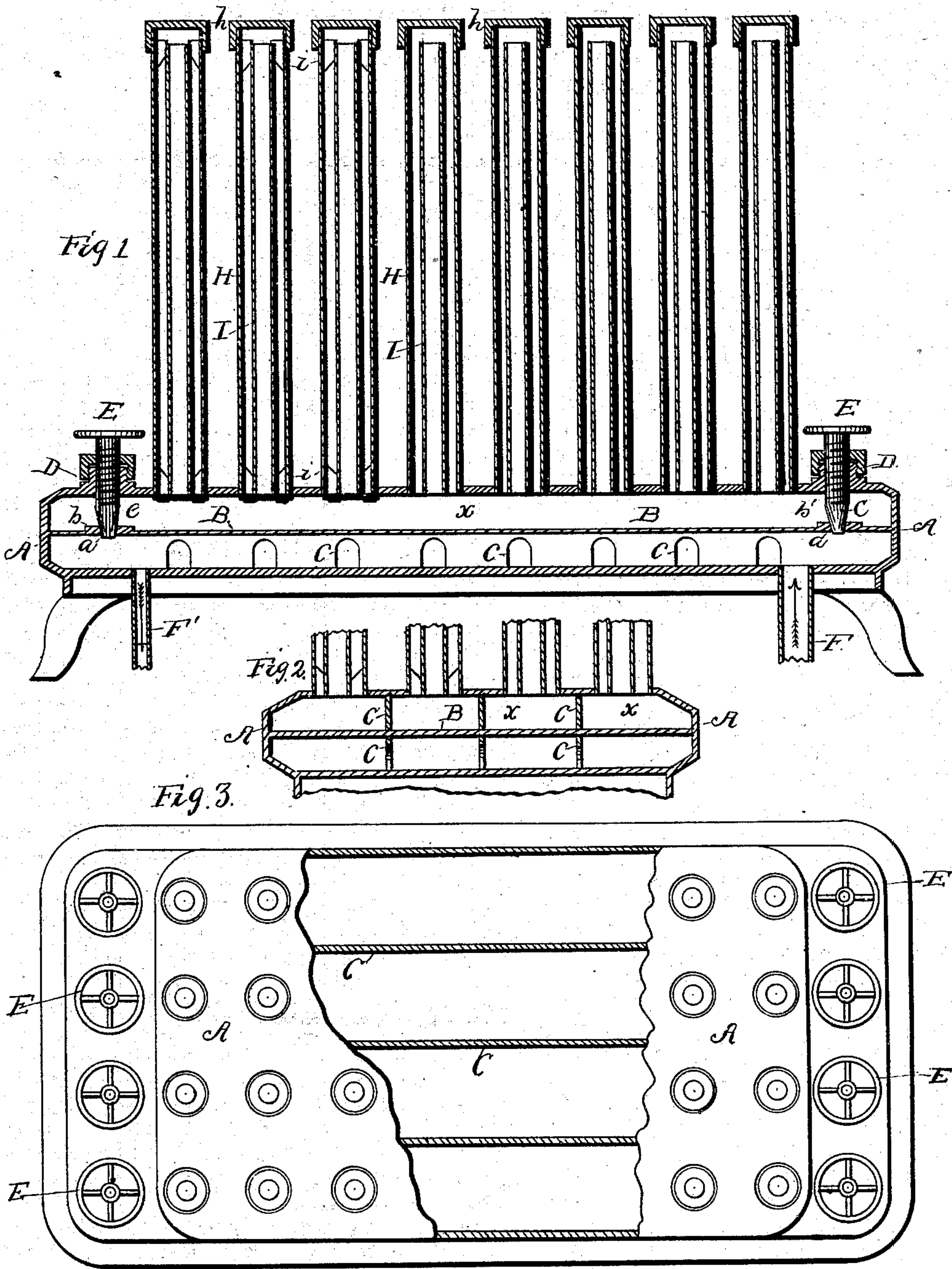


(No Model.)

D. RENSHAW.  
STEAM RADIATOR.

No. 274,826.

Patented Mar. 27, 1883.



WITNESSES

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# UNITED STATES PATENT OFFICE.

DAVID RENSHAW, OF BRAINTREE, MASSACHUSETTS.

## STEAM-RADIATOR.

SPECIFICATION forming part of Letters Patent No. 274,826, dated March 27, 1883.

Application filed January 6, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID RENSHAW, of Braintree, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Steam-Radiators; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My invention relates to the construction of steam heaters or radiators, and is an improvement upon that kind in which two or more sections or rows of tubes are employed at will for increasing or diminishing the heating-surface in use, as required.

The object of my invention is to simplify the construction of the base of the radiator, and render it more effective and durable in operation in connection with the heating or radiating tubes than those now in general use; to provide means whereby one or more sections of tubes may be conveniently thrown into or out of use—that is, put into connection with the steam-supply or cut off from connection therewith, as desired—while at the same time the lower chamber of the base is supplied with steam throughout and uniformly heated, thus preventing twisting and warping of the parts from unequal expansion and contraction, due to unequal heating, as in radiators now in use; also, to simplify the construction of the radiator-tubes and provide for good circulation of the steam through the inner and outer tubes.

In carrying out my invention, I cast or otherwise form the base with a horizontal division-plate extending through its entire area, and connecting with the outer walls of the base on all sides, and also with one or any desired number of longitudinal vertical division-plates intersecting the horizontal plates at right angles. The vertical division-plates should correspond in number to the number of tube-sections, and are placed between the different sections or rows of tubes, thus forming an independent upper steam-chamber for

each section of tubes above the horizontal division-plate, and such plates are made entire—i. e., without perforations—above the horizontal plate, and thus form tight partitions, but in the lower chamber, below the horizontal plate, are formed with numerous openings, providing for a free circulation of steam throughout the entire area of the lower chamber, whereby the same is uniformly heated and unequal expansion and contraction are prevented. This is an important feature of my invention, as by means of it the objectionable and injurious warping and twisting of the parts are prevented. By reason of the number of partition-plates employed they may be made quite thin and light, and this is desirable in order to insure the more uniform heating of the base. At each end the base is provided with a number of hubs or bosses having openings for the valve-stems, and the horizontal diaphragm is provided at each end with a corresponding number of openings or conical valve-seats directly below the openings in the top plate of the base, for receiving the conical valves. These openings at each end correspond to the number of upper steam-chambers, and are for the purpose—in conjunction with the valves—of admitting steam independently to any one of the steam-chambers and tube-sections, and for drawing off the products of condensation from them, as desired. The steam-inlet pipe and the draw-off pipe connect with the lower chamber of the base. The inner tubes of the double radiating-tubes are made open at each end, and are preferably made of such size in relation to the outer tubes as to form narrow annular spaces between the tubes in order to induce a better circulation of steam.

Having stated the nature of my invention and pointed out its general construction and some of its advantages, I will now proceed to describe it more particularly with reference to the accompanying drawings, in which the same letters designate like parts in all the figures.

Figure 1 is a longitudinal vertical section of a radiator having double tubes and a base embodying my invention. Fig. 2 is a transverse section of the base, showing the separation of the



rate upper steam-chambers and the connected tube-sections; and Fig. 3 is a plan or top view, partly in section, for showing the vertical division-plates and the separate steam-chambers.

The hollow base A is divided by the horizontal plate B into upper and lower chambers, and these are again divided by the vertical plates C into smaller chambers, those above being tight and independent of each other throughout, while those below the plate B communicate freely with each other through the openings *c* in the plates C. The partition-plates are preferably made thin and light for the free transmission of heat, and by reason of their number make the base sufficiently strong. The horizontal plate B is provided at each end with bosses or thickened portions *b* *b'*, for the better formation therein of the conical valve openings and seats. The top plate of the base is provided at each end with screw-threaded hubs or bosses D, for receiving the screw-threaded valve-stems E. Suitable stuffing-boxes are provided for making tight joints about the valve stems and openings. The conical ends *e* of the valves fit in the openings *a* upon the conical seats and make therewith tight joints. The openings *c* in plates C, below the plate B, permit a free circulation of steam through all the lower chambers of the base, thereby uniformly heating the same, and preventing strain and distortion of the parts by unequal expansion and contraction. The steam-inlet pipe F connects with one end of the lower part of the base, and the draw-off pipe F', for drawing off the products of condensation, connects with the other end thereof. The outer tubes, H, are secured in the top plate of the base in the usual or any desired manner, and are provided with caps *h*. The inner tubes, I, are secured and held concentrically within them by wedge-shaped pieces or lugs *i* at top and bottom. The inner and outer tubes are made of such relative size as to provide a very narrow annular space between them, whereby condensation in such space is more rapid, and the circulation of steam is facilitated by its passage up through the inner tube and down through the outer tube. As the heat is mainly radiated from the outer tubes, of course condensation takes place there as the heat is given off from the steam, and the steam, becoming heavier, falls, together with the portion reduced to water, inducing a natural circulation up through the inner tubes and down through the outer tubes.

Steam is introduced directly from the boiler or generator through pipe F into the lower chamber or chambers of the base, spreading through the whole area thereof below the plate

B, and may be admitted at will into any one or more of the steam-boxes *x* and tube-sections by opening the appropriate valve E. It is thus seen that the radiating-surface in actual use is under complete control, so that the volume of heat or temperature may be raised or lowered, as required, and heat thus economized, and the comfort of those using the radiator better provided for.

I am aware that radiators have been constructed with bases having separate and independent end division-chambers, each of said chambers having a controlling-valve for admitting steam to one or more of the radiating sections. In these patents the steam enters only a portion of the lower base-chamber, which expands the surrounding heated metal, while the other portion of the base is cold, and therefore contracted, the difference in temperature having a tendency to cause the metal to crack and burst. With mine the temperature throughout the base is equal, and therefore I avoid the objections above alluded to.

Having described my invention, what I claim is—

1. In a steam heater or radiator, the hollow base provided with the horizontal division-plate B, having openings *a*, and forming upper and lower main chambers, and the vertical division-plates C, dividing the upper chamber or space above plate B into independent longitudinal steam-chambers *x*, in combination with the independent valves and separate tube-sections communicating with each steam-chamber *x*, as described.

2. In a steam heater or radiator, the hollow base provided with the horizontal plate B, having valve-openings, and the vertical division-plates forming separate longitudinal steam-chambers above the plate B, and having opening *c* below the plate B, in combination with the valves and tube-sections for each upper steam-chamber, and the steam-supply pipe and the discharge-pipe, for the purpose set forth.

3. In combination with the hollow base having longitudinal division-plates and openings through the same, and a supply pipe, valves, and openings, and a discharge pipe, valves, and openings, the double tubes, the inner one of which is open at both ends, and both communicating with the same chamber, as and for the purpose described.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

DAVID RENSHAW.

Witnesses:

B. F. MORSELL,  
EUGENE D. CARUSI.