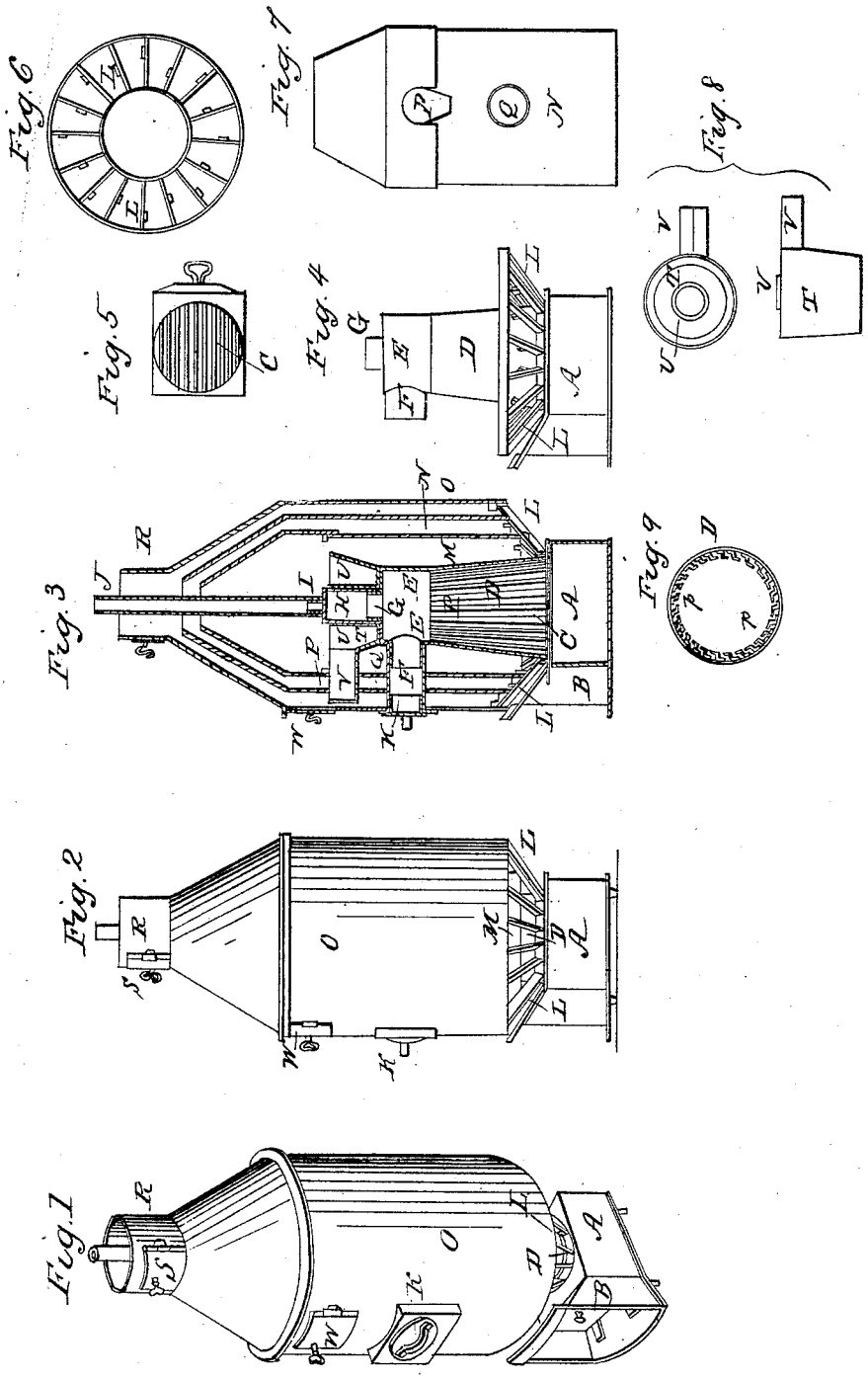
M. STEWART.

Hot Air Furnace.

No. 2 371. Patented Nov. 16, 1841.



# UNITED STATES PATENT OFFICE.

MATHEW STEWART, JR., OF PHILADELPHIA, PENNSYLVANIA.

## METHOD OF CONSTRUCTING THE FIRE-CHAMBERS OF STOVES OR FURNACES, &c.

Specification of Letters Patent No. 2,371, dated November 16, 1841.

*To all whom it may concern:*

Be it known that I, MATHEW STEWART, Jr., of the city and county of Philadelphia and State of Pennsylvania, have invented a new and useful Apparatus for Heating Air for Warming Rooms, which is described as follows, reference being had to the annexed drawings of the same, making part of this specification.

Figure 1 represents a perspective view of the exterior view of the heater. Fig. 2 represents a front elevation of the same. Fig. 3 represents a vertical section of the same through the center showing the interior of the heater. Fig. 4 represents the exterior of the base or ash box, fire chamber, cap, and circular-grate for supporting the concentric hot air cylinders. Fig. 5 represents a plan of the grate at the bottom of the fire chambers. Fig. 6 represents a plan of the circular grate for supporting the cylinders. Fig. 7 represents an elevation of one of the three concentric cylinders the other two being formed in a similar manner. Fig. 8 represents a top view and side elevation of the water vessel. Fig. 9 is a top view of the chamber of combustion.

The similar letters refer to corresponding parts.

This apparatus consists of 1st a base A Figs. 1, 2, 3, 4. This is composed of five plates arranged so as to form a rectangular box A about 18 inches long, 18 inches wide, and 9 inches high, held firmly together by screw rods. The front parts of the two side plates and top plate, are made flaring, like the sides of a Franklin stove. The bottom plate also projects horizontally about the same distance, or a little more, which forms the hearth. The front is left open for removing the ashes and admitting air to the chamber of combustion; but may be closed when required by a sliding door B, made to fit said opening in front. On the inside of the side plates under and near the top plate of the box A, are horizontal brackets, or ribs, upon which rests a sliding grate C. In the center of the aforesaid top plate is a round aperture, around which is raised a cylindrical rim over which is placed the cylinder D which forms the fire chamber or chamber of combustion, said cylinder may be cast with the top plate of the box. This box forms the ash pit, and also a chamber through which the cold air passes for supplying combustion. The sliding grate C, is cast with a circle containing a range of parallel bars and a handle for drawing it out when required to clean chamber D and for shoving it in when to be supplied with fuel.

The interior of the chamber of combustion Figs. 3, 9 is constructed with a lining of thin plates *p* of sheet or cast iron bent at right angles forming spaces between said plates and the cylinder and flanges by which they are riveted or otherwise fastened to the cylinder over the sides of which plates next the center of the cylinder are arranged a series of oblique ribs for preventing the fuel from becoming packed in a solid mass against said plates and also from burning out rapidly. The plates are for preventing the same effect on the cylinder-columns of smoke and other gas being kept circulating between the plates and the other cylinder which ascend to the chimney. By this arrangement the cylinder may be made of thick sheet iron which will not absorb the heat as soap stone, brick, and cast iron and will heat the surrounding air much sooner. The plates, ribs and cylinder, however, may be made of thin cast iron, with or with out the ribs, then the plates may be in the form of a T or Z or any suitable shape to produce the intended result. This mode of constructing the furnace or chamber of combustion will answer a valuable purpose in other kinds of stoves or heaters other than the one here described.

Second. A cylindrical cap E Figs. 3 and 4. This is made of sheet iron and fits the upper end of the cylinder. D has an aperture in one side surrounded by a horizontal tunnel F about 12 inches in length and open at both ends through which the fuel is admitted to the fire cylinder and said cap is covered at top, except a small round aperture in the center of about 8 inches diameter, surrounded by a collar G about 3 inches high. Around this collar is raised a drum H 8 inches diameter and 12 inches high closed at the top except an aperture for the escape of the smoke of about 5 inches surrounded by a collar I to receive the smoke pipe J leading to the chimney.

The outer end of the feeding tunnel is finished with a neat flange and is closed by a door or stopper K, to prevent the admission of air, or the escape of smoke. The aperture in the head of the cap, when a single drum is placed over it, is closed by a slide.

Third. An open basket bottom L sur-

rounding the fire chamber for supporting the cylindrical hot air cases—Figs. 1, 2, 3, 4, and 6. This is composed of two rings one smaller than the other connected together by bars radiating upward from the periphery of the smaller ring at an angle of about 40 degrees with a horizontal plane. The diameter of the lower and inner ring is a little larger than the outside of the fire cylinder at the bottom, around which it is placed, where it unites with the top of the base, or ash box, which cylinder it surrounds, resting upon the top of said ash box. The outer ring is about 30 inches diameter and is placed above the lower ring. To the bars are riveted cleats projecting about one inch above them for holding the concentric cylinders or hot air cases hereafter described. This inverted conical grate or basket is composed of stout band iron.

Fourth. Three hollow concentric cylinders or hot air cases open at both ends M, N, O, Figs. 1, 2, 3, 7. The inner cylinder M Fig. 3 or that which surrounds the fire cylinder, or chamber of combustion, is about 26 inches diameter and 36 inches high, made of sheet iron and resting on the inverted circular grate on the cleats riveted to its bars the upper end of said cylinder is surrounded by an inverted funnel shaped cap open at top, two openings P, Q, in the side—one directly over the other—the lower opening Q is to allow the feeding tunnel to pass horizontally through it. The upper opening is to admit a trough for holding water to create vapor. The second or middle cylinder N is about 28 inches diameter and 36 inches high made and supported in like manner to the first or inner cylinder, just described. The third or outer cylinder O is made of tin about 30 inches diameter and 36 inches high, formed and supported in like manner to the cylinder last described, excepting that the upper end of the section of a funnel, surrounding the top of the cylinder, is surrounded by a vertical collar or rim R open at top having a valve S in one side to regulate the heat.

Fifth. An evaporator T Fig. 3. This is a cast iron vessel for holding water, about 10 inches diameter at bottom and 12 inches at top, having a round aperture in its bottom for the smoke pipe to pass through which aperture is surrounded by a vertical collar U as deep as the vessel and having a notch cut in the side of the vessel at top against which is placed a horizontal trough V closed at its outer end for holding water. This vessel or evaporator rests upon the top of the cap of the fire chamber. This trough projects through the sides of the several cylinders where the notches are made in order to enable any person to see when the water has evaporated that a fresh supply may be admitted if necessary. The opening in the outer cylinder opposite the trough is to be closed by a door W. This air heating apparatus is designed to be placed on the floor of the cellar in any convenient place, the conducting tube or tubes for conveying the heated air to any place desired being attached to the collar or rim of the outer cylinder last described by means of a drum or cap which covers it. The smoke tube or pipe may be conducted into the chimney either in the cellar or above as desired.

The dimensions and proportions of the parts may be varied as circumstances shall require.

The charcoal light wood, or other combustibles are placed on the grate and lighted; the coal is then put into the cylinder and ignited; the fire cylinder soon becomes hot the cold air surrounding it is quickly heated and rises to the top of the outer cylinder— the cold air to be heated enters and rises between the bars of the circular inverted grate and cylinders thereon which are open at both ends and coming in contact, with the outside of the fire cylinder and each other, is heated and rises to the top of the funnel of the outer cylinder, the first and second cylinders prevent the escape of heat by radiation—the columns of heated air between them rise and circulate with the air which was heated by coming immediately in contact with the fire cylinder as before described. The heated air is then conveyed immediately into the room above by extending the top of the funnel, or it may be collected into a common receiver or drum from whence it may be conducted to whatever place is desired to be heated, by suitable tubes furnished with registers or valves.

Among the advantages possessed by this air heater over any other in use is that of producing a greater quantity of heated air with a less consumption of fuel than has been heretofore effected, within the knowledge of the subscriber.

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

1. The construction of the furnace with the lining of thin bent plates for the purpose and in the manner herein set forth.

2. The method of constructing and combining the water vessel with the hot air chamber E E by forming it with a projection V and arranging it immediately over said chamber with the tube for conducting off the smoke passing through the opening in its center as described.

MATHEW STEWART, Jr.

Witnesses:
Ph. Christian,
Wm. Jaggers.