H. M. PHINNEY.
Hot-Air Furnace.

No. 205,762. Patented July 9, 1878.

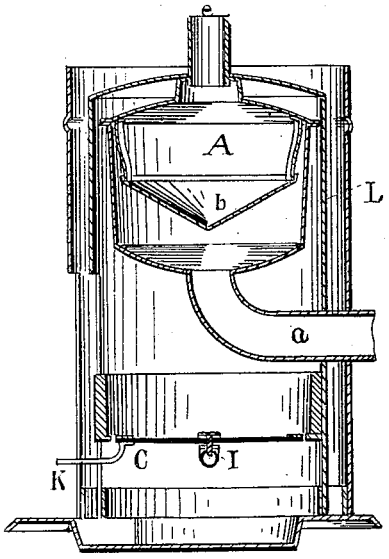


Fig. 1.

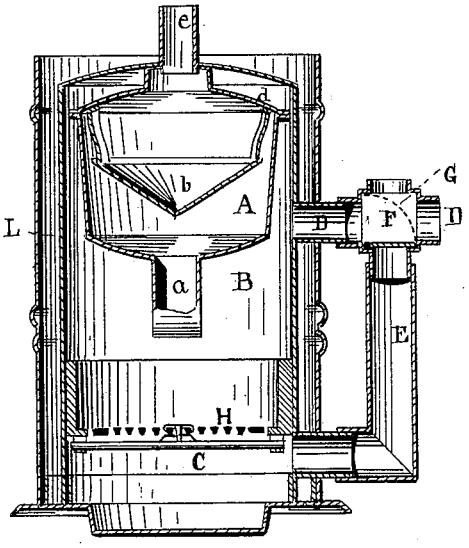


Fig. 2.

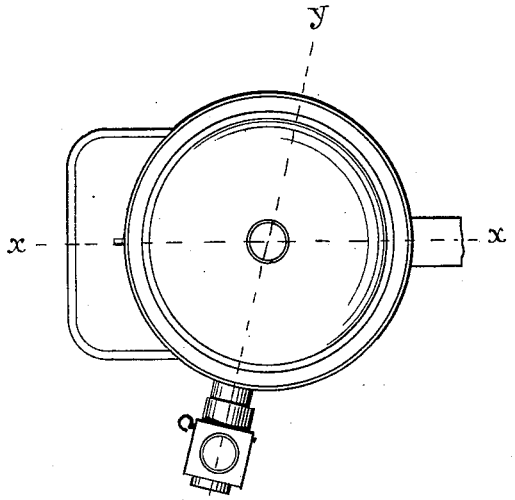


Fig. 3.

WITNESSES
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HUGH M. PHINNEY, OF CAMBRIDGE, MASSACHUSETTS.

## IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. **205,762**, dated July 9, 1878; application filed November 20, 1877.

*To all whom it may concern:*

Be it known that I, HUGH M. PHINNEY, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Furnaces, of which the following is a specification:

This invention has for its object the following-described heating-chamber, entirely surrounded by a combustion-chamber and provided with a cold-air inlet and suitable hot-air outlet, and also with a cone-shaped deflector arranged immediately over the cold-air inlet, so that the cold air is caused to impinge against and contact with the heated walls of the chamber in passing through the same by being thrown against said walls by the deflector in a very thin current, as will hereinafter be more fully described.

In the drawing, Figure 1 is a vertical section of a furnace, showing my invention on the line *x x* of Fig. 3. Fig. 2 is another vertical section of the same on the line *y y* of Fig. 3; and Fig. 3 is a plan of the furnace.

The chamber A is arranged within and near the top of the combustion-chamber B, and is provided with the cold-air inlet *a*, the deflector *b*, and the hot-air outlet *c*. In practical use I design to adapt the chamber A to any of the principal furnaces on the market, as the same may be introduced as an attachment and fitted in the combustion-chamber with a very little modification or alteration of any of the furnaces now in use; and, on a smaller scale, the same principle may be used in stoves having a combustion-chamber of sufficient size. The chamber may be made of cast, sheet, or wrought iron, and, preferably, is constructed in detachable sections. In the drawing, the top plate *d* is shown removable.

It will be seen that the deflector spreads the amount of cold air and causes it to contact with the heated side of the chamber in a thin volume, and thereby greatly assists its heating property.

The ash-pit C is connected with the direct draft D leading to the flue by the pipe E, and the damper F is pivoted in the lower corner of the box G toward the furnace, so as to act either in closing the direct draft from the fire, the indirect draft from the ash-pit, or to regulate the proportion of the direct to the indirect draft.

The grate H is pivoted on the cross-bar I to swing to and from the entrance to the ash-pit K, so that the ashes and coal from the fire-pot, when the same is cleaned, may be deposited at the entrance to the ash-pit by tipping the grate downward in that direction, thereby providing means for the ready removal of the same. The indirect passage from the ash-pit to the direct flue provides an escape for fine ashes from the ash-pit when the fire is raked or shaken by closing the direct draft from the fire-chamber, preventing the escape of dirt into the chamber L, surrounding the fire-pot and combustion-chamber, or into the combustion-chamber, or chamber A.

It will be observed that by means of a heating-chamber, placed in the combustion-chamber, as described, the heating capacity of the furnace is greatly increased, and that the cold air introduced into the same is very quickly heated to a high temperature, higher than could be given the air heated in a chamber which incloses a combustion-chamber, like chamber L, as the outer surface of such a chamber is exposed to the cold air surrounding the furnace and necessarily radiates more or less heat, while the air heated in the inner chamber cannot be reduced in temperature by radiation, and can only escape therefrom through the outlets into the pipes leading to the room above.

If desired, in addition to drawing the heat from the inner heating-chamber, the heat may be conducted from the chamber L as is done in the ordinary furnaces, as the heat is not only radiated from the combustion-chamber into the inner-chamber A, but also radiates into the chamber L with as great and perhaps greater intensity than if the chamber A was not used, as the heat in the combustion-chamber circulates between the inner wall of chamber L and the wall of the inner chamber A, and, therefore, radiates in both directions with about equal intensity.

The many advantages of this construction are too manifest to need further description, although it is well enough to say that by its use a stove may be changed into a small fur-

nace, and perform the double duty of heating the room in which it is placed as well as other rooms with which the inner chamber may be connected by suitable piping, as the heat in the interior of a combustion-chamber cannot be utilized unless provided with means for radiating, substantially like that I have described.

It will be observed that the cold air is supplied the heating-chamber through an inlet that enters the chamber at its lowest part, at or near the center of the bottom plate of the chamber, so that the cold air is introduced into the chamber at its very bottom; and in a manner to secure a quick, uniform, and direct heating of the same in its passage through the chamber.

It will also be seen that the deflector is placed immediately over the cold-air inlet in such a way as to cause the air in its passage through the heating-chamber to be spread against the wall of the chamber evenly and uniformly.

I am aware that the patent granted Solomon Mead, December 24, 1861, No. 34,003, shows and describes a system of spiral air-passages and spiral fire-flues, whereby a current of air is caused to be passed through an interior heating-chamber spirally in a body; but this method of heating a volume of air does not constitute my invention, as there is no provision therein for throwing a very thin current of air uniformly and simultaneously against the wall of a heated chamber on all sides of an inverted cone-shaped deflector arranged within said chamber immediately over the cold-air inlet in such a way that the air in passing the same is not diverted from its direct course, but is spread into a very thin current, entirely inclosing the deflector in passing directly by the same to the exit.

I claim—

1. In a furnace or heating-stove, the combination of the heating-chamber A, entirely surrounded by the combustion-chamber B, and provided with a cold-air inlet, *a*, and a hot-air outlet, *c*, and also with a cone-shaped deflector, *b*, arranged immediately over the cold-air inlet with the said combustion-chamber B, substantially as and for the purposes described.

2. The hereinbefore-described system of air-passages and drafts, together with a regulating-damper in a box, whereby an indirect-draft opening from the ash-pit and a direct-draft opening from the combustion-chamber are brought together in the box and regulated by that damper.

3. In a furnace or heating-stove, the combination of the ash-pit C, indirect draft E, leading from said ash-pit directly to the direct draft, the direct draft D, opening from a combustion-chamber above the fire, and the damper F, hinged in the box G at the juncture of said direct and indirect drafts, as shown, to act as a regulator, as described, and to alternately serve in closing, or partly closing, either the direct or indirect draft, as set forth.

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Witnesses:

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