

...invention in this patent  
 is not in point.

# *S. Pierce.* *Hot-Air Furnace.*

N<sup>o</sup> 8,104.

Patented May 20, 1851.

Fig. 1.

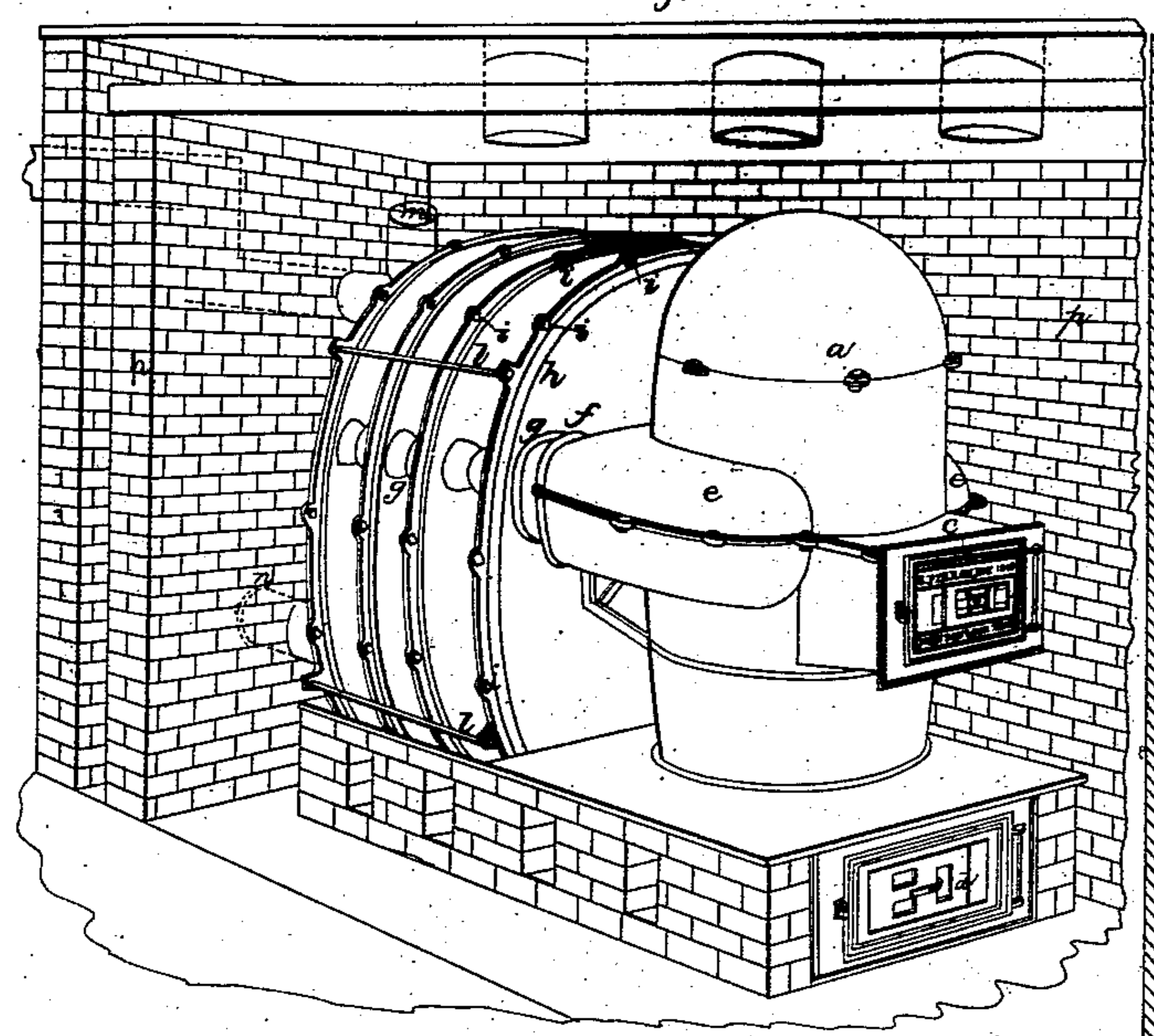


Fig. 2.

Section C of fig. 3.

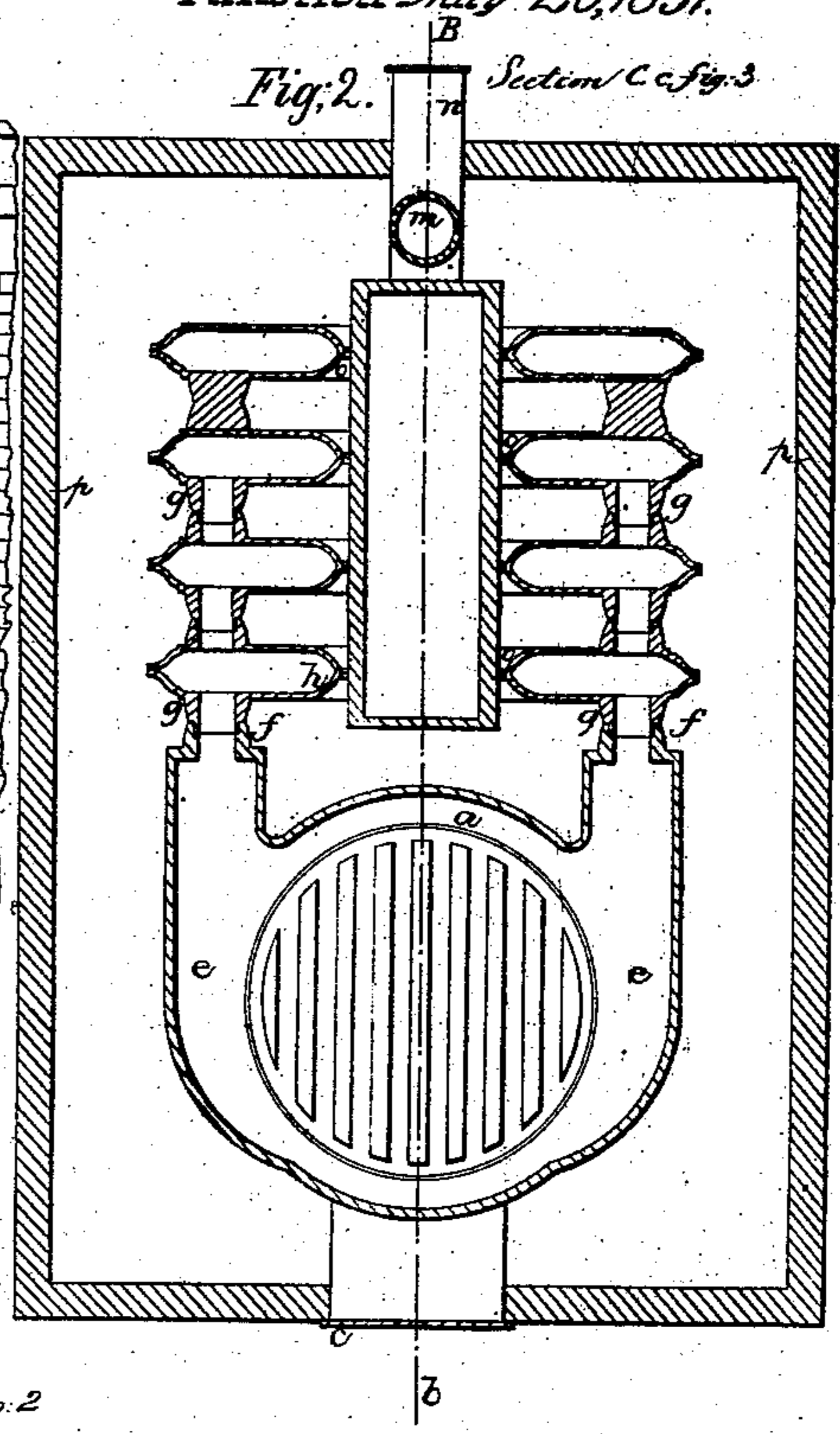


Fig. 3. Vertical Section B of fig. 2.

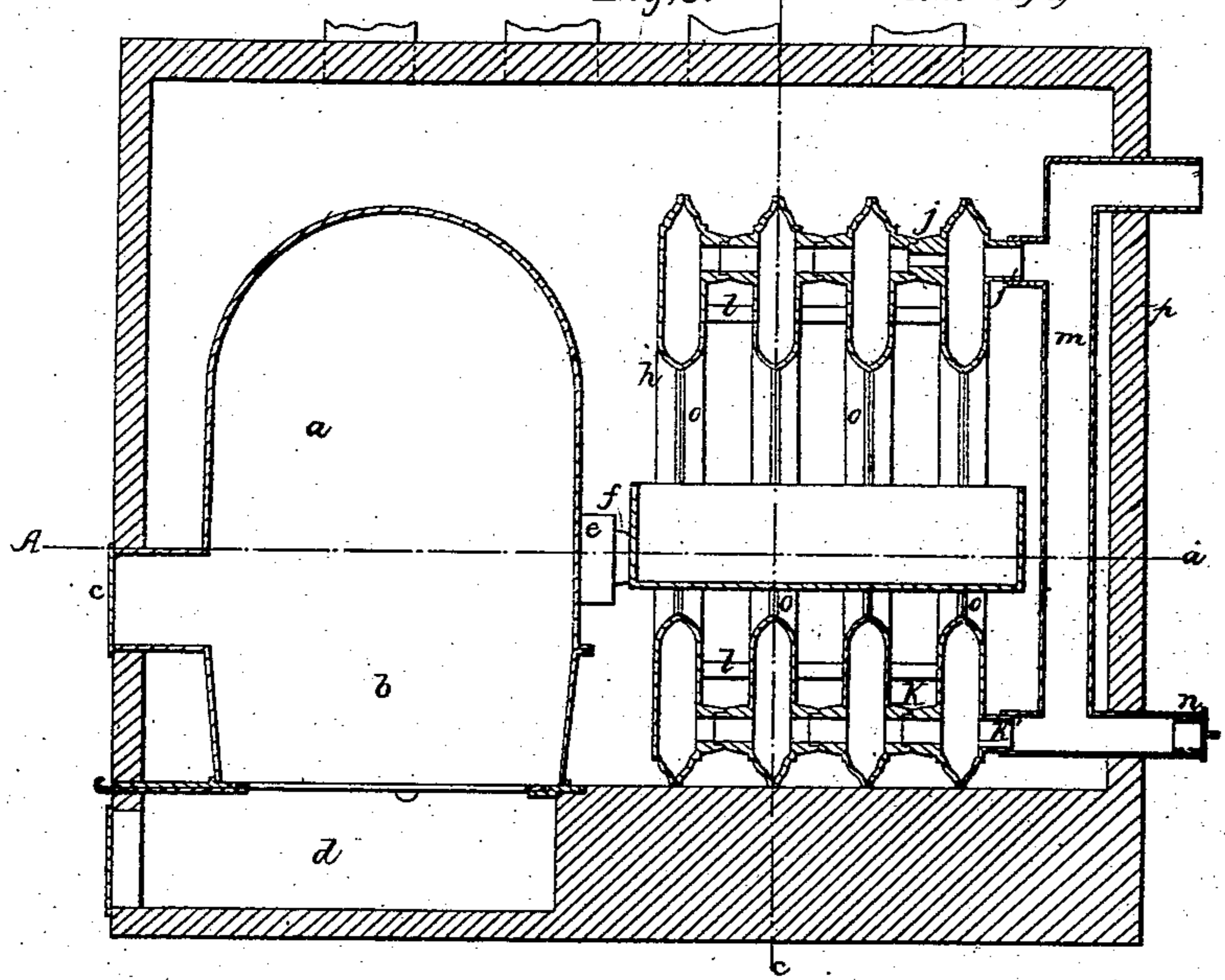
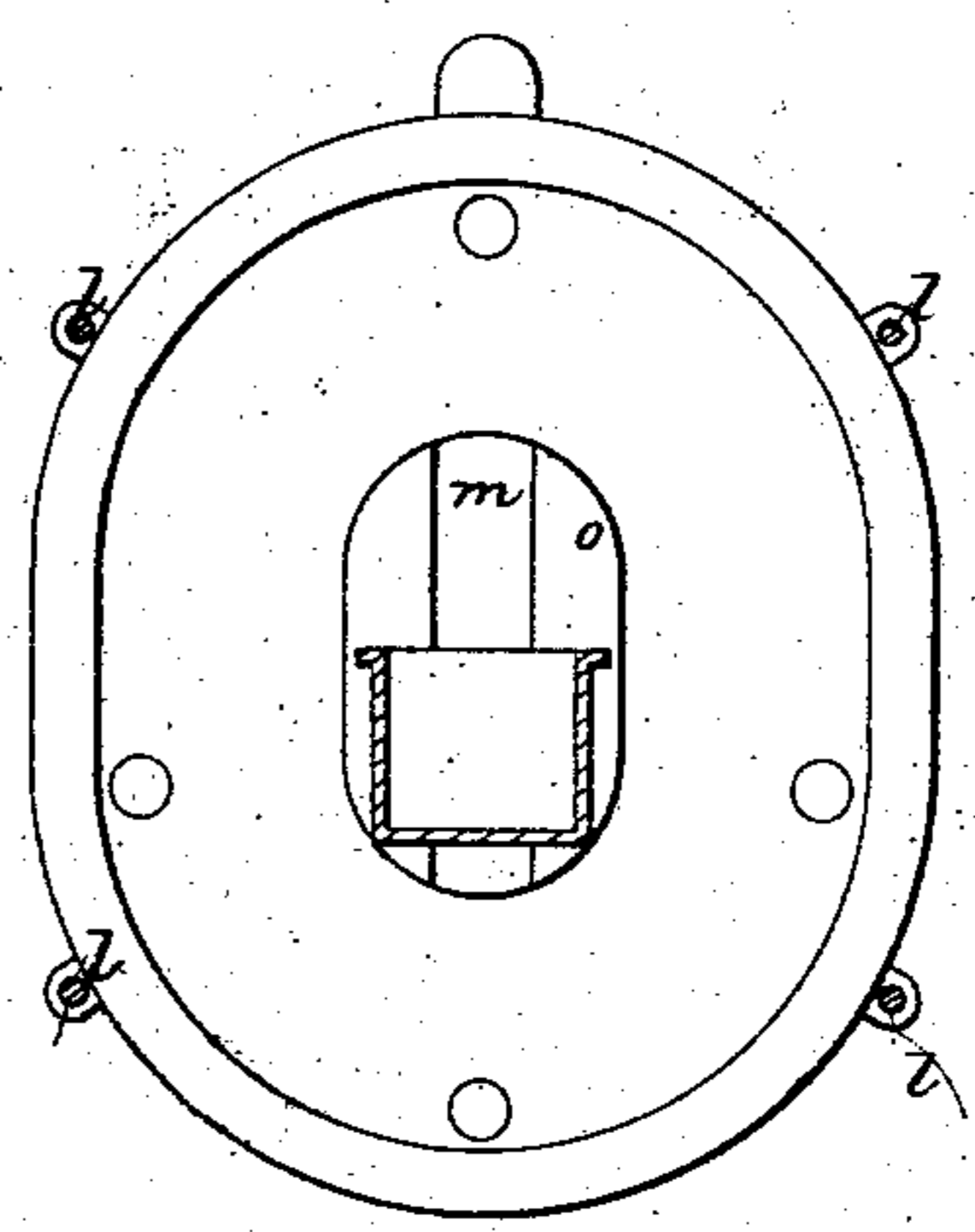


Fig. 4.



# UNITED STATES PATENT OFFICE.

SAML. PIERCE, OF TROY, NEW YORK.

## HOT-AIR FURNACE.

Specification of Letters Patent No. 8,104, dated May 20, 1851.

*To all whom it may concern:*

Be it known that I, SAMUEL PIERCE, of Troy, in the State of New York, have invented a new and useful Improvement in Hot-Air Furnaces for Heating Houses, &c., and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—  
Figure 1 is a perspective view with part of the surrounding masonry removed; Fig. 2, is a horizontal section taken at the line A, *a*, of Fig. 3; Fig. 3, a vertical section taken at the line B, *b*, of Fig. 2; and Fig. 4, a cross vertical section taken at the line C, *c*, of Fig. 3.

The same letters indicate like parts in all the figures.

The object of my invention is so to construct a hot air furnace that the heated gaseous products of combustion, in passing through from the fire chamber to the chimney, shall not only pass in contact with a large extent of metal surface to heat the surrounding atmospheric air, but by a peculiar arrangement of these metal surfaces, and the passages through which the gaseous products of combustion pass to retain the heat in contact with them for a sufficient length of time to give out the heat, and to effect this without impeding the draft. All this I effect by connecting with the fire chamber of the furnace, a series of four, more or less, vertical heating chambers, each presenting two large flat surfaces outside to the air which is to be heated and a thin space within for the reception and passage of the heated products of combustion. The first of this series communicates with the furnace by means of two pipes or collars, this first chamber communicating in the same manner and in the same lines with the second, the second with the third, this connection not being carried through to the last of the series. And the said chambers at or near the bottom communicate with each other throughout the series by collars or pipes, and the last of the series communicates with a pipe leading to the chimney, and then again the said series of chambers communicate together at or near the top by a series of pipes or collars and the last of the series with the exit pipe leading to the chimney; but the communication between the two last of the series, or between the last and the exit pipe, is only

about half the capacity of the others for the purpose of checking the escape of the products of combustion directly into the chimney and thereby inducing a portion of the escape from the bottom. It is this peculiar arrangement of the heating chambers with each other and the furnace in combination with the method of connecting them together and with the furnace and with the exit pipe, which constitutes the nature of my invention.

In the accompanying drawings *a* represents the furnace containing in the usual manner a fire pot *b*, feeding door *c* and ash pit *d*. The furnace just above the top is cast with two swells or enlargements *e*, *e*, one on each side, the rear end of each of which is cast with a collar *f*, to fit by appropriate joints corresponding collars *g*, *g*, cast onto the front face of the first heating chamber *h*. These heating chambers *h*, are each made of two plates cast with a rim all around and a flanch by which the two are united and secured by bolts *i*, so as to make a close joint; and when put together there is a thin space between the two plates constituting the heating chamber which being very narrow receives a very extensive but thin film of the gaseous products of combustion, which being very thin will give out its sensible heat readily to the metal plates.

All the plates except the front plate of the first and the back plate of the last of the series of chambers are cast each with two collars *g*, *g*, like the first, and with one collar *j* near the upper rim and a like one *k* near the lower rim. So that when these collars are all put together and the whole secured together by bolt rods *l*, there will be two passages directly through from the furnace through the holes in the collars *g*, *g*, to the third chamber, the two last collars not being perforated like the others. And there will be another passage through holes in the collars *k*, near the bottom connecting all the chambers together, and in like manner a similar connection at top through the collars *j*; with this exception that the aperture in the collar *j*, which forms the connection with the last chamber is only about half the capacity of the others.

The back plate of the last chamber is cast with two collars *j'*, and *k'*, and in the same line with the corresponding collars on the other plates, which last collars are connected

with corresponding collars on a vertical exit pipe *m* which communicates in the usual manner with the chimney. The exit pipe is provided with a collar *n* at the back in a line with the series of collars *k*, and this collar *n* is provided with a cap which when removed gives access to all the chambers, which by their peculiar construction shall deposit all soot and ashes at the bottom and in the pipe formed by the series of collars *k*, so that by this means all the chambers can be readily cleansed.

Instead of closing the apertures of the collars *g*, *g*, which form the connections with the last of the series of chambers, these apertures may be opened provided this last chamber be connected with the exit pipe at the top and bottom, and the top aperture be made of less capacity, instead of having this reduced capacity between the last of the series and the one preceding it.

From the foregoing it will be seen that when the gaseous products of combustion pass from both sides of the furnace into the first chamber, a portion of the heated gases will spread and fill the entire chamber, and the rest will continue through the collars *g*, *g*, into the second chamber, a portion will then spread in the second chamber and so on. A portion of the gases which spread out in the first chamber will escape from the top and bottom connections into the second chamber and so on throughout the series. But as by rarefaction all heated gases seek to ascend and to escape through the highest aperture, if the last of the series of chambers were connected with the exit pipe at top by an aperture of sufficient capacity, none or but a very small portion of these gases would descend to the bottom of the chambers, hence I make the aperture which connects the next to the last with the last

of the series of chambers at top or the last of the series of chambers with the exit pipe of only one half (or thereabouts) the capacity of the other apertures or passages, which has the effect to check the escape there and compel a portion of the gases to descend and escape into the exit pipe through the lower connection. In this way I insure the spread and circulation of the gases in thin films throughout all and every portion of the chambers constituting the series; while at the same time they are retained within the chambers sufficiently long to give out the heat required, and this too without injuriously checking the draft. Each chamber constitutes in fact a hollow ring with an open space *o* in the middle in which space a pan containing water may be placed to furnish the requisite moisture.

The whole apparatus is surrounded by masonry *p*, of the usual construction and which therefore need not be described.

What I claim as my invention and desire to secure by Letters Patent is—

The arrangement, substantially as herein described, of the heating chambers in connection with the furnace, when this is combined with the method, substantially as described of connecting the heating chambers with each other, with the furnace and with the exit pipe leading to the chimney, whereby the gaseous products of combustion are carried into and through, and made to spread out in thin films in, the said heating chambers, and therein retained to give out heat without seriously impeding the draft, substantially as described.

SAMUEL PIERCE.

Witnesses:

WM. H. BISHOP,  
CASPER BROWNE.