

J. P. HAYES.
Air-Heating Furnaces.

No. 151,285.

Patented May 26, 1874.

Fig. 1.

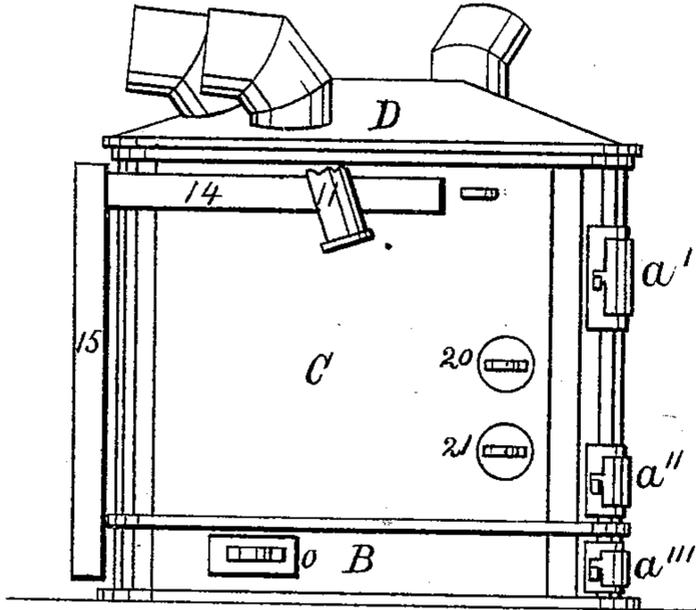


Fig. 2.

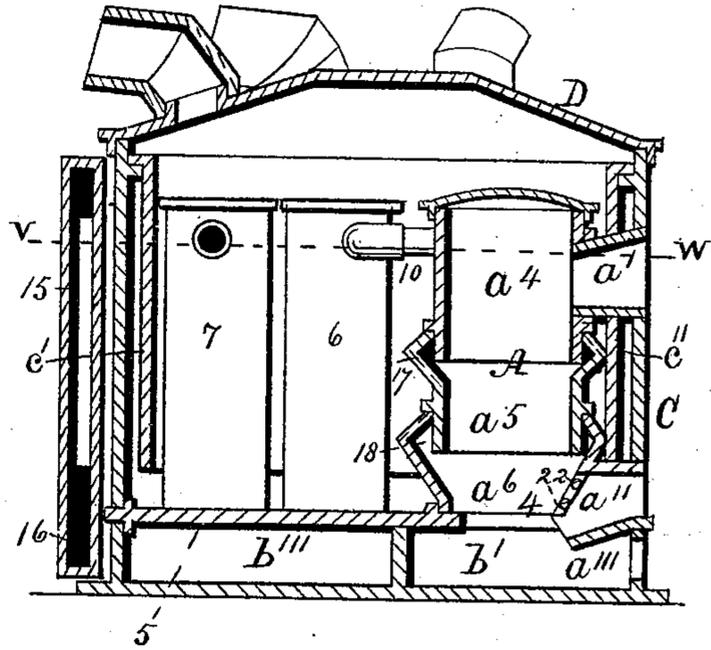


Fig. 3.

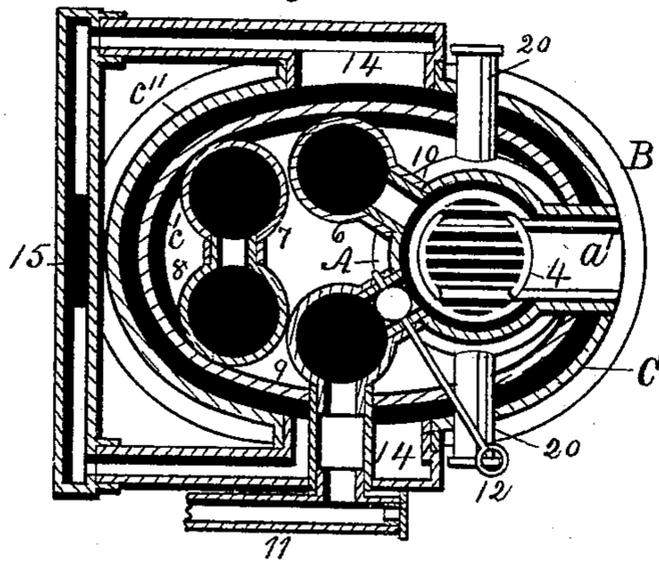
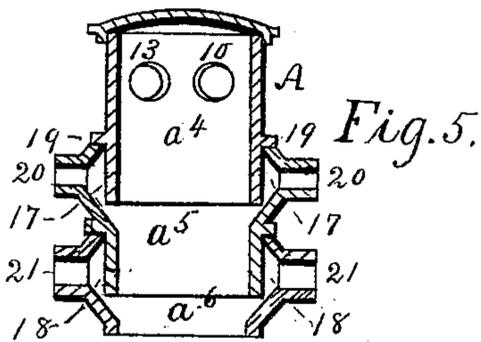
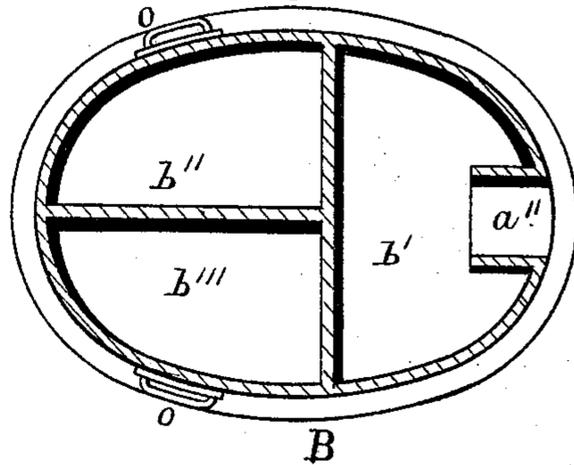


Fig. 4.



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IMPROVEMENT IN AIR-HEATING FURNACES.

Specification forming part of Letters Patent No. 151,285, dated May 26, 1874; application filed April 11, 1874.

To all whom it may concern:

Be it known that I, JOHN P. HAYES, of the city of Philadelphia, in the State of Pennsylvania, have invented an Improvement in Air-Heating Furnaces, of which the following is a specification:

My invention relates to the class of portable furnaces for heating air in warming buildings; and consists in the peculiar construction and relative arrangement of certain parts of the same, as will hereinafter be fully and clearly described, whereby a more effective and economical air-heating, portable furnace is produced.

Referring to the accompanying drawings, Figure 1 is a side elevation of my said improved portable air-heating furnace. Fig. 2 is a central vertical longitudinal section. Fig. 3 is a horizontal section below the dotted line *v w*, (shown in Fig. 2.) Fig. 4 is a horizontal section below the dotted line *x y* of Fig. 2, and Fig. 5 is a central vertical section of the fuel-holder detached.

This heater is oval in its horizontal section, and has its fuel-cylinder A, fuel-door opening *a'*, fire-door opening *a''*, and ash-pit-door opening *a'''* in one end of the oval. The outside casing is made of sheet-iron, and in three parts, consisting of the base B, body C, and cover D, closely fitted together. The base B is divided by vertical partitions into three distinct spaces, *i. e.*, the ash-pit *b'*, into which the grate 4 and fire and ash doors *a'' a'''*, respectively, open, and the two spaces *b'' b'''*, through which the air-heating draft successively passes from the fuel-cylinder A, as will be explained. These three spaces, *b' b'' b'''*, are covered by a horizontal plate, 5, except where the grate 4 and fire-door *a''* open into the ash-pit *b'*, and where the radiating flue-cylinders 6 7 8 9 communicate with the spaces *b'' b'''*. The air-heating draft passes from the fuel-cylinder A through the opening 10, near its upper end, into cylinder 6; thence down through 6 and the space *b''* of the base B, and up through cylinder 7; thence into and down cylinder 8 and space *b'''* to and upward through cylinder 9 to the chimney-flue 11; and thus, by radiation, heating the air-chamber, which is between the base B and the cover D. A direct draft from the fuel-cylinder A to the chimney-

flue 11 is produced, when required, by opening the valve attached to rod 12, and thus allowing the draft to pass directly through another opening, 13, in the fuel-cylinder A, and across cylinder 9 to the chimney-flue 11, (see Fig. 3,) the said cylinders 6 7 8 9 being of course closed at their upper ends, and left open at their lower ends. The hot-air chamber in C has a lining, *c'*, which leaves an air-space, *c''*, around the fuel-cylinder A, and the series of cylinders 6 7 8 9, which is closed at its top and open at its bottom, and the cold fresh air is admitted to this surrounding space at the two opposite sides of C, through openings near the top of said space *c''*, into which openings respective air-conducting pipes 14 14, vertical connecting-pipe 15, and supply-pipe 16 lead, the said air spreading around through the space *c''*, and entering, partially warmed by the said lining-plate *c'*, into the hot-air chamber, through the opening at the lower end of plate *c'*. The air heated in the chamber inclosed in the body C rises into the space formed by the roof D, and passes through the distributing-pipes of the latter to the different rooms required to be heated, or to either of them, in accordance with the condition of the damper-valves, which are intended to be placed in each pipe in the usual manner.

The fuel-cylinder A is peculiar in construction in that it is formed of a plurality of short cylinders or fuel-holders, connected together at their ends by surrounding fresh-air channels, which receive the fresh air through pipes from the outside of the body C of the furnace, and distribute it at different annular openings into the series of short fuel-holders, and thus produce in a more rapid and effective manner the combustion of the fuel, and, consequently, a greater amount of heat. In the present instance, the said fuel-cylinder A is composed of three fuel-holders, *a⁴ a⁵ a⁶*, connected together, the lower end of the top one, *a⁴*, entering the upper end of the next one below, *a⁵*, and the lower end of the latter entering the upper end of the bottom one, *a⁶*. The upper ends of *a⁵* and *a⁶* are enlarged, respectively, by the annular channels 17 and 18, and the lower ends of *a⁴* and *a⁵* are, respectively, slipped down into the upper ends of *a⁵* and *a⁶*

far enough to leave only a narrow annular space for air to enter from the channel of each to the interior of the cylinder A, the said entering portions being supported upon the upper edges of the portions entered thereby by means of projecting outside flanges 19 19, (see Fig. 5,) and the whole fuel-holder A supported upon the plate 5, so as to allow the grate 4 to be freely drawn out from beneath A through the fire-door opening *a''*. (See Figs. 2 and 3.) Fresh air is admitted to the channels 17 and 18 through pipes 20 and 21, which open through both the outside wall and lining of the body C, the mouths of which are fitted with register-plates, so as to close and open them as the draft of fresh air to the annular channels 17 and 18 may be required to be less or more, or stopped off entirely. The base B, including the plate 5, and the fuel-holder A, with its covering-plate and grate, are intended to be of cast-iron; but sheet-iron will be most suitable for all the other parts. Stoppered clean-out holes *o o* are made to give access to the divisions *b''* and *b'''*, respectively. (See Figs. 1 and 4.) Two horizontally-arranged separated bars, 22 22, are fixed across the rear part of the fire-door opening *a''*, which serve as bearings for the usual forked poker in lifting or lightening up the fuel when desirable. The bottom of the fire-door opening is one inclined plane, which conducts any ashes that may fall upon it in agitating the fuel into the ash-pit *b'*.

It will be understood without any further explanation that, as the fresh air to be heated enters at the upper part of the space left between the lining *c'* and the outside wall of the body C, and descends to the lower part of the said space before it enters the heating-chamber which incloses the heating-cylinders and fuel-holder, there will not be any waste of heat by radiation from the outside casing or sheet-iron wall of the body C, because the entering air absorbs the heat radiated by the lining *c'*, and carries it back to the air-heating chamber; that the height or length of the fuel-cylinder, provided with the fresh-air channels 17 and 18, will produce better combustion of the contained fuel, and consequently increased heat therefrom; and the first and fourth cylinders 6 and 9 being of equal height to that of the fuel-cylinder A, and close to the latter, the radiation of heat from both will be very

great, and, with the additional heat radiated from the other two cylinders, 7 and 8, a very powerful air-heating effect will be produced in the containing-chamber.

It will be seen that the clean-out openings in the sides of the base B afford ample means for cleaning the divisions *b'' b'''* therein without the usual trouble and inconvenience of removing the radiating-cylinders for the purpose; that a greatly-enlarged ash-pit, *b'*, is afforded by the described arrangement of the cylinders; and that the horizontal supporting-bars 22 22, just above the grate 4 in the opening of the fire-door, will afford importantly useful bearings for a forked poker in lightening up the incandescent fuel and separating the ashes therefrom into the ash-pit *b'*; and, moreover, with all these advantages, the heater is portable.

I claim as my invention—

1. The combination, in a portable air-heating furnace, substantially as described, of the air-entering space *c''* between the outside casing of the body C and the lining *c'*, the said space *c''* receiving fresh air at its top from pipes 14 14, and discharging it through the space at the bottom edge of lining *c'* into the hot-air chamber between the top D of the case and the plate 5, with the radiating cylinders 6 7 8 9 and fuel-holder A in the said hot-air chamber, for the purpose described.

2. The fuel cylinder or holder A, constructed substantially as described, with surrounding fresh-air channels 17 18, opening into said fuel-holder through respective annular spaces at the bottom edges of said channels, and receiving the fresh air through pipes 20 and 21 from the outside of the furnace, all substantially as and for the purpose hereinbefore set forth.

3. The combination, in a portable air-heating furnace, substantially as described, of the two horizontally-fixed bars 22 22, with the rear part of the opening *a''* for the fire-door, and the opening in the bottom thereof to the ash-pit below, for the purpose of supporting the usual forked poker in lifting and agitating the incandescent fuel in the fuel-holder, and allowing the ashes in front to fall into the ash-pit.

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Witnesses:

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