

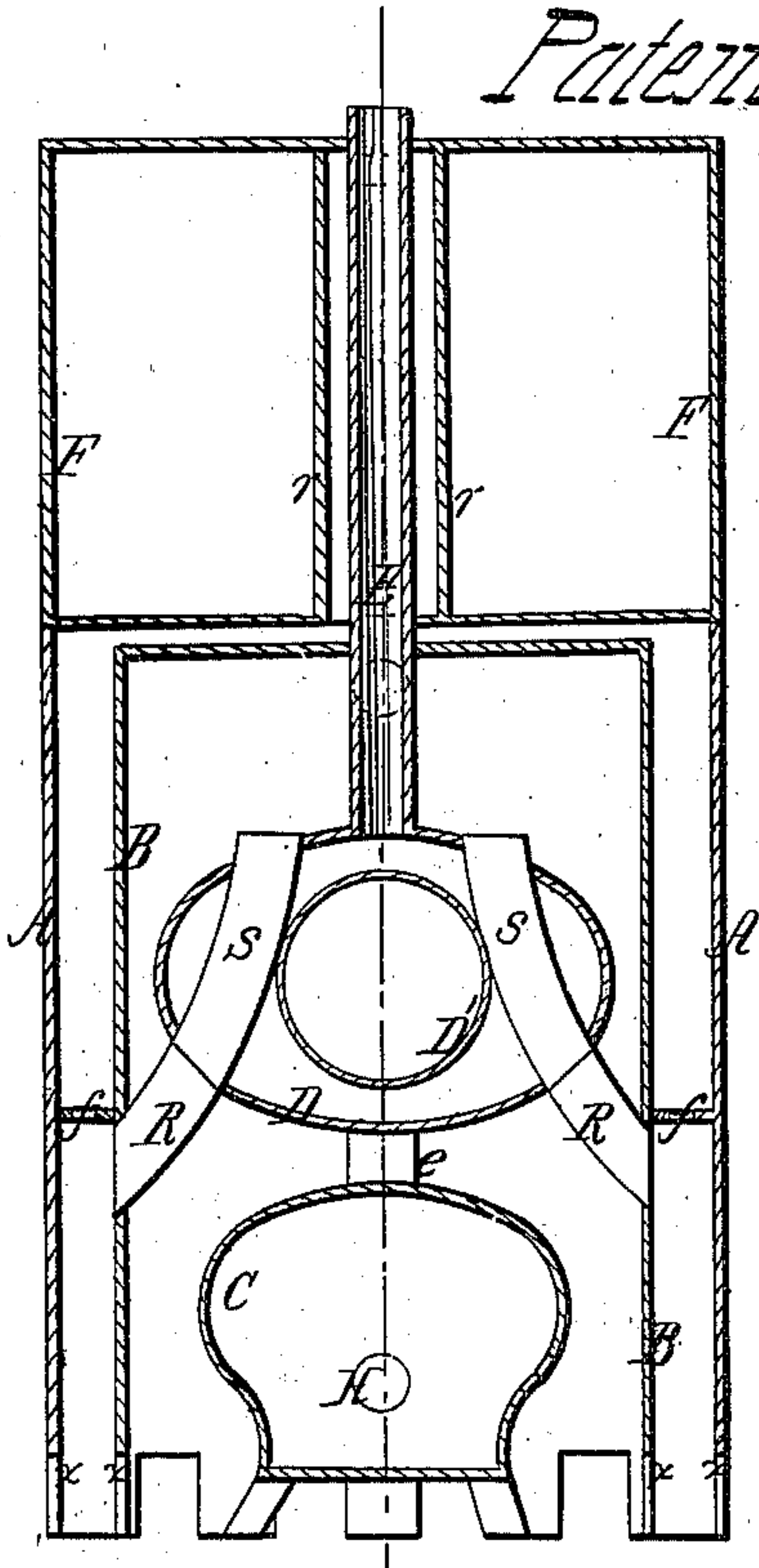
*M. Metcalf.*

*Hot-Air Furnace.*

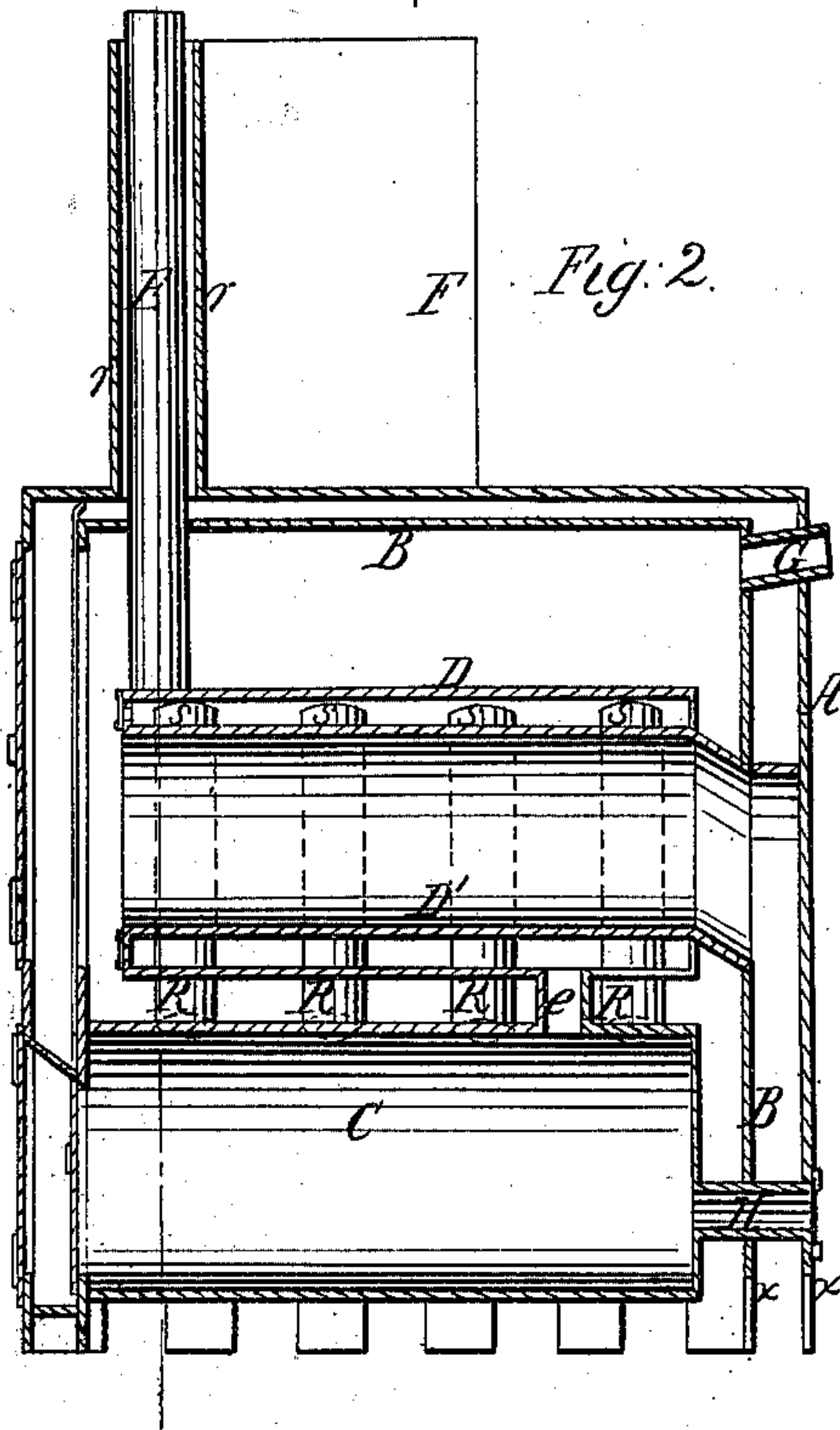
*N<sup>o</sup> 81,809.*

*Patented Sept. 1, 1868.*

*Fig. 1.*



*Fig. 2.*



*Witnesses,  
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by  
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att'y,*

# United States Patent Office.

MARTIN METCALF, OF GRAND RAPIDS, MICHIGAN.

Letters-Patent No. 81,809, dated September 1, 1868.

## IMPROVEMENT IN HOT-AIR FURNACES.

The Schedule referred to in these Letters Patent and making part of the same.

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, MARTIN METCALF, of Grand Rapids, in the county of Kent, and in the State of Michigan, have invented certain new and useful Improvements in Hot-Air Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and the letters of reference marked thereon.

In the annexed drawings, making a part of this specification—

Figure 1 represents a cross-section, and

Figure 2 represents a longitudinal section of my furnace.

A represents the outer brick or metallic case, provided with suitable doors hinged thereto, leading into the fire-box C, and to the drum D, which is situated immediately above the fire-box. The case A is also provided with slots or passages *x*, at suitable distances apart along its bottom or lower edge, for the purpose of allowing or conducting the cold air of the room to the heating-surface of the fire-box and drum.

B represents another box, of smaller dimensions, corresponding in shape to the outer case A, and provided with slots *x*, also corresponding with the slots through the outside of the furnace, and provided with a projecting horizontal edge or flange, *f*, just so as to fit inside of the outer case A nearly equidistant from the top and bottom of the same. The flange or partition *f* has a suitable number of small holes, to allow the passage of air from the chamber below said partition to the one above the same, and *vice versa*.

Near the bottom of the inner box B is adjusted a fire-box, C, of such shape and dimensions as may be required, which is provided with a suitable door to close the same when it becomes necessary so to do, and directly above the said fire-box is adjusted a drum, D, which has a cylindrical pipe, D', running through its centre longitudinally. The ends of the drum D, between its edge and the edge of the pipe D', are closed, thereby forming an air-chamber between the sides of the said pipe and drum. The inner pipe D' projects beyond the drum D and downward, so that the passage through said pipe is extended and conducts the air from the chamber between the boxes A and B, below the partition *f*, through said pipe forward, and thence into the chamber above the drum D.

A connecting smoke-pipe, *e*, conducts the smoke from the rear end of the fire-box into the chamber of the drum D, and thence it passes forward, and is carried off by means of a smoke-pipe, E, attached to the front end of the drum D, and extending up through the top of the boxes B and A of the furnace.

A series of pipes, R, is secured in the drum D, and, extending downward, is adjusted or fastened in the sides of the box B, below the horizontal partition *f*; and corresponding pipes S are placed within the drum D, and extend upward, making a series of cylindrical pipes extending through the drum D, from the bottom to the top thereof.

F represents a cover for the outside box A, with a metallic radiator, of such shape and dimensions as may be most suitable, and *r* represents a chimney surrounding or in lieu of the smoke-pipe E, and extending as high as required.

G represents a pipe leading from the chamber above the drum D, into which the hot air, from all sources, is first conducted, and thence through the pipe G to any place desired.

H represents a small pipe or hole leading from the back side of the furnace into the fire-box C, which may be closed by means of a cut-off valve or button secured on the outside of the furnace.

It will be seen that the cold air from the outside of the furnace passes through the passages *x* and upward through the pipes R, and is brought directly in contact with the hot surface of the drum D, and passes thence into the chamber above said drum, and is conducted wherever it may be desired by means of the pipe G. A part of the cold air from the outside may pass through the passages *x* and corresponding slots *x* of the inner box B, and come directly in contact with the heated surface of the fire-box C, and passes thence around the outside of the heated drum D into the chamber above, and thence as above described.

Thus it is obvious that the coldest air from the outside is conducted directly to the hottest surfaces inside of the furnace, and therefore more heat is imparted to the air than by any other known device.



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

1. The pipes R, or their equivalents, when arranged with a drum, D, and extending downward as described, and for the purpose specified.
2. The combination of a case, A, provided with passages *x* and a box, B, provided with a projecting flange, *f*, and slots *x*, with the pipes R and the drum D, when constructed and arranged substantially as and for the purpose herein set forth.

In testimony that I claim the foregoing, I have hereunto set my hand, this 11th day of December, 1867.

MARTIN METCALF.

Witnesses:

T. SINCLAIR,

H. L. CRITTENDEN.