

(No Model.)

2 Sheets—Sheet 1.

J. GALT.
FURNACE.

No. 460,469.

Patented Sept. 29, 1891.

Fig. 1.

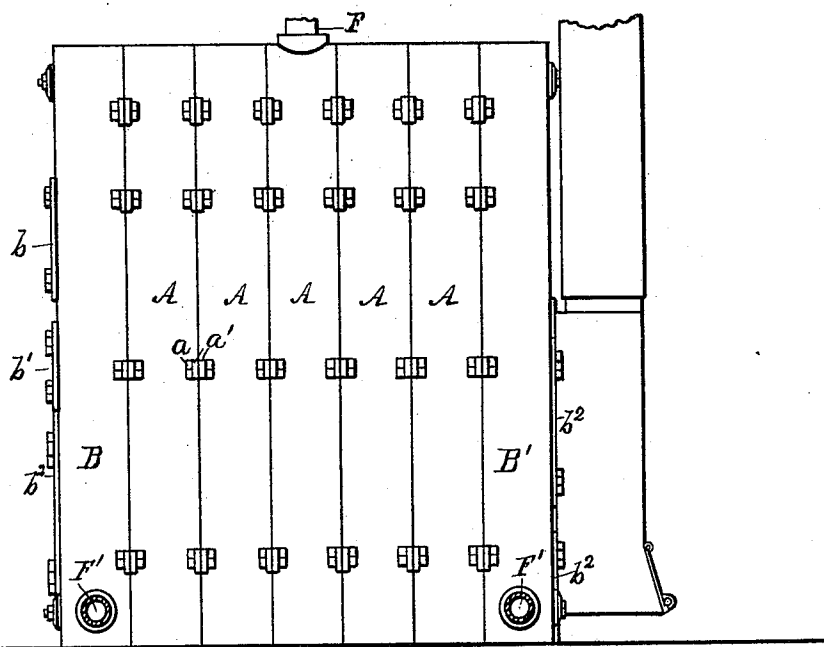
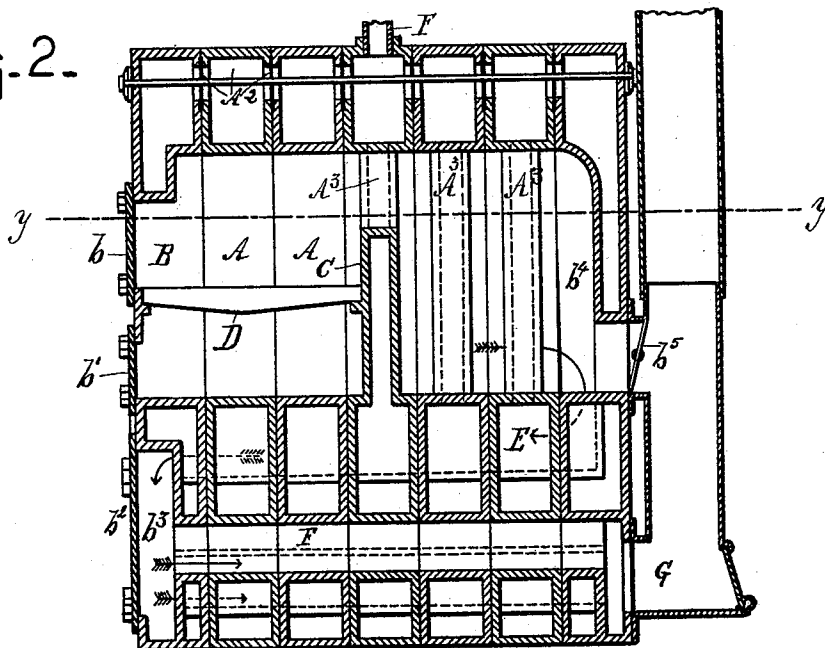


Fig. 2.



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Fig. 3.

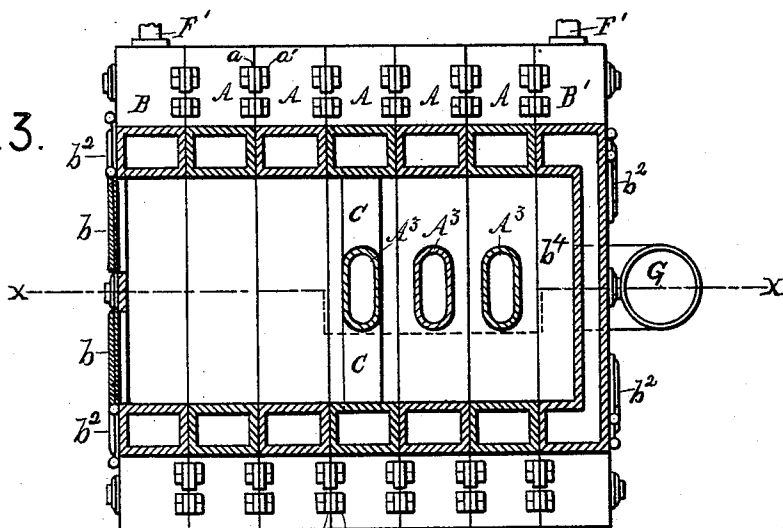


Fig. 6.

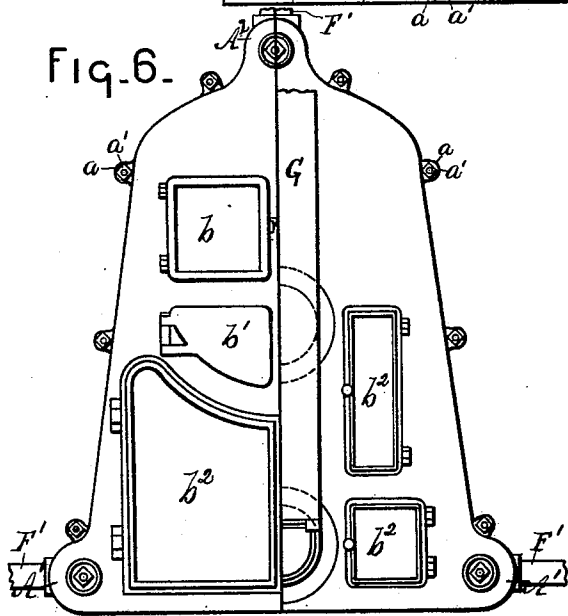


Fig. 4.

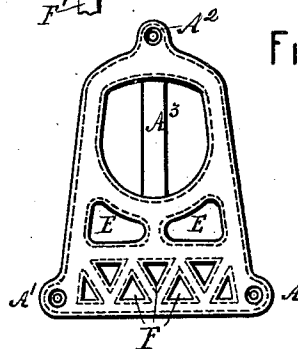
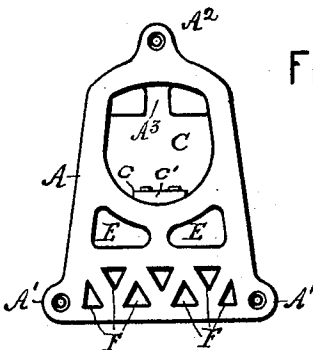


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN GALT, OF TORONTO, CANADA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 460,469, dated September 29, 1891.

Application filed August 18, 1890. Serial No. 362,338. (No model.)

To all whom it may concern:

Be it known that I, JOHN GALT, a subject of the Queen of Great Britain, residing at Toronto, county of York, Province of Ontario, Canada, have invented a certain new and useful Improvement in Sectional Heating-Furnaces; and I 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 pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

In the drawings, Figure 1 is a side elevation of my improved furnace. Fig. 2 is a longitudinal section by a vertical plane on xx of Fig. 3. Fig. 3 is a section by a horizontal plane on yy of Fig. 2. Fig. 4 is a separate view of one of the sections. Fig. 5 is a separate view of one of the sections made to serve as a bridge-wall. Fig. 6 is a half-front and half-rear elevation.

It is the purpose of my invention to produce a new and improved heating-furnace designed for steam or hot-water circulation; and my invention consists, essentially, first, in adapting the apparatus to secure and support the grate at a high level close to the upper stratum of water in the furnace, so that the most highly-heated products shall expend their heat directly upon this upper stratum, leaving the lower strata to be heated by the said products after they shall have acted on the upper stratum, the arrangement being such that they are for their purpose deflected downward and through the lower portions of the furnace; second, in the peculiar arrangement and construction of the sections in a sectional boiler and furnace for accomplishing this purpose; also, in other special features of construction.

In carrying out my invention, A represents those sections of my boiler between the front and rear sections.

B represents the front and B' the rear section, which are respectively designed to make a front and rear finish and are provided with fuel-doors b , ash-pit doors b' , cleaning-doors b^2 , and suitable flue-openings b^3 b^4 , and with such other usual features as are found on the

front and rear of furnaces, such as dampers and the like for regulating the draft. Such a damper is shown at b^5 .

C represents a bridge-wall, formed by simply making one of the sections with this portion cast therewith, the same being hollow and constituting part of the water-space of the said section. It may, if desired, be so cast as to leave openings c at the base, closed by suitable doors c' , by opening which access can be had for cleaning out any dust or ashes that may have gathered in the spaces back of the bridge-wall.

D is the grate, located high up, so as to bring the highly-heated products, as well as the most intense radiation from the fuel-bed, directly against the upper portion of the water-tubes, thereby expending the greatest heating energy in heating the upper stratum of water, raising it quickly to a steam-heat; or, if the furnace is used as a water-circulation, raising it quickly to the proper temperature for circulation. It is apparent that this is accomplished without correspondingly heating the lower strata of water, and so much needless expenditure of fuel for this purpose is avoided. On the other hand, the highly-heated products, having expended their intense heat on the upper stratum, as above, are deflected downward and forward through flues E, provided for the purpose, and flues F are provided at the base for their return again to the smoke-flue G. At the edges of each section are hubs A' for uniting the sections at the base and permitting free circulation from one to the other, and similar hubs A² at the top serve a like purpose at this point. At suitable points steam or water outlet pipes F may be connected for leading the steam or water to the points to be supplied therewith, and suitable return-pipes F' may be connected with the base of any section or sections. These sections may be united at their hubs by suitably packing them and then binding each one to the adjacent one by suitable bolts passing through ears, as shown at aa' , respectively, or bolts or clamps passing from front to rear of the entire furnace might simultaneously bind them all together, and if such bolts are employed they may pass centrally through the

hubs and be packed at their ends, or they may be arranged externally of the sections in any convenient manner.

For starting the furnace the damper at b^5 may be opened, producing a direct draft, and closed when the fire is fairly under way.

In a furnace thus constructed the upper portion and the hub-channel A^2 form the steam-gatherer when employed as a steam-heater, but when employed as a water-heater the same hub-channel serves to maintain circulation at the top of the furnace and prevents any accumulation of air in the top of the sections, causing said air to pass on through the circulating-pipes, to be drawn off, as usual, at an expansion-chamber, where it may be collected without disturbing the circulation.

I do not limit myself to the particular construction here shown, as the same may be modified considerably without departing from the essential features of the invention.

This furnace, it is manifest, is well calculated to raise steam quickly and economically by combining its greatest heating energy to the upper stratum, while at the same time it effectually extracts the remnants of heat, imparting the same to the lower strata before reaching the exit-flue.

The drawings show the device arranged for a single grate and single fire-chamber, with a middle dividing water-passage A^3 formed with each section back of the bridge-wall. If it be desired to make the device in the form of a double furnace—*i. e.*, with two grates and two fire-chambers—these upright passages A^3 might be continued forward of the bridge-wall to the front of the furnace, and if necessary be so shaped as to leave very little space between them, and so make an effectual partition between the said two fire-chambers.

I am aware that furnaces have been constructed with the fire-chamber located in the upper part thereof, but am not aware that such furnaces have been made of sections so

constructed that the water in each section can move straight to the top and in which circulation can be so rapid and free as in my construction. As the upper stratum of water is subject to intense heat, it is necessary that the circulation from the lower and cooler stratum should be as free and through as many points as possible, and which I accomplish by allowing free passage from lower to upper part of each section as well as from section to section. In prior constructions the water has been compelled to take as circuitous a course in rising as is given to the products of combustion in descending.

What I claim is—

1. A steam or water heating furnace consisting of sections, with means for uniting them and providing circulation of water or steam from section to section, said sections being provided with a fire-chamber in the upper part thereof, with a stratum of water above and around the same, and flues situated beneath said chamber for conducting heated products of combustion therefrom through said sections to the outlet, substantially as and for the purposes described.

2. A steam or water heating furnace consisting of sections adapted to circulate water or steam from base to top of each section and from section to section, said sections being provided with a fire-chamber in the upper part thereof, with a stratum of water surrounding the same, and flues situated beneath said chamber for conducting heated products of combustion therefrom through said sections to outlet at the base of said furnace, substantially as and for the purposes described.

In testimony whereof I sign this specification in the presence of two witnesses.

JOHN GALT.

Witnesses:

W. H. CHAMBERLIN,
C. J. SHIPLEY.