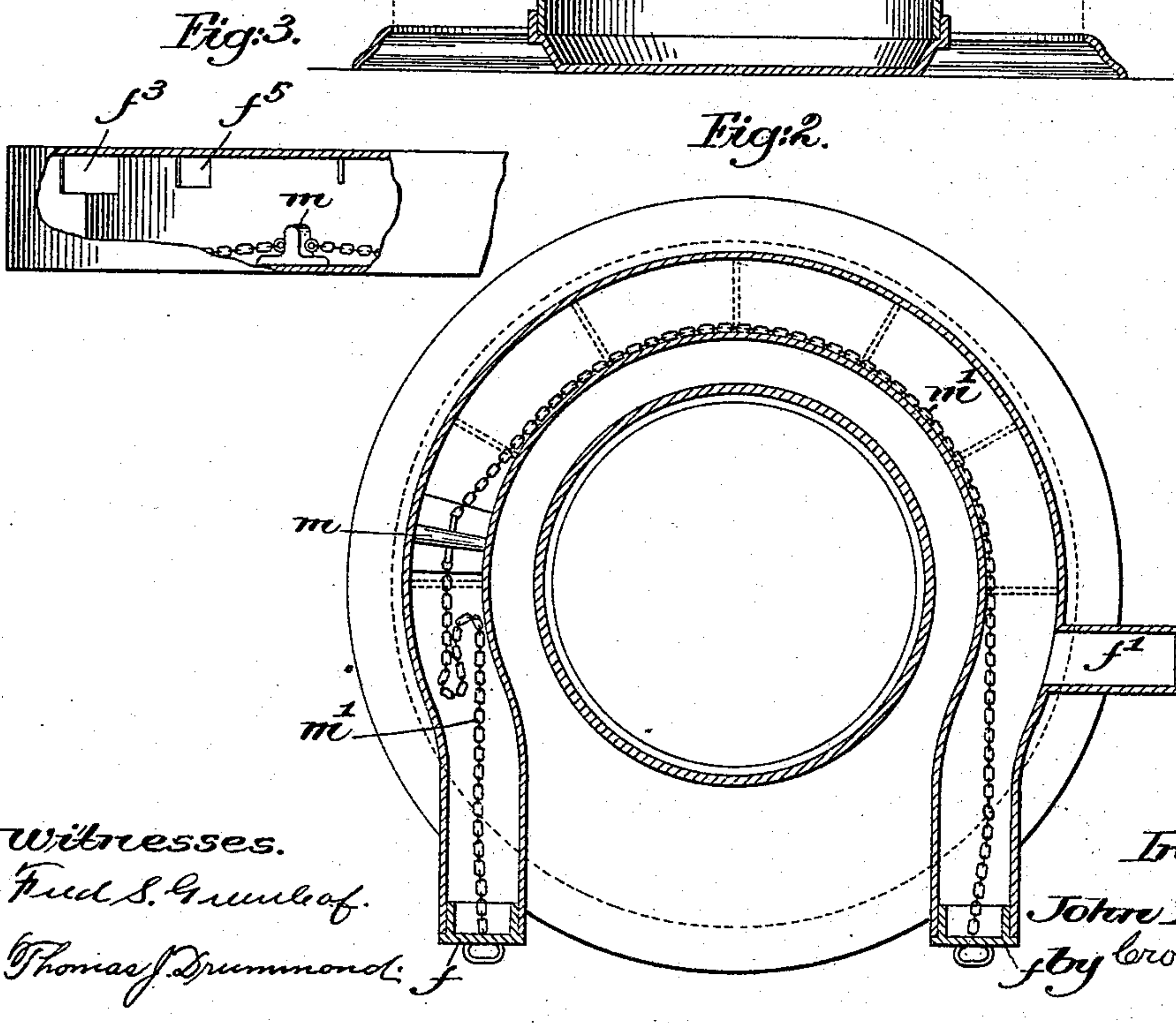
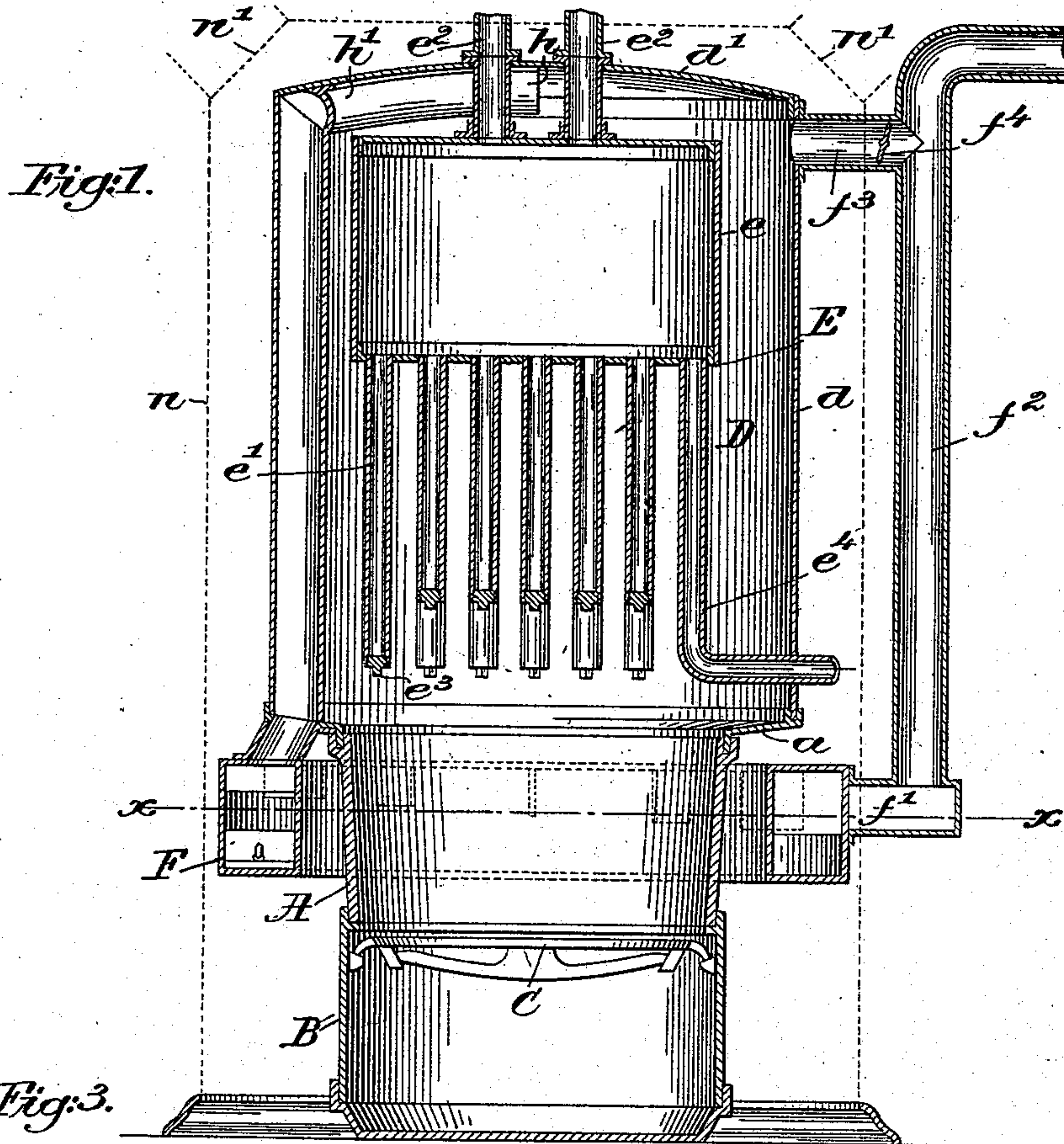


(No Model.)

J. DEMAREST.  
COMBINATION HEATING APPARATUS.

No. 539,978.

Patented May 28, 1895.



Witnesses.

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# UNITED STATES PATENT OFFICE.

JOHN DEMAREST, OF MALDEN, MASSACHUSETTS.

## COMBINATION HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 539,978, dated May 23, 1895.

Application filed July 16, 1894. Serial No. 517,635. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN DEMAREST, of Malden, county of Middlesex, State of Massachusetts, have invented an Improvement in  
5 Combination Heating Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 This invention relates to what are known as combination heating apparatus, that is, heating apparatus adapted to furnish both warm air, and steam or hot water, for heating purposes.

15 My invention has more especial reference to heating apparatus in which the boiler for generating the steam, or warming the water, is arranged within the usual dome constituting the heating chamber, and adjacent or immediately over the fire pot.

Prior to my invention it has been the usual practice to employ the common form of vertical fire tube boiler, arranged immediately above the fire pot, the products of combustion from the latter passing through the vertical tubes in the boiler and finding their exit from the sides of the dome near the crown of the latter and above the said boiler. To improve heaters of this type I wish to employ a  
25 water tube boiler, preferably of the drop tube type, wherein the products of combustion after circulating among the water tubes are caused to pass to the sides of the boiler and around the top header to the smoke exit above the boiler. It is desirable that the products of combustion pursuing the course described, be again drawn in or wrapped over and in contact with the top header in their passage to the smoke exit in order to more thoroughly  
35 impart heat to the water within the header. The smoke exit cannot lead directly up from the extreme top and center of the dome or heating chamber in which the boiler is placed, because such arrangement would bring it into  
45 too close proximity to the floor and other timbers above, thereby creating an element of great danger. To overcome this difficulty, and still preserve the centrally located smoke exit, my present invention comprehends leading said exit from the point named down the side of the dome or heating chamber, to the bottom of the heater and preferably into a

suitable combined radiator and flue encircling the fire pot. In this way the advantages of the central exit at the top of the heating chamber are retained, and also such as attend the use of the radiator referred to, without the danger which attends the leading of the smoke exit directly up from the top of the heating chamber.

My invention further comprehends a series of retarding plates in and depending from the top of the radiator or flue referred to, the successive plates from the inlet to the exit ends of said radiator dropping lower than the preceding ones to thereby produce a substantially uniform retarding effect throughout the length of the radiator or flue.

Still another feature of my invention consists in providing the radiator referred to, which, so far as this feature of my invention is concerned, constitutes one form of conduit through which products of combustion are passed, with a permanent cleaning device, meaning by permanent, one which always remains in operative position within the flue or radiator, suitable means being provided by which to draw this cleaning device in one or the other direction through the said conduit to remove the soot and ashes therefrom.

Other features of my invention will be hereinafter described and particularly pointed out in the claims.

Referring to the drawings, Figure 1, in vertical section, shows a preferred form of heating apparatus embodying my invention, the outer inclosing-case being indicated in dotted lines; Fig. 2, a horizontal section taken on the dotted line *x x*, Fig. 1; and Fig. 3, a detail showing a portion of, and looking at the side of, the radiator and partially broken away to show the graduated retarding-plates and the cleaning device within the same.

Referring to the drawings, in the particular apparatus shown as embodying my invention, A is a suitable fire-pot, forming the combustion chamber, and mounted in a suitable manner upon the top of the base casting B, containing the ash-pit, a suitable grate or fuel support C being arranged at or near the bottom of the said fire-pot.

The fire pot A, as herein shown, is substantially circular in cross section, see Fig. 3, and at its top is formed to receive and hold the



base ring  $\alpha$ , which in turn sustains the cylindrical side sheet  $d$  of the dome D, preferably provided with a convex crown  $d'$ . Within this dome D, which constitutes the preferred form of heating chamber, I have arranged a water tube boiler E, shown as of the drop tube type, and comprising the body portion or header  $e$ , from which depend the tubes  $e'$  screwed into or otherwise suitably attached to the tube sheet. The header  $e$  is supported in a suitable manner, the same being herein shown as suspended by the outlet pipes  $e^2$  from the crown  $d'$  of the dome. The drop tubes  $e'$  may be simple tubes, as shown, or they may be otherwise constructed in accordance with well known practice in drop tube boiler construction at the present time.

To provide a means for draining the drop tubes, my invention comprehends closing the lower ends of the same in a suitable manner, as by screw plugs  $e^3$ , which may be removed when it becomes necessary or desirable to drain the tubes.

The inlet pipe for the boiler is shown at  $e^4$ , the same constituting preferably the return pipe for the system.

F is a semi-circular radiator, preferably rectangular in cross-section, as shown, and encircling the fire-pot, the same, as shown, having its ends closed by removable plates or covers  $f, f'$ . See Fig. 2.

The products of combustion from the fire pot rise and circulate among the drop tubes of the boiler, and are deflected by the tube sheet thereof outwardly to the sides of the dome, passing thence up to the top of the dome to the entrance  $h$  of the smoke exit flue  $h'$ , which leads down, herein along the inside of the dome, to and preferably enters the radiator F, as best shown in Fig. 1, the said flue, as shown, entering the radiator, near one end of the latter, so that the products of combustion will pass along the entire length of the radiator to the exit  $f'$ , at or near the opposite end thereof, see Fig. 2, which exit enters the end of the vertical funnel  $f^2$  leading to the uptake or chimney. A direct draft passage  $f^3$  leads from the side of and near the top of the dome to the said vertical funnel  $f^2$ , which passage is controlled by the usual damper  $f^4$ .

Within the radiator F and, as shown, depending from the top thereof I have arranged a series of plates  $f^5$  shown as graduated, that is, depending each lower than the preceding one, from the entrance to the exit of the said radiator, in order that the products of combustion in passing therethrough shall be retarded.

Within the radiator F, I have also arranged the cleaner  $m$  adapted to remain permanently within the same, and which when drawn through said radiator acts to push before it the soot or ashes accumulated therein. As a means for moving this cleaning device I prefer to employ two flexible connections, as chains  $m'$ , connected to opposite sides of the

same, as best shown in Fig. 2, which chains are each of sufficient length to extend completely around or through the radiator, and at their ends may be connected, as shown, to the covers  $f, f'$ , at the ends of the radiator, or left loose within the latter. The normal position of the cleaning device is preferably at one end of the radiator, that is, between the radiator end and the inlet or exit thereof, so that it will not interfere with the passage of the products of combustion therethrough.

When it is desired to remove the ashes from the radiator one of the covers  $f$  at the opposite end from that at which the cleaning device is located, is removed, the same forming a handle by which, through the chain  $m'$ , the cleaning device may be drawn through the entire length of the radiator to remove the ashes, as described.

The dotted lines  $n$  represent the outer inclosing shell or casing, usually of sheet iron, from which lead the usual warm air pipes  $n'$  to the registers in the floors of the rooms to be heated. The outlet pipes  $e^2$  for the boiler lead to the radiators in the rooms to be heated by the same.

The products of combustion pass up at the sides of the boiler header  $e$  and are wrapped over the crown sheet thereof, being gathered in between said crown sheet and the crown of the dome, and in contact with the former by and to the central exit  $h$ , so that the products of combustion reach and contact with the boiler on all sides before passing from the dome, yet the said products are conducted to the bottom of the heater, to permit the use of the meritorious construction of radiator and direct and indirect drafts to be employed.

The boiler may be used for raising the temperature of water in a hot water system, or for the generation of steam in a steam system, as may be found most desirable.

It is essential in my invention that the boiler be arranged within the dome of the combustion chamber, with its top or crown sheet in substantially close proximity to the crown of the said combustion chamber in order that the products of combustion, when drawn or wrapped in over the crown sheet of the boiler to the centrally located exit flue, may contact with the said crown sheet and impart heat therethrough to the water in the boiler. Were the boiler dropped away from the crown of the combustion chamber or dome, the flames would pursue the most direct path from the sides of the boiler to the centrally located exit, and would, therefore, not come into direct contact with the crown sheet of the boiler. This location of the boiler is further necessary, as a boiler, as distinguished from a water-coil or other similar device, cannot be crowded down too close upon the fuel in the fire pot, but must be located close to the crown of the combustion chamber, for if kept above the fire-pot and still down away from the crown of the combustion chamber the heater would be so high as to pre-



clude its use in the ordinary cellar or basement.

My invention is not necessarily restricted to the particular arrangement and construction of the various parts herein shown, for the same may be varied without departing from the spirit and scope of my invention.

Having described my invention, and without limiting myself as to details, what I claim, and desire to secure by Letters Patent, is—

1. A combination heater, comprising a combustion chamber, a fuel support therefor, a heating chamber, a water boiler arranged within said heating chamber and having its top sheet in close proximity to the crown thereof, a smoke exit confined within the upper portion of the heating chamber and beneath its crown and having its entrance arranged centrally of the heating chamber, to thereby draw together the products of combustion over and in contact with the top sheet of the boiler, said products of combustion being crowded down upon said top sheet by the proximity of the crown of the heating chamber, the said smoke exit leading outwardly from below the crown of the heating chamber, whereby a central exit for the products of combustion is obtained without leading the same from the top of the heater near the floor timbers, substantially as described.

2. A combination heater, comprising a combustion chamber, a fuel support therefor, a heating chamber, a water boiler arranged within the heating chamber and having its top sheet in close proximity to the crown thereof, a radiator outside of and adjacent said combustion chamber, and a smoke exit confined within the upper portion of the heating chamber and beneath its crown and having its entrance arranged centrally of the heating chamber, to thereby draw together the products of combustion over and in contact with the top sheet of the boiler, said products of combustion being crowded down upon said top sheet by the proximity of the crown of the heating chamber, the said smoke exit leading outwardly from below the crown of the heating chamber and communicating with said radiator, and an outlet for said radiator, substantially as described.

3. A combination heater, comprising a combustion chamber, a fuel support therefor, a heating chamber, a water boiler arranged within the heating chamber and having its top sheet in close proximity to the crown thereof, a radiator outside of and adjacent said combustion chamber, a smoke exit confined within the upper portion of the heating chamber and beneath its crown and having its en-

trance arranged centrally of the heating chamber, to thereby draw together the products of combustion over and in contact with the top sheet of the boiler, said products of combustion being crowded down upon said top sheet by the proximity of the crown of the heating chamber, the said smoke exit leading outwardly from below the crown of the heating chamber and communicating with said radiator, an outlet for said radiator, and an inclosing shell or casing provided with hot air exits, substantially as described.

4. In a heating apparatus, the combination with a segmental smoke conduit, having openings at its opposite ends and closures therefor of a cleaning device permanently located in said conduit, and operating connections leading from the said cleaning device in opposite directions to the ends of said conduit and furnishing means by which to draw the said cleaning device through the said conduit in opposite directions to remove ashes, &c., therefrom, substantially as described.

5. In a heating apparatus, the combination with a smoke conduit, of a cleaning device permanently located therein, and flexible connections permanently attached to and furnishing means by which to draw the said cleaning device through the said conduit, substantially as described.

6. In a heating apparatus of the class described, the combination with a radiator, as F, and a cover closing one end of the same, of a cleaning device arranged within the said radiator, and a flexible connection joining the same to the said cover the latter furnishing means by which to draw the cleaning device through the radiator, substantially as and for the purpose specified.

7. In a heating apparatus of the class described, a radiator, as F, through which the products of combustion pass combined with a series of retarding plates arranged therein, and at substantially right angles to the direction of flow of the said products of combustion therein each plate approaching the wall of said radiator nearer than the preceding one, from the inlet to the outlet thereof, to furnish a substantially uniform retarding effect throughout the entire travel of the said products of combustion through the said radiator, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN DEMAREST.

Witnesses:

FREDERICK L. EMERY,  
EMMA J. BENNETT.