

(No Model.)

D. S. RICHARDSON.

COMBINED HOT AIR AND HOT WATER HEATER.

No. 390,098.

Patented Sept. 25, 1888.

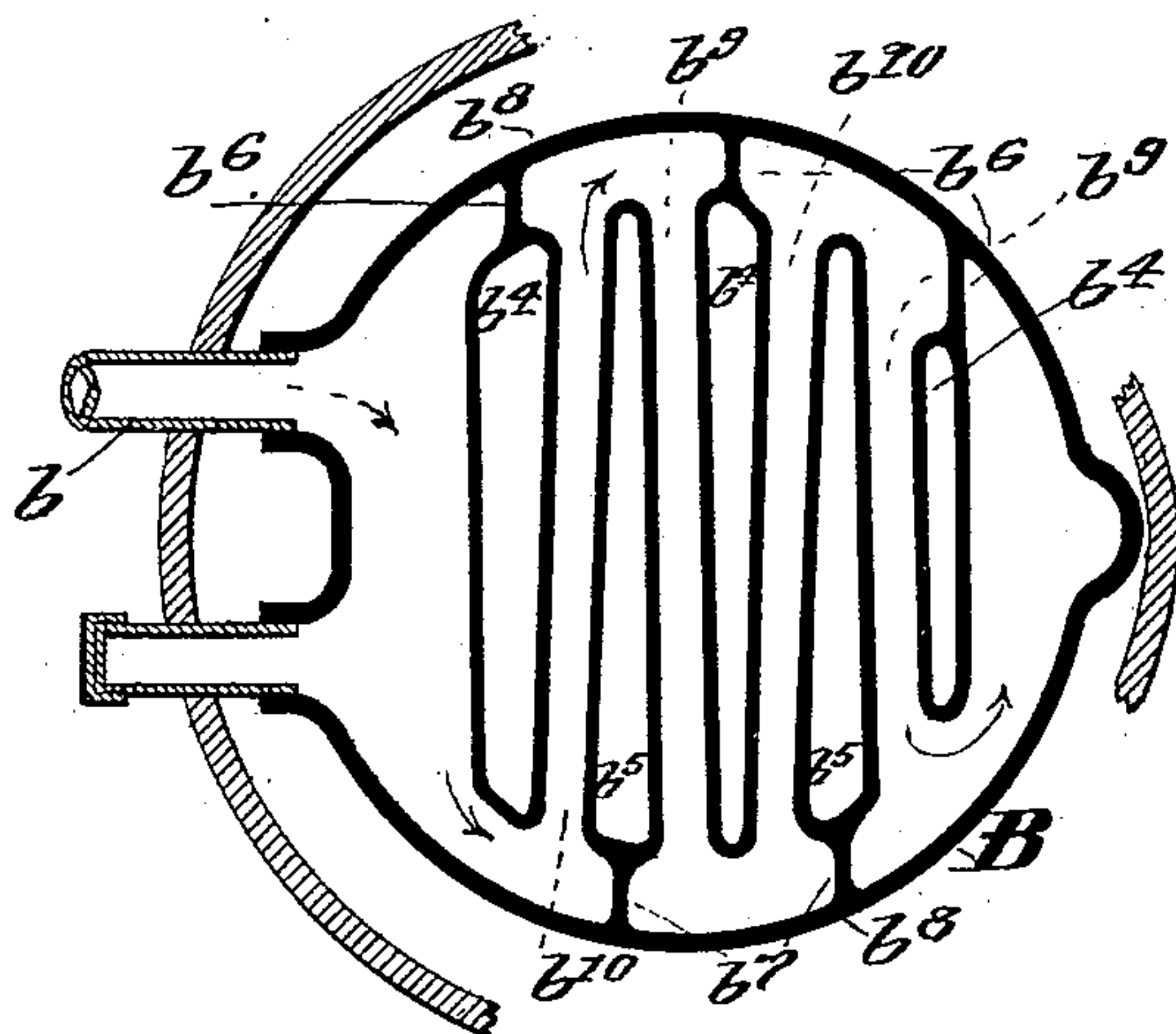
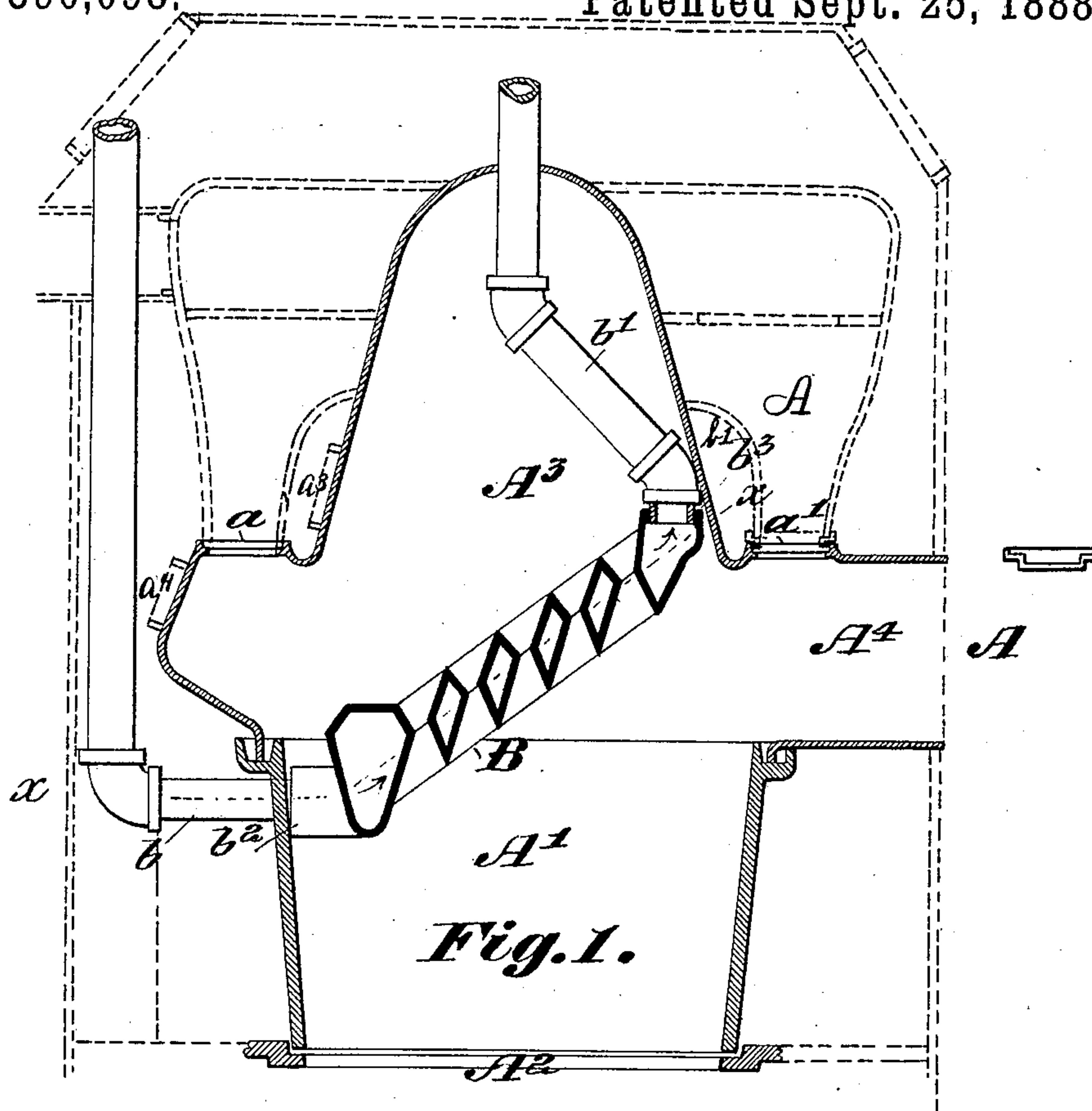


Fig. 2.

Witnesses
Arthur Ashley
Matter S. Dodge.

G. & C. Inventor.
Dwight F. Richardson
M. J. Atteney Atty.

UNITED STATES PATENT OFFICE.

DWIGHT S. RICHARDSON, OF BROOKLYN, NEW YORK.

COMBINED HOT-AIR AND HOT-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 390,098, dated September 25, 1888.

Application filed January 12, 1888. Serial No. 260,477. (No model.)

To all whom it may concern:

Be it known that I, DWIGHT S. RICHARDSON, a citizen of the United States, residing in the city of Brooklyn, in the county of Kings, in the State of New York, have invented a new and useful Combined Hot-Air and Hot-Water Heater, of which the following is a description.

The invention relates to that class of domestic heaters which embrace two distinct methods or systems of heating, one being the hot-air-furnace system, in which air is first heated in a chamber which incloses the furnace and is then conveyed away in pipes which discharge directly into the apartments which are to be heated, and the other being the hot-water-heater system, in which the air of the various apartments is warmed by radiation of heat from pipes through which hot water continually circulates, each circuit being formed by a central reservoir, which is located in or near the fuel-chamber, and a pipe which, by each extremity, is connected with such central reservoir or water-chamber.

The object of the invention is to produce a two-system heater of the character hereinabove described, in which at small cost, and without much, if at all, impairing the effectiveness of the device as an air-heater, the combustion-chamber of a hot-air furnace shall be provided with a water-chamber of moderate dimensions, arranged in such relation to the fuel-chamber as to render the heat thereof fully available in sustaining a rapid circulation through the hot-water system.

The invention consists in certain novel features and combinations in a two-system heating apparatus of the character above indicated, as will be hereinafter described and claimed.

In the drawings, Figure 1 is a vertical central section, from front to rear, of a portion of a hot-air furnace in which my invention is embodied, an air-casing and a radiator or heating-drum being represented in dotted lines. Fig. 2 is a transverse section on the line xx in Fig. 1.

The hot-air furnace proper consists in general of the fire-pot or fuel-chamber A^1 , the ash-pit A^2 , which is here represented in part only, the combustion-chamber A^3 , which embraces all the interior portion of the furnace

above the upper extremity of the fuel-chamber, and the fuel-supply passage or feed-chute A^4 , the whole for convenience being designated by the letter A.

As shown in the drawings, the furnace is composed of an ash-pit or base-section, a fire-pot or fuel-chamber section, and a combustion-chamber section, placed one upon another in the order indicated; but this sectional formation, although a convenient and desirable one, is not essential to the practice of the invention. In this example an opening, a , is provided at the rear of the combustion-chamber for the attachment of an exit-pipe or to receive the rear leg of a radiator or heating-drum, if such be employed. A corresponding opening, a' , in the top of the feed-chute is to receive a "plug," as p , in the ordinary well-known manner to receive and support a front leg of a radiator, if one should be used in connection with the furnace.

If desired, the exit-pipe or the radiator may be connected at a higher point, as at a^3 , or at a lower point, as at a^4 , without affecting the principle of the operation.

The water-chamber B is made broad and shallow, and it is preferably of such conformation in its horizontal or transverse area as to adapt it to the combustion-chamber in which it is placed, although, for obvious reasons, it does not closely fit the same. It is arranged athwart the combustion-chamber in such a manner as to lie across the course of the volatile products of combustion as they pass from the fuel-chamber to the exit-opening, and also in such manner as to offer no obstruction to the passage of fuel as it is supplied through the feed-chute to the fire-pot. In this instance it is represented as extending from the front wall of the furnace, at a point a little below the mid-height of the combustion-chamber, obliquely downward to a point at or near the upper extremity of the fire-pot or fuel-chamber. As thus arranged it receives the direct impact of the heat-currents as they pass from the burning fuel to the exit-opening, and absorbs the heat thereof, for connection and utilization, without any appreciable diminution of the power of the furnace proper to perform its legitimate function as a radiator of heat and a distributor of hot air.

The water-chamber is provided with the

usual tapped inlet and outlet openings, b^2 and b^3 , for the attachment of the inflow and outflow pipes b and b' , and it may be provided with tapered vertical passages b^4 b^4 and b^5 b^5 , one
 5 end wall of each of which is connected by a web or diaphragm, b^6 or b^7 , with the side wall, b^8 , of the chamber in such manner that right and left zigzag water-passages b^9 and b^{10} are produced. Under this construction, as well
 10 as under a construction in which the water-chamber is made plain or imperforate, the water which is received at the lower extremity of the chamber passes in a continuously-ascending current through the chamber to its
 15 point of discharge therefrom, each of the water-passages b^9 and b^{10} being slightly higher at its receiving than at its discharging end.

When the water-chamber is perforated or flued, as described, the water-passages b^9 b^{10}
 20 are of the configuration in transverse section represented in Fig. 1—that is, broadest in the center and diminishing upwardly and downwardly, a construction which presents a very extensive surface to the action of the outflowing heat-currents, and thus insures thorough
 25 heating and rapid circulation of the water.

In some situations it may be desirable to place the exit-opening of the furnace at a right angle to the fuel-supply passage, and when
 30 this is done the arrangement of the water-chamber will by preference, although not necessarily, be correspondingly changed.

Although I have represented the water-chamber as extending from the upper rear
 35 portion of the fire-pot obliquely upward across the combustion chamber, it will be obvious that it need not extend entirely across such chamber, since the advantages of the flat and shallow construction, and of the inclined ar-
 40 rangement in the midst of the hottest portion of the combustion-chamber, would be available in almost an equal degree, if the front extremity of the water-chamber come somewhat short of the front wall of the furnace. It will
 45 be apparent that under this construction the two systems of heating operate advantageously in conjunction—that is, the effectiveness of neither is impaired by reason of its associa-

tion with the other—for it will be understood that while the hot-air chamber is warmed by
 50 radiation from the exterior surface of the combustion-chamber and its related parts the water-chamber receives its heat almost entirely from the central portion of the furnace, abstracting from the burning fuel and from that
 55 portion of the combustion-chamber immediately above the same a large proportion of the heat which otherwise would pass directly to the exit-opening and escape unutilized. This construction is quite distinct from one in which
 60 the water-chamber occupies a large proportion of the combustion chamber and extends into the upper portion of the same, presenting a large body of water in such relation to the walls of the combustion-chamber as to render the furnace almost wholly useless as an air-
 65 heater.

Having described my invention, I claim—

1. In a hot-air furnace which has a front fuel-supply passage or feed-chute, a water-
 70 chamber which extends from a point at or near the upper extremity of the fire-pot diagonally upward and across the combustion-chamber of the furnace to a point near the upper boundary of the feed-chute.

2. A hot-air furnace which is provided with a shallow water-circulating chamber which extends athwart the interior of the furnace, across
 75 the course of the escaping products of combustion, and in which the water passes in a continually-ascending zigzag current from the inlet to the outlet opening of the chamber.

3. The combination, with a hot-air furnace, of an inclined water-heating chamber which extends across the lower portion of the com-
 80 bustion-chamber, and which is provided with zigzag water-passages, the wall of each of which inclines continuously upward from the inlet to the outlet opening of such passage, whereby the ascent of the water-currents is made con-
 85 tinuous from the lower to the upper extremity of the chamber.

DWIGHT S. RICHARDSON.

Witnesses:

JAMES B. TAYLOR,
 H. C. KAUSCH, Jr.