(No Model.)

3 Sheets—Sheet 1.

E. D. VAN STONE & E. W. TAYLOR.

HOT AIR FURNACE.

No. 334,310. Patented Jan. 12, 1886.

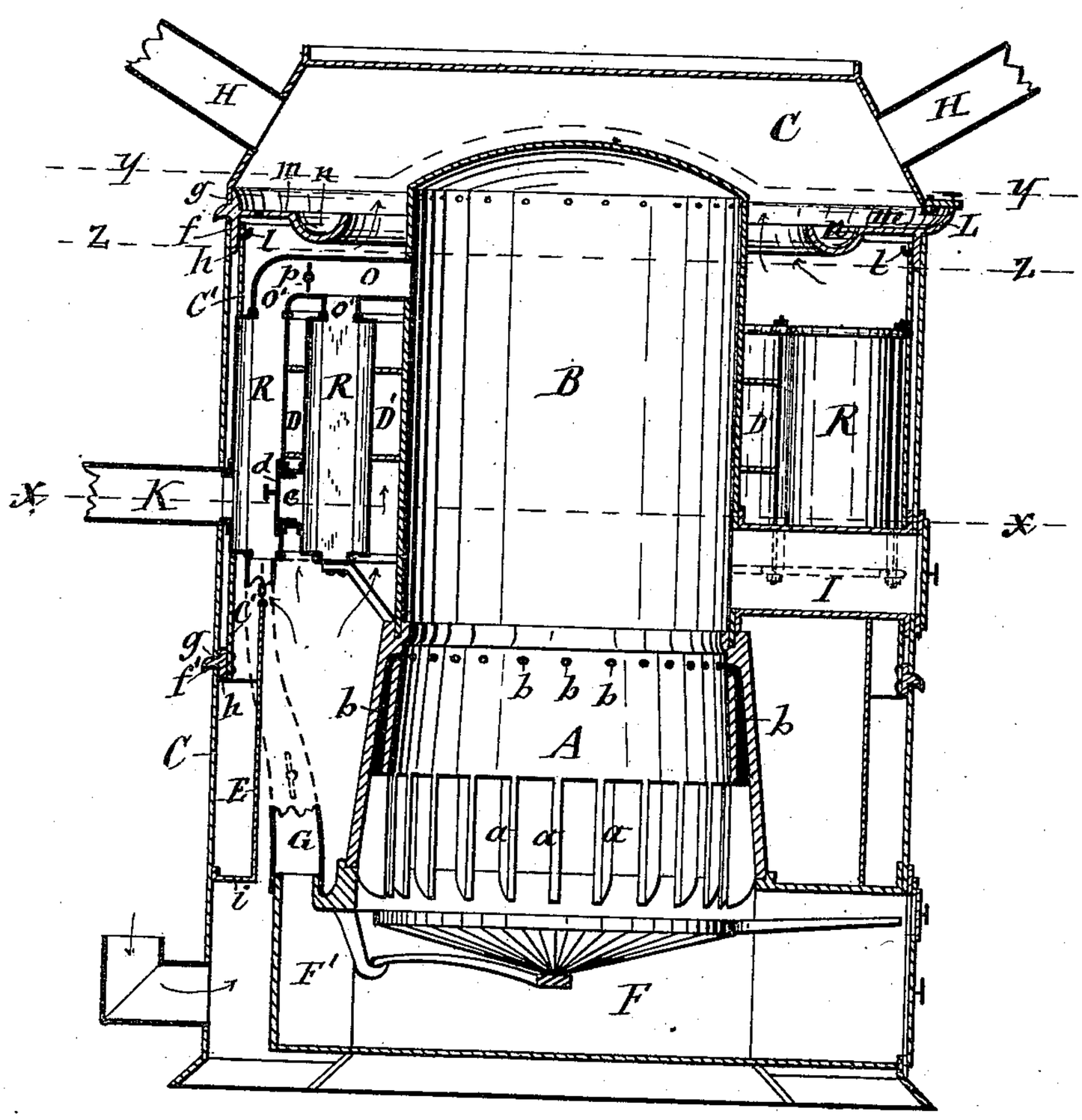

FIG-1-

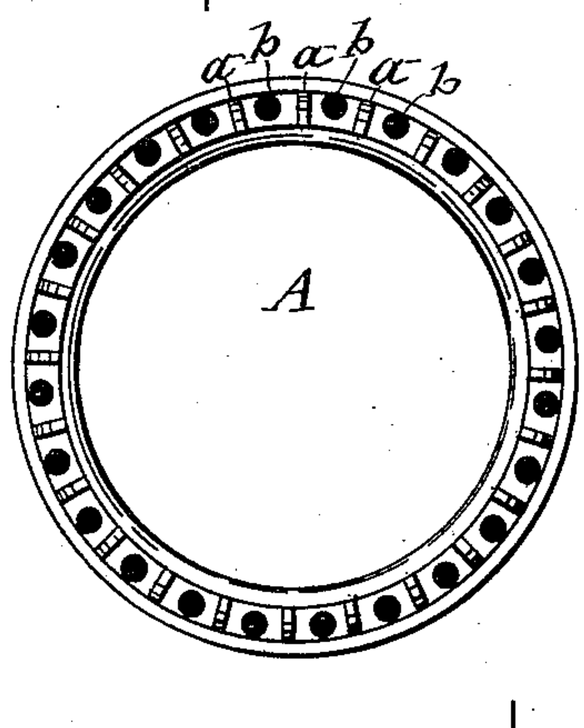

FIG-2-

ATTEST—

Wm. E. Reynolds

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(No Model.) 3 Sheets—Sheet 2.

E. D. VAN STONE & E. W. TAYLOR.

HOT AIR FURNACE.

No. 334,310. Patented Jan. 12, 1886.

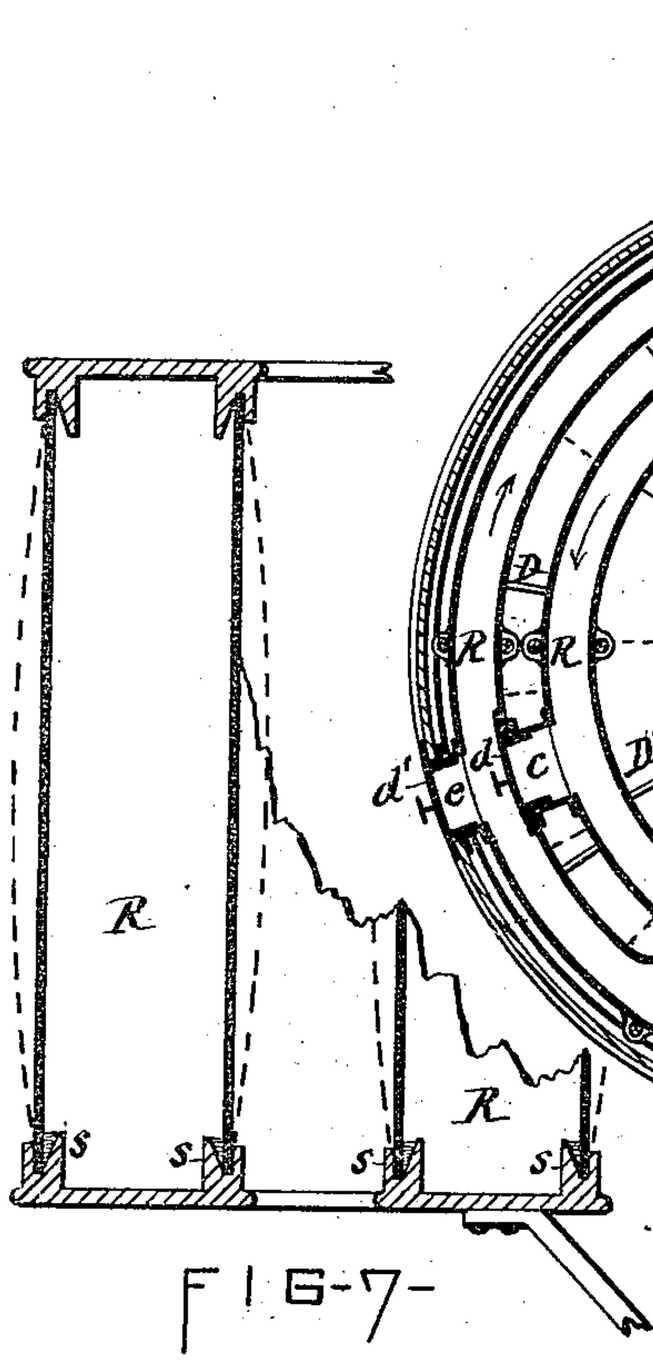

FIG-7-

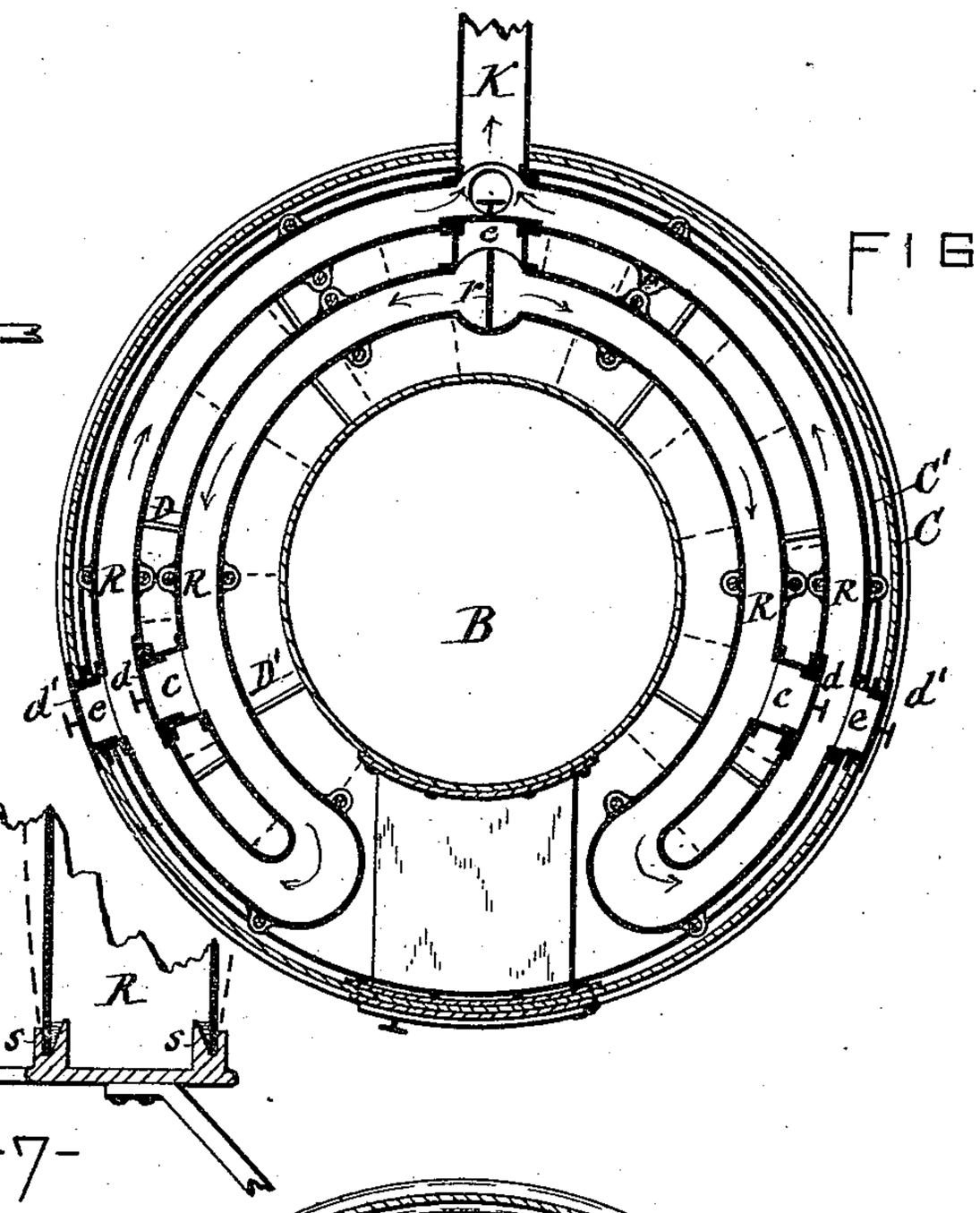

FIG-5-

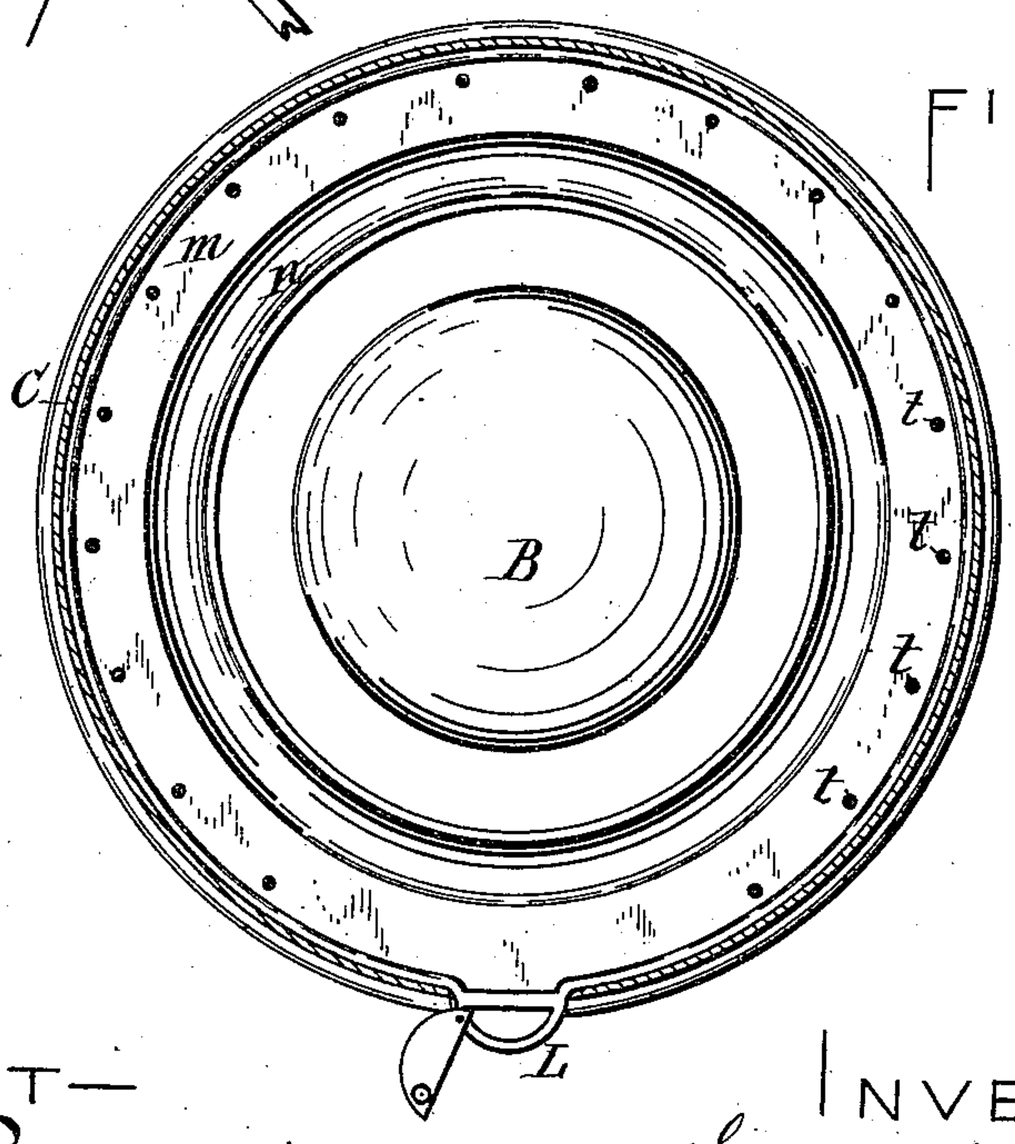

FIG-4-

ATTEST—

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Attys.

(No Model.) 3 Sheets—Sheet 3.

E. D. VAN STONE & E. W. TAYLOR.

HOT AIR FURNACE.

No. 334,310. Patented Jan. 12, 1886.

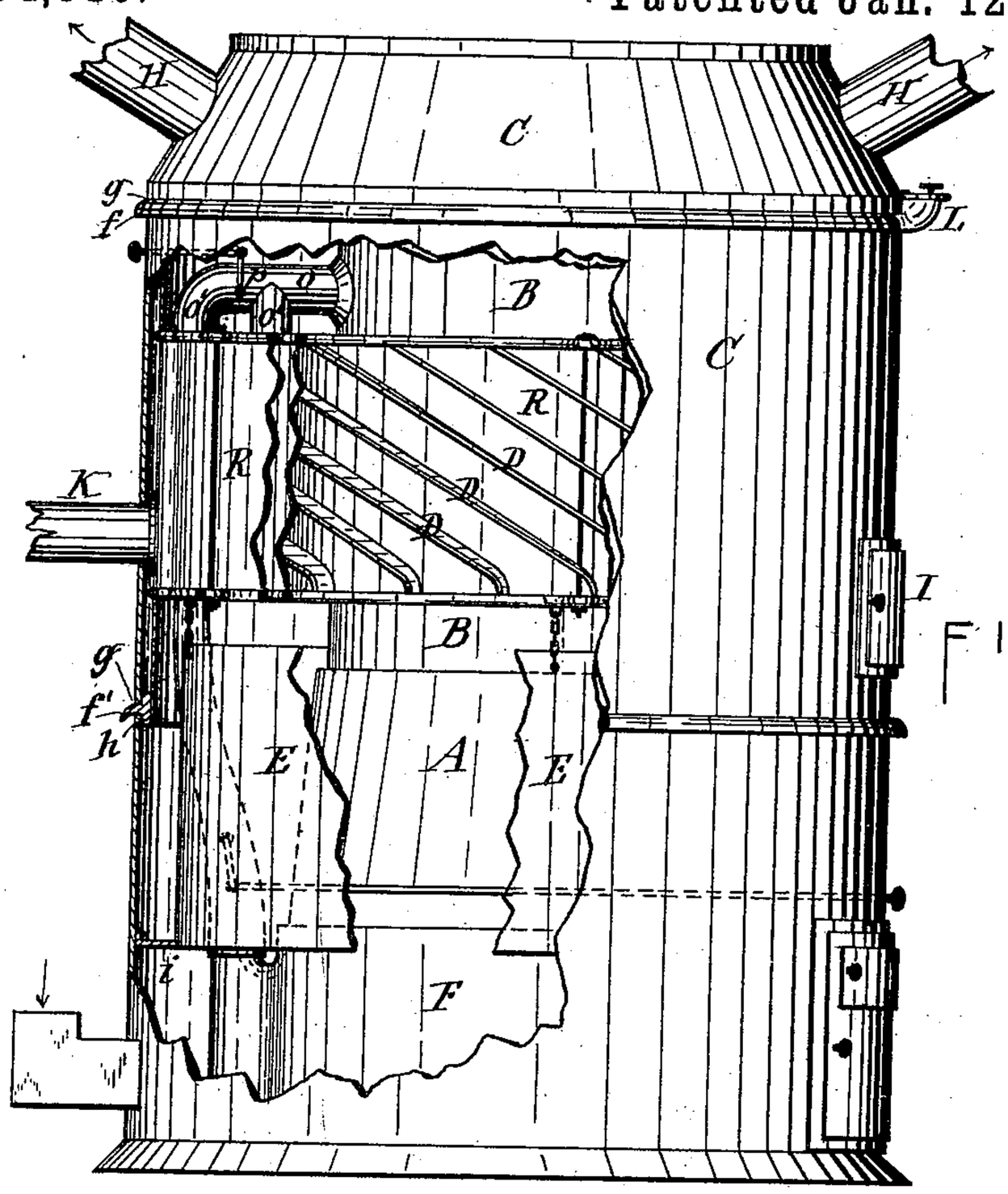

FIG-5-

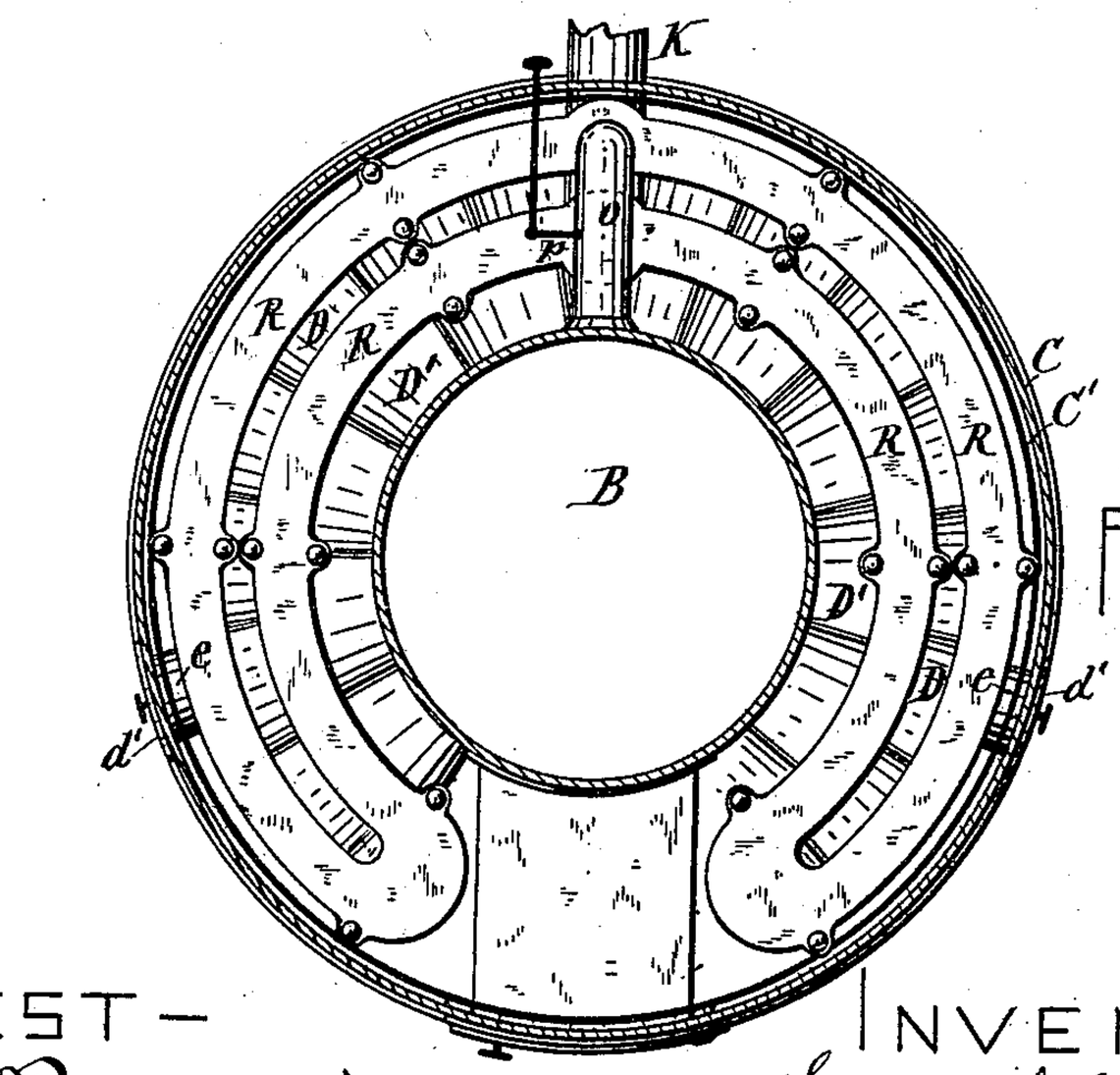

FIG-6-

ATTEST—

Wm. E. Raymond Jr.

F. H. Gibbs

INVENTORS—

Edwin D. Van Stone and

Edward W. Taylor

per Duell, Lacey & Hay

Attys

UNITED STATES PATENT OFFICE.

EDWIN D. VAN STONE, OF SYRACUSE, AND EDWARD W. TAYLOR, OF ALBION, NEW YORK.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 334,310, dated January 12, 1886.

Application filed September 16, 1884. Serial No. 143,193. (No model.)

To all whom it may concern:

Be it known that we, EDWIN D. VAN STONE, of Syracuse, county of Onondaga, and State of New York, and EDWARD W. TAYLOR, of Albion, in the county of Orleans, in the State of New York, have invented new and useful Improvements in Hot-Air Furnaces, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention consists in various important improvements in the construction and combination of the constituent parts of a hot-air furnace, possessing superior heating capacity and efficiency generally.

The invention is fully illustrated in the annexed drawings, wherein Figure 1 is a vertical transverse section of our improved hot-air furnace. Fig. 2 is an inverted plan view of the fire-pot. Figs. 3 and 4 are horizontal transverse sections, respectively, on lines *x x* and *y y* in Fig. 1. Fig. 5 is an elevation with portions broken away to illustrate the internal arrangement. Fig. 6 is a horizontal transverse section on line *z z* in Fig. 1; and Fig. 7 is an enlarged transverse section of a portion of the radiators, illustrating their detail construction.

Similar letters of reference indicate corresponding parts.

F denotes the ash-pit, and A the fire-pot, mounted on the ash-pit in any suitable and well-known manner.

B represents the dome or combustion-chamber, mounted on the fire-pot, and provided with the feed-door I.

R R are two radiators, consisting of an endless deep and narrow flue, arranged in the form of two segments connected at their ends and arranged side by side and around the combustion-chamber B, with which they communicate by a flue, *o*, extended from the upper part of the combustion-chamber at the side opposite from the feed-door, which flue terminates with two branches, *o' o'*, each of which connects with one of the radiators R R at the center of the length thereof. A damper, *p*, is arranged in the said flue, between the two branches thereof, for the purpose of controlling the passage of the products of combustion, so as to cause them to either pass directly to the inner radiator or allow them free circulation to both radiators. The exit-pipe K is connected to the outer radiator at or near the bottom thereof, and preferably directly under the flue *o'*, hereinbefore described. By opening the damper *p* the products of combustion are allowed to escape from the combustion-chamber directly through the outer radiator R and exit-flue K, thus increasing the draft through the fire-pot, and accelerating combustion of the fuel. When the fire is well under way, the damper *p* may be closed, thereby compelling the products of combustion to take the more circuitous passage through the inner radiator, and thence to the outer radiator and exit-flue.

Directly under the flues *o'* the inner radiator is provided with a partition, *r*, by means of which the current of the products of combustion is divided and caused to pass from the flue *o'* in opposite directions around the inner radiator, and thence back through the outer radiator to the exit-flue K, as indicated by arrows in Fig. 3 of the drawings.

By the described peculiar form of the two radiators R R the heating-surface of the furnace is materially augmented, and the heat is effectually absorbed from the products of combustion before they reach the exit-flue. The vertical walls of the radiators are formed of sheet metal, and held between segmental base and cap plates, which are of cast-iron, and have V-shaped rims *s s*, in which the edges of the sheet-metal walls are seated, the base and cap plates being clamped onto the said walls by bolts connecting the said plates, as shown in Fig. 7 of the drawings. The aforesaid V-shaped joint is paced with cement so as to render it air-tight and to securely hold the edges of the walls of the radiator in place. The main portion of said walls is caused to bulge or spring outward, as indicated by dotted lines in Fig. 7 of the drawings, when expanded by heat.

c c represent cleaning-flues connecting the two radiators R R at or near the bottom, and provided with removable covers *d d*, and in the outer side of the outer radiator are hand-holes *e e*, in range with the flues *c c*, and provided with removable covers *d' d'*. By removing the covers *d d d' d'* access is obtained to the interior of the radiators for cleaning the same. A similar flue, *c*, is connected with the two radiators in range with the exit-

flue K, so that by removing the latter the interior of the radiators can be cleaned through the opening provided for the exit-flue.

From the outer radiator R is suspended an annular apron, E, which surrounds the fire-pot, and is provided at its base with an outward flange, *i*, extending to the usual casing, C, which incloses the furnace. The object of this apron is to force into more intimate contact with the fire-pot the air which enters into the casing at the base in the usual manner.

Between the two radiators R R, and also between the inner of said radiators and the combustion-chamber B, we place oblique or diagonal air-deflecting plates D D′, so that the ascending air is somewhat retarded in its circulation and compelled to move over more extensive heating-surfaces, and thus caused to absorb the heat more effectually. The casing C we form with horizontal joints *g g*, one of which is near the top and the other is below the radiators, and in said joints we interpose rings *f* and *f′*, which are formed with vertical flanges, which rest against the inner side of the casing and hold the rings in place. The flange of the upper ring we provide with inward projecting hooks *l l*, on which we hang a lining, C′, reaching to the lower ring and secured to the flange thereof, as illustrated in Fig. 1 of the drawings, said lining preventing external radiation of heat from the furnace. The upper ring, *f*, we also form with a horizontal inward-projecting annular disk, *m*, and a circumferential trough, *n*, on said disk. Said disk and trough form an air-deflector, which crowds the ascending air toward the combustion-chamber, and also prevents too rapid escape of the air through the usual hot-air pipes, H H, connected to the top or upper part of the casing.

The trough *n* is designed to contain water, which is introduced through a lip, L, cast on the ring *f* and projecting at the outside of the casing, as shown. Said arrangement of the trough *n* near the top of the furnace subjects the water to the heat circulating around said part of the furnace, and it thus becomes evaporated, the vapor being absorbed by the hot air, which is conducted to the apartments to be heated by the usual pipes, H H.

In order to create a circulation of air over the inner surface of the upper part of the casing, so as to protect it from excessive moisture, incident to the evaporation of the water in the trough *n*, we provide the disk *m* with the perforations *t t*, as best seen in Fig. 4 of the drawings, said perforations allowing sufficient currents of hot air to pass up through them and circulate around the inner surface of the top portion of the casing to maintain the same dry.

Having described our invention, what we claim as new is—

1. In combination with the fire-pot and combustion-chamber, two radiators, consisting of an endless flue in the form of segments, connected at their ends and arranged side by side around the combustion-chamber, a flue extended from the combustion-chamber and terminating with two branch flues, each of which communicates with one of the radiators at about the center of the length thereof, a damper between said branch flues, and an exit-flue extended from one of said radiators, substantially as described and shown.

2. The combination of the casing C, formed with horizontal joints *g g*, the ring *f*, interposed in the upper joint and provided with hooks *l l*, the ring *f′*, interposed in the lower joint and provided with the flange *h*, and the lining C′, hung on the hooks *l l* and secured to the flange *h*, substantially as described and shown.

3. In combination with the fire-pot and combustion-chamber, radiators R R, surrounding the combustion-chamber, and the annular apron E, suspended from the bottom of one of said radiators, substantially as set forth and shown.

4. In combination with the fire-pot, combustion-chamber, and casing, the radiators R R, arranged side by side around the combustion-chamber, and the apron E, suspended from the bottom of the outer radiator, with a space between them, and having its base provided with an outward flange, *i*, extended to the casing, substantially as described and shown.

5. In combination with the radiators R R, the combustion-chamber B, rising above said radiators, and the casing C, the circumferential deflecting-plate *m*, projecting inward from the casing above the radiators, substantially as shown and described.

6. In combination with the fire-pot, combustion-chamber, radiators, and casing, a circumferential deflecting-plate projecting inward from the upper part of the casing and provided with perforations *t t*, substantially as and for the purpose set forth.

7. In combination with the casing C, provided near its top with the joint *g*, the ring *f*, having the annular disk *m*, and trough *n*, formed in one piece with the said ring, substantially as described and shown.

8. In combination with the combustion-chamber B, the radiators R R, of segmental form, connected with each other at both ends, the flue *o*, having branches *o′ o′*, connected, respectively, with the top of the two radiators at the center of their length, the damper *p*, between the branch pipes *o′ o′*, the partition *r* in the inner radiator, R, and the exit-flue K, connected to the outer radiator, all combined substantially as described and shown.

In testimony whereof we have hereunto signed our names and affixed our seals, in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this 9th day of September, 1884.

EDWIN D. VAN STONE. [L. S.]
EDWARD W. TAYLOR. [L. S.]

Witnesses:
FREDERICK H. GIBBS,
C. BENDIXON.