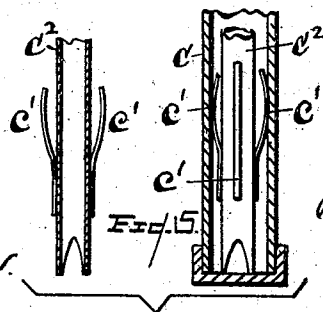
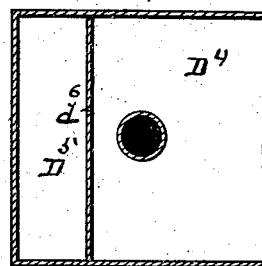
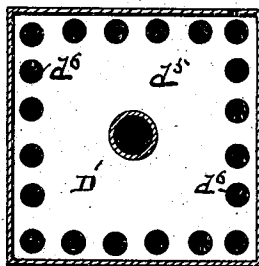
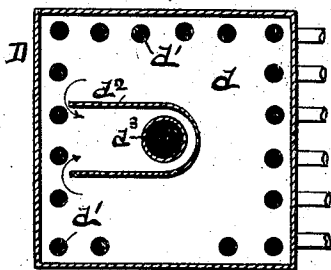
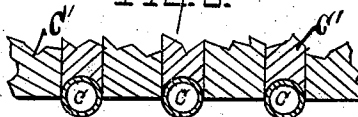
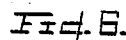
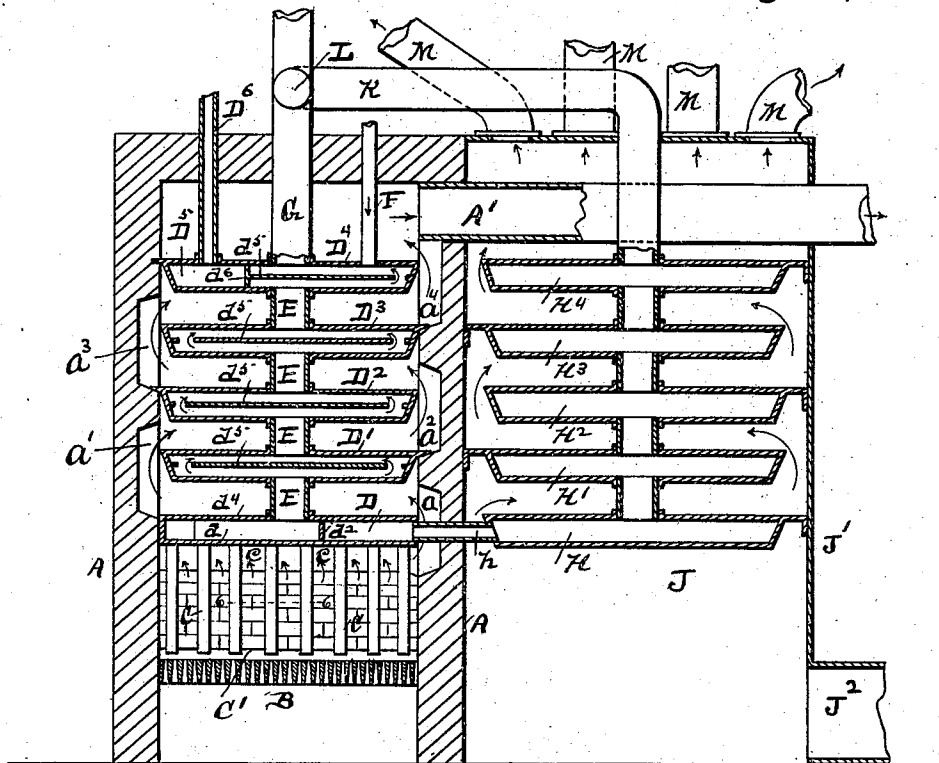


(No Model.)

C. A. HOWARD.
HEATER.

No. 503,141.

Patented Aug. 15, 1893.



Charles A. Howard,

INVENTOR

By his Attorney

Newell S. Wright.

WITNESSES

L. G. Thomas

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UNITED STATES PATENT OFFICE.

CHARLES A. HOWARD, OF PONTIAC, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE PENINSULA HEATER AND RADIATOR COMPANY, OF DETROIT, MICHIGAN.

HEATER.

SPECIFICATION forming part of Letters Patent No. 503,141, dated August 15, 1893.

Application filed September 10, 1892. Serial No. 445,493. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. HOWARD, a citizen of the United States, residing at Pontiac, county of Oakland, State of Michigan, have invented a certain new and useful Improvement in Heaters; and I 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, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to certain new and useful improvements in heaters, and is more especially designed as a hot-water heater, although it may also be used as a steam heater if desired.

The object of my invention is to provide a heater of simple and economical construction, and of superior efficiency.

To these ends my invention consists of the devices and appliances, their construction, combination and arrangement as hereinafter described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section embodying my invention. Fig. 2 is a horizontal section through the lower chamber D. Fig. 3 is a horizontal section through one of the intermediate chambers. Fig. 4 is a horizontal section through the upper chamber D⁴. Fig. 5 shows in detail the construction of the upright pipes about the combustion chamber; and Fig. 6 is a horizontal section on line 6—6 of Fig. 1.

I carry out my invention as follows:

In the drawings A represents the outer wall of the heater which may be made of any desired material, as metal or brick.

B is the grate.

C denotes a series of upright pipes located about the combustion chamber above the grate.

C' denotes a filling of brick or other suitable material between said pipes. At the back of the combustion chamber this filling comes short of the upper ends of said pipes to provide openings therebetween as indicated at "c" allowing the products of combustion to pass from the combustion cham-

ber upward to the uptake A'. I prefer to locate the tubes about four inches apart so that the end of a brick will just fit between any two adjacent tubes whereby a portion of the tube projects inward from the flat portion of the wall, as shown in Fig. 1. As it is a well known and established fact that the combustion of fuel is not as perfect when inclosed by a perfectly flat walled water jacket as when surrounded by a vertically ribbed or corrugated one, the advantages of this construction becomes apparent. The pipes C communicate at their upper ends with a lower chamber D, the lower plate "d" of said chamber being perforated as indicated in Fig. 2 at "d'" to receive the upper ends of said pipes. The pipes C to provide for circulation are each constructed with double passages or flues. I prefer as shown in Fig. 5 to construct each pipe double by inserting within the outer pipe C an interior pipe C², so adjusted in the former as to permit free circulation therebetween. In the construction of the double pipes C and C² I prefer to make the inner pipe C² of zinc plate or other non-corrosive metal, having its edges properly united, and inserted within the outer pipe C. To hold the pipe C² in proper position to allow free circulation thereabout, I unite to the pipe C² two or more, preferably four, spring metal strips "c'" which bear against the adjacent face of the pipe C and support the pipe C² properly within the outer pipe. This is a very simple, efficient and economical manner of constructing the upright pipes with double interior passages for the required circulation.

Above the combustion chamber I locate a series of chambers D, D' D² D³ D⁴, five being shown in Fig. 1. These chambers are united at their centers in any suitable manner, as by intermediate nipples E.

F denotes a water supply or feed pipe, communicating with the said chambers.

G is a hot water or steam pipe leading from the heater.

The lower and upper chambers D, D⁴ are slight modifications of the intermediate chambers D', D², D³.

In order that the water in the lower cham-

ber may be compelled to circulate about the outer edges of the chamber I prefer to provide said lower chamber with an interior wall "d²" extended about the orifice "d³" in the upper plate "d⁴" thereof, as shown.

The intermediate chambers D', D², D³ are each constructed with an interior diaphragm "d⁵" supported therein in any suitable manner. As shown in Fig. 3 the diaphragm is made integral with the walls of said chamber, and provided with a series of perforations "d⁶" toward the outer edge to permit the circulation of water or steam therethrough. I do not limit myself, however, to this particular construction of said diaphragm. The interior portion of said diaphragm, as shown, is made solid, so as to prevent the water or steam entering from below passing directly upward through the passage connecting the several chambers. The diaphragm, it will be seen, spreads the water or steam and compels it to pass around the edges of the chambers, and thence inward toward the center of the upper compartment of the chamber to find its egress therefrom into the chamber above. As many of these intermediate chambers may be connected together as are required to afford sufficient heat for any given building. In this manner a heater may readily be connected up with as many chambers as may be desired, each chamber constituting a section of the completed device. The upper chamber I prefer to construct with an independent water chamber D⁵ provided with a pipe D⁶, by which a damper regulator may be connected therewith, controlled by the expansion and contraction of the water in said chamber D⁵. In consequence of the provision of said damper-regulating chamber, the diaphragm in the upper chamber D⁴ only extends part way across the interior thereof, an upright wall "d⁶" in the chamber D⁴ serving to form the chamber D⁵.

The chambers D, D', D², D³, D⁴ are supported within the walls A so as to permit a free circulation of the products of combustion thereabout. To this end the walls about said chambers are so constructed as to cause the products of combustion on their journey from the fire box to the uptake to pass about the said chambers on alternate ends. For this purpose the wall is recessed as shown at "a" "a'" "a²" "a³" "a⁴" alternately on opposite sides to permit the passage of the products of combustion. Thus it will be seen that said products pass from the combustion chamber through the openings c at the top of the filling between the pipes, and in contact with the under side of the chamber D, through the recess "a," thence between chambers D, D', recess "a'" and so on out through the smoke flue A'.

In Fig. 1 of the drawings I have shown my invention in connection with an air-heating apparatus for further utilizing the heat and securing a more perfect ventilation, but I do not claim such air-heating apparatus in the

present application, but have only introduced it for the purpose of showing how such apparatus may be combined with my hot water or steam heater. A very desirable form of hot air heater may be formed by connecting with the chambers D, D', D², D³, D⁴, &c., and similarly connected together, a series of radiating chambers H, H', H², H³, H⁴, said radiating chambers being located within an air chamber J formed by a jacket J' in connection with one of the walls A, and into which a fresh air duct J² is led. Circulation of water or steam may be effected by suitably leading a pipe K from a manifold L into which the pipe G communicates, into the chamber H⁴, and providing a tubular connection "h" between the chambers D and H. Should the radiating chambers H, H', H², H³, H⁴ not be employed, the pipe connection L and the tubular connection "h" would of course be dispensed with. Any desired number of radiating chambers may thus be employed if desired.

M denotes hot air flues leading from the chamber J. The smoke flue A' may be led through the chamber J also, if desired, although I do not limit myself thereto.

I prefer to construct the chambers D', D², D³, D⁴, and the chambers H, H', H², H³, H⁴ with beveled edges, as shown to facilitate the free passage of the products of combustion. The water or steam chambers D, D', D², D³, D⁴ are, as shown, horizontally expanded so as to be most readily affected by the products of combustion passing upward within the walls A. The chambers H, H', H², H³, H⁴ are also preferably constructed in similar form.

By locating the chambers one above another and spaced one from another, the best possible results are obtained, as the products of combustion thus circulate freely entirely about the chambers D, D', D², D³, D⁴ and the air circulates freely entirely about the chambers H, H', H², H³, H⁴. The products of combustion can be taken out from either side of the heater or through the top, as may be desired.

The water or steam chambers may be constructed square or round in form, or otherwise, as may be desired.

What I claim as my invention is—

1. In combination, a series of centrally communicating chambers arranged one above the other, each chamber except the bottom one being provided with a horizontal perforated diaphragm, and the lower chamber being provided with an interior substantially U shaped wall extended about the communicating orifice of said chamber, and a supply pipe for the chambers, substantially as set forth.

2. In combination, a series of centrally communicating chambers arranged one above the other and each of them provided with a diaphragm and the upper one being provided with an upright wall across one end, whereby an independent chamber is formed, a damper regulator pipe communicating with said independent chamber and a supply pipe com-

municating with the other portion of said top chamber, substantially as set forth.

5 3. In combination, a heater, the walls of which are alternately recessed, a series of chambers located therein the edges of which extend to said recessed portions of the walls whereby passages are formed for the products of combustion, a series of tubes depending from the lower chamber, and a filling between

said pipes extending from the grate nearly to the chamber, and a supply pipe for the chambers, substantially as set forth.

In testimony whereof I sign this specification in the presence of two witnesses.

CHARLES A. HOWARD.

Witnesses:

N. S. WRIGHT,

JOHN F. MILLER.