(No Model.)

W. M. BARBER.

RADIATOR.

No. 588,312. Patented Aug. 17, 1897.

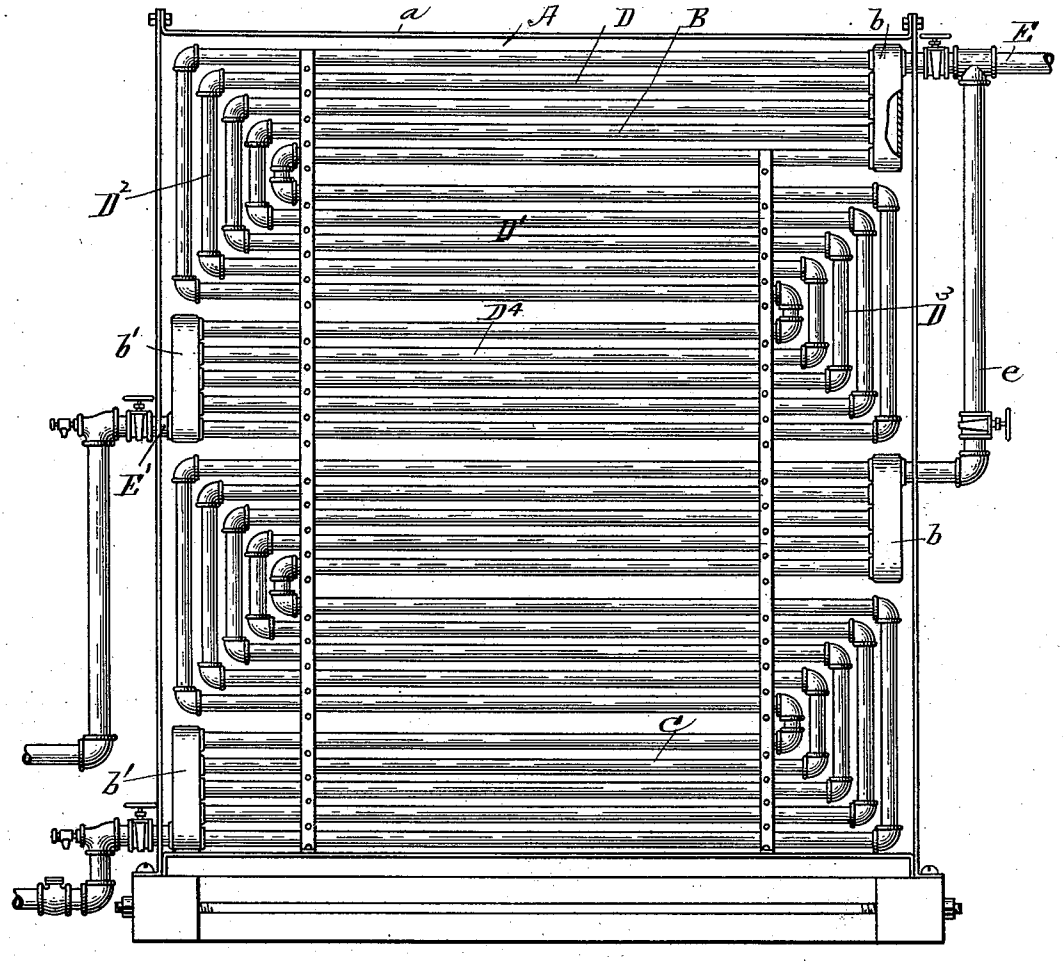


Fig. 1.

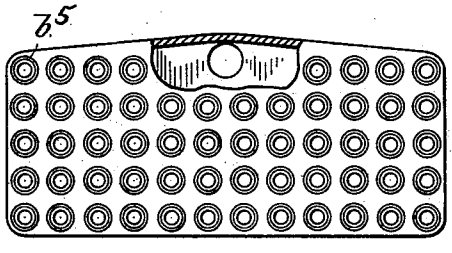


Fig. 2.

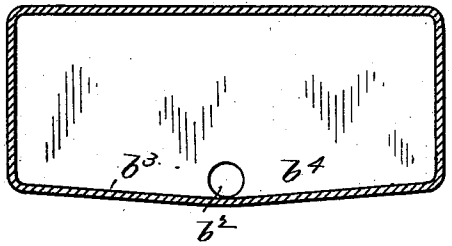


Fig. 3.

WITNESSES

J. M. Dolan.
Ernest L. Ford.

INVENTOR.

William M. Barber
by his attys
Clarke & Baynard

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM M. BARBER, OF SOMERVILLE, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO THE SMITH & ANTHONY COMPANY, OF BOSTON, MASSACHUSETTS.

RADIATOR.

SPECIFICATION forming part of Letters Patent No. 588,312, dated August 17, 1897.

Application filed October 19, 1895. Serial No. 566,183. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. BARBER, a citizen of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Radiators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention is an improvement upon that type or form of heating apparatus in which air is forced or drawn through a chamber containing heating pipes or surfaces and in its hot condition forced through distributing-pipes; and my invention relates to various improvements in the pipe system whereby the circulation of the steam is improved, interference by the water of condensation with the circulation of the steam avoided, and distribution of the steam throughout the entire lengths of the pipes maintained, whereby all portions of the system are heated practically alike and cannot become cold because of the extent of the pipe system or rotation of the steam or backing up of the water of condensation, and whereby economy in the manufacture is obtained.

I will now describe my invention in connection with the drawings, wherein—

Figure 1 is a view of the heating apparatus or device, showing in elevation the pipe system. Fig. 2 is a view, enlarged, partially in elevation, of one of the steam-receiving headers. Fig. 3 is a view in vertical section through the header, showing it as adapted to be used at the exhaust ends of the pipes.

The blower used with this type of apparatus is not shown, and it is used in its usual manner in connection with the chamber A, inclosed by the casing *a*, which is preferably of thin metal plates bolted together. Within the chamber is the pipe system, preferably in two or more divisions or parts. Two divisions—namely, division B and division C—are shown, one being mounted above the other. Each division comprises a receiving-header *b* and an exhaust-header *b'*. These headers are castings in the form of a narrow rectangular box, upon one side of which are the lines b^5 of bosses, in which the threaded holes for receiving the threaded ends of portions of the pipes of the system screw. The other side is plain, excepting near the top or bottom, as the case may be, where there is a boss b^2, in which is formed a relatively small threaded hole. This is at about the center of the length of the header and at the end of the two inclined surfaces b^3 b^4. (See Fig. 3.) But one form of header is used, and when employed as a receiving-header the inclined surfaces b^3 b^4 and boss b^2 are upon the upper side, as represented in Figs. 1 and 2, and when used as an exhaust-header the inclines and hole are upon the lower side, as represented in Fig. 1 at *b'* and in Fig. 3. The object of providing the header with the inclines b^3 b^4 is for the purpose of making it convertible, so that when used as an exhaust the waters of condensation will flow down the inclines to the hole in the boss b^2, which then becomes the outlet. From the header *b* there extend very nearly horizontally the various lines of pipes in as many rows as desired. The first section of these pipes I have lettered D. Of course it will be understood that they dip or incline slightly from the header.

Various rows of pipes extend to different distances from the header, the upper row extending the farthest and each row shortening in regular order below, and the ends of the pipes are connected with a second series D' of pipes by the vertical pipe-sections D^2, which are connected with the ends of the sections D D' by suitable couplings and are made with right and left threaded ends. The pipes of the section D' are of the same width. They in turn are connected by the vertical pipe-section D^3 with the pipe-section D^4, which contains pipes of the same order as the pipes of section D and which open at their ends into the cavity of the exhaust-header *b'*. The steam is supplied to the system through the supply-pipe E, and the circulation is maintained and the waters of condensation taken from the system by the exhaust-pipe E', which opens from the header *b'*. The pipes of the pipe-sections D' D^4 are slightly inclined to provide for the flow of the waters of condensation to the exhaust-header *b'*.

It will be seen that the pipes connecting the headers *b* and *b'* are of the same length

throughout and that therefore the steam is not left in its passage by any one of them long, that this insures a constant and uniform passage of the steam through them all.

It will also be seen that the pipes of the system are not long, that they traverse the casing preferably only three times, and that the exhaust ends of the pipe are not so removed from the receiving ends as to become chilled or cold by the air passing by them. On the contrary, they constantly provide a heating-surface of very nearly the efficiency of the receiving end.

It will also be seen that the waters of condensation pass free and with the steam to the exhaust pipe or inlet E′ and at no time retard it in their flow.

It will further be seen that the construction is cheap and simple and that all parts of the chamber are heated uniformly, so that all parts of the air drawn or forced through the chamber are uniformly heated.

The invention will be practiced if only one division is used. Ordinarily, however, two or more are employed, and in Fig. 1 I have shown two. One is the counterpart of the other, and the lower one is connected with the supply-pipe E by the branch pipe *e*, in which is a suitable valve, and the exhaust from the lower one may enter a common return-pipe.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

In a heating system of the character specified, the chamber A through which air is forced or drawn, and the pipe system contained in said chamber comprising the steam-receiving header *b*, and the groups of horizontal pipes D, D′ and D^4, the exhaust-header *b*′ and the vertical sections D^2, D^3, all the pipes of the said apparatus being of the same size, as and for the purposes described.

WILLIAM M. BARBER.

In presence of—
J. M. DOLAN,
F. F. RAYMOND, 2d.