J. A. BUCKWALTER.

AIR-HEATING FURNACE.

No. 175,819. Patented April 11, 1876.

Fig. 1.

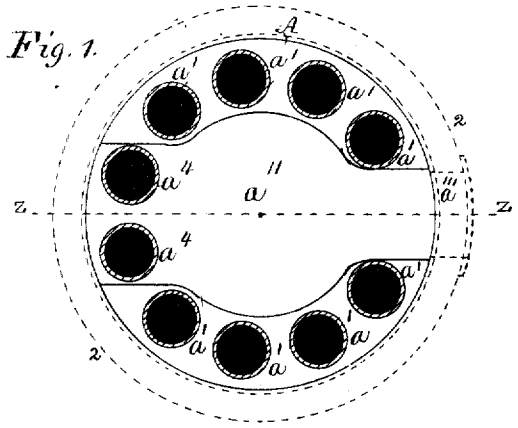


Fig. 2.

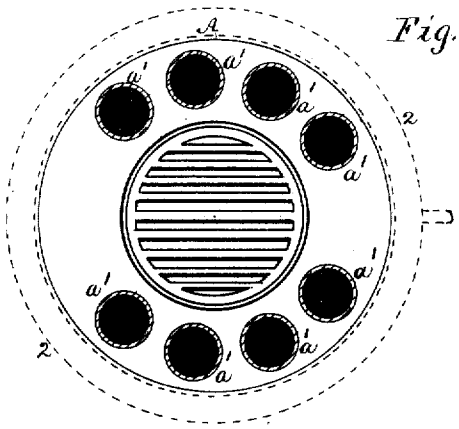
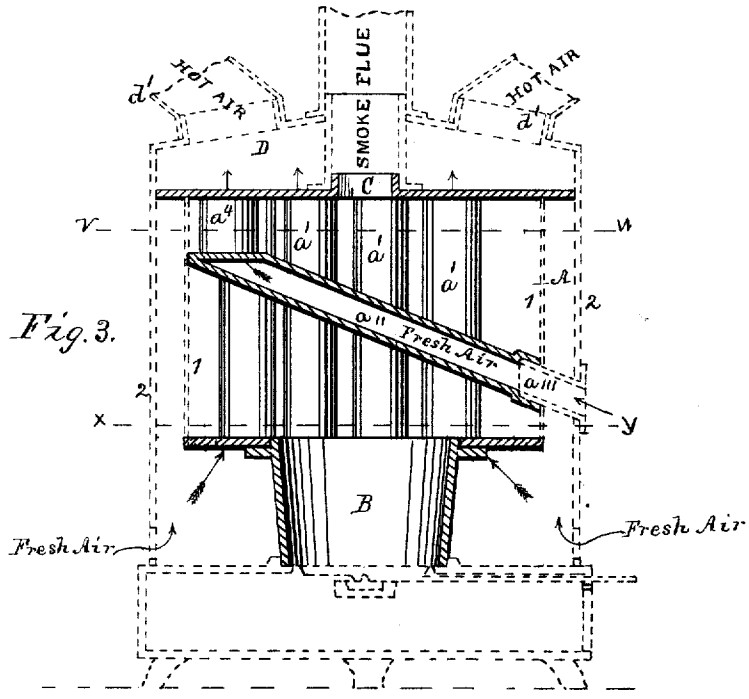


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

JOSEPH A. BUCKWALTER, OF ROYER'S FORD, PENNSYLVANIA.

IMPROVEMENT IN AIR-HEATING FURNACES.

Specification forming part of Letters Patent No. **175,819**, dated April 11, 1876; application filed February 18, 1876.

To all whom it may concern:

Be it known that I, JOSEPH A. BUCKWALTER, of Royer's Ford, in the county of Montgomery and State of Pennsylvania, have invented a new and useful Improvement in Air-Heating Furnaces, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

My improvement relates more especially to portable heaters; and the object of my invention is to render more effective the heat which rises directly upward from the incandescent fuel in the fire-pot by causing the said heat to impinge against the under surface of a broad inclined fresh-air channel, which passes through the drum, and thus rapidly heat the air, which freely passes from the fresh atmosphere by which the furnace is surrounded upward into the hot-air chamber above the tubular drum, and at the same time cause that portion of the heat rising from the incandescent fuel, and deflected by the under surface of the said inclined channel, to be directed laterally over the open top of the fire-pot, so as to become mingled with that portion of the hot products of combustion which surrounds the tubes of the drum, and thus together heat the air which is passing through the said tubes into the hot-air chamber above the said drum in a more economical and effective manner.

Referring to the drawings, Figure 1 is a horizontal section of the tubular drum, showing the portion below the dotted line *v w* of Fig. 3; Fig. 2, a horizontal section, showing that portion which is below the dotted line *x y* of Fig. 3; and Fig. 3 is a vertical section, showing that portion of the heater which is above the dotted line *z z* of Fig. 1.

The drum A is a hollow cylindrical case, containing a series of tubes, *a'*, opening at both ends through the respective ends of the case, and arranged around near to and parallel with each other and the vertical sides of the said case. The lower end of said case or drum has a large central opening communicating with the upper open end of the fire-pot B, and the upper end of said drum has a central opening communicating with the smoke-pipe C. The sides of the drum are indicated by the dotted lines 1 1 in Fig. 3, and the whole drum A and fire-pot B are intended to be supported within an outside casing, resting upon a base in the usual manner, (see dotted lines 2 2,) the upper portion of said outside casing forming the hot-air chamber D in the usual manner, and from which latter the hot air is conducted, by flues *d' d'*, to the required rooms of the building in which the furnace may be located, while the smoke and gases from the fire-pot B pass in contact with the outer surfaces of the tubes *a'* to the chimney-flue through C. The inclined channel *a''* has its lower open end projecting through one side of the outer casing 1 of the drum A, and communicates with the fresh atmospheric air outside of the furnace through a short flanged tube, *a'''*, which is inserted in a suitable hole made for the purpose through the outer casing 2 of the furnace. The upper end of said inclined channel *a''* extends upward at about an angle of forty-five degrees to the opposite side of the drum A, where it communicates with two short vertical tubes, a^4, each of which latter opens through the upper end plate of the drum in the same manner as the tubes *a'*. The width of the channel *a''* corresponds substantially with the space surrounded by the tubes *a'*, and its depth is intended to be about equal to half the diameter of any one of the tubes *a'*, substantially as represented in Figs. 1 and 3, the object being to afford a broad flat surface for rapidly heating the fresh air passing through the channel *a''*, and at the same time deflecting the heating products of combustion laterally, so as to heat the air-tubes *a'* as thoroughly as they would be heated if the channel *a''* were absent, and consequently the effect of the said channel *a''* is to add to the air-heating power of the furnace by so much without increasing the consumption of fuel.

I am aware that a conical deflector has been applied directly over the mouth of the fire-pot for the purpose of heating the fresh air directed by two short channels over the outer surface of the said cone, as in Henderson's patent of December 23, 1862, and that several other modes have been used in stoves and furnaces for the same purpose, as in the Patents No. 2,965, of February, 1843, No. 62,726,

of March, 1867, No. 77,032, of April 21, 1858, and No. 33,127, of 1861; and therefore I do not desire to claim, broadly, the use of air-heating pipes in either stoves or furnaces; but

I claim as my invention—

In the air-heating chamber D, containing a drum, A, provided with a circular series of vertical air-tubes, a' a', and located directly above the fire-pot B, substantially as set forth, the combination of the inclined channel a'' with the short air channels or tubes a^4 a^4 of the said drum A and the tubular extension a''' in the casing 2, substantially as and for the purposes described.

JOSEPH A. BUCKWALTER.

Witnesses:

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