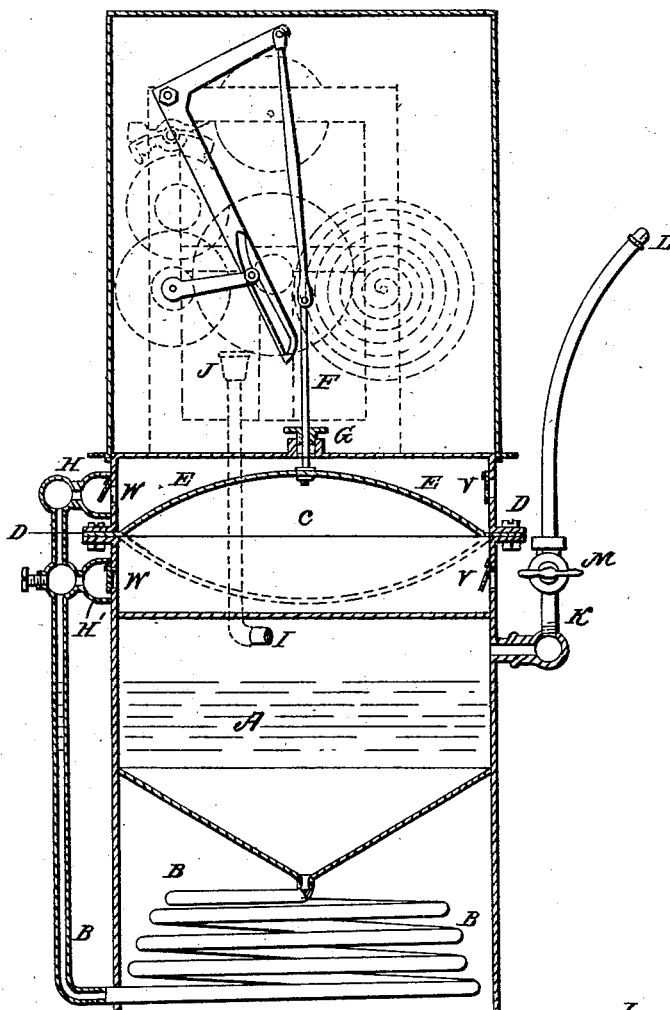


POND & RICHARDSON.
Apparatus for Carbureting Air.

No. 50,029.

Patented Sept. 19, 1865.



Witnesses:

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UNITED STATES PATENT OFFICE.

E. A. POND AND M. S. RICHARDSON, OF RUTLAND, VERMONT.

IMPROVED APPARATUS FOR CARBURETING AIR.

Specification forming part of Letters Patent No. 50,029, dated September 19, 1865.

To all whom it may concern:

Be it known that we, E. A. POND and M. S. RICHARDSON, both of Rutland, in the county of Rutland and State of Vermont, have invented certain new and useful Improvements in Machines or Apparatus for Making Illuminating-Gas; and we hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to the construction and arrangement of gas-machines or apparatus or machines for making illuminating-gas by forcing atmospheric air through the light and volatile hydrocarbon fluids—these secondary products of the distillation of coal or the oils emanating from coal or petroleum. They are generally composed of an air-forcing apparatus and a vaporizer, combined for operation so as to produce a steady flow of air well charged with hydrocarbon vapor. This, however, could only be effected by apparatus or machinery too voluminous to admit of portability or of application to railroad-cars or other like vehicles.

The object of this invention, therefore, is to combine and arrange a gas-machine with a view of compactness and portability, so that the same may be used for illuminating purposes as a fixture in railroad-cars and other vehicles, or as a lamp or movable and portable apparatus in houses, &c.

To accomplish the object of this our invention two conditions are requisite: first, that the air shall be forced or drawn through the volatile hydrocarbon liquid by a mechanism the operation of which shall not be sensibly affected by the movement to which it may be subjected; second, that the air shall be so forced or drawn through a column of volatile hydrocarbon liquid of such length (equivalent to height) as will insure the perfect saturation or charging of the air with hydrocarbon vapor.

To this effect we combine with an air-pump a vaporizer under the arrangement substantially as follows: A hydrocarbon-fluid reservoir, the funnel-shaped bottom of which terminates into a coiled pipe, is connected with an air-chamber provided with a double-acting diaphragm air-pump operated by a spring-power mechanism. Valves for the admission to and expulsion from the air chamber are arranged so that at each stroke of the pump air is admitted into the air-chamber and forced out

through the coil into the fluid-reservoir, whence it escapes through a pipe or pipes leading to one or more burners.

In the accompanying drawing we have shown in sectional elevation an apparatus constructed according to this our invention.

A is the reservoir, consisting of a hermetically-closed cylindrical vessel, the bottom of which is funnel-shaped, terminating at the center into a pipe, C, coiled spirally, helically, or in other convolute manner. Above the reservoir there is an air-chamber and pump, C, composed of two parts, which are united by means of screws or bolts passing through flanges D, between which is clamped and securely held the elastic or flexible diaphragm E, made of india-rubber, leather, or other suitable substance.

To the diaphragm is imparted reciprocating action by means of a clock-work or spring-power mechanism, operating the rod F, which passes through the stuffing-box G in the top of the air-chamber. No special reference is here needed to the construction and operation of the said mechanism. It will suffice to say that it is similar to that of a clock, being provided with a spring of requisite power, gear-wheels, regulating mechanism, and the proper means or devices for transmitting rotary movement and converting the same into reciprocating movement.

One or more air-admission valves, V V', are arranged in the air-chamber on each side of the diaphragm, and similar valves, W W', but working outwardly—i. e., for the expulsion of air from the air-chamber—are arranged in valve-chambers H H', located on each side of the diaphragm and communicating with the pipe B.

I is a tube provided with a funnel-shaped top, through which the fluid or hydrocarbon liquid is poured into the reservoir, and K is a pipe, which conveys the air charged with vapor to the burner L.

M is a cock to shut off the supply of gas to the burner.

The operation of the apparatus described, which is one of the many forms into which our invention may be reduced, is as follows: The reservoir A, being first filled with hydrocarbon liquid to a level some distance below the point of outlet of the gas, the coil of pipe B will be

supplied from the reservoir, and thus kept constantly filled. The clock-work or spring mechanism is now wound up and operated, imparting an up-and-down motion to the pump-rod F. The drawing exhibits the pump-rod at the end of its upward stroke, having raised the diaphragm, whereby the air in the upper portion of the chamber was compressed. The compression of the air caused the closing of the internal valve, V, and the opening of the external valve, W, whereby the air contained in the air-chamber above the diaphragm is partly forced down and through the pipe B and up and through the coil. While the air is thus forced through the sinuosities of the pipe it becomes more or less charged with the vapor of the volatile hydrocarbon fluid, according to the length of the coil, which may be increased or decreased in accordance with requirements. On the downward stroke of the rod F a precisely similar operation and with same effect will take place through the valves V' and W'. The former, owing to the compression of the air within the lower compartment of the air-chamber, is closed, while the latter is opened, and the air is forced, in the manner before described, through the pipe and coil B, and becomes charged to a sufficient degree with hydrocarbon vapor. The gas thus formed by the charging of air with vapor is collected in the upper part of the fluid-reservoir, whence it is allowed to escape through the pipe K at the burner L, where it may be ignited and burned for illuminating or heating purposes.

From the foregoing it will be understood that the important feature of our invention is the circuitous arrangement of the pipe, whereby air in a more or less continuous stream or column is kept moving through or in contact with hydrocarbon liquid for a length of time requisite to sufficiently charge it with vapor, without, however, involving voluminous and expensive contrivances, such as have heretofore been used.

An advantage which renders this machine peculiarly adapted to railroad-cars and other vehicles or for portable lamps is that the motion to which the fluid-reservoir may be submitted will not sensibly affect the operation of the machine. The swash or motion of the liquid in the vessel is by the arrangement shown confined to the supply-reservoir, and does not take place in the coil, so that the column of liquid through which the air is forced—i. e., the longitudinal development of the coil—is constantly the same, or nearly so. If the motion of the fluid-vessel be violent, there is danger of the flow of gas being occasionally wholly or partially interrupted, causing the extinguishment or flickering of the flame of the burner. To obviate this we propose to provide in the fluid-vessel, and below the outlet of the gas, a spherical shield or cover with a hole in the center, through which the gas escapes.

Another important feature of our invention is the application of a spring-power mechanism to work the air-pump, which may be of

any known or suitable construction. By this means gas may be generated on the principle set forth in a small and portable apparatus.

We are aware that clock-works have been used in oil-lamps to pump up the oil to supply the wick at the burner; but we are not aware that such means have ever been used for the purpose of forcing air through the volatile hydrocarbon fluid; and, lastly, the application of the diaphragm-pump to lamps or gas-machines, as described, offers the important advantage of doing away with friction, more or less attending the operation of all other pumps.

Although we have described our apparatus with reference to its use as a vaporizer of atmospheric air, we wish it to be understood that it may be used with superior advantages as a carbonizer of hydrogen gas. Experiments made with our improved machine developed the important fact that if hydrogen gas be forced through the coil in lieu of or together with air, a more intense heat and a brighter illuminating-flame will be produced.

We have also found it advantageous to regulate and divide the current or flow of air into as fine a stream as possible, as it passes through the coil, by means of finely-perforated diaphragms or wicking drawn through the coil or other equivalent means. Perforated diaphragms may be used for this purpose either across the coil or across the reservoir, or across both.

In conclusion, we would observe that we do not confine or restrict ourselves to the precise details or arrangements which we have had occasion to describe or refer to, as many variations may be made therefrom without deviating from the principles or main features of the said invention. Thus, instead of a spring-power mechanism for operating the air-pump any other available power and method of transmitting the same may be used. Instead of a diaphragm-pump a piston-pump or the rotary pump ordinarily used in connection with gas-machines may be employed.

Having now described the nature of our invention, we would state our claims as follows:

1. In machines for generating illuminating-gas by charging atmospheric air or hydrogen with the vapor of hydrocarbon fluids, the employment of a vaporizer composed of pipe or tube coiled spirally or otherwise, substantially as and for the purposes hereinbefore set forth.
2. In machines for generating illuminating-gas by charging atmospheric air or hydrogen with vapor of hydrocarbon fluids, in combination with the tubular vaporizer, as described, a supply-reservoir to maintain said vaporizer constantly filled, substantially as herein set forth.
3. In machines for generating illuminating-gas by charging atmospheric air or hydrogen with the vapors of hydrocarbon fluids, the employment of an elastic or flexible diaphragm air-pump, constructed and arranged for operation substantially as herein set forth.
4. In machines for generating illuminating-

gas by charging atmospheric air or hydrogen with the vapor of hydrocarbon fluids, the employment, in combination with an air or gas pump, of a clock-work or other spring-power mechanism arranged to operate the said pump substantially as and for the purpose set forth.

5. In a machine for generating illuminating-gas by charging atmospheric air or hydrogen with the vapor of hydrocarbon fluids, the combination of the following elements: first, a flexible or elastic diaphragm-pump or other pump operating without the use of water or

other liquid; second, a tubular vaporizer, substantially such as herein described; and, third, a spring-power mechanism to operate the pump, substantially as described.

In testimony whereof we have signed our names to this specification before two subscribing witnesses.

E. A. POND.

M. S. RICHARDSON

Witnesses:

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S. R. GIDDINGS.