

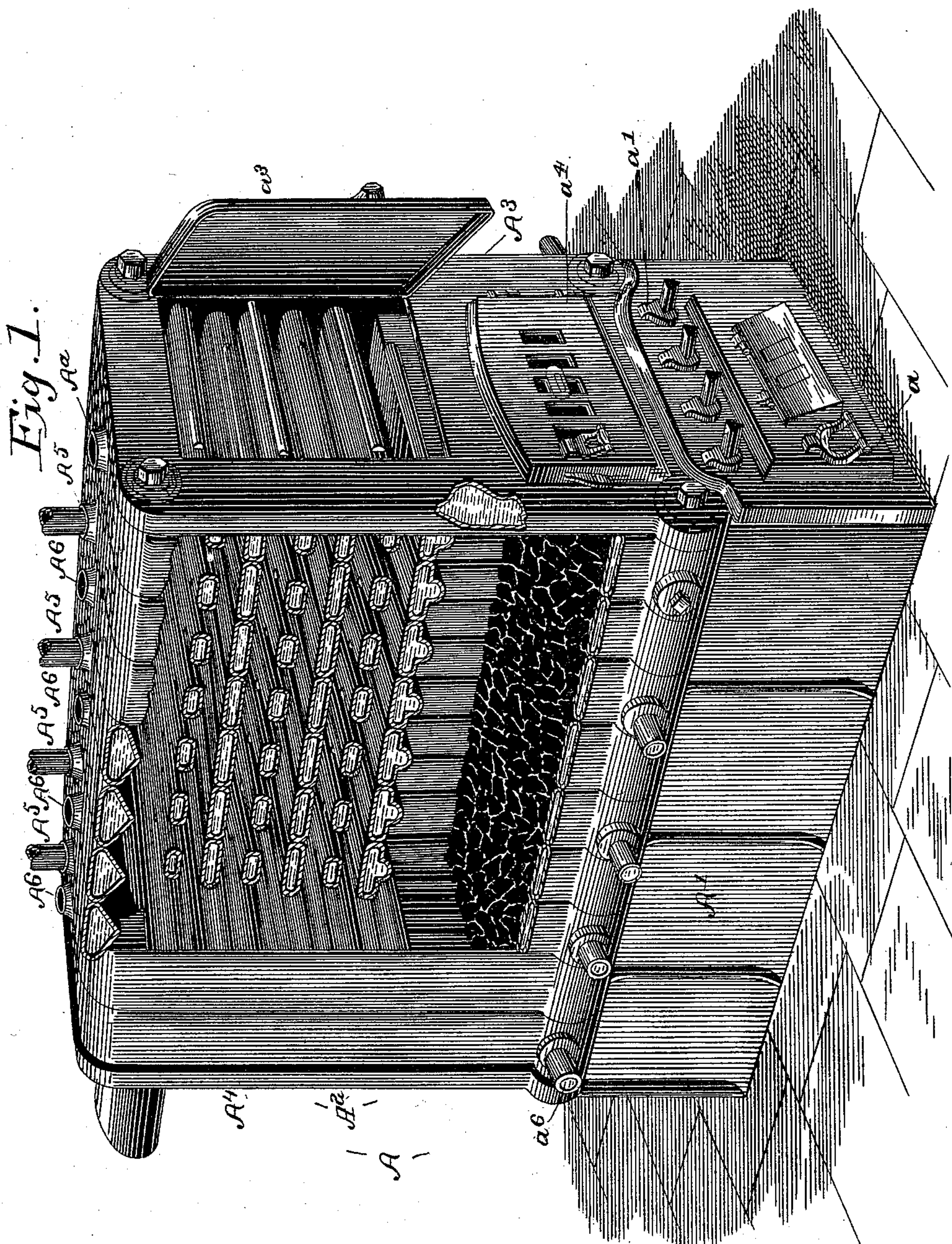
(No Model.)

3 Sheets—Sheet 1.

N. A. BOYNTON.  
WATER HEATING APPARATUS.

No. 408,455.

Patented Aug. 6, 1889.



Witnesses:  
Arthur Ashley  
James F. Duhamel

Inventor  
Nathaniel A. Boynton  
per *J. H. Ashley* Atty.



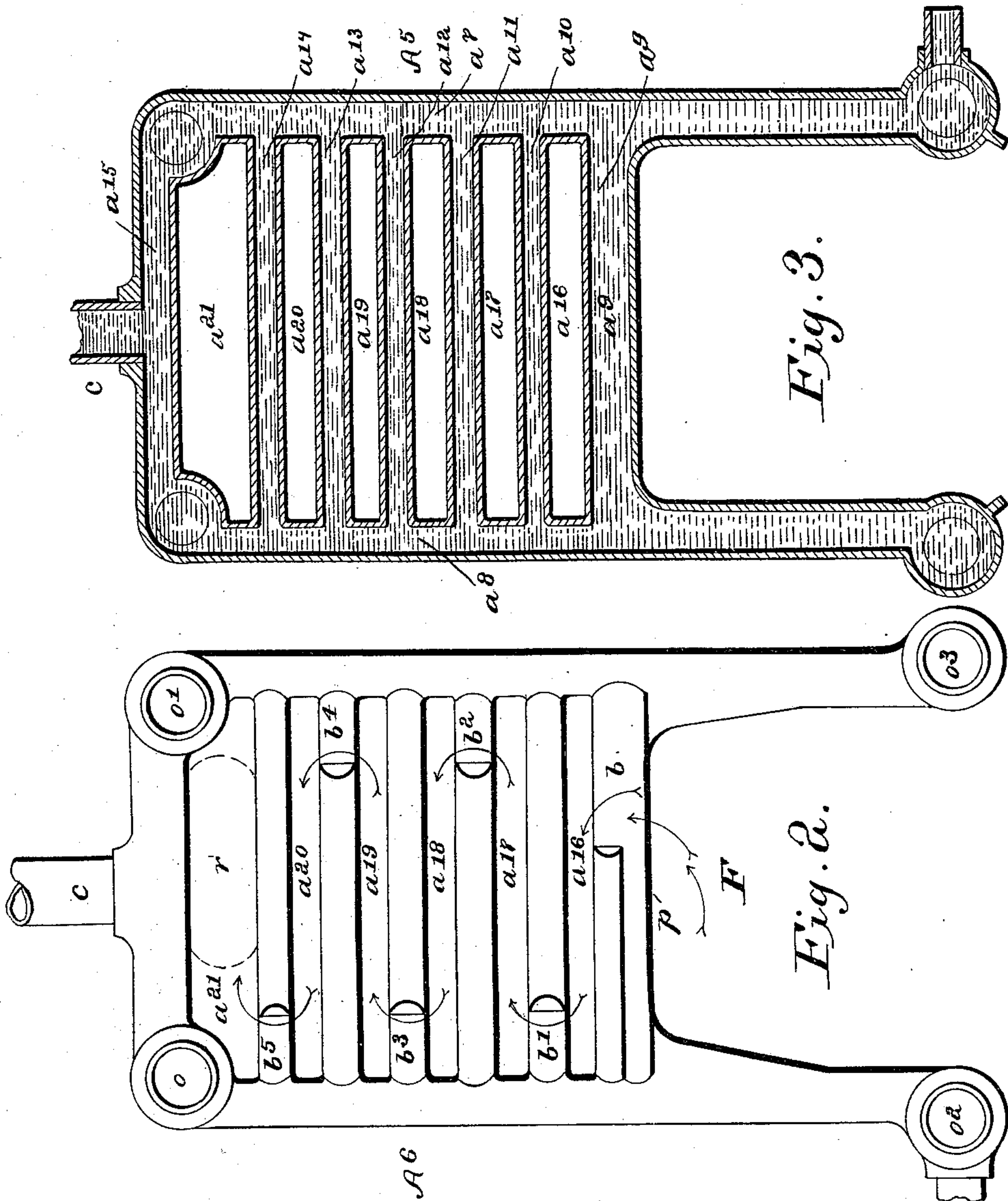
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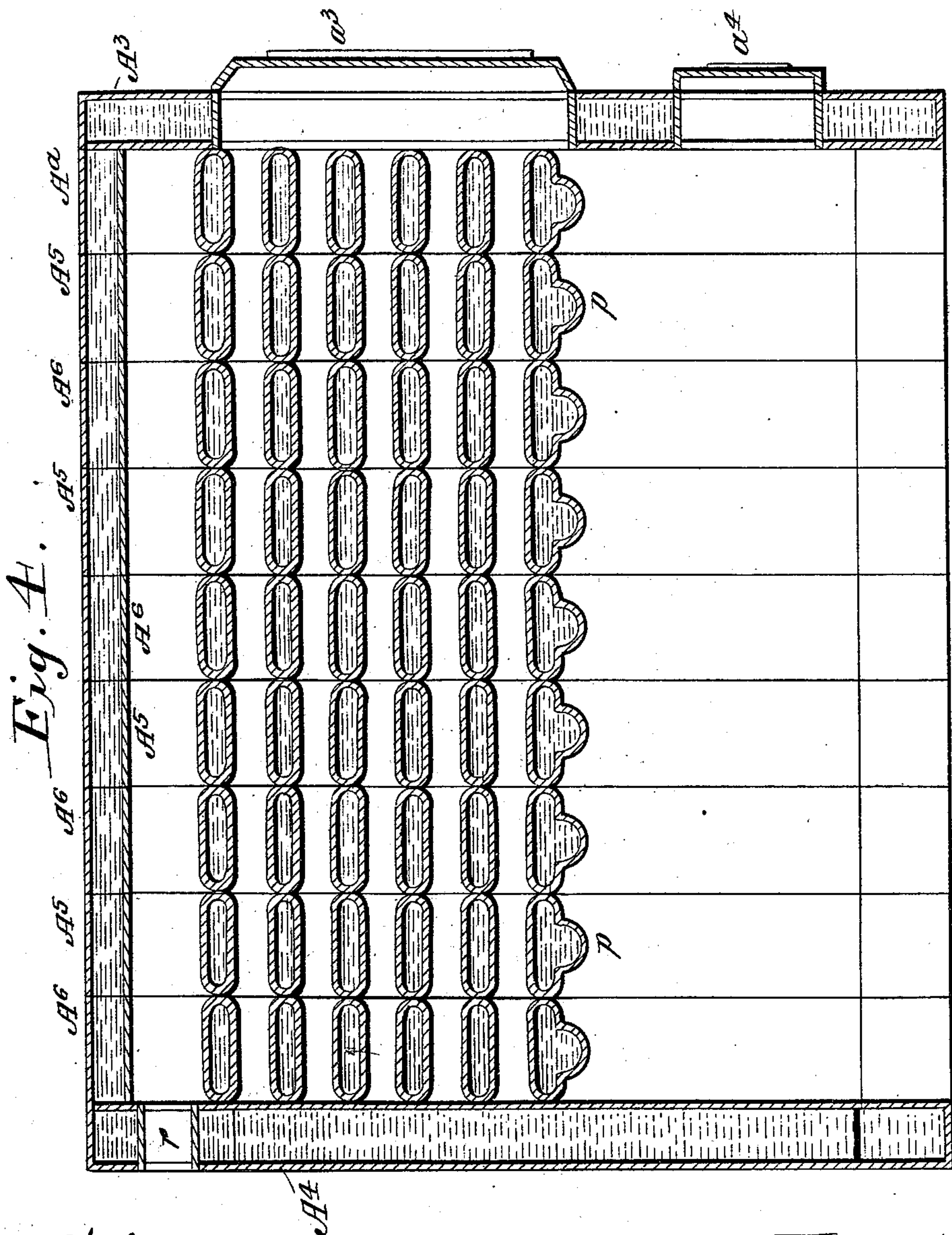
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Atty.



# UNITED STATES PATENT OFFICE.

NATHANIEL A. BOYNTON, OF NEW YORK, N. Y., ASSIGNOR TO THE BOYNTON FURNACE COMPANY, OF SAME PLACE.

## WATER-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 408,455, dated August 6, 1889.

Application filed June 15, 1889. Serial No. 314,496. (No model.)

*To all whom it may concern:*

Be it known that I, NATHANIEL A. BOYNTON, a citizen of the United States, residing in the city of New York, in the county of New York, in the State of New York, have invented a new and useful Hot-Water Heating Apparatus, of which the following is a description.

The invention relates in general to that class of heating apparatus in which a body of water introduced from any convenient source is warmed and the heat circulated throughout a series of pipes which extend through the several apartments of the dwelling or other structure in which the heater is placed.

The invention relates particularly to a heating apparatus which is composed essentially of a series of chambered water-sections, each of which is adapted to receive and to discharge water, and each of which constitutes a portion of the fuel-chamber and of the smoke-flue surfaces of such apparatus.

The invention consists in various novel parts and in various novel combinations of parts in an apparatus for heating by hot water, as will be hereinafter described and claimed.

In the drawings, Figure 1 represents a perspective elevation of my hot-water heating apparatus, portions being broken out to show the interior, and portions of some of the water-sections being shown in section. Fig. 2 represents an elevation of one of the intermediate transverse water-sections. Fig. 3 represents a vertical central section of one of the intermediate transverse water-sections. Fig. 4 represents a longitudinal central section through the water-sections, the base or supporting section being omitted from the view.

The base or supporting section A' of the heater A (here shown as of iron) may be of any suitable material and will be of form and dimensions to receive the assembled water-sections. The superstructure or water-heater proper A<sup>2</sup> is composed of a front closing-section A<sup>3</sup>, a rear closing-section A<sup>4</sup>, an intermediate section A<sup>5</sup>, intermediate sections A<sup>5</sup> A<sup>5</sup>, and intermediate sections A<sup>6</sup> A<sup>6</sup> A<sup>6</sup> A<sup>6</sup>, arranged in alternation, as shown. The base A' has at the front a hinge-door a, which affords access to the ash-pit within such

base, and it has locking appliances a' for the ends of the grate-bars or grate-sections, which may be of any approved construction. The front section A<sup>3</sup> of the series of water-sections is provided in its rear surface at its upper and lower and right and left extremities with an opening for the passage of water, and it is provided, also, with openings and corresponding doors a<sup>3</sup> a<sup>4</sup> for access, respectively, to the smoke-flues and fuel-chamber of the apparatus. The intermediate sections are substantially similar in construction, the sections A<sup>5</sup> and A<sup>6</sup> being precisely alike, except that in the former the inflow or return pipes a<sup>5</sup> are attached at the right, while in the latter the corresponding pipes a<sup>6</sup> are attached at the left of the apparatus. As most clearly seen in Fig. 3, each intermediate section has a right vertical water-passage a<sup>7</sup>, a left vertical water-passage a<sup>8</sup>, transverse horizontal water-passages a<sup>9</sup> a<sup>10</sup> a<sup>11</sup> a<sup>12</sup> a<sup>13</sup> a<sup>14</sup> a<sup>15</sup>, which connect the right and left vertical water-passages, and horizontal longitudinal smoke-passages a<sup>16</sup> a<sup>17</sup> a<sup>18</sup> a<sup>19</sup> a<sup>20</sup> a<sup>21</sup>, which receive smoke, respectively, through vertical smoke-passages b b' b<sup>2</sup> b<sup>3</sup> b<sup>4</sup> b<sup>5</sup>. These vertical smoke-passages are produced through the coincidence of two half-flues, which are formed by the indrawing at alternate sides of the sections of the walls of the transverse horizontal water-passages a<sup>9</sup> a<sup>10</sup> a<sup>11</sup>, &c., as seen in Figs. 1 and 2, and substantially after the manner shown and described in an application for patent filed by me in the United States Patent Office on the 13th day of April, 1889, and serially numbered 307,096. The rear closing-section A<sup>4</sup>, like the front closing-section A<sup>3</sup>, has openings at top and bottom in its inner face communicating with the coincident longitudinal passages o, o', o<sup>2</sup>, and o<sup>3</sup>, formed in the intermediate water-sections. Through the top and bottom longitudinal water-passages extend the holding-rods h, by which, as in my former application above referred to, the series of water-sections are securely clamped together, any suitable packing being employed to render the joints watertight.

As will be understood, the forked arrows in the drawings indicate the course of the products of combustion, while the unfeathered



arrows indicate the flow of water from the inlet or return pipes to the outflow-pipes  $c$   $c'$   $c^2$ , &c., at the center of the transverse upper water-passages  $a^{15}$ .

5 It will be noted that while the flattened and rounded transverse water-passages  $a^{10}$ ,  $a^{11}$ ,  $a^{12}$ ,  $a^{13}$ , and  $a^{14}$  are plain above and below the lowermost transverse water-passage  $a^9$ , while flat as to its top surface, is provided centrally  
10 with a longitudinal bottom protuberance or corrugation  $p$ , the series of protuberances constituting, as it were, a corrugated fire-surface, which is well adapted to receive and utilize the heat contained in the escaping volatile  
15 products of combustion. In an analogous manner the water-passages  $a^{15}$  at the top are downwardly tapered or indrawn to form a similarly-corrugated surface, which is calculated to arrest and retard the products of com-  
20 bustion in the smoke-passage  $a^{21}$ , wherein they are given a wave-like or whirling motion as they pass from section to section, until they at length find their exit through the rear opening  $r$ .

25 It will be observed that no portion of the volatile products of combustion ascending from the fuel-chamber  $F$  can escape from the heater until it has passed six times across the interior of the same, from side to side, and  
30 that in addition the greater portion of such products will traverse the entire length of the heater. It will be observed, also, that the currents of water flow side by side with the heat-currents, and in the same direction, from  
35 the point of their admission to the point of their discharge. This intimate union of the two currents is found most advantageous in effecting thorough utilization of the heat evolved from the incandescent fuel.

40 Having thus described my invention, I claim—

1. In a hot-water heating apparatus, a series of transversely-extending water-sections, each of which has vertical water-passages, and horizontal water-passages which connect with the  
45 vertical water-passages and the walls of which are at one extremity indrawn or recessed at either side to form a portion of a vertical smoke-passage, substantially as specified.

2. In a hot-water heating apparatus, a series  
50 of transversely-extending water-sections, each of which has a water-passage which is provided with a horizontal longitudinal bottom protuberance which extends from side to side of the section, and transversely-extending  
55 water-passages which have a plain flat top and bottom surface, each of such transverse passages having lateral walls which at one extremity are recessed or indrawn to form on either side a half-flue for the upward passage  
60 of smoke, substantially as set forth.

3. In a hot-water heating apparatus, a series of transversely-extending water-sections, each of which has vertical water-passages at the sides of the apparatus, a top horizontal trans-  
65 verse water-passage which has a flat top surface and a tapered or V-shaped bottom surface, a series of horizontal transversely-extending water-passages which are flat at top and bottom and which are curved at their  
70 sides, and a horizontal transversely-extending passage which is flattened at its top and which has a longitudinal downwardly-extending protuberance or corrugation which extends from end to end of such passage, sub-  
75 stantially as shown and described.

NATHANIEL A. BOYNTON.

Witnesses:

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A. GILBERT.