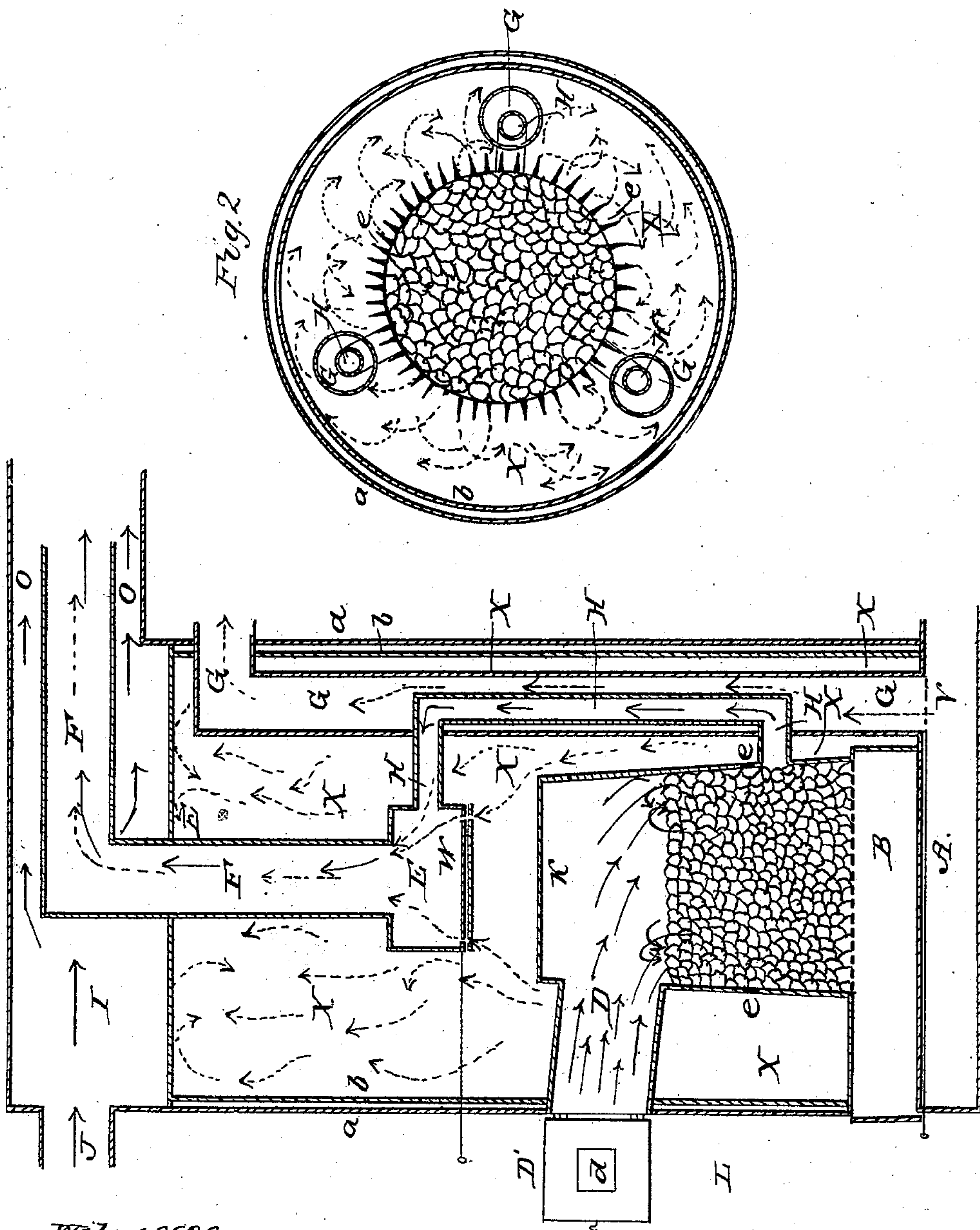


C. B. SAWYER.

Hot Air Furnace.

No. 24,332.

Patented June 7, 1859.



Witnesses
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CHARLES B. SAWYER, OF FITCHBURG, MASSACHUSETTS.

FURNACE AND STOVE.

Specification of Letters Patent No. 24,332, dated June 7, 1859.

To all whom it may concern:

Be it known that I, CHARLES B. SAWYER, of Fitchburg, county of Worcester, State of Massachusetts, have invented an Improvement in Air-Warming and Ventilating Furnaces and Stoves; and I do hereby declare that the following is a full and exact description of its construction and operation, reference being had to the accompanying drawings, and to the letters of reference marked thereon, so as to enable others skilled in the art to make and use my invention.

Figure 1, of the drawings represents a vertical central section through the apparatus. Fig. 2, a horizontal cross section through the same, the section being taken through the gas holes *e*, in the fire pot of the furnace on the line L M, Fig. 1.

K, is the fire pot provided with a grate Y, and an ash box B, below it.

A doorway D, provided with a door D', communicates with the fire pot as seen in the drawings.

The fire pot stands in the center of the gas or combustion chamber X, which latter is surrounded by a double wall *a b*, the diameter of the cylinder *b*, being smaller than that of cylinder *a*, so as to leave a hollow space between the two walls which being filled with air prevents the escape of heat and thus economizes fuel. The chamber X, is closed on top and bottom and a cold air chamber A, is arranged below it.

Three or more pipes G, communicate with the cold air chamber A, and extend through the combustion chamber X, and through the walls *b, a*, into the room or rooms to be heated by the furnace. The valves V, at the bottom of pipes G, serve to open, adjust, or shut up the communication of the cold air chamber A, with the pipes G, for the purpose of adjusting the quantity of fresh air introduced into and heated in the pipes G, and conveyed through said pipes to the room or rooms to be heated.

The pipes G, being arranged in the combustion chamber X, and around and near the fire pot K, the cold air entering said pipes G, from below must naturally become heated in its passage through them, but to heat the air still more during said passage through the pipes G, pipes H, are arranged one inside of each of the pipes G, and communicating at the bottom with the fire pot below the surface of the fuel being burned,

and at the top with the radiator E. Of course the pipes H, become highly heated by the direct heat from the burning fuel and thus serve to raise the temperature of the air in the pipes G.

A pipe F, passes from the radiator up into the chimney and the bottom of the radiator is provided with a valve or damper W. The pipe F, where it passes through the top of the chamber X, and before it enters the chimney at O, is surrounded by the horizontal ventilating chamber I, which latter communicates at one side through pipe J, with the room or rooms to be heated, and at the other side at O, with the chimney.

The cool and vitiated air passes from the room into the pipe J, where it opens in the floor of the room, and escapes through the pipe J, and ventilating chamber I, into the chimney.

When it is desired to start the fire in the above described furnace, some kindlings are placed upon the grate Y, and the coal is turned in through the doorway D, (the door D', being open as represented in Fig. 1,) upon the kindlings, after which the door D', is closed and the damper or door in the ash box B, under the grate opened. The kindlings being now fired the draft through the fire flues H, will cause the flame and heat to ascend through the coal so as to cause it to ignite, after which the door or damper in the ash pit below the grate is closed, and the door or damper *d*, in the door D', is partially opened. In this way all air is shut out from ingress below the coal, and consequently the fresh air to support combustion must pass in through the door D', and then down through the coal and out and up the fire and draft flues H, so that the most intense heat of the burning coal will be on, or about on a line with the upper edge of the draft flues H, where they leave the fire pot K, as indicated in red color in the drawings. Now as the air enters the fire pot K, through the door D', it seeks or flows toward the inside of the fire pot as shown in waved black arrows—instead as some would suppose down directly through the coal. It will therefore be seen that the highly carbonized gas which escapes or is evolved by the gradually heating of the coal in the fire pot K, above the flues H, H, and before it becomes ignited will to a great extent rise through the coal as indicated by blue arrows, until

it comes in contact with the fresh air, indicated by black arrows when it will be turned and carried toward and down the sides of the fire pot. The damper W, which
 5 separates the gas or combustion chamber X, from the radiator E, is now slightly opened, as shown in Fig. 1, so as to cause a draft from the chamber X, up through the gas
 10 chamber X, into the radiator and pipe F. This draft will cause the excess of the highly carbonized gas which would otherwise be liable to escape unburned through the flues H, where the draft is very strong,
 15 to issue and burn freely through a series of little holes or slots *e*, in the combustion chamber X, as represented in Figs. 1, and 2. These holes or slots are arranged all around the fire pot immediately above the upper surface of the draft flues H, where they enter
 20 the fire pot K. By this means it will be seen all the gas and carbon will be consumed within the stove, and no smoke or combustible gases will escape. Thus all the heat which can be derived from a thorough
 25 combustion of the coal introduced in the stove will be made effective toward heating the rooms with which the furnace is connected.

Whenever it should be desirable to draw
 30 off most of the heat directly into the chimney and thereby suspend the heating of the rooms the draft through the door D', may be shut off, and the damper W, may be drawn out so as to uncover the opening in the bottom of the radiator E, when the hot air contained within the gas burning chamber X,
 35 through which the pipes G, pass will escape through the radiator E, and pipe F, into the chimney.

40 Each of the hot air pipes G, being pro-

vided with a valve V, at its bottom, it will be understood that by closing one or more of said valves the current of air through the corresponding pipe or pipes G, will be cut off and the heating of the room or rooms
 45 to which said pipes G, lead will be discontinued.

By combining the draft flues H, gas holes *e*, fire pot K, and gas burning chamber X, I am enabled to burn a large proportion of
 50 the gas evolved by the gradually heating of the coal in the chamber X, and under a slight draft while at the same time I have a strong draft from the bottom of the burning coal through the pipes H, so as to keep up the
 55 proper supply of fresh air and admixture therewith of the gas evolved as indicated in blue and black waved arrows Fig. 1, which would not be the case if the gas was allowed to escape through the flues H, where the
 60 draft is strong and the motion of the gases passing through the same consequently very rapid.

What I claim and desire to secure by Letters Patent, is:

1. The arrangement of the closed topped
 65 fire pot K, gas or combustion chamber X, fire or draft flues H, small gas openings *e*, and air heating flues G, in relation to each other substantially as shown and described.

2. The arrangement of the horizontal ventilating flue J, ventilating chamber I, and
 70 exit ventilating flue O, and right angled draft flue F, in relation to each other and in the top of the furnace as shown and described.

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Witnesses:

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