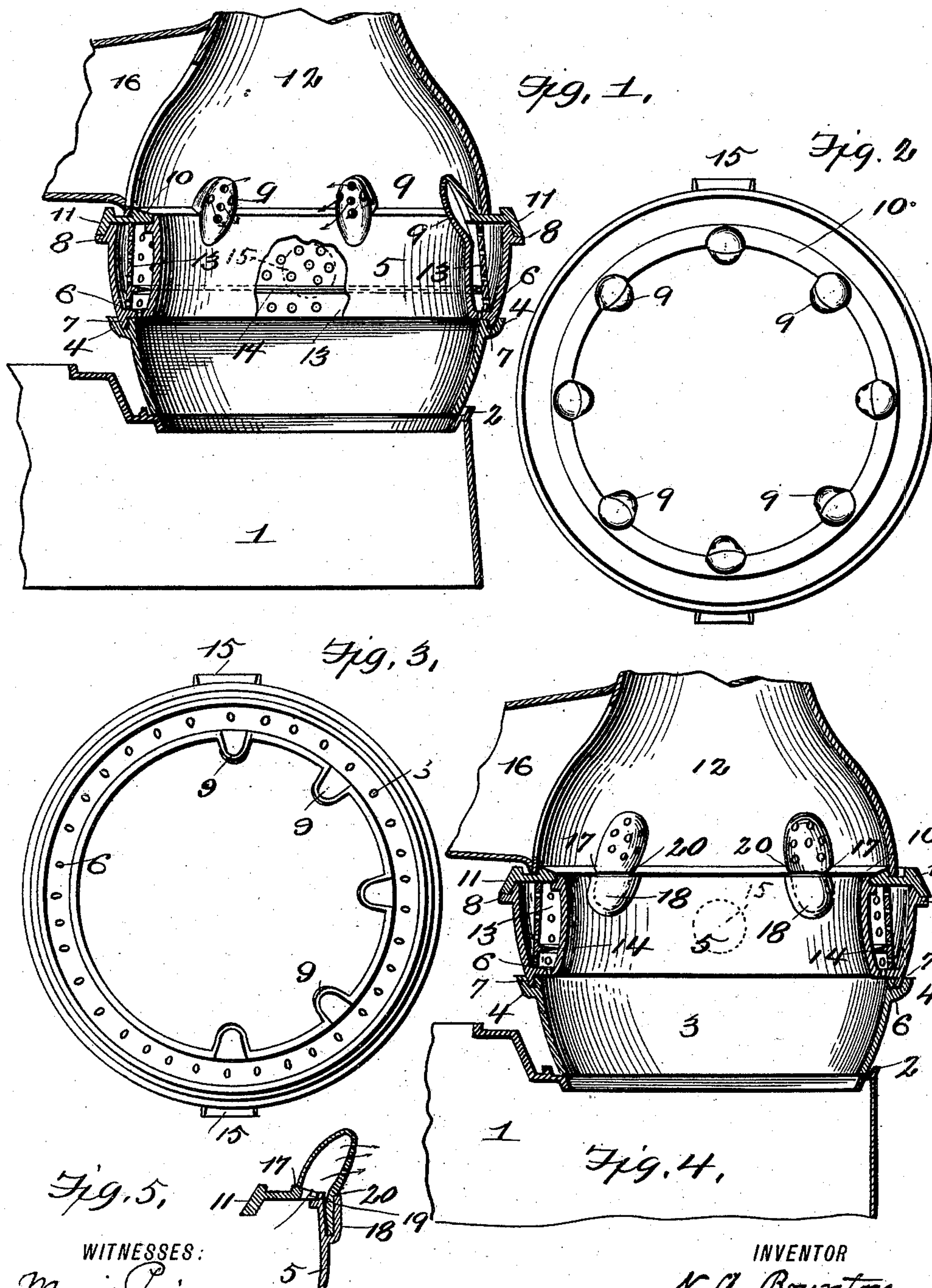


(No Model.)

N. A. BOYNTON.
FURNACE OR HEATER.

No. 558,894.

Patented Apr. 21, 1896.



WITNESSES:

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FURNACE OR HEATER.

SPECIFICATION forming part of Letters Patent No. 558,894, dated April 21, 1896.

Application filed February 13, 1896. Serial No. 579,152. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL A. BOYNTON, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Furnaces or Heaters; 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 has for its objects to provide for the thorough combustion of the fuel in furnaces, boilers, and heaters by supplying heated air to the body of the ignited fuel, and also to a point above the same, so as to consume the combustible and inflammable gases resulting from the partial combustion of the fuel as occurs in the furnaces of ordinary construction.

The invention further has for its object to provide a furnace of improved construction by means of which the thorough combustion of said gases may be effected, as more fully hereinafter set forth.

The above-mentioned objects are attained by the means illustrated in the accompanying drawings, in which—

Figure 1 is a vertical sectional view of a portion of a furnace with my improvement applied thereto; Fig. 2, a plan view of the fire-pot; Fig. 3, a plan view of the fire-pot with the annulus removed; Fig. 4, a sectional view of a portion of the furnace, showing a modification of my invention; and Fig. 5, a detail sectional view of one of the thimbles.

Referring to the drawings, the numeral 1 indicates the base or lower section of the furnace, which is preferably constructed of cast metal, and which constitutes the ash-pit of the same. The said base or lower section at the top is provided with a circular opening, around which extends an annular rib 2, forming a seat for a section 3, which is also constructed of cast metal, preferably, and which constitutes the lower part of the fire-pot of the furnace. This section is of less diameter at its lower than at its upper edge, and at its upper edge is formed with a grooved annular flange 4, which forms a seat for the lower edge of a section 5, which constitutes the upper portion of the fire-pot. The section 5, like the section 3, is less in diameter at its lower

than at its upper edge. The section 5 is constructed of metal, and consists of an annular shell, open at the top and closed at the bottom, with the exception of a series of apertures 6, for the purpose hereinafter explained. The lower edge of the said section is formed with a downwardly-extending annular flange 7, which sets in the seat at the upper edge of the section 3 when the parts of the furnace are in place. The section 5 is formed with an annular flange 8 on its outside, just below its upper edge, as shown in Fig. 1 of the drawings, for the purpose to be presently explained.

The upper edge of the inner wall at intervals is provided with a series of half-thimbles 9, which are cast integral with said wall, and which communicate by means of suitable openings with the annular space between the said inner wall and the outer wall thereof. The half-thimbles, as shown in Figs. 1, 2, and 3, extend above the upper edge of the said section, so as to form, in connection with a series of similar half-thimbles on an annulus 10, situated above, a series of air-flues, by means of which air may be admitted from the air-space to the combustion-chamber of the furnace, as more fully hereinafter explained. The said annulus is constructed of cast metal, having a downwardly-extended flange 11, which rests upon the flange before mentioned. The annulus is also provided with an annular recess on top to form a seat for the lower edge of the upper section 12 of the furnace.

The section 5 is cast complete in one piece, and the annulus also, the latter serving as a cover to close the annular space between the walls of the section 5. The half-thimbles of the section 5 and annulus 10 register when in place, and the upper portions of said thimbles are perforated, as shown, to admit air in jets into the combustion-chamber at a point just above the bed of fuel, so as to admit air to the inflammable gases which pass from the fuel in the fire-pot and insure their combustion. The upper section of the furnace is constructed of cast metal and is of greater diameter at its lower than at its upper edge, the lower edge resting in the groove in the annulus when the parts of the furnace are assembled.

The numeral 13 indicates an annular por-

tion of cast metal, which is perforated, as shown, and which sets within the space in the section 5, dividing it into two chambers. The said partition serves as an air-heating plate and is formed on the inside with a horizontal ledge 14, the edge of which abuts against the inner wall of the section 5 and diverts a portion of the air from the space in said section into the fire-pot, so as to enter the body of the fuel therein and assist in its combustion. The section 5 is provided with one or more openings or doors 15 through its outer wall for the admission of air from the outside to supply the air-chamber, and from said chamber to be delivered in a heated condition, through the perforations in the thimbles, to the combustion-chamber and to the fire-pot. The passage of the outside air through the door or doors 15 is checked by the heating-plate, and the air receives heat from said plate while passing through the perforations into the inner chamber and is discharged through the thimbles, as above stated.

At one side the combustion-chamber is provided with a feed-conduit 16, through which fuel is introduced. The escape-flue (not shown) extends from the top of the upper section or combustion-chamber of the furnace.

In the modification shown in Fig. 4 detachable thimbles are shown instead of the half-thimbles cast integral with the section 5 and the annulus. The said thimbles consist of metallic shells, which are open at one side, the said shells being shouldered, as indicated by the numeral 17, and the lower ends at their open sides being shouldered and shaped to conform to the inner contour of pockets 18, which are formed at the upper edge of section 5 of the furnace. The annulus in this case is provided at intervals with openings 19, which coincide with the openings in the thimbles, the shoulders resting upon the upper surface of the annulus when in place, the lip portion of said thimbles being loosely confined in said pocket, while the shouldered portion 20 thereof rests upon the upper edge of the pocket. The upper parts of the thimbles, which extend into the combustion-chamber, are perforated to admit the heated air from the space in the section 5 to the combustion-chamber above.

The construction of the furnace will be fully understood in connection with the above description.

The operation of the invention is as follows: The parts being assembled as shown, the fire is started in the fire-pot, as usual. The air to support combustion being admitted through the grate, as usual, combustion takes place and is perfect in the lower part of the fire-pot, but in passing upward the carbonic acid, resulting from the perfect combustion in the lower part of the fire-pot, is converted into carbonic oxid. This is an inflammable gas and usually passes off unconsumed as one of

the products of combustion of the fuel. In my improved furnace this gas meets with heated air supplied through the perforations at the lower part of the section 5, and is reconverted into carbonic acid, which rises and passes upward through the fuel above, where it is again converted into carbonic oxid. This gas rises through the fuel and would pass off unconsumed, but is met by the heated air escaping through the perforations in the thimbles, where active combustion is again established and a thorough combustion of the final combustion elements of the fuel is effected.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a furnace or heater, a fire-pot having a hollow section, a perforated air-heating plate arranged vertically within said section and dividing it into two chambers, said section having openings providing communication between the outer atmosphere and one of said chambers, and between the other of said chambers and the combustion-chamber.

2. In a furnace-heater, a fire-pot having a hollow section, a perforated air-heating plate arranged vertically within said section and dividing it into two chambers, said section having openings providing communication between the outer atmosphere and one of said chambers, and perforated thimbles by means of which communication is provided between the other of said chambers and the combustion-chamber.

3. In a furnace or heater, a fire-pot having a hollow section provided with a series of perforations in its bottom, a perforated air-heating plate arranged vertically within said section and dividing it into two chambers, said plate being provided with a horizontal ledge to direct a current of heated air into the body of the fuel in the fire-pot, and said hollow section having openings providing communication between the outer atmosphere and one of said chambers, and between the other of said chambers and the combustion-chamber.

4. The combination with the hollow annular section having perforated half-thimbles formed at intervals on the inner wall thereof, and the annulus provided with registering half-thimbles, substantially as specified.

5. The combination with the hollow annular section of the fire-pot, the annulus forming the cover thereof and the upper section of the furnace, of the perforated thimbles registering with the openings in the annulus and extending into the upper section or combustion-chamber of the furnace substantially as specified.

In testimony whereof I affix my signature in the presence of two witnesses.

NATHANIEL A. BOYNTON.

Witnesses:

J. R. NOTTINGHAM,
L. L. JOHNSON.