

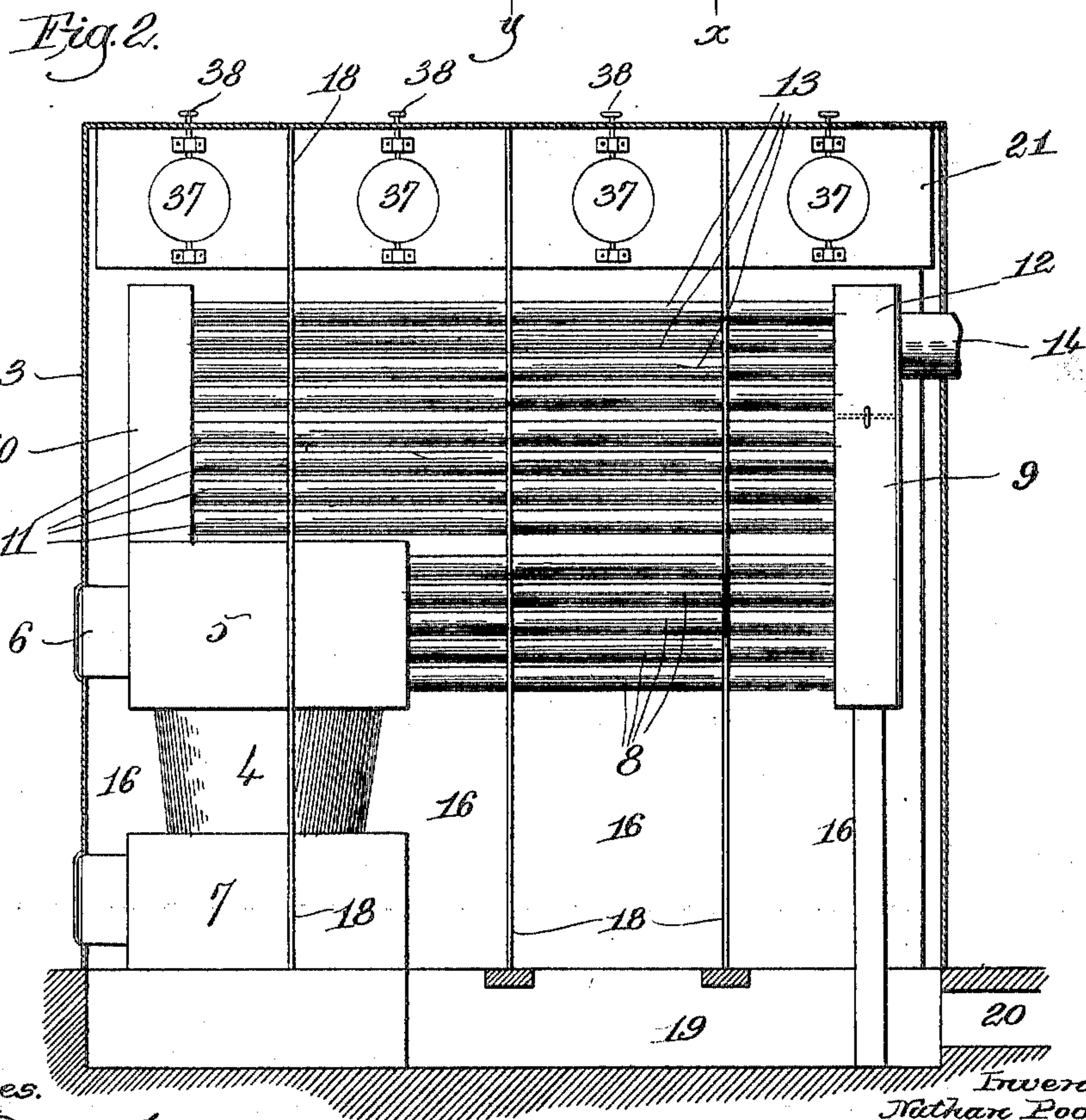
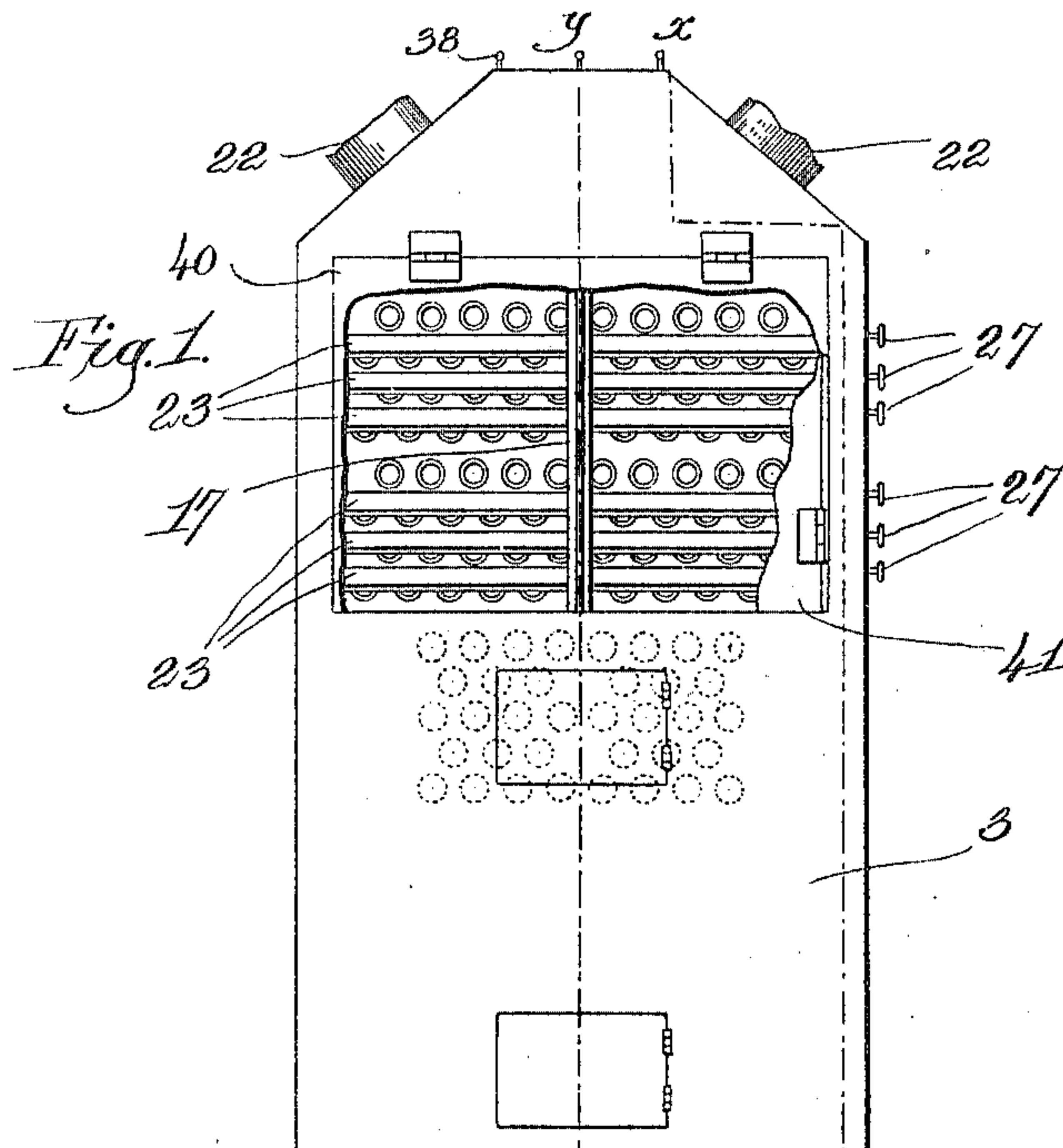
No. 811,869.

PATENTED FEB. 6, 1906.

N. POOR.  
HOT AIR FURNACE.

APPLICATION FILED MAY 5, 1904.

3 SHEETS—SHEET 1.



Witnesses.  
Thomas Drummond  
Harriet Owen.

Inventor.  
Nathan Poor,  
by Masby Ferguson, atty.

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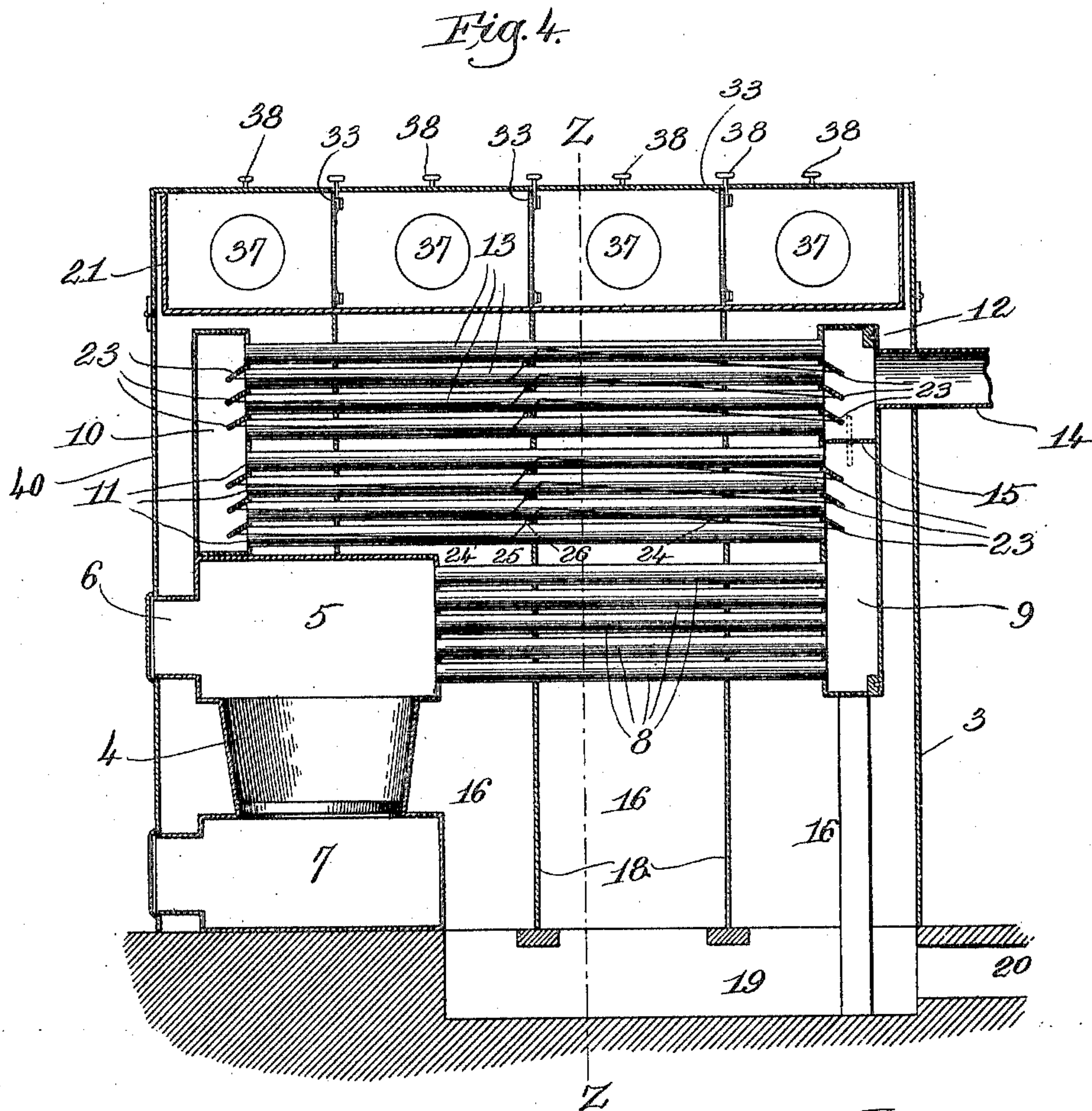
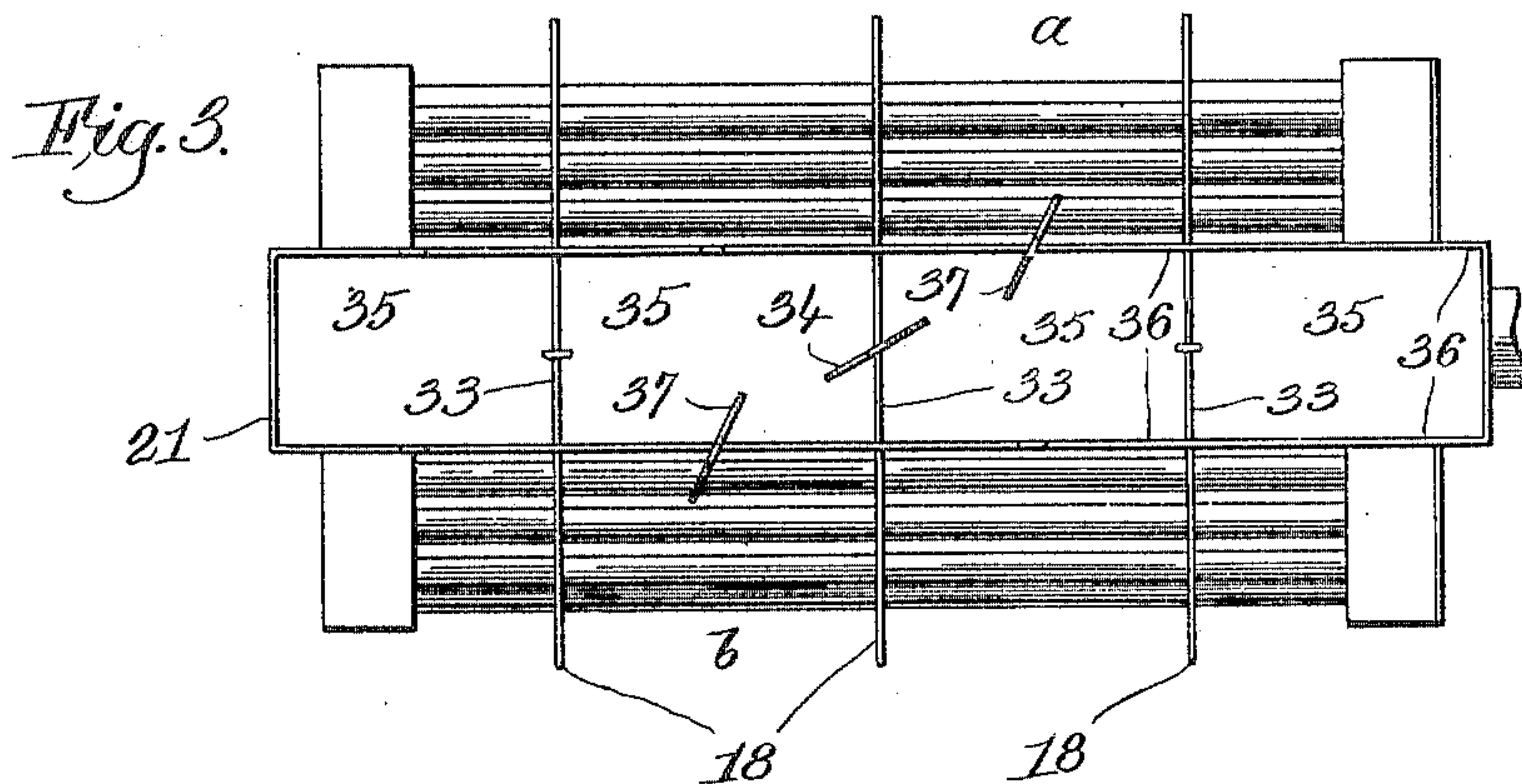
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HOT AIR FURNACE.

APPLICATION FILED MAY 5, 1904.

3 SHEETS—SHEET 2.



Witnesses.  
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No. 811,869.

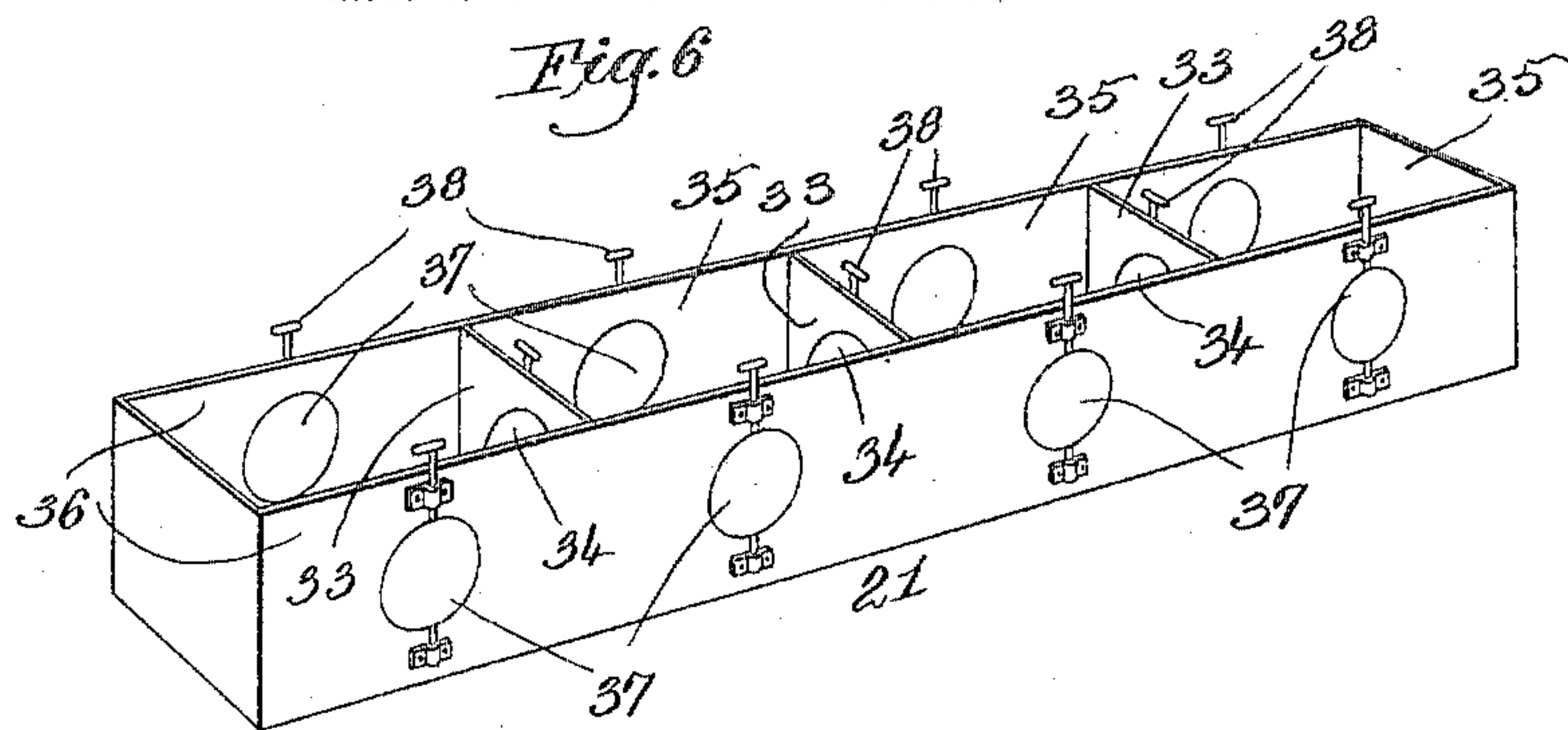
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N. POOR.

## HOT AIR FURNACE.

APPLICATION FILED MAY 5, 1904.

3 SHEETS—SHEET 3.





# UNITED STATES PATENT OFFICE.

NATHAN POOR, OF PEABODY, MASSACHUSETTS.

## HOT-AIR FURNACE.

No. 811,869.

Specification of Letters Patent.

Patented Feb. 6, 1906.

Application filed May 5, 1904. Serial No. 206,438.

*To all whom it may concern:*

Be it known that I, NATHAN POOR, a citizen of the United States, residing at Peabody, in the county of Essex and State of Massachusetts, have invented an Improvement in Hot-Air Furnaces, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

10 This invention relates to that type of furnace in which a plurality of independent heating-chambers are employed, each heating-chamber being connected to a different room; and the invention has for one of its objects to improve this type of furnace by providing a simple and efficient construction by which the hot air developed in any heating-chamber may be directed into any distributing-pipe and for another object to provide 20 novel means by which the amount of heating-surface in the various heating-chambers can be controlled.

The features wherein my invention resides will be more fully hereinafter described, and 25 then pointed out in the claims.

Referring to the drawings, which show one simple embodiment of my invention, Figure 1 is a front view of my improved furnace, a part thereof being broken out. Fig. 2 is a section on the line  $x x$ , Fig. 1. Fig. 3 is a top plan view with the casing removed. Fig. 4 is a section on the line  $y y$ , Fig. 1. Fig. 5 is a section on the line  $z z$ , Fig. 4; and Fig. 6 is a perspective view of the trunk or distributing-chamber. 35

My improved furnace may either be set in brick or inclosed in a casing of sheet metal. It is the latter construction which I have illustrated in the drawings, and 3 designates the sheet-metal casing, which incloses the furnace proper. The latter comprises a fire-pot 4 of any suitable construction, having above it a combustion-chamber 5, provided with a door or opening 6 for the introduction of coal, and an ash-pit 7 beneath the fire-pot. 45 These parts may be of any suitable and usual construction.

At the rear of the furnace is a chamber 9, which is connected to the combustion-chamber 5 by a plurality of heating-flues 8, and at the front of the furnace is a front drum or chamber 10, which is connected to the rear chamber 9 by a plurality of heating-flues 11. 50

The drum 10 is connected with a smoke-chamber 12 by a third series of heating-flues 13, 55 and said smoke-chamber 12 has connected thereto the usual smoke-pipe 14, which leads to the chimney. The heated products of combustion therefore pass from the combustion-chamber 5 to the chamber 9, from 60 thence to the front chamber 10, and then to the smoke-chamber 12, where they pass to the flue.

15 designates a damper between the smoke-chamber 12 and chamber 9. When said 65 damper is closed, the chambers 12 and 9 are separate from each other and only have communication round through the front drum 10. When said damper is open, as shown in dotted lines, the chambers 9 and 12 are directly connected and the products of combustion escape directly up the chimney from the chamber 9. This is the position of the damper when the fire is being started or when it is desired to get a direct draft. 75

The casing 3 is divided into separate independent heating-chambers 16 by partitions, which are preferably vertically arranged. In this form of my invention I have shown said partitions as extending transversely and longitudinally. The longitudinal partition is designated by 17 and extends from one end of the casing to the other along its central line. The transverse partitions are designated by 18 and extend transversely across 85 the partition, said transverse partitions intersecting the longitudinal partition. The casing 3 is therefore divided into two rows of chambers, one row each side of the longitudinal partition 17. The partitions extend 90 from the top to the bottom of the casing, and the various chambers 16 open at their lower ends into the usual cold-air chamber or pit 19 beneath the furnace, said pit being connected with the cold-air box by the usual conduit 20. 95 The partitions are so arranged that part of the heating-flues extend through each chamber 16, as seen from Figs. 2 and 5.

In the present form of my invention the chambers 12 and 9 at the rear of the furnace 100 are located in the two rear chambers at each side of the partition 17 and the chamber or drum 10 and a portion or all of the fire-pot and combustion-chamber located in the two front chambers 16, the heating-flues 8, 11, 105 and 13 extending from the front to the rear



heating-chambers and through the intermediate chambers.

The distributing-pipes are designated by 22, and I propose to connect one pipe with the upper end of each of the chambers 16, so that each pipe has an individual chamber communicating therewith.

With the construction thus far described it will be seen that the air in the various heating-chambers 16 will be heated by radiation from the heating-surface comprising the flues and the chambers 9 10, smoke-chamber 12, fire-pot 4, and combustion-chamber 5, and that the heated air in each heating-chamber is delivered to the corresponding distributing-pipe. Since all of the heating-chambers 16 communicate with the cold-air pit 19, it will be seen that they are all supplied with cold air from the same source, but that the air is heated independently in each chamber, thereby insuring positive distribution of the heated air to the room for which it is intended.

I have herein shown three transverse partitions and one longitudinal partition, thus making four heating-chambers each side of the longitudinal partition, or eight heating-chambers in all. This is the size of furnace which would accommodate an ordinary dwelling-house; but by merely lengthening the casing and the flues 8, 11, and 13 or by inserting extra partitions the capacity of the furnace can be increased. I have shown the transverse partitions as so arranged that the various heating-chambers are substantially the same size; but it is within my invention to adjust these partitions so as to make the size of any heating-chamber correspond to the size of the room to which its distributing-pipe leads or to the demands made upon said distributing-pipe. If one room is a small room and easily heated, I propose to make the distributing-chamber corresponding to such room a small chamber, and therefore to contain a small amount of heating-surface, while if a room is large or difficult to heat I will make the heating-chamber corresponding thereto comparatively large and with a sufficient amount of heating-surface therein to properly heat said room. With my invention therefore it is possible to so build or adjust the furnace after it is built that the house will be evenly heated.

I have also included in my invention means for varying the amount of heating-surface in the various heating-chambers, thus making the furnace one which can be adapted to evenly heat the house in either hot or cold weather. I preferably accomplish this by providing means for cutting out certain of the heating-flues in the circuit. In this form of my invention I provide dampers 23 at each end of the flues 13 and 11, said dampers preferably being in the form of hinged flaps, each one of which is adapted to cover one row or

line of flues. The dampers at the opposite ends of each of the flues of each row have connected thereto links 24, which are connected to a cross-arm 25 on a shaft 26, extending transversely of the casing, said shaft having on its exterior a handle 27, by means of which it may be turned. The operating means for the damper at each end of each horizontal row of flues is independent from the other dampers, so that any one row of flues can be closed by dropping the dampers over their ends without closing any of the other dampers. During very cold weather it may be necessary to have all the dampers open, as shown in Fig. 4, and thus utilize all of the heating-surface of the flues. In slightly warmer weather the dampers corresponding to the flues of one row may be closed, thus cutting said flues out, and thereby reducing the heating-surface, while in still warmer weather other flues can be similarly cut out and the heating-surface still further reduced.

As herein illustrated, there are no dampers 23 for the upper row of flues 11 and the upper row of flues 13, so that when all the dampers 23 are closed there still will be some flues in the circuit. It is within my invention, however, to provide dampers for these flues, if desired.

It often happens that certain rooms of a house are not used and therefore do not need to be heated and that the heat which would naturally be conducted to said room is needed in other rooms. To accommodate such circumstances, I have provided means whereby any one heating-chamber can be connected with any other heating-chamber and the heat from both said chambers delivered to a single room. In this form of my invention this is accomplished by means of a distributing trunk or chamber 21, which is located at the upper end of the casing between the rows of distributing-pipes 22. Said chamber 21 is divided by transverse partitions 33, corresponding to the partitions 18, and each of said partitions 33 is provided with an opening closed by a damper 34. The opposite sides 36 of each of the compartments 35 of the distributing-chamber are also provided with openings controlled by suitable dampers 37. The dampers 34 and 37 have stems 38 extended outside of the casing by means of which they can be operated. When all the dampers are closed, the compartments of the distributing-chamber are closed to the various heating-chambers, and the heated air which is heated in any one heating-chamber passes directly to its distributing-pipe.

In case it is desired to divert the heat from one heating-chamber to another heating-chamber—as, for instance, from the heating-chamber *a* in Fig. 3 to the heating-chamber *b*—the corresponding dampers 37 and 34 are opened, as shown in said figure, and the



damper in the distributing-pipe corresponding to chamber *a* is closed. The air which is heated in chamber *a* therefore will pass into the corresponding compartment of the distributing-chamber through the opening adapted to be closed by the valve 34 and into the next adjacent compartment, and from thence through the opening adapted to be closed by the damper 37 into the chamber *b*, from whence it will pass to the distributing-pipe for said latter chamber.

By properly manipulating the various dampers 34 and 37 it is possible to direct the heat from any heating-chamber to any other heating-chamber, according to the needs of the particular place being heated.

The front part of the casing has a door 40 therein which can be opened to afford access to the interior thereof, and the front of the chamber 10 is also provided with suitable doors 41, through which access may be had to the flues 13 and 11 for the purpose of cleaning them. Access may be had to the same for the purpose of cleaning the flues. In this form of my invention the back side of the smoke-chamber and drum may be made removable, a suitable door or opening being provided in the casing 3 opposite said rear drum to admit of the removal of the rear side of the drum.

I prefer the arrangement of partitions shown—that is, a partition 17, which divides the casing longitudinally, and transverse partitions 18—but such arrangement is not essential, as the partitions might have any relative arrangement without departing from the invention.

From the above it will be seen that the air which is heated in any one heating-chamber may be directed into any desired distributing-pipe, and this may be accomplished without interfering with the operation of directing the hot air from another heating-chamber to still another distributing-pipe. In other words, one heating-chamber may be connected by means of the trunk arrangement with a second heating-chamber, and independently a third heating-chamber may be connected to a fourth heating-chamber. It will also be seen that the dampers 23 close the ends of the corresponding flues, and thereby absolutely close communication between said flues and the combustion-chamber. In this way any hot gases are prevented from entering said flues and said flues are entirely cut out of the heating system.

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

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

1. In a furnace, a casing divided into separate heating-chambers, a combustion-cham-

ber, a plurality of heating-flues through which hot gases of combustion circulate, said flues passing through the heating-chambers, and means to close all communication between said combustion-chamber and one or more of said flues.

2. In a furnace, a casing divided into separate heating-chambers, a combustion-chamber, a plurality of flues for hot products of combustion, said flues passing through said heating-chambers, and dampers for closing the ends of some of the flues.

3. In a furnace, a casing divided into separate heating-chambers, a distributing-pipe connected to each heating-chamber, a cold-air chamber common to all the heating-chambers, a combustion-chamber, flues through which the hot products of combustion from the combustion-chamber circulate, said flues extending through the heating-chambers, and means for closing all communication between said combustion-chamber and certain of the flues.

4. In a furnace, a casing divided into separate heating-chambers, a heater within said casing, said heater having a combustion-chamber, a rear chamber, flues connecting said combustion-chamber and rear chamber, a front drum, other flues connecting the rear chamber and the front drum, a smoke-chamber and still other flues connecting the front drum and smoke-chamber, said flues passing through the various heating-chambers, a distributing-pipe connected to each heating-chamber and means to close the ends of a portion of said flues.

5. In a furnace, a casing divided into separate heating-chambers, a heater within said casing, said heater having a combustion-chamber, a rear chamber, flues connecting said combustion-chamber and rear chamber, a front drum, other flues connecting the rear chamber and the front drum, a smoke-chamber and still other flues connecting the front drum and smoke-chamber, said flues passing through the various heating-chambers, a distributing-pipe connected to each heating-chamber, and means to close the ends of one or more of the flues whereby the amount of effective heating-surface in the heating-chambers can be varied.

6. In a furnace, a plurality of heating-chambers, a distributing-pipe connected to each heating-chamber, means to heat the air on its passage through said heating-chambers, and means to connect one heating-chamber to a second heating-chamber, and to simultaneously and independently connect a third heating-chamber to a fourth heating-chamber.

7. In a furnace, a plurality of separate heating-chambers, a distributing-pipe connected to each heating-chamber, means to heat the air on its passage through each heating-cham-

ber, a distributing-trunk divided into compartments, dampers controlling openings between adjacent compartments, and other dampers controlling openings between the  
5 compartments of the trunk and the adjacent heating-chambers.

In testimony whereof I have signed my

name to this specification in the presence of two subscribing witnesses.

NATHAN POOR.

Witnesses:

LOUIS C. SMITH,  
J. ETHEL TARR.