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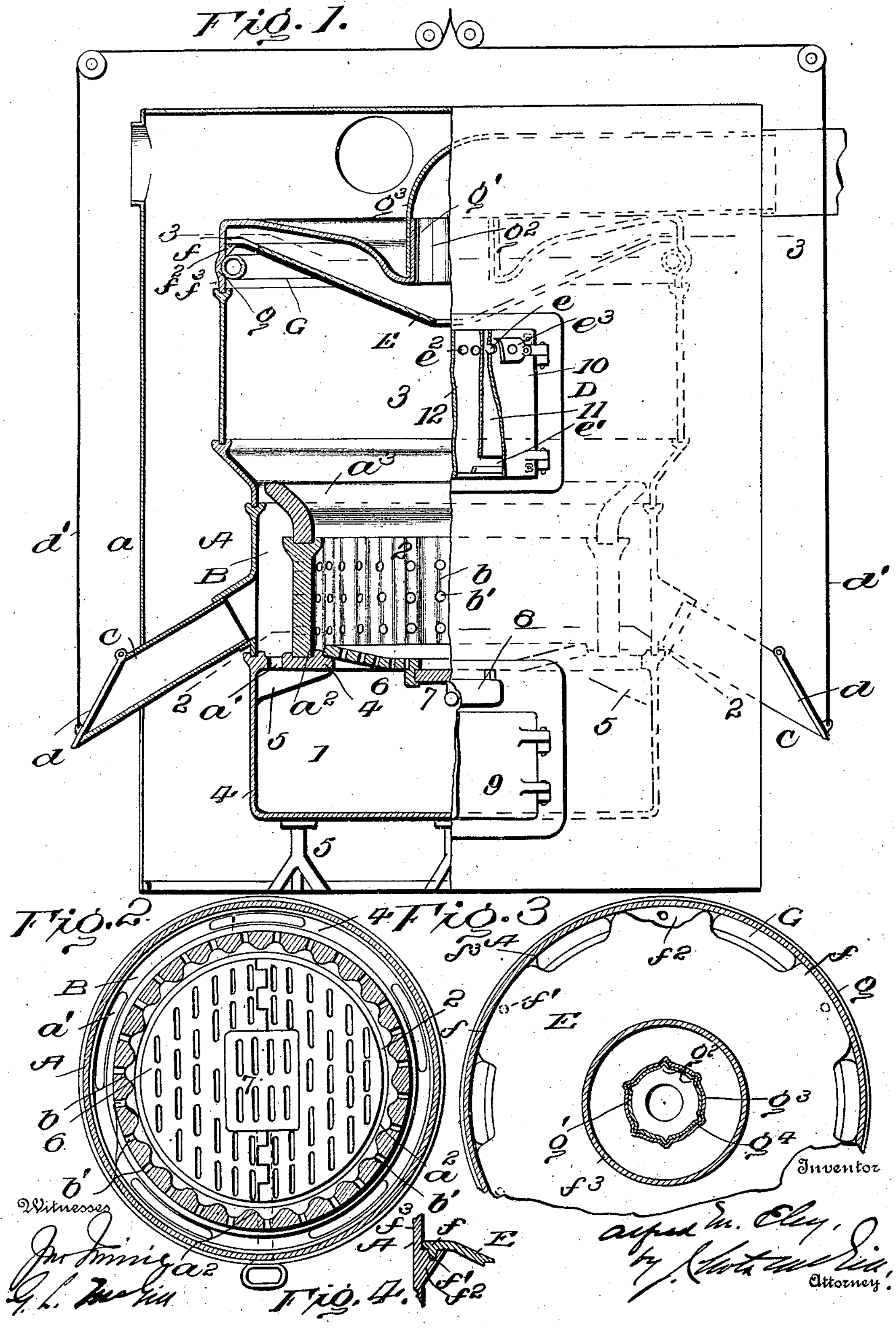
A. M. ELEY.

HOT AIR FURNACE.

(Application filed May 27, 1899.)

(No Model.)



UNITED STATES PATENT OFFICE.

ALFRED M. ELEY, OF NILES, OHIO.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 648,861, dated May 1, 1900.

Application filed May 27, 1899. Serial No. 718,542. (No model.)

To all whom it may concern:

Be it known that I, ALFRED M. ELEY, of Niles, in the county of Trumbull and State of Ohio, have invented certain new and useful Improvements in Hot-Air Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention contemplates certain new and useful improvements in hot-air furnaces.

The objects of the invention are to obtain a maximum degree of heat from the fuel by thoroughly burning all the gases, to prevent the escape outside of the furnace of dust particles during the shaking of the grate, to prevent the fuel, especially soft coal, from adhering to the fire-pot, to supply hot air to the fire-pot at numerous points, and thereby enable combustion to be obtained without too great consumption of fuel, and, lastly, to provide a furnace which will be strong, durable, and highly efficient.

The invention will be hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is view, partly in section and partly in elevation, showing a furnace embodying my invention. Fig. 2 is a horizontal sectional view on line 2 2, Fig. 1. Fig. 3 is a sectional view on line 3 3, Fig. 1. Fig. 4 is a sectional detail.

Referring to the drawings, A designates the furnace-casing, and *a* the outer inclosing casing from which hot air is conveyed by flues throughout a house or building.

1 is the ash-pit, 2 the fire-pot, and 3 the combustion-chamber. The ash-pit 1 is formed with an annular ring 4, supported by braces 5. The grate 6 rests on this ring and is provided with a central movable section 7, over the front end of which the poker-door 8 is located, above the door 9 of the ash-pit. In the ring 4 are formed several flues or openings a', through which the dust and light particles of ashes will pass from the ash-pit to the combustion-chamber. The fire-pot 2 is composed of a cylindrical section a^2, resting on the ring 4, the same being concentric with the casing A and forming, in conjunction with the latter, a hot-air chamber B, which entirely encircles the fire-pot. An upper rim or section a^3 rests in a groove $a^\times$, formed in the top edge of section a^2, and is flared in bell-like form, throwing its upper end close to, but not in contact with, the casing A, thus leaving communication between the hot-air chamber B and the combustion-chamber 3. The section a^2 of the fire-pot is formed throughout with vertical corrugations *b* and transverse holes or ports b', arranged in series around the entire section. By reason of these corrugations coal is prevented from adhering to the fire-pot, or the danger of its doing so is reduced to a minimum, and channels are formed in which the blaze may rise and thus keep the fire-pot quite hot, heating the air in the chamber B. This hot air entering through the holes b' will ignite the gases in the fuel and cause them to blaze up in the channels.

C designates cold-air-inlet flues opening at their inner ends into the hot-air chamber B. These flues occupy inclined positions, their inner ends being higher than the outer ends, so that the air entering therethrough will pass upwardly into chamber B and prevent hot air passing outward through the flues. Each flue is provided with a valve or damper for controlling the admission of cold air. I have shown valves *d* hinged at their upper ends to the flues and capable of being controlled from above by the chains d'. When these valves are unseated, cold air will be admitted into chamber B and being heated will pass through the holes or ports into the fire-pot, effecting the thorough burning of the fuel-gases at all points. Thus I avoid using any forced draft from beneath the grate-section, the heated oxygen coming in contact with the gases in the fuel causing a gas-blaze all around the fire-pot.

D designates the fuel-supply door, which is composed of plates 10, 11, and 12, suitably secured together. The outer plate 10 is formed at its top with air-inlet openings *e*. The central plate 11 at its bottom is formed with a continuous slot e', while the plate 12 is formed at its top with air-discharge openings e^2. Any suitable slide or damper e^3 may be arranged to close the air-inlet holes *e*. When these holes are opened, cold air will be drawn inward and pass down between the plates 10 and 11 and

through the slot e' and upwardly between the plates 11 and 12 and then into the furnace through the openings e^2. In this way the air is heated before it enters the furnace and when discharged therein will effect the complete combustion of all gases within the combustion-chamber.

E designates the deflector-plate, located within the casing A, at the top thereof, so as to prevent the gases from passing on a direct line to the outlet-flue. This deflector-plate E is of approximately inverted-cone shape, and its diameter is less than that of the casing A. It is provided with a series of spaced-apart peripheral flanges f, formed on their under sides with lugs f', which are designed to fit within the recesses of flanges f^2 on the inside of the top section f^3 of casing A. (See Fig. 4.) In this way the deflector-plate is secured in position without the use of bolts and screws. This top section f^3 of the casing is slightly bulged at g to form an annular recess to accommodate a coiled pipe G if it is desired to effect the heating of water within the furnace. The top section f^3 of the casing is depressed at its center in concavo-convex form and provided with an upwardly-projecting flange g', which is formed with a series of spaced-apart V-shaped ribs g^2. The outlet-flue section g^3 is formed at its inner end with a series of grooves g^4, which correspond to the ribs of the flange g'. By this means the flue-section is securely held to the casing and prevented from turning laterally. The flue may be extended in any desired direction from the furnace by first removing it from the flange and then replacing it in engagement therewith.

The advantages of my invention are apparent to those skilled in the art. It will be observed that I have produced an extremely simple and inexpensive furnace having means for readily increasing the heating capacity of the furnace and effecting the thorough combustion of all gases. Should any gases rise unburned from the combustion-chamber, as when the fire-pot is filled with fuel, the air-space between the flared end of the pot and the casing will admit sufficient hot air to effect the consumption of such gases, and should it be desirable to burn still less fuel the hot air admitted through the fuel-door may alone be used.

I claim as my invention—

1. A furnace comprising a casing having a flared or enlarged portion forming a combustion-chamber, a fire-pot located within said casing below said combustion-chamber, an air-chamber having an upper contracted outlet-passage being formed between said casing and said fire-pot said outlet-passage leading into said combustion-chamber, and cold-air flues communicating with openings in the outer walls of said air-chamber, substantially as set forth.

2. A furnace comprising a casing having a flared or enlarged portion forming a combustion-chamber, a fire-pot located within said casing and having its upper edge flared to approach the lower walls of said combustion-chamber, an air-chamber being formed between said casing and said fire-pot and communicating with said combustion-chamber around the flared edges of said fire-pot, and cold-air flues communicating with openings in the outer walls of said air-chamber, substantially as set forth.

3. A furnace comprising a casing having a flared or enlarged portion forming a combustion-chamber, a cylindrical fire-pot located in said casing, an air-chamber being formed between the same and the walls of said casing, said fire-pot having transverse perforations therein, an upper flaring rim supported by said fire-pot and forming, with the wall of said casing, a contracted air-passage between said air and combustion chambers, and cold-air-inlet flues opening into said air-chamber, substantially as set forth.

4. A furnace comprising a casing having a flared or enlarged portion forming a combustion-chamber, a cylindrical fire-pot located in said casing, an air-chamber being formed between the same and the walls of said casing, said fire-pot being provided with longitudinal corrugations and transverse perforations, an upper flaring rim supported by said fire-pot and forming, with the wall of said casing, a contracted air-passage between said air and combustion chambers, upwardly-inclined cold-air flues communicating with said air-chamber, and means for regulating the supply of air to said flues, substantially as set forth.

5. A furnace comprising a casing having a combustion-chamber, an annular rim secured to said casing and provided with flues or openings, a fire-pot supported by said rim formed of two concentric members, one of which is provided with holes or ports, an air-chamber being formed between said casing and said fire-pot and communicating at its top with said combustion-chamber, and cold-air flues leading into said air-chamber, substantially as set forth.

6. A furnace comprising a casing having a combustion-chamber, an annular rim located therein having a groove in its top surface and provided with flues or openings, a cylindrical fire-pot having its lower edge resting in said groove and having a corresponding groove in its upper edge, an air-chamber being formed between said fire-pot and said casing, an upper flaring rim or section resting in the groove of said fire-pot and forming a contracted air-passage between the air and combustion chambers, and cold-air flues leading into said air-chamber, substantially as set forth.

7. A furnace comprising a casing having a combustion-chamber, an annular rim located within said casing and provided with flues or openings and having an annular groove, a grate supported by an annular flange of said rim, a fire-pot resting within said groove and

provided with holes or ports, an air-chamber being formed between said casing and said fire-pot and communicating with said combustion-chamber, and cold-air flues leading into said air-chamber, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ALFRED M. ELEY.

Witnesses:
WILLIAM D. LEWIS,
FRANK R. COWDERY.