No. 616,844. Patented Dec. 27, 1898.

C. D. HOWARD.

FURNACE OR HEATER.

(Application filed Aug. 26, 1898.)

(No Model.) 2 Sheets—Sheet 1.

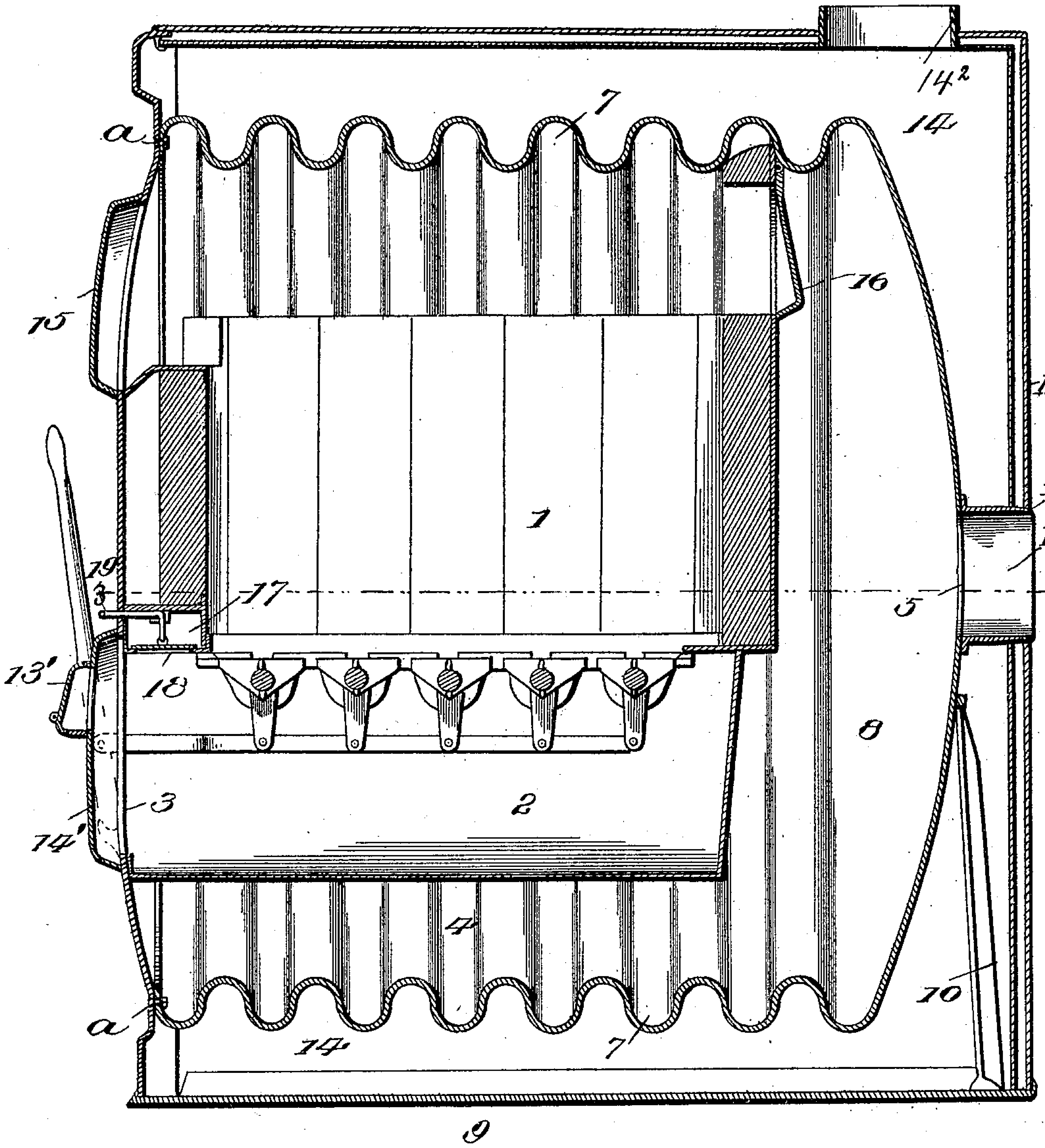

Fig. 1.

Witnesses
Jno Finnie
T. W. Johnson

Inventor
C. D. Howard
By J. R. Nottingham
Attorney

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Fig. 2.

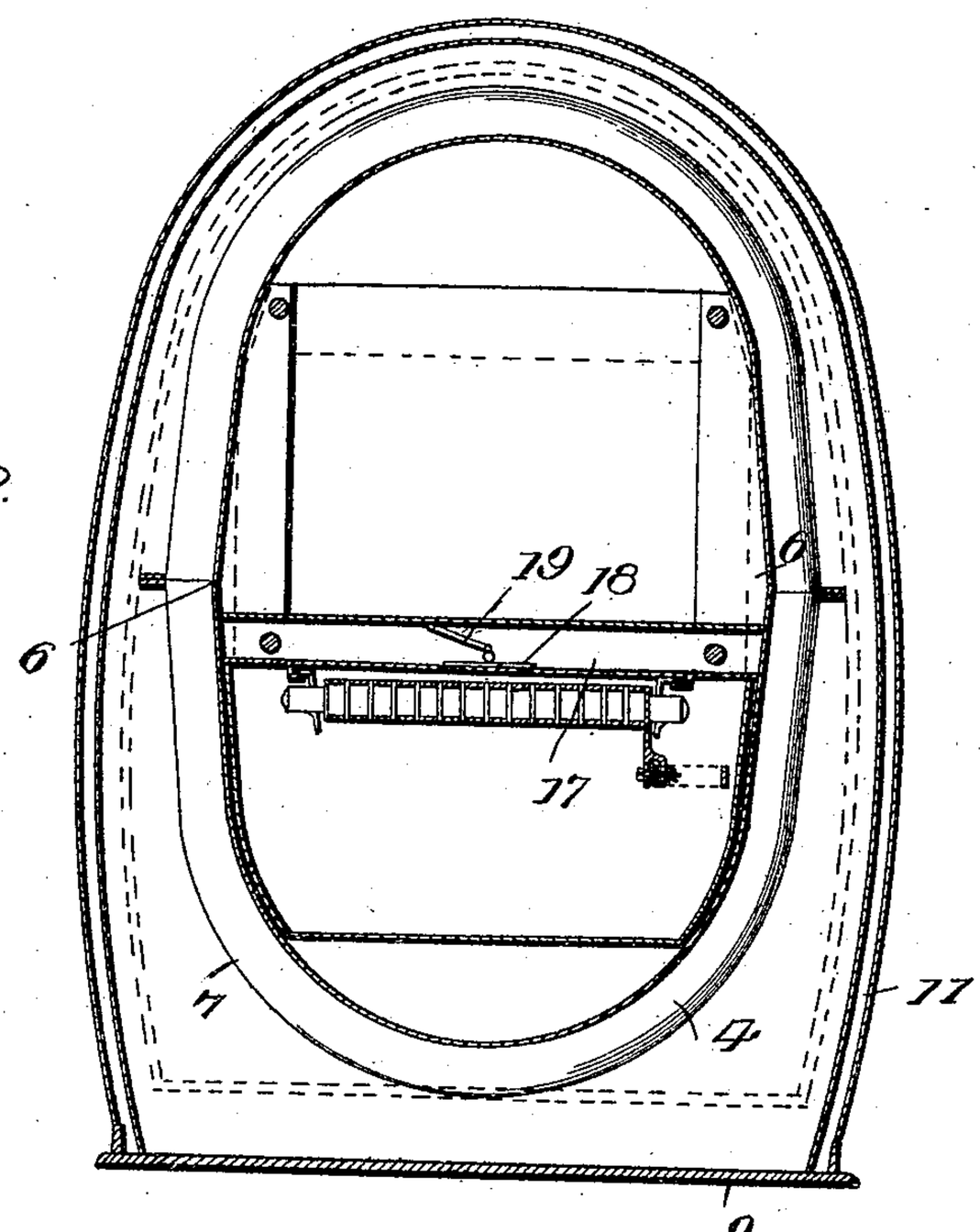
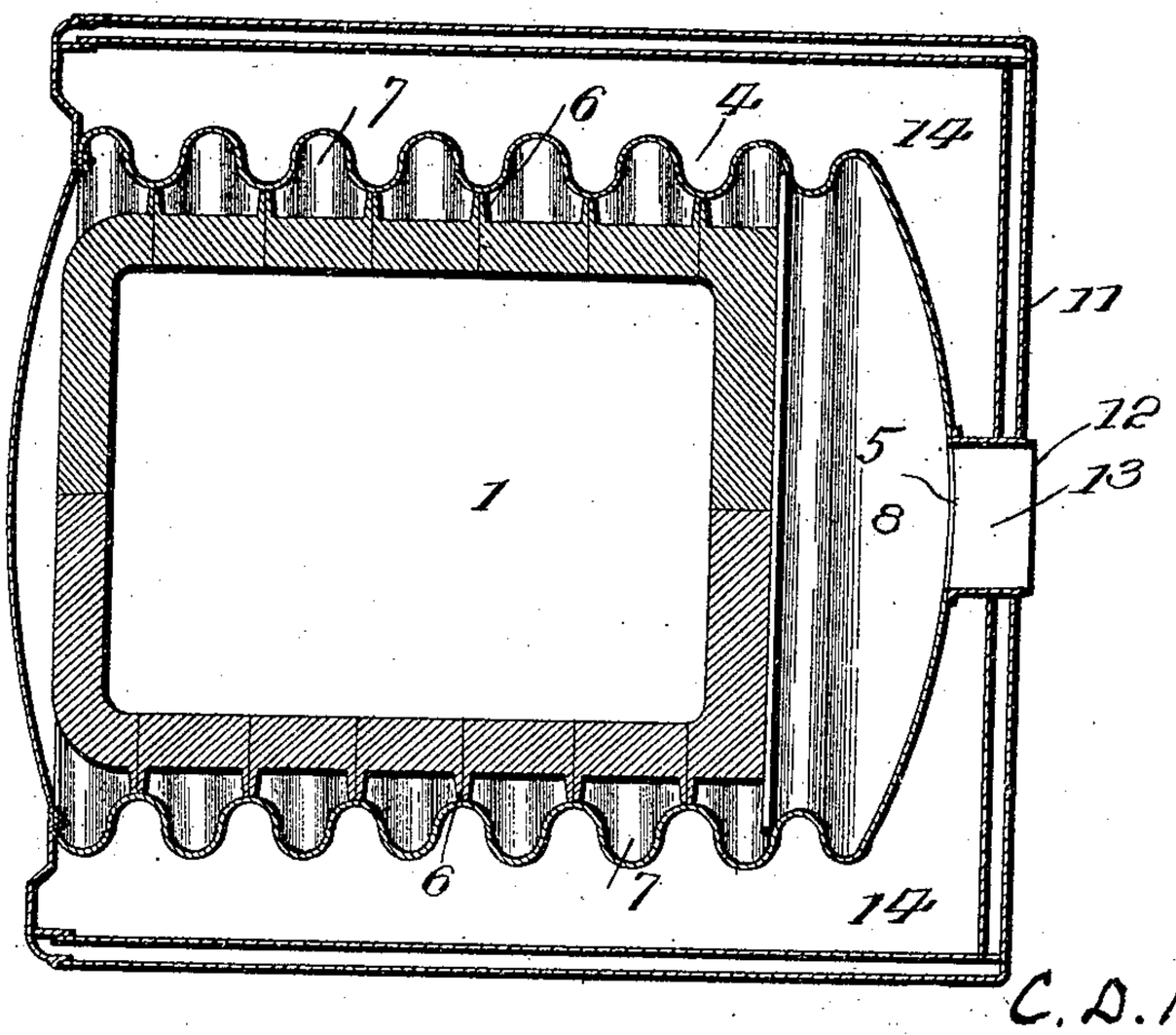


Fig. 3.



Witnesses

Inventor

C. D. Howard

By J. R. Nottingham

Attorney

UNITED STATES PATENT OFFICE.

CHARLES D. HOWARD, OF SYRACUSE, NEW YORK.

FURNACE OR HEATER.

SPECIFICATION forming part of Letters Patent No. 616,844, dated December 27, 1898.

Application filed August 26, 1898. Serial No. 689,605. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. HOWARD, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Furnaces or Heaters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that class of heating-furnaces in which either hot air or hot water, or both, may be employed as the heating medium; and it consists generally in the construction and novel arrangement and combination of the various parts, as will be hereinafter more fully described, and pointed out in the claims.

The primary object of the invention is to produce a furnace or heater which will furnish a maximum amount of heat for the expenditure of a minimum amount of fuel.

Another object of the invention is to so construct the furnace or heater that it may be readily adapted for hot-air or hot-water heating or a combination of both hot air and hot water.

These and other objects may be attained by means of the device illustrated in the accompanying drawings, in which—

Figure 1 represents a longitudinal vertical section of my improved furnace; Fig. 2, a transverse vertical section of the same, and Fig. 3 a horizontal section on line 3 3 of Fig. 1 with the grate removed.

Referring to the several views, the numeral 1 indicates the fire-pot, which is provided with a suitable grate and shaking attachments. Below the fire-pot, suitably arranged and supported, is a removable ash-pit 2, open at its front end to correspond with the opening in the front wall 3 of the furnace or heater, so as to provide for the ready removal of the ashes.

Surrounding and supporting the fire-pot and ash-pit is a shell 4, approximately oval in cross-section, having a corrugated or fluted peripheral surface for the purpose of increasing its heat-giving capacity. The rear end of the shell is preferably convex and is provided with a smoke-exit 5, while the front end is open and is securely attached by its end corrugation to the front wall of the furnace or heater, as shown at *a*, Figs. 1 and 3. The outer side walls of the fire-pot are formed with vertical ribs 6, which fit snugly against the inner convex portions of the corrugated surface of the shell 4, and as the sides of the ash-pit conform to the curvature of said inner convex portions of the corrugated surface continuous flues 7 are formed between the inner side walls of the shell and the outer side walls of the fire-pot and ash-pit, the diameter of the upper portion of said flues being increased by the ribs 6 of the fire-pot, through which flues the products of combustion pass down through flues 7 beneath the ash-pit and then up into the chamber 8, which is formed between the inner rear wall of said shell and the outer rear walls of the fire-box and ash-pit, and thence to the exit 5, as shown in Fig. 1.

The numeral 9 indicates the base of the furnace or heater, in which base the front wall 3 is tightly and securely seated and from which the rear end of the shell 4 is rigidly supported by a brace 10, T-shaped in cross-section. The shell 4, with its contained fire-pot and ash-pit, is inclosed by an air and water tight double-wall casing 11, which is tightly seated in the base 9 and attached at its front to the front wall of the furnace or heater. The rear end of the casing is provided with an opening 12 opposite the exit 5 of the shell 4, through which projects a collar 13, secured to said shell and surrounding said exit. The space between the casing and shell forms a chamber 14, which may be either for hot air or hot water. When employed as a hot-air chamber, the casing is provided with a proper exit, as shown at 14^2, Fig. 1. If hot water is to be the heating medium, the casing is provided with the usual connections, to which the supply and return pipes are connected.

The front wall 3 is provided with the usual draft-regulating doors 13′ and 14′ and fuel-feeding door 15, and the fire-pot is provided with a damper 16, which when open gives a direct outlet-draft for the products of combustion to the smoke-stack.

Situated at the front of the furnace or heater, just above the grate, is a rectangular-

shaped conduit 17, having an opening in its bottom closed by a check-damper 18, which is operated by a rocker-arm 19. The conduit 17 is open at both ends and receives air from the ash-pit. To check combustion, the damper 18 is opened, and to increase combustion the damper is closed. It will be apparent that this conduit also serves as a dust-flue when the grate is being shaken, as by opening the damper the arising dust will be carried into said conduit, and thus be prevented from coming out into the room or apartment.

The operation of my improved furnace or heater will be readily understood from the foregoing description, it only being necessary to state that the air or water in chamber 14 is quickly heated to a high temperature by reason of the peculiarly constructed and arranged shell, which holds the products of combustion while they are being directed down through the flues 7, under the ash-pit, and out into the chamber 8 to the smoke-stack.

In providing a heating medium of hot air and hot water the fire-pot may be made hollow and provided with suitable connections for attachment to a source of supply and with radiator supply and return connections.

Various modifications of my invention may be made—such, for instance, as constructing the shell in two parts and bolting them together, as shown in Fig. 2—without departing from its spirit or sacrificing the principle thereof.

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

1. In a furnace or heater, the combination with the front thereof, of a shell having a corrugated peripheral surface and a plain back, a fire-pot and ash-pit supported within the shell and so arranged that continuous hot-air flues are formed vertically along the sides of the fire-pot and ash-pit, substantially as specified.

2. In a furnace or heater, the combination with the front thereof, of a shell, oval in cross-section, having a corrugated peripheral surface and plain back, a fire-pot and ash-pit supported within the shell and so arranged relative to the corrugations thereof, as to form vertical hot-air flues, the fire-pot being formed with means which coöperate with the corrugations of the shell to increase the diameter of the upper portion of said flues, and a casing surrounding the shell to form a hot-air or hot-water chamber.

3. In a furnace or heater, the combination with the front thereof, of a shell, oval in cross-section, having a corrugated peripheral surface and plain back, a fire-pot and ash-pit supported within the shell, and so arranged relative to the corrugations thereof, as to form vertical hot-air flues, the fire-pot being formed with means which coöperate with the corrugations of the shell to increase the diameter of the upper portion of said flues, a casing surrounding the shell, and a draft conduit or chamber, situated at the front of the furnace or heater, provided with a check-damper.

4. In a furnace or heater, the combination of a vertically-corrugated shell, oval in cross-section, a fire-pot and ash-pit supported by resting against the inwardly-extending surfaces of the corrugations of the shell, and forming with said shell vertical hot-air flues and a longitudinal chamber or flue beneath the ash-pit, and a casing surrounding the shell, substantially as specified.

5. In a furnace, the combination with a fire-pot and a removably-supported ash-pit having a closed bottom, of a shell having corrugated sides, top and bottom, inclosing said fire-pot and ash-pit, forming a vertical chamber surrounding the same on the sides and rear portions thereof, and horizontal chambers, one above the fire-pot and one below the ash-pit, whereby the products of combustion are caused to pass down through the vertical passage into the lower horizontal chamber and thence to the outlet.

6. In a furnace, the combination with the fire-pot and a removably-supported ash-pit having a closed bottom, of a two-part shell having corrugated sides, top and bottom, inclosing said fire-pot and ash-pit, said shell arranged relatively to the fire-pot and ash-pit to form a vertical chamber surrounding the same on the sides and rear portions thereof, and horizontal chambers, one above said fire-pot and one below said ash-pit, and division-plates between the fire-pot and the sides of the corrugated shell, whereby flues are formed through which the products of combustion are conducted down into the lower horizontal chamber and thence to the smoke-outlet.

7. In a furnace, the combination with the fire-pot and a removably-supported ash-pit having a closed bottom, of a shell having corrugated sides, top and bottom, inclosing said fire-pot and ash-pit, forming a vertical chamber surrounding the same on the sides and rear portions thereof, and horizontal chambers, one above the fire-pot and one below the ash-pit, and an air-tight casing surrounding the shell, forming a space for a heating medium.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES D. HOWARD.

Witnesses:
E. M. MOORE,
E. P. CRANE.