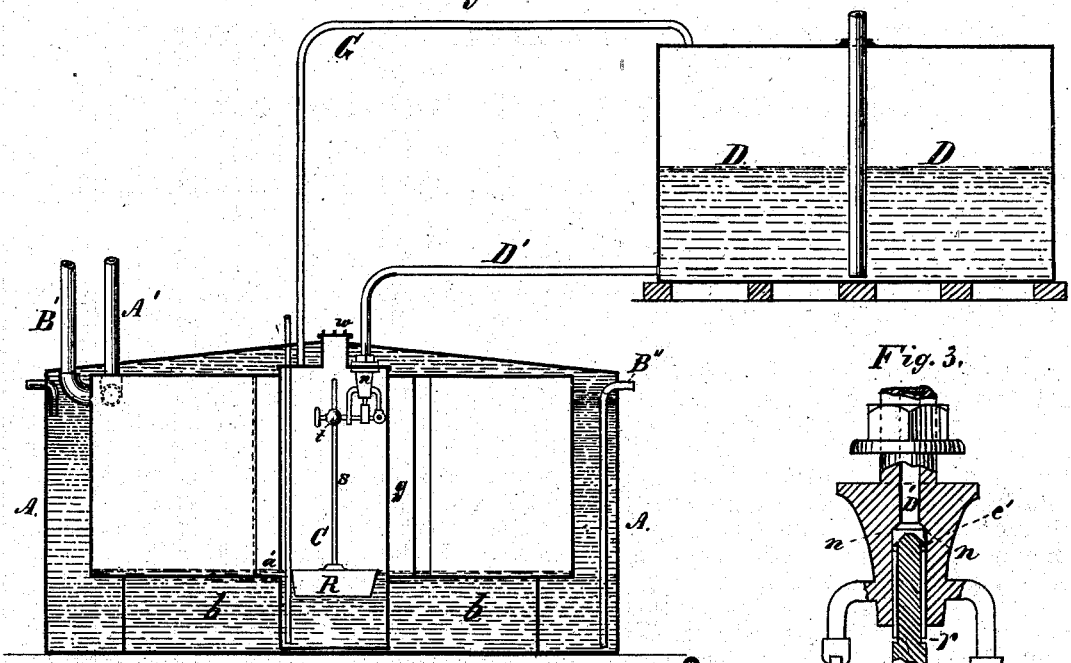


Fig. 3.

Fig. 2.

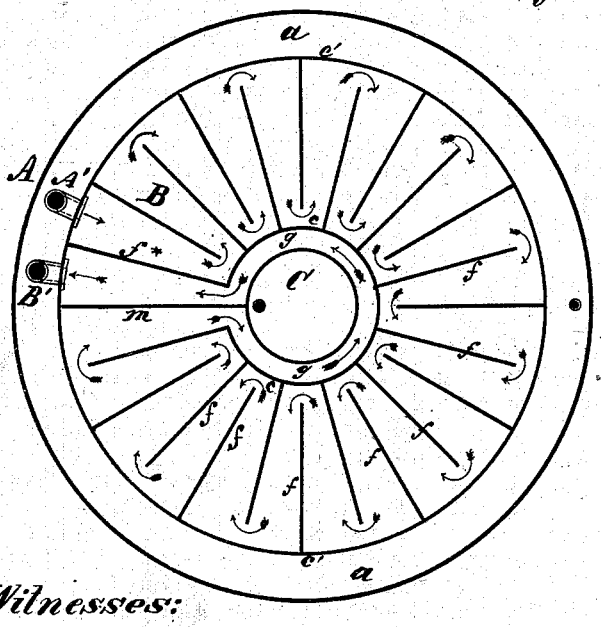
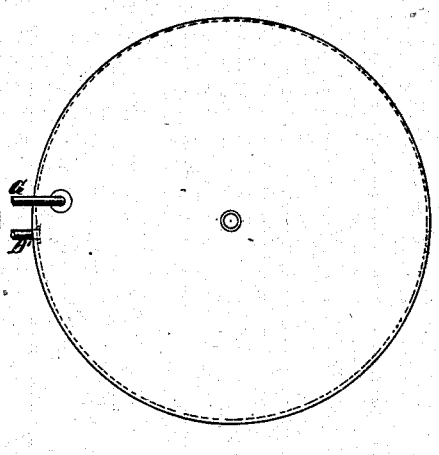


Fig. 4.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN GAS AND AIR CARBURETERS.

Specification forming part of Letters Patent No. **186,302**, dated January 16, 1877; application filed June 15, 1876.

To all whom it may concern:

Be it known that we, OSCAR F. BOOMER and HENRY R. RANDALL, both of the city, county, and State of New York, have invented certain Improvements in Gas and Air Carbureters, of which the following is a specification:

This invention comprises, in a gas and air carbureter, a novel combination of central oil-distributing chamber, an automatic valve, a surrounding zigzag carbureting-passage, an interposed annular condensing-chamber, and inlet and outlet pipes to the zigzag carbureting-passage, whereby is provided a carbureter compact and simple in structure, and whereby the uniform carbureting-surface is afforded to the air or gas to be carbureted, and whereby further provision is made for the condensation of any surplus hydrocarbon absorbed by the air or gas, as the case may be, in order that a uniform quality of carbureted air or gas may be secured.

The invention further comprises a novel combination, with the water-jacket of the carbureting-passage, of an inlet-pipe, supplying water of moderate temperature, which may be admitted at the top or upper part of said jacket, and an outlet-pipe, affording an outlet also at the top of the jacket, but extended so near the bottom thereof that the water cooled by the abstraction of heat in the operation of the apparatus descending to the bottom of the jacket will pass therefrom through said outlet, by which means provision is made for the withdrawal of the constantly-refrigerated water, and its replacement with water of moderate temperature, which is required to insure the volatilization of the oil or liquid hydrocarbon in the carbureting-passage as the air or gas is passing through the latter.

Figure 1 is a central longitudinal section of a carbureting apparatus made according to our invention. Fig. 2 is a plan view and partial horizontal section of the same. Fig. 3 is a partial longitudinal section, on an enlarged scale, of a portion of the automatic feeding device. Fig. 4 is a detail transverse sectional view of the valve-plug forming part of said automatic feeding device.

A is the water-jacket, and B represents the carbureting-passage. Between this carbureting-passage (presently hereinafter fully described) and the jacket A is a space or annular chamber, *a*. Moreover, this carbureting-passage, which is closed at all sides, is placed at the same distance from the bottom of the water-jacket A, as shown at *b* in Fig. 1, by which means the sides and bottom of said passage are kept in constant contact with the water with which the space *a* is filled.

The carbureting-passage B is annular, its inner wall *c* being concentric with the outer wall *c'* of the same. Extending alternately from the inner and outer walls *c c'* are radial partitions *f*. These partitions do not extend quite across the entire width of the passage, so that communication alternately at the inner and outer sides of the passage is opened between the compartments formed between the partitions *f*.

C is the oil-chamber, placed in the center of the apparatus, as represented in Figs. 1 and 2, and with a space, *g*, between it and the concentric inner wall *c* of the carbureting-passage, in which the gas or air, enriched by its contact with the hydrocarbon, is subjected to a somewhat lower temperature than while passing through said hydrocarbon, by which means any surplus of the hydrocarbon taken up or absorbed by the gas or air, as the case may be, is deposited, condensed, or precipitated, whereby (this somewhat reduced temperature in the chamber *a* being uniform) the quantity of hydrocarbon absorbed by the gas or air is practically limited to a certain percentage, dependent, of course, upon the temperature within the said chamber *a*, and the uniform carbureting of such gas or air, and the production of an illuminating fluid of uniform and definite character is secured.

From one side of this oil-chamber C to the outer wall of this passage just mentioned extends a radial partition, *m*. One of the radial partitions *f* next adjacent to this partition *m* is extended quite across from the inner wall *c* to the outer wall *c'*, as shown at *f**. At one side of this partition *f** is an air or gas inlet pipe, A', and at the opposite side of said partition is an outlet-pipe, B'. Gas or air, being passed in through the pipe A', passes in a zigzag course until it returns to the said passage from which it started, when it is diverted by

the partition *m*, and is passed through the space *g* around the oil-chamber C, and thence out to the outlet-pipe B′.

It will be observed that, owing to the arrangement of the partitions *f*, the carbureting-passage is necessarily zigzag. This passage is filled with cotton, or other suitable fibrous or absorbent material sufficiently loose or porous to permit the ready passage of the air or gas through the same, so that, this fibrous or porous material being saturated with hydrocarbon oil, as hereinafter explained, the flow of the air through said passage in minute and intimate contact with said hydrocarbon causes the air to absorb the latter, thereby carbureting or charging it with inflammable vapors.

The oil-tank C, at the level of the zigzag carbureting-passage B, has its sides provided with holes *a′*, by which it communicates with the carbureting-passage B. It follows, therefore, that a suitable quantity of oil or hydrocarbon being placed in the oil-chamber C, such oil or hydrocarbon will flow, through the openings *a′*, into the zigzag carbureting-passage aforesaid, and thereby cause the saturation to the requisite degree of the fibrous material hereinbefore specified, and for the purpose explained. It is manifestly necessary, however, that this supply of oil or liquid hydrocarbon should be regularly supplied to the oil-chamber C, in order that it may be supplied to the fibrous material in the carbureting-passage with regularity and in suitable quantities; and to this end we provide an automatic feeding apparatus, constructed and arranged as follows:

From the bottom of the tank D, from which the supply of oil or hydrocarbon may be most conveniently obtained, extends the pipe D′ to the top of the oil-chamber C, and, entering the said chamber, terminates at its lower end in the valve-seat *n*. In this valve-seat is fitted the plug *r*. (Represented in Fig. 3.) The upper end of this plug is in the form of the frustum of a cone, fitting the correspondingly-shaped surface of the valve-seat. Formed circumferentially at the base of the conical end of the plug *r* is a groove, *e′*, and extending the entire length of this plug are one or more grooves, *e″*. Vertical motion is given to the plug *r* by means of a lever, P, to which the lower end of said plug is attached, as represented in Figs. 1 and 3. R is a float, which rests upon the oil in the lower part of the oil-chamber C, and from which extends upward a staff, *s*, the upper side of said staff being attached to the free or moving end of the lever P, as indicated at *t*. When the oil in the lower part of the chamber has been withdrawn by the fibrous material in the carbureting-passage B to an undue extent, the descent of the float R draws downward the valve-plug *r*, thereby drawing its conical end away from the surface of the valve-seat, and of course opening the pipe D′, to permit the outflow of the oil or liquid hydrocarbon therefrom. This oil or liquid hydrocarbon, flowing down through the grooves *e″*, passes into the chamber C until the accumulation of oil in the lower part of said chamber is such as to lift the float R to such an extent as to drive the plug *r* home in the valve-seat *n*, and thereby close, for the time being, the flow of oil from the pipe D′. By this means it will be seen that the supply of oil to the chamber C, consequently to the zigzag carbureting-passage, is always automatically adjusted by the movement of the float. The relative proportion of oil is of course regulated by the vertical adjustment of the float R with reference to the lever P, and the rapidity of movement of the valve-plug is regulated by the adjustment of the point of attachment of the rod S to the said lever P.

In order to provide for this adjustment, and also for any repair or for inspection, when desired, the man-hole *w* of the oil-chamber C is arranged in the top thereof, and immediately above and adjacent to the feed apparatus constituted by the valve-seat *n*, plug *r*, lever P, and staff *s* of the float R, and hence easy and convenient access to such feed apparatus being by this means provided. From the top of the tank D to the top of the carbureting-chamber B extends a pipe, G, by which means air or gas is permitted to pass from the carbureting-chamber into the upper part of the oil-tank D, to replace the oil withdrawn from the latter in the operation of the carbureter, thereby permitting the free outflow of oil from the tank to the carbureter without the danger incident to the use of a tank or reservoir of oil communicating directly with the atmosphere.

It is to be kept in mind that the useful operation of the apparatus hereinbefore explained is due, for the most part, not only to the mode of its connection with the float R, but more especially to the peculiar construction of the plug *r*—that is to say, with the groove *e′* at its upper end, and the longitudinal grooves *e″* extending lengthwise to the same—for this reason, that any mechanical impurities contained in the oil passing from the tank D will, when the plug is lowered to open the pipe D′, pass first into the annular groove *e′*, and thence to the longitudinal groove *e″*, and be carried without hinderance down into the chamber C, where they can do no mischief. It will be further observed that the chamber C and its contained parts, being placed at the center of a circular apparatus, occupy but very little room that would be otherwise available, and hence the apparatus is brought into the most compact and symmetrical form, and permitting such arrangement of the automatic feeding apparatus as insures all advantages of any automatic feed, and none of the disadvantages ordinarily experienced with such mechanism. Furthermore, inasmuch as the volatilization of the hydrocarbon in the carbureting-passage B necessarily renders latent a large quantity of heat, which is

abstracted from the water contained in the jacket A, it becomes necessary to constantly renew the supply of water of a comparatively warm or moderate temperature, and to remove that refrigerated or made unduly cold because of the heat rendered latent, as just hereinbefore explained.

It will be observed that the inlet-pipe, by passing the inlet-water to the top of the jacket A, causes the supply of such inlet-water of comparatively moderate temperature to be continually at such top of the jacket, while the outlet-pipe B″, taking the water from the bottom of the jacket A, conveys the refrigerated water away, the cold water, of course, descending to the bottom of the jacket. By this means a constant supply of water is uniformly maintained in the jacket at such temperature as to best promote and facilitate the evaporization of the carbons contained in the carbureting-chamber, as hereinbefore explained.

What we claim as our invention is—

1. In a gas and air carbureter, the herein-described combination of the central oil-distributing chamber C, the automatic longitudinally-operating valve-plug, the surrounding zigzag carbureting-passage, the interposed annular condensing-chamber, and the inlet and outlet pipes, the whole constructed and arranged in relation with each other substantially as and for the purpose herein set forth.

2. In a gas and air carbureter, the combination, with the water-jacket surrounding the carbureting-passage B, of the water-inlet pipe, entering the said jacket at the top thereof, and a water-outlet pipe, leading from or near the bottom of said jacket, whereby the refrigerated water is continuously drawn from the bottom of said jacket, in order to secure a uniform temperature, substantially as set forth.

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