

(No Model.)

N. A. BOYNTON.

HOT AIR FURNACE.

No. 356,980.

Patented Feb. 1, 1887.

Fig. 1.

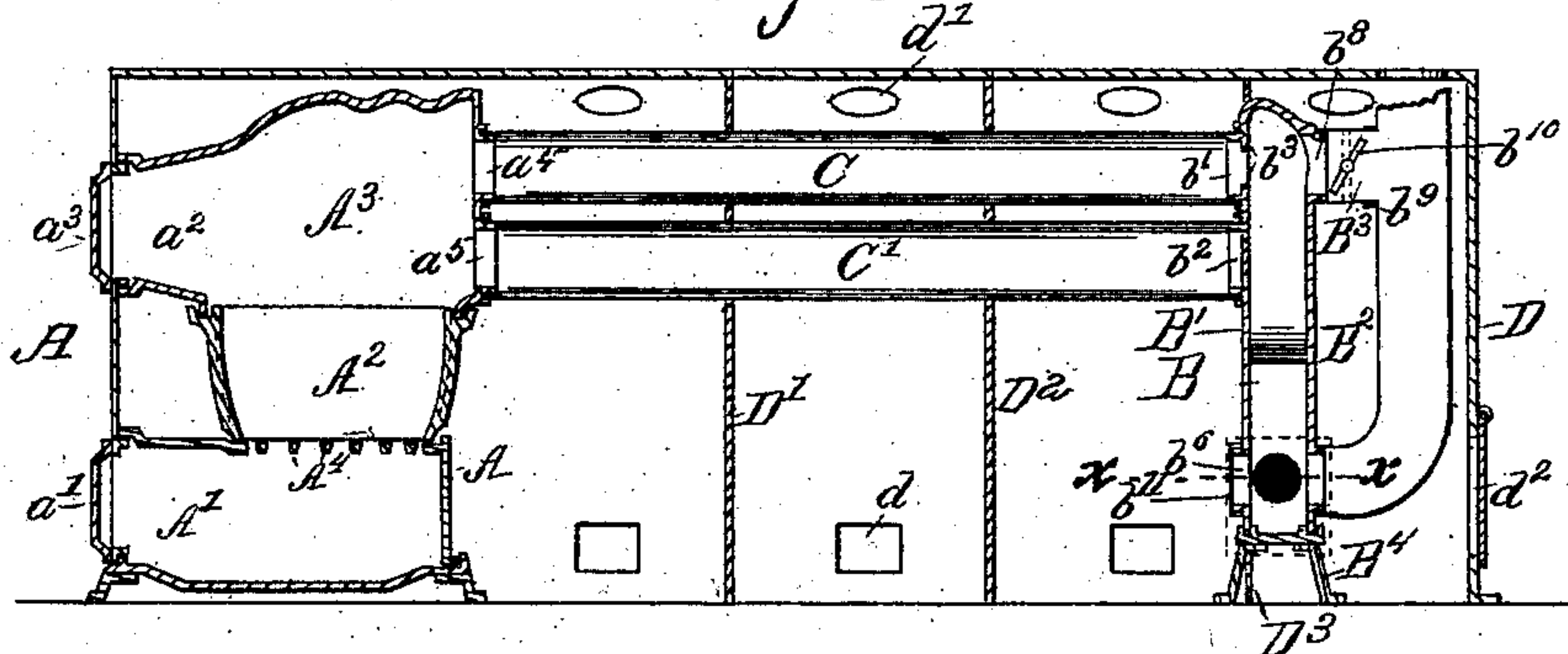


Fig. 2.

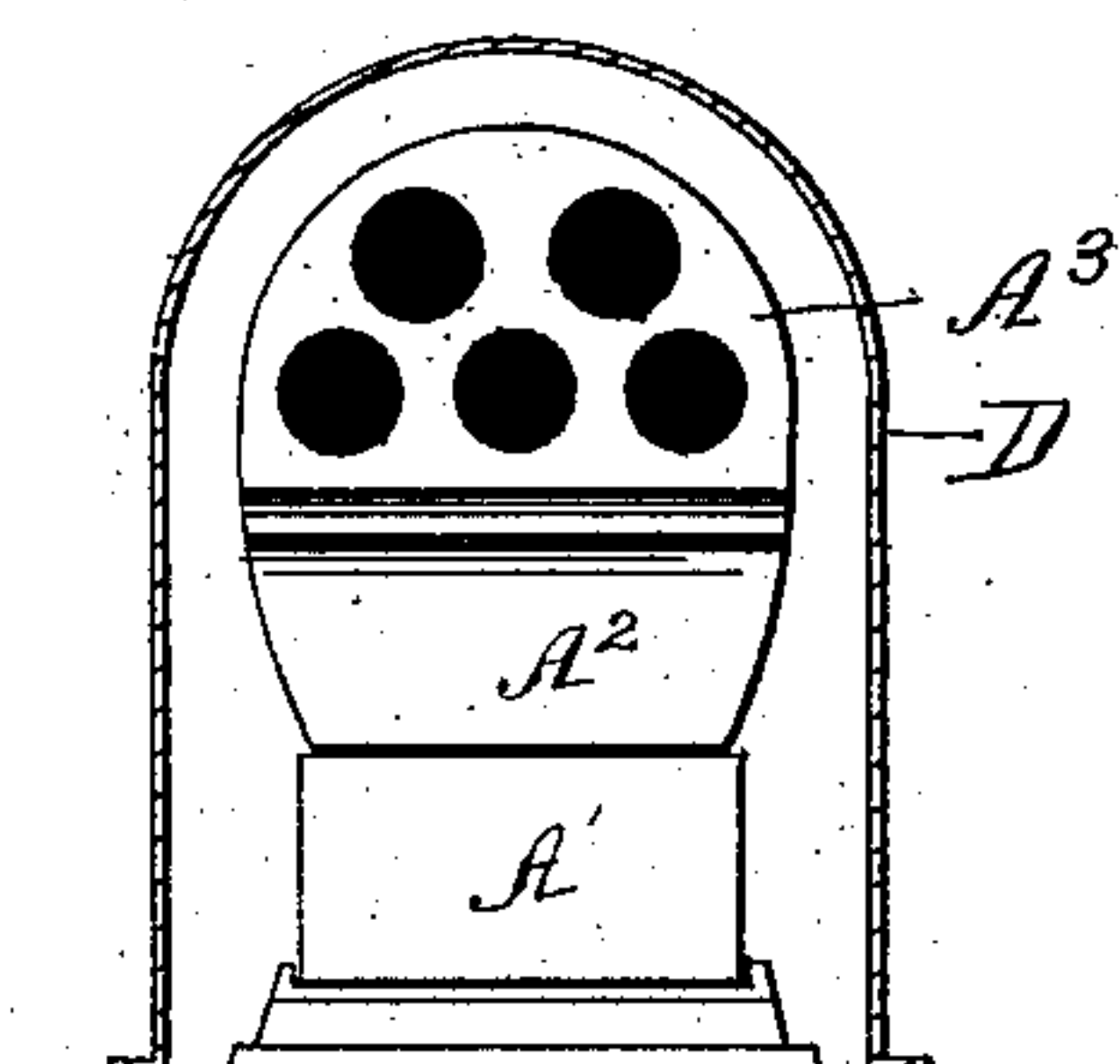


Fig. 3.

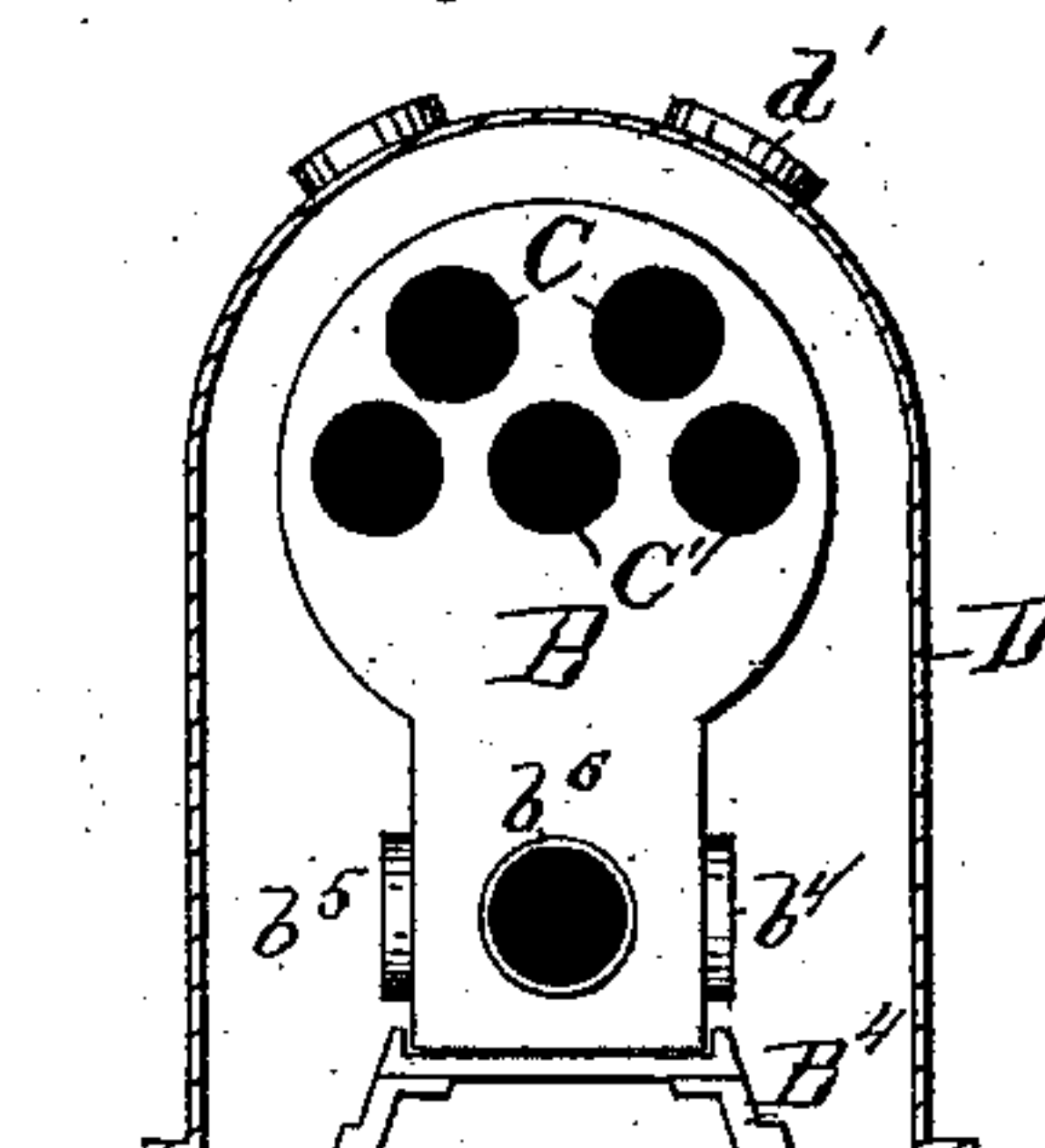


Fig. 5.

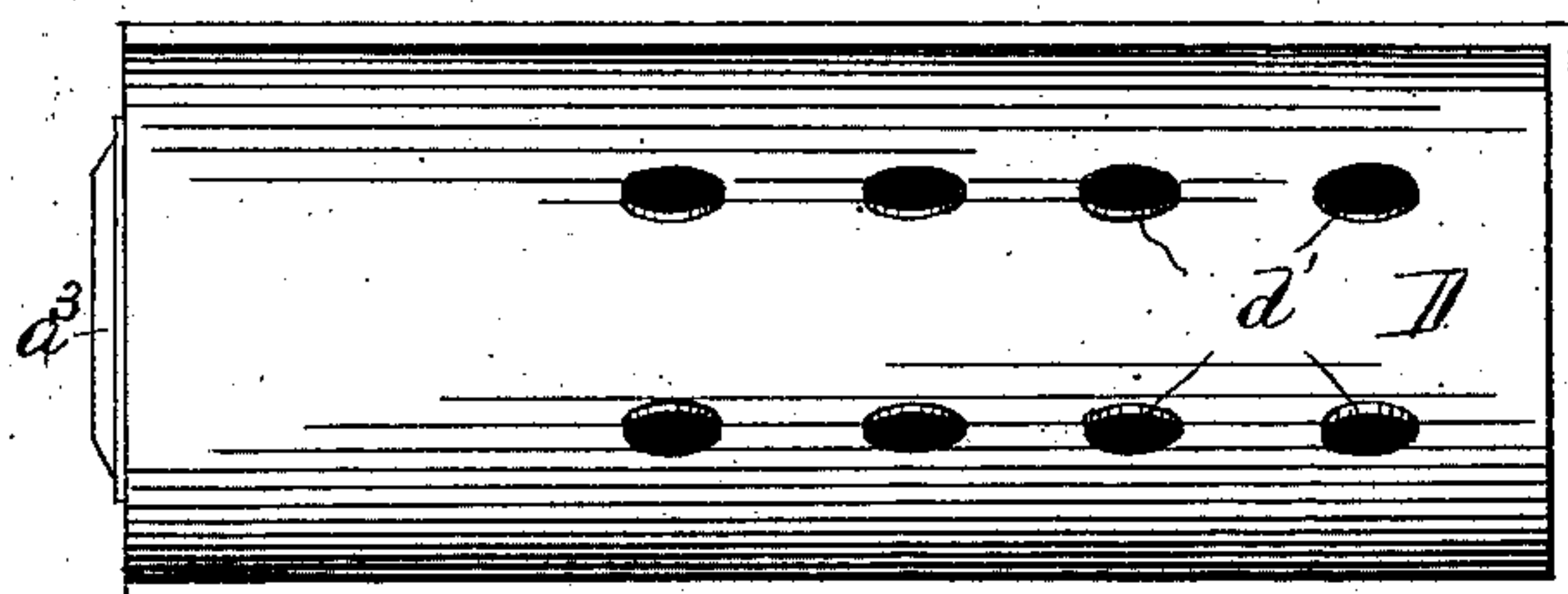
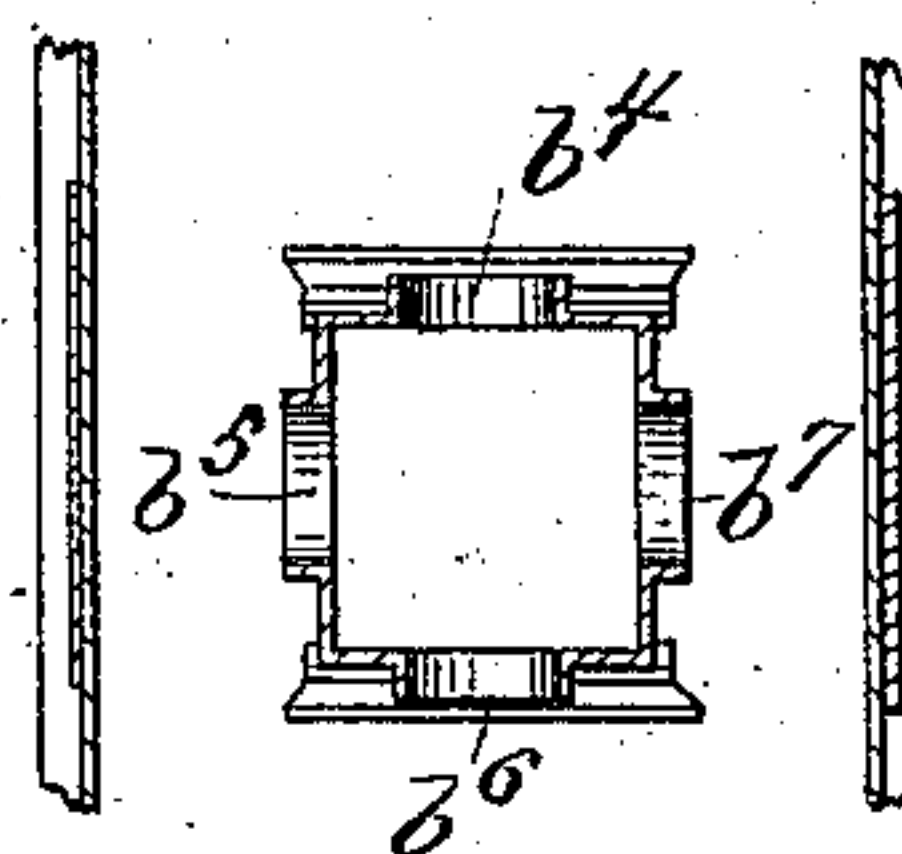


Fig. 4.



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UNITED STATES PATENT OFFICE.

NATHANIEL A. BOYNTON, OF NEW YORK, N. Y., ASSIGNOR TO THE
BOYNTON FURNACE COMPANY, OF SAME PLACE.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 356,980, dated February 1, 1887.

Application filed December 17, 1885. Serial No. 185,900. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL A. BOYNTON, a citizen of the United States, residing in the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Hot-Air Furnaces, of which the following is a description.

The object of my invention is the provision of a furnace in which combustion of gases evolved from the burning fuel shall take place partly in the combustion-chamber proper and partly in the flues which lead therefrom, in which the unconsumed volatile products of combustion shall pass by a direct course from the front portion to the rear portion of the furnace, and in which the air in the air-warming chamber shall be quickly but thoroughly heated, and shall be conducted by the most direct course from its point of admission to such chamber to its point of discharge therefrom.

Having in view the accomplishment of these ends, my invention consists, in general, of a furnace which is composed of two distinct independently-supported sections, placed at a considerable distance apart and connected by a series of preferably tubular flues, which are secured at one end to the rear portion of the front or combustion-chamber section at a point opposite the fuel-supply opening thereof, and at the opposite end to the front wall of the rear or diving-flue section of the furnace.

It consists, also, of the combination, with the combustion-chamber and with the fuel-chamber of a hot-air furnace, of a series of smoke-exit flues which are connected to the rear wall of the combustion-chamber at a point directly opposite the supply-opening and immediately above the upper extremity of the fuel-chamber.

It consists, also, of a novel means in or in connection with an upper flue, whereby the flow of the products of combustion through such upper flue is restricted and made equal or substantially equal with the flow through the lower flue.

It consists, also, of various other novel parts or combinations of parts, whereby the efficiency of the furnace is enhanced, as will be hereinafter described.

In the drawings, Figure 1 represents a central vertical longitudinal section from front to rear of a furnace embodying my improvements. Fig. 2 is a rear elevation of the front section of the furnace, the tubular flues being removed. Fig. 3 is a front elevation of the rear section of the furnace, the tubular flues being removed. Fig. 4 is a horizontal plan view of a section taken on the line *xx* of Fig. 1. Fig. 5 is a top plan view of the casing of the furnace and its air-warming chamber, drawn to a reduced scale.

A is the front or main section of the furnace, A' being the ash-chamber section, A² the fire-pot or fuel-chamber section, and A³ the combustion-chamber or dome-section of the same. This main section A is provided with a lower or ash-chamber door, *a'*, an upper or feed-chute door, *a*³, at the outer extremity of the feed-chute *a*², and a grate, A⁴, of any suitable construction.

The rear section, B, of the furnace is composed of a main front or diving-flue section, B', and a rear direct-draft and rising-flue section, B². Upon the rear portion of the combustion-chamber section A³ are provided pipe-collars *a*⁴ and *a*⁵ to receive the front ends of tubular flues C and C', similar collars, *b*¹ and *b*², being provided upon the rear section, B, to receive the opposite ends of the same. Projecting inwardly from the base of the interior surface of each of the collars *b*¹ is an annular flange or contraction, *b*³. In the lower portion of the section B' of the rear section, B, upon either of the four sides of the same, is a flue-opening or clearing-opening, and these openings are provided with collars *b*⁴, *b*⁵, *b*⁶, and *b*⁷, the latter of which ordinarily receives the lower extremity of the rear pipe or rising-flue section, B², while a similar collar, *b*⁸, upon the rear upper portion of the same section receives the short direct exit or direct-draft pipe B³, the opposite end of which is fitted upon the collar *b*⁹ of the rising-flue section or rear pipe, B². The section B is seated upon a suitable supporting-base, B⁴, and the direct draft pipe B³ is provided with a damper, *b*¹⁰, for regulating the flow of the products of combustion.

The furnace is inclosed from end to end by

a casing, D, which at suitable intervals along the lower portion of its vertical walls is provided with openings d for the admission of cold air, and at its top, along the central portion thereof, is provided with openings and corresponding pipes, d' , for the discharge of heated air.

Suitable transverse partitions, D' , D^2 , and D^3 , perforated to receive the horizontal flues C and C' , may be employed to divide the air-warming chamber formed by the casing into distinct compartments, in which the temperature of the air will vary according to the distance of the compartment from the combustion-chamber.

As will be seen in the drawings, the flues which extend between the two furnace-sections are connected to the combustion-chamber at a point but a short distance above the top of the fuel-chamber and directly opposite the feed-chute. Under this construction the flues for a considerable distance from the combustion-chamber become highly heated, and it has been found in practice that the gases of combustion are largely consumed within them, thus heating them to a still higher degree. The combustion-chamber or dome-section being composed of a single casting, as shown, escape of gases, except into the exit or radiating flues, is prevented. By the provision of the annular flanges b^3 an excessive escape of the heated currents through the upper flues is effectually prevented without diminishing the radiating-surface of such flues, and a portion of the heat which would otherwise escape with undue rapidity through these flues is directed into the lower flues, thus rendering them equal in temperature with the upper flues without diminishing the aggregate heating capacity of all the flues.

Through the extension of the radiating flues in a direct line from the flat rear wall of the combustion-chamber, and in a line leading directly from the doorway of such chamber, the insertion of a flue-cleaner and the removal of all accumulations of refuse from the flues are accomplished with the utmost facility. By the provision of the lateral openings in the body of the diving-flue accumulations of ashes and other refuse are readily removed.

It will be apparent that under some conditions the rising flue might be most conveniently attached at one of the sides, instead of at the rear, of the section B, and that in such case ashes and the like would be removed either through the rear opening or through the side opening opposite to the rising flue.

It will be obvious that a construction in which the volatile products of combustion pass in a direct line from the very point of their production to the rear portion of the heater insures a quick heating action of such products upon the radiating flues through which they pass, and that a construction in which the air-currents pass almost in a direct line from their point of admission to their point of discharge, and are in their course brought into

contact with highly-heated radiating flues, insures the accomplishment of the general object of this invention—that is, the production of a rapid and powerful heater in which the currents flow quickly and directly, as distinguished from that class in which either the heat-currents or the air-currents, or both, pass by sluggish movements through tortuous channels.

The walls of the casing D, at points opposite the clearing-openings in the rear furnace-section, will be provided with doors d^2 , and it will be understood that either of the collars b^4 b^5 b^6 b^7 may be covered by a closing-cap, b^{11} .

Having described my invention, I claim—

1. The combination, in a hot-air furnace, of an ash-chamber, a fuel-chamber, a combustion-chamber, a rear direct and indirect draft furnace-section, and lower and upper flues extending from the combustion-chamber to the rear furnace-section, the lower flue being connected to the combustion-chamber at a point immediately above the upper extremity of the fire-pot, and being of uniform capacity from end to end, and the upper flue being contracted at its point of discharge into the rear furnace-section.

2. In a hot-air furnace, the combination of a front section, a rear section, an upper flue which extends from the front section to the rear section and is contracted at its rear extremity, and a lower flue which extends from the front section to the rear section and is of uniform capacity from end to end.

3. In a hot-air furnace, an ash-chamber, a fuel-chamber above the ash-chamber, a combustion-chamber above the fuel-chamber, a fuel-supply opening in the front wall of the combustion-chamber, a rear diving-flue section, and a series of flues connected to the rear wall of the combustion-chamber at a point opposite the fuel-supply opening and directly above the upper extremity of the fuel-chamber and extending to the rear diving-flue section, all in combination, as described.

4. In a hot-air furnace, the combination of a fuel-chamber, a combustion-chamber which has opposite the door thereof and immediately above the upper extremity of the fuel-chamber a series of flue-openings, a series of flues extending rearwardly from the flue-openings, and a rear furnace-section which receives the rear extremity of the flues, such furnace-section being provided with a direct-draft pipe, a diving-flue, a rising flue, and an exit-opening.

5. In a hot-air furnace, an ash-chamber, a fuel-chamber, a combustion-chamber, a fuel-supply opening in the front wall of the combustion-chamber, a rear furnace-section, and a series of flues which are contracted at their rear extremity, extending from the rear of the combustion-chamber at a point opposite the fuel-supply opening to the front of the rear furnace-section, in combination, as described.

6. A hot-air furnace which consists, essentially, of a front section which is composed of

an ash-chamber, a fuel-chamber, and a combustion-chamber which is provided with a door or opening in the front thereof, and with a series of flue-openings in the rear thereof, 5 directly opposite to or coincident with the door or opening, a rear section embracing a front diving flue and a rear rising flue and having a series of flue-openings in the front wall thereof, and an exit-opening, and a series 10 of flues, each of which extends in line with the door or opening from the front section to the rear section of the furnace.

7. The combination, with the fuel-chamber, the combustion-chamber, and the radiating 15 flues of a hot-air furnace, of a rear furnace-section which is provided in its front wall with a series of openings which correspond in dimensions with such radiating flues, and which is also provided with a series of open- 20 ings, the capacity of which is less than that of the radiating flues.

8. The combination, with the front fuel-chamber section, the rear direct-draft and diving and rising flue sections, the intermediate flues, and the hot-air casing, of the transverse 25 partitions D' , D^2 , and D^3 , substantially as and for the purposes specified.

9. The combination, with a hot-air furnace which embraces a front section, a rear section, and a series of flues which connect the two sec- 30 tions, of a casing which incloses the sections and the flues, and which is divided by transverse partitions into several transverse air-warming compartments which, when the furnace is operated, are of unequal temperatures, 35 as and for the purpose described.

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Witnesses:

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