

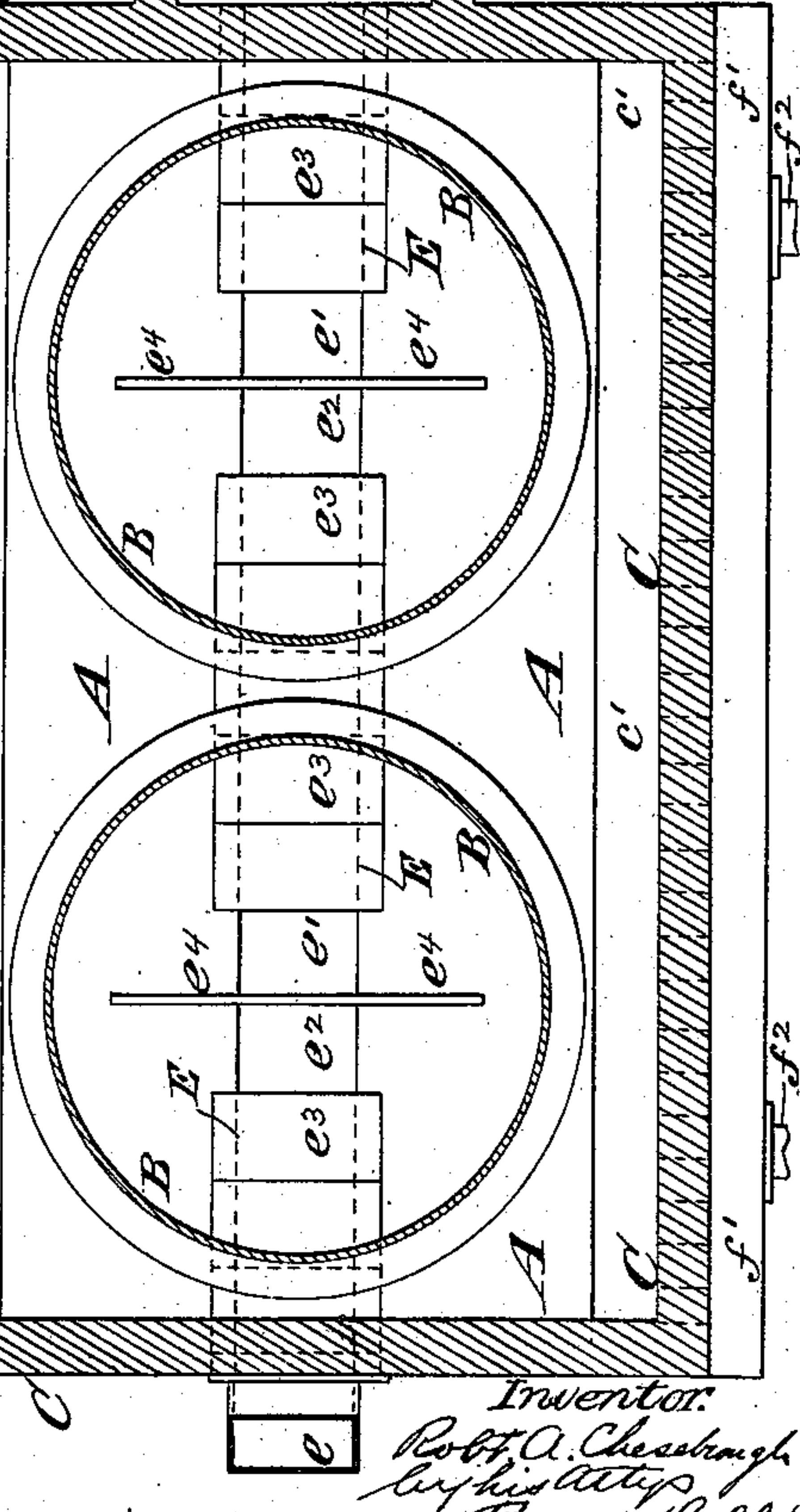
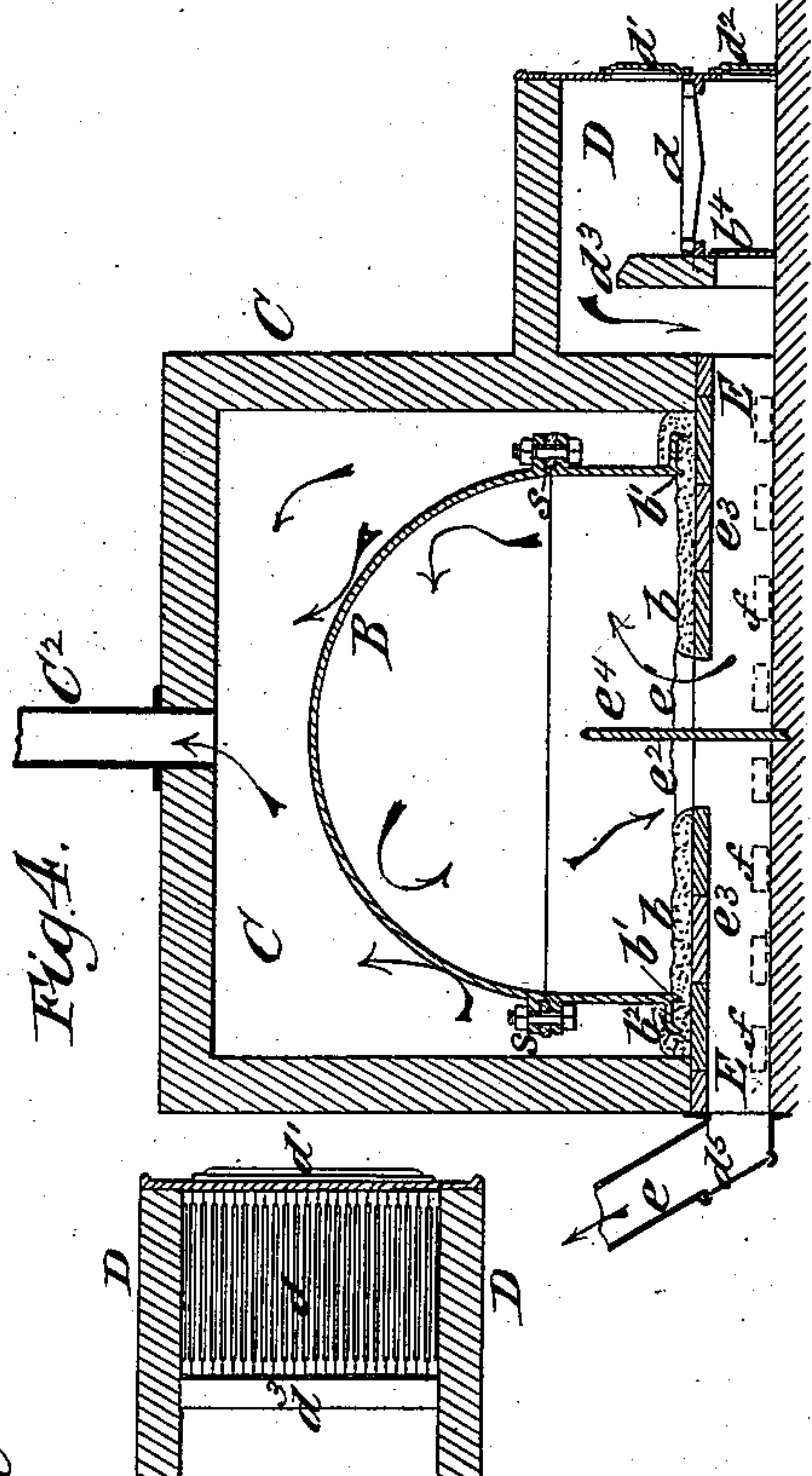
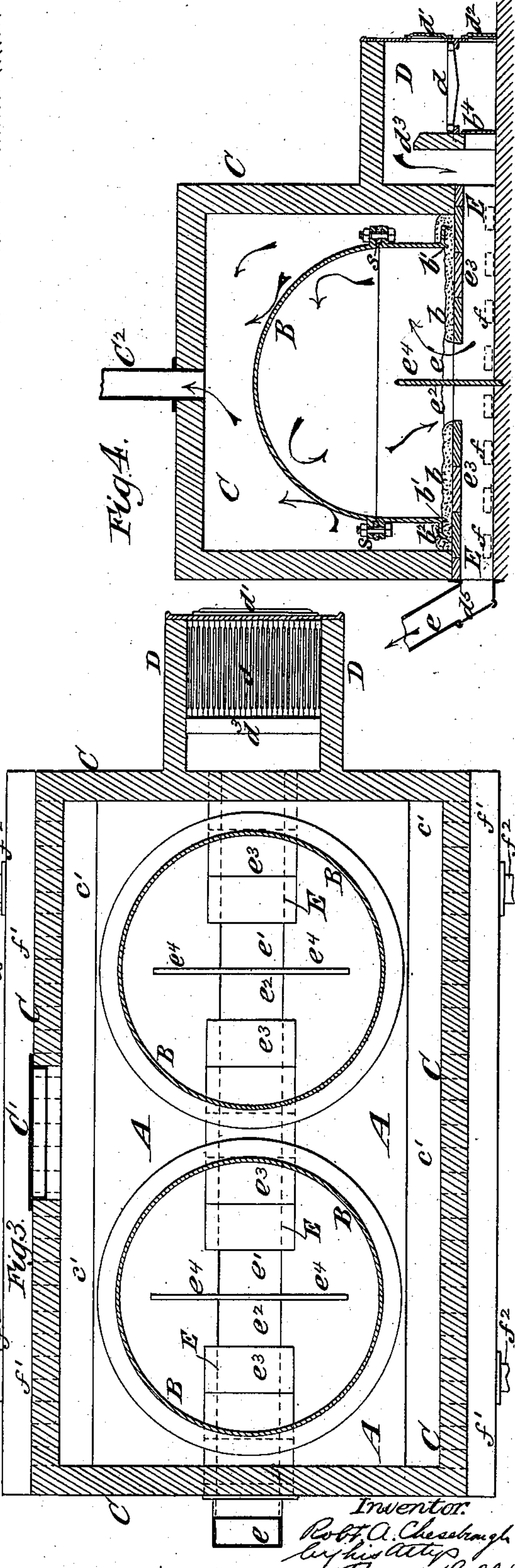
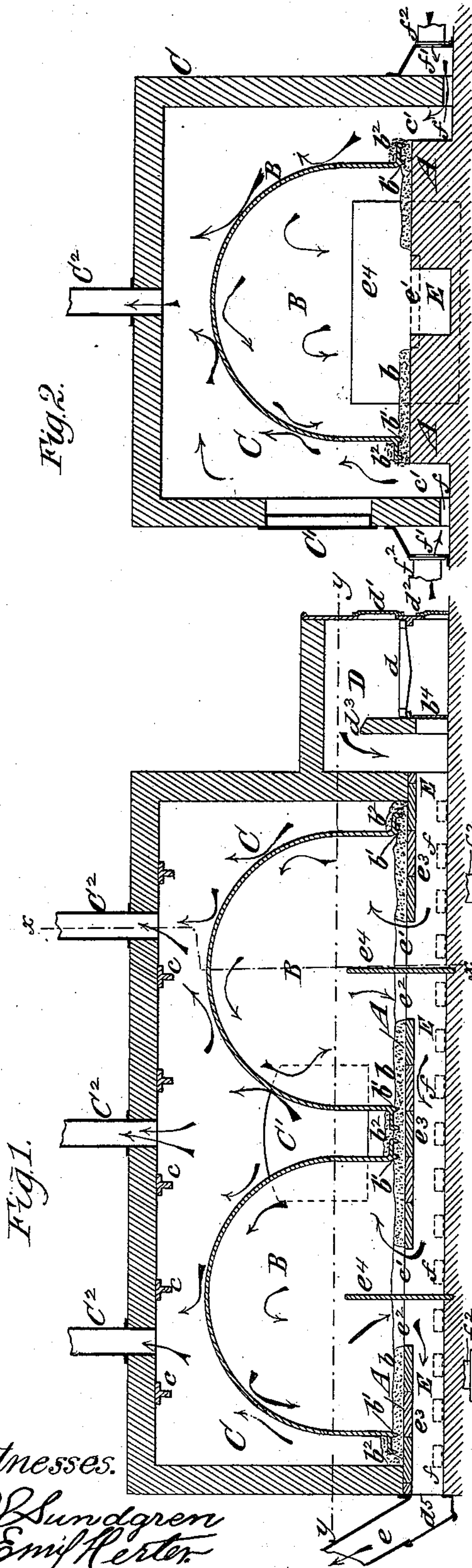
(No. Model.)

2 Sheets—Sheet 1.

R. A. CHESEBROUGH.  
HOT AIR FURNACE.

No. 376,812.

Patented Jan. 24, 1888.



Witnesses.  
O. Sundgren  
Emil Renter.

Inventor.  
R. A. Chesbrough  
by his Attys.  
Brown Hall

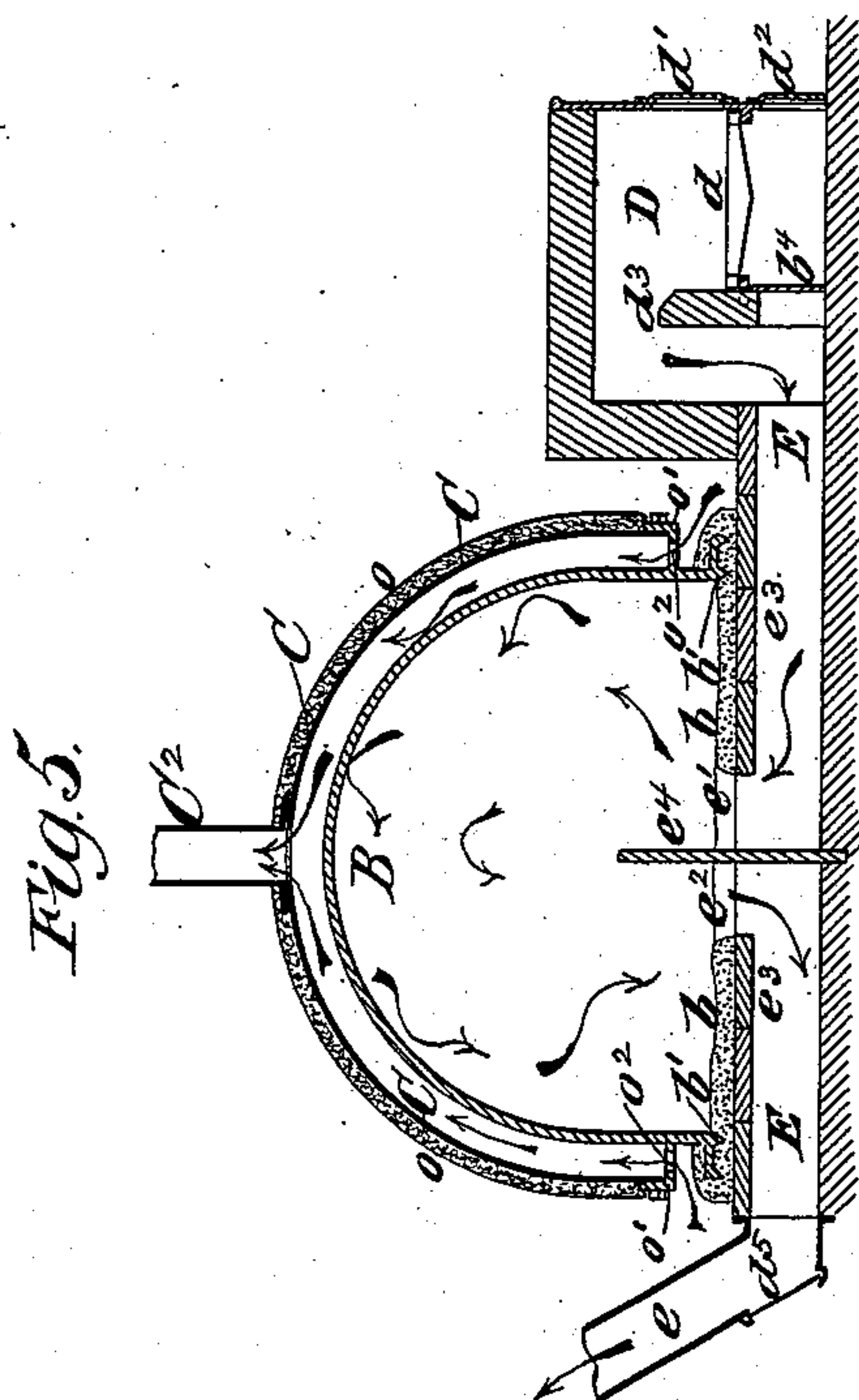
(No Model.)

2 Sheets—Sheet 2.

R. A. CHESEBROUGH.  
HOT AIR FURNACE.

No. 376,812.

Patented Jan. 24, 1888.



*Witnesses:*

O. Sundgren  
Emil Kertter.

*Inventor:*

Robt. A. Chesebrough  
by his attys  
Brown & Hall



# UNITED STATES PATENT OFFICE.

ROBERT A. CHESEBROUGH, OF NEW YORK, N. Y.

## HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 376,812, dated January 24, 1888.

Application filed February 1, 1887. Serial No. 226,120. (No model.) Patented in England July 2, 1887, No. 9,410; in France July 4, 1887, No. 184,395; in Belgium July 4, 1887, No. 78,060, and in Canada September 3, 1887, No. 27,570.

*To all whom it may concern:*

Be it known that I, ROBERT A. CHESEBROUGH, of the city and county of New York, in the State of New York, have invented a new and useful Improvement in Hot-Air Furnaces, of which the following is a specification.

The present invention has been patented by the United Kingdom of Great Britain and Ireland by Letters Patent No. 9,410, dated July 2, 1887; by the Republic of France by Brevet d'Invention No. 184,395, dated July 4, 1887; by the Kingdom of Belgium by Brevet d'Invention No. 78,060, dated July 4, 1887, and by the Dominion of Canada by Letters Patent No. 27,570, dated September 3, 1887.

The object of my invention is to provide a hot-air furnace of extremely simple construction, and in which the hot products from the furnace or fire-place proper will be utilized economically for heating air to a desired temperature without burning the oxygen of the air or overheating it, and in which the products of combustion will not escape into the chamber or casing for heated air.

In carrying out my invention I provide a base or foundation, which may be of masonry, and on this base or foundation I place one or more inverted or dome-shaped chambers, which may be of cast metal, and the lower edges of which are embedded or otherwise secured upon the base or foundation in an air-tight and smoke-tight manner. A casing, which may be of masonry, surrounds the chamber or chambers, and is provided with a suitable inlet for cold air and an escape pipe or pipes for heated air, the air within the casing being heated by contact with the exterior of the chamber or chambers. A furnace or fire-place is built at the side of the air-casing, and from the furnace an escape-flue, for products of combustion, which is constructed in the base or foundation, extends beneath the chamber or chambers, and this escape-flue communicates with the chamber or with the several chambers in succession by inlet and outlet openings, commonly separated by a deflector which intercepts the flue, and may extend upward to the desired height into the chamber. The walls of the air-casing may be sufficiently removed from the raised base or foundation to afford a space or channel on opposite sides

thereof, and into the spaces or channels on opposite sides of the base or foundation lead air-inlet openings, while the hot-air-escape pipe or pipes extend from the top of the casing. The object of thus bringing the cold-air-inlet openings at as low a level as possible and below the bottom of the chamber or chambers is to insure a draft or passage of air through the lower inlet-openings, thence in contact with the exterior of the chamber or chambers, and thence upward through the air-escape pipe or pipes.

The invention will be herein more fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal section of a hot-air furnace or air-heating apparatus embodying my invention. Fig. 2 is a transverse vertical section thereof on about the plane indicated by the dotted line *xx*, Fig. 1. Fig. 3 is a horizontal section thereof on about the plane indicated by the dotted line *yy*, Fig. 1. Fig. 4 is a sectional elevation similar to Fig. 1 of a furnace having but a single inverted or dome-shaped chamber, through which the products of combustion pass; and Fig. 5 is a sectional elevation similar to Fig. 4, showing a modification of my invention.

Similar letters of reference designate corresponding parts in all the figures.

I will first describe the construction shown in Figs. 1, 2, and 3.

A designates the base or foundation, which may have a horizontal surface, and on which I support a number or series of dome-shaped or inverted chambers, B. I have here represented two such chambers, and they may consist simply of inverted pot-like vessels of cast metal, destitute of any bottom and resting with an air-tight and smoke-tight joint upon the bed or foundation A, the bed or foundation being usually of brick-work. The bed or foundation may be covered upon its surface with a layer, *b*, of fire-clay, cement, or other suitable material, which when laid is more or less plastic, and each chamber may have at its lower edge downwardly-extending ribs or flanges *b'*, which embed themselves by the weight of the chamber, and also by any pressure which may be applied to it, into the facing *b*, of fire-clay or other material. The joints



which each chamber B forms with the bed or foundation may also be luted or covered with fire-clay,  $b^2$ , to prevent leakage of the products of combustion.

5 C designates an air-casing, which may be of brick-work and which incloses the chambers B. The top of this casing may be supported by iron bearers or cross-bars  $c$ , and the side walls of the casing C may be at such distance from the opposite sides of the bed or foundation A  
10 as to form longitudinal channels or spaces  $c'$ , as shown in Fig. 2, for a purpose hereinafter described. In the side of the casing C may be a door,  $C'$ , which may be double, so as to  
15 form a dead-air space to prevent radiation, and through which access may be had to the interior of the casing C for sealing the chambers B by luting  $b^2$  in case there should be  
20 after use any leakage of products of combustion from said chambers B into the air-casing C.

D designates a furnace or fire-place, having a grate,  $d$ , and fire and ash-pit doors  $d'$   $d''$ , and from this furnace the products of combustion  
25 pass over the bridge-wall  $d^3$  into and through the flue E. This flue E is approximately horizontal through the bed or foundation A and beneath the chambers B, and it communicates at its farther end with the smoke-pipe  $e$ , and  
30 it also communicates successively with the two or more chambers B of the series by inlet-openings  $e'$  and outlet-openings  $e^2$ . The top of the flue E may be formed of tiles  $e^3$ , which are  
35 flush on the surface with the bed or foundation A, and the inlet and outlet openings  $e'$   $e^2$ , leading to and from each chamber B, may be formed simply by omitting certain of the tiles.

In the present example of my invention the flue E beneath each chamber is interrupted by  
40 a partition or deflector,  $e^4$ , which extends upward to the proper height within the chamber B, and which compels the products of combustion, as they pass along the flue E in the  
45 direction of the arrows, Fig. 1, to take the course indicated by arrows in said figure—that is to say, upward into the chamber B, thence over the partition or deflector  $e^4$ , and  
50 downward through the outlet-opening  $e^2$ . By this arrangement the products of combustion circulate within the chamber B which is nearest to the furnace D, and from that chamber they pass to the next, and so on throughout the several chambers employed in the series.  
55 It will be seen that by this construction I avoid the necessity for any joints for pipes, &c., in the chambers B, which may be made integral of a single piece of cast metal, and the joint between the lower edges of such chambers and the bed or foundation A may be easily kept tight. I have here shown in the  
60 bridge-wall  $d^3$  a cleaning-hole,  $b^4$ , which may be closed by a door or stopper, and at the junction of the smoke-pipe  $e$  with the flue E is a second cleaning-hole,  $d^5$ , also closed by a

stopper. Through these holes a rake or hoe 65 may be inserted for cleaning out the flue E.

One or more escape or outlet pipes for heated air extend from the top of the air-casing C, and three such pipes,  $C^2$ , are here represented. The casing C also has suitable inlets 70 for cold air, and such air is heated by contact with the exterior of the chambers B and passes in a heated condition through the outlet-pipes  $C^2$ . It is necessary that the inlet-openings be so arranged that the air will pass through the  
75 casing C in the proper direction, and for this reason it is desirable to have the inlet-openings as low as possible in the casing C. I have here represented these inlet-openings  $f$  at the extreme bottom of the casing C, and they may  
80 admit cold air into the channel-like spaces  $c'$  at opposite sides of the bed or foundation A, as shown at Fig. 2. The air is heated by contact with the chambers B, and by arranging the inlet-openings  $f$  low down in the casing the  
85 circulation of air through the casing in the direction of the arrows shown in Fig. 2 is secured. As here represented, these openings are at short distances apart, as best shown in  
90 Fig. 1, along the two sides of the casing; but they might be upon a single side only. The inlet-openings  $f$  on each side take their supply from a cold-air box,  $f'$ , which may be supplied by a pipe,  $f^2$ , leading to the outside of the building. 95

The example of my invention shown in Fig. 4 corresponds in all respects to that shown in Figs. 1, 2, and 3, save that in Fig. 4 a single chamber only, B, is supported upon the base or foundation A. 100

For convenience, the dome-shaped chamber B may be cast in two or more sections, bolted together with bolts and using a rust-joint, as shown at  $s$  in Fig. 4, so as to prevent the escape into the air-casing C of any of the products of combustion; but it will be evident that it will be better to cast the chamber B in one piece when the location will admit of it. 105

In Fig. 5 I have shown, as a slight modification of my invention, a furnace in which the air-casing C is not constructed of brick-work, as in the previous figures, and consists of a sheet-metal shell of shape similar to the chamber B, but larger. This shell, which has an outlet-pipe,  $C^2$ , for the escape of heated air, 115 may be covered with asbestos,  $o$ , or other non-conducting material, and may rest upon and be secured to a flange,  $o'$ , projecting from the exterior of the chamber B. Inlet-openings for cold air may be provided in the flange  $o'$ , as shown at  $o^2$ , and the air entering those openings will be heated by contact with the exterior of the chamber B, and will finally escape at the pipe  $C^2$ . 120

To heat large halls or buildings, two or more rows of chambers B may be inclosed in one casing C, and each row heated by a separate flue, E, the products of combustion from 125



the external furnace passing through these flues beneath the chambers B and communicating with them in succession, and there being as many flues as there are lines or rows of chambers.

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

1. The combination, with a base or foundation and a metal chamber supported thereon, of a casing surrounding such chamber and having an inlet for cold air and an outlet for heated air, a furnace for supplying heat external to the casing, and a flue for products of combustion extending from the furnace through the base and beneath the chamber and communicating with the interior of the chamber, substantially as herein described.

2. The combination, with the base A and the chamber B, supported thereon, of the air-casing having a cold-air inlet and a heated-air outlet, an external furnace, D, and a flue, E, leading from the furnace through the base and intercepted at the opening under the chamber B by a deflector, substantially as herein described.

3. The combination, with the base or foundation

and a series of two or more dome-shaped metal chambers supported thereon, of a casing inclosing said base and chambers and having an inlet for cold air thereto and an outlet for heated air therefrom, a furnace external to said casing, and a combustion-flue extending from the furnace through the base and communicating with the chambers in succession, substantially as herein described.

4. The combination, with the base or foundation A and the chamber B, of a casing, C, surrounding said chamber and leaving a space, *c'*, between it and the base or foundation, and provided with air-inlets into said space below the top of the base or foundation, and with a hot-air-escape pipe, a furnace, and a flue, E, extending from the furnace through the base or foundation directly beneath the chamber, and having inlet and outlet openings *e' e''*, whereby it communicates with said chamber, substantially as herein described.

ROBT. A. CHESEBROUGH.

Witnesses:

C. HALL,

MINERT LINDEMAN.