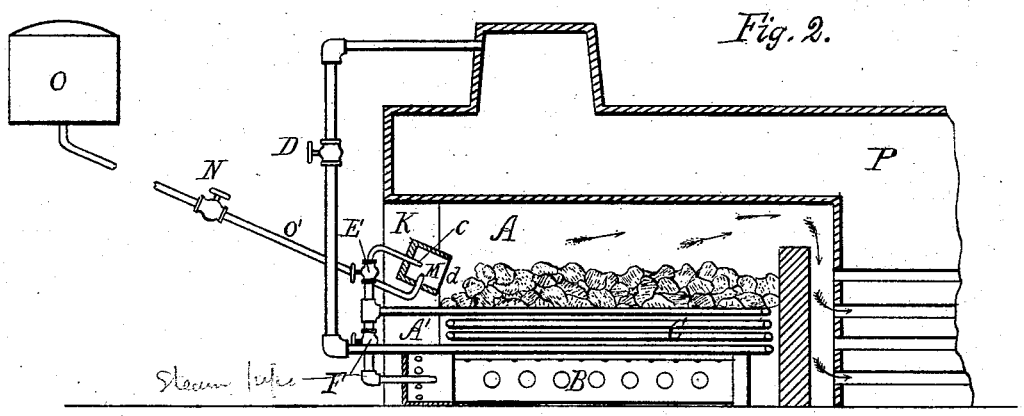
(No Model.)

H. S. SARONI.

HYDROCARBON FURNACE.

No. 260,789. Patented July 11, 1882.

Fig. 2.



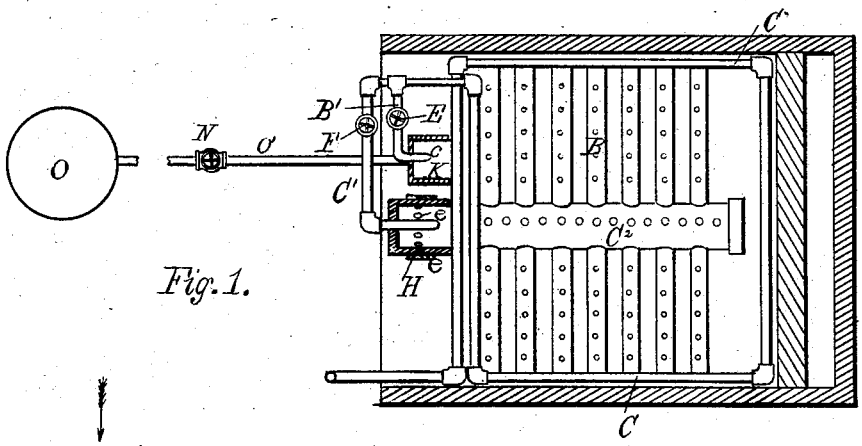


Fig. 1.

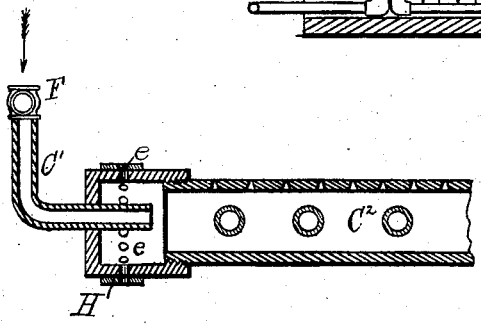
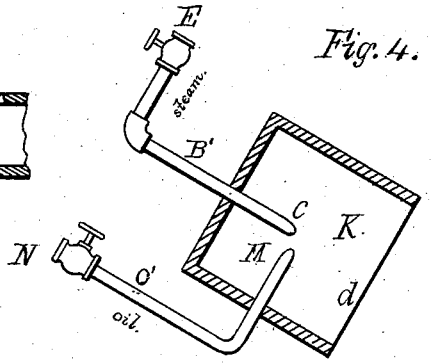


Fig. 3.

Fig. 4.



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HERRMAN S. SARONI, OF ST. PAUL, MINNESOTA.

HYDROCARBON-FURNACE.

SPECIFICATION forming part of Letters Patent No. 260,789, dated July 11, 1882.

Application filed March 25, 1882. (No model.)

To all whom it may concern:

Be it known that I, HERRMAN SANDER SARONI, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Hydrocarbon-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as 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 or figures of reference marked thereon, which form a part of this specification.

This invention relates to furnaces adapted to the use of liquid hydrocarbons as fuel, and has for its object to insure the more perfect combustion of the fuel, particularly the heavier particles of hydrocarbons, such as exist in crude petroleum, tar, and similar liquids.

My improvements consist in various details of construction of the furnace and the manner of connecting the same with the liquid-fuel supply, as hereinafter described.

The drawings accompanying this specification represent, in Figure 1 a plan, and Fig. 2 a vertical longitudinal section, of a boiler-furnace containing my improvements. Fig. 3 is an enlarged view of the perforated-pipe system for supplying superheated steam, and Fig. 4 a view of the oil-atomizer.

Reference being had to these drawings, A will be seen to represent a fire-box or furnace of proper form, while B represents a grate composed of a series of tubes pierced at the top with fine perforations, and located at the lower part of the furnace, this grate being covered with broken fire-brick, soapstone, or other refractory material, to present ample surface for reception of the heavier products of the fuel, and present the latter in the most favorable condition for effective combustion.

Within the lower part of the furnace, and surrounding the grate B, I arrange a coil of pipe, C, one end of this coil connecting with a suitable steam-supply—a steam-boiler, for instance, as shown at P in the accompanying drawings, as heated by the furnace A—and being provided with a valve, D. After coursing about the interior of the furnace A to the desired extent the pipe C makes exit therefrom, as shown at A′, and divides into two branches, B′ C′, each of which has a valve, that of the pipe B′ being shown at E and that of the pipe C′ at F.

The central tube of the grate is shown at C^2 as extending preferably through the front of the furnace, and is there provided with a register-gate, H, which operates with corresponding peripheral apertures, *e e*, &c., in the pipe, this register being to regulate admission of atmospheric air to the interior of the grate. The branch steam-pipe C′ connects with and discharges into the outer end of the central portion, C^2, of the grate. The branch steam-pipe B′ terminates in a nozzle, *c*, which connects with and discharges into the interior of an atomizer in the form of a chamber, K, open at front, as shown at *d*, this chamber being located in the upper part of the furnace, above the grate B.

The tank for containing the hydrocarbon-fuel supply is shown at O, while O′ represents a pipe leading from such tank and provided with a valve, N, the outlet of this pipe being a nozzle, M, which enters the atomizer K, the two nozzles *c* and M being arranged preferably at right angles to each and closely together, in order that their contents may intercept each other.

The operation of this device is as follows, it being understood that the boiler P is supplied with water and the tank O with hydrocarbon, the valves N, E, D, and F being closed: The valves E and D are now opened and saturated steam admitted to the interior of the grate B and of the atomizer K. When the condensed water has been expelled from the superheater C the valve N is opened, which permits liquid fuel from the tank O to issue from the nozzle M and be intercepted by the steam escaping from the nozzle *c*, the fuel by the force of the steam being driven in a spray over and upon the refractory material upon the grate B, and being ignited by suitable means. The heat from the burning fuel speedily heats the coil C to such a degree as to superheat the steam passing through it and heat the refractory material upon the grate to incandescence, or partially so. With the lighter hydrocarbons this would be sufficient to insure perfect combustion; but when crude petroleum or similar hydrocarbons are used the lighter portions only will be vaporized and be

utilized in flame, while the heavier properties—such as tar or similar residuum—cool off and run to waste. In order to utilize this tar or other residuum, when the refractory material upon the grate has become heated to the requisite degree I open the valve F of the pipe C′, which allows superheated steam from the coil C to enter the tubular grate B, while at the same time air by way of the openings *e* enters such grate and is taken up by and joins the jet of steam arising from such inspirator C′ and the whole projected at a high temperature into the vapor created by the dripping of the heavier particles of the hydrocarbon upon the incandescent refractory material, thereby effecting perfect combustion of such particles and utilizing the entire fuel-supply.

I do not restrict myself to the precise construction and arrangement of the details of my apparatus, as these may be varied without losing sight of the essential feature of my invention, which I consider to consist in a process of mixing air and steam at a high temperature with the vapor arising from the escape of the heavy hydrocarbons.

I therefore claim, and desire to secure by Letters Patent of the United States, the following:

1. The combination of tubular grate B with a steam-supply pipe, C′, air-inlets *e*, and incandescent refractory material arranged on said grate, the latter being provided on its upper side with perforations, through which the combined steam and air are applied to liquid hydrocarbons distributed over said refractory material.

2. In combination with a furnace, a tubular grate located therein, and a refractory material upon such grate, a coil of steam-pipe surrounding or combined with the same, substantially as stated.

3. In combination with a furnace, a tubular grate located therein, a refractory material disposed upon such grate, and a steam-coil surrounding or combined with such grate, an atomizer supplied with steam from such coil and with liquid fuel from a suitable tank, substantially as and for purposes stated.

4. In combination, a furnace, a tubular grate located therein, a refractory material upon such grate, a superheating steam-coil surrounding or combined with such grate and delivering steam to the interior thereof and to an atomizer, and provision for supplying the interior of the grate with air, substantially as described.

5. In combination, the furnace, the tubular perforated grate therein, with provision for an air-supply, the superheating steam-coil supplied with steam from a suitable source and communicating with and supplying the tubular grate, and a liquid-fuel tank delivering its fuel to an atomizer connected with the said superheating-coil and located in the furnace above the grate, and a refractory material placed upon the grate to provide a distributing-surface for the heavier particles of the fuel, substantially as stated.

In testimony whereof I affix my signature in presence of two witnesses.

HERRMAN SANDER SARONI.

Witnesses:
H. E. LODGE,
F. CURTIS.