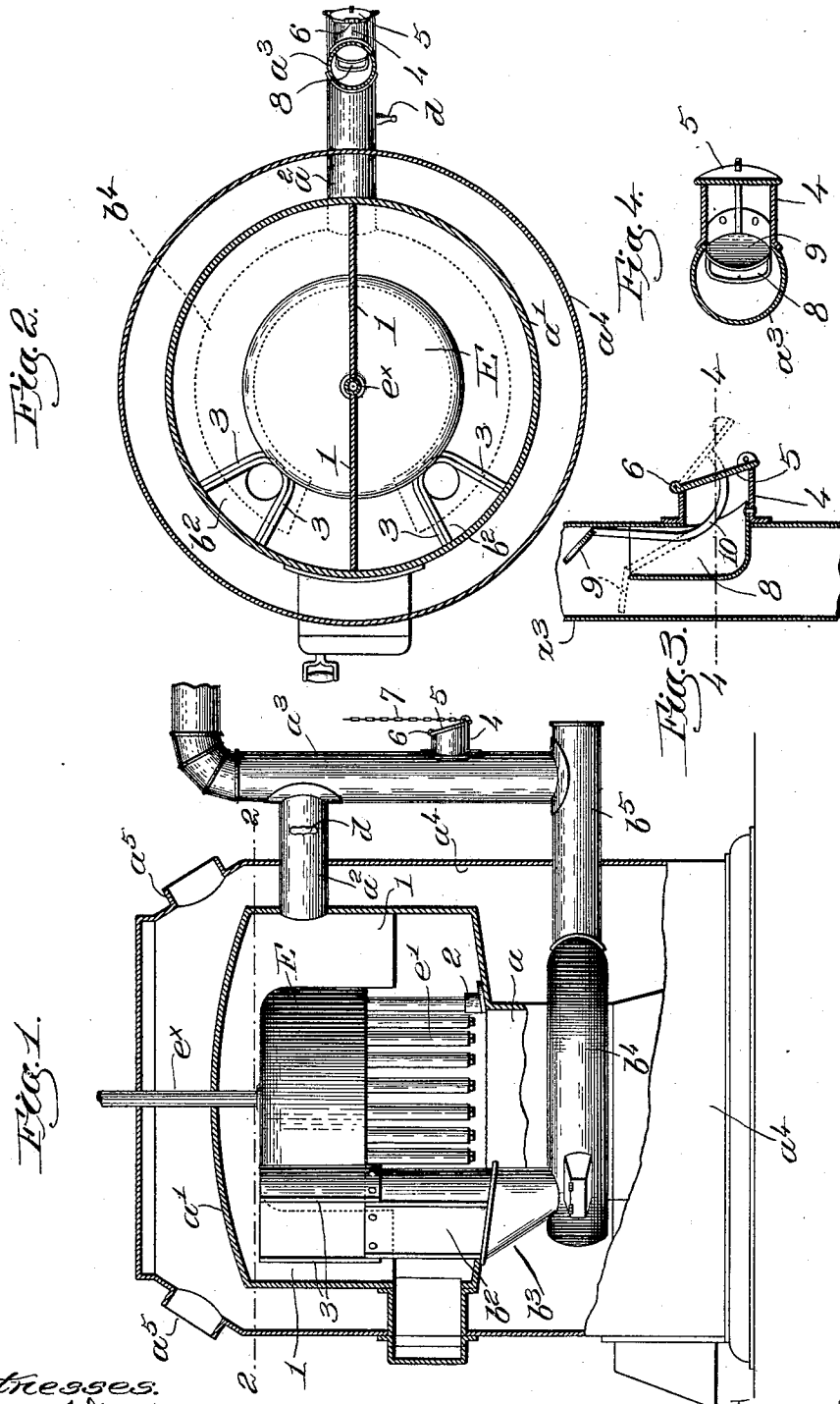


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 COMBINED STEAM AND HOT AIR HEATER.
 APPLICATION FILED JULY 18, 1910.

999,756.

Patented Aug. 8, 1911.



Witnesses.
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UNITED STATES PATENT OFFICE.

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COMBINED STEAM AND HOT-AIR HEATER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN DEMAREST, a citizen of the United States, and resident of Springfield, county of Hampden, State of Massachusetts, have invented an Improvement in Combined Steam and Hot-Air Heaters, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to heaters of the type wherein hot-air and steam or water systems are combined in one heater, and it has for its main object the production of means whereby a more uniform and equal distribution and circulation of the products of combustion is effected, to increase the efficiency of the main heating chamber and the water heater contained therein. I have also provided improved means to govern the cold-air inlet, so that the entering air is directed toward the chimney flue instead of being permitted to mingle at once with the escaping products of combustion. The valve controlling the cold-air inlet and the throttling of the escaping products of combustion are effected in such manner that no movable joint or pivotal connection is exposed to the corroding effect of the gases.

The various novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a central vertical section and partial elevation of a heater or furnace embodying one practical form of my present invention, the casing being broken out for the most part to show the internal structure; Fig. 2 is a horizontal section taken on the line 2—2, Fig. 1, looking down; Fig. 3 is an enlarged vertical sectional detail of the cold-air inlet and adjacent parts; Fig. 4 is a sectional view taken mainly on the line 4—4, Fig. 3, but with the throttling valve in elevation.

As to the main features of construction of the heater herein illustrated no detailed description is necessary, as they are in general of well known construction in heaters of this type, and include a fire-pot a , dome a' having a direct outlet-flue a^2 provided at d with a controlling valve or damper, said flue leading to the smoke-pipe a^3 , and the inclosing casing or jacket a^4 having provision at a^5 for connection with the hot-air flues, in the usual manner.

The parts specified, and also the hot-water or steam generator, comprising the boiler E and the drop-tubes e' depending therefrom above the fire-pot, are all substantially as in United States Patent No. 624,189 granted to me May 2, 1899, to which patent reference may be had. In said patent I show a horizontal diaphragm or baffle-plate which divides the dome into upper and lower chambers, connected by an opening in the baffle-plate near the inlet end of the flue a^2 , and at a distance from such opening the upper chamber communicated by down-flues, one at each side of the dome, with a radiator-flue connected at its rear end with the smoke-pipe or flue a^3 . That construction was devised for the more complete control of the products of combustion, as set forth in the patent, but in actual practice I have found that sometimes, when the down-flues are in use, such products tend to traverse one of such flues, to the exclusion of the other, and thereby the dome and the hot-water heater are not subjected to the most advantageous and uniform heating action of the products of combustion. To overcome this objectionable feature I have in my present invention eliminated the horizontal baffle-plate, and instead I divide the upper part of the dome from front to rear by a vertical and diametrically located separator 1, 1, for convenience made in two parts and extending completely across the dome, and from its top downward to a point well below the boiler E , as shown in Fig. 1, the separator being shaped to tightly fit the exterior of the boiler and abutting against the pipe e' leading therefrom.

The vertical separator intersects the inlet of the direct outlet-flue a^2 , and the products of combustion rising from the fire-pot and surrounding the drop-tubes e' are equally divided and pass upward, half at one side and half at the other side of the separator, escaping at opposite sides thereof into the flue a^2 . The drop-tubes e' and the boiler, as well as the upper part of the dome, are thus always subjected to the action of the products of combustion, the separator 1 depending so far toward the fire-pot that an initial and substantially equal division of such products is effected and maintained, giving a practically uniform heating action in all parts of the dome. Of course the products of combustion will pass out through the flue a^2 as long as the damper

therein is open, but if a greater heating action in the dome is desired such damper is closed at *d*, and the products of combustion are directed downward by means of
 5 down-flues *b*², one at each side of the separator near the front of the heater. Said flues terminate in elbows *b*³ at the ends of a usual radiator-flue *b*⁴ connected at its rear
 10 end by a flue *b*⁵ with the smoke pipe *a*³, substantially as in my patent above referred to. The flues *b*² at their upper ends project beneath and support the overhanging edge of the boiler *E* toward the front thereof, and the rear part of the boiler can be supported
 15 in any suitable manner, as by a brace 2 on one of the drop-tubes *e*¹, Fig. 1, resting on the adjacent part of the heater structure. The projection of the flues *b*² beneath the boiler is clearly shown in Fig. 2 by the
 20 dotted line portions of said flues.

In order to obtain the most complete and thorough circulation of the combustion products throughout the drum when the down-flues are in use I have herein provided
 25 each one with an upward extension consisting of the attached plates 3, 3, shown as riveted to the upper ends of said flues and at their inner upright edges butted against the wall of the boiler *E*.

30 It will be understood that the casing or jacket *a*⁴ forms the outer wall of each flue and its extension, the latter bringing the inlet ends of the down-flues, as a whole, substantially at the level of the boiler top,
 35 near the top of the dome.

After the divided products of combustion traverse the dome at each side of the upright separator 1 such products enter the open upper or inlet ends of the down-flues, and
 40 pass therethrough downward to the radiator-flue *b*⁴ and from it to the smoke-pipe as will be apparent.

By the construction described I obtain in practice a most uniform and efficient heating action throughout the dome when the
 45 damper at *d* is closed, and the efficiency of the heater as a whole is much improved.

The smoke-pipe *a*³ is provided with an elbow 4 above the flue *b*⁵, constituting a cold-air inlet, governed by an outside damper 5
 50 hinged on the elbow at 6, Figs. 1, 2, and 3, wholly outside of the inlet and the smoke-pipe, so that the pivotal connection cannot be in any circumstances affected by the cor-
 55 roding action of the products of combustion.

The damper 5 is controlled in any suitable or usual manner by a flexible connection or chain 7, Fig. 1, forming no part of my invention.

60 Within the smoke-pipe I provide an upturned tubular deflector 8, only partly filling the smoke-pipe and opening at its upper end thereinto at a point higher than the air-inlet 4, but said inlet opens into the deflector,
 65 as shown. This deflector 8 guides the enter-

ing air in an upward direction within the smoke-pipe *a*³, instead of permitting the air to mingle at once with the products of combustion escaping from the flue *b*⁵, as in other structures now in use. By this deflection of
 70 the incoming air I secure a much better and smoother regulation of the chimney draft.

A throttling damper 9 to govern the escaping products of combustion is fixedly
 75 mounted on a curved, upturned arm 10 fixedly attached to the damper 5 at its inner side, said arm being located within the deflector 8, so as to obviate any inside joints in the means for controlling said throttling
 80 damper. When the air-inlet damper 5 is opened, see dotted lines Fig. 3, it moves the arm 10 to drop the throttling damper 9 across a portion of the flue *a*³ outside of the deflector. This serves to throttle, more or
 85 less, the escape of the products of combustion according to the extent to which the inlet valve 5 is opened, the damper 9 when in use practically clearing the deflector, so that the incoming air is not obstructed.

Various changes or modifications in details of construction and arrangement may
 90 be made by those skilled in the art without departing from the spirit and scope of my invention as set forth in the claims annexed hereto.
 95

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

1. In a heater having a heating-dome and a water-boiler centrally located therein,
 100 an upright separator extending from side to side of the dome and downward from its top below the boiler, and shaped to embrace the latter, a direct outlet-flue communicating with the dome at opposite sides of the
 105 separator, and down-flues constituting indirect outlets for the products of combustion, the open inlet ends of said flues being located near the top of the dome at opposite sides of the separator.
 110

2. In a combined hot air and water heater having a heating-dome and a water-boiler centrally located therein, means interposed
 115 between said boiler and the dome to divide the latter into two vertically-separated compartments, an outlet-flue communicating with both compartments near the top of the dome, and a down-flue in each compartment having its open inlet near the top of
 120 the dome and at a distance from the first-mentioned outlet-flue.

3. In a combined hot air and water heater having a heating-dome and a water-boiler centrally located therein, means interposed
 125 between said boiler and the dome to divide the latter into two vertically-separated compartments, an outlet-flue communicating with both compartments near the top of the dome, and an upright down-flue in each compartment, each of such flues
 130

coöperating with the water-boiler to support the same and having its open inlet end near the top of the dome, said down-flues constituting indirect outlets for the products of combustion in each of the compartments of the dome.

4. In a heater having a heating-dome and a water-boiler centrally located therein, and a fire-pot beneath said boiler, an upright separator interposed between the dome and boiler at the top and opposite sides thereof and extending downward toward the fire-pot, to effect a substantially equal separation of the products of combustion at oppo-

site sides of the separator, a direct outlet for such products, communicating with the dome at each side of the separator, and indirect outlets for the products of combustion, communicating with the dome near its top and at opposite sides of the separator.

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

JOHN DEMAREST.

Witnesses:

JOHN C. EDWARDS,
THOMAS J. DRUMMOND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."