

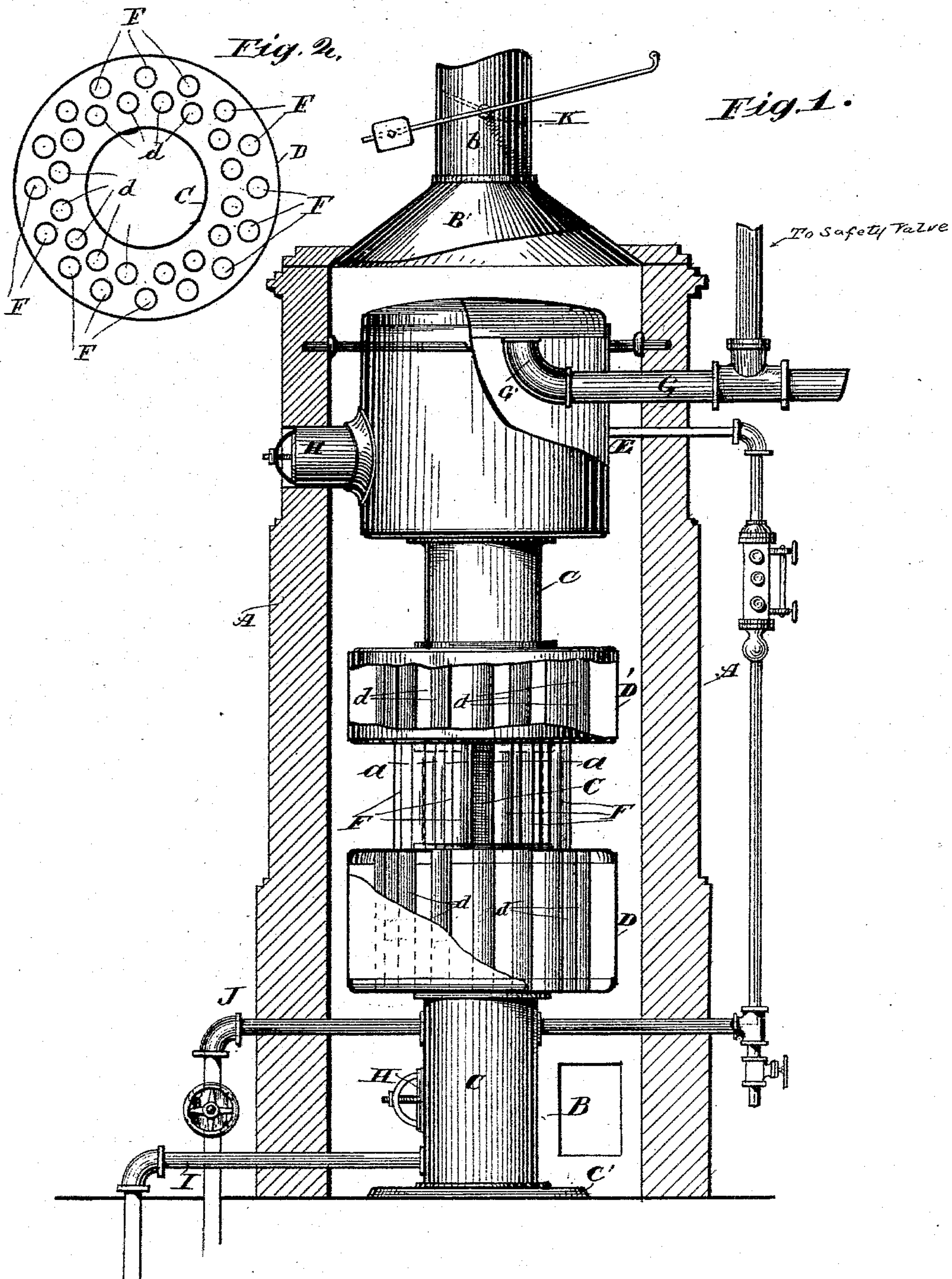
(No Model.)

2 Sheets—Sheet 1.

M. HIGGINS.
BOILER.

No. 494,861.

Patented Apr. 4, 1893.



Witnesses.
For J. David
E. Green

Inventor
Martin Higgins
by *Wm. M. Morrow*
Attorney

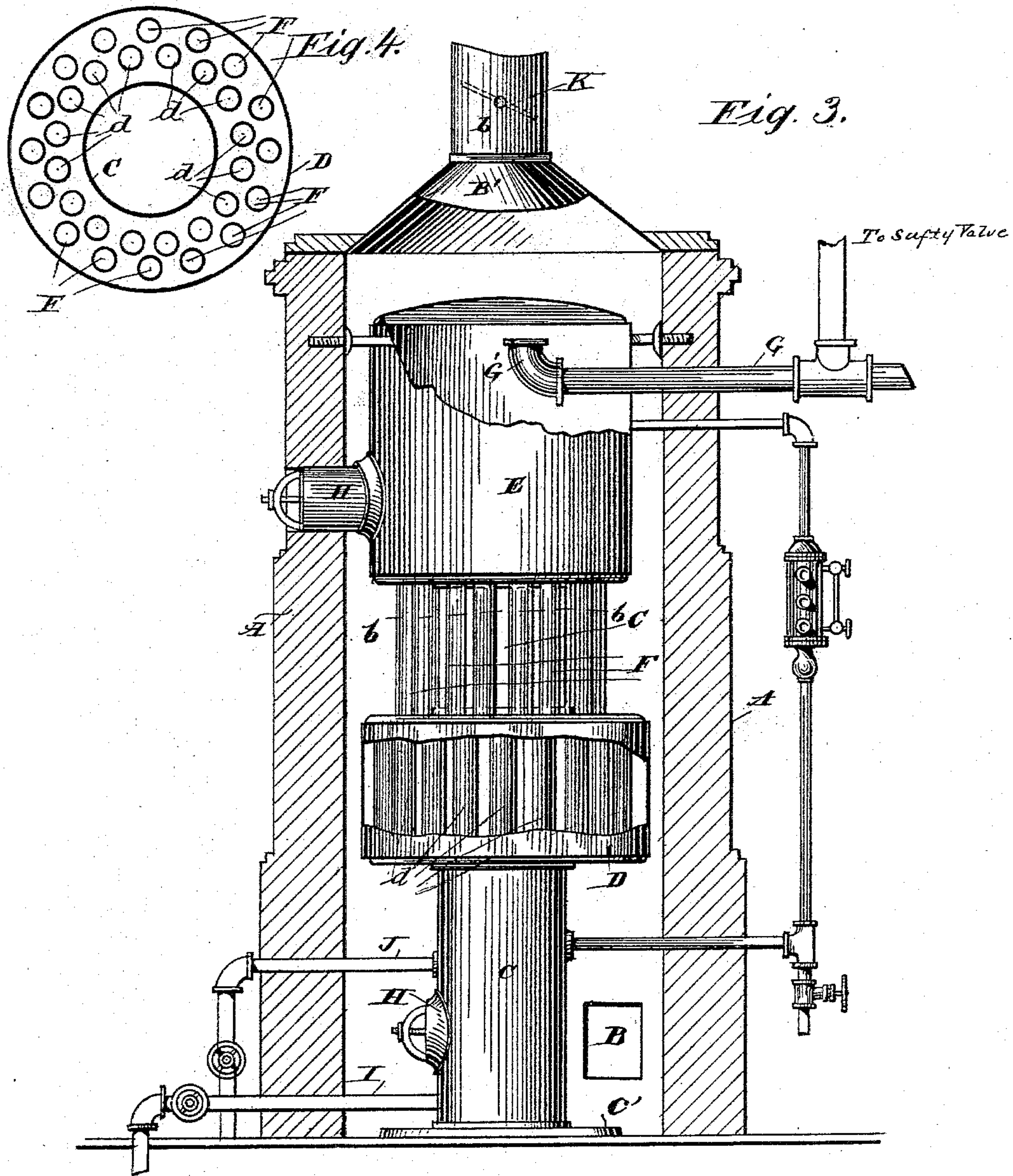
(No Model.)

2 Sheets—Sheet 2.

M. HIGGINS.
BOILER.

No. 494,861.

Patented Apr. 4, 1893.



Witnesses
E. J. Davis
Joe Davis

Inventor
Martin Higgins.
by *W. M. Monroe*
Attorney.

UNITED STATES PATENT OFFICE.

MARTIN HIGGINS, OF NILES, OHIO.

BOILER.

SPECIFICATION forming part of Letters Patent No. 494,861, dated April 4, 1893.

Application filed December 7, 1892, Serial No. 454,410. (No model.)

To all whom it may concern:

Be it known that I, MARTIN HIGGINS, a citizen of the United States, and a resident of Niles, county of Trumbull, State of Ohio, have invented certain new and useful Improvements in Boilers, of which I hereby declare the following to be a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in sectional combined water and fire tube boilers, and its objects are to provide a quick steaming boiler with the greatest amount of surface distribution of heat compatible with strength, and with sufficient drum capacity to retain the steam generated.

My invention further consists in the combination and arrangement of parts and construction of details as hereinafter described, shown in the accompanying drawings and more specifically pointed out in the claims.

In the accompanying drawings, Figure 1, is a vertical sectional view of one form of my invention. Fig. 2, is a transverse section on line *a-a*, Fig. 1. Fig. 3, is a vertical sectional view of a modified form, and Fig. 4, is a transverse section of the same on line *b-b*, Fig. 3.

In the views, A is a solid mason work inclosing case or chimney, surrounding the boiler.

B is a flue supplying hot air and flame from an operative furnace as from a reduction or blast furnace which is employed to heat the boiler. A hood B' and smoke stack *b* serve to collect the escaping gases after they have passed around and through the flues and drums of the boiler.

C is the main boiler tube, connecting the drums D, D' and E, and resting securely upon the foundation plate C'. The drums are spaced at regular intervals upon the main vertical tube which is not continuous through them and are closely filled with vertical tubes *d* which transmit the heat upward through the water occupying the drums. F are additional water tubes connecting two of the drums so as to give additional circu-

lation to the water and further expose it to the heat.

The main chimney or furnace A should be of sufficient internal diameter to pass all the heat rising from the flue B freely but without waste and the drum E will of necessity be of less diameter than the perforated drums in order to give an equal area of flue passage for the heat around its periphery. The steam pipe G is provided with an upturned nozzle G' the object of which is to prevent the entrance of water in case of foaming of the boiler or strong suction through the steam pipe. H, are man holes placed wherever convenient, for access in cleaning and repairing.

It will readily be seen that all parts are easily constructed and repaired, when necessary.

I is the blow off pipe and J the feed pipe; a damper K is placed in the smoke stack for regulation.

The modified form shown in Fig. 3 does not vary from the form shown in Fig. 1, except that one of the drums D' is absent and the tubes F are connected with the remaining drums D and E.

I do not limit myself to the exact form or proportion of the flues or to the use of the flue B, since a common grate and horizontal furnace could be added if desired for situations remote from an adjacent blast furnace.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a vertical boiler the combination of main sectional tube one or more drums D, D' connecting said sections and provided with vertical hot air flues, a terminal steam drum at the top of the main tube, water tubes connecting two or more of the drums, and an inclosing chimney of larger diameter than the drums, substantially as described.

2. In a vertical boiler the combination of a main tube in sections alternating with two or more drums, the upper or terminal drum adapted to serve as a steam drum, a steam outlet pipe from said drum provided with an upwardly turned inlet nozzle, air flues within

the lower drum or drums, and water tubes connecting two adjacent drums, substantially as described.

3. In a vertical boiler, the combination of
5 a sectional main tube, drums between and connecting said sections, a steam drum of lesser diameter than the lower drums mounted upon the upper end of the upper main

tube section, hot air flues within the lower drums, water tubes connecting two adjacent drums, and an inclosing chimney provided with hot air flue B, substantially as described.

MARTIN HIGGINS.

Witnesses:

WM. M. MONROE,

JOS. J. DAVID.