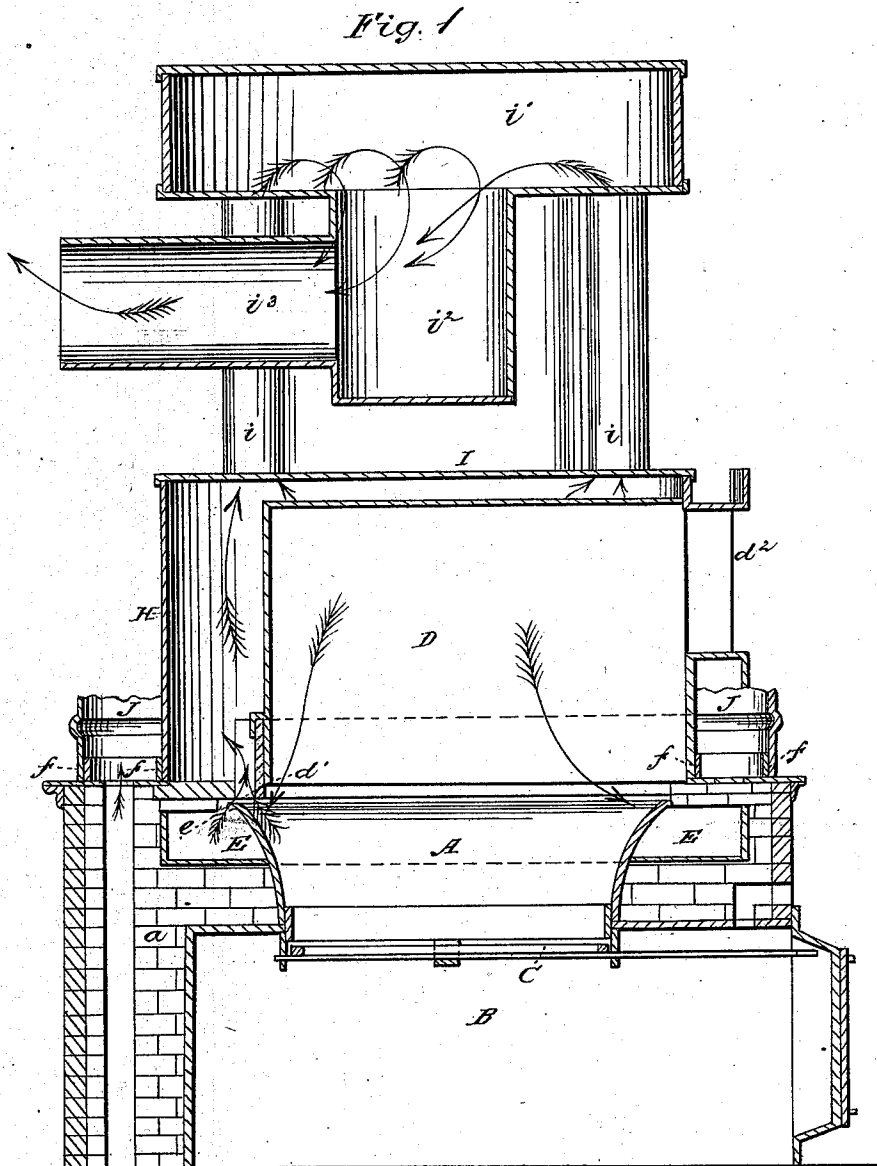


G. G. THOMAS.
Hot-Air Furnace.

No. 105,864.

Patented July 26, 1870.



Witnesses:
S. J. Noyes
J. H. Wilson

Inventor:
G. G. Thomas by
H. W. Beadle atty

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Fig. 3

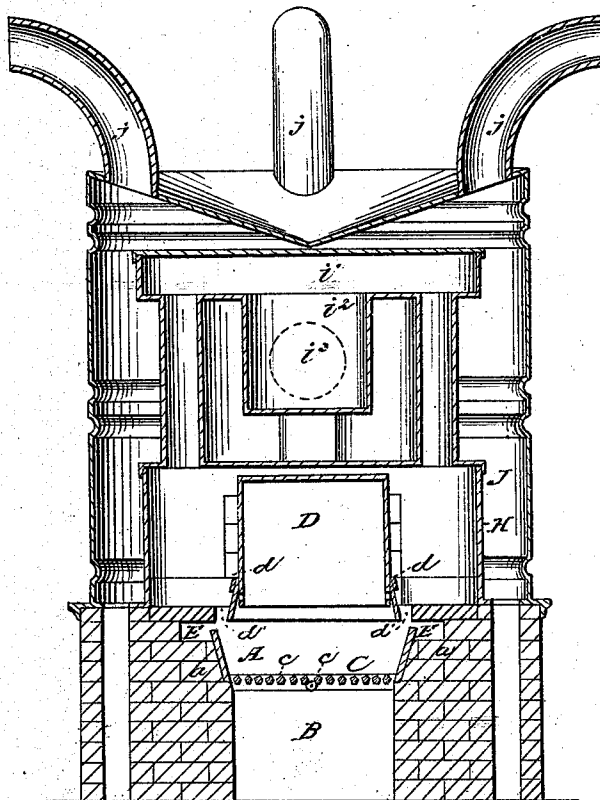
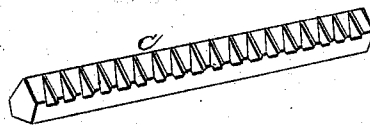


Fig. 2



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Fig. 2 x-x

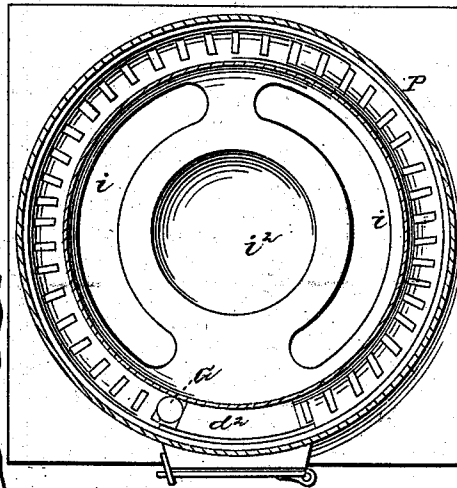
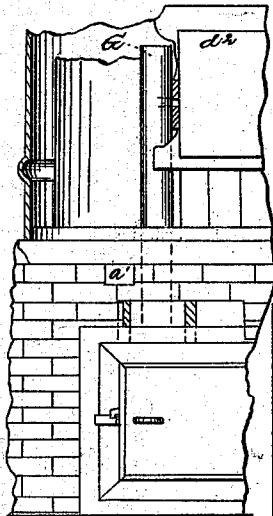
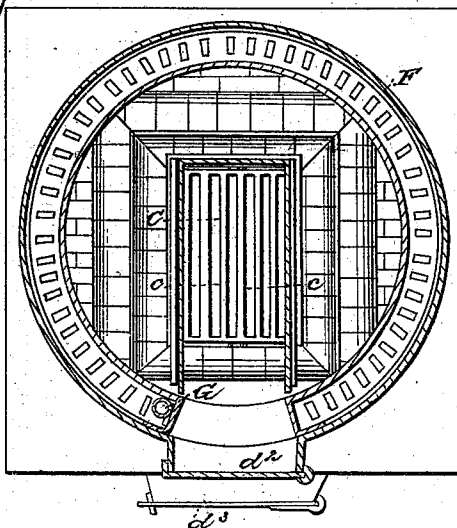


Fig. 3 y-y



Witnesses:
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J. H. Dixon

Inventor:
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United States Patent Office.

GEORGE G. THOMAS, OF ST. LOUIS, MISSOURI.

Letters Patent No. 105,864, dated July 26, 1870.

HOT-AIR FURNACE.

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, GEORGE G. THOMAS, of St. Louis, in the county of St. Louis and State of Missouri, have invented a new and useful Improvement in Furnace; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawing and to the letters of reference marked thereon.

This invention has for its main object the production of a furnace which shall be durable in all its parts, and yet be comparatively inexpensive to manufacture, and consists in certain details of construction, which will be fully described hereinafter.

In the drawing—

Figure 1, sheet 1, represents a central vertical section across the furnace from side to side,

Figure 2 represents a perspective view of the grate-bar;

Figure 1, sheet 2, represents a central vertical section across the furnace from front to rear.

Figure 2, sheet 3, represents a plan view through the line *x x*, fig. 1; and

Figure 3, sheet 3, a plan view through the line *y y*, fig. 1, sheet 1.

To enable others skilled in the art to make and use my invention, I will now proceed to describe fully its construction and manner of operation.

A represents the fire-pot, constructed, preferably, of fire-brick, which is imbedded in the solid brick walls *a a*, and completely inclosed thereby, as shown.

It is provided with flaring sides, and opens below into the ash-pit B, in the usual manner.

C represents the grate, constructed of bars, *c c*, united in any suitable manner. The form of these bars is peculiar. Their upper sides are sharply inclined, and provided with grooves or depressions wider at the bottom than at the top, as is clearly shown in fig. 2, sheet 1.

The location of the grate is also peculiar. It is dropped several inches below the upper line of the ash-pit, and is left open in front. By means of this construction, the removal of any clinkers which may form thereon is easily effected by the use of a poker, without turning the grate.

D represents the coal-reservoir, which is located immediately over the fire-pot.

It is preferably constructed of wrought iron, with flanges, *d*, which rest upon the edges of a layer of fire-brick interposed between them and the fire-pot. A few courses of fire-brick may also be placed above the flanges, if desired, for the purpose of protecting the outside of the reservoir from excessive heat.

This reservoir is so arranged over the fire-pot as to leave an opening, *d'*, on each side and at the rear end, through which the products of combustion from the

fire-pot are permitted to pass upward through the radiator to the smoke-tube.

Coal is supplied to this reservoir through the opening *d'* in the radiator, and the opening *d'*, in the outer casing.

E represents a reservoir for water formed in the walls *a a*, which entirely surrounds the fire-pot near its upper edge.

It is provided with a covering of fire-brick, which projects slightly over the edge of the fire-pot, and forms the flue or passage *e* at the top edge of the fire-pot, between the fire-pot and the fire-brick, sufficiently large to supply oxygen for burning the gases and smoke of the coal.

This chamber is provided with an opening in the front of the brick-work, through which the air and water may be introduced.

The flue E of this chamber, it will be observed, is arranged in such relation to the opening *d* that the air or vapor caused to rise through the former by the heat of the fire-pot, is brought into direct contact with the gas and smoke arising through the latter from the fire-pot. The union of the oxygen of the air or water from the one with the products of combustion of the other, causes the latter to be entirely consumed.

F represents a perforated base-plate, which is bolted to the brick-work in any suitable manner.

It is preferably constructed of cast-iron, and is provided with flanges, *f f'*, for the purpose of supporting the radiator and outer casing. Its outer edge is provided with a downwardly-projecting flange, which covers the edge of the brick-work, and protects it from being accidentally broken in any manner. Through the perforations in this plate the cold air passes from the chambers in the brick-work below to the heating-chamber above.

G represents the draught-tube, the lower end of which communicates with an opening in the front of the brick-work, covered by a suitable register, and the upper end of which opens into the door-frame of the coal-reservoir D, as shown.

Behind this same register in the brick-work, but separated from the chamber opening into the draught-tube G by a partition, is located a chamber which connects with the ash-pit by means of holes in the top of the latter.

By means of this construction the draught through the tube G and ash-pit B is regulated by a single movement of the register, the draught in the former serving to drive down the gases from the coking coal in the reservoir, and in the latter serving to increase the combustion of coal in the fire-pot.

H represents a cylinder, forming the lower part of radiator.

It rests upon the inner flange, *f*, and is provided

with an opening, d^2 , through which the coal is poured into the reservoir D.

I represents the upper portion of the radiator, which rests upon the cylinder H.

It is provided with connecting flues i i , drum i^1 , chamber i^2 , and smoke-pipe i^3 .

J represents the outer casing, which rests upon the flange f' .

It forms the hot-air chamber, and is provided with the usual pipes, j j , for conveying the hot air to any desired point.

The operation of the furnace is as follows:

The fire is first lighted and coal supplied through the door d^3 of the reservoir. When well under way, the reservoir may be filled and the door closed. As the coal burns away at the bottom its place is supplied from the reservoir above. The clinkers are easily drawn out at the front by means of a poker, and the ashes are thrown down by slightly shaking the grate, the peculiar construction of the latter effectually preventing their permanent lodgment.

The products of combustion, with the gases from the coking coal in reservoir D, which are forced down by the draught from tube G, both pass from the fire-pot through the opening d^1 , up through the radiator H I, into the smoke-pipe.

At the opening d^1 they come in contact with the air or vapor from the chamber E, the oxygen in which, being highly heated, from its contact with the fire-pot, burns freely, and consumes the heavier products of combustion, about to pass away in smoke. By this result a much more intense heat is obtained, and the escape of smoke is effectually prevented.

The cold air enters the chambers a' a' in the brick-work, passes up through the perforated plate into the hot-air chamber, about the radiator, and is finally conveyed to the register by the pipe j j .

In consequence of the fire-pot and ash-pit being imbedded in the brick-work, and completely inclosed thereby, it is impossible for the heat to radiate into the cold-air chamber, as is the case in the ordinary furnace. This result has been found exceedingly pernicious in practice, inasmuch as the gases from the

burning fuel, under certain conditions, pass freely through the red-hot iron into the air-chamber, and render it unfit for use.

By means of my improved construction this difficulty is obviated, inasmuch as it is impossible for the cold air to come in contact with the red-hot iron, or to receive gases from it in any way, or to receive ashes from the ash-pit.

This furnace is especially designed for soft coal, but may be used for other kind if desired.

Having thus fully described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

1. The arrangement of the fire-pot A, ash-pit B, constructed as described, and walls a a , as described, for the purpose set forth.

2. The water-reservoir E, arranged around the fire-pot, below the flue e and above the line of the grate-bars, as described.

3. The air-passage or flue e , when arranged in relation to the opening d^1 , as described.

4. The perforated base-plate F, constructed as described, for the purpose set forth.

5. The arrangement of the draught-tube G, with its lower end opening into the outer air, and its upper end into the reservoir D, for the purpose of expelling the gases from the latter, as described.

6. The radiator described, consisting of the parts H I, connecting flues i i , drum i^1 , chamber i^2 , and smoke-pipe i^3 , as described, for the purpose set forth.

7. The arrangement of the grate below the upper line of the ash-pit, as described.

8. The furnace described, consisting essentially of the fire-pot A, ash-pit B, grate C, reservoir D, chamber E, plate F, draught-tube G, radiator H I, and casing J, when combined and arranged as described.

This specification signed and witnessed this 23d day of June, 1870.

GEO. G. THOMAS.

Witnesses:

EDM. F. BROWN,
H. W. BEADLE.