

No. 672,280.

Patented Apr. 16, 1901.

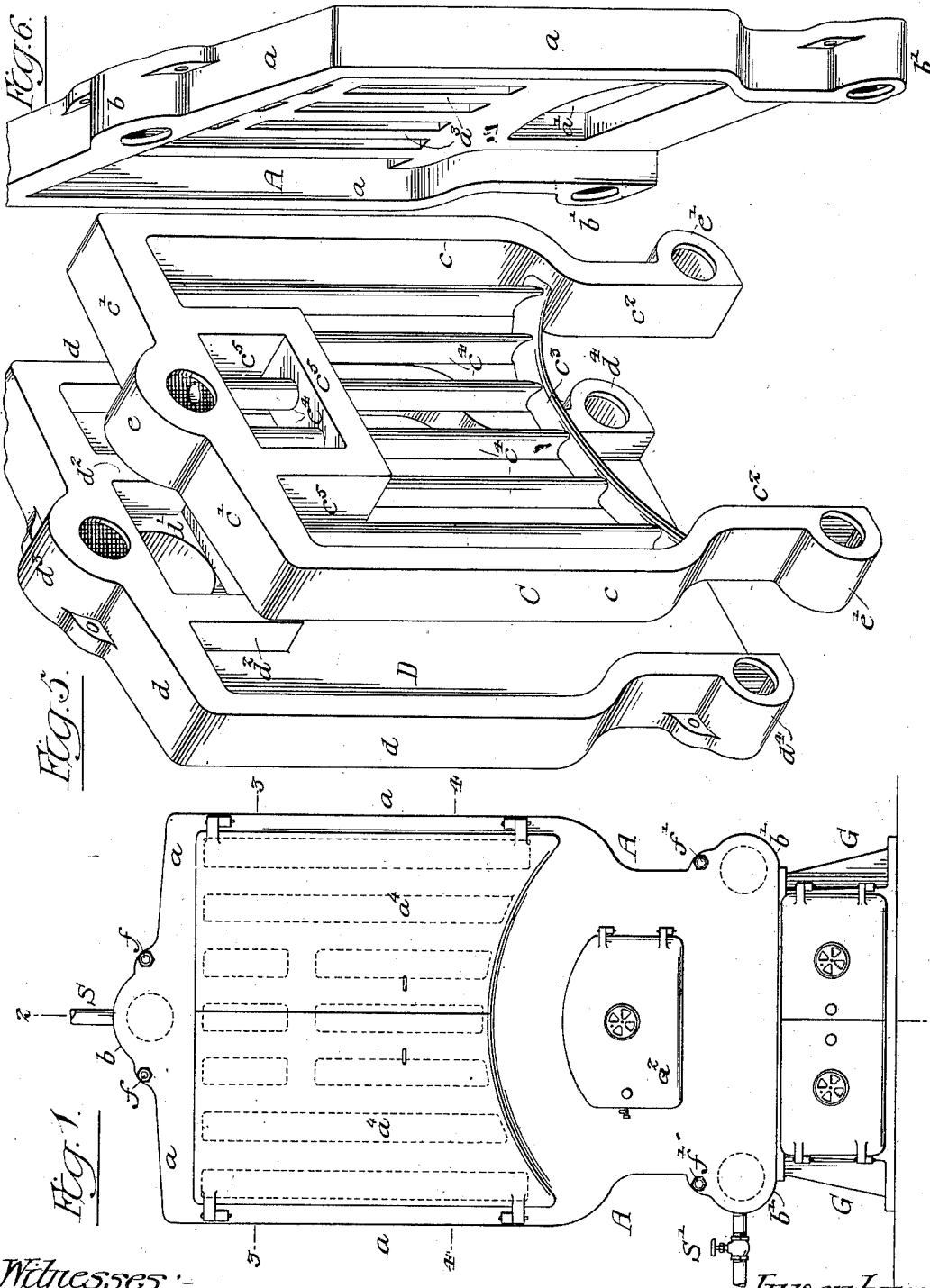
M. B. MOORE.

VERTICAL SECTIONAL-BOILER.

(Application filed Nov. 20, 1900.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:-

Herman C. Melius.

Louis H. F. Whitehead

Inventor:-

Moses B. Moore
by his Attorneys:-
Hovorn & Hovorn

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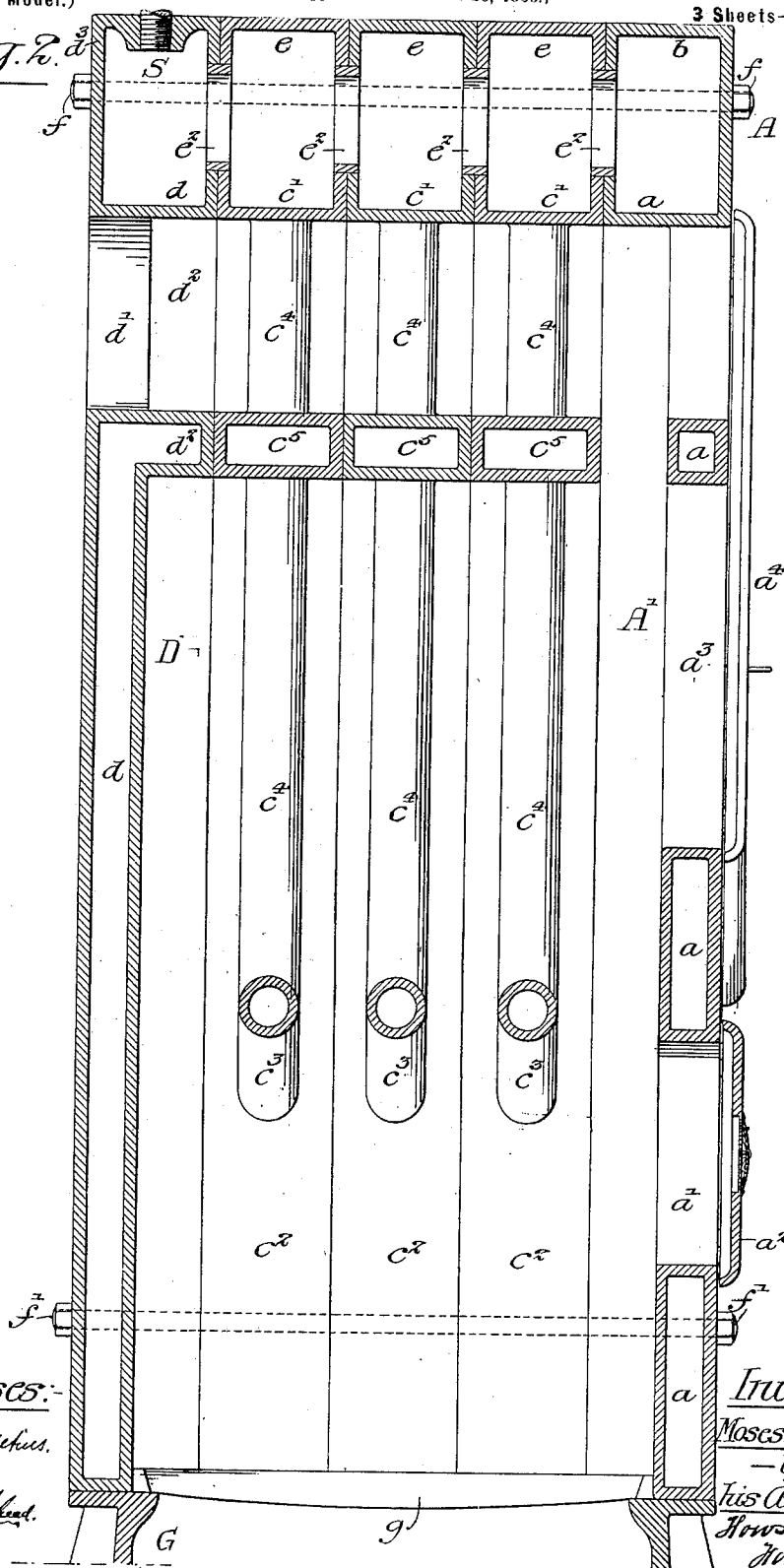
M. B. MOORE.
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3 Sheets—Sheet 2

(No Model.)

Fig. 2.



Witnesses:

Armen C. McKus.

John H. H. H. H. H.

Inventor:

Moses B. Moore.

— by —

His Attorneys:

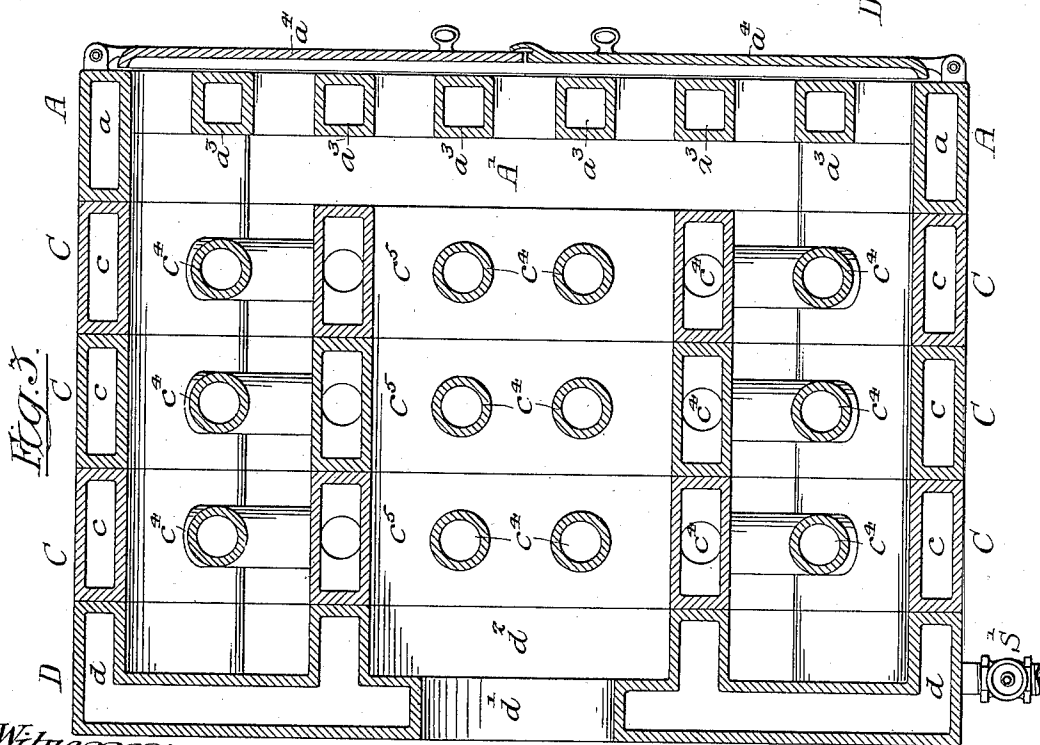
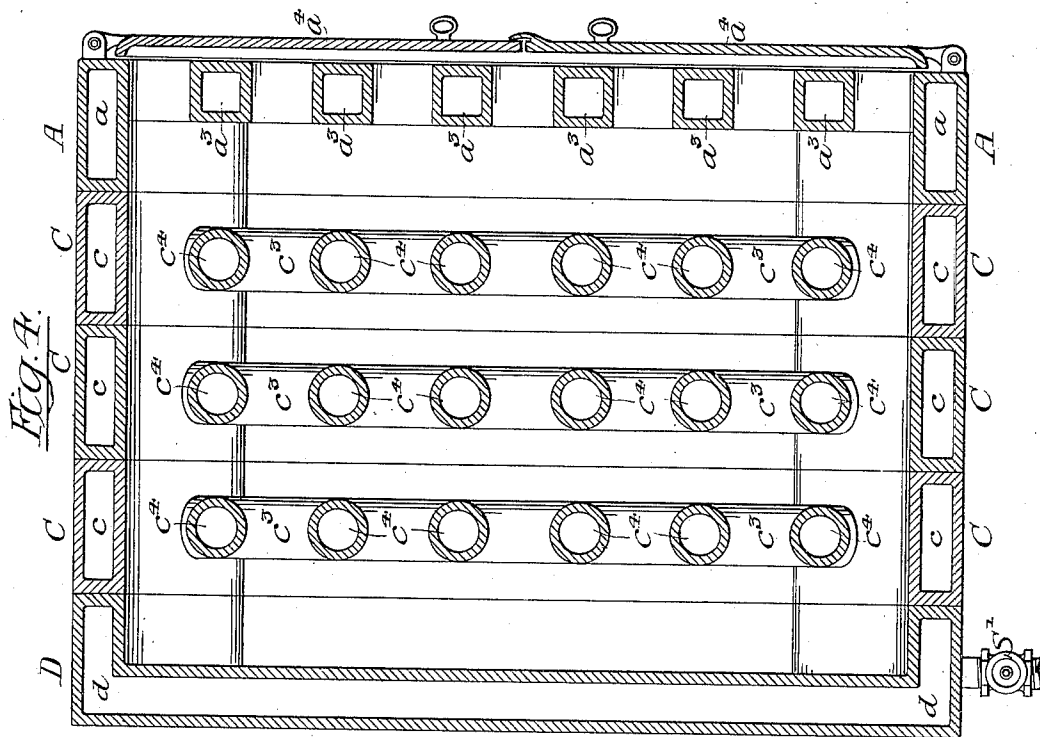
Howe & Johnson

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3 Sheets—Sheet 3.



Witnesses:

Abraham C. McKim.
Charles H. Whitehead.

Inventor:
Moses B. Moore
by his Attorneys: - Horn & Horn

UNITED STATES PATENT OFFICE.

MOSES B. MOORE, OF READING, PENNSYLVANIA, ASSIGNOR TO PENNINGTON
FOUNDRY AND HEATER COMPANY, OF PENNINGTON, NEW JERSEY.

VERTICAL SECTIONAL BOILER.

SPECIFICATION forming part of Letters Patent No. 672,280, dated April 16, 1901.

Application filed November 20, 1900. Serial No. 37,159. (No model.)

To all whom it may concern:

Be it known that I, MOSES B. MOORE, a citizen of the United States, residing in Reading, Pennsylvania, have invented certain Improvements in Vertical Sectional Boilers, of which the following is a specification.

My invention relates to certain improvements in boilers for hot-water or steam heating, having for its object the thorough combustion of the fuel and the thorough heating of the tubular sections. This object I obtain by making a boiler composed of vertical sections so constructed as to cause the products of combustion from a furnace to pass directly to the top of the boiler, then to the front, and through a longitudinal flue to the rear of the furnace, as described hereinafter.

In the accompanying drawings, Figure 1 is a front view of my improved boiler. Fig. 2 is a vertical sectional view on the line 2 2, Fig. 1. Fig. 3 is a sectional plan view on the line 3 3, Fig. 1. Fig. 4 is a sectional plan view on the line 4 4, Fig. 1. Fig. 5 is a perspective view of the rear section and one of the intermediate sections, and Fig. 6 is a perspective view of the front section.

Heretofore in the construction of boilers of this type the path for the hot gases from the furnace to the stack has been made as circuitous as possible, and the said gases have frequently been cooled to a lower temperature than the water in the boiler before escaping into the stack.

In my improved boiler the products of combustion rise directly from the fire around the tubes to the top of the boiler and then pass to the front end of the same. Here they enter a flue formed through the top of the body of the boiler and passing around water-tubes in this flue are finally discharged into a stack or piping connected thereto.

The boiler is made up of a front and rear section and intermediate sections, all mounted on a suitable base G and secured together by suitable bolts. The several sections are hollow and communicate with one another, so that the water will circulate through all the sections of the boiler.

A is the front section, preferably made of a single casting, having a hollow frame a on each side and at the top, the top forming part of

the dome or steam space of the boiler. The lower portion has an opening or doorway a' , which is provided with a door a^2 . Extending from the lower portion to the top frame are a series of tubes a^3 . The central series of tubes may be connected by cross-tubes, as shown by dotted lines in Figs. 1 and 6. The tube-space of this front section is closed by suitable doors a^4 . The frame a is preferably deeper than the body of the front section A, and consequently a space A' is formed back of the tubes.

The front section A has an enlargement b projecting from the top frame, and has enlargements $b' b'$ at the lower ends of the side frames. Openings in the rear walls of these enlargements communicate with similar openings in the intermediate sections, described hereinafter, so as to allow water to circulate through the front section as well as the intermediate sections.

D is the back section of the boiler and is of the general outline of the front section A, having a frame d at the top and at each side. Near the top is a flue-opening d' , and this opening is surrounded by a hollow frame d^2 , as shown in Fig. 5. The section has enlargements $d^3 d^4 d^4$ in line with the enlargements $b b' b'$ of the section A, and each enlargement has an opening in front communicating with the intermediate section.

Between the front section A and the back section D are placed a number of intermediate sections C (in the present instance three) of the form shown in Fig. 5. Each section C consists of hollow side frames $c c$, top frame c' , and hollow legs c^2 , forming continuations of the side frames.

c^3 is a cross-tube forming the crown of the fire-chamber, and this tube is preferably curved, as shown. Connecting the tube c^3 with the top frame c' are vertical tubes c^4 . A frame c^5 forms a flue for the products of combustion, the central tubes c^4 continuing through the flue, as shown.

When the several sections are assembled, as shown in Figs. 2, 3, and 4, the frames c^5 of the several intermediate sections form the flue which communicates with the flue-opening d in the back section, as clearly shown in Fig. 2, the space A' between the front sec-

tion and the first intermediate section allowing for the escape of the products of combustion from the body of the furnace to this flue. The several intermediate sections have projections $e e' e'$ in line with the projections $b b'$ of the section A and have communicating openings. The several sections are coupled by nipples e^2 .

Bolts $f f'$ pass through suitable lugs on the sections A and D and extend on each side of the projections of the intermediate sections. The bolts f' near the base of the structure pass through lugs in the front and back sections and extend above the projections or enlargements of the intermediate sections, the said bolts rigidly holding the various sections of the boiler together.

A base G, upon which the boiler is preferably mounted, also supports the grate g of a length depending upon the number of intermediate sections used. The number of sections will depend upon the required capacity of the boiler, since the said capacity may be varied by varying the number of sections.

A steam-pipe S is connected to one of the enlargements of the sections of the boiler, preferably the rear section, as shown in Fig. 2, and a return-pipe S' is preferably connected to the lower part of the same section, as shown in Fig. 1.

A water-column (not shown) of any approved pattern may be attached to the side of the boiler and the water-level kept above the bottom of the cross-tubes c^3 , forming the crown of the fire-chamber.

In operation the gases from the incandescent fuel in the furnace rise around the tubes c^4 to the top of the boiler and from there pass to the front of the same, entering the flue D' through the space A' left between the tubes of the section A and the first intermediate section C. In this flue, the sides, top, and bottom of which are hollow and covered with water, are the tubes c^4 , around which the still hot gases must pass before reaching the smoke-pipe connected to the opening d' .

It is to be noted that by the above-described arrangement of parts there is an exceptionally large surface exposed to the direct heat from the furnace, and with all this surface the products of combustion have a comparatively short distance to travel before reaching the stack. Moreover, by the use of the vertical tubes c^4 the formation and escape of steam to the top section of the boiler is greatly facilitated. By means of the construction herein described I am enabled to operate my boiler at a much lower temperature in the fire-pot, and consequently with an increased economy of fuel for the same output of steam.

I claim as my invention—

1. The combination in a sectional boiler, of front and rear sections, with an intermediate section consisting of a hollow frame with vertical tubes connecting the top and bottom members thereof and a single flue-inclosure at the top and within the frame of

said intermediate section, substantially as described.

2. In a sectional boiler, the combination of front, rear and intermediate sections, the intermediate sections consisting of hollow frames having their upper and lower members connected by vertical tubes, a flue-inclosure within and at the top of each section, a flue-inclosure on the rear section, all of the said inclosures being in line and forming a continuous flue through the boiler, an opening from the interior of the boiler into the flue at the front thereof, means for connecting the sections and steam and water connections, substantially as described.

3. A section forming part of a boiler of the character described, consisting of hollow top and side frames, a cross-tube and a single hollow flue-inclosure at the top of the section, tubes extending from the cross-tube to the top frame and flue to the inclosure, substantially as described.

4. In a boiler of the character described, the combination of a number of hollow sections forming a casing, water-legs on each section forming a furnace for the boiler, means for operatively connecting the sections, vertical tubes forming part of the intermediate sections, a flue inside of the boiler at the top of the casing and extending laterally therethrough, an opening for the entrance of products of combustion into said flue at the front of the boiler, whereby said products of combustion are made to rise from the furnace to the top of the boiler, then to pass to the front of the same to enter the flue and finally to pass through said flue to a stack, substantially as described.

5. The combination in a sectional boiler of the character described, of a hollow-sided flue at the top of and within said boiler, having an inlet and outlet, and water-tubes in said flue connected to its interior walls, substantially as described.

6. In a steam-boiler composed of vertically-arranged cast sections, the combination of a rear section consisting of a hollow plate, intermediate sections each formed of a hollow frame in which are vertical tubes, a flue running through the rear, and intermediate sections formed by inclosures cast in said sections, and a front section, means for operatively connecting the adjacent faces of the sections, said front section consisting of a hollow plate having an opening through it for a fire-doorway, and a frame around its edge resting against the intermediate sections whereby a space is left between the front section and the forward end of the flue, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MOSES B. MOORE.

Witnesses:

WILLIAM E. BRADLEY,
JOS. H. KLEIN.