S. T. McDOUGALL.

Apparatus for Carbureting Gases.

No. 45,729. Patented Jan. 3, 1865.

Fig. 1.

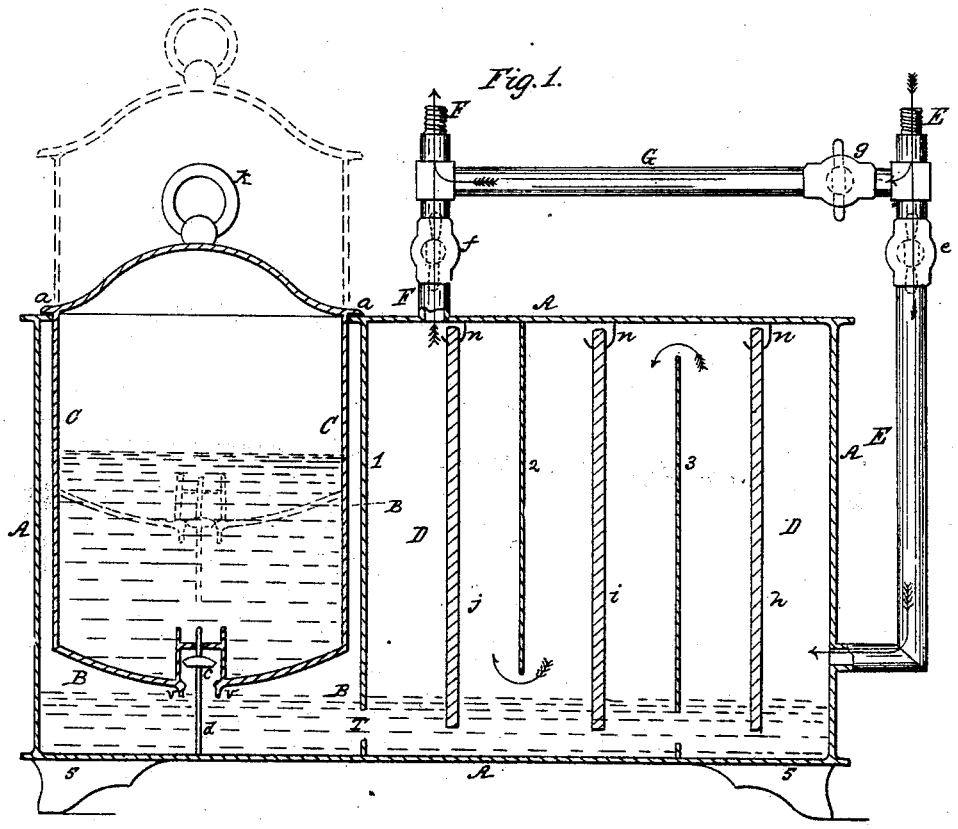
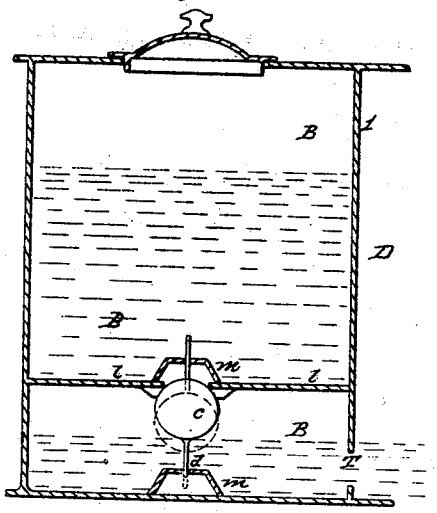


Fig. 2.



Witnesses:
Wm. H. Bartley
E. Kurtz Smith

Inventor:
S. T. McDougall

UNITED STATES PATENT OFFICE.

S. T. McDOUGALL, OF NEW YORK, N. Y.

IMPROVED APPARATUS FOR CARBURETING GASES.

Specification forming part of Letters Patent No. **45,729**, dated January 3, 1865.

To all whom it may concern:

Be it known that I, S. T. McDOUGALL, of the State, city, and county of New York, have invented certain new and useful Improvements in Apparatus for Carbureting Gas for Illuminating and other Purposes; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a longitudinal vertical section of the whole apparatus as it is when in operation, showing the chamber in which the gas is carbureted or enriched and the vessel or fountain containing and supplying the liquid with which the gas is carbureted; and Fig. 2 represents in a similar view another form of fountain for supplying the liquid to the carbureting-chamber, and though differing in detail is yet the same in principle as the first figure, 1, when used in a gas-carbureting apparatus of the character herein described.

The nature of my invention consists in the construction, combination, and arrangement of an improved apparatus for enriching or carbureting hydrogen or other gas, (by the method of causing such gas to pass over or through volatile hydrocarbons or volatile liquids highly charged with carbon,) and for holding such carbureting-liquid and constantly supplying the same in limited and regulated quantities, all substantially in the manner and to fulfill the design, as hereinafter set forth. Previous to my invention in apparatus for this purpose the carbureting-liquid having no other receptacle than the carbureting-chamber itself, the gas to be carbureted was caused to pass the whole body of liquid until the latter was exhausted; and the consequence of that method of carbureting gas is to enrich or carburet the gas which first passes the liquid more than that which passes when the liquid is nearly used up, because a large body of fresh volatile liquid will charge the gas more highly than a small amount when stale, and when such liquid is fresh, and the quantity considerable, more is often carried off by the gas than is really required, and is, of course, wasted. My invention overcomes that difficulty by presenting to the action of the gas in the carbureting-chamber only a small or limited quantity of the carbureting-liquid, and in such a manner that such quantity remains the same in the carbureting-chamber at all times, and therefore the same or nearly the same proportion of gas and liquid is continually maintained in said chamber, and the carbureting or enriching operation is thus rendered equable.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

In the drawings the same letters refer to corresponding parts.

A is an impervious vessel, inclosed at the bottom and sides, and provided in its interior with several like impervious partitions, 1 2 3, of which 1 may be considered the main or principal one, and serves a different purpose from 2 and 3, as will appear.

C is a metallic vessel fitted into an opening in the top of the vessel A, and provided with a small rim or flange around the top *a*, by which it is supported and kept from falling down. It has a small aperture in the bottom, and this is furnished with a short pipe, V, and a valve, *c*, opening inwardly. The valve has a stem, *d*, depending therefrom, by which said valve is opened.

Near the bottom of the vessel A there is an opening, T, through the partition 1, which partition divides the vessel A into two principal chambers—an outside or liquid chamber, B, so called because containing the receiver or reservoir C and liquid only, and an inside or carbureting chamber, so called from the gas being subjected there to the carbureting or enriching process. The object of the opening T is to convey the liquid from the bottom of the liquid-chamber D, where it is delivered by the vessel or receiver C to that of the carbureting-chamber. The partitions 2 and 3 in the carbureting-chamber are alternately fixed at the top and bottom of the chamber, and if more than two are used the number should always be an even one, as 4 6 8, &c., in order that the one next to the right end of the chamber, where the gas enters, should be free at the top, and the one at the left end, where it escapes, open at the bottom—*i. e.*, open for the escape of the gas above the surface of the liquid.

All the impervious partitions which extend

to the bottom of the carbureting-chamber should be provided with an opening, *d*, below the surface of the liquid, so that the liquid shall flow freely and always maintain the same level. Between these impervious partitions there are several sections, *h i j*, of fibrous or other absorbent material, (such as wicking or canton-flannel, for example,) fastened near the top of the chamber by hooks *n n* or any convenient means, and these hang with their lower edge in the carbureting-liquid, and by absorption and capillary attraction carry up the liquid and distribute it over the surfaces for the action of the gas thereon. This enables me to get a large extent of carbureting-surface with quite a small amount of the liquid.

E is the pipe which supplies the apparatus with the gas. F is the delivery-pipe through which the gas escapes to the burners after having undergone the enriching or carbureting process. Both pipes are provided with cocks *e f*.

G is a pipe which makes a communication between pipe E, carrying in the uncarbureted gas, and the pipe F, having the enriched or carburated gas. It has a cock, *g*. The receiver *g* has a ring, *k*, or other suitable handle by which it may be lifted out when it is to be filled with the liquid. The whole apparatus is supported in a level position on small feet 5 5.

Having thus described the construction, I will now briefly go through the operation.

Presuming the receiver to have been filled with the liquid on its being put in its place, the valve-stem *d* strikes the bottom of the liquid-chamber, which raises the valve *c*, letting the liquid flow down and through the partitions into the carbureting-chamber. The gas is now entering through the pipe F and comes in contact with the surface of the liquid in the chamber and passes through the absorbent material *h*, then up and over the impervious partition 3, as indicated by the arrow; then down and against the surface of the liquid, through the material *i*, and under the partition 2; then through the material *j*, and thence, escaping at the pipe E, completely charged with the carbon of the liquid, being now ready for use at the burners.

When the receiver B is to be filled, it has only to be lifted out of the vessel A by the handle *k*, when the valve *c* will take its seat in the interior of the aperture in the bottom, and retain any liquid remaining in it. The receiver is now inverted and filled at the bottom in the same manner as the fountain of an ordinary fountain-lamp, the valve *e* falling inward from its seat when inverted and allowing the liquid to be poured in. When filled, it is turned right side up, when the valve *c* resumes its seat and prevents the liquid from running out until placed in the vessel A, when the valve-stem *d*, striking the bottom of the chamber, allows the liquid to flow down in the outside and inside chambers, as before alluded to. The liquid will not rise higher in said chambers than the mouth of the pipe *v*, on account of the pressure of the atmosphere and the partial vacuum in the top of the receiver caused by the fall of the liquid therein. Said liquid, from the same cause, will always maintain this level, being supplied from the receiver as fast as taken out of the carbureting-chamber by the carburation of the gas or otherwise. Thus, it will be observed, that the flow of the liquid into the carbureting-chamber is regulated entirely by the consumption of said liquid in said chamber, and so the gas has always the same amount of liquid and of the same or nearly the same carbureting properties. The liquid, while preserving the same level in the two chambers above the top of the opening T in the partition 1, will prevent the escape of any gas from the carbureting-chamber, and it is not therefore necessary to shut off the supply of gas from the apparatus when it is desired to replenish the receiver B with the liquid.

The temperature of the weather is liable to affect the process of carburetion, heat inducing a better action, and cold having a contrary effect.

In order to regulate the richness of the light produced by the carbureted gas, and also to provide for the differences between the carbureting properties of different liquids, I have made a communication direct from the receiving-pipe E to the discharge-pipe F by a pipe, G, so that when the gas is found to have too much carbon the cock *f* may be turned to let a portion of the unenriched gas pass to and be mixed with that which has been enriched. This arrangement enables me to maintain at all times a gas of a uniform quality in any temperature and with liquid of any degree of carbureting property.

For the cocks *e* and *g* a single two-way cock might be substituted, situated at the junction of the pipes E and G, communicating with both pipes, so that the turning of the gas onto pipe G will cut off the supply, or a portion of the supply, to F, and vice versa.

Although in this invention I do not claim the fountain of Fig. 1 of itself, I shall not confine myself to it as a means of rendering the carbureting-chamber of a gas carbureting or enriching apparatus self-supplying, but shall use any other means for that purpose which is properly equivalent thereto in principle; and as an alternative to such fountain, I have shown in Fig. 2 an arrangement different in detail, but effecting the same result by the same means essentially,—viz., the chamber D is made self-supplying of the liquid, and that supply, as in the operation of Fig. 1, is dependent upon the height of the liquid in the said chamber, and consequently regulated by the amount consumed or carried off from said chamber. In the latter plan the liquid is forced directly into the liquid-cham

ber B, which is furnised with an impervious lateral division or partition, *l*, in the center of which there is an aperture for the liquid to flow through into the carbureting-chamber. The valve *c* in this case floats on the surface of the liquid in the bottom of the chamber, and when the said liquid has attained a given height therein the float-valve rises and shuts off the supply. It is now seen closed, and the dotted lines show it as when slightly open. The valve has a stem, *d*, but its only office is to guide the valve to cause it to take its seat properly when closing. *m m* are guides for said stem.

In the above specification the words "carbureting" and "enriching" are to be understood as being synonymous.

Having thus described the nature, the object, the construction, and operation of my invention for carbureting or enriching with carbon gases for illuminating and other purposes, what I claim therein as my invention, and desire to secure by Letters Patent, is —

1. The combination of a liquid or reservoir chamber, B, a reservoir, C, and a carbureting-chamber, D, for the purposes hereing specified.

2. The vessel A, composed of a chamber, B, and a chamber, D, constructed and arranged substantially as and for the purposes herein set forth.

3. The construction and arrangement of the chamber D, as provided with alternating close partitions or divisions 2 and 3 and intermediate fibrous or capiliary divisions, *h i j*, substantially as and for the purposes herein specified.

S. T. McDOUGALL.

Witnesses.
E. HARRY SMITH,
WM. F. KERTTING.