

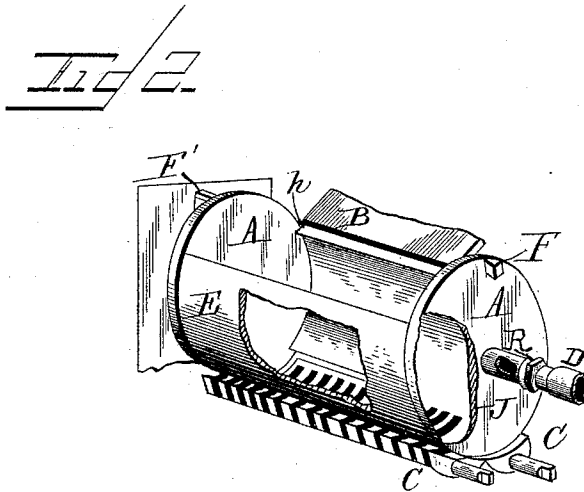
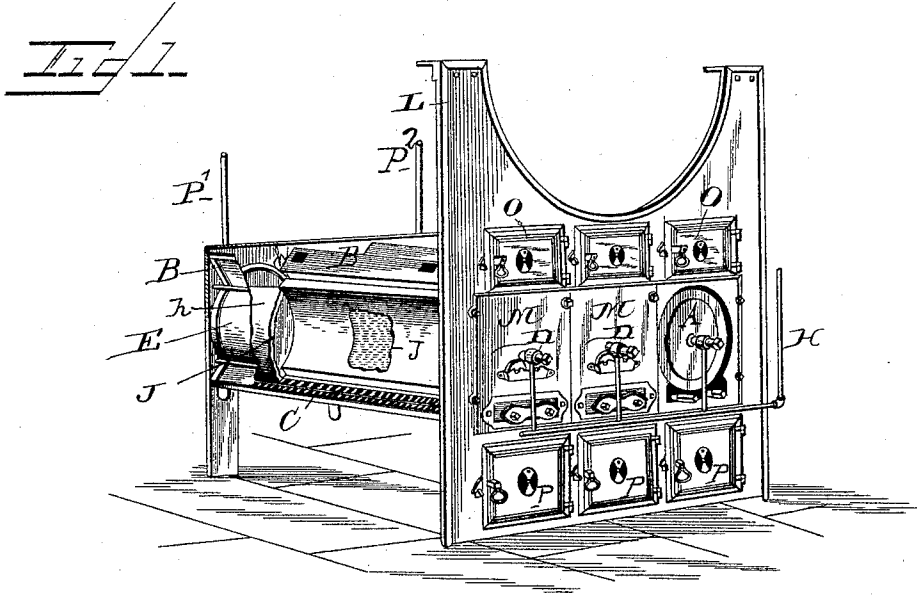
(No Model.)

2 Sheets—Sheet 1.

J. C. HENDERSON.
BOILER FURNACE.

No. 463,191.

Patented Nov. 17, 1891.



WITNESSES
F. L. Ouraud
R. F. Hecker

INVENTOR
Joseph C. Henderson
By Wm. H. Doolittle
Attorney

(No Model.)

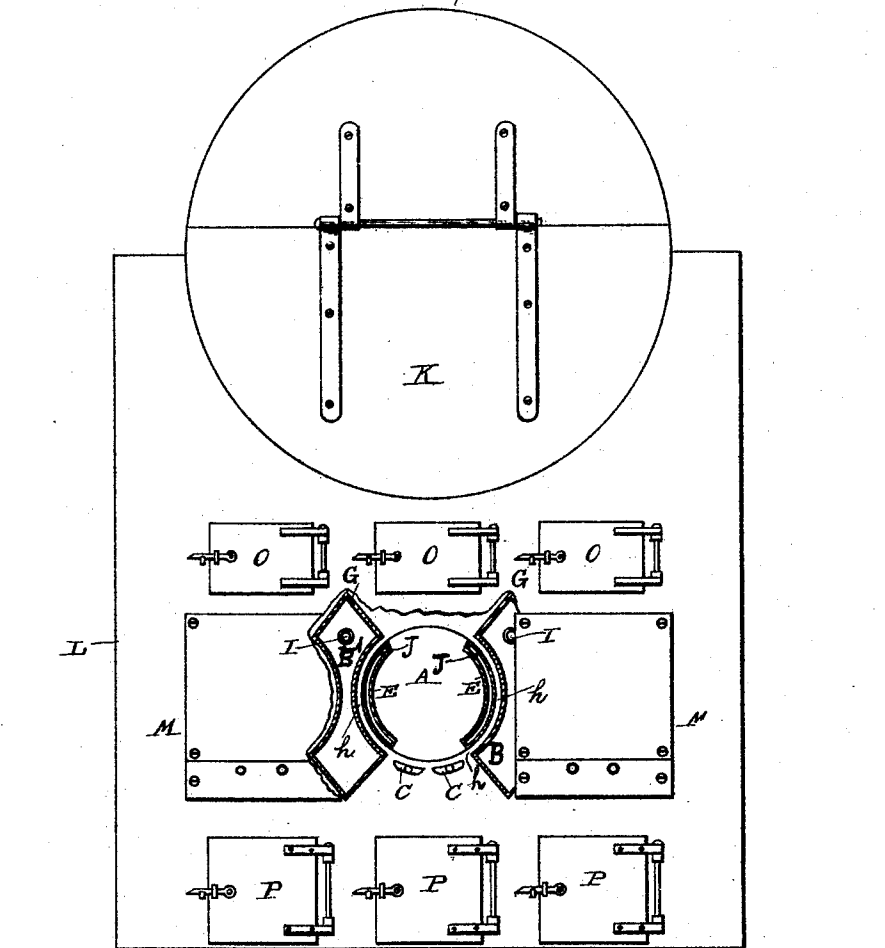
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~~Fig. 3.~~



Witnesses

Joseph Blackwood

Albert B. Blackwood

Inventor

Jos. C. Henderson
by Wm. H. Doolittle

Attorney

UNITED STATES PATENT OFFICE.

JOSEPH C. HENDERSON, OF TROY, NEW YORK.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 463,191, dated November 17, 1891.

Application filed December 4, 1890. Serial No. 373,617. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH C. HENDERSON, a citizen of the United States, residing at Troy, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Boiler-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.

My invention relates to boiler-heaters; and it consists of the adaptation to such purpose of my improved form of cylindrical fire-box forming the subject of my patent, No. 443,850, of December 30, 1890.

In that patent is described and claimed a cylindrical fire-box having opposite openings, a surrounding cylindrical casing, said casing separated from the fire-box, so as to form inclosed but unobstructed passages on both sides of the fire-box, which communicate with said opposite openings, and a grate beneath said box and separated therefrom, whereby room for the expansion of the box is secured and air and gases from the bottom opening are conducted through said passages to the upper opening and projected from both sides across the chamber over the top of the fire and thoroughly mixed therewith.

In this application the same fire-box is employed, but adapted to be used in series or battery form by additional changes and arrangement therein to effect a water-circulation around the box and to permit of the ready separate and independent removal of each of the fire-boxes from its surrounding casing for the purpose of repair, substitution, or cleaning of that and the adjacent parts.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view in elevation of a boiler-frame and one end of the series of my fire-boxes applied thereto; Fig. 2, a detail, partly in section, showing the fire-box and water-circulation. Fig. 3 is a front elevation, partly in section, of a series of fire-boxes, in combination with casing, boiler, and outside head-plates for fire-boxes.

Referring to the drawings, the fire box or chamber is shown as composed of two curved plates or sections E E, joined to opposite heads A, which plates are separated by op-

posite openings for the insertion of fuel and to afford communication with a double revolving grate C. The box is supported at both ends by and revolves on hollow trunnions D, extending through the heads A and when in place in the boiler-frame, through an outside casing M. Both the sides E and the heads A are made hollow, as shown at J. A water-circulation to preserve the boxes from destruction by heat is provided around the fire-boxes by the hollow heads A, hollow longitudinal sides E, all connected with hollow trunnions D, supply-pipes H, leading to said trunnions, and exit-pipes P', leading from such trunnions to the boiler.

B is a curved plate cast or otherwise attached to the outside casing at the front and rear of the box to form a cylindrical chamber in which the box revolves. The chamber is so separated from the fire-box as to form a space *h* around and on both sides of the box between it and the casing.

F are lugs on the heads A of the fire-box, which meet corresponding lugs F' on the casing, so that when it is desired to revolve the box it is given but a half-turn.

Referring to Figs. 1 and 3, K is a boiler supported on a box or frame L, and in which box is contained a series of fire-boxes.

In Fig. 3 the letter G represents the sections of the boiler-box, which are formed by the casings B B' for each fire-box. These casings follow the contour of the fire-box, leaving the space *h* between them and the box, and are preferably made triangular at the top, so that the angular sides coincide with the upper end of the side plates E at the top opening and extend above the same, as shown, to form a sort of hopper or guide for the coal fed into the fire-box and to aid in confining it there. These functions are better performed by such shape than if the casing was vertical.

M are plates bolted to the casing over the heads A of the fire-box and the grate, and such plates may be made of two parts, as shown, one for the head and one for the grates, whereby the grates and cylinder may be independently passed into or removed from the casing surrounding the cylinder without disturbing the casing or the other parts. The trunnions D of the cylinder are passed

through such plates. The plates M constitute extra or additional heads.

O are the doors in the casing over the fire-boxes for supplying fuel thereto, and P the ash-doors below the grates.

Such water-space may be formed in plates B' of the sections G of the surrounding casing, and water also may be introduced into such case-sections by means of feed-pipes I and led into boiler by pipes P². The revolving cylinders are connected with the trunnions by a universal joint R.

The functions of space h are to avoid friction between box and chamber, to afford room for expansion of the box, to constitute an air-space around the box to prevent its destruction by overheat, and to provide passages for conducting the gases evolved from the fresh fuel at the bottom of the box to the top of the same, where, meeting the live or incandescent fuel, they are consumed, thereby adding to the heat of the fire and at the same time by their increased force and combustion increasing and maintaining the draft. When the cylindrical fire-chamber is supplied with fresh fuel, it is turned by means of a crank applied to a trunnion, and the fuel on top is turned down on the grate below and the burning fuel is brought to the top. The grate is revolved to clear off the ashes, which adds to the draft. A bright fire is maintained on top, while the gases evolved from the bottom by the heat pass through the fire and are more perfectly consumed. The advantages of this form of boxes are that the separate chambers can be independently and separately removed and supplied without interfering with any of the other chambers. The separate doors being small, the fire-box is filled quickly and the door closed to keep the cold air from the boiler-chamber. Then the fire-box is revolved and another can be charged in like manner. So a steady continuous fire is maintained.

Again, this device not only preserves the fire-box, but the additional fire-box surface in contact with the fire-heat adds very much to the steam-producing power of boiler by contact with the fire-box.

What I claim is—

1. In a boiler-furnace, in combination with a boiler and boiler-frame, a cylindrical fire-box composed of hollow sides E, hollow heads A, said heads provided with and supported at each end by hollow trunnions D, the spaces in said heads, sides, and trunnions all connected, and a water supply and an exit pipe connected, respectively, to said opposite trunnions, said box also provided with opposite openings for the insertion of fuel and communication with grate, and an outside stationary cylindrical casing for said fire-box, but separated by a space therefrom, whereby the box may be rotated and removed and the water-circulation maintained around the same independently of the casing, substantially as described.

2. In a boiler-furnace, in combination with boiler-frame, two or more cylindrical fire-boxes, each composed of hollow sides and hollow heads, said heads provided with and supported at their opposite ends by hollow trunnions connecting with said sides and heads, a water supply and exit pipe connected, respectively, to said opposite trunnions, said box also provided with opposite openings for the insertion of fuel and communication with grate, and an outside stationary cylindrical casing for each box, also provided with a removable head for each box, and a water-circulation, substantially as described.

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

JOSEPH C. HENDERSON.

Witnesses:

CHAS. A. BENTWOOD,
HUGH GALBRAITH.