

(No Model.)

W. W. DASHIELL.  
STEAM, AIR, OR WATER HEATER.

No. 367,601.

Patented Aug. 2, 1887.

Fig. 1.

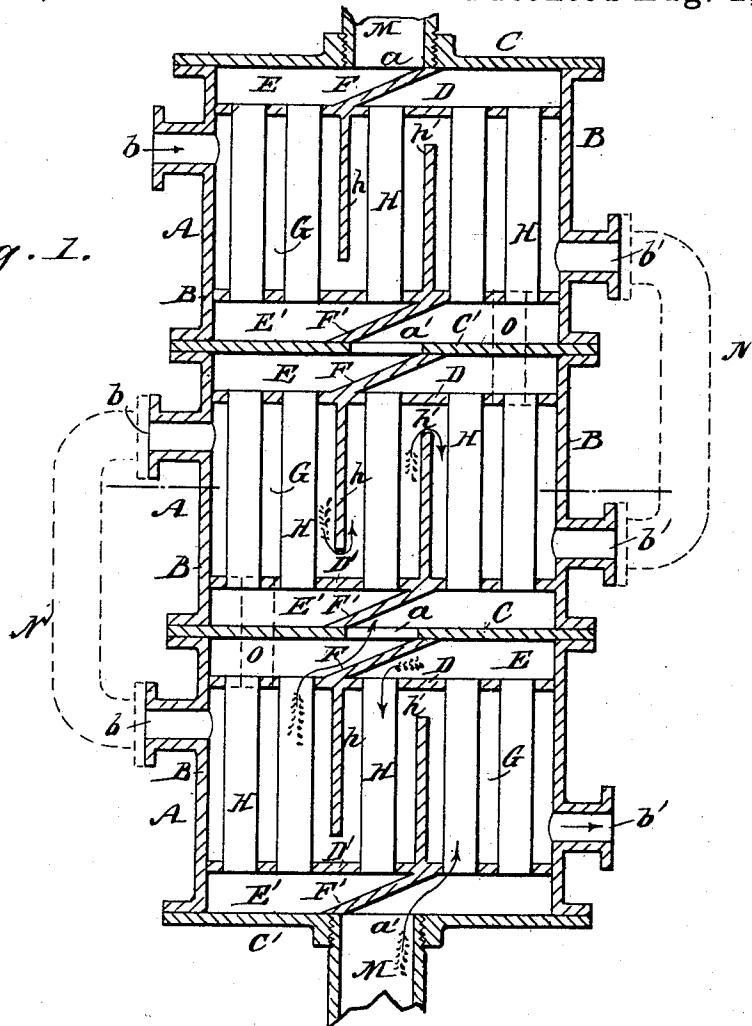
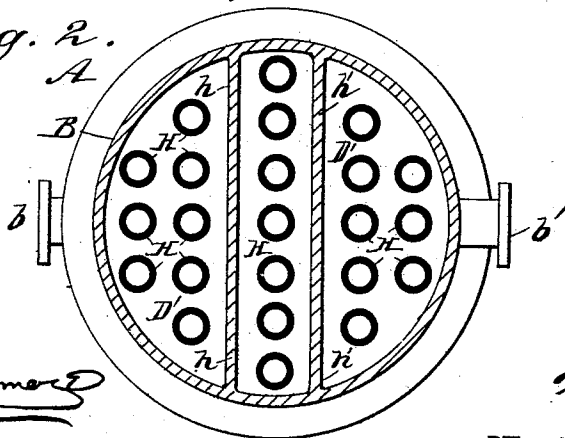


Fig. 2.



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## STEAM, AIR, OR WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 367,601, dated August 2, 1887.

Application filed October 28, 1886. Serial No. 217,464. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM W. DASHIELL, of Bergen Point, in the county of Hudson and State of New Jersey, have invented a new and Improved Steam, Air, or Water Heater, of which the following is a full, clear, and exact description.

My invention relates to a steam, air, or water heater, and has for its object in a thorough and efficient manner to heat air by the products of combustion or exhaust-steam, or to heat steam, air, and water at the same time by the said products of combustion or exhaust-steam by a duplication of heaters, one attached to and above the other.

The invention consists in the construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in both the figures.

Figure 1 illustrates a central vertical section through a series of my heaters, and Fig. 2 is a horizontal section of the same.

In the construction of my heater A, the casing B is provided upon one side, near its upper portion, with an inlet, *b*, and upon the opposite side, near the bottom thereof, with an outlet, *b'*. The said casing is also further provided with heads C and C', having central apertures, *a* and *a'*, in the same vertical plane, one or both of which apertures may be fitted with a thread. Within the casing B, a distance from each head, and respectively above and below the aforesaid inlet *b* and outlet *b'*, horizontal tube-sheets D and D' are attached, and in the upper chamber, E, thus formed, a central division is made by a guide-plate, F, attached at an angle to the upper tube-sheet, D, and to the head C, at one side of the aperture *a* therein, so as to incline immediately below said aperture.

The lower chamber, E', is also divided by a similar guide-plate, F', secured in like manner as the aforesaid guide-plate F, and at the same angle of inclination to the lower head, C', and to the lower tube-sheet, D', over the central aperture, *a'*. Within the central chamber, G, a series of tubes, H, are arranged vertically within the tube-sheets D and D', and upon each side of the central row of said tubes deflecting-

plates *h* and *h'* are cast, the one, *h*, integral with the upper tube-sheet, D, adapted to extend vertically downward near the opposite tube-sheet, and the other, *h'*, is made integral with the lower tube-sheet, D', adapted to project vertically upward within a short distance of the opposite or upper tube-sheet, D.

In arranging my heaters to heat at one time water, steam, and air by exhaust-steam or products of combustion passing up the pipe to which they are attached, the heads of the central heater may be dispensed with, the top and bottom heads of the upper and lower heaters acting in their stead when bolted steam-tight thereto. While this arrangement is not absolutely necessary, as a steam-joint may be readily made between heads of the complete heaters when three or more are grouped together, it is preferable.

When grouped as above, the exhaust-steam, products of combustion, or whatever heating agent may be employed is passed up the pipe M, as indicated by the arrows, through the pipes to the right of the lower guide-plate, then down the central pipes, up the opposite outer pipes, and from thence over the upper guide-plate out through the top aperture, *a*, into the next heater, and so on through each heater until the upper portion of the said pipe M is reached.

The air, steam, or water is introduced upon one side, through the inlet-apertures *b*, into the chambers G, and allowed to circulate around the heated tubes H, the circulation being retarded and broken to admit of thorough heating by the deflecting-plates *h*. The said air, water, or steam, after following the course indicated by arrows in the chamber G, passes out through the outlets *b'*.

When it is desired to heat but one material, either air, steam, or water, and employ to that end a series of heaters, I connect the outlets *b'* of the center and upper heater by a pipe, N, and the inlets *b* of the center and lower heaters by a similar pipe, N', thus leaving an inlet in the upper heater and an outlet in the lower one, as shown in dotted lines, Fig. 1. The heating agent is made to pass up through the combined heaters, as before, while the material to be heated is passed down around the tubes H of each heater, through the said connecting-pipes N N', becoming hotter as it descends,

owing to the greater intensity of heat encountered as it approaches the lower heater, until, after encircling the intensely-heated tubes in the lower chamber, G, it escapes at a high temperature through the outlet *b'*. I sometimes close the outlets and inlets connected by the pipes N and N', thereby dispensing with said pipes, and effect a communication between the several chambers G, inside the casing, by means of vertical pipes O, penetrating the heads and tube-sheets of the heaters, as also shown in dotted lines in Fig. 1.

It is not absolutely necessary that the heating agent be passed through the tubes and the material to be heated around the same, as the operation may be reversed without departing from the spirit of my invention.

It will be observed, as illustrated in positive lines in Fig. 1, that by combining three heaters and passing through the heaters thus combined any heating agent—such as exhaust-steam, hot air, or waste products of combustion—three distinct chambers are obtained heated by the one agent. Thus air may be passed through the uppermost heater, steam to be superheated through the second, and

water through the third, each heater being provided, as shown, with an independent inlet and outlet, *b b'*.

Having thus fully described my invention, 30 I claim as new and desire to secure by Letters Patent—

1. A steam, air, or water heater provided with an upper and lower divided chamber, E E', having an outlet, *a*, and inlet *a'* in opposite divisions, a central chamber, G, provided with a series of tubes, H, connecting said upper and lower chambers, an outlet, *b'*, and inlet *b*, and vertical deflecting-plates *h h'*, substantially as shown and described, and for the purpose 40 herein set forth.

2. A steam, air, or water heater consisting of a casing provided with an inlet, *b*, and outlet *b'*, the apertured heads C C', the tube-sheets D D', having integral vertical deflecting-plates 45 *h h'*, the dividing-plates F F', and the tubes H, all arranged substantially in the manner and for the purpose herein set forth.

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Witnesses:

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