

No. 762,591.

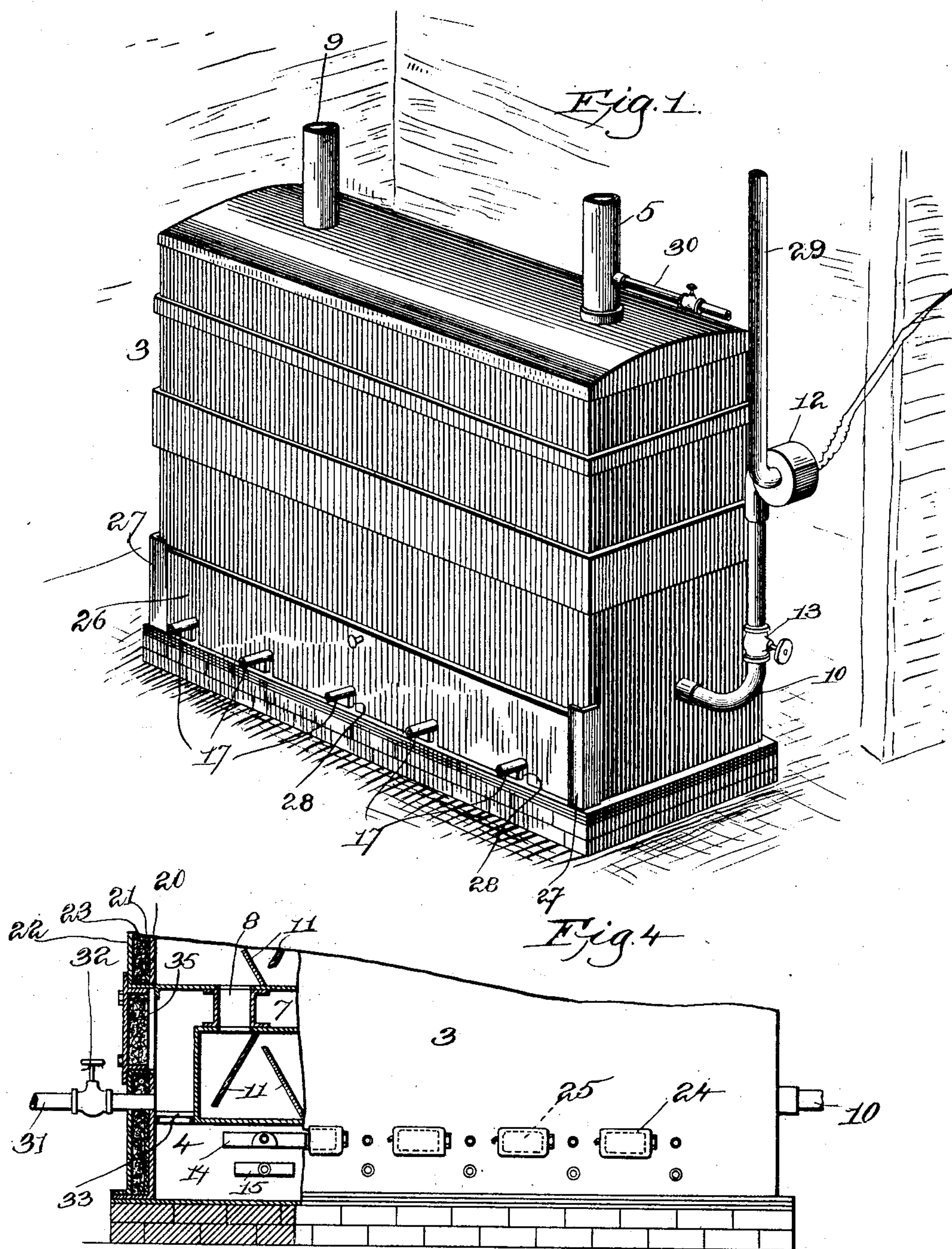
PATENTED JUNE 14, 1904.

R. S. LAWRENCE.
DEVICE FOR HEATING OR COOLING AIR.

APPLICATION FILED AUG. 21, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:
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J. W. Lutton.

Inventor:
Robert S. Lawrence,
by Charles Gregory,
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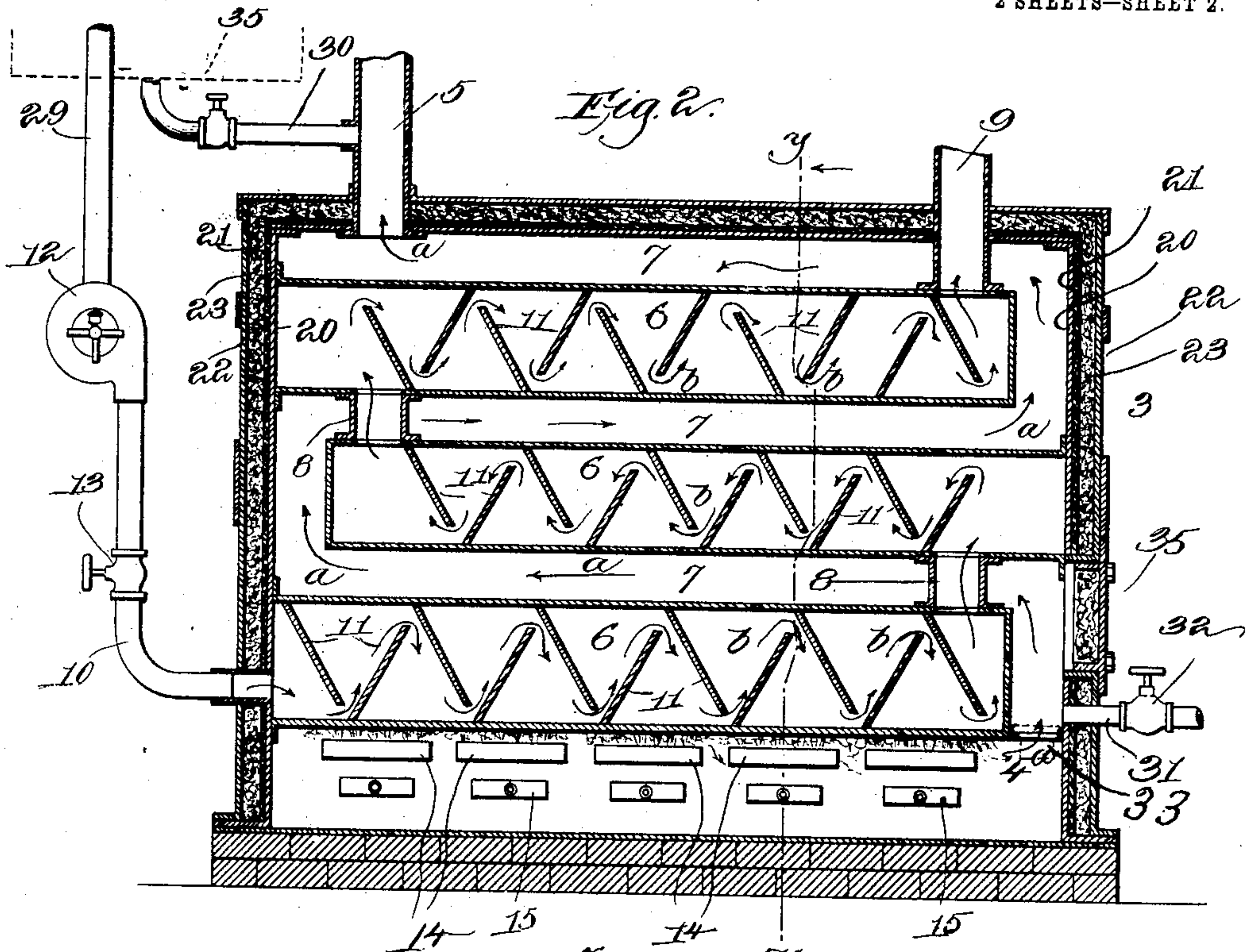


Fig. 3.

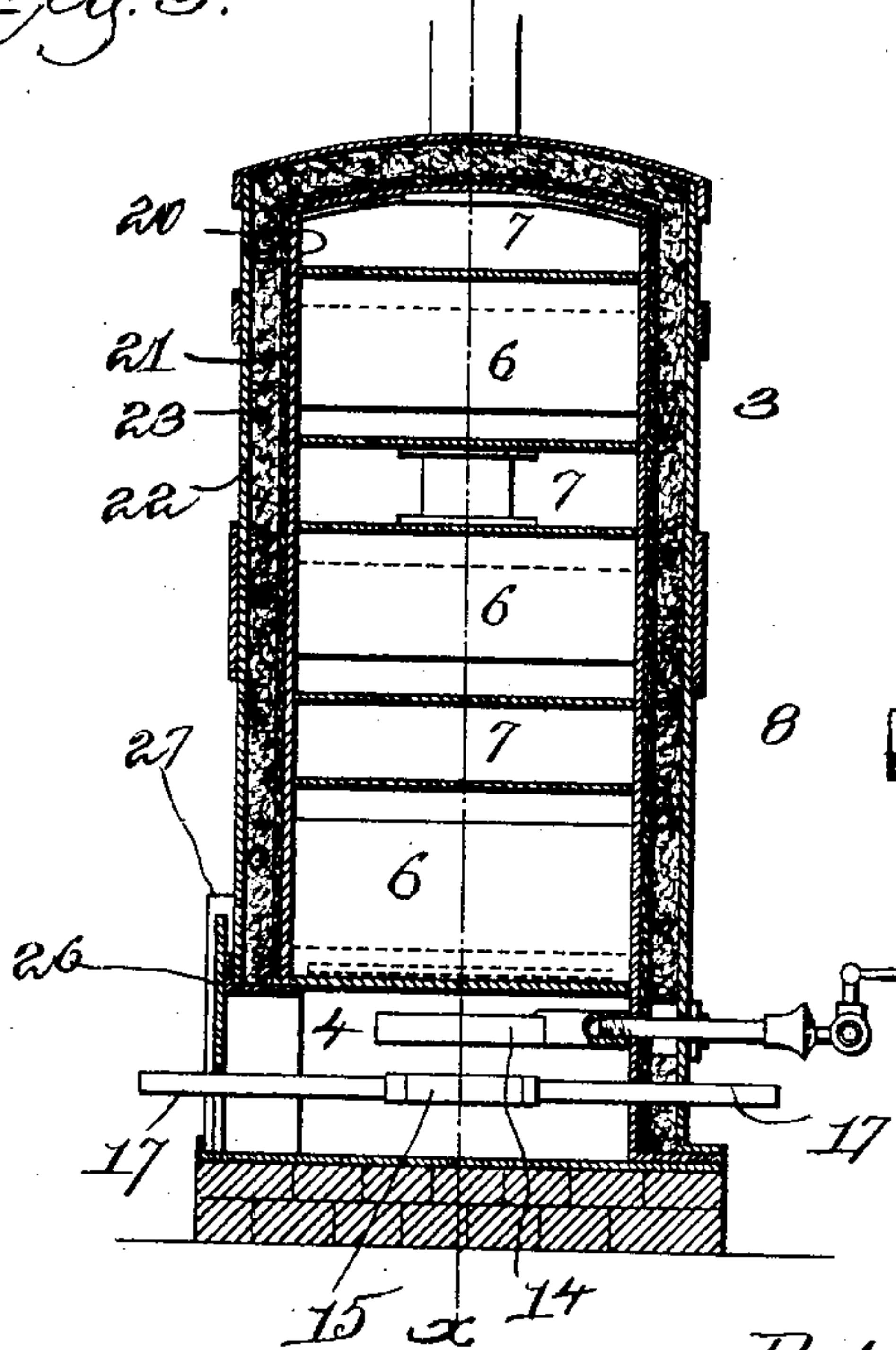
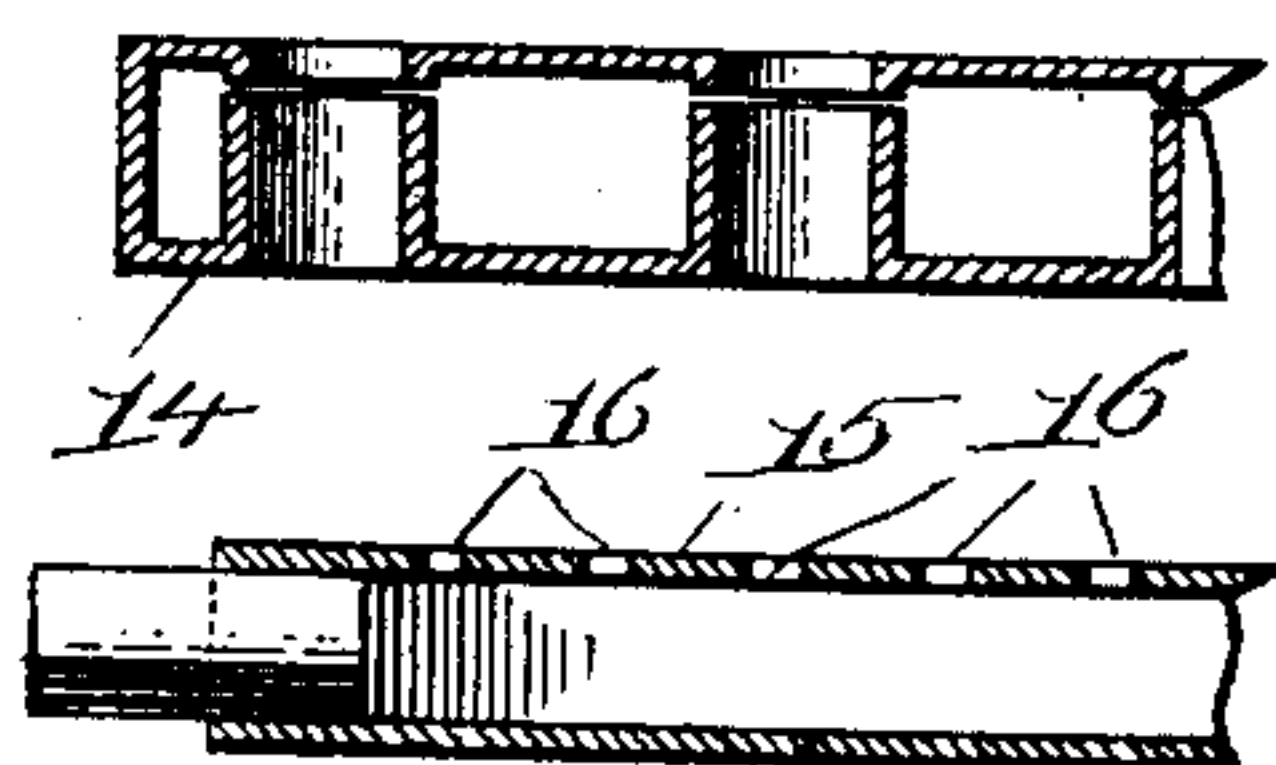


Fig. 5.



Witnesses:
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UNITED STATES PATENT OFFICE.

ROBERT S. LAWRENCE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO CONSOLIDATED INVENTORS CORPORATION, OF BOSTON, MASSACHUSETTS, A CORPORATION OF SOUTH DAKOTA.

DEVICE FOR HEATING OR COOLING AIR.

SPECIFICATION forming part of Letters Patent No. 762,591, dated June 14, 1904.

Application filed August 21, 1903. Serial No. 170,313. (No model.)

To all whom it may concern:

Be it known that I, ROBERT S. LAWRENCE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Devices for Heating or Cooling Air, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to a device which can be used either to heat or cool air, as desired.

The particular points wherein the invention resides will be more fully hereinafter described and then pointed out in the claim.

In the drawings, Figure 1 is a perspective view of my improved device. Fig. 2 is a sectional view on the line *x x*, Fig. 3. Fig. 3 is a section on the line *y y*, Fig. 2. Figs. 4 and 5 are details of the device hereinafter described.

3 designates a suitable casing having at its lower end a burner-chamber 4, in which one or more burners or other heat-producing devices are situated, and at its upper end an outlet-pipe 5, through which the products of combustion escape.

Inclosed in the casing 3 above the burner-chamber 4 are a plurality of heating-chambers 6, which extend entirely across the casing 3 and are arranged in staggered relation to each other, so as to form a sinuous or zigzag passage-way 7, through which the heated products of combustion pass from the burner-chamber 4 to the outlet-pipe 5, as indicated by the arrows *a*. As herein shown, the alternate chambers 6 are secured to one end of the casing 3 and the other chamber secured to the other end, each chamber being of a slightly-less length than the casing, so as to permit the products of combustion to pass around its end. The chambers 6 are arranged one above the other and are connected by short lengths of pipe 8. The upper chamber of the series has connected thereto an outlet or discharge pipe 9, while the first chamber of the series or the lowest chamber has connected thereto an inlet-pipe 10. The in-

terior of each casing has projecting from its opposite sides inclined baffle-plates 11.

Suitable means—such, for instance, as a fan 12 of any usual construction—is employed for establishing a current of air through the connected heating-chambers 6, the baffle-plates 11 compelling said air-current to take the sinuous or zigzag course indicated by the arrows *b*. A valve 13 in the pipe 10 regulates the amount of air which is to pass through the heating-chambers.

Any suitable heating device may be employed in the chamber 4, and, as herein shown, I have provided a plurality of burners 14, which are adapted for burning gasoline or liquid vapor. The burner-chamber is closed, and in order to supply sufficient air thereto to support combustion and to supply it in the way which will make combustion the most perfect I place beneath each burner 14 a hollow member 15, provided with a plurality of apertures 16 and having on opposite sides thereof the supply-pipes 17, which extend out through the walls of the casing 3 and are open to the atmosphere. While the burners are in operation, air is drawn in through the supply-pipe 17 and emitted from the apertures 16, which, it will be noted, are situated directly beneath the burner 14, so that air is evenly distributed to the burner in such a way that complete combustion takes place. The hot products of combustion strike directly on the bottom of the lower chamber 6 and then pass around the end of said chamber, between the same and the chamber next above, thereby heating both the top of the lower chamber and the bottom of the second chamber, and thence pass, as indicated by the arrow *a*, on through the passage-way 7 until finally they escape through the outlet-pipe 4. The heated products of combustion are therefore brought into contact with both the upper and lower side of each chamber 6, and owing to the particular arrangement of baffle-plates 11 the current of air passing through these chambers is directed against the top and bottom of the chambers alternately. As a result it becomes very highly heated before it passes into the discharge-pipe 9.

The device is intended to be used for heating purposes chiefly, and the discharge-pipe 9 will be arranged to deliver the heated air to the room or rooms or other place which is to be heated.

The walls of the casing 3 are made double, and the space between the walls 7 is filled with some non-heat-conducting material—such, for instance, as infusorial earth, sifted ashes, &c. This construction absolutely prevents the loss of any heat by radiation. As herein shown, I have covered the inner wall 20 with a covering 21, of asbestos paper or similar sheet non-heat-conducting material, and have filled the space between the inner wall and outer wall 22 with the dry non-heat-conducting material 23.

24 designates covers which close suitable openings 25, (shown in dotted lines, Fig. 4,) through which a torch, match, or igniting device may be inserted when it is desired to light the burners.

To obtain access to the burner-chamber 4, I prefer to make one side 26 thereof removable, said side being normally held in place by suitable guides 27. This door 26 can be removed by merely lifting it up, the slots 28 therein, through which the pipes 17 extend, permitting its removal without disturbing the pipes. When the burner-chamber has been opened by the removal of the door 6, the air-supply members 15 or the burners 14 may be removed or replaced, as desired.

It is my intention to carry the supply-pipe 29, which conducts air to the fan or forcing mechanism 12, sufficiently high so that the air which is drawn in through said pipe will be absolutely pure and free from the impurities occasioned by the dust of the street and foul gases of decomposition.

By regulating the amount of air which is forced through the heating-chambers and the heat generated by the burners the correct quantity of air for heating to any desired temperature any sized building or room can be supplied.

My device may also be used for cooling air, as well as for heating air, for by supplying the casing 3 with a cooling medium instead of a heating medium and at the same time forcing air through the chamber 6 it will be obvious that the air will be cooled instead of heated. To thus adapt my device for both heating and cooling air I connect to the outlet-pipe 5 a supply-pipe 30, through which water may be supplied to the casing 3 from any suitable source of supply. At the lower end of the casing and immediately above the burner-chamber 4 is a discharge-pipe 31, controlled by a suitable valve 32, through which the water escapes from the casing 3.

When the device is used for cooling air, I propose to close the opening between the burner-chamber 4 and the passage-way 7 by

means of a suitable removable closure 33, (shown in dotted lines, Fig. 2,) so as to prevent water filling said burner-chamber. This closure 33 may be put in place or removed through a door 35, which closes the opening in the side of the casing. I prefer to make the door with two walls the space between which is filled with non-heat-conducting material, as shown.

To convert the device into a cooling device, it is merely necessary to put the removable closure 33 in place and then supply cool water to the device from the pipe 30, allowing said water to completely fill the passage-way 7 in the casing. The valve 33 permits a slow circulation of water through this sinuous passage-way 7 and keeps the chambers 6 cool. If desired, the pipe 30 may connect to a suitable tank 31, (shown in dotted lines, Fig. 2,) which may contain ice-water. By gaging the temperature of the water and rapidity of circulation the temperature of the air may be controlled.

In addition to its function as a heating device the apparatus may also be used for drying purposes. The air which is supplied to the device is taken from such an elevation that it is absolutely pure, and this pure air after being heated to the required temperature may be conducted to a drying-chamber wherein the articles to be dried are placed.

Various changes may be made in the construction of the parts without departing from the spirit of the invention.

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

In a device of the class described, a closed casing, heating-chambers within the casing and extending entirely across the same, the alternate heating-chambers being connected with one end of the casing and the other chambers with the other end thereof, the space beneath the lower chamber constituting a burner-chamber and having communication with the circuitous passage between the heating-chambers through a discharge-port, said port being adapted to be closed, a pipe connected to the upper end of the casing and a discharge-pipe connected to the lower end of the casing immediately above the burner-chamber, whereby when the discharge-opening is opened and the burners are lighted the device may be used to heat the air in the heating-chamber and when said opening is closed a cooling medium may be conducted through the casing and the air in said chambers cooled.

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

ROBERT S. LAWRENCE.

Witnesses:

LOUIS C. SMITH,
JOHN C. EDWARDS.