W. W. THOMAS.
Hydrocarbon-Burner.

No. 218,337. **Patented Aug. 5, 1879.**

Fig. 1.

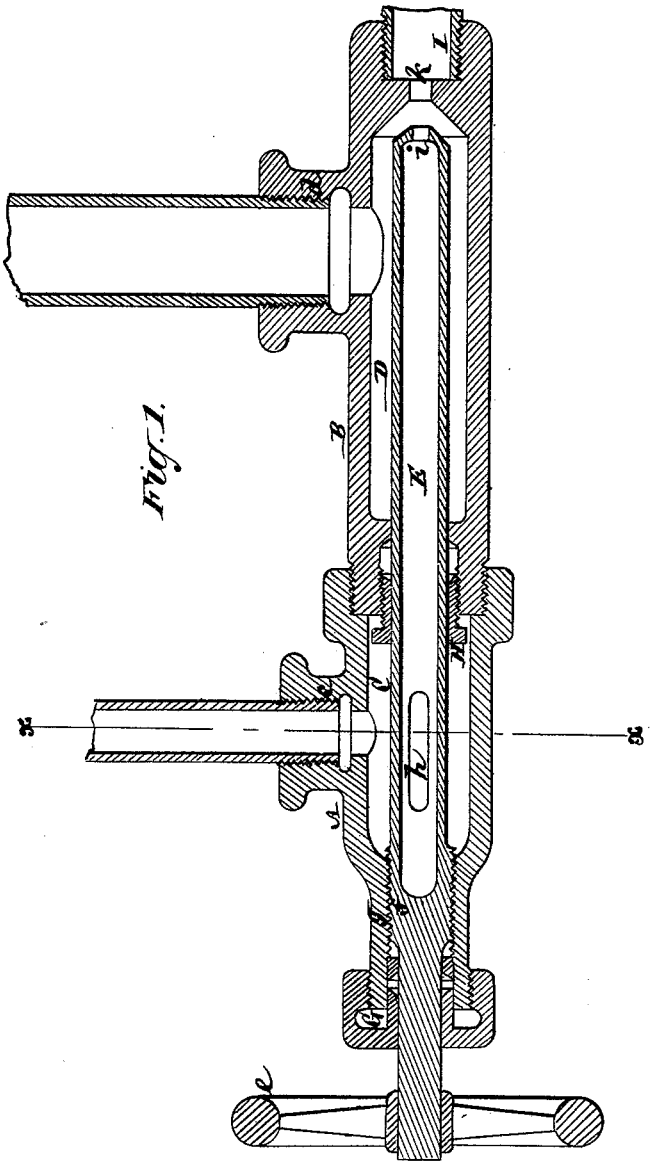
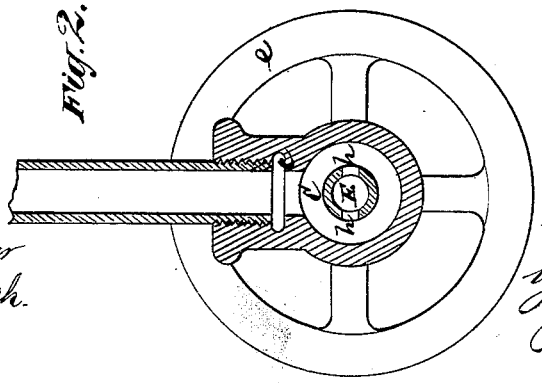


Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM W. THOMAS, OF JERSEY CITY, ASSIGNOR TO DAVID B. GRANT, OF PATERSON, N. J., AS TRUSTEE FOR SAID THOMAS, DOUGLAS S. GRANT, OF NEW YORK, N. Y., AND EDWIN D. McCRACKEN, OF PATERSON, N. J.

IMPROVEMENT IN HYDROCARBON-BURNERS.

Specification forming part of Letters Patent No. **218,337**, dated August 5, 1879; application filed May 20, 1879.

To all whom it may concern:

Be it known that I, WILLIAM W. THOMAS, of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Atomizers for Burning Hydrocarbons, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to apparatus for injecting tar or other hydrocarbon to be used as fuel, in the form of spray, into a furnace or other heating-chamber. Among various purposes or uses it will be found especially advantageous in gas-works, inasmuch as it provides in a simple and practicable manner for the utilization of the tar which is produced in the manufacture of gas. It may also be very advantageously employed in steam-boiler furnaces of various kinds, and in which a bed of "breeze" or other solid fuel is used in addition to the tar or other hydrocarbon.

The invention consists in an atomizer, in which are combined a steam-chamber and tar or hydrocarbon chamber, arranged in front of said steam-chamber, and having a contracted spraying opening or duct in its forward end, and an enlarged spray-delivery nozzle in advance of said end, and a perforated hollow steam-spindle or elongated nozzle, preferably made adjustable through stuffing-boxes in said chambers, and provided with an unobstructed contracting steam-issuing orifice in line with the spraying duct or opening, whereby a straight and clear discharge is obtained for the hydrocarbon by the steam, a perfect spray is produced without liability of the parts to clog, and backing up of the hydrocarbon in the apparatus is avoided.

In the accompanying drawings, Figure 1 represents a vertical longitudinal section of a hydrocarbon-atomizer constructed in accordance with my invention, and Fig. 2 a transverse section of the same on the line *x x*.

A and B indicate the body of the atomizer, which might be constructed of a single piece, but which it is preferred to make of two parts or tubes, A and B, fitted to connect at the rear end of one and forward end of the other by a screw-joint, *b*, to facilitate construction and cleaning or repair. These tubes A and B, however, have no direct communication with each other at their connecting ends, but are constructed to form independent chambers C and D, the rear one of which, C, in the tube A, constitutes a steam-chamber, which is supplied with steam by an inlet, *c*, from a steam-generator or other steam-chamber, while the forward chamber, D, in the tube B, constitutes a tar or hydrocarbon chamber, which is supplied with hydrocarbon under pressure or by gravity through a lateral inlet, *d*, from any suitable chamber or source of supply.

E is the steam-nozzle through which the steam passes from the steam-chamber C into the tar-chamber D, to eject the tar from the latter. This nozzle, which is constructed in the form of a hollow spindle, having an opening in its front end, but closed in its rear, is of somewhat greater length than the chambers C and D, within which it is concentrically arranged, and through the rear of which former chamber, C, it projects to admit of its being rotated from the exterior by a crank or hand-wheel, *e*, for the purpose of adjusting its forward end nearer to or farther from the advance end of the chamber D, within which the nozzle projects. To effect this adjustment, said hollow spindle or elongated nozzle E has a screw-thread, *f*, upon it, arranged to fit a female thread or screw-box, *g*, in the rear end of the tube A, which end of the latter is also provided with a stuffing-box and gland, G, to prevent leakage of steam through the back end of said tube.

It is also preferred to provide a stuffing-box and gland, H, where the hollow spindle or elongated nozzle E passes from the steam-chamber C into the tar-chamber D, to prevent leakage between said chambers. Steam is supplied from the chamber C to the interior of the hollow spindle or elongated nozzle E by one or more apertures, *h*, in the side of the latter within the chamber C.

The opening *i* in the forward end of the elongated steam-nozzle E forms a contracted orifice, through which the steam issues to eject the tar or hydrocarbon from the chamber D,

and through a spraying opening or duct, *k*, in the forward end of the chamber D, from the outer edges of which latter duct or orifice the tar as ejected by the steam is distributed in the form of spray within an enlarged spray-delivery or spraying-nozzle I, which connects with the furnace or heating-chamber it is required to supply with hydrocarbon.

It is important that there should be a ready clearance beyond the advance edges of the contracted spraying opening or duct *k*, in order to insure a full or perfect spray by the scattering of the tar as it strikes and escapes by said edges, which latter it is preferred to make straight and sharp, or not flaring in an outward direction.

The steam-issuing orifice *i*, also in the forward end of the elongated nozzle or hollow spindle E, opposite which the spraying-opening *k* is arranged, is also of a contracting construction, or not flaring in an outward direction, but preferably straight, so that as the steam issues from said orifice to drive the tar before it there will be no back action of the tar or hydrocarbon in the chamber, but said liquid fuel will be driven directly into and through the contracted spraying opening or duct *k*. This, likewise, is very important, and it is preferred, generally, to make the opening *k* of a larger diameter than the orifice *i*.

Furthermore, although the hollow spindle or elongated nozzle E is adjustable by turning it to the right or left to increase or diminish the distance between the forward end of said nozzle and the forward end of the chamber D to regulate the quantity of hydrocarbon to be injected, it is not designed that the forward end of said elongated nozzle and advance end of the chamber D should form a valve and valve-seat; and instead of being of tapering or conical construction, as shown, they may be of any other suitable form, inasmuch as it is proposed to regulate or open and shut off the supply of steam and hydrocarbon to the chambers C and D by valves arranged in the supply-pipes to said chambers. In every instance the forward end of the elongated steam-nozzle E and advance end of the chamber D will be in moderate proximity with each other; and said nozzle has no valve fitted to it to regulate the discharge of the steam, but is free or unobstructed, as a valve applied to the steam-issuing orifice only adds to the complication, and by its liability to clog interferes with the free and perfect action of the atomizer.

When the atomizer is used in connection with a furnace for heating gas-retort benches, it may be inserted in an opening arranged at any suitable or convenient point in the wall of the furnace.

Injectors and ejectors have heretofore been constructed with adjustable hollow internal spindles, adapted to convey steam from a steam-chamber and discharge it into an intermediate passage leading from a water-chamber, said passage being separate from the delivery or final discharge nozzle or pipe, and located at a fixed distance therefrom; but none, so far as I am aware, have a hollow spindle opening near one end in a steam-chamber, and adjustable longitudinally, if desired, within, and opening at the other end in, a chamber adapted to contain hydrocarbons, and connected directly with a spray-delivery pipe, as in my atomizer. This direct connection is essential in order to prevent clogging of the ducts when heavy hydrocarbons are used.

I claim—

The combination of the detachably-connected sections A and B, the former inclosing the steam-chamber C and provided with a steam-induction pipe, and the latter inclosing the hydrocarbon-chamber D, and having a hydrocarbon induction-pipe and the contracted spraying-opening *k*, the hollow adjustable spindle E, having the contracted end aperture *i*, opening into the hydrocarbon-chamber, and the slot *k*, opening into the steam-chamber, and the spray-delivery pipe or nozzle I, substantially as and for the purpose set forth.

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