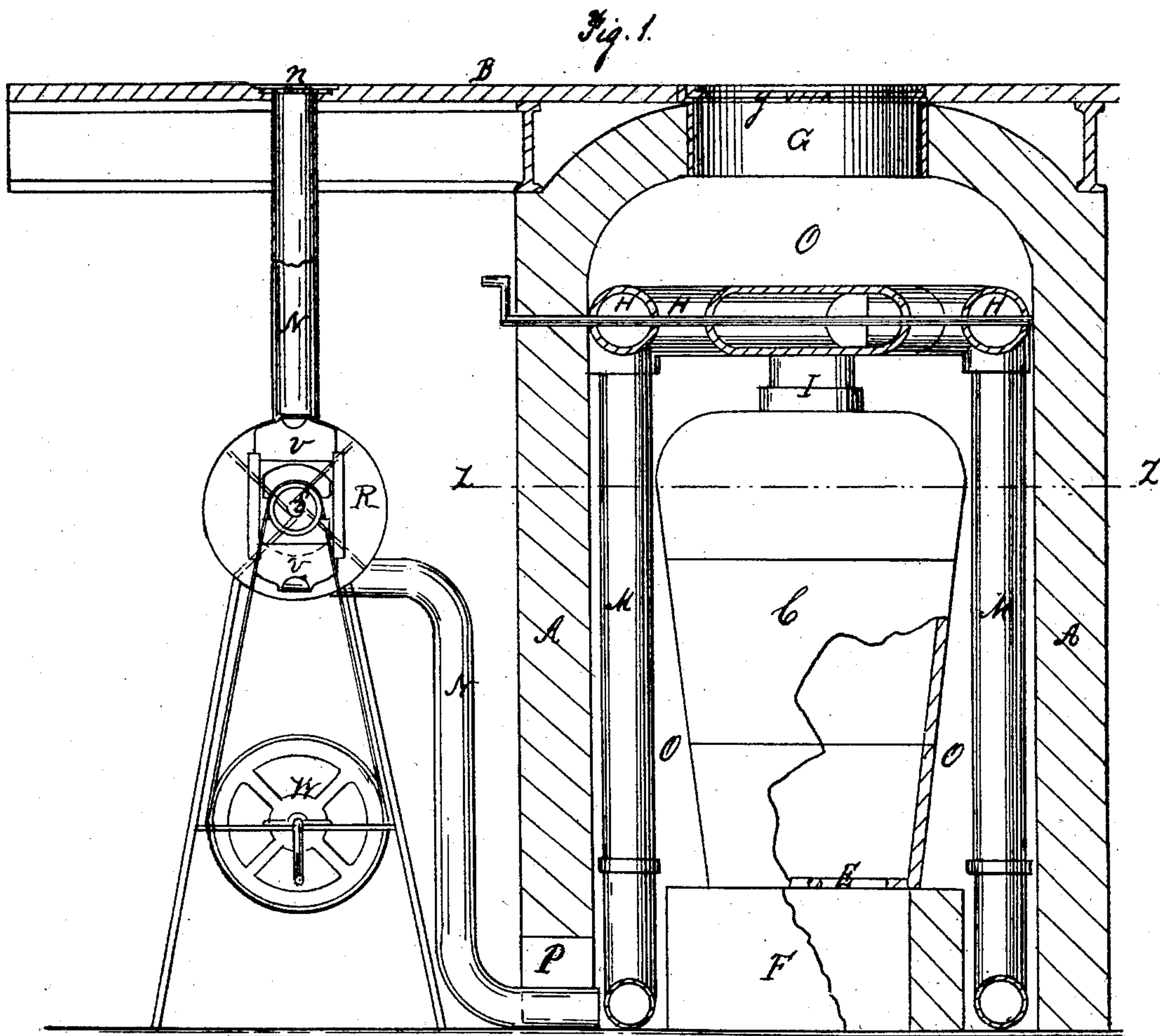


J. WHITEHILL.  
Hot Air Furnace.

No. 76,018.

Patented Mar. 24, 1868.



Witnesses.

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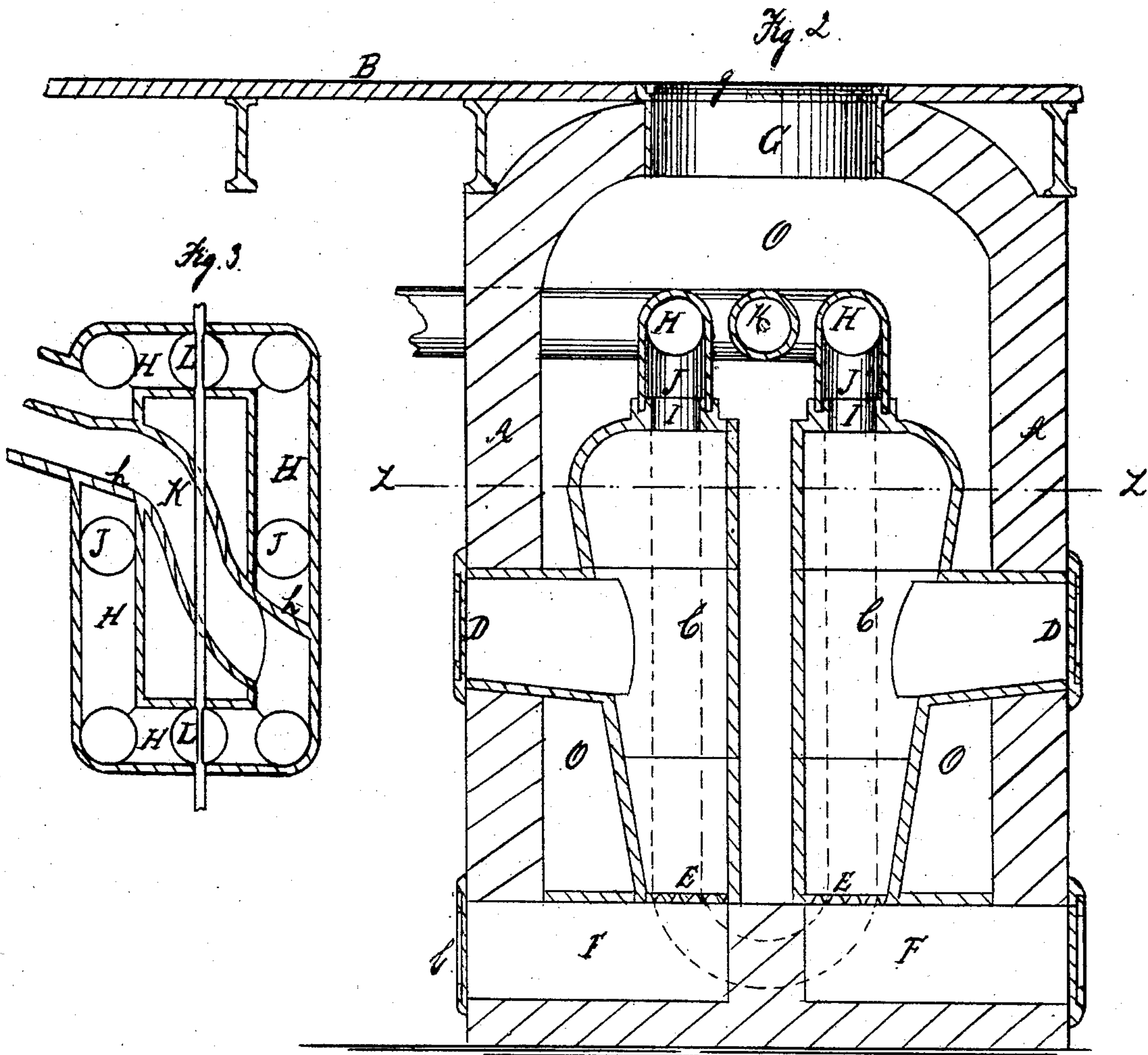
Inventor.

James Whitehill  
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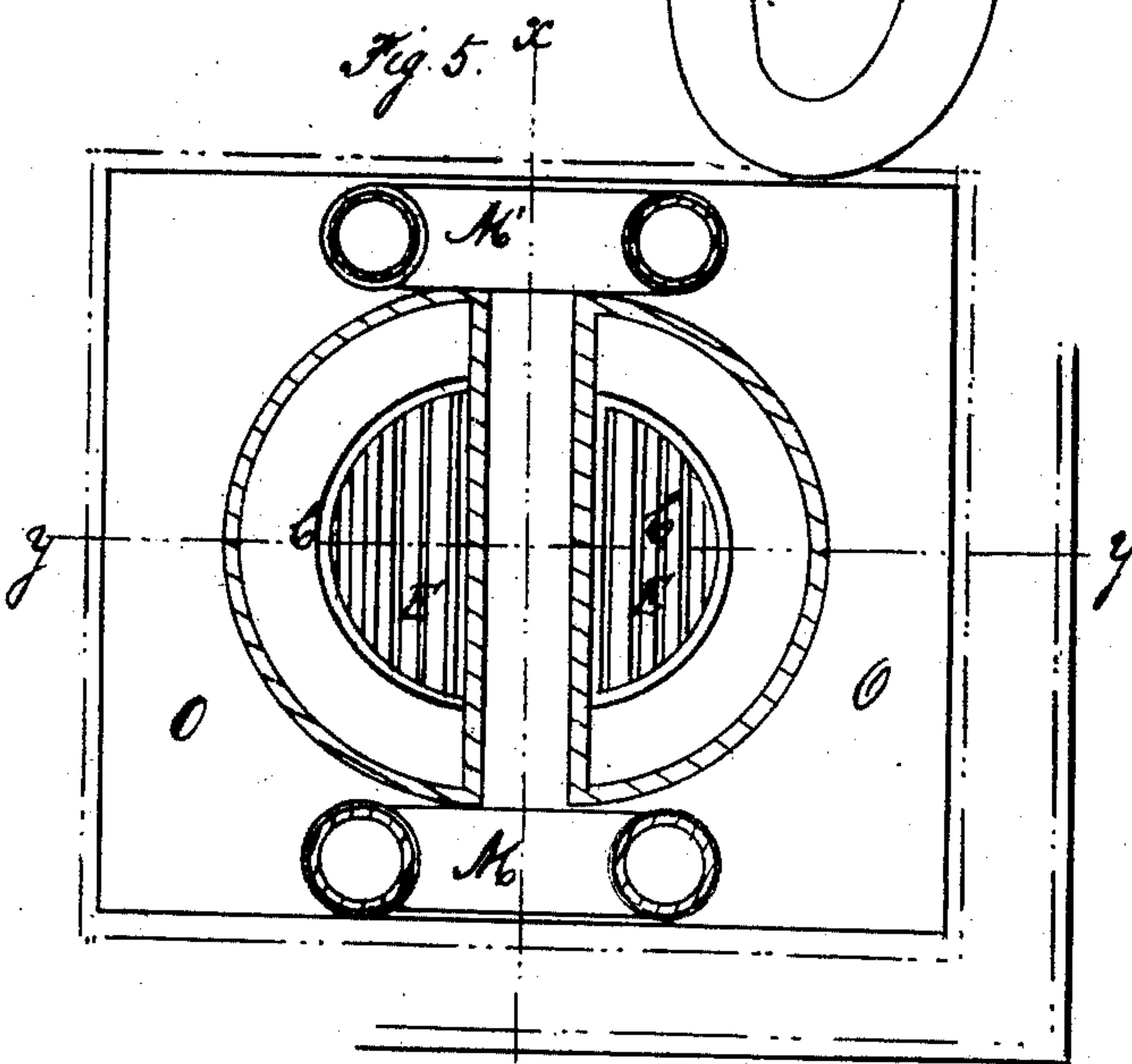
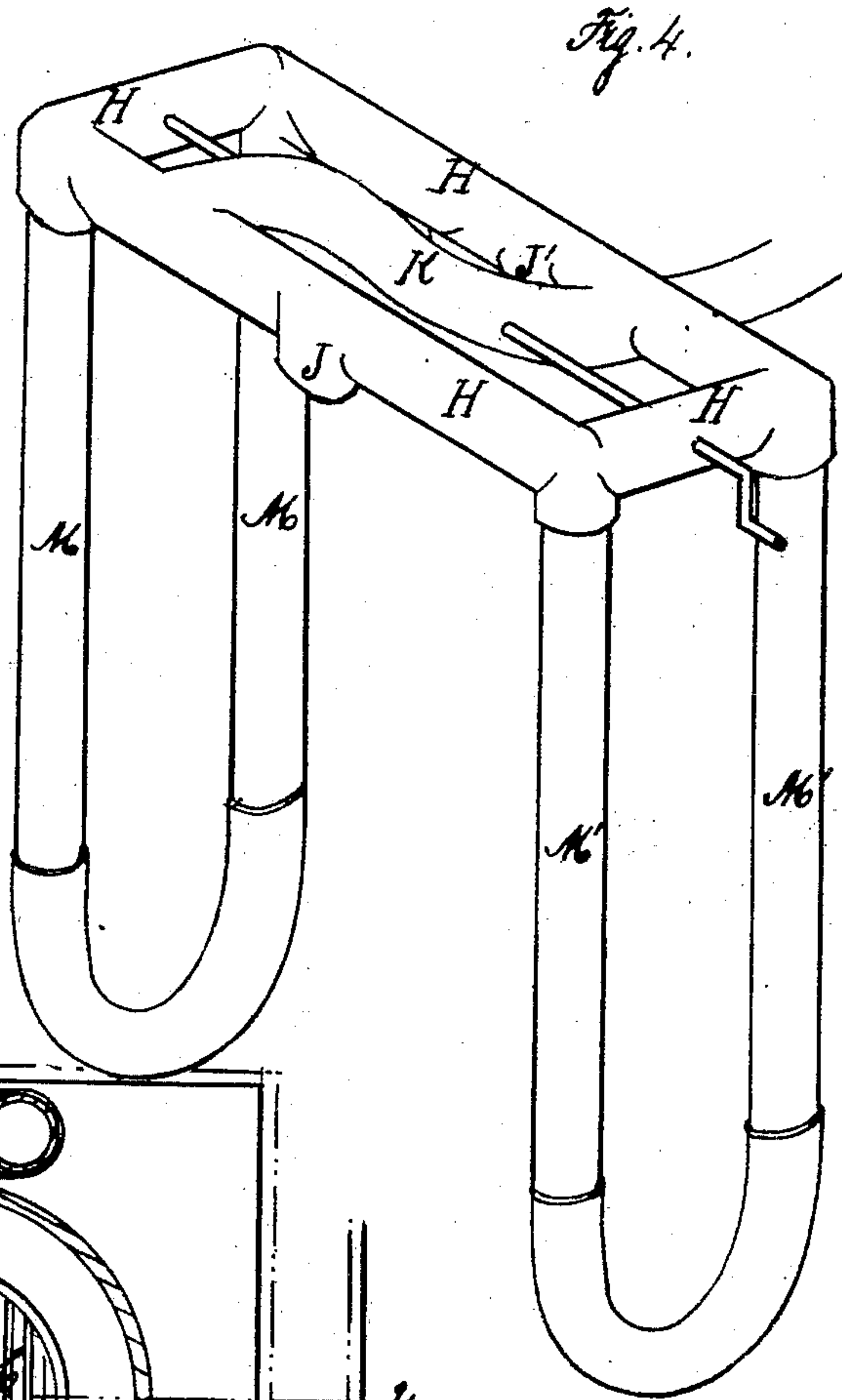
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# UNITED STATES PATENT OFFICE.

JAMES WHITEHILL, OF FREDERICK, MARYLAND.

## IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. 76,018, dated March 24, 1868.

*To all whom it may concern:*

Be it known that I, JAMES WHITEHILL, of the city and county of Frederick and State of Maryland, have invented a new and Improved Apparatus for Warming and Ventilating Buildings; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a vertical section through the line  $x x$  of Fig. 5. Fig. 2 is a vertical section through the line  $y y$  of Fig. 5. Fig. 3 is a cross-section through the top of the attachment shown in Fig. 4. Fig. 4 is a detached perspective view of the attachment for increasing the radiation. Fig. 5 is a cross-section through the line  $z z$  of Figs. 1 and 2.

This invention consists, first, in an improved attachment to be used in connection with the furnace patented by me November 8, 1859; and, secondly, in so connecting the hot and cold air flues, and employing a fan in combination with them, that the building can be quickly emptied of its cold air while being filled with warm air, and that the supply of cold and warm air can be so adjusted that the temperature of the building can be perfectly regulated and controlled at all times.

In the drawings, the red part A of the figures represents the brick or metallic walls inclosing the body of the furnace. The blue parts show sections of the metallic portions of the furnace. The buff part B represents the floor of the room or building above, and the gray parts represent the empty spaces between the walls of the furnace and its inclosing-wall A, the furnace being supposed to be located in a cellar or basement.

The body of the furnace is the same as that patented by me November 8, 1859, C C representing the twin fire-chambers; D D, the doors; E E, the grates; F F, the ash-boxes, closed by doors  $f f$ ; G, the hot-air flue, surmounted by a register,  $g$ .

In the furnace thus constructed, many of which have been in use since the former patent was granted, the smoke and volatile products of combustion escaped through a pipe or flue leading directly to the chimney, if not forming a part of it. In this way the heat of

the smoke, &c., was not utilized to its fullest extent, but in the rapid direct passage of the smoke to the open air was conveyed away and dissipated.

The object of one part of this invention is to remove that objection to my old furnace by providing it with such an attachment that I can at pleasure either suffer the smoke to pass away directly, as before, or cause it to circulate around the furnace until it releases the major part of its heat before escaping to the open air.

The attachment which I have constructed for this purpose is shown detached from the furnace in Fig. 4, in perspective, and in Fig. 3 in horizontal section. It consists of a hollow pipe, H, large enough to pass the smoke, &c., of the furnace, extending horizontally around in the shape of a rectangle, and provided with dividing partitions,  $h h$ . The smoke from the fire-pots C C passes up through two flues, I I', and enters this pipe at the center of each side, as shown at J J'.

K is a pipe extending across the rectangle somewhat obliquely, and L L' are two damper-valves attached to a single shaft, which close the pipe H at each end simultaneously. From each corner of the rectangle a pipe, M M', runs down to the bottom of the furnace, in the space O, between the blue and the red parts, bending round at the lower part of the furnace, where it may rest upon an iron or brick support, and returning to the other corner at the same end of the rectangle. When the dampers L L' are opened, the smoke, &c., passing into the rectangular pipe from each flue I I, goes around the end of the rectangle and escapes directly through the oblique pipe K; but when the dampers are closed the smoke cannot pass directly around the ends of the rectangle, but in order to get by the dampers is obliged to go down at one corner into the pipe M or M', and come up at the other corner, whence it can escape, as before. The pipes M M' may be so convoluted, divided, or coiled in the empty space O, between the walls shown in blue and red in Figs. 1 and 2, that the smoke will be made to traverse a very long distance before it comes up to the opposite corner of the rectangle. Thus its heat may be thoroughly utilized and employed in heating the building, and thereby a great saving



of fuel may be effected. The heat from the space O passes up to the building through the flue G and register *g*. In connection with a furnace thus constructed I use a pipe, N, extending from a register, *n*, in the floor of the room or building to be warmed to the bottom of the space O, and passing through the wall A, alongside of flue P, through which cold air can be thrown directly from the cellar, or by means of a suitable pipe from out-of-doors to the hot-air space or chamber O. Through the pipe N, while the building is warming, the heavy cold air, (that is always the last to escape from a building,) remaining, in consequence of its gravity, near the floor, is drawn out of the room above into the hot-air space O, the heat in the latter and the rapid escape of hot air through pipe G causing so great a draft in the pipe N that in a brief time a room of considerable size may be emptied of cold air by means of it; but in order to bring the whole thing more completely under the control of the fireman, and enable me to adjust and regulate it at will, I provide a fan-box, R, about midway of the pipe N, through which all the air traversing the latter must pass, and in this box I station a revolving fan, S, driven by a belt from a weighted wheel, W, below. When I desire to empty the room of its cold air with great rapidity, I set this fan in motion, which causes so great a suction through the pipe N toward the furnace as to soon relieve the room or building from such air. In the side of the fan-box are two valves, *v v*. If I desire to retard the heating of the room, or to hold its heat at any given point, I set the fan in motion and open these valves to any suitable degree. The fan then draws cold air in through the open valves, drawing little or none from the register *n*, and throws it into the hot-air chamber O, whence it also forces it immediately to the building or room without allowing it to become overheated. The fan may also be reversed, if occasion should require, and be used for pumping the hot air from the air-chamber O. The register *n* being

closed and the valves *v v* opened, the fan, when its action is reversed, will exhaust the hot air from the space O and discharge it through the valves *v v*, whence it may be carried outside of the building by suitable pipes. Thus the amount of hot air thrown into or withdrawn from the room may be perfectly regulated and controlled, and the air in the chamber O may be so mixed with cold air at any moment as to bring its temperature to and keep it at any point which may be desirable while supplying it to the chamber above; or the hot air from the furnace may be entirely withdrawn and a back current established from the building through register *g*, flue G, pipe N, and valves *v v* by reversing the action of the fan.

This invention has been thoroughly tested in heating a room sixty by eighty feet, and it is found that by establishing the circuit through pipe N, hot-air chamber O, and flue G, by means of the fan, the building will be heated in about one-half the time required when the register *n* is closed.

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

1. When used in connection with my furnace, as above described, the attachment shown in Fig. 4, substantially as and for the purpose set forth.

2. The combination of a fan, S, with a pipe, N, leading from the lower part of the room to be warmed to the lower part of the hot-air chamber O, by which a circuit of air can be established that will exhaust the cold air from the room, pass it over the heater, and return it warm to the room again, substantially as and for the purpose set forth.

To the above specification of my invention I have signed my hand this 29th day of January, 1868.

JAMES WHITEHILL.

Witnesses:

CHAS. A. PETTIT,  
 SOLON C. KEMON.