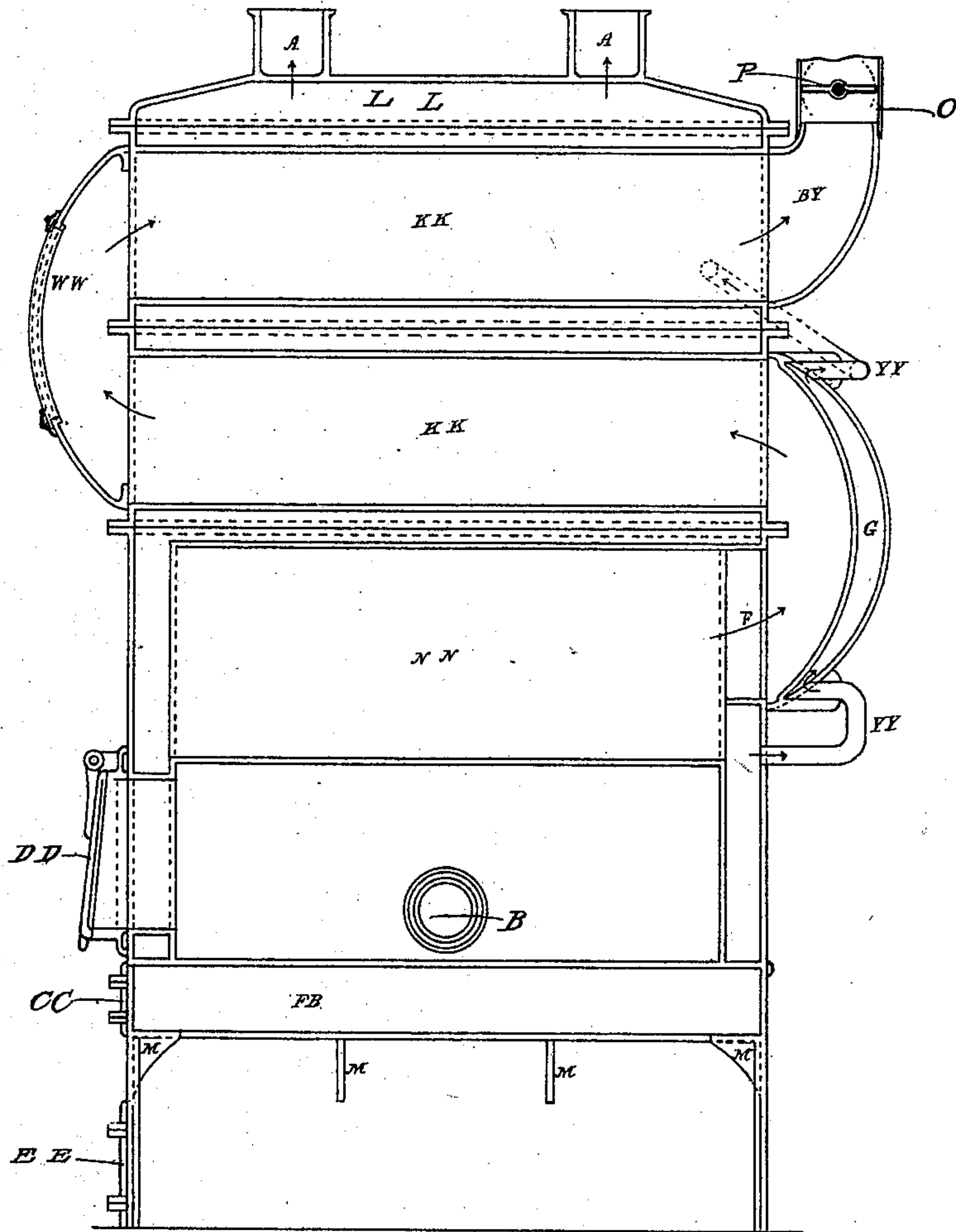


W. A. WHITE.
WATER HEATER.

No. 402,499

Patented Apr. 30, 1889.

Fig. 1.



WITNESSES.

Silas Woodell
John H. Crane

INVENTOR.

William A. White
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Attorney.

(No Model.)

2 Sheets—Sheet 2.

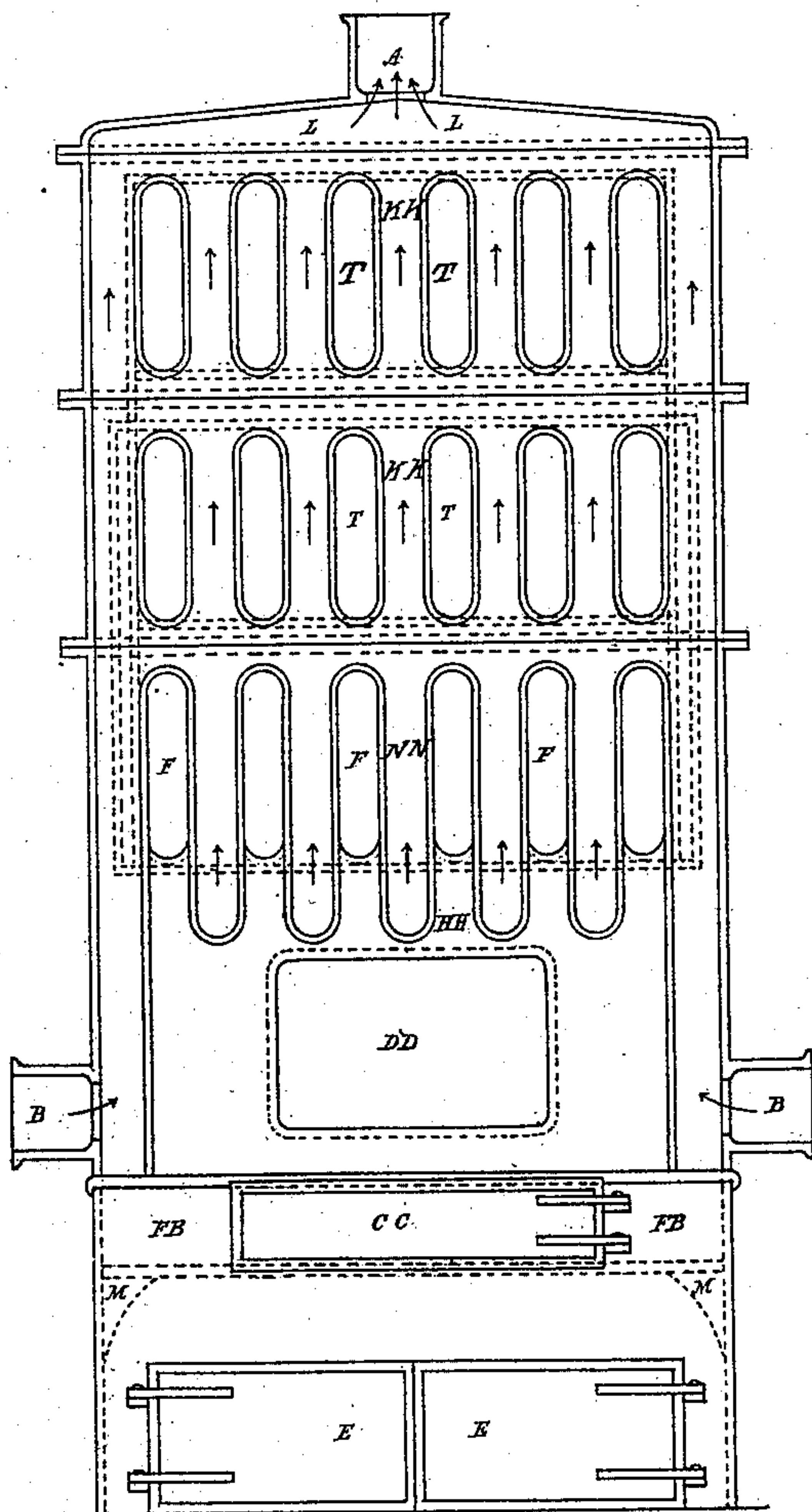
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Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM A. WHITE, OF STAATSBURG, NEW YORK.

WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 402,499, dated April 30, 1889.

Application filed October 24, 1888. Serial No. 289,033. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. WHITE, a citizen of the United States, residing at Staatsburg, in the county of Dutchess and State of New York, have invented certain new and useful Improvements in Hot-Water Heaters or Low-Pressure Steam-Heaters; 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 sectional hot-water heaters or low-pressure steam-boilers in which the arch or crown-sheet of the fire-box is formed by deep water-cells, running lengthwise of the boiler from the fire-door to the back of the fire-box, and in which the smoke-flues are placed at the back of the boiler through the water-space and near the top of the deep water-cells, the draft being thence carried along by the surfaces of all the water-cells; and the objects of my improvements are, first, to obtain a larger direct heating-surface by means of the deep water-cells forming the arch or crown of the fire-box; second, to facilitate the rapid and free circulation of the heated water by having each water-way between the flues a direct vertical open course from the bottom to the top, including all the sections of the boiler; third, to create the strongest possible draft and at the same time to utilize the greatest amount of heat by having the smoke-flues lead from the center and near the top of the deep water-cells, and so carry the heated gases between all the water-cells all the way to the top of the boiler, as shown by the arrows in Fig. 1 of the drawings, and, fourth, to unite these advantages of great heating-surface, rapid circulation, and strong draft with the convenience of a sectional boiler which allows for free contraction and expansion of each section and permits a ready change in the height of the boiler to suit requirements. I attain these objects by the device illustrated in the accompanying drawings, in which—

Figure 1 is a side cross-section of my sectional hot-water heater in position, showing the smoke-flues, &c., and Fig. 2 is a front cross-section of the same, better showing the water-cells, and also showing the bottom of

flues F F closed, as they lead into and through the water-space at the back of the fire-box.

Similar letters refer to similar parts throughout the views.

A A represent the hubs for the discharge of the hot water at the top of the boiler; B B, the hubs for the return of the water to the bottom of the boiler.

C C represent the clinker-door; D D, the opening for the fire-door in the fire-section of the boiler.

E E are the double doors of the ash-pit.

F F are the short flues which carry the smoke and heated gases from the fire-box in the fire-section to the water-back G, which acts as a smoke-bonnet, thence through the smoke-flues T T of the upper sections, between all the water-cells in the direction of the arrows in Fig. 1.

F B are the fire-bricks running around the boiler-walls on each side to the clinker-doors.

H H are the deep water-cells forming the arch or crown-sheet of the fire-section of the boiler, the arrows between these cells in Fig. 2 indicating the direction of the circulation of the heated water through the clear vertical water-ways from the bottom to the top of the boiler.

K K represent the upper water-cells of the boiler.

L L represent the top cover or section of the boiler.

N N show the water-cells forming the crown-sheet or arch of the fire-box.

M represents brackets to carry the shelf on which the fire-brick rests, forming a line around the grate-bars.

T T represent the flues of the upper section.

B Y represent the flue connecting with smoke-pipe O.

Y Y are the pipe-connections for the water-back G, and W W represent the smoke-bonnet, the door of which, where the dotted lines appear in Fig. 1, is removable by loosening four small buttons for the purpose of cleaning the flues.

The draft to increase combustion is regulated by opening or shutting the ash-pit doors E E, and also by a damper, P, which is in the pipe O above the flue.

It will readily be seen that my hot-water heater, as above described, obviates the wasteful effect of the unnatural arrangement of most boilers in which the heated water has no free, continuous, vertical passage to the top of the boiler, such as I furnish. Any interference with direct perpendicular circulation must necessarily cause a waste of heat and a diminished return from fuel. It will also be noted that I save in the quantity of fuel necessary to produce a given amount of hot water of a required temperature by providing so much larger a surface for the contact of heat with the water-cells than is possible in boilers which have not such deep water-cells forming the crown or arch of the fire-box, and which do not convey, as mine does, the smoke and heated gases directly past the water-cell surfaces all the way to the top of the boiler. Fuel is likewise saved and the danger of cracking the iron of the furnace obviated by a damper in the flue, (shown at P,) which, in connection with the draft at the ash-pit door, serves to regulate the fire without the introduction of cold air above the flame. These advantages serve to make my boiler the most economical and most powerful heater known for hot-water and low-pressure steam heating. With these advantages of economy I unite the advantages of convenience derived from the boiler being constructed in sections, which allow for expansion and contraction and for ready adaptation to all kinds of stoke-holes, deep or shallow. Each section has flanges which can be packed and bolted together.

The boiler may be made of either cast or wrought iron and the water-cells can be cast.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a sectional hot-water heater or low-pressure steam-boiler, a flue or flues passing separately from between and near the top of the water-cells and extending by means of outside smoke-bonnets through between the water-spaces in each upper section to give a direct draft along the surfaces of the upper-

section water-cells, as and for the purpose described.

2. A sectional hot-water heater or low-pressure steam-boiler having the water-cells in all the upper sections, K K, directly above the deep water-cells H H, which form the crown-sheet of the fire-box, thus giving a clear open water-space vertically from the arch of the fire-box through and to the top of the boiler, including all the sections, for the purpose of facilitating rapid circulation of the heated water, substantially as described.

3. A sectional hot-water heater or low-pressure steam-boiler constructed with continuous separate flues T T between the water-cells and running lengthwise of each of the upper sections and connected by outside smoke-bonnets to make a continuous draft, as and for the purpose described.

4. In a hot-water heater or low-pressure steam-boiler, the combination of the deep water-cells forming the top of the fire-box with the short smoke-flues F F, passing only from the back of the fire-box through the water-leg to the outside continuous flue or smoke-bonnet, substantially as described.

5. In a sectional hot-water heater or low-pressure steam-boiler, the combination of the water-cells H H, forming the arch of the fire-box, the short flues F F, leading to the smoke-bonnet, the flues T T, and the smoke-bonnet W W, all for the purpose of securing economical combustion, as described.

6. A sectional hot-water heater or low-pressure steam-boiler consisting of a fire-box having an arch formed by deep water-cells H H, the short flues F F, and the flues of the upper sections, T T, smoke-bonnet W W, and the water-hubs A A and B B, all substantially as and for the purpose described.

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

WILLIAM A. WHITE.

Witnesses:

SILAS WODELL,
IRVING ELTING.