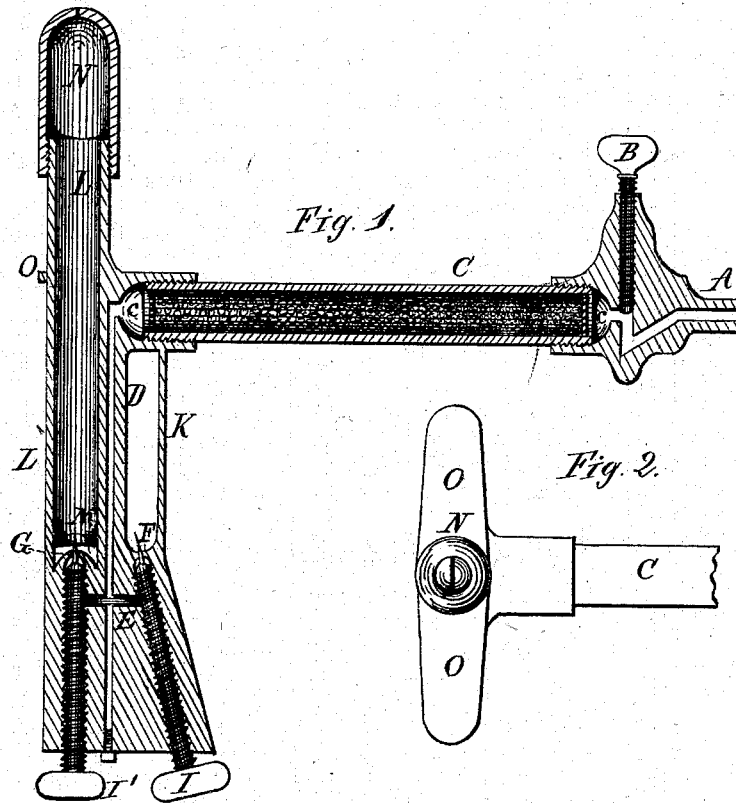


M. L. BALLARD.

VAPOR-BURNER.

No. 186,519.

Patented Jan. 23, 1877.



Witnesses  
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# UNITED STATES PATENT OFFICE

MARTIN LUTHER BALLARD, OF CANTON, OHIO.

## IMPROVEMENT IN VAPOR-BURNERS.

Specification forming part of Letters Patent No. **186,519**, dated January 23, 1877; application filed December 2, 1876.

*To all whom it may concern:*

Be it known that I, MARTIN L. BALLARD, of Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Vapor-Burners; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure I is a sectional view of my improved vapor-burner. Fig. II is a plan view, showing the deflecting-shields.

This invention relates to that class of illuminators in which the volatile hydrocarbons are burned, and the burning material vaporized by a supplemental flame, in order to supply or feed the illuminating-flame. The object of the invention is to obtain a burner which shall be cheaply constructed, perfectly safe, and less bulky and unsightly than those heretofore in use.

In the drawings, A represents a tube or pipe proceeding from the reservoir of oil. B is a stop-cock, by which the flow from said pipe is regulated. C is an oil-feeding tube, constructed of suitable material, and leading the oil from the pipe A to that part of the burner which is used as a retort. This tube C is packed or filled with pieces of emery, preferably of different sizes, the receiving end being filled with very small particles, while those at the other end are somewhat larger. This emery may be secured in the horizontal tube by means of a wire-gauze, *c*.

Hitherto in the manufacture of vapor-burners great difficulty has been experienced in so packing the tubes which conduct the oil as to prevent the passage of flame to the reservoir, and at the same time allow the oil to pass in such manner as to be thoroughly vaporized. The packings that have been employed have been subject to such changes, physical and chemical, from the action of the hydrocarbons, and the changes in temperature, that their efficiency has been impaired. By experiment I have ascertained that to accomplish the desired ends it is necessary to have a hard, insoluble material, which will

resist the fracturing force of heat and prevent solution and deposition by the liquid. I have found, further, that the packing should furnish as much vaporizing-surface as possible to the liquid passing through it; that it should be a good conductor of heat, should prevent the flowing of the oil in a continuous current, and should not become incrustated with non-conducting oxidations. My experiments have led me to the adoption of broken emery for this purpose, which possesses these desired properties, and which, besides being exceedingly hard and insoluble, has, when broken, unusually angular and irregular surfaces.

The tube C, at the delivery end, connects with a vertical tube, D, which, at its lower end, communicates with a short horizontal tube or pipe, E, of which one end communicates with an orifice, F, and the other with an orifice, G, said orifices being upon opposite sides of the vertical tube D. Communication with the orifice F is controlled by the screw I and with the orifice G by the screw I', which screws are of the ordinary construction.

It will be seen from the drawings that by this construction I am enabled to employ two jets, one for the purpose of heating, the other for illuminating, which can be regulated independently of each other, as circumstances may require. The orifice F allows the escape of gas for a heating-jet by which the vaporization is effected, and in order to effect it more properly I turn the line of the jet so that it may play directly against the tube D. The heat thus passes around three sides of the vertical tube upward against the horizontal tube C, which tubes together become a retort. In order that the retort part of the tubes may receive as much of the heat as possible, I so cast or make the burner that it shall have a vertical web or shield, K, extending from the outer side of the orifice F to the tube C. The gas for illuminating passes vertically through orifice G into the burner-tube L, where it is mixed with air, which enters the burner-tube through apertures M. Experiment has shown that, by placing these air-apertures on a line horizontal with the orifice G, and with such an inclination that the air shall enter, not horizontally, which would impede the flow of gas, but with an upward

motion, I can obtain a more rapid and perfect mixture of the gas and air than by the devices heretofore employed. After the gas has been thus mingled with air it passes to the burner-tip N, where it is ignited for illumination. In order to prevent the hot currents from the heating-orifice F interfering with the illuminating-flame, I so cast or make the burner that horizontal deflectors or shields O shall extend from the sides of the burner-tube between the heating-jet orifice and the illuminating-jet orifice.

It is apparent that my vapor-burner is so simple and small that the greater part, if not the whole, of it can be cast in one piece of metal, and this is the method of manufacture which I follow, thus being enabled to produce a cheap yet effective burner.

The operation is simple, and will be readily understood from the foregoing description. The oil passes from the reservoir to the tube C, where it percolates through the emery packing, which breaks its continuous flow, and forms it into thin sheets for readier vaporization. The orifice G being closed, and the orifice F open, a small quantity of the oil will pass through the heating-tube D and escape at F, where it readily ignites and furnishes a flame that immediately vaporizes the oil passing over it, and supplies the orifice G with an abundance of illuminating-gas.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a vapor-burner, a tube filled with emery, through which the hydrocarbon is conducted to the jets, as and for the purposes set forth.

2. In a vapor-burner, a retort formed of a horizontal tube, a vertical tube beneath the horizontal tube, and a burner-tube contiguous to the vertical tube, in combination with a jet-orifice, which heats all of said tubes, substantially as and for the purposes set forth.

3. In a vapor-burner, a heating-jet orifice and an illuminating-jet orifice, arranged as described, so that the gas-jets can be regulated independently of each other, substantially as set forth.

4. In a vapor-burner, a horizontal tube, from which a vertical tube and a vertical shield extend downward, in combination with a heating-orifice between said vertical tube and shield, substantially as set forth.

5. Tube C and tube D, in combination with orifices F and G, substantially as set forth.

6. Tube C, shield K, tube D, and orifice F, in combination with tube L, orifice G, and air-passages M, substantially as set forth.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

MARTIN LUTHER BALLARD

Witnesses:

C. E. SOWERS,

PERCY S. SOWERS.