R. D. TURNER.

Hydrocarbon Furnaces and Atomizing-Apparatus.

No. 158,759. Patented Jan. 12, 1875.

Fig. 1.

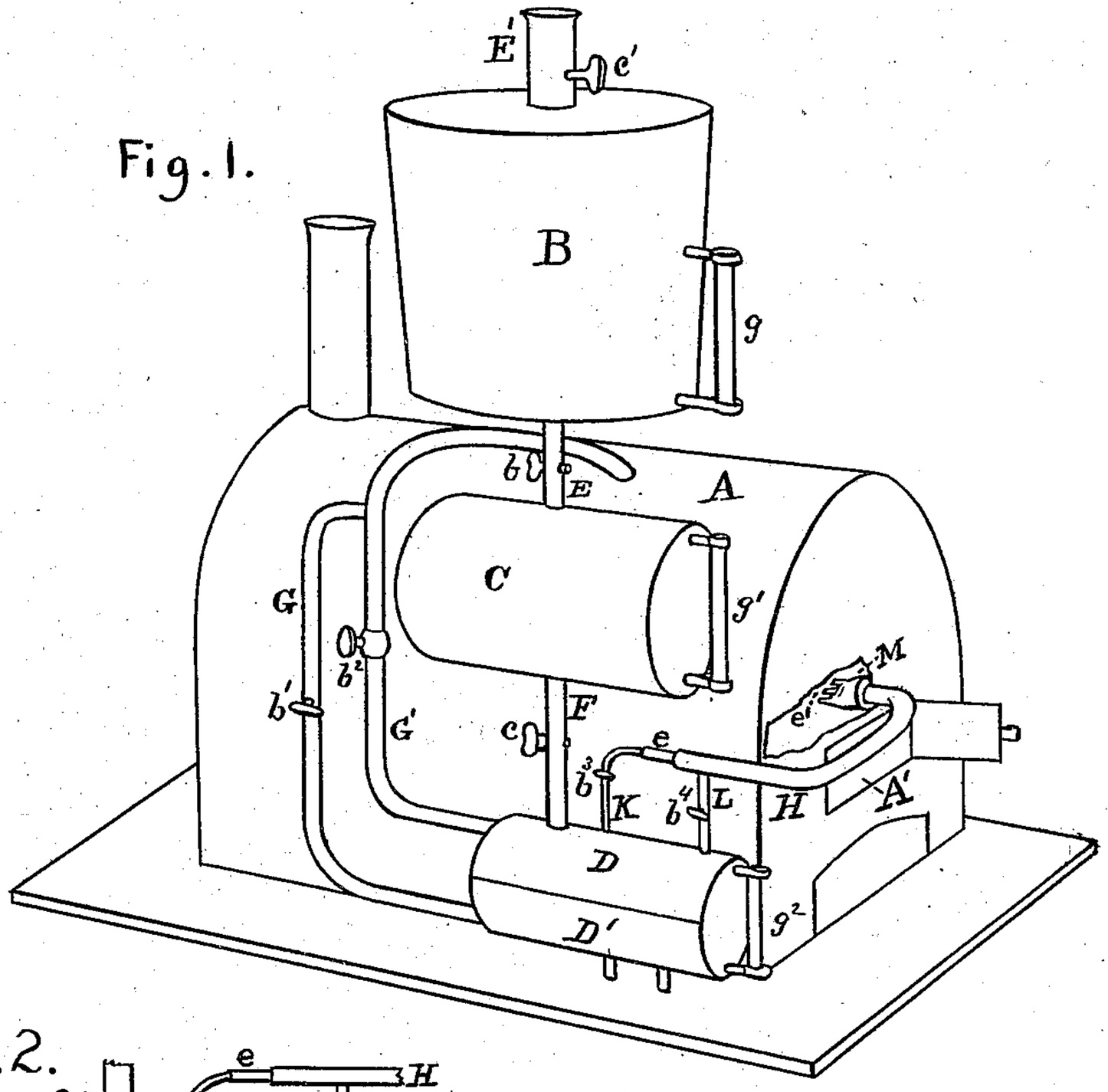


Fig. 2.

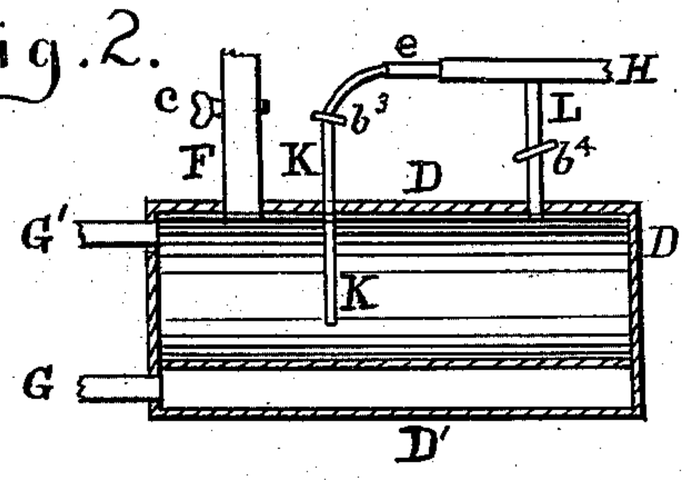


Fig. 5.

Fig. 3.

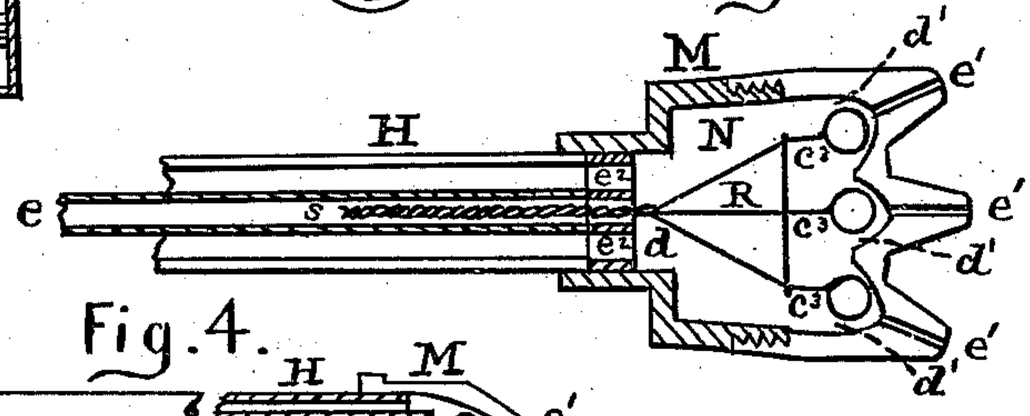
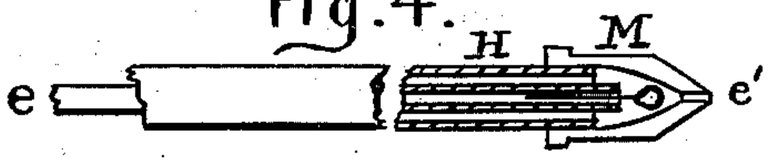


Fig. 4.



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UNITED STATES PATENT OFFICE.

REUBEN D. TURNER, OF NEW YORK, N. Y.

IMPROVEMENT IN HYDROCARBON-FURNACES AND ATOMIZING APPARATUS.

Specification forming part of Letters Patent No. **158,759**, dated January 12, 1875; application filed December 31, 1874.

To all whom it may concern:

Be it known that I, REUBEN D. TURNER, of the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus and Process for Burning Petroleum and other Hydrocarbons for Fuel; 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 pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a perspective. Fig. 2 is a longitudinal vertical section of the heating-cylinder and shell. Fig. 3 is a longitudinal section of the atomizing apparatus. Fig. 4 is a longitudinal section of an atomizing apparatus with one ejecting-tube. Fig. 5 is a face view of the perforated core.

My invention relates to an apparatus for atomizing petroleum and other liquid hydrocarbons, and in atomic conditions mixing them and their vapors with steam, superheated or otherwise, before and at the point of combustion, for producing complete combustion in a heating-furnace, as hereinafter described.

A represents a boiler, and A′ a furnace. B C are supply-tanks, and D is a heating-cylinder, all made of any required capacity, and are connected by pipes E F, which are provided, respectively, with cocks *b c;* and for stationary engines, or on steamers, the tanks and cylinder may be located at any convenient distance from each other. D′ is a shell inclosing the lower part of the cylinder. Tank B is provided with a receiving-pipe, E′, and stop-cock c^1. G G′ represent steam-pipes leading from the boiler into the cylinder and shell D D′. H is a tube provided with a core, *d*, having a hole in the center to receive the inner tube, *e*, and holes c^2 for the passage of steam and vapor from the cylinder. K is a pipe extending through the top to the lower part of the cylinder, and connecting with the outer end of tube *e*. L is a pipe extending from the upper interior part of the cylinder into the tube H. The pipes G, G′, K, and L are provided, respectively, with cocks b^1 b^2 b^3 b^4. M represents the head of an atomizer attached to the end of the tube H, and is provided with a large cavity, N, and small recesses *d′*, and ejecting-tubes *e′*. The atomizer may be made with any required number of ejecting-tubes, as shown in Fig. 3, and these tubes may be arranged convergingly or divergingly, to concentrate or spread the flame, as may be required for different purposes. R represents an auxiliary device, having a stem, S, extending into tubes *e*, and having branches c^3 terminating in loops, to extend into and across the recesses *d′* in the head M. The tanks and cylinder are provided with glass gage-tubes g^1 g^2 g^3, to indicate the quantity of oil in them and the cylinder-tanks, and all the pipes are made sufficiently strong to secure them against liability of breaking them by any pressure to which they may be subjected. The furnace is heated with fuel sufficiently to produce the requisite steam to heat the cylinder, and force the oil into the furnace. The cylinder being supplied with oil, leaving sufficient space at the top for steam and vapor, the steam is conducted from the boiler, through pipe G, into the shell D′, and when the oil in the cylinder is sufficiently heated the cock b^2 in G′ is opened and allowed to flow into the cylinder, and cocks b^3 b^4 in pipes K L being opened, the oil is forced up through pipe K and tube *e*, and the steam and vaporized oil from the top of the cylinder are forced through the pipe L into tube H, and through holes c^2 into the cavity N of the atomizer, where the oil, steam, and vapor of oil meet, and are mixed together, and, by the force of the steam and the operation of the separator R, the oil is broken up and atomized, and in a mixed atomized condition the oil, steam, and vaporized oil are forced, through the ejecting-tubes, into the furnace, where they are immediately ignited.

To produce complete combustion certain proportions of oil and steam are required to be combined and mixed, as described. These proportions may be ascertained by turning on the required flow of steam, and then, at first, a partial flow of oil, and gradually increasing the quantity of oil till complete combustion is produced, which will be indicated by a perfectly white flame in the furnace; and indi-

cators properly adjusted may be employed to indicate the right proportions of oil and steam when ascertained.

I contemplate that by means of a pipe leading from the upper part of the cylinder to the boiler, sufficient quantities of vaporized oil may be thrown into the boiler to lubricate its inner walls, and prevent them from scaling, and also for lubricating the steam-cylinder.

What I claim, and desire to secure by Letters Patent, is—

1. An apparatus consisting of an auxiliary device, R, having stem S and branches c^3, in combination with tubes *e* H, perforated core *d*, and head M, having cavity N, recesses *d'*, and ejecting-openings *e'*, for the purpose of atomizing petroleum and other liquid hydrocarbons, and in atomic conditions mixing them and their vapors with steam before and at the point of combustion, substantially as described and shown.

2. The perforated core *d*, in combination with tubes *e* H and head M, substantially as described.

3. In combination with a boiler, A, cylinder and shell D D', pipes G G' K L, with their stop-cocks, the atomizing apparatus, consisting of tubes *e* H, core *d*, head M, and auxiliary device R, substantially as and for purposes described and shown.

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

REUBEN D. TURNER.

Witnesses:

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