

No. 654,719.

Patented July 31, 1900.

D. A. EBINGER.
HEATING FURNACE.

(Application filed Apr. 6, 1899.)

(No Model.)

Fig. 1.

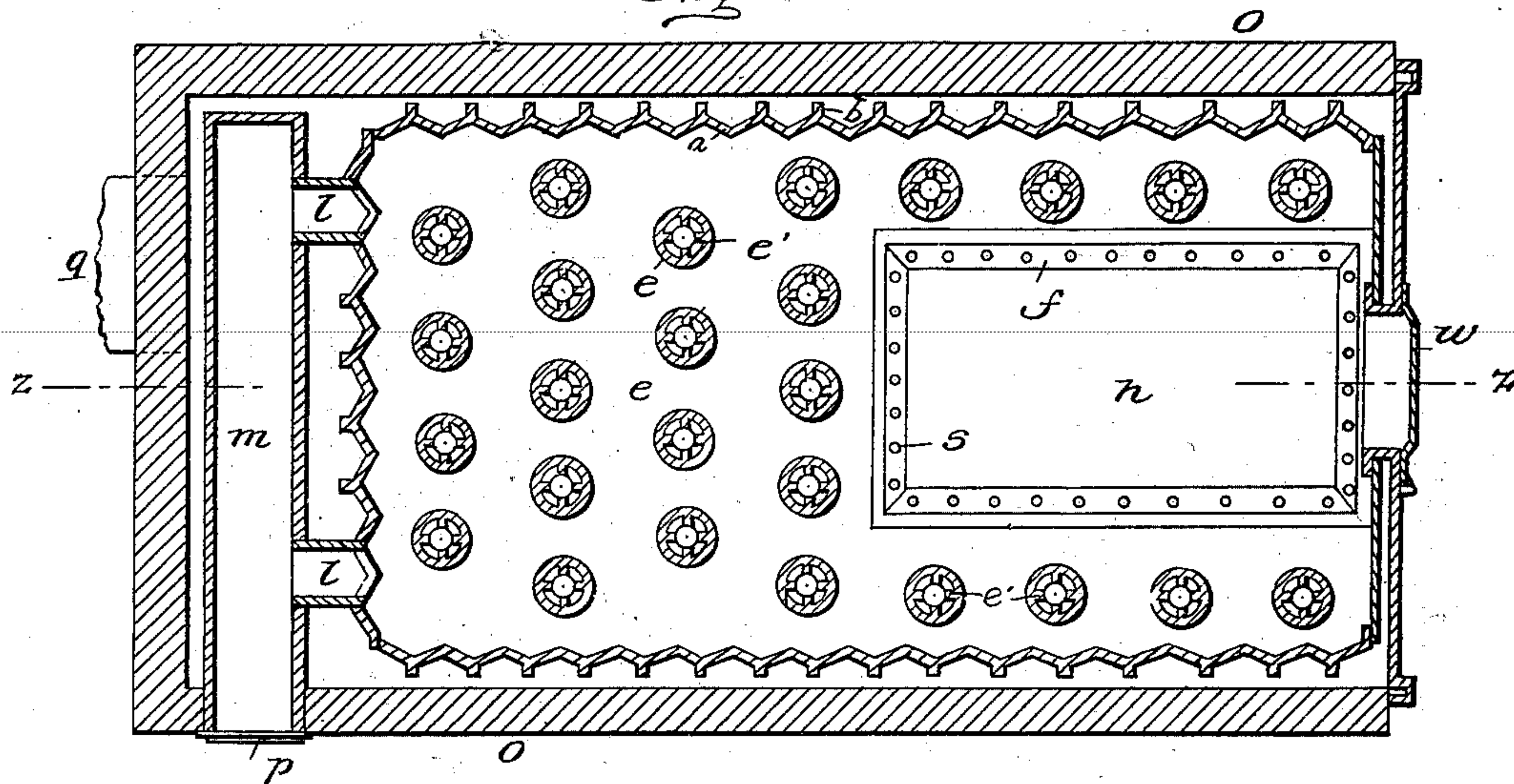
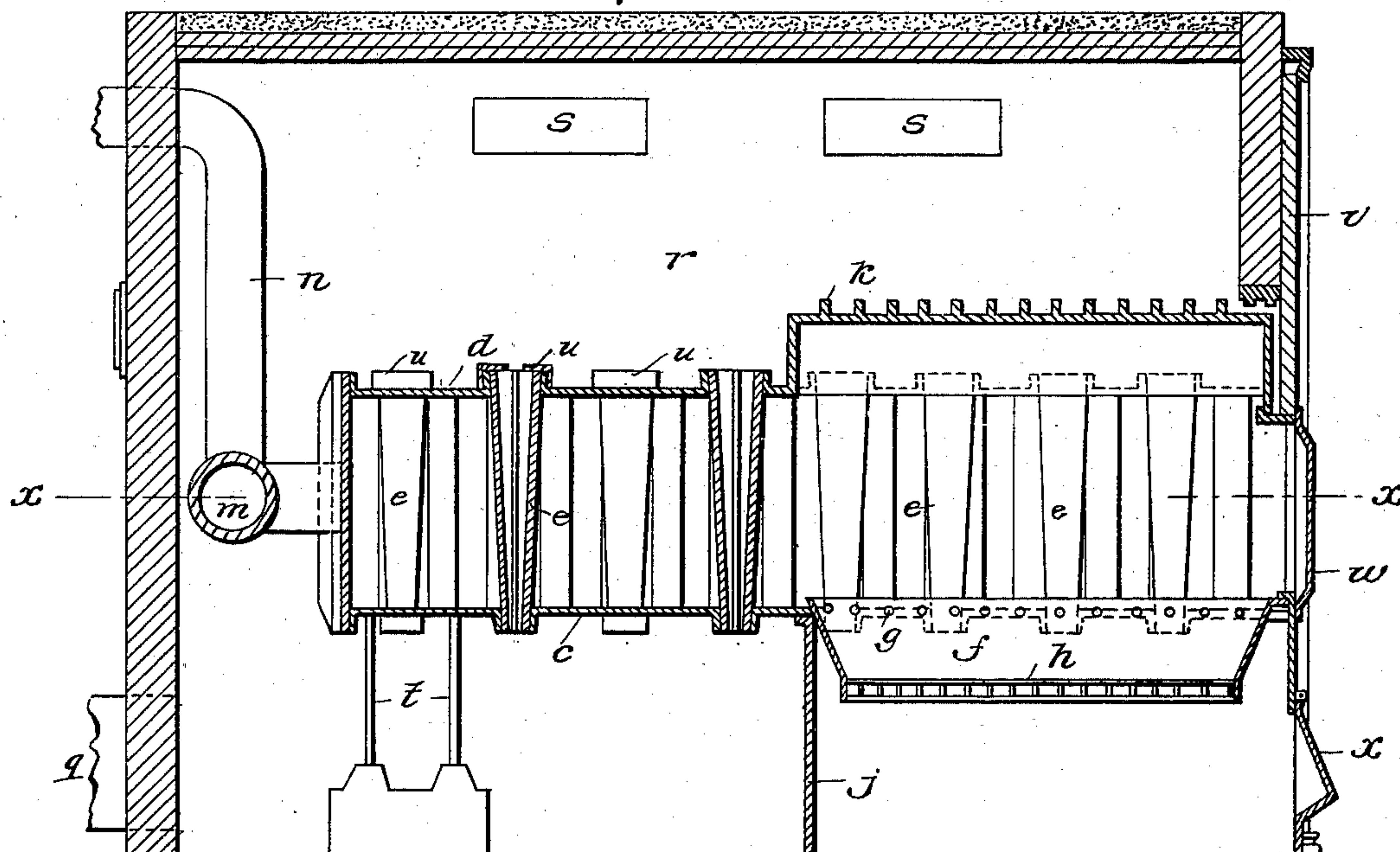


Fig. 2.



Witnesses

[Signature]
H. A. Brown

Inventor
— David A. Ebinger

— By — David P. Moore.
Attorney

UNITED STATES PATENT OFFICE.

DAVID A. EBINGER, OF COLUMBUS, OHIO, ASSIGNOR TO THE VOGELGESANG FURNACE COMPANY, OF SAME PLACE.

HEATING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 654,719, dated July 31, 1900.

Application filed April 6, 1899. Serial No. 711,970. (No model.)

To all whom it may concern:

Be it known that I, DAVID A. EBINGER, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a new and useful Improvement in Heating-Furnaces, of which the following is a specification.

My invention relates to a furnace; and the object of the invention is the provision of a very simple, durable, and cheaply-constructed one.

The special features of this furnace are illustrated in the accompanying drawings, in which—

Figure 1 is a sectional plan on the line X X of Fig. 2, and Fig. 2 is a sectional elevation on the line Z Z of Fig. 1.

Similar letters refer to similar parts throughout both views.

The main furnace-body is constructed with corrugated outer walls *a*, having on their outer surfaces the webs *b* for increasing the heating-surface, which is also the object of making the outer walls in the corrugated form. The top and bottom of the rear portion and sides of the furnace are constructed of plates *c* and *d*, having holes through them for the passage and connection of the flues *e*.

At the front end of the furnace is a fire-pot *f*, having perforated holes *g* near its top for furnishing draft and also for cooling and preserving the fire-box against the action of the fuel. At the bottom of the fire-box is a grate *h*, which may be constructed of any conventional form, with necessary bars extending to the front for shaking and dumping. Around the fire-box, on the sides and rear and connecting with the furnace-front, are walls *j*, forming the ash-pit. At the top of the furnace and directly above the fire-box is an arched top, made either in one piece or in sections, according to the convenience of construction, said arched top having on its upper surface webs *k* for the purpose of increasing its heating-surface. The tubes are arranged along the side and at the rear of the fire-box, those in the rear comprising several rows, with the flues *e* of each alternate row staggered, so as to break the direct line of the heat from the fire-box toward the smoke-flue.

The tubes *e* are made tapering from bottom

to top, having the lower ends smaller than the upper ends. The object in constructing these in tapered form is a special feature in this furnace and is intended to prevent down-drafts in said flues. When the cool air enters these tubes at the bottom, it is expanded from the heat surrounding said flues, thus expanding the air and increasing the volume to such an extent that it will pass upward out of the larger end instead of being forced back by reason of any downdraft which might occur in the distributing-ducts. These flues are attached to the bottom and top walls of the furnace in any manner consistent with simple construction. On the inner surfaces of the tubes *e* there are radial webs *e'* for increasing the heating-surface.

Connected with the furnace-wall *a*, at the rear end, are smoke-flues *l*, connecting with the drum *m*, extending across the full width of the furnace at the rear, to which the smoke-flue *n* is connected, conveying the smoke and products of combustion to smoke-stack. The drum *m* is extended at one end through the walls *o*, surrounding the furnace, having at its end a door for the purpose of cleaning out ashes or soot.

Fresh cool air is conveyed from outside of building through air-duct *q*, located, preferably, at the rear end of the walls *o*, surrounding the furnace near the floor. After the air has passed in beneath, through, and around the furnace it passes to the chamber *r* above the furnace and is conveyed through outlets *s*, near the top of the surrounding walls *o*, to the various warm-air ducts communicating with the different portions of the building. The outlets *s* may be of any form or number. The surrounding walls *o* are closed at the top by brick or other insulating material and covered with sand or any suitable material, but preferably sand.

The rear end of the furnace is supported by adjustable stanchions *t*, which may be of any conventional form.

The three rear rows of tubes *e* are partially closed at the top by the plates *u*, which are graduated in size from the rear row toward the fire-box, those in the rear row shutting off about one-half the area of the tube *e*, those in the second row shutting off about one-third,

and those in the third row shutting off about one-fourth of the area of the tube-openings. The object in doing this is to retain the cool air, which is conducted through the duct *q* at the rear, much longer in contact within the several rows of tubes mentioned, so that it may become heated as evenly as the air passing through the tubes *e*, which immediately surround the sides and rear of the fire-box, which, being near the fire, are heated more than those at a greater distance, thus equalizing the temperature of the air passing through the various tubes *e*.

A further feature in connection with the tube system of this furnace is that owing to the tapering form of the tubes *e* heating-ducts may be connected to any one or more of them for the purpose of conveying heated air where it is necessary to carry it long distances and through ducts which may by force of circumstances be installed with a trap or downward grade, which under ordinary circumstances would impede, if not entirely stop, the flow of warm air. Owing, however, to the tapered construction of the tubes *e* the heated air within cannot exhaust downward, but by its own expansion is forced through the ducts, which may be placed at any point in the surrounding walls *o*.

The front of the furnace *v* is constructed of the ordinary form, and the fire and ash-pit doors *w* and *x* located in the proper position for communicating with the fire-box and ash-pit.

As herein described and as illustrated in the accompanying drawings, I claim as my invention the following points, to wit:

1. In a furnace, the combination of an outer casing, a heating structure located therein, and two series of vertically-disposed air-tubes passing through said structure, one series of said tubes located adjacent to the fire-box and the other remote therefrom, all of said tubes being provided with webs and those remote

from the fire-box being provided with baffle-plates in addition to the webs.

2. A furnace, comprising an outer casing, a fire-box, top and bottom plates located above the fire-box, and two series of vertically-disposed air-tubes passing through said plates, one series of said tubes located adjacent to the fire-box and the other remote therefrom, all of said tubes being provided with webs and those remote from the fire-box being provided with baffle-plates also.

3. A furnace, consisting of an outer casing, the furnace proper arranged therein and comprising, the top and bottom plates provided with openings, a fire-box having communication with said plates, and two series of vertically-disposed air-tubes passing through said plates, one series of said tubes located adjacent to the fire-box and the other remote therefrom, all of said tubes being provided with webs and those remote from the fire-box provided with baffle-plates also.

4. A furnace, consisting of the top and bottom plates provided with openings, a fire-box having communication with said plates, and two series of vertically-disposed air-tubes passing through said plates, one series of said tubes located adjacent to the fire-box and the other remote therefrom, all of said tubes being provided with webs and those remote from the fire-box provided with baffle-plates also.

5. A furnace, comprising the two flat plates provided with openings, and two series of vertically-disposed air-tubes passing through said plates, one series of said tubes located adjacent to the fire-box and the other remote therefrom, all of said tubes being provided with webs and those remote from the fire-box provided with baffle-plates also.

DAVID A. EBINGER.

Witnesses:

ALBERT STRITMATTER,
C. H. WING.