

No. 661,751.

Patented Nov. 13, 1900.

J. C. & D. WIGERT.  
FURNACE.

(Application filed Feb. 13, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

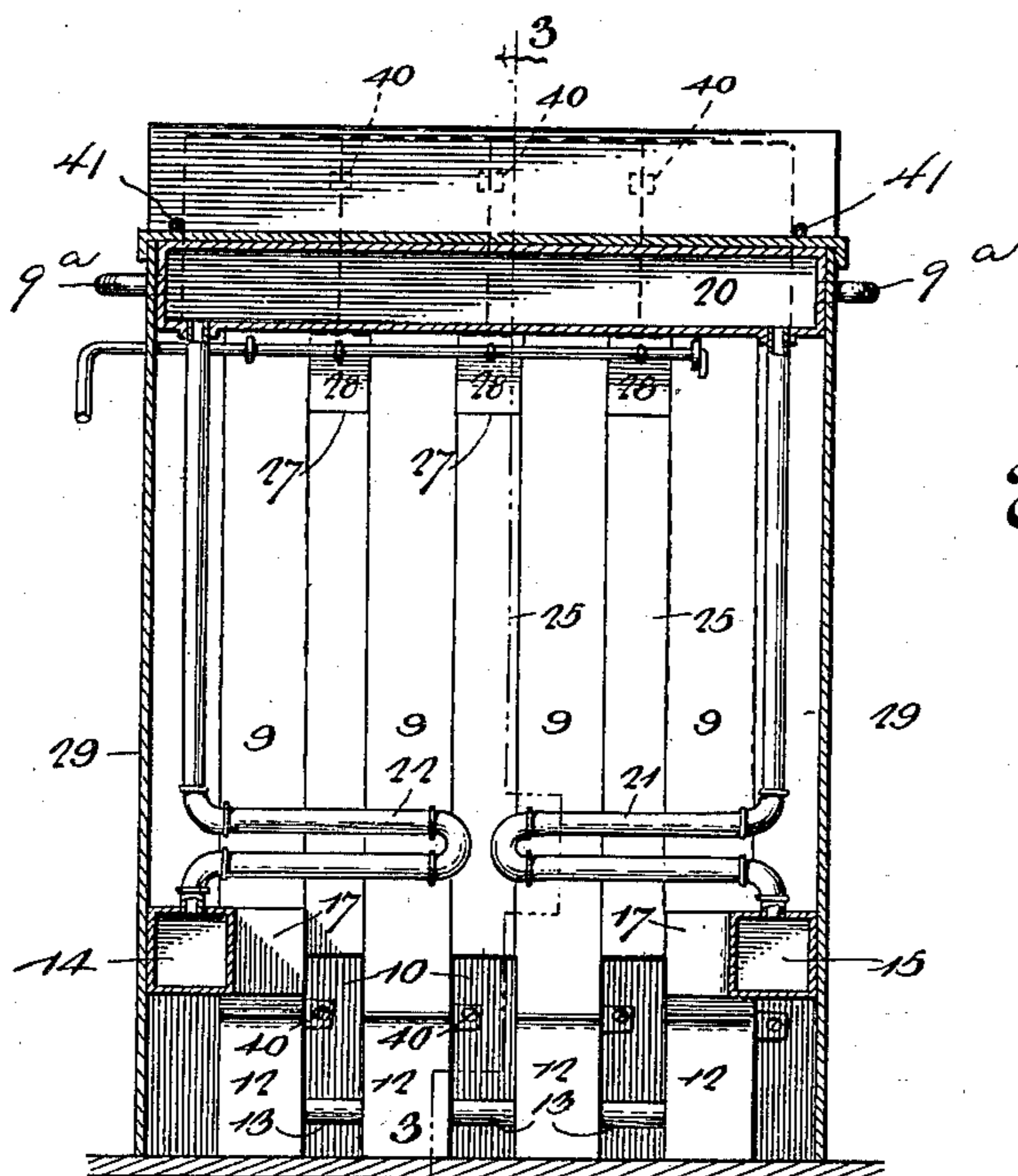
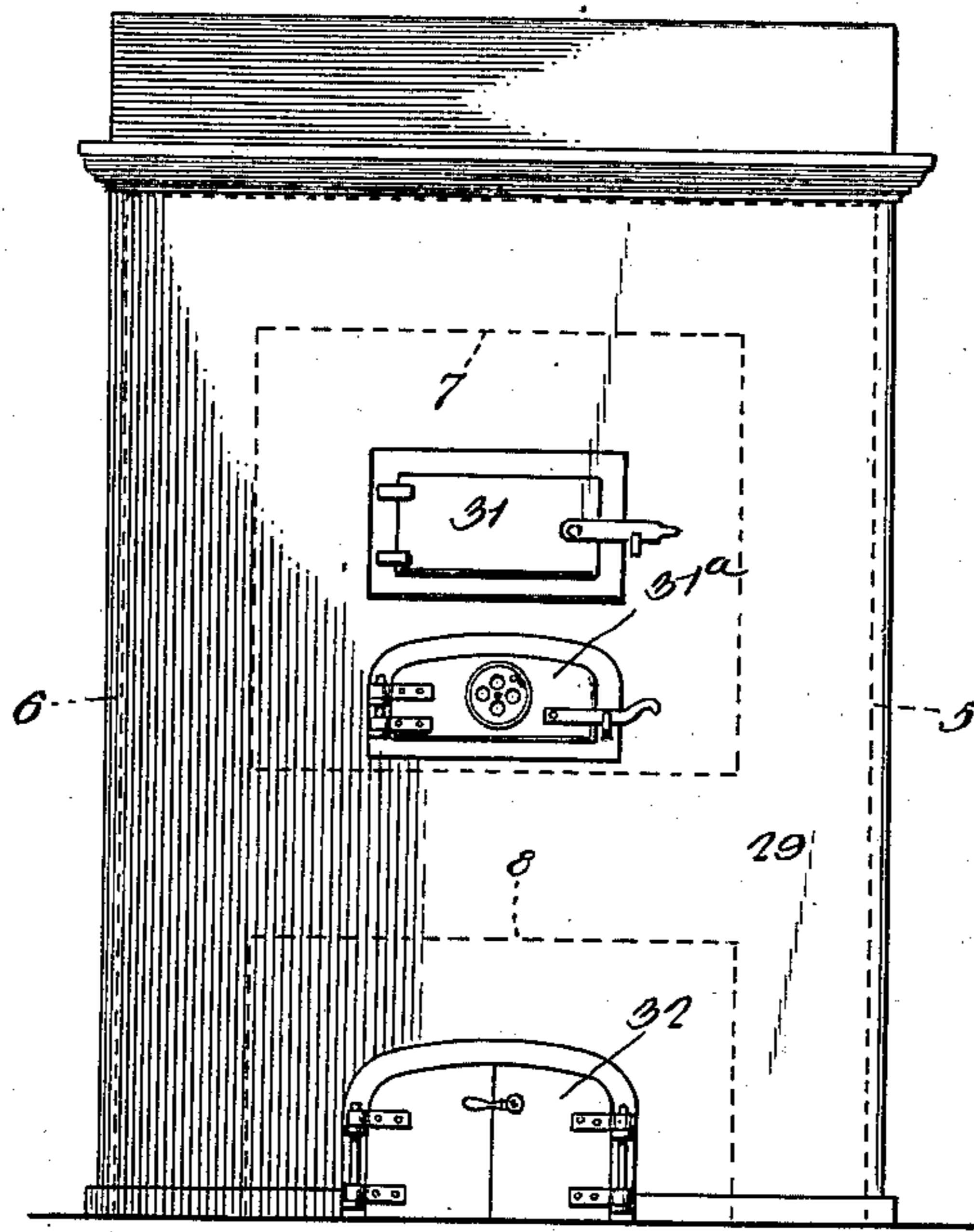


Fig. 2.

Witnesses

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2 Sheets—Sheet 2.

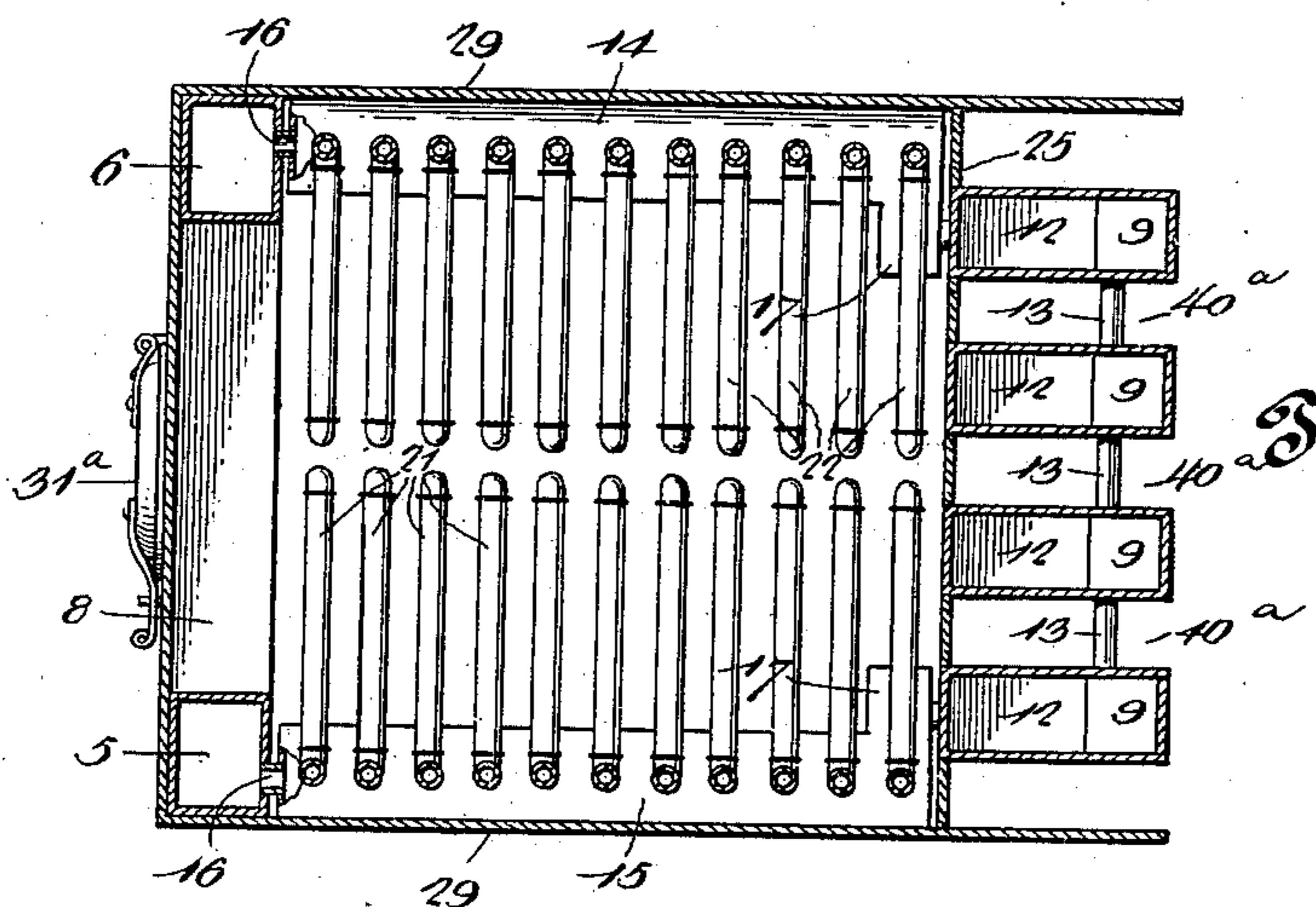
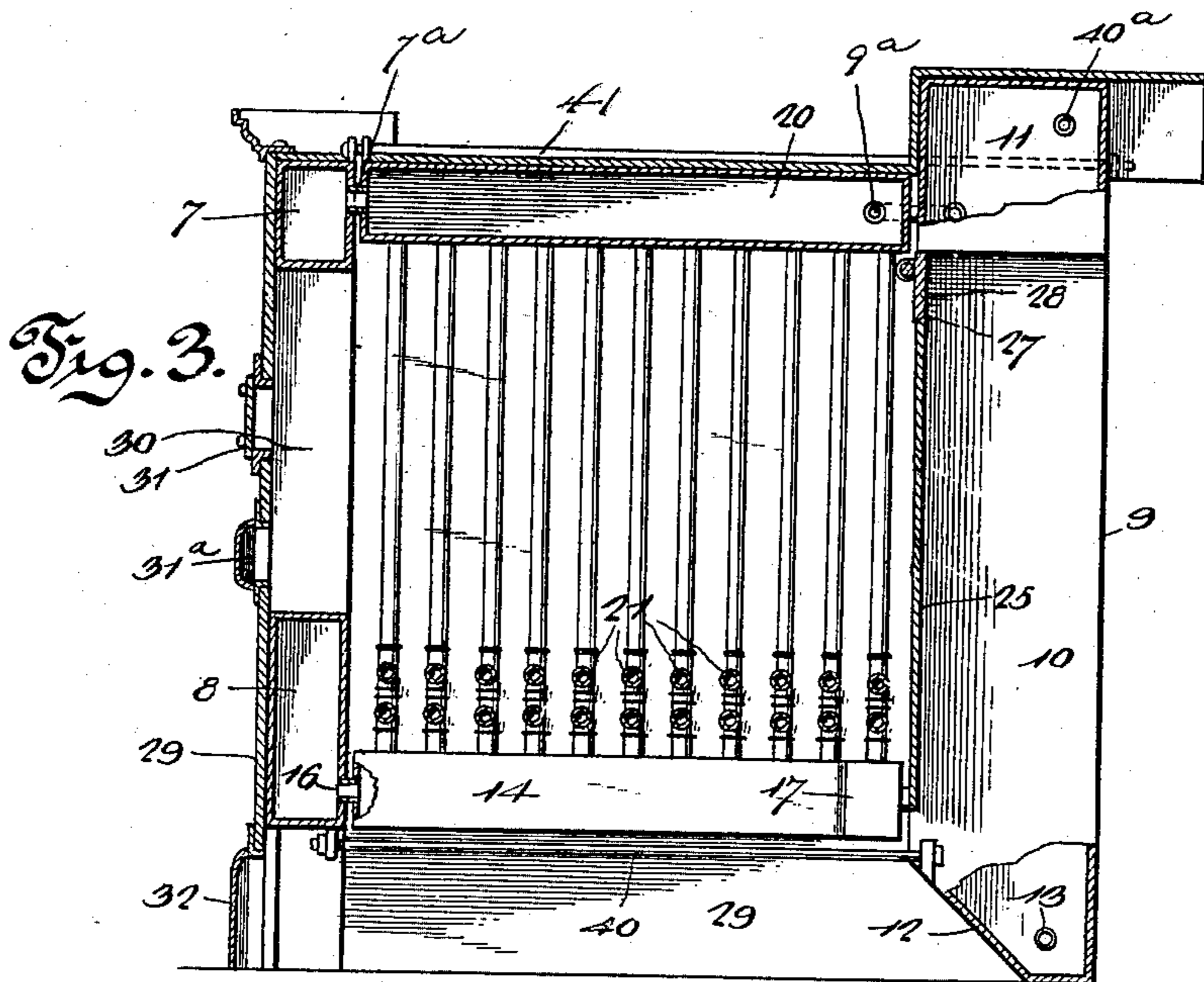


Fig. 4.

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# UNITED STATES PATENT OFFICE.

JOSEPH C. WIGERT AND DAVID WIGERT, OF BUSHNELL, ILLINOIS.

## FURNACE.

SPECIFICATION forming part of Letters Patent No. 661,751, dated November 13, 1900.

Application filed February 13, 1900. Serial No. 5,089. (No model.)

*To all whom it may concern:*

Be it known that we, JOSEPH C. WIGERT and DAVID WIGERT, citizens of the United States, residing at Bushnell, in the county of McDonough and State of Illinois, have invented a new and useful Furnace, of which the following is a specification.

This invention relates to furnaces in general, and more particularly to the class of heating-furnaces employed in systems of steam and hot-water heating, the object of the invention being to provide a structure comprising front and rear hollow portions adapted to receive water and to combine with these portions an arrangement and construction of grate-bars and crown-sheet, with their connecting-pipes, as will insure a most efficient heating with a minimum of fuel, thus not only saving the cost of an excess of fuel, but also precluding the necessity of frequent attention.

In the drawings forming a portion of this specification, and in which similar numerals of reference designate like and corresponding parts in the several views, Figure 1 is a front elevation of a furnace constructed in accordance with the present invention. Fig. 2 is a vertical transverse section of the furnace. Fig. 3 is a section on line 3 3 of Fig. 2. Fig. 4 is a horizontal transverse section of the complete furnace.

Referring now to the drawings, the present invention comprises a water-front including columns 5 and 6, having a connected water-section 7 at their ends, said columns being also connected at a point above their lower ends by a second water-section 8, the space between the water-sections 7 and 8 permitting the supply of fuel to the furnace, while the space below the section 8 opens into the ash-pit.

The water-back consists of a plurality of rectangular columns 9, the upper ends of which are enlarged transversely, as indicated in dotted lines in Fig. 2, and the upper ends of these several columns are connected by means of an interspace 40<sup>a</sup> to permit a free flow of water from one to another. The water-columns have the inner faces of their lower ends beveled, as shown at 12, and these lower portions are also connected by means of an interspace 13.

Two mutually-parallel water-sections 14 and 15 are connected at their front ends with the water-section 8 through the medium of the nipples or pipe 16, and at their rear ends these water-sections have inwardly-directed portions 17, which communicate with the outermost columns 9, as illustrated in Fig. 4.

A water-crown 20 extends transversely throughout the width of the furnace and reaches from the water-section 7 to the upper ends of the columns 9. The forward end of the water-crown is connected with the column 7 by a single nipple, (shown at 7<sup>a</sup>,) while the sides of the water-crown, at the rear ends thereof, are connected with the upper ends of the outermost columns 9 by curved nipples 9<sup>a</sup>. (Shown in Fig. 2.) The grate of the present invention comprises a number of pipes oppositely disposed in pairs, these grate-pipes being in the form of return-tubes. One series of return-tubes 21 is mounted upon the water-section 15, each of these tubes being connected through the upper face of the water-section and extending upwardly a short distance, then inwardly for substantially one-half the width of the fire-pot, and then upwardly and rearwardly to lie above the inwardly-directed portion, after which the tube is bent upwardly and opens into the water-crown 20 at a point above the water-section 15. Similar tubes 22 are mounted upon the water-section 14 and communicate with the water-crown 20 thereabove, these series of tubes forming a complete grate, the upper surface of which lies in a common horizontal plane, the grate thus comprising what is in effect two horizontal layers of pipes, so that the water in its circulation moves under the fire in one direction for substantially one-half its width and is then returned.

As illustrated in Figs. 2 and 4, the mutually-adjacent ends of the series of pipes are separated by slight interspaces, so that when expanded under the influence of the heat in the furnace the inner ends of the pipes will not touch, and thus each grate-bar may expand and contract independently of every other grate-bar, and consequently there is a minimum liability to disjoining or loosening and the leakage that is incident thereto.

As shown in the drawings, plates 25 are disposed in the interspace 10 between the col-

umns 9 to lie flush with the inner faces of the latter. Openings 27 are formed in the plates 25 just below the water-section 11, and these openings 27 are provided with regulating-dampers 28, through the medium of which the openings 27 may be opened or closed, and the draft through the furnace may thus be regulated.

In practice the structure above described may be inclosed in a metallic casing 29 or may be set in brick or otherwise inclosed, the feed-opening 30 between the sections 7 and 8 having a communicating door 31, while the ash-pit below the grate has a communicating door 32, as illustrated. Between the feed-door 31 and the ash-door 32 and above the water-section 8 is a draft-door 31<sup>a</sup>. The lower ends of the columns 9 are unconnected below the grate, excepting by the pipes 13, and thus if the dampers 20 be closed and the draft-door 31<sup>a</sup> be opened there will be a downdraft through the fire-box to the ash-pit and thence upwardly between the water-columns 9 and to the chimney.

It will be noted from the foregoing description that the usual water-section directly between the feed-door and the draft-door is omitted, and thus the front of the furnace is not liable to fracture or other injury due to expansion and contraction of this section as usually employed. Also each grate-bar may be built up of straight pipe-sections combined with nipples, L's, and returns, and, as illustrated, suitably-disposed bolts 40 are arranged to brace the several connected water-sections. Two additional bolts 41 are disposed one at each side of the furnace, connecting the water-columns 9 with the section 7, and thus acting to thoroughly brace the upper portion of the furnace.

In practice the fuel is placed directly upon the grate in the usual manner, the heat from the fuel passing upwardly and in contact with the upwardly-extending continuations of the grate-bar, as also in contact with the water-crown and the several parts of the water-front and water-back.

It will of course be understood that in practice any suitable materials may be employed for the various parts of the structure, any suitable proportions may be employed for the several parts, and that the furnace may be employed for any purpose to which it is adapted.

What is claimed is—

1. A furnace comprising a grate including a plurality of bars oppositely disposed in pairs, each of the bars consisting of a tube bent upon itself to form two sections lying one above the other to conduct water in opposite directions and in different horizontal planes.

2. In a furnace, a grate comprising a plurality of bars oppositely disposed in pairs, each bar consisting of a pipe returned upon itself to conduct water in different directions.

3. A furnace comprising spaced water-sections, a water-crown and a plurality of trans-

verse hollow grate-bars each comprising a pipe returned upon itself and connected at one end with its respective water-section the opposite ends of the bars being bent upwardly to form sides and connected with the crown.

4. A furnace comprising water-sections and a water-crown, and pipes connected with the water-sections, said pipes passing transversely of the furnace and bent upon themselves with the convolutions of each pipe lying in a common vertical plane, said pipes having their upper ends connected with the water-crown.

5. In a furnace, the combination with a water-crown, of a plurality of series of pipes connected therewith and oppositely disposed in pairs, the pipes of each series lying in a common vertical plane, and the lower ends of the pipes being continued inwardly and transversely of the furnace to form a grate.

6. A furnace comprising mutually-parallel water-sections and a water-crown disposed thereabove, a series of pipes connected with the water-crown and with a water-section, the pipes of each series lying in a common vertical plane and having their lower portions bent inwardly and transversely of the furnace and returned upon themselves.

7. A furnace comprising a fire-box, a water-back including a plurality of water-columns separated by interspaces, plates closing the interspaces at the inner edges of the columns, and openings communicating with the interspaces and provided with dampers.

8. A furnace comprising a fire-box, a plurality of water-columns in the rear of the fire-box and separated by interspaces, plates closing the interspaces at the inner edges of the columns, openings through the plates, and additional openings through the plates provided with adjustable closures.

9. A furnace comprising a water-front, a water-back including columns separated by interspaces, plates closing the interspace at the inner edges of the columns, mutually-parallel water-sections communicating with the water-front and the water-back, a water-crown communicating with the water-front and the water-back, a series of pipes connected with the water-crown and with the water-sections, the pipes of each series being bent at their lower ends to lie transversely of the furnace and form a grate, and openings through the plates and leading to the interspace between the columns of the water-back.

10. A furnace comprising a fire-box, a plurality of water-columns in the rear of the fire-box and separated by interspaces, plates closing the interspaces at the inner edges of the columns, a grate, openings through the plates below the grate, and additional openings through the plates above the grate and provided with adjustable closures.

11. A furnace comprising a fire-box, a plurality of water-columns in the rear of the fire-box and separated by interspaces, plates closing the interspaces, openings through the

plates, and additional openings through the plates provided with adjustable closures.

5 12. A furnace comprising a fire-box, a water-back including columns separated by interspaces, plates closing the interspaces, a grate, openings through the plates below the grate, and additional openings through the plates above the grates and provided with adjustable closures.

10 13. A furnace comprising a fire-box, a plurality of water-columns in the rear of the box, a grate comprising transversely-disposed

pipes, openings leading between the columns below the grate, and additional openings leading between the columns above the grate and 15 provided with adjustable closures.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

JOSEPH C. WIGERT.  
DAVID WIGERT.

Witnesses:

ANDREW N. MATHENY,  
ELLSWORTH HITES.