

D. E. BANGS.
VAPOR BURNER.

Patented Jan. 29, 1884.

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UNITED STATES PATENT OFFICE.

DAVID E. BANGS, OF MEDFORD, MASSACHUSETTS.

VAPOR-BURNER.

SPECIFICATION forming part of Letters Patent No. 292,616, dated January 29, 1884.

Application filed August 24, 1883. (No model.)

To all whom it may concern:

Be it known that I, DAVID E. BANGS, of Medford, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Vapor-Burners, of which the following is a full, clear, and exact description.

This invention relates to vapor-burners for the burning of the vapors of petroleum or other hydrocarbon oils—such vapor-burners, for instance, as are described and shown in Letters Patent of the United States issued to me, dated June 29, 1880, No. 229,355; and it consists in the combination, with a steam-generator, and superheater, and tubes for vaporizing the hydrocarbon, of the burner-tube located below and between the steam-generator and vaporizing-tubes, and provided with jet-openings to direct the vapor-flame directly against the steam-generator and the vaporizing-tube; and, also, in the combination of the parts whereby the superheated steam will strike and spray the hydrocarbons as they enter the vaporizing-tube, as hereinafter particularly described, and then specifically defined by the claims.

In the accompanying plate of drawings, Figure 1 is in part a front elevation and in part a longitudinal vertical section of a vapor-burner constructed according to the present invention. Fig. 2 is a plan view. Fig. 3 is a vertical cross-section on line 3 3, Figs. 1 and 2. Fig. 4 is a longitudinal vertical section on line 4 4, Fig. 2, on a reduced scale.

In the drawings, A represents the burner-tube of a vapor-burner having jet-holes *a*, at which, in the operation of the burner, the vapor of the petroleum or other hydrocarbon oil escapes and is burned.

B and C are two tubes or pipes, arranged one above the other, and having communication with each other by a passage, *b*, the tube or pipe C, by its other end, communicating by a pipe, D, with the burner-tube A, as at *f*, by any suitable connections. The tube C is horizontal, or substantially so, while the tube B inclines in the direction of the passage *b*, as shown more particularly in Fig. 1. At the other end of tube *b* is an opening or passage, *h*, through which the hydrocarbon oil from the pipe E, connecting with the supply pipe

or tank holding the oil, enters the tube B, the opening *h* being preferably of such a diameter as only to allow the oil to pass through it into tube B drop by drop.

So far the vapor-burner as described is substantially the same as the one shown in said patent.

G is a tube or chamber situated at the rear of the tube C, and above this tube G is a tube or chamber, H, having communication with the tube G by vertical passages *l l*, and by a tube or pipe, L, at its side with the tube B. The tube or chamber G is for water, and it is connected by a pipe, M, with a water-tank or other suitable water-supply, and so that the water in the tube G is maintained at such height that there will be sufficient space left above the water and between it and the top of the tube G for the generation of steam therein, and from which, through the passages *l*, it can pass into tube H. The tube G is preferably made, as shown, in oblong form in vertical section, so that there may be considerable space for the steam above the water therein, so that the water in the generator may not overflow to extinguish the flame.

The operation of the burner is as follows: The hydrocarbon oil being allowed to flow through the pipe E, it passes drop by drop into the tube B through the passage *h*, thence through said tube to and through passage *b* into tube C, and thence through said tube C and pipe D to the burner-tube A, where it is burned at the holes *a* in a vapor form, the oil in its passage through the tubes B and C having become vaporized from the heat of the flames of the burner-tube. At the same time, the water in chamber G is heated, and steam generated therein passes into the chamber H through the passages *l*, where it is superheated, and from thence it passes through pipe L into the end of tube B, where the oil, as it drops through the passage *h* into the superheated steam, becomes sprayed, as it were, the superheated steam and oil then passing through the tubes B and C, in which the oil is thoroughly vaporized, and through the pipe D to the burner-tube A, where they are burned, as described. To insure the generation of steam in the chamber G and its being superheated in the chamber H, the burner-tube A has other

jet-holes, *m*, back of the holes *a*, the flames from which act more directly against the chambers G and H. By locating the burner-tube below the steam-generating tube and vaporizing-tube, and providing it with jet-openings to direct the flame directly against said tubes, the heat is applied directly to points from whence the best results are obtained; and by directing the superheated steam against the hydrocarbon as it drops into the vaporizing-tube, the hydrocarbon is sprayed by the steam, and the two immediately combine to form a gas, and better results are obtained than when the two elements are otherwise brought together.

The apparatus, when used, is to be placed in the fire-chamber of a stove and secured therein in any suitable manner, the proper pipe-connections being made with tanks or holders of the water and oil for a proper operation of the burner. The ends of the several tubes and the portions of the tubes over or opposite to the several communicating passages have screw plugs or caps N, the removal of which, when desired, allows the tubes and pipes, &c., to be cleaned of sediment or dirt that may have accumulated in the use of the burner.

Any suitable means may be used to regulate the flow of the water into the chamber G, to maintain the height desired therein, and the several tubes and chambers can be of any length and size in cross-section desired.

I am aware that it has been proposed, in vapor-burners to generate vapors from gasoline and unite such vapors with superheated steam generated in the same burner, and afterward burn at the burner-tube the gas thus produced, which, however, I do not claim. My invention differs therefrom in combining the burner-tube with the steam-generator and vaporizing-tubes, so that the flames will strike di-

rectly against said tubes, and, further, in combining the parts so that the superheated steam will enter the vaporizing-tube at a point to spray the hydrocarbon as it enters said tube. It further differs therefrom in that heavy oils may be used from which to generate the vapors, while in the construction disclaimed only gasoline or light oils can be used.

Having thus described my invention, what I claim is—

1. The combination of the steam-generator tube, the superheater-tube connecting therewith, the vaporizing-tubes, with one of which the steam-generator communicates, means for introducing hydrocarbons into said vaporizing-tubes, and the burner-tube communicating with the vaporizing-tubes, and located below the steam and vaporizing tubes, and provided with jet-openings for directing the flame-jets directly against the steam and vaporizing tubes, substantially as described.

2. The combination of the steam-generator tube, the vaporizing-tubes, means for supplying hydrocarbons to said tubes, the superheater-tube communicating with the steam-generator tube and with the vaporizing-tubes at a point where the superheated steam will strike and spray the hydrocarbon as it enters the vaporizing-tube, and the burner-tube communicating with the vaporizing-tubes, and located at a point to direct the flame against both the steam and vaporizing tubes, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

D. E. BANGS.

Witnesses:

EDWIN W. BROWN,
WM. S. BELLOWS.