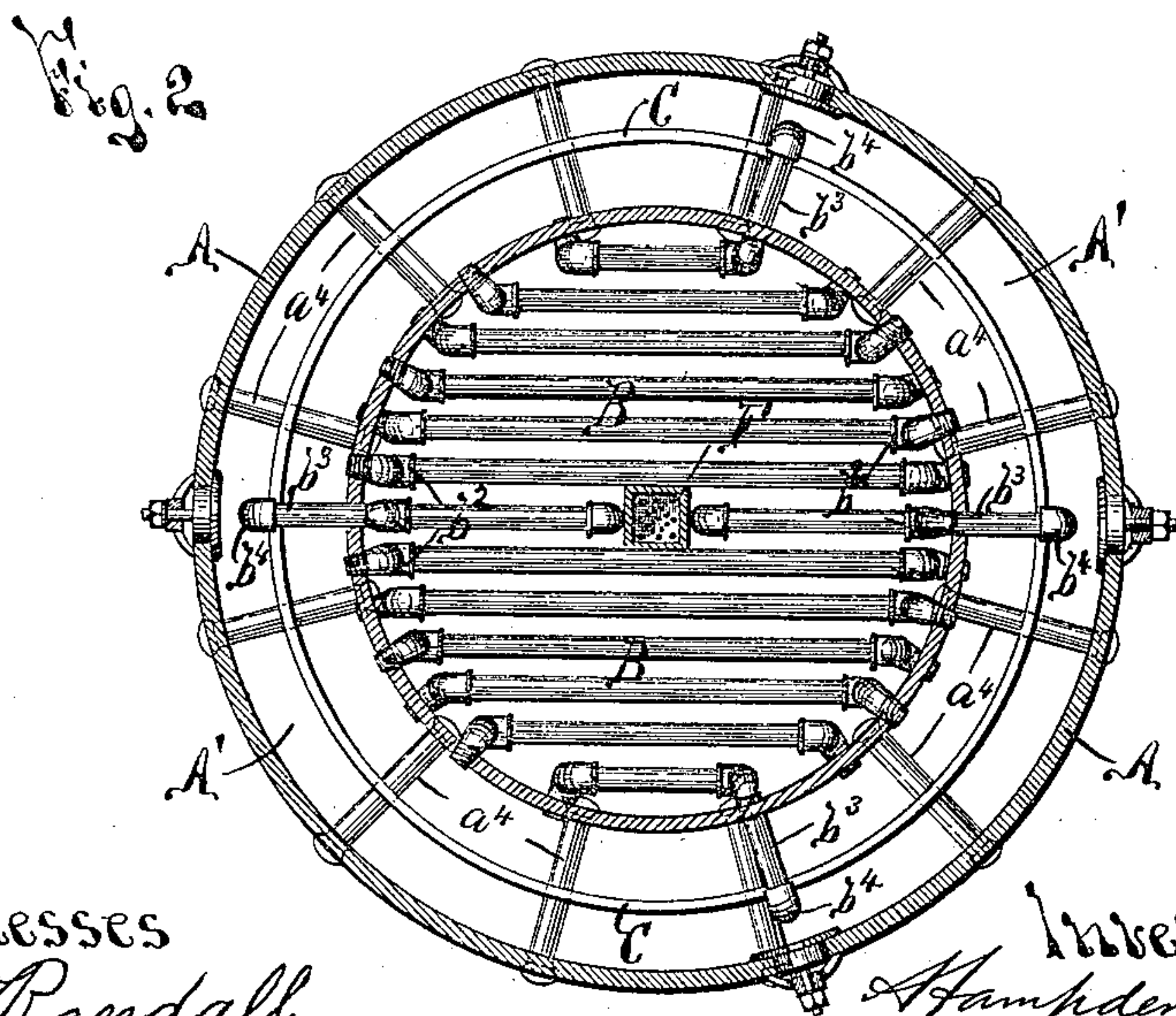
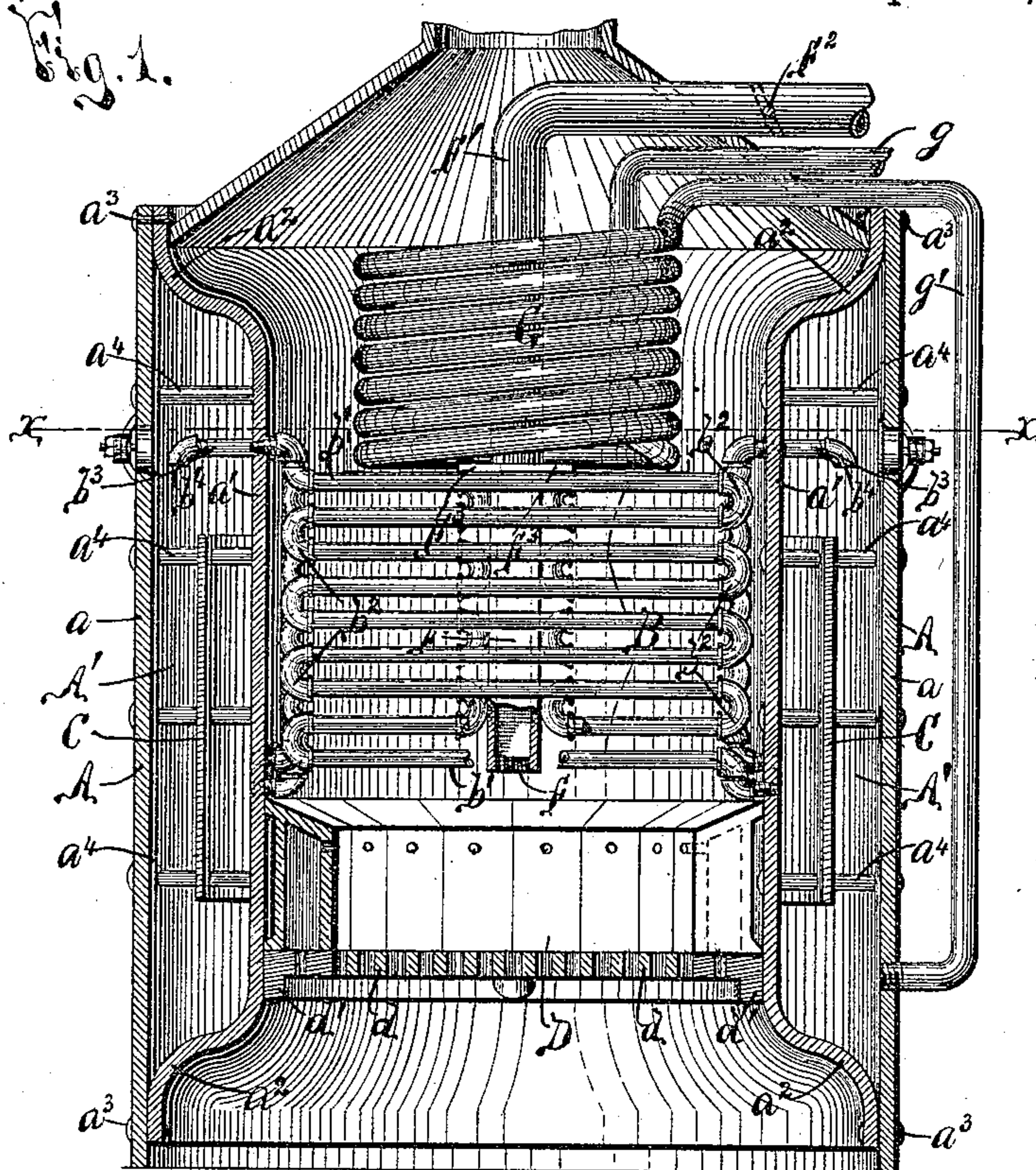


(No Model.)

H. HYDE.  
HEATER.

No. 451,245.

Patented Apr. 28, 1891.



Witnesses  
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# UNITED STATES PATENT OFFICE.

HAMPDEN HYDE, OF ROCHESTER, NEW YORK.

## HEATER.

SPECIFICATION forming part of Letters Patent No. 451,245, dated April 28, 1891.

Application filed May 21, 1890. Serial No. 352,594. (No model.)

*To all whom it may concern:*

Be it known that I, HAMPDEN HYDE, of Rochester, in the county of Monroe, and State of New York, have invented new and useful  
5 Improvements in Heaters, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to an improved heater,  
10 and has for its object the production of a simple, effective, strong, and durable construction which produces a maximum amount of heat from a minimum amount of fuel; and to this end my invention consists, essentially, in  
15 a hollow water-containing shell, pipes projecting from the inner surface of said shell, and a combustion-box beneath the said pipes, whereby the products of combustion circulate around the separate pipes in their upward  
20 passage and impart their heat thereto for heating the water.

The invention also consists in a central chamber having an exit-opening for discharging air over the top of the combustion-box  
25 and an inlet-opening for receiving air from the outside.

The invention furthermore consists in a partition within the hollow shell for separating the up and down circulatory currents, in  
30 a feed-water heater mounted upon the inwardly-projecting pipes, and in the detail construction and arrangement of the parts, all as hereinafter more particularly described, and pointed out in the claims.

35 In describing this invention reference is had to the accompanying drawings, forming a part thereof, in which like letters indicate corresponding parts in all the views.

40 Figure 1 represents a longitudinal vertical section of my improved invention, illustrating the relative construction and arrangement of its preferred form. Fig. 2 is a horizontal sectional view taken on line  $xx$ , Fig. 1.

45 The outer or inclosing shell A of my invention is of desirable form, size, and construction, and is provided with a cavity A' of suitable size to contain the desired amount of water. As preferably constructed, this shell A is formed of the separate plates  $a$  and  $a'$ , of  
50 suitable material to afford the desired strength and rigidity. The inner plate  $a'$  is preferably as thin as the requirement of strength will

allow, in order to afford a minimum resistance to the absorption of the heat by the water, and is formed with its opposite extremities  $a^2$  55 bent outwardly toward the outer shell  $a$  and secured at said extremities by suitable rivets or other securing means  $a^3$ .

In order to provide additional strength and rigidity to the plates  $a$  and  $a'$ , I use stay-bolts 60 or rivets A<sup>4</sup>, of suitable size and number, arranged at desirable intervals around the periphery or body of my improved boiler.

Projecting from the inner surface of the shell A are the heating-pipes B, preferably 65 arranged parallel with each other and extending transversely across the boiler. As best seen in Fig. 2, by this arrangement of the pipes they are caused to be of unequal length, with the longer ones near the center of the 70 heater.

As best seen in Fig. 1, the pipes B are formed of a series of small lengths  $b'$ , arranged with the upper and lower sections entering the plate  $a'$  and the intervening sections joined thereto 75 and to each other by elbows  $b^2$ , being thereby formed into a series of U-shaped bends arranged edgewise in substantially horizontal planes, one above the other. If desired, however, these pipes may be formed of a continu- 80 ous piece bent into the illustrated or any other suitable form. As preferably constructed, these pipes B, with the exception of the coupling connecting their extremities to the hollow shell, are disposed vertically with 85 their opposite extremities one above the other and with their loops within the vertical plane of the next adjacent pipes.

As seen in the drawings, a suitable number of the pipes B are formed with their extremities  $b^3$  projecting beyond the outer face of the 90 shell  $a'$  and provided with the downturned ends  $b^4$  for discharging the heated water at a point in proximity to the outer shell  $a$ , whereby the circulation is greatly aided and acceler- 95 ated.

In order to further aid the circulation within the hollow shell A and prevent the friction of the upward and downward currents, I provide the partition C of suitable size and preferably 100 arranged within the vertical plane of the aforesaid downturned extremities  $b^4$  of the pipes B, and with a considerable space interposed between the edge of said partition and



the adjacent portion of the extremities of the shell  $a'$ .

D represents a suitable combustion-box, having a suitable grate  $d$ .

5 As seen in the drawings, the pipes B project above the combustion-box D, and as the said pipes are of great number the upwardly-ascending products of combustion are subdivided into minute currents, which circulate  
10 around and between the several pipes, thus affording great heating-surface and enabling the temperature of the heated water to be quickly raised and at a minimum cost of expense for fuel.

15 In order to further increase the efficiency of my heater and reduce to a minimum the required amount of fuel, I provide the upper chamber F, having at its lower extremity an exit  $f$ , discharging over the combustion-box,  
20 and at its upper extremity an inlet-pipe  $f'$ , leading from the outside air. It will thus be seen that outside air is drawn to the interior of the heater and discharged directly over the combustion-box, thereby effecting perfect  
25 combustion, and provided in said inlet-pipe  $f'$  is a damper  $f^2$ , the position of which may be varied at will for regulating the amount of the incoming air and governing the combustion. In order to produce the inward suction  
30 of the air, it will be understood that the draft through the chimney preponderates over the draft through the pipe  $f'$ , and thus prevents outward passage of the products of combustion through said pipe  $f'$ . It will, however,  
35 be understood that when starting the combustion in the heater it is advisable to shut the damper  $f^2$  until vigorous combustion takes place or otherwise the air must be artificially drawn inward through the pipe  $f'$ .  
40 In order to support this chamber F, I prefer to provide the same with a shoulder  $f^3$ , which rests upon the pipes B.

Supported in the upper part of my heater and preferably upon the pipes B is the feed-  
45 water heater G, of suitable form, size, and construction, and here shown as a coil of pipe having the inlet-pipe  $g$  and the outlet-pipe  $g'$ , discharging at a suitable position into the base of the heater.

50 Upon reference to the drawings and the foregoing description it will be understood that my invention is very simple in construction and operation, that the same may be readily repaired, that a maximum amount of heating-surface is afforded, and a minimum  
55 amount of fuel required.

I am aware of the Patent No. 111,298 of January 31, 1871, to Ahrens and Kamman, in which a heater is shown having heating-pipes  
60 on its interior with the coils disposed in substantially horizontal instead of vertical planes, and with the coils of one pipe disposed vertically above the coils of the other, whereby they interlap one with the other; but I do  
65 not herein claim such a construction. Indeed, a distinguishing feature of my invention is the fact that the coils, which are disposed

horizontally in substantially parallel planes, extend vertically in substantially the same plane without any interlapping of the coils. 70  
In other words, the coils of one pipe are between the vertical plane of the next adjacent pipes. By this peculiar construction of heater a very rapid circulation of the water within the water-containing shell and projecting vertically-disposed pipes formed by  
75 U-shaped coils is effected, which greatly enhances the efficiency of the heater. I am aware that in steam-heaters coiled pipes have been connected at one extremity to a distributor and at the other to a steam-drum, and that in hot-water heaters a single spiral  
80 coil has been mounted within an outer water-containing shell with its opposite extremities connected thereto; but I do not herein wish to claim such a construction. It will be understood, however, that my invention may be varied from the described form and construction, and hence I do not limit myself to the precise detail, construction, and arrangement  
90 of the parts thereof.

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

1. In a heater, the combination, with a hollow water-containing shell, of a series of substantially vertically-disposed pipes of unequal area, one or more of said pipes having each of its opposite extremities connected to said shell at points one above the other, whereby  
95 a natural quick circulation of the water is effected within the shell and pipe, said pipe being bent into substantially horizontally-disposed U-shaped coils arranged edgewise and mounted in planes one above the other, substantially as and for the purpose set forth. 100

2. In a heater, the combination, with an outer hollow rounding water-containing shell, of three or more substantially vertically-disposed heating-pipes extending in substantially parallel planes from the inner wall of  
110 said shell, one of said pipes being composed of coils extending in substantially horizontal planes one above the other, said coils being disposed between the vertical planes of the next adjacent pipes, substantially as and for the purpose specified. 115

3. In a boiler, the combination, with a hollow rounding water-containing shell, of a series of substantially vertically-disposed heating-pipes projecting in substantially parallel planes from the inner wall of the shell and formed with a series of substantially vertically-arranged loops extending inwardly in  
120 substantially horizontal planes, said loops being disposed in planes one above the other, with the loops of one pipe formed of greater length than the loops of another of said pipes, whereby interlapping of the coils is prevented, substantially as and for the purpose specified. 125

4. In a boiler, the combination, with a hollow shell, of two or more substantially vertically-disposed heating-pipes, each having its extremities one above the other and connected  
130



to said hollow shell; and having the central portion thereof bent into a series of substantially vertically-disposed loops, one above the other, extending in substantially a horizontal plane, whereby interlapping of the loops is prevented, said loops of one of said pipes being of greater length than the loops of the other, substantially as and for the purpose set forth.

10 5. In a boiler, the combination, with a hollow inclosing water-containing shell, of a pair of oppositely-arranged pipes projecting from the inner wall of the shell and formed with a series of loops extending inwardly with a  
15 space between the adjacent free extremities of said loops, said loops being disposed horizontally in substantially parallel planes and vertically in substantially the same plane, whereby interlapping of the coils is prevented,  
20 and in planes one above the other, substantially as and for the purpose specified.

6. In a heater, the combination of a hollow water-containing shell, a partition within said shell for aiding the circulation, and a pipe  
25 projecting from the interior of said shell and arranged with one extremity opening from one side of said partition and the other projecting within the hollow shell toward its opposite wall to a point on the other side of said  
30 partition, substantially as and for the purpose set forth.

7. In a heater, the combination of a hollow water-containing shell, a partition within said shell for aiding the circulation, a pipe pro-  
35 jecting from the interior of said shell and arranged with one extremity opening from one side of said partition and the other project-

ing within the hollow shell toward the opposite wall to a point on the other side of said partition, and other pipes of unequal length  
40 projecting laterally from the interior of said shell, substantially as and for the purpose specified.

8. In a heater, the combination of a hollow water-containing shell, pipes projecting later-  
45 ally from the inner surface of said shell, a combustion-box below said projecting pipes, a central chamber having an exit discharging into the combustion-box, an inlet for receiving outside air, and a shoulder provided  
50 on said central chamber and adapted to rest upon the extremity of the adjacent laterally-projecting pipes, substantially as and for the purpose specified.

9. In a boiler, the combination, with a hol-  
55 low shell, of two or more heating-pipes having their extremities one above the other and connected to said hollow shell and having the central portion thereof bent into a series of  
60 loops, one above the other, extending in substantially a horizontal plane, with the loops of one of said pipes of greater length than the loops of the other, and a feed-water heater supported on said pipes, substantially as and  
65 for the purpose set forth.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Rochester, in the county of Monroe, in the State of New York, this 2d day of May, 1890.

HAMPDEN HYDE.

Witnesses:

CHARLES E. TOMLINSON,  
ALBERT E. LYKE.