No. 742,046. PATENTED OCT. 20, 1903.

T. F. MEINHARDT.

HOT AIR FURNACE.

APPLICATION FILED FEB. 17, 1903.

NO MODEL.

4 SHEETS—SHEET 1.

Fig. 1.

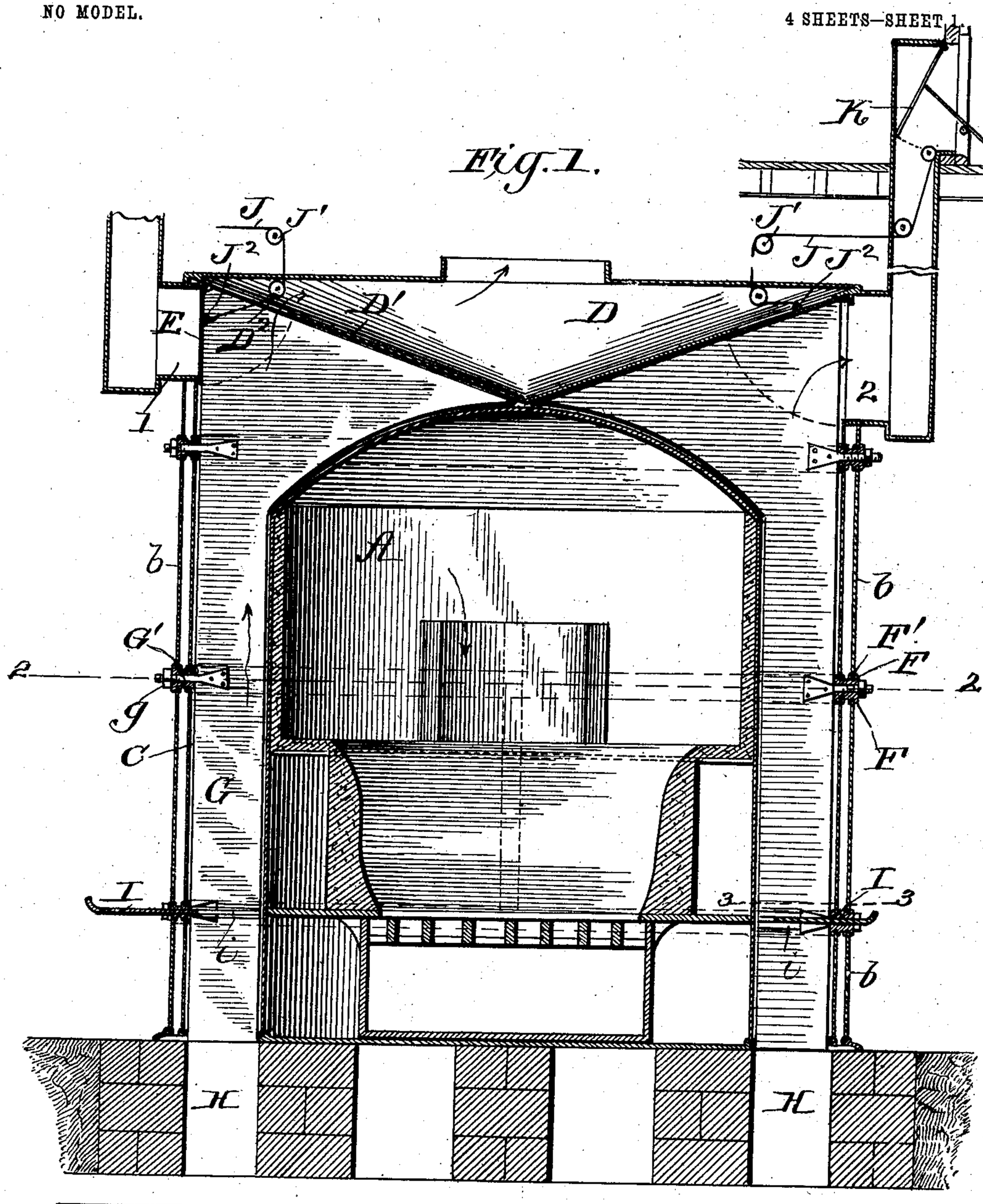
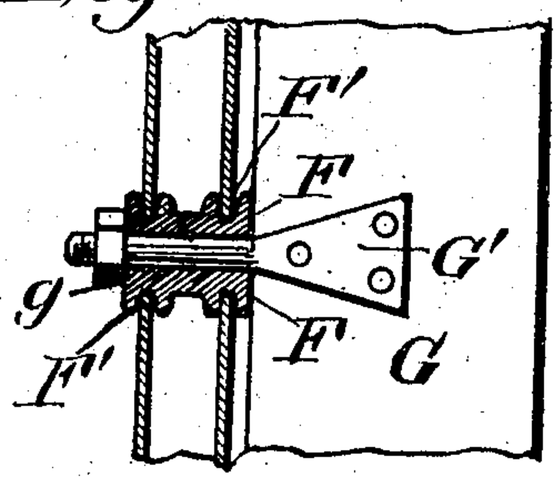


Fig. 10.



WITNESSES:
Jos. A. Ryan
Percy B. Fairfax

INVENTOR
T. F. Meinhardt,
BY Munn & Co.
ATTORNEYS.

No. 742,046. PATENTED OCT. 20, 1903.

T. F. MEINHARDT.

HOT AIR FURNACE.

APPLICATION FILED FEB. 17, 1903.

NO MODEL. 4 SHEETS—SHEET 2.

Fig. 3.

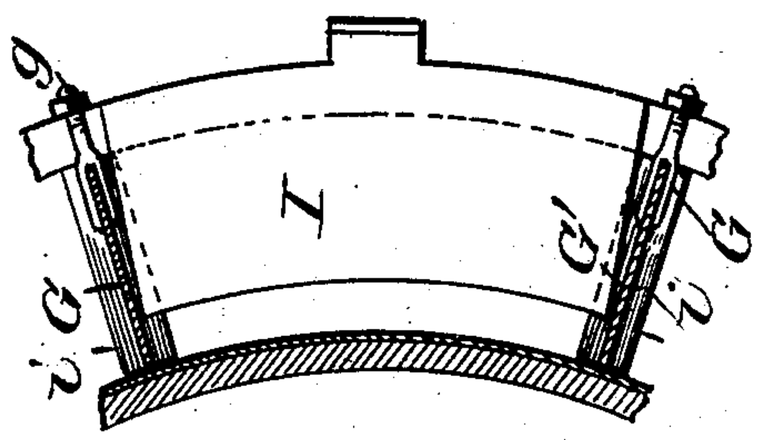


Fig. 4.

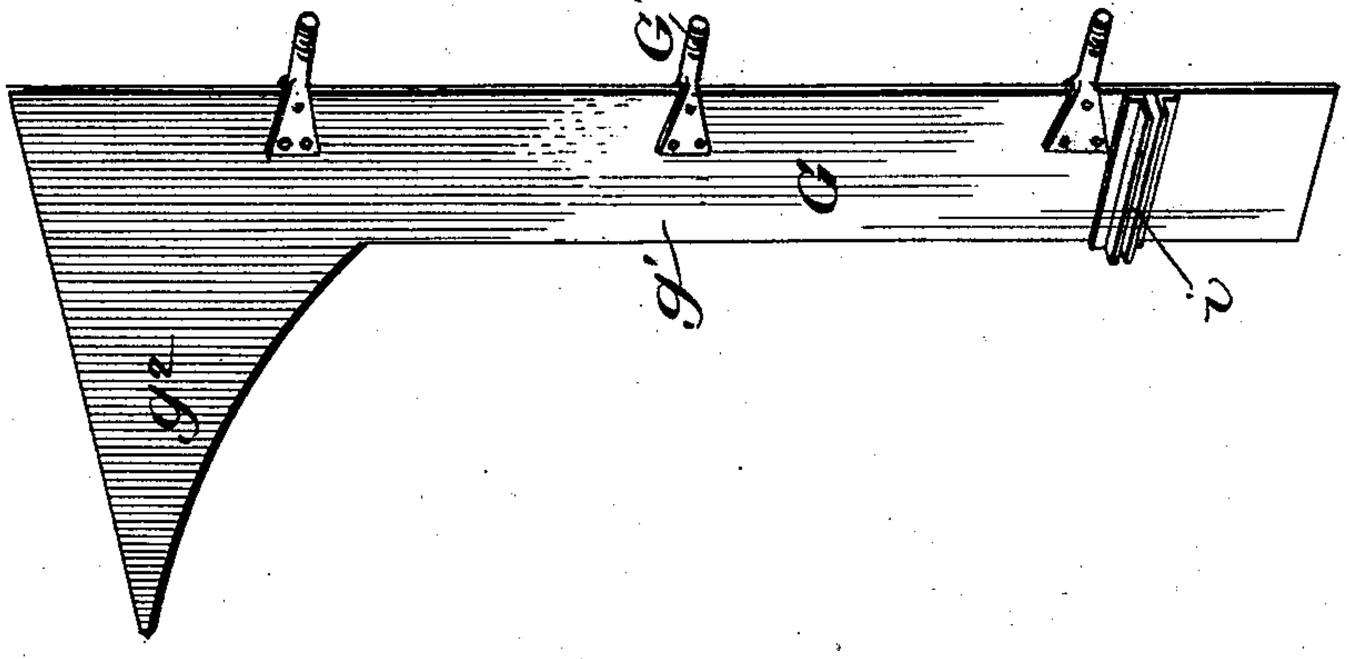
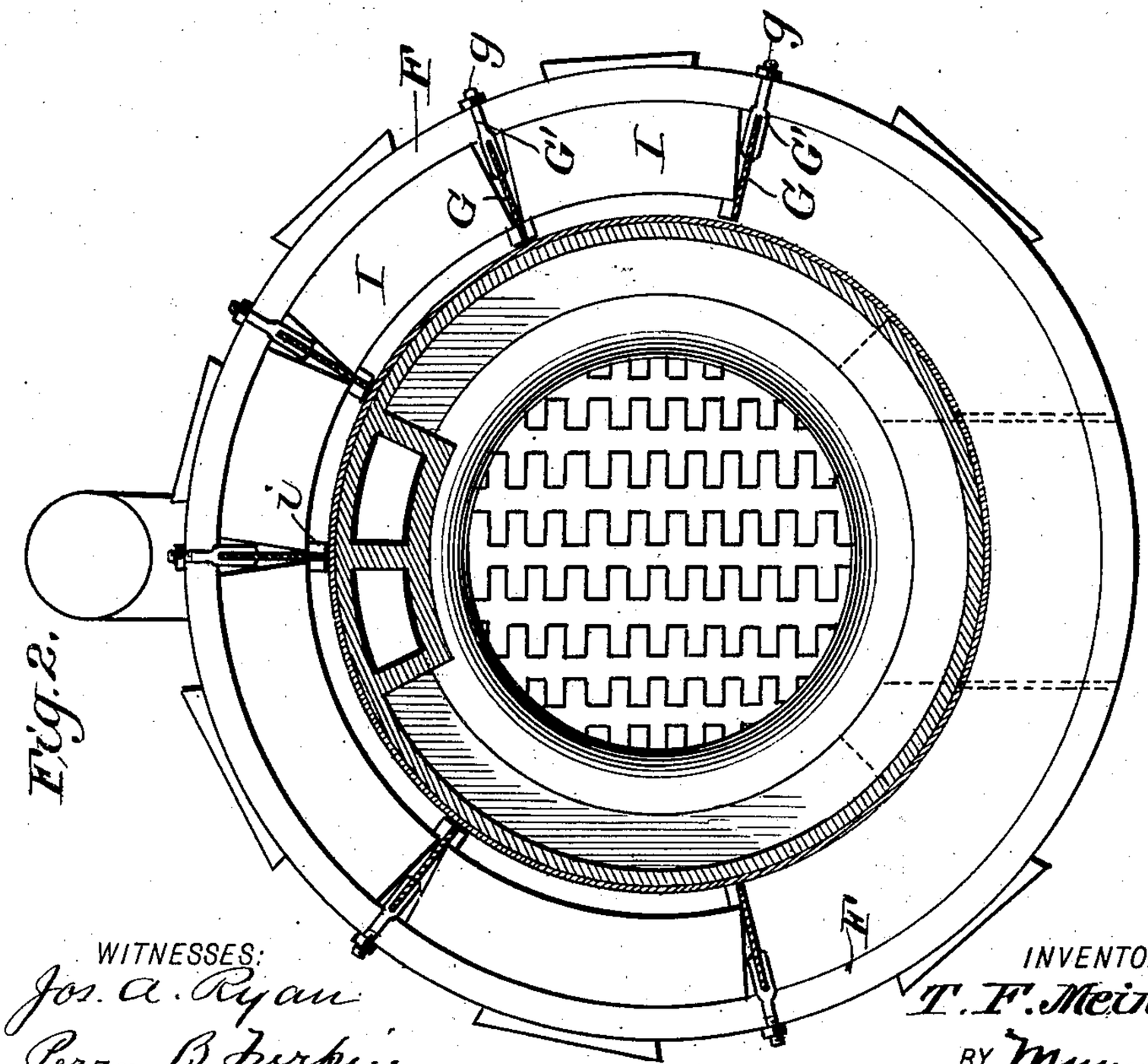


Fig. 2.



WITNESSES:

Jos. A. Ryan

Percy B. Turpin

INVENTOR

T. F. Meinhardt

BY Munn & Co.

ATTORNEYS.

No. 742,046. PATENTED OCT. 20, 1903.

T. F. MEINHARDT.

HOT AIR FURNACE.

APPLICATION FILED FEB. 17, 1903.

NO MODEL. 4 SHEETS—SHEET 3.

Fig. 7.

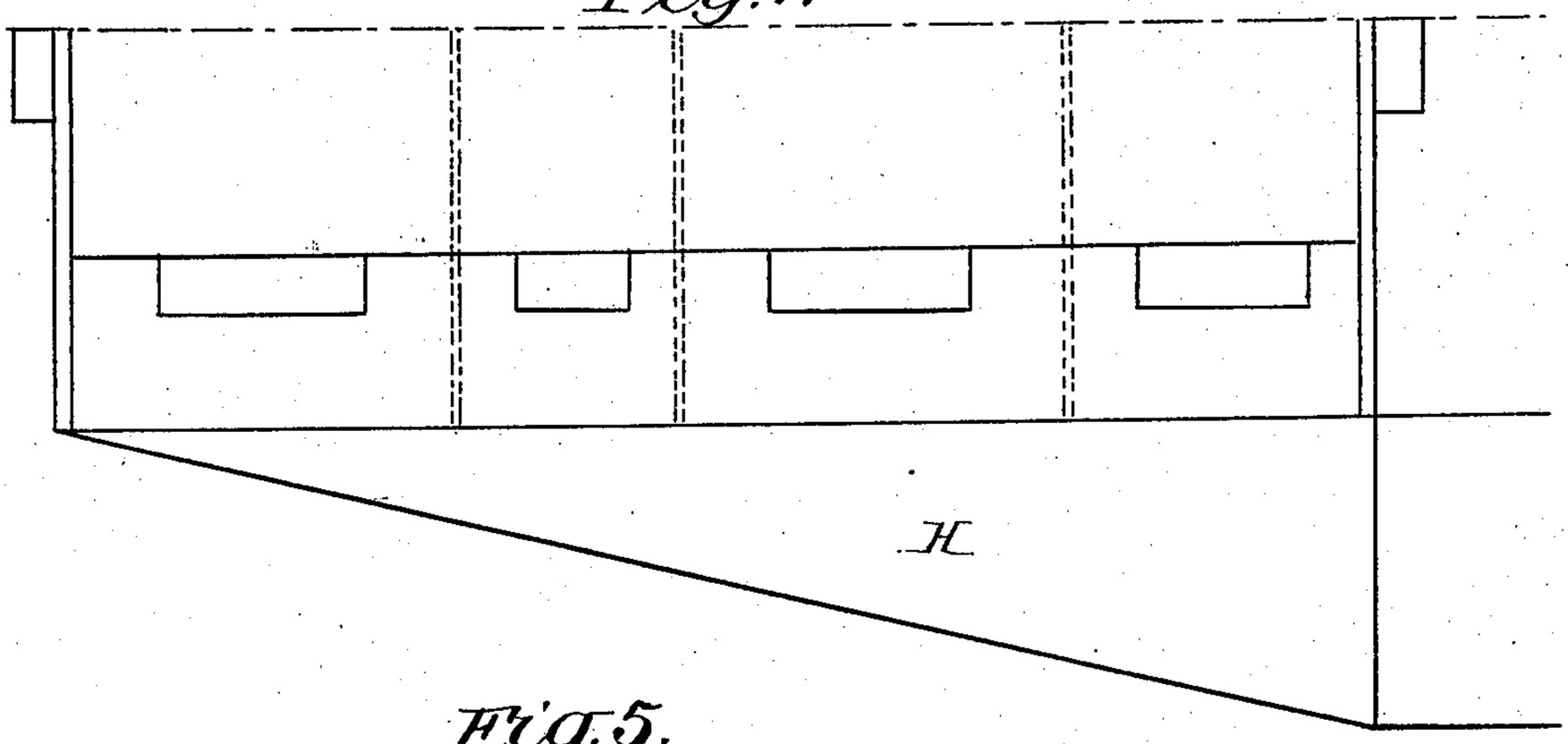
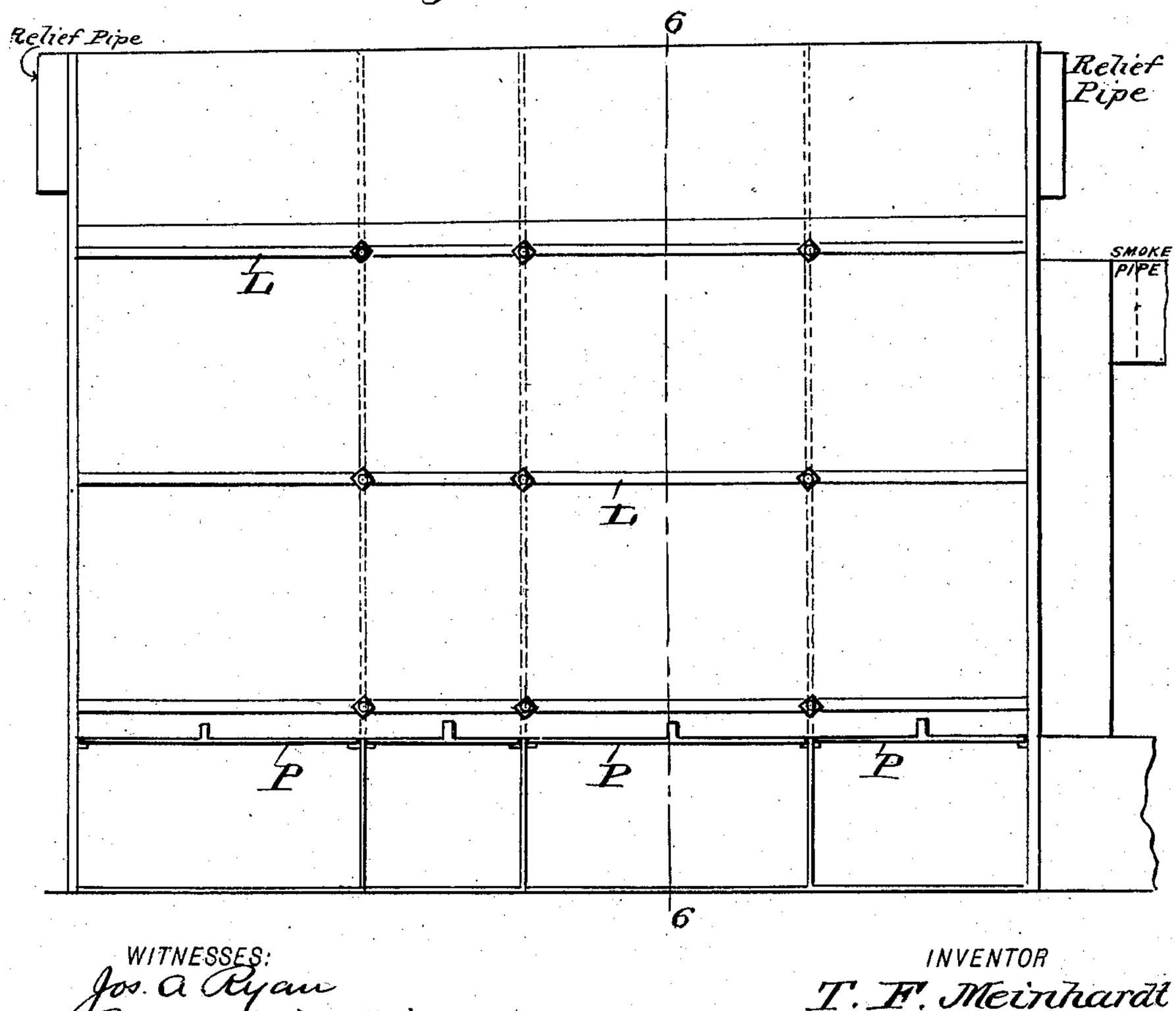


Fig. 5.



WITNESSES:
Jos. A Ryan
Perry B. Turpin.

INVENTOR
T. F. Meinhardt
BY Munn & Co.

ATTORNEYS.

No. 742,046. PATENTED OCT. 20, 1903.

T. F. MEINHARDT.

HOT AIR FURNACE.

APPLICATION FILED FEB. 17, 1903.

NO MODEL. 4 SHEETS—SHEET 4.

Fig. 9.

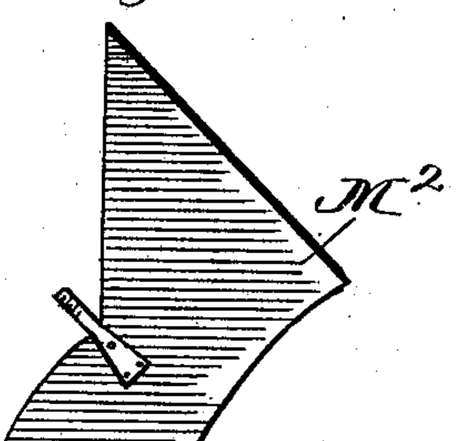
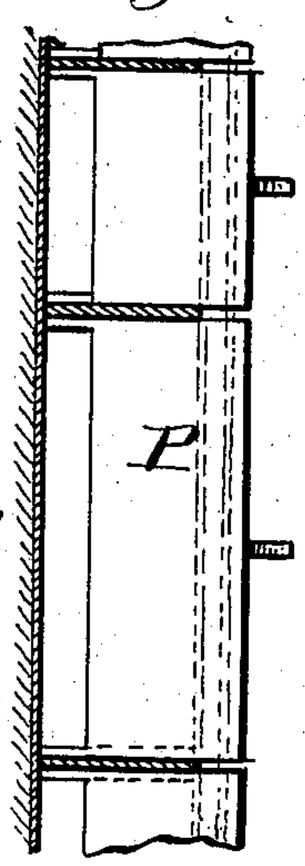


Fig. 6

Fig. 8.



WITNESSES:
Jos. A. Ryan
Perry B. Turpin.

INVENTOR
T. F. Meinhardt,
BY Munn & Co.
ATTORNEYS.

No. 742,046. Patented October 20, 1903.

UNITED STATES PATENT OFFICE.

THEODORE F. MEINHARDT, OF CHARLOTTESVILLE, VIRGINIA.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 742,046, dated October 20, 1903.

Application filed February 17, 1903. Serial No. 143,768. (No model.)

To all whom it may concern:

Be it known that I, THEODORE F. MEINHARDT, a citizen of the United States, and a resident of Charlottesville, in the county of Albemarle and State of Virginia, have made certain new and useful Improvements in Hot-Air Furnaces, of which the following is a specification.

My invention is an improvement in hot-air furnaces, having for objects, among others, to construct the furnace so as to provide a separate heating-chamber for each room to be heated, so the heating-chamber of such room can be proportioned to the area of the room; to provide means whereby the opening and closing of the register in any given room will operate a valve, so that when the register of any room is opened the valve controlling the hot-air pipe leading to such room will be opened and that when such register is closed the valve will close the corresponding hot-air pipe and will open communication between the particular hot-air chamber and the dome or relief-space of the furnace to prevent undue superheating in any particular chamber or hot-air pipe or furnace, and to provide other improvements; and the invention consists in certain novel constructions and combinations of parts, as will be hereinafter described and claimed.

In the drawings, Figure 1 is a vertical longitudinal section of a cylindrical furnace embodying my invention. Fig. 2 is a cross-sectional view thereof on about line 2 2 of Fig. 1. Fig. 3 is a detail horizontal section on about line 3 3, Fig. 1, showing one of the cold-air valves. Fig. 4 is a detail perspective view of one of the movable partitions used in the construction shown in Figs. 1 and 2. Fig. 5 is a side elevation of a horizontal type of furnace embodying my invention. Fig. 6 is a vertical cross-section on about line 6 6 of Fig. 5. Fig. 7 is a detail partial plan view of the furnace shown in Fig. 5. Fig. 8 is a detail horizontal section on about line 8 8 of Fig. 6, and Fig. 9 is a detail side elevation of one of the movable partitions employed in the construction shown in Figs. 5, 6, 7, and 8, and Fig. 10 is an enlarged detail view of casing-rings and studs or shanks on movable partitions.

By my invention I seek to determine with accuracy the exact heating-surface or radiating-surface on the furnace to supply each heating-pipe with the proper amount of hot air to correspond with the size or cubic contents of the room to be heated from said pipe; also, to vary the volume of air supplied to each subdivision of the heating-surface or radiating-surface as desired, thereby changing temperatures as outside conditions demand without rendering it necessary to increase or diminish the firing of the furnace; also, to render the heating system absolutely safe by permitting all surplus heat generated in the furnace-chamber and not utilized in the heating of the rooms to escape to halls or other convenient parts of the building. In securing these results I subdivide the hot-air chamber or space of the hot-air furnace by means of movable partitions, which can be adjusted relatively to provide a larger or a smaller radiating-chamber for the different-size hot-air pipes, so the hot-air supply to any pipe may be regulated by increasing or diminishing the heating-chamber or heating-surface on furnace which supplies said pipe by the adjustment of its partitions, which may be accomplished in the manner hereinafter described.

In the construction shown the furnace A may be made of steel, wrought or cast iron, in one piece or in several sections, as may be desired. The casings or outside inclosures *b*, forming the mantle of the furnace, may be of galvanized iron or other metal or brick, either covered by asbestos fiber or other suitable insulator, and spaced apart from the furnace A to provide the hot-air space C between the furnace and casing and the top space D above the dome of the furnace and constituting a relief chamber or space, as shown. The bottom wall of this relief-chamber D is in the form of an inverted cone with its apex at the center of the dome of the furnace and sloping upwardly therefrom to the outer casings of the furnace, as shown. This bottom plate or division D′ is provided near its upper outer edge with openings D^2 corresponding with the hot-air pipes 1 or 2 leading to the rooms, as will be seen in Fig. 1, the said openings D^2 being in position to be closed by the valves E when said valves are adjusted to the position shown at the right in Fig. 1, the valves

E closing the hot-air pipes 1 or 2 when adjusted to the position shown in full lines at the left in Fig. 1.

The outer casings of the furnace, as shown in Fig. 1, are formed of the several cylindrical sections *b*, resting at their edges in the grooves F′ in the casing-rings F, said rings receiving between them the studs or shanks G′ of the movable partitions G. It will be understood that the casing lining-rings extend around the furnace and support the several sections *b* in proper position and yet permit the adjustment of the movable partitions to any desired position and the locking of such partitions in the desired position by tightening the nuts *g* on the outer ends of the shanks G′ up against the outer sides of the casing-rings, as will be understood from Figs. 1 and 10 of the drawings. The movable partitions G, Fig. 4, conform to the vertical section of one-half of the hot-air space C of the furnace, being formed with the upright portion *g′*, fitting within the upright portion of the hot-air space C, and with the top wing g^2, which extends laterally from the upper end of the upright wing *g′* and tapers toward its free extremity, so it will fit in the space between the dome of the furnace and the bottom or division plate of the relief-chamber and subdivide the space between such dome and plate, as will be understood from Fig. 1 of the drawings. In practice I employ a sufficient number of the casing-rings and of the studs or shanks G′ to enable me to properly secure the several partitions in their different adjustments, and manifestly the number may be varied as may be found necessary in any particular case. The cold-air supply may be directed by an underground chamber H, as shown in Fig. 1, into the lower end of the hot-air space C all around or aboveground, as shown in Fig. 7, and the admission of the cold air to the several chambers formed by the adjustable partitions may be regulated by means of cold-air valves I, slidable across their respective chambers and between the upper and lower casing-rings immediately above the lower section *b* of the casings, as shown, for instance, at I in Fig. 1 or at P in Fig. 5 of the drawings. These cold-air valves may be simply plates of sheet-iron or other metal cut to correspond to the size of the chambers in which they are to be used, and I usually construct the plates, as best shown in Fig. 3, so they cannot be entirely closed, thus insuring at least a small supply of fresh air at all times to all of the heating-chambers within the furnace-casing.

Now in constructing my furnace it will be understood that when the area of any particular room is determined the size of the chamber supplying the hot-air pipe leading to such room can be adjusted by moving its partitions G in order to secure a correspondence between the area of the room to be heated and the area of the radiating-surface of the furnace, so that I am able to divide the heating-surface of the furnace with due consideration to the proportions of the rooms to be heated by the said furnace. It will also be noticed that I am able, by means of the independent air-valves for each radiating or heating chamber of the hot-air space, to vary the air supplied to each of the chambers and thereby to each hot-air pipe for the rooms, so that I can change the temperatures as the outside conditions may demand without necessarily increasing or diminishing the firing of the furnace. Manifestly by means of the valves E when the air from the several heating-chambers is shut off from their respective hot-air pipes such air will be deflected into the relief-chamber at the top of the furnace, whence it may be supplied to halls or otherwise, as may be desired, thus preventing the overheating of the furnace and flues when the registers in the different rooms are shut off. In order to operate the valves E automatically, I provide lines J, carried over suitable guides J′, secured at one end at J^2 to the valves E and extended thence and connected with the registers K in the rooms corresponding to the valves E, so that when the said registers K are open, as shown in Fig. 1, the valve E will be moved to open communication between its hot-air pipe 2 and its radiating or heating chamber in the furnace and to close the opening leading from said chamber into the relief-space D, so that the hot air within the heating-chamber in communication with the pipe 2 will pass through said pipe and into the room designed to be heated thereby. When, however, the register K is closed, the valve E (shown at the right in Fig. 1) will swing by gravity on the dotted line indicated in said figure to the position in which it will close, the hot-air pipe 2 shutting off the supply of hot air to such pipe and opening communication between the chamber for supplying said pipe 2 and the relief-chamber at the top of the furnace.

In Figs. 1 and 2 I show my invention applied to an upright or cylindrical type of furnace, while in Figs. 5 and 6 I show it embodied in a horizontal type of furnace. Manifestly the broad principles of the invention can be carried out in either style of furnace. Thus in Figs. 5 and 6 instead of making the casing-holder in the form of rings, as shown in Figs. 1 and 2, such holders will be made in the form of longitudinal bars L, suitably grooved to receive the metal sheets of the single or double casings or brick inclosure and adapted to permit the passage between them of the shanks or stems M′ on the partitions M, the said partitions M being provided at their upper ends with the lateral wings conforming to the conical space between the dome of the furnace and the relief-chamber, and valves N being arranged for adjustment to position to close the hot-air pipes O or the openings leading into the relief-chamber, and separate cold-air valves P being provided for each of the heating-chambers in a manner quite similar to

that described in connection with the construction shown in Figs. 1 and 2. In the construction shown in Fig. 1 the cold-air valves I move in guides *i*, provided on the partition-plates G.

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

1. A furnace substantially as herein described comprising the furnace proper, the furnace-casing composed of a number of cylindrical sections encircling the furnace proper, the casing-holders in the form of rings or longitudinal bars between the sections of the casings and spaced apart for the studs or shanks of the partitions, the relief-chamber at the top of the furnace, the partition-plates subdividing the heating-space between the casing and furnace proper, and having studs or shanks projecting outwardly between the casing rings or bars and provided at their upper ends with the lateral wings conforming to the space between the dome of the furnace and the bottom of the relief-chamber, the nuts on the outer ends of the shanks or studs of the movable partitions, and the independently-movable cold-air valves for the chambers between the adjustable partitions, the hot-air pipes leading from such chambers, and the valves controlling the openings between their respective chambers and the relief-chamber substantially as set forth.

2. A furnace having its casing formed in horizontal sections, casing-holders between the said sections and spaced apart to permit the passage and adjustment of the shanks of the movable partitions and the movable partitions in the hot-air space of the furnace and having shanks extending between the casing-holders thereof substantially as set forth.

3. A furnace having its hot-air space subdivided into independent heating-chambers and having a relief-chamber provided with openings communicating with the respective heating-chambers and with hot-air pipes leading to said chambers, valves adjustable to position to close the openings leading from their respective heating-chambers to the relief-chamber, the dampers, and connections between the dampers and their respective valves whereby the movement of the dampers may automatically adjust the valves substantially as set forth.

4. The combination of the furnace proper or combustion-chamber, the casing surrounding the same and forming a hot-air space, movable partitions dividing said space into independent chambers, means connected with said partitions and extending through the casings to the outside thereof whereby the partitions may be adjusted from without the casing, and the cold-air valves for independently controlling the supply of cold air to their respective heating-chambers substantially as set forth.

5. The combination of the furnace proper or combustion-chamber, the casings or brick inclosures surrounding the same and comprising a series of annular sections, the casing-rings between said sections and grooved to receive the said sections, the partitions subdividing the hot-air space between the casing and combustion-chamber, and studs or shanks extending from said partitions outwardly between the casing-rings substantially as set forth.

6. The combination of the combustion-chamber, the casing surrounding the same and forming a hot-air space, movable partitions dividing the space into independent chambers, guides on said partitions for the cold-air valves, and the cold-air valves movable in said guides for independently controlling the supply of cold air to their respective heating-chambers substantially as set forth.

THEODORE F. MEINHARDT.

Witnesses:
WILLIAM J. KILMARTIN,
W. L. MORTON.