



# UNITED STATES PATENT OFFICE.

LUCIUS A. DOBLE, OF DES MOINES, IOWA.

## SKELETON FURNACE AND STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 324,461, dated August 18, 1885.

Application filed October 11, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, LUCIUS A. DOBLE, a citizen of the United States, and a resident of Des Moines, in the county of Polk and State of Iowa, have invented a Skeleton-Boiler Furnace and Steam-Generator, of which the following is a specification.

My object is to simplify the construction and improve the operation of a steam-generator adapted for cooking feed, baking, heating buildings, and driving machinery, and to thereby reduce the cost of manufacturing and the expense of operating a generator for such purposes.

My invention consists in the construction and combination of metal tubes, as hereinafter fully set forth, to produce a combined grate, fire-chamber, boiler, steam-chamber, and skeleton boiler-furnace, that is adapted to be moved to any place desired and inclosed in a wall to produce a complete boiler-furnace and steam-generator, with which a fuel-magazine, a water receiver, an oven, and induction and eduction tubes can be readily connected to adapt it for most all the various purposes for which steam-generators are required.

Figure 1 of the accompanying drawings, is a perspective view of one of my skeleton boiler-furnaces ready to be inclosed in a jacket or wall. Fig. 2 is a side view of my complete apparatus in position as required for practical use. Jointly considered, these figures clearly illustrate the construction and operation of my complete invention.

A represents a skeleton frame and fire-box made of steam-tight tubes.

B are tubular grate-bars extending horizontally across the lower portion of the frame A from a water-chamber, B<sup>2</sup>.

C represents a corresponding number of tubes bent into serpentine shape and attached to the rear ends of the tubular grate-bars to extend vertically to a tubular steam-chamber, D, with which they are connected by means of suitable fastening devices, that produce steam-tight joints.

F F represent a second series of tubes of serpentine shape, connected with the chamber D at their upper ends and with the tube B<sup>2</sup> at their lower ends.

G is a tube attached to the steam-chamber D and the tube or water chamber B<sup>2</sup> in such

a manner that water may be filled into the lower portion of the complete skeleton boiler composed of the tubular grate-bars B, their connecting-tube and water-chamber B<sup>2</sup>. The serpentine tubes C and F and the chamber D form a reservoir or source of supply outside of the furnace-wall.

H H represent steam-eduction tubes, connected with the steam-chamber D, and adapted to be adjustably connected with barrels or other vessels for heating water or cooking food.

J represents a safety-valve connected with the steam-chamber D.

K represents a steam-eduction tube that may extend to heat radiators or other receptacles wherein it can be utilized.

L represents a jacket or wall inclosing the skeleton A composed of tubes.

L<sup>2</sup> represents the mouth of a fuel-magazine, inclosed in the wall and over the grate-bars B.

M represents an oven fixed in an opening between the upper portions of the serpentine tubes C and F in such a manner that it will be accessible from the outside of the jacket or wall L.

N represents a water-reservoir connected with the tube G and the steam-chamber D in such a manner that water will flow into the skeleton boiler and steam into the reservoir.

In the practical operation of my boiler-furnace, thus constructed, I fill the lower portion of the skeleton composed of tubes with water, and then start a fire upon the tubular grate and feed it with fuel—wood or coal, cobs, or any combustible material—in a common way. The entire tubular skeleton will be subject to the products of combustion, as the heat generated on the grate is diffused and ascends to envelop the tubes. A smoke-flue on top of the jacket or wall causes the required upward draft. As the water in the lower portion of the skeleton is converted into steam, it will ascend and become superheated in the upper portion of the same skeleton, and may be conducted therefrom through the eduction-tubes for all the various purposes for which steam is applied.

I am aware that skeleton boiler-furnaces have been made of straight tubes; but my manner of combining serpentine tubes with straight tubes to produce a complete boiler-furnace and oven is novel and advantageous.

I claim as my invention—

1. A skeleton boiler-furnace composed of straight and serpentine tubes, substantially as shown and described, for the purposes specified.
2. The boiler-furnace composed of the tubular grate-bars B, the water-chamber B<sup>2</sup>, the serpentine tubes C and F, arranged as shown and adapted to receive an oven, the steam-

chamber D, a water-induction tube, and one or more steam-eduction tubes, the jacket or wall L, substantially as shown and described, to operate in the manner set forth, for the purposes specified.

LUCIUS A. DOBLE.

Witnesses:

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