(No Model.) 2 Sheets—Sheet 1.

F. J. FURMAN.

STEAM HEATER.

No. 421,262. Patented Feb. 11, 1890.

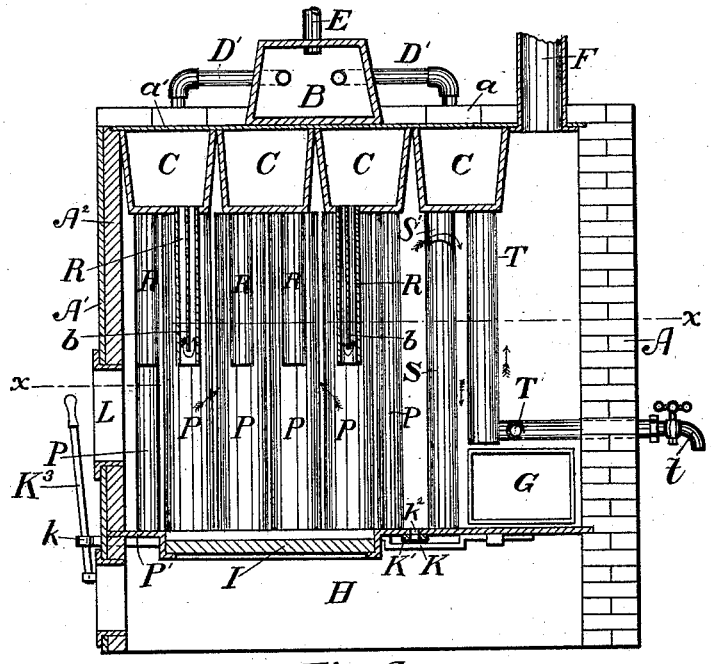

Fig. 1.

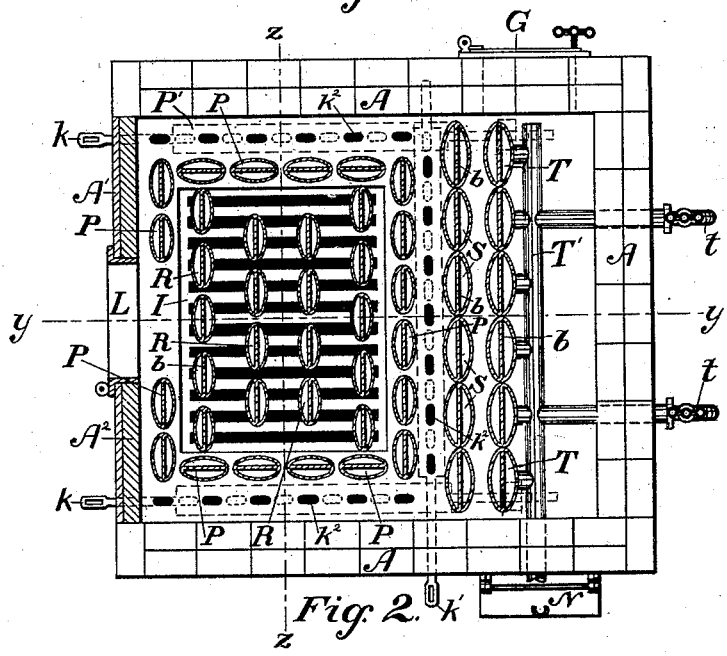

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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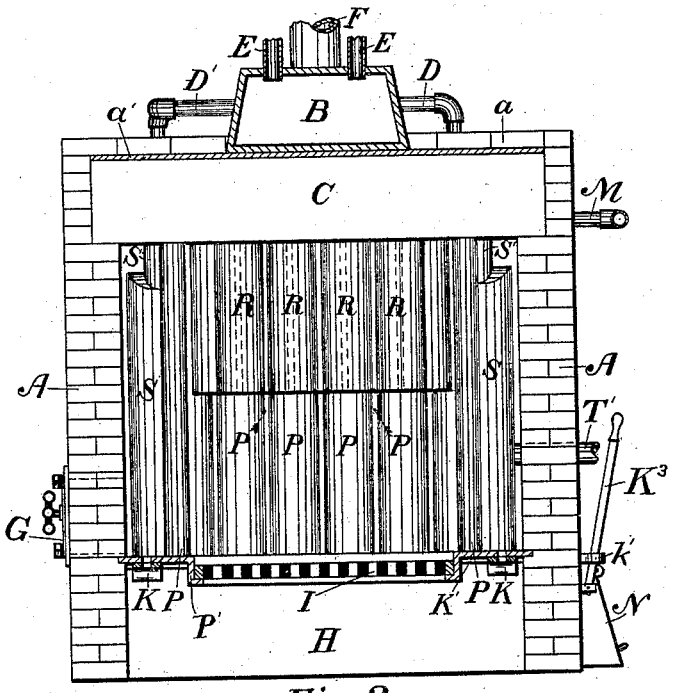

Fig. 3.

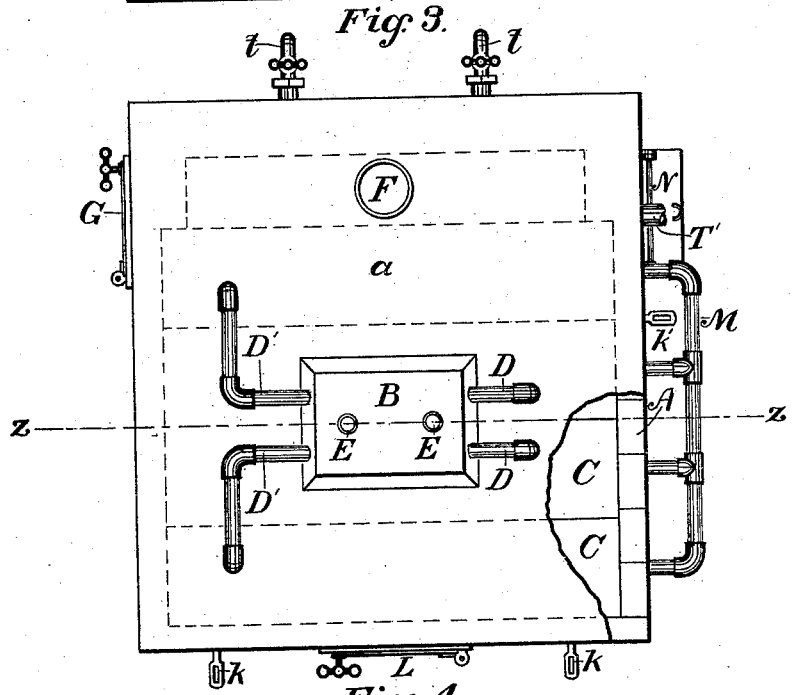

Fig. 4.

Witnesses
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UNITED STATES PATENT OFFICE.

FREDRIC J. FURMAN, OF GENEVA, NEW YORK, ASSIGNOR TO THE HERENDEEN MANUFACTURING COMPANY, OF SAME PLACE.

STEAM-HEATER.

SPECIFICATION forming part of Letters Patent No. 421,262, dated February 11, 1890.

Application filed July 1, 1889. Serial No. 316,123. (No model.)

To all whom it may concern:

Be it known that I, FREDRIC J. FURMAN, a citizen of the United States, residing at Geneva, in the county of Ontario and State of New York, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

Of the accompanying drawings, Figure 1 is a sectional view of my improved generator on the line *y y*, Fig. 2. Fig. 2 is a sectional view on the line *x x*, Fig. 1. Fig. 3 is a sectional elevation on the line *z z*, Fig. 2. Fig. 4 is a plan view of the steam-generator.

My invention consists of certain improvements in the construction of steam-generators, as hereinafter fully described.

I preferably construct my improved generator in a rectangular form, as shown in the drawings, within a setting of brick.

A is the brick wall, which, as shown in the drawings, forms the back and sides of the heater. In the construction of boilers of large capacity it has been found that the large steam-domes were exceedingly hard to cast and from their great size difficult to handle. I overcome this obstacle by the employment of a series of smaller steam and water domes C, placed side by side, each of which is connected with a small common steam-dome B on the top of the heater.

H is the ash-pit at the bottom of the generator, covered by the grate I, which is of any desired construction.

The fire-pot is formed by a series of water-circulatory tubes P on all four sides, arranged closely together, and preferably of elliptical or oblong section, so as to present a broad heating-surface to the direct flame. These tubes rest upon the base-plate P′ around the grate I, the tubes being screwed at their upper ends into the domes C. In addition to the long circulatory tubes P, forming the sides of the fire-pot, I employ a series of drop-tubes R, which are constructed in a similar manner to the long tubes P, and like them are screwed at their upper ends into the bottom of the sectional domes C, but which are suspended over the fire-pot, as shown in Figs. 1 and 3, thus presenting much additional heating-surface.

I preferably make the sectional domes C of trapezoidal shape in cross-section, so that they are wider at the top than at the bottom, as clearly shown in Fig. 1, tapering inward from top to bottom. When thus constructed, there remains a wedge-shaped space between the domes throughout their length, although their top edges are in contact with each other. In these spaces the heated air and gases are enabled to circulate between the sides of the domes C, much more heating-surface being thus exposed than if the domes are made rectangular in cross-section, in which latter case only the bottom of the domes are exposed to the heat when placed side by side.

The heated gases and other products of combustion passing out from the fire-pot between the tubes P, as indicated by the arrows, come in contact with the wall formed by a series of larger elliptical tubes S, placed preferably in contact end to end, but having spaces formed between the tubes near the upper end of the same by reason of cylindrical tops S′, through which spaces the said products of combustion pass, thence downward and around a second series of drop-tubes T, depending from the rearmost dome beyond the limits of the fire-pot, of similar construction to the tubes R, but preferably larger, and placed in contact end to end, like the tubes S. After passing around this latter series of tubes the waste gases escape directly up the chimney-flue F. In this manner the greatest possible amount of heat is utilized in generating the steam. The sectional steam and water domes C are connected together by means of the water-tubes M, which enter the domes near the bottom of the same.

Water of condensation is conveyed to the sections formed of the steam and water domes C and the circulatory tubes connected thereto by means of the pipe T′, which communicates preferably with each of the drop-tubes T, and by means of the tubes M connecting the sectional domes together near the bottom of the same, water is maintained at an accurate level in all of the sections. The pipe T′ is moreover provided with one or more blow-off cocks *t* in order to remove whatever sediment collects in said drop-tubes. From the construction and position of the circulatory tubes, which are preferably made with a diaphragm

b, reaching nearly to the bottom of the same, a vigorous circulation of water is kept up in the direction of the arrows shown therein, and the steam which accumulates in the steam-spaces of the domes C passes therefrom through the conducting-pipes D D′, leading from each of the sectional steam and water domes into the common steam-dome B, situated on the top of the generator, from which it passes outward through the tubes E to the circulatory radiating system. A draft is maintained by means of air entering the ash-pit through the door N and passing up through the grate. A series of holes k^2 are made in the base-plate P′ outside the circulatory tubes P, and beneath these rows of perforations are placed, at the two sides and rear, the similarly-perforated dust-sifting bars K K′, so arranged, by means of pivoted handle-bars K^3 or otherwise, that a back-and-forth movement may be given to the sifters, whereby dust, ashes, clinkers, &c., falling beyond the limits of the grate I may be sifted through the dust-sifters and thus be removed.

Access to the rear of the generator is provided by means of doors G placed on one or both sides, through which the interior may be cleaned.

Many advantages result from the use of a series of small steam and water domes C, instead of one large dome in boilers of large size.

Aside from the convenience of manufacturing, transporting, and handling the dome in sections, this peculiar form of construction is especially useful from the fact that generators of several sizes may be made by simply employing a greater or less number of sections of the same size. If, for instance, on account of enlarging a building heated by a generator of a given size, or if for any other reason the generator be found to be inadequate for the purposes demanded of it, instead of removing it and replacing it by one of larger size, one or more additional sectional domes C with drop-tubes attached may be added, thus increasing the length. In this manner, with a few other minor alterations—such as substituting a larger grate and increasing the length of the two sides of the brick-setting A—the size and heating-capacity of a heater may be readily increased at any time.

I claim—

1. A steam-generator provided with a series of connected sectional steam and water domes of trapezoidal shape in cross-section, being wider at the top than at the bottom, substantially as and for the purposes described.

2. A steam-generator having a series of connected steam and water domes of trapezoidal shape in cross-section, in combination with a separate common steam-dome connected therewith, substantially as and for the purposes described.

3. A steam-generator constructed in sections composed of a series of connected steam and water domes C, and elliptical circulatory tubes provided with diaphragms connected therewith, in combination with a separate common steam-dome B, substantially as described.

4. In a steam-generator, a series of steam and water domes, the rearmost of which is provided with back-tubes T beyond the limits of the fire-pot, in combination with the feed-water pipe T′, communicating with said back-tubes, and tubes M connecting said sectional domes, whereby water is maintained at a level in all the sections, substantially as described.

In witness whereof I have hereunto set my hand.

FREDRIC J. FURMAN.

Witnesses:
EDGAR PARKER,
G. W. NICHOLAS.