

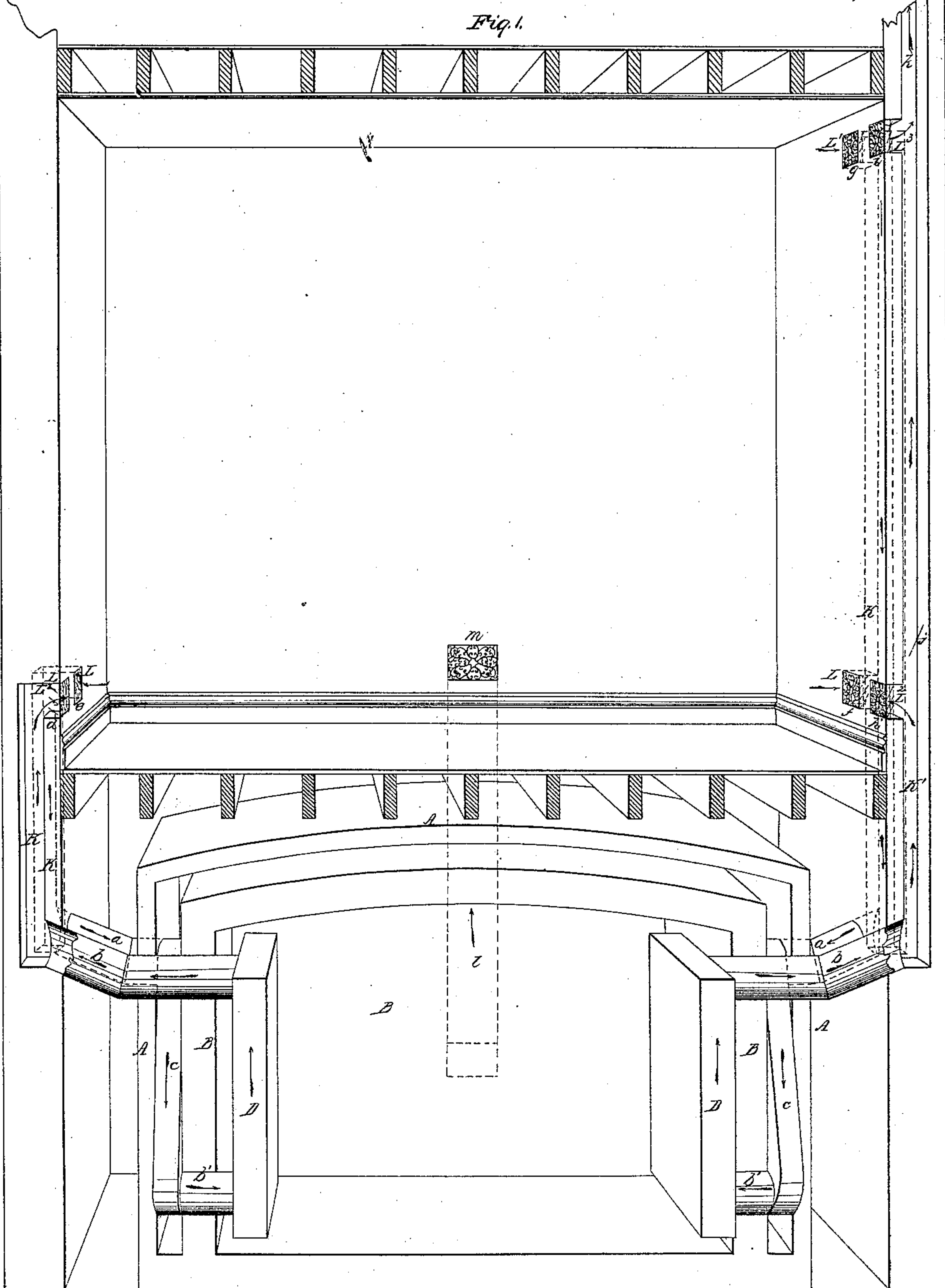
W. H. Churchman,

House Ventilator.

No. 22,109.

Patented Nov. 23, 1858.

Fig. 1.



Witnesses:  
W. O. Lawler  
C. C. Johnson

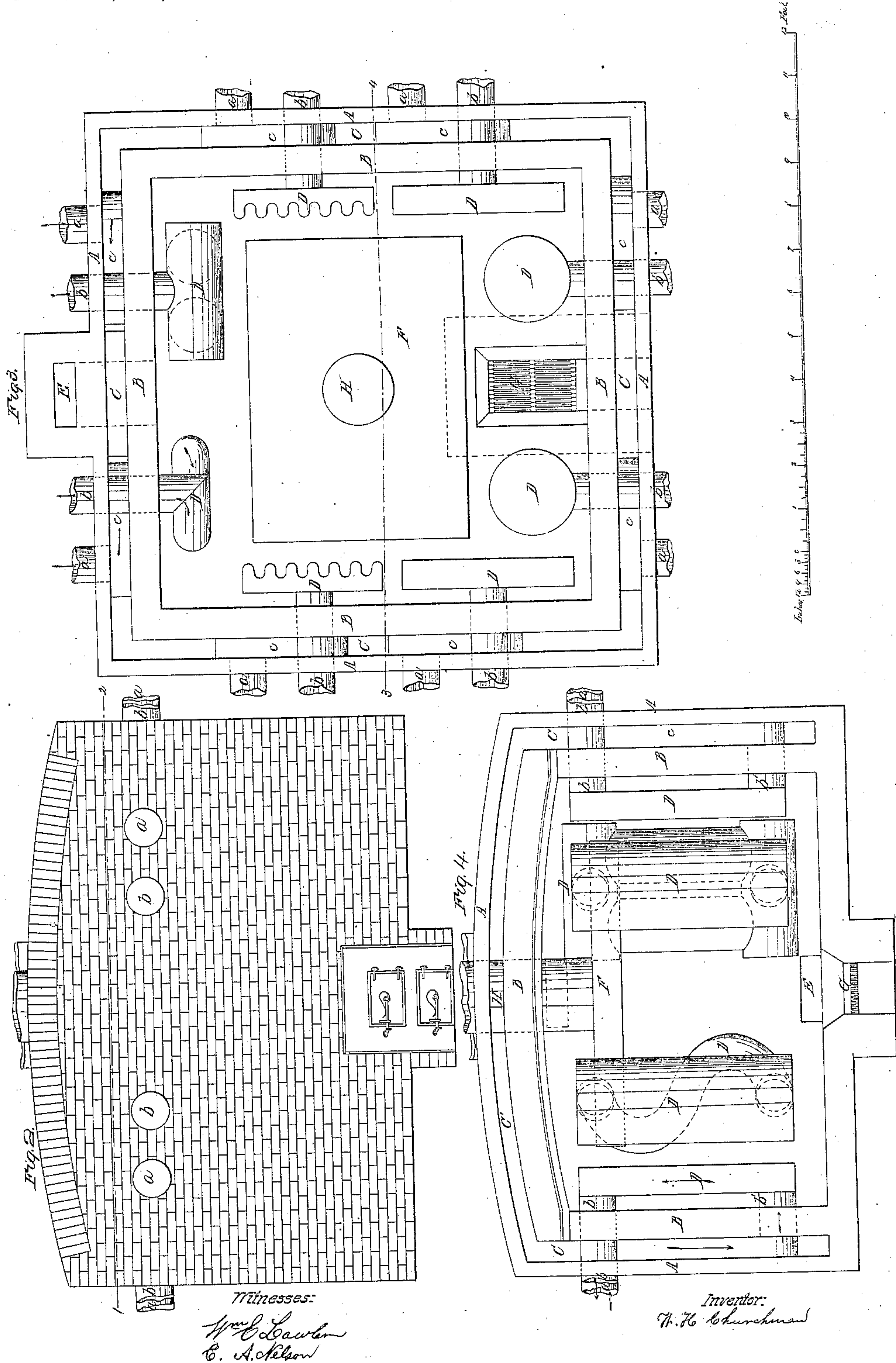
Inventor:  
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# UNITED STATES PATENT OFFICE.

W. H. CHURCHMAN, OF JANESVILLE, WISCONSIN.

## APPARATUS FOR HEATING AND VENTILATING BUILDINGS.

Specification of Letters Patent No. 22,109, dated November 23, 1858.

*To all whom it may concern:*

Be it known that I, WILLIAM H. CHURCHMAN, of Janesville, in the county of Rock and State of Wisconsin, have invented a new and useful Improvement in the Method of Heating and Ventilating Apartments in Dwelling-Houses and other Buildings; and I do hereby declare 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 (Sheet No. 1) is a perspective sectional view of the improved furnace, viewed from the front part thereof, with a corresponding view of the side walls and flues, and the floors at the sides, and above the same. Fig. 2 (Sheet No. 2) is a front elevation of the said furnace. Fig. 3 is a horizontal section of the same, at the line 1, 2, of Fig. 2. Fig. 4 is a vertical section of the same, at the line 3, 4, of Fig. 3.

Similar letters in the figures refer to corresponding parts.

The nature of this invention and improvement consists in arranging within the double walls of a furnace, placed in the lower or other suitable part of the building to be heated, a series of peculiarly-formed rarefying metallic drums, to which a moderate degree of heat is imparted, and causing the said drums, to communicate, by suitable pipes at the upper and lower parts, with venti-ducts or flues extending to the apartments to be heated, in such a manner as to produce a continuous draft of air from the apartments through the drums and thence back again to said apartments in a heated state; thereby treating each apartment to be warmed as a distinct atmospheric reservoir, and, under all conditions of weather, supplying it with a mild and genial warmth, entirely free from dust, smoke, sulfurous gases or other impurities arising from over-heating, and in fact rendering the heated atmosphere of the apartments in every respect equal to that produced by heating furnaces in which steam or hot water is employed as a heating medium.

To enable others to make and use my invention, I will proceed to describe its construction and operation.

The outer wall A, of the furnace is made square or may be made of other desired form, of firebrick or any suitable material; and within it is erected another wall B, a

short distance from the outer one, so as to leave a space C, between and entirely around the two. These walls are surmounted respectively by arches sprung from either side and having a space C', between them, which space communicates with the space C, at the sides.

Within the inner wall B, and at a short distance therefrom are arranged a series of sheet iron or other metallic drums D; which may be made of any convenient form as is indicated by the variety exhibited in the drawings, the main desideratum being to expose the greatest amount of heating surface within the smallest compass. These drums D, are provided with horizontal communicating branch pipes (b, b') at their upper and lower portions, those (b) at the upper portions extending outward through both walls A, B, and the space C, between them, and communicating with induction or ascending flues K', formed in the walls of the building, or in any convenient manner, which flues communicate with the upper and lower portions of the apartments to be heated, as represented at the right hand in Fig. 1 (Sheet No. 1), by horizontal openings L<sup>2</sup>, L<sup>3</sup>, leading into the same; these openings being provided with registers (h, i) for either letting on or partially or entirely shutting off the communication. These flues K' may extend either past the openings L<sup>2</sup>, L<sup>3</sup>, leading into the upper and lower portions of the room, and communicate with the main chimney or exterior of the building, in which case they must be provided with dampers (j,) between said openings; or the said flues K', (as well as other flues K, hereinafter described,) may terminate at the openings L, L<sup>2</sup>, leading into the lower portion of the apartment as shown at the left hand in Fig. 1 (Sheet No. 1), in which latter case they will be provided with two registers (d, e). The other horizontal pipes b', at the lower portions of the drums are passed through the inner wall B, and communicate with the lower portions of inclined flues (c) arranged between the two walls A, B, and having horizontal communicating pipes a, at their upper ends, which communicate with eduction or descending flues K, formed in the walls of the building or in any convenient manner, parallel to the flues K', and like them extending to the upper and lower portions of the apartments to be heated, and communicating with the same,



through openings L, L', beside the openings L<sup>2</sup>, L<sup>3</sup>, and provided with suitable valves or registers (*f*, *g*).

The main chamber of the heater in which the drums D are situated, communicates at its upper and lower parts, through horizontal inlets, with a chimney E, the upper inlet being provided with a damper for confining the heat after the fire is well started; and in said main chamber are placed the grate bars G, upon which the fuel and fire are situated: and above the same is placed (in particular cases) a horizontal drum or rarefier F, having a large vertical outlet pipe H. This last mentioned drum or rarefier F, is only employed when it is desired to heat an apartment immediately over the heating furnace, or it may be used in other cases, in which event the outlet pipe H is carried in the most direct course to the said apartment.

In the use of the ordinary hot-air furnace, the atmosphere to be warmed is drawn from some external source into chambers where it is subjected to a high degree of heat, and its healthful properties destroyed by direct contact with the intensely heater metallic surfaces of the heater; and from this common receptacle it is distributed through numerous single channels or flues to the several apartments of the building. In the employment of my improved furnace, the effect is different; a moderate degree of heat being given to the metallic drums D, by the circulation of the heat from the fire-grate G, entirely around the surfaces of said drums. The heat thus imparted to the drums D, will be communicated to the air within them, and this when it becomes rarefied will rise and thereby establish an atmospheric circulation between them and the rooms with which the venti-ducts K, K', communicate.

This simple and efficient system of heating the air will insure four distinct advantages over the ordinary hot-air furnace, which advantages may be briefly stated as follows:—First. The circulation induced promotes a more equitable diffusion of warmth throughout the apartment being heated, by constantly withdrawing the colder air through the eduction or descending flues K, as it sinks to the floor, and returning it in a heated state through the induction or ascending flues K'. Second. A great saving of heat is effected, for instead of the usual loss of several roomful of partially warmed air before the desired temperature can be reached, and the constant escape afterward of the warmest portion of the air through the ventilation flues, (which loss is inseparable from the action of the furnaces now in use,) whether the change of air is wanted or not, the same air passes and repasses through the rarefying drums D, until sufficiently warmed, and it may be retained in

the room without change for as long a time afterward as desired, ventilation being effected independently. Third. A more genial and salubrious warmth is obtained, as the atmosphere in its passage through the apparatus is neither over-heated by contact with red-hot iron, nor vitiated by smoke, dust, gas or other impurities; and, fourth, immunity is secured from the almost universal trouble of downward drafts in the warm air flues during the prevalence of high winds; for any resistance to the entrance of the warm air through the induction flues K', will be counterbalanced by the addition of an equal force to the descending column in the eduction flues K.

As an apparatus for ventilating either in connection with the warming process or without it, my improved heater possesses many advantages, which may be embraced under the following heads, viz:—First. By shifting certain registers and dampers hereinafter pointed out, it may be used either for warming as above described, or for the most efficient forced ventilation without throwing any heat into the room, or for both of these purposes combined at one and the same time; and, second, it may, through the same agency, be made to throw warm air into, or withdraw vitiated air from, either the top or bottom of the apartment, at the election of the occupant. These features will be understood by reference to Fig. 1, (Sheet No. 1,) of the drawings, which exhibits in connection with the same room, two rarefying drums D, and their circulating ducts or flues K, K', one set on the left hand side, being designed for warming alone, and the other set, on the right hand side, for both warming and ventilating as just explained. Now, if we wish to use the right hand set merely for warming, we have only to close the damper (*j*,) in the flue K', and open the registers (*f*, *h*,) when they will act precisely similar to the set on the left hand side. If we wish to ventilate alone, it will be necessary to close the registers (*h*, *i*,) and open the damper (*j*,) in conjunction with register (*f*, or *g*) when the vitiated air will be drawn off from either the bottom or the top of the apartment and carried into some chimney or ventilating flue through the continuation of the venti-duct K'; while if it is desired to warm and ventilate both at once, with the same apparatus, but with diminished efficiency of course, it will be necessary to adjust the damper (*j*) and registers (*f*, *g*, *h*, *i*) by partially opening those necessary to this end. Fresh air can be admitted through the channel *l*, when desired; the supply being graduated by the register *m*.

Spontaneous ventilation may be obtained by closing the damper (*j*,) and opening the valve or register (*i*). This method will be



adopted in summer, or when the apparatus is in use for warming alone.

5 The valves or registers (*d*), and (*e*) with (*f* and *h*) control the supply of heat from the drums D.

10 The furnace as before described and represented, is constructed for an open fire, which is deemed preferable when coke, anthracite coal or other almost smokeless fuel is used; but in the employment of wood, bituminous coal and the like, as fuel, a simple stove or its equivalent will be desirable for collecting and carrying off the smoke, otherwise the conducting power of  
15 the rarefying drums would be impaired by depositions of soot upon their surfaces.

What I claim as new, and desire to secure by Letters-Patent is:—

The peculiar arrangement and combination of the induction and eduction flues or venti-ducts K, K', the continuation flue of the venti-duct K', the damper *j*, and the registered openings *f*, *g*, *h*, *i*, whereby any number of the rarefying drums D, with their accompanying venti-ducts K, K', may be used at pleasure, either for warming or ventilating alone, or for both at the same time, as before described.

W. H. CHURCHMAN.

Witnesses:

WM. E. LAWLER,  
E. M. CURTISS.