

No. 830,984.

PATENTED SEPT. 11, 1906.

T. FIELLY.  
HEATING APPARATUS.  
APPLICATION FILED DEC. 26, 1905.

2 SHEETS—SHEET 1.

Fig. 2.

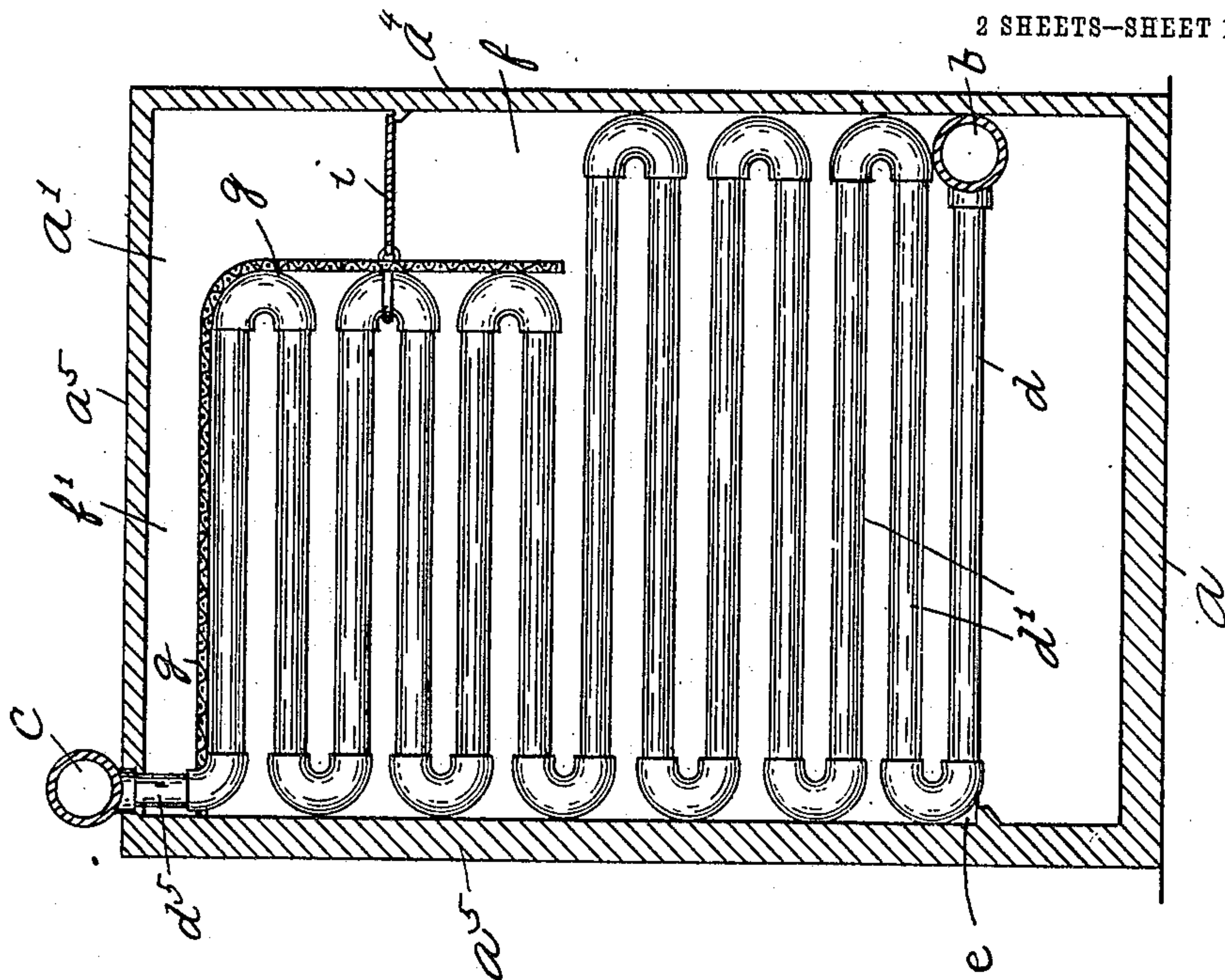
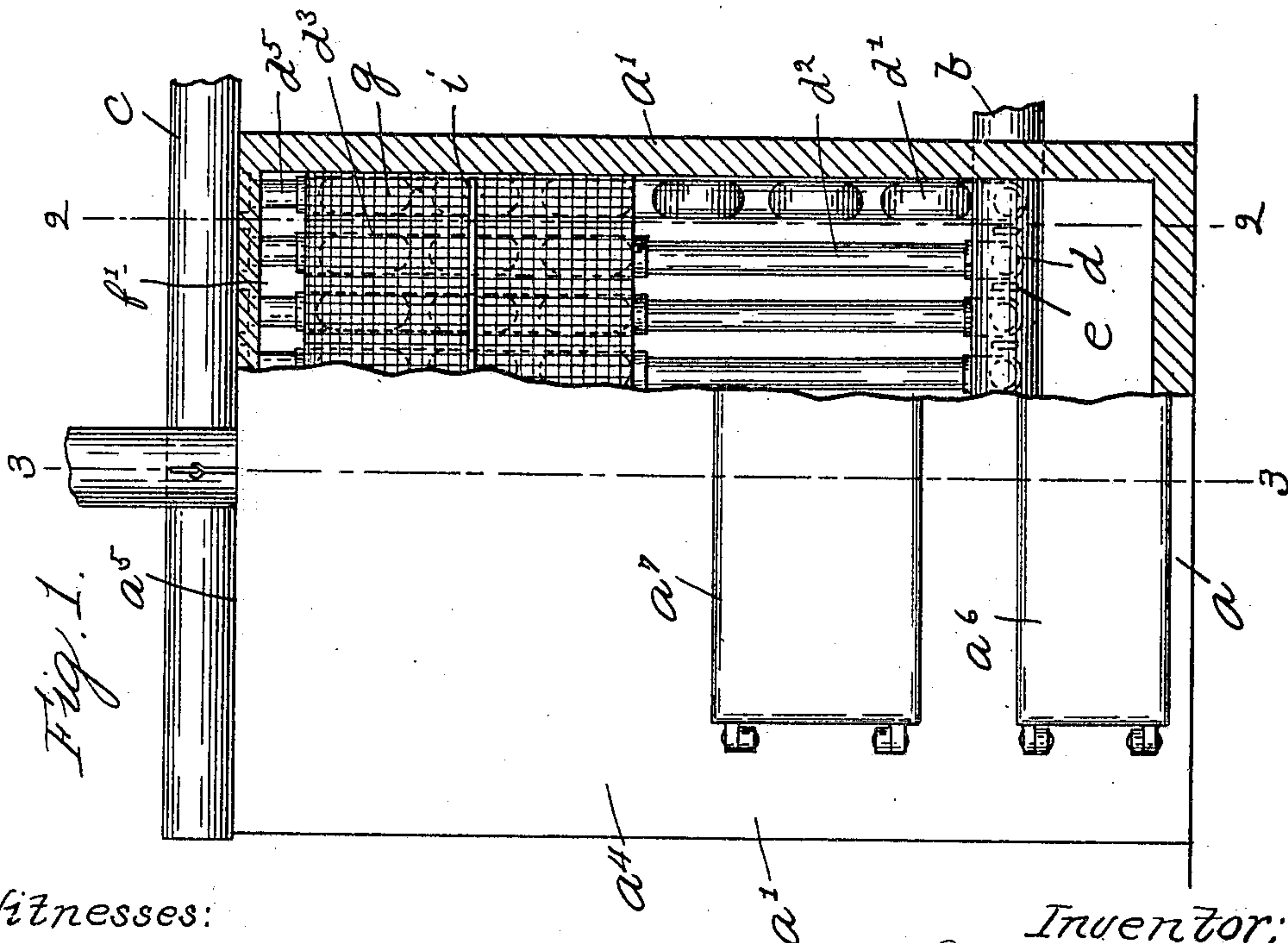


Fig. 1.



Witnesses:

H. B. Davis

Cynthia Doyle.

Inventor:

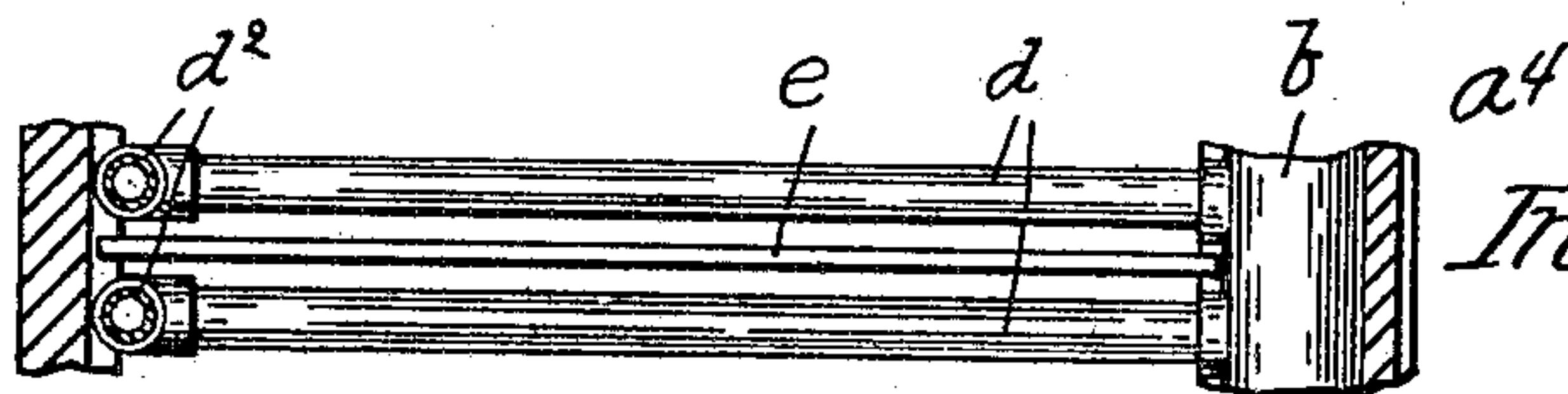
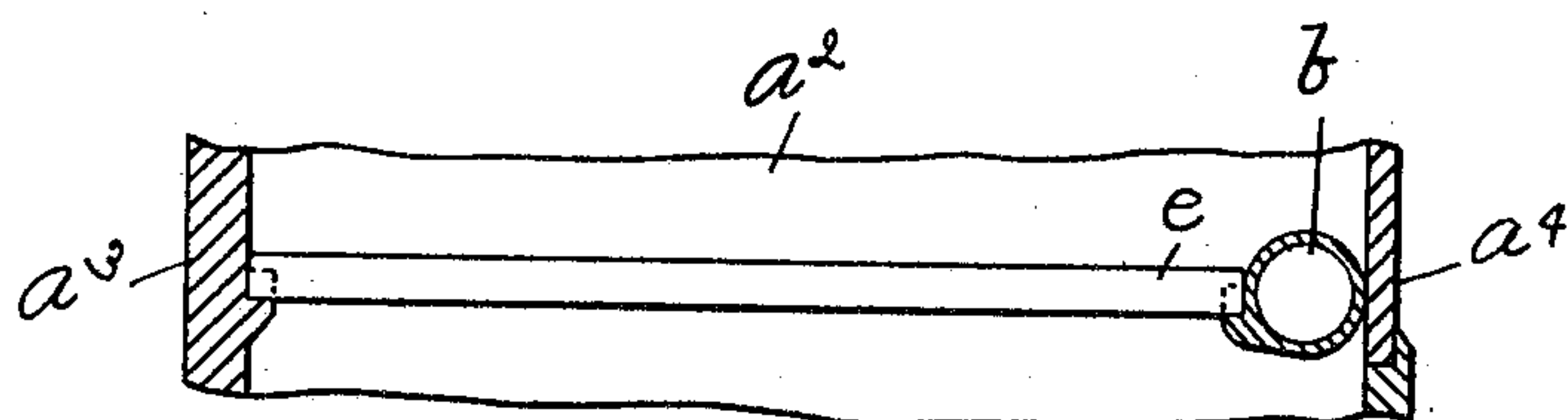
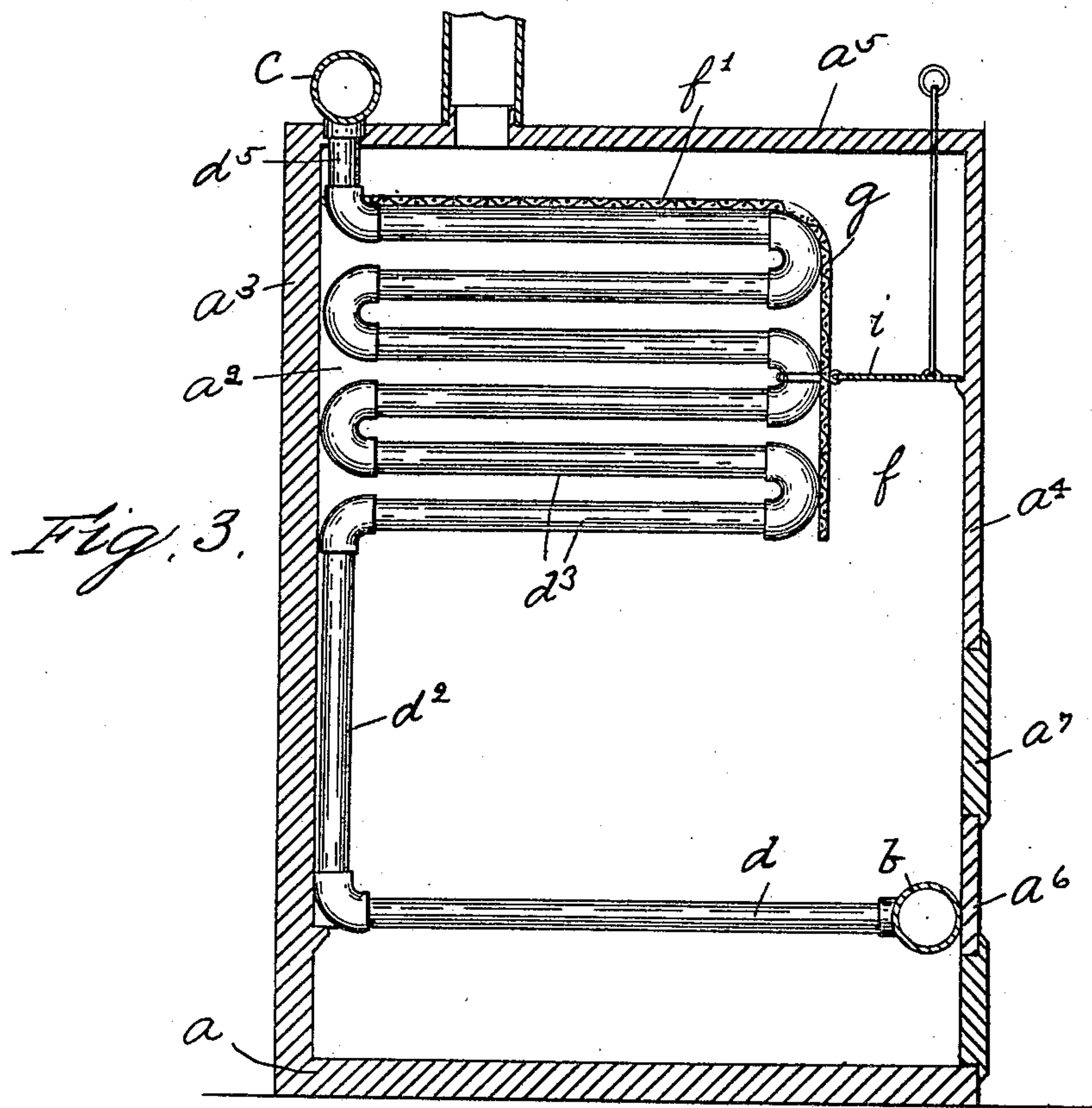
Thomas Fihelly  
by Hayes & Harman,  
Attys

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2 SHEETS—SHEET 2.



Witnesses:  
H. B. Davis.  
Synthia Doyle.

*Inventor:*

Fig. 5. *Thomas Fihelly*  
by *Jay Hammond*.  
Atty



# UNITED STATES PATENT OFFICE.

THOMAS FIELLY, OF ROCKLAND, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO STILLMAN E. WESTGATE, OF BROCKTON, MASSACHUSETTS.

## HEATING APPARATUS.

No. 830,984.

Specification of Letters Patent.

Patented Sept. 11, 1906.

Application filed December 26, 1905. Serial No. 293,171.

*To all whom it may concern:*

Be it known that I, THOMAS FIELLY, of Rockland, county of Plymouth, State of Massachusetts, have invented an Improvement in Heating Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

10 This invention relates to heating apparatuses, either hot water or steam, and has for its object to improve the construction of the same to the end that the water to be heated is contained in water-tubes so constructed as  
15 to present large areas to the action of the products of combustion; also, to provide a plurality of water-tubes which are connected at their upper and lower ends to pipes or reservoirs common to all the water-tubes of the  
20 set, the circulation-pipes being connected to said pipes or reservoirs, and to so construct and arrange the water-tubes that they shall form the fire-pot, and to provide a heating compartment or chamber at the top of the  
25 apparatus which receives the upper end portions of the water-tubes, said portions being thus located directly above the fire-pot and in direct contact with the products of combustion, and, furthermore, to provide a pas-  
30 sage for the products of combustion which extends around the upper ends of the water-tubes and contains a damper.

Figure 1 shows in front elevation and partial section a heating apparatus embodying  
35 this invention. Fig. 2 is a vertical section of the heating apparatus shown in Fig. 1, taken on the dotted line 2 2. Fig. 3 is a vertical section of the heating apparatus shown in Fig. 1, taken on the dotted line 3 3, the side  
40 or endmost water-tube of the set of water-tubes being omitted for the sake of clearness. Fig. 4 is a detail showing in side elevation one of the grate-bars, and Fig. 5 is a detail showing in plan view a portion of the grate.

45 The outer shell or case consists of the base  $a$ , side walls  $a'$   $a^2$ , rear wall  $a^3$ , front wall  $a^4$ , and top wall  $a^5$ . These walls may be made of masonry or cast-iron or any other suitable material, and, so far as my invention is con-  
50 cerned, may be constructed in any suitable manner. The front wall  $a^4$  has the usual ash-pit door  $a^6$  and fire-door  $a^7$ . Within the shell or case a plurality of vertically-disposed water-tubes are arranged in parallelism, being con-

nected at their lower ends to a horizontal 55 pipe or reservoir  $b$  and at their upper ends to a horizontal pipe or reservoir  $c$ , thereby providing a plurality of passages leading from one to the other reservoir. The pipe or reservoir  $b$  is located near the bottom of the 60 shell or case, and, as herein shown, it is located at the front side of the bottom of the fire-pot, although it may be located at the rear side thereof, if desired. The pipe or reservoir  $c$  is located above the top wall  $a^5$  and 65 preferably at or near the rear edge thereof, although it may be located within the shell or case at the top thereof, if desired. The circulation-pipes lead from the pipe or reservoir  $c$  and return to the pipe or reservoir  $b$ , being 70 connected to the opposite ends of said pipes or reservoirs, or at any other suitable or desirable points. There will be as many vertically-arranged water-tubes in the shell or 75 case which connect the two pipes or reservoirs  $b$   $c$  as desired, according to the capacity required, and each water-tube consists of a plurality of pipes connected together by elbows, return-bends, or other equivalent fittings. 80

Each water-tube has a horizontal pipe  $d$  at its lower end, which is connected to the pipe or reservoir  $b$ , and as said pipe or reservoir  $b$  is extended from side to side of the shell or case the horizontal pipes  $d$  of the water-tubes 85 will be extended from the front to the rear thereof, and said horizontal pipes  $d$  in addition to forming a part of the vertically-arranged water-tubes also serve as grate-bars. In practice, however, these horizontal pipes 90  $d$  are not arranged as closely together as is necessary to form the grate, particularly if a low grade of coal is used. Hence grate-bars  $e$  are arranged between said pipes, which are supported at their front and rear ends on 95 ledges or other supports provided for them. Below the grate thus formed the ash-pit is located and above it the fire-pot, and the doors  $a^6$   $a^7$  open respectively thereto. The vertical water-tubes, which are arranged at 100 the opposite sides of the set of water-tubes, being the endmost water-tubes of the set, each consist of a plurality of horizontal pipes connected together at their ends by return-bends and disposed in parallelism, the pipes  $d$ , 105 above referred to, representing the lowermost pipes thereof and the pipes  $d'$  representing the pipes above the pipes  $d$ , and said end-



most water-tubes in addition to serving to conduct the water from the pipe or reservoir *d* to the pipe or reservoir *c* also form the side walls of the fire-pot. The pipes *b* and *b'* are made long enough so that, together with the return-bends which connect them, they will extend from the front wall to the rear wall of the shell or case, or thereabout.

The intermediate water-tubes are constructed differently. They each consist of the lower horizontal pipe *d*, which, as before stated, serves as a grate-bar, and which extends from the pipe or reservoir *b* rearwardly to the rear wall of the shoulder or case, or thereabout, and a vertical pipe *d*<sup>2</sup>, rising from the rear end of said horizontal pipe *d*, which is connected thereto by an elbow-fitting, and a plurality of horizontal pipes *d*<sup>3</sup>, which are connected together by return-bends, the lowermost horizontal pipe *d*<sup>3</sup> being connected by an elbow-fitting with the vertical pipe *d*<sup>2</sup>. The vertical pipes *d*<sup>2</sup> of the several intermediate water-tubes serve as the rear wall of the fire-pot and are made long enough to serve this purpose. Thus it will be seen that the pipes composing the water-tubes are employed to form the bottom and sides of the fire-pot, while above the fire-pot the horizontal pipes of the water-tubes are in direct contact with the products of combustion. The horizontal pipes *d*<sup>3</sup> of the intermediate water-tubes, together with the return-bends by which they are connected, terminate a short distance back of the front wall to thereby form a vertical passage *f*, just back of said front wall, for the products of combustion. The horizontal pipes *b'* of the endmost water-tubes, together with the return-bends by which they are connected, may likewise terminate a short distance back of the front wall, although this is not material.

All of the vertical water-tubes terminate a short distance below the top wall to thereby provide a horizontal passage *f'* for the products of combustion just below said top wall in continuation of the vertical passage *f*, and over the top of the vertical water-tubes and down in front thereof extends a heat-resisting diaphragm *g*, which may be composed of a wire-netting or screen covered with asbestos, either in cement form or otherwise. This heat-resisting diaphragm *g* is located at the bottom and rear side of the passages *f'* and *f* and extends to the rear wall and also to the side walls of the shell or case, and in connection with said rear and side walls forms a heating compartment or chamber at the top of the apparatus in which the upper end portions of the vertical water-tubes are contained, and said tubes being thus confined are subjected to all the direct heat of the products of combustion. Short vertical pipes *d*<sup>5</sup> extend from the upper ends of the vertical water-tubes through the heat-resisting dia-

phragm *g* and passage *f'* and top wall *a*<sup>5</sup> and are connected to the horizontal pipe or reservoir *c*, which is located above the top wall, or in some other convenient location. A flue-pipe *h* leads from the top wall of the apparatus near the rear end thereof, or it may lead from any other part of the passage *f'*. A damper *i* is contained in the passage *f*, which is made as a plate adapted to close or substantially close said passage, and, as herein shown, it is pivoted at its rear edge to the vertical water-tubes so as to be moved up and down to open and close the passage *f*, and a rod *i'* is loosely connected to said plate, which is employed as a means for operating it.

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

1. In a heating apparatus, a shell or case, a heat-resisting diaphragm below the top wall of said shell or case, which extends from side to side thereof, and from the rear wall toward but not to the front wall, and then downward, thereby forming a heating-compartment and a passage for the products of combustion, water-tubes contained in said shell or case, the upper end portions of which are contained in said heating-compartment and a damper contained in said passage for the products of combustion, substantially as described.

2. In a heating apparatus, a shell or case, a plurality of water-tubes constructed and arranged to form a fire-pot at their lower ends and heating-coils at their upper ends, a stationary heat-resisting diaphragm contained within said shell or case extending over the tops of said heating-coils and down at the side thereof to thereby form a heating-compartment above the fire-pot, containing said heating-coils, substantially as described.

3. In a heating apparatus, a shell or case, a plurality of water-tubes constructed and arranged to form a fire-pot at their lower ends and heating-coils at their upper ends, a stationary heat-resisting diaphragm contained within said shell or case extending over the tops of said heating-coils and down at the side thereof to thereby form a heating-compartment above the fire-pot, containing said heating-coils, and also forming a passage for the products of combustion, and a damper contained in said passage, substantially as described.

4. In a heating apparatus, a shell or case, a heat-resisting diaphragm contained therein, forming a compartment at the upper end thereof and a passage for the products of combustion, a plurality of vertically-arranged water-tubes contained in said shell or case, which are connected at their upper and lower ends, respectively, to reservoirs common to all, the upper end portions of said water-tubes being contained in the compartment formed by said diaphragm, a damper contained in the passage for the products of combustion



and a flue-pipe leading from said passage, substantially as described.

5 In a heating apparatus, a shell or case, a heat-resisting diaphragm contained therein which is located a short distance below its top wall and which forms a compartment at the upper end of the shell or case and also a passage for the products of combustion, a plurality of water-tubes contained in said  
10 shell or case, the endmost water-tubes of the set consisting of a plurality of horizontal pipes connected together by return-bends and extending from the bottom of the fire-pot to the top of said compartment, and in-  
15 termediate water-tubes consisting of a horizontal pipe at the bottom, a vertical pipe connected to it, and a plurality of horizontal pipes connected together by return-bends,

and connected to the upper end of said vertical pipe, and extending also to the top of said 20 compartment, a horizontal pipe or reservoir within the shell or case to which the lower ends of all of said water-tubes are connected, and a horizontal pipe or reservoir at the top of the shell or case to which the upper ends of 25 all of said water-tubes are connected, a damper located in the passage for the products of combustion, and a flue-pipe leading from said passage, substantially as described.

In testimony whereof I have signed my 30 name to this specification in the presence of two subscribing witnesses.

THOMAS FIHELLY.

Witnesses:

PATRICK CAPLICE, 2d,  
AMOS A. PHELPS.