

No. 615,445.

Patented Dec. 6, 1898.

C. M. GEARING.
HYDROCARBON BURNING FURNACE.

(Application filed Jan. 29, 1898.)

(No Model.)

Fig. 1.

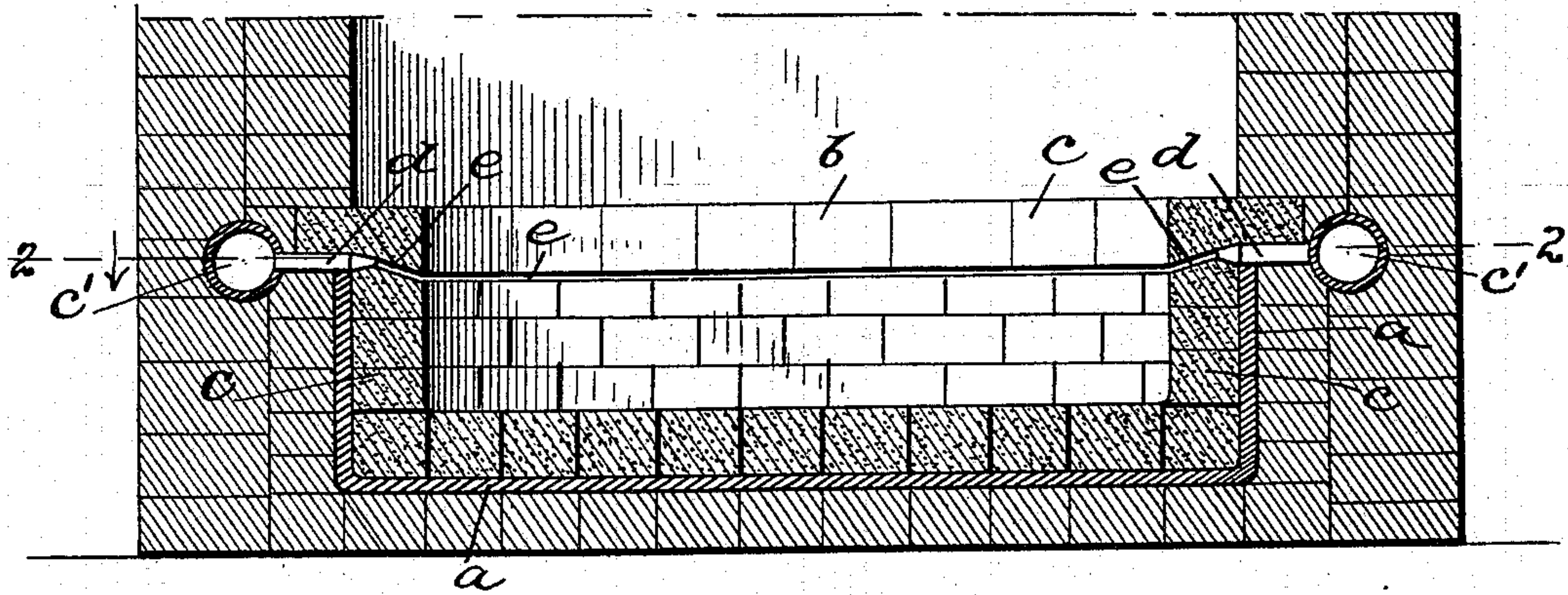
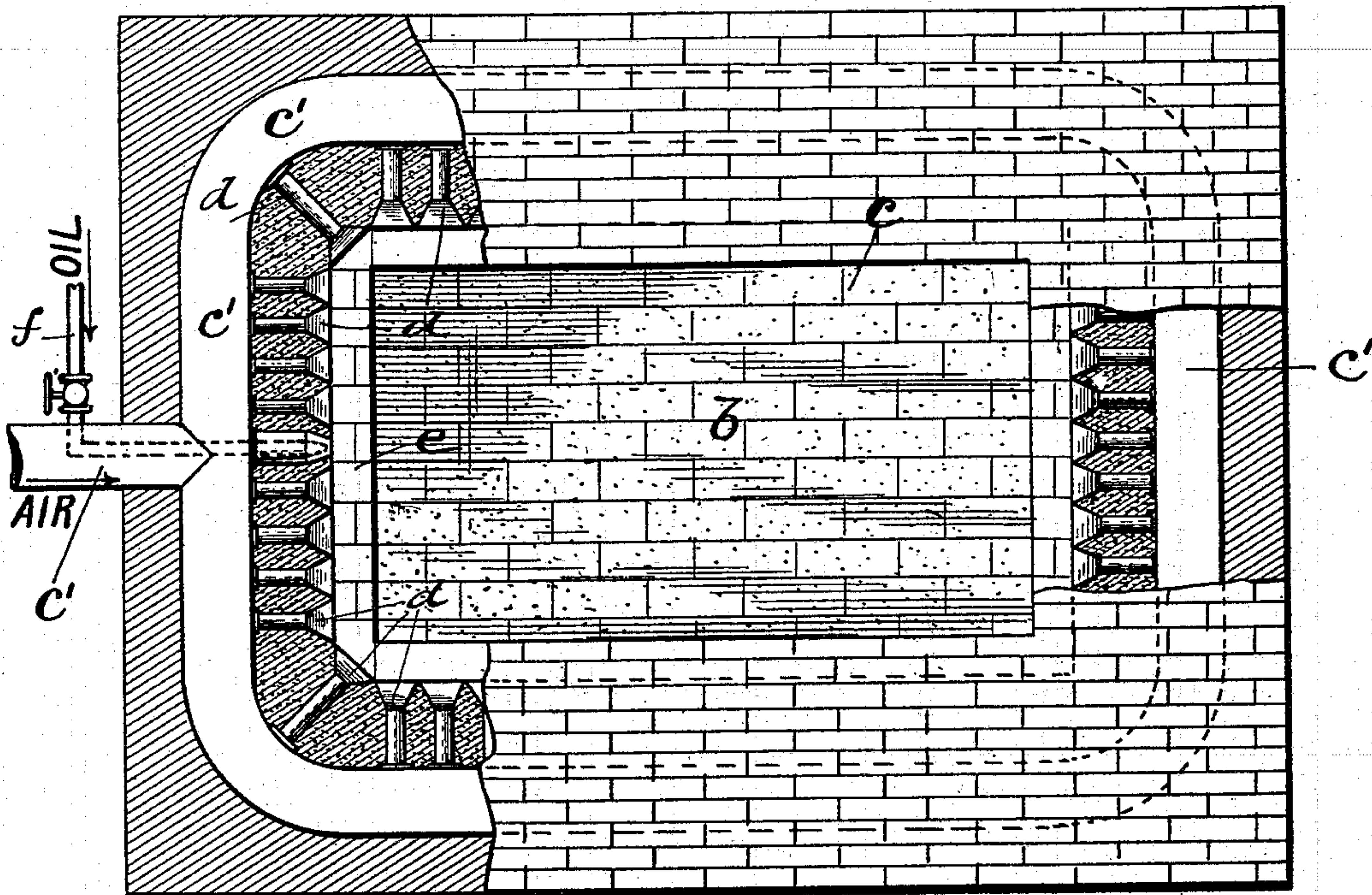


Fig. 2.



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CHARLES M. GEARING, OF BROWNWOOD, TEXAS, ASSIGNOR OF TWO-THIRDS
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HYDROCARBON-BURNING FURNACE.

SPECIFICATION forming part of Letters Patent No. 615,445, dated December 6, 1898.

Application filed January 29, 1898. Serial No. 668,435. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. GEARING, a citizen of the United States, residing at Brownwood, in the county of Brown and State of Texas, have invented certain new and useful Improvements in Hydrocarbon-Burning Furnaces, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 is a vertical sectional view of a portion of a furnace provided with my improved burner, and Fig. 2 a horizontal sectional view of the same.

It is the object of the present improvements to provide for the more thorough combustion of the gases derived from the hydrocarbon fuel employed and also to provide a fire-box that shall be capable of withstanding very high temperatures without clogging or burning out the parts, as more fully hereinafter stated.

Referring to the drawings, *a* designates a rectangular metal pan fixed in the masonry of the bottom of the furnace *b* and being co-extensive in area with the fire-box thereof. The inner surface of this pan is lined with fire-brick sections *c*, which not only extend over the entire bottom surface of the pan, but which also extend above the upper edge thereof, the adjacent edges of the sections fitting close together to prevent as nearly as possible the injected oil reaching the pan. It is practically impossible, however, to fit the sections so close together as to entirely prevent the oil reaching the pan. In fact, it is desirable that slight interstices be left between the sections, since during the preliminary operation of the furnace the oil works its way into the interstices, and, burning therein, leaves a residuum, mostly carbon, which completely fills the crevices in a short time, thereby not only rendering the lining practically impervious to oil, except, of course, in so far as its porosity admits of the absorption thereof, but also cementing the sections together and making a solid bottom. It will also be observed that in a comparatively short time the oil that is absorbed into the pores of the fire-brick will be similarly coked or burned, and will thereby render the same practically non-absorbent.

A lining such as I have described has the advantage of being exceedingly durable, the refractory nature of the fire-brick being well-known. The metal pan below is essential to hold the oil until the sections are completely bound or cemented together and rendered non-absorbent. With the exception of the small quantity of residuum that goes to fill the pores and crevices the entire quantity of oil injected will be subjected to intense heat and be completely consumed, leaving practically no residuum to be cleaned out. It is evident that if the metal of the pan were exposed to the heat it would soon burn out and leak oil, and it will also be observed that if the fire-brick alone were used the oil would leak between the sections continually, as the cementing process described will not proceed without means to hold the oil between the sections while being burned.

The air-supplying pipe *c'* is embedded in the masonry of the furnace outside of and approximately level with the upper edge of the pan and extending entirely around the same, the inlet end of the pipe entering, preferably, at the front of the furnace. Projecting inward from the pipe is a series of nozzles *d*, which project beyond and rest upon the upper edge of the pan and are flattened into broad mouthpieces whose adjacent edges preferably come together, forming a practically continuous discharge-opening. These mouthpieces terminate a little inside the edge of the pan and rest upon the adjacent layer or course of lining-sections. They open into a narrow chamber *e* formed between the two uppermost layers of fire-brick sections and extending continuously around the fire-box and opening unobstructedly into the same and inclining downward toward the center thereof. The upper course of fire-brick extends back over the nozzles to near the main air-pipe and is thereby supported. This arrangement requires no supports for the inner ends of the sections, thereby leaving the chamber *e* unobstructed.

The construction described in the foregoing possesses two important advantages. The metal nozzles are entirely protected from the intense heat, so that they will not fuse and burn out and clog, and, further, the air-blast

is introduced into the fire-box in the form of an unbroken sheet extending entirely around the fire-box and being practically coextensive with the same.

5 The oil is carried into the fire-box by means of the pipe *f*, which is preferably carried through the supply-pipe and one of the nozzles *d*, said nozzle being somewhat enlarged and contracted at its inner end, so as to spray
10 the oil into the fire-box. The oil-pipe, however, may be arranged in any other suitable way, as it is simply necessary that the oil be conducted into the fire-box and not sprayed therein. The oil-pipe, as usual, will be con-
15 nected to an elevated tank, so that the oil will run in by gravity, and the air-supply pipe will be connected, as usual, to a suitable source of pressure.

It will be observed that in operation air
20 will be supplied continuously and uniformly around the fire-box in a thin spray-like sheet, which will insure a more perfect combustion of the gases and other matter formed and re-
25 leased by the decomposition of the oil, the sheet-like form of the spray and the manner in which the same is extended over the entire area of the fire-box preventing any of the gases escaping unconsumed. The intense
30 heat thus produced would quickly fuse any metal parts exposed. Hence the advantage of arranging the nozzles and pan so that they will be completely protected by fire-brick will be obvious. In practice I have found that
35 when the proportions of air and oil are properly regulated the heat produced is so intense that practically all the oil, even though crude oil be used, is converted into gases and consumed, leaving no residuum to be cleaned out and enabling the furnace to be run continu-
40 ously at an even temperature.

The advantages of a burner of this sort will be particularly appreciated when used in connection with gas-producing apparatus, puddling-furnaces, and heating and anneal-
45 ing furnaces, although the invention is of course applicable to all other furnaces, such as are used in connection with boilers, ore-

roasters, steel crucibles, open-hearth furnaces, and glass and pottery kilns and pots. In fact, the apparatus is peculiarly useful in connec- 50
tion with all furnaces where a steady high temperature is desired.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is— 55

1. In a hydrocarbon-furnace, the combina-
tion of a fire-box, a narrow slit or chamber *e*
being formed entirely around the same above
its bottom and having a continuous, unbroken
entrance into and communication with the 60
fire-box, an air-flue in the walls of the furnace, this flue encircling said chamber *e*, in-
wardly-extending flues connecting said air-
flue with the outer edge of said chamber *e*
and adapted to spray the air therein, and 65
means for conveying oil into the fire-box, whereby a thin spray-like sheet of air may be continuously injected into the fire-box, said sheet of air being substantially coexten-
sive therewith. 70

2. In a hydrocarbon-furnace, the combina-
tion of a pan supported in the bottom thereof,
a sectional lining of fire-brick contained in
said pan and extending above the upper edge
thereof, the upper layer or course of said fire- 75
brick being supported slightly above the layer or course next below, forming a narrow chamber extending continuously around the fire-
box and opening unobstructedly into the
same, a series of flues *d* extending inward 80
below said upper layer of fire-brick and resting upon the pan and serving to support said
upper layer of fire-brick, the inner ends of
said tubes communicating with said narrow
chamber, an air-flue in the walls of the fur- 85
nace, this flue communicating with said flues
d, and means for supplying oil to the fire-
box.

In testimony whereof I hereunto affix my
signature this 24th day of January, 1898.

C. M. GEARING.

Witnesses:

C. D. DAVIS,
WM. R. DAVIS.