

(No Model.)

2 Sheets—Sheet 1.

A. A. HARWOOD.  
OIL FURNACE.

No. 383,123.

Patented May 22, 1888.

FIG. 1.

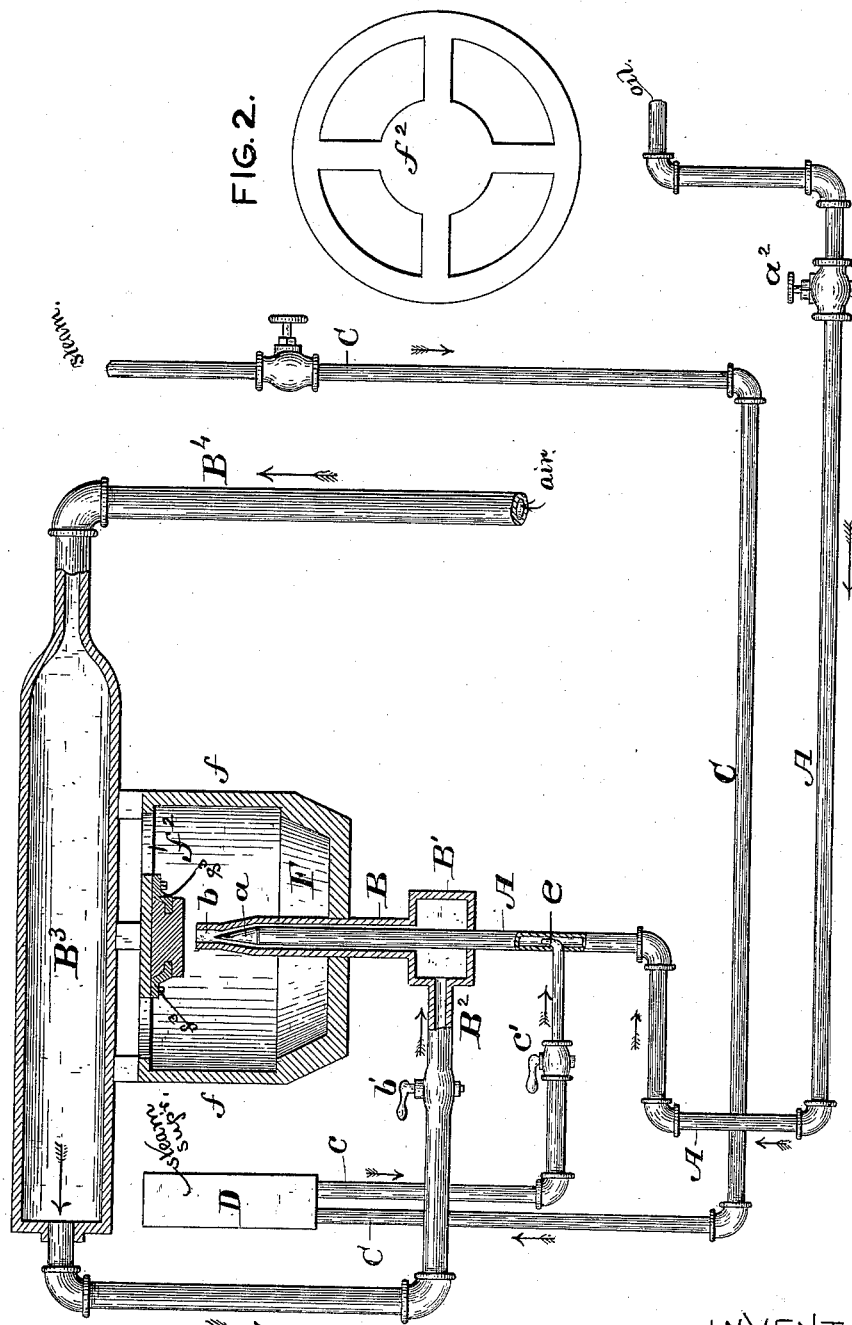
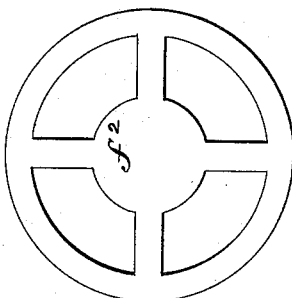


FIG. 2.



ATTEST.  
*J. Henry Kaiser*  
*Victor J. Evans.*

INVENTOR.  
*A. A. Harwood.*  
*by Atty. Hornsby.*

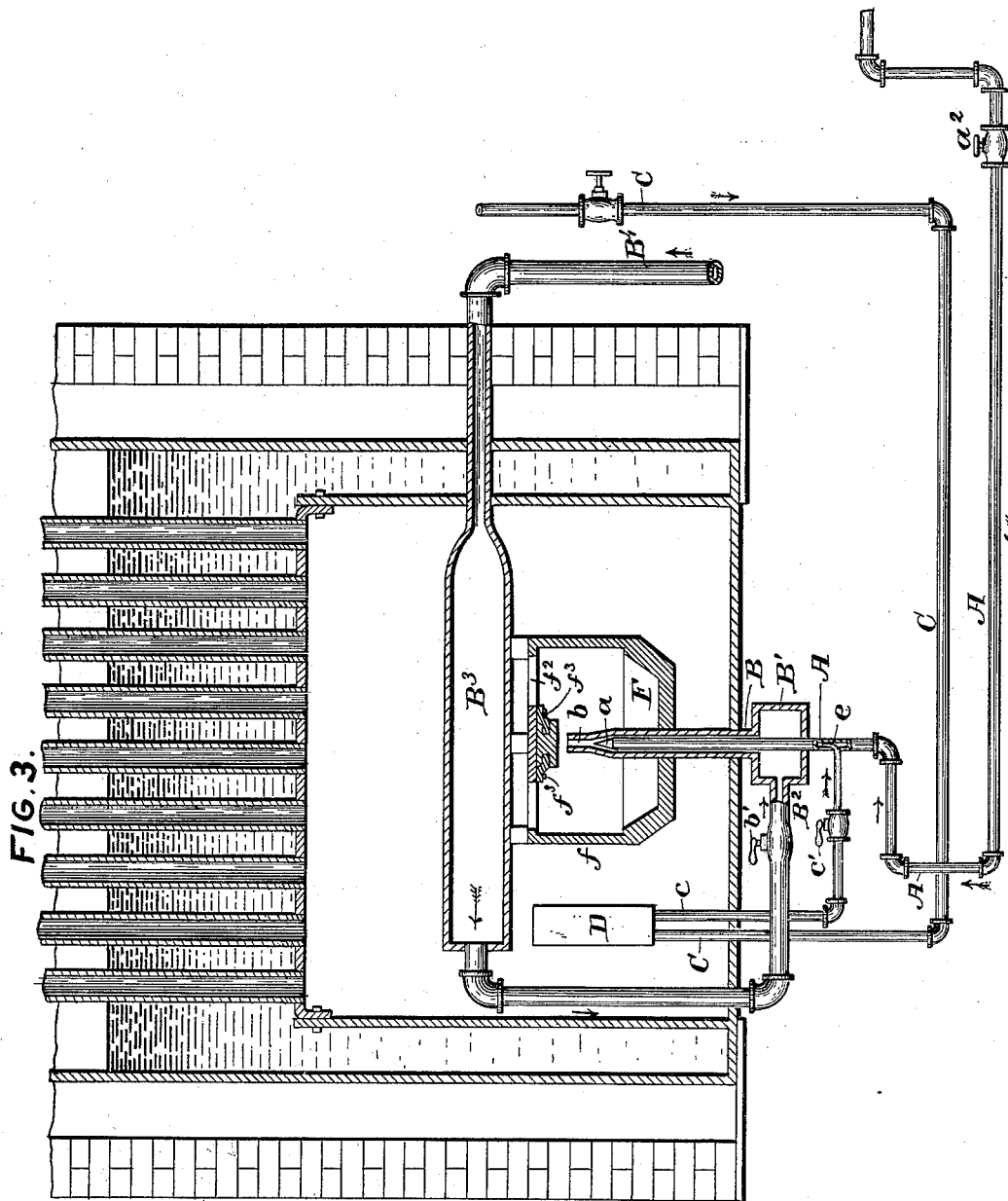
(No Model.)

2 Sheets—Sheet 2.

A. A. HARWOOD.  
OIL FURNACE.

No. 383,123.

Patented May 22, 1888.



ATTEST.  
J. Henry Kaiser.  
Victor J. Evans.

INVENTOR.  
A. A. Harwood.  
By atty. *George Con*

# UNITED STATES PATENT OFFICE.

ALPHRANZO A. HARWOOD, OF McKEESPORT, PENNSYLVANIA.

## OIL-FURNACE.

SPECIFICATION forming part of Letters Patent No. 383,123, dated May 22, 1888.

Application filed August 19, 1887. Serial No. 247,327. (No model.)

*To all whom it may concern:*

Be it known that I, ALPHRANZO ANDERSON HARWOOD, a citizen of the United States, residing at McKeesport, county of Allegheny, and State of Pennsylvania, have invented certain new and useful Improvements in Oil-Furnaces, of which the following is a specification.

This invention relates to hydrocarbon-furnaces for generating steam in steam-boilers, and has for its object to provide a furnace wherein oil, steam, and heated air are employed to generate the heat in a simple and effective manner; and to this end my invention consists in the improved construction and arrangement of parts hereinafter fully described, and more specifically pointed out in the claims, due reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a side elevation, partly in section, of my improved device. Fig. 2 is a plan view of the web and spider for supporting the fire-brick.

Referring to the drawings, the letter A indicates the oil-supply pipe connected to any suitable source of oil-supply and terminates in a contracted nozzle, *a*.

B indicates an air-pipe surrounding the upper portion of the oil-pipe, and also terminating in a contracted nozzle, *b*, in a direct line with the nozzle *a*, after the manner of the usual and well-known atomizers. The lower end of the air-pipe B is connected with a box, B', also surrounding the oil-pipe A, and said box is connected to an air-pipe, B<sup>2</sup>, which at its other end connects with an air-heating chamber, B<sup>3</sup>, located directly over the exit of the oil and air pipe, so as to be in the pathway of the issuing flame.

B<sup>4</sup> indicates an air-supply pipe connected to the air-heating chamber at a point preferably opposite the pipe B<sup>2</sup>, and leading outside of the fire-box to the external atmosphere.

C indicates a steam-pipe connected at one end to the steam-space of the boiler, which is to be heated, and the other end connected to a heating-chamber, D.

*c* indicates a steam-pipe connected at one end to the heating-chamber D, and at its other end terminates in a nozzle, *e*, which nozzle

communicates with the oil-pipe A, as shown. The steam-pipe *c* is provided with a valve, *c'*, adapted to control the passage of steam through said pipe, and a similar valve, *b'*, is located in the air-pipe B<sup>2</sup>, for the purpose of controlling the passage of heated air through said pipe.

F indicates an oil-pan adapted to catch and hold any drip from the atomizer, and *f* the vertical wall thereof, which is provided at its top with a web or spider, *f*<sup>2</sup>, and said spider is provided upon its under side with lugs *f*<sup>3</sup>, which serve to support a fire-brick directly over the atomizer, said fire-brick being provided with grooves or recesses, as shown, in which the lugs *f*<sup>3</sup> fit to hold it in place.

It will be understood that the parts above described are to be located in the fire-box of the steam-boiler in the usual manner.

The operation is as follows: When fire is to be started in the fire-box, oil is allowed to flow through the oil-pipe A, a suitable valve, *a*<sup>2</sup>, being located in said oil-pipe to control the passage of the oil therein, and drips into the oil-pan *f*, where it is ignited. The flame from the oil in the oil-pan will in a short time heat the air in the heating-chamber B<sup>3</sup>, and the hot air will then pass through the pipe B<sup>2</sup>, and through the box B' and air-pipe B, surrounding the oil-pipe, and thence out through the nozzle *b*. The heated air in its passage through the box B' and pipe B will partially vaporize the oil in the pipe A, and the heated air and partially-vaporized oil will mingle as they issue from the nozzle *a b* and impinge against the fire-brick in the form of a gaseous vapor, which will be ignited by the flame of the oil in the oil-pan. When steam has become generated in the boiler, it will pass through the steam-pipe C to the heating-chamber D, and said chamber D being located in the fire-box in close proximity to the point of combustion the steam will become superheated, and thence pass through the pipes C and *c*, and will issue from the nozzle *e* into the oil-pipe A, the oil and superheated steam mingling and issuing from the nozzle *a*, and the heated air, the vaporized oil, and the superheated steam will issue from the nozzle *b*, and as they emerge from said nozzle the three are thoroughly commingled, the oil being finely comminuted, and the vaporous mass, being effectually oxygenized

to maintain a perfect and rapid combustion, will impinge against the fire-brick and afford a flame giving forth a most intense heat.

Having thus described my invention, what I claim is—

1. In a hydrocarbon-furnace, the combination, with the oil-pipe A, terminating in a nozzle, *a*, the air-pipe B, terminating at one end in a nozzle, *b*, surrounding the nozzle *a*, and at the other end in a box, B', surrounding the pipe A, said box B' being connected with an air-heating chamber, B<sup>a</sup>, located directly above the nozzles *a* and *b* and having an air-supply, and the superheating-chamber D, connected with a steam-supply pipe, C, and a pipe, *c*, the pipe *c* terminating in a curved contracted nozzle, *e*, leading into the oil-pipe A at a point below the box B', substantially as shown and described, and for the purposes specified.

2. In a hydrocarbon-furnace, the combination, with the oil-pipe A, terminating in a

nozzle, *a*, the air-pipe B, terminating at one end in a nozzle, *b*, surrounding the nozzle *a*, and at the other end in a box, B', surrounding the pipe A, said box B' being connected with an air-heating chamber, B, located directly above the nozzles *a* and *b* and having an air-supply, and the superheating-chamber D, connected with a steam-supply pipe, C, and a pipe, *c*, the pipe *c* terminating in a curved contracted nozzle, *e*, leading into the air-pipe A at a point below the box B', and the oil-pan F, having vertical wall *f*, and spider *f*<sup>2</sup>, the latter provided upon its under side with lugs which support a fire-brick directly over the nozzles *a* and *b*, the whole being constructed and arranged substantially in the manner shown, and for the purpose specified.

A. A. HARWOOD.

Witnesses:

S. B. MARKLE,

A. C. KOMAR.