April 23, 1929. P. P. HENSHALL 1,710,579

REVERSIBLE HEATING OR COOLING RADIATOR

Filed Jan. 25, 1927

Fig. 1

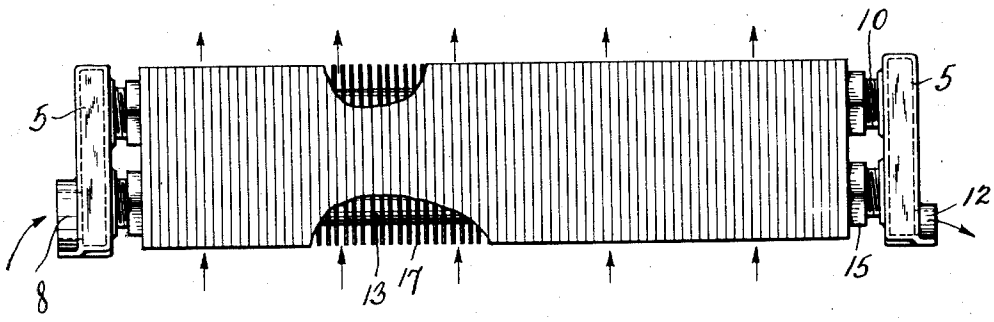


Fig. 2

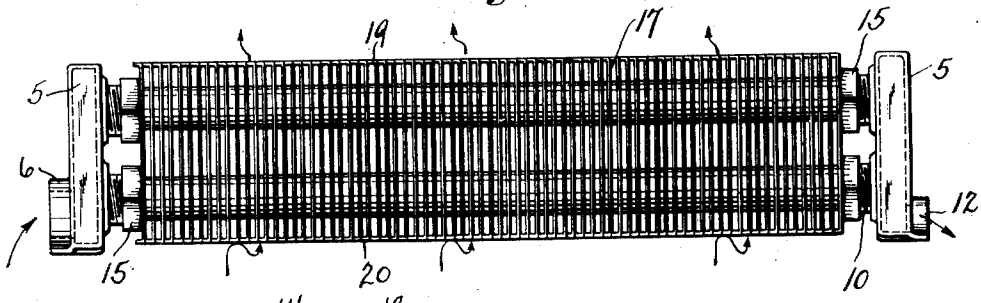


Fig. 4

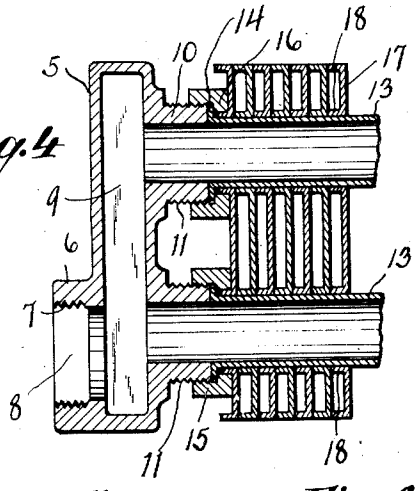


Fig. 3

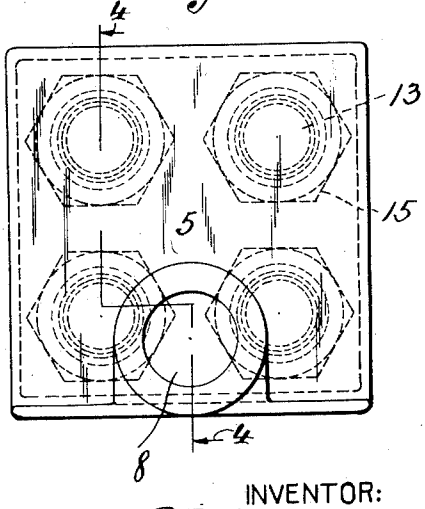


Fig. 5

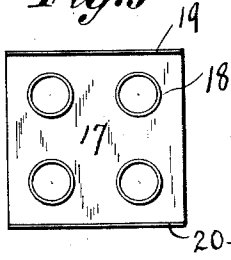
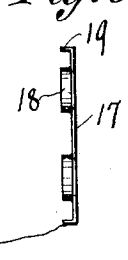


Fig. 6



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UNITED STATES PATENT OFFICE.

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REVERSIBLE HEATING OR COOLING RADIATOR.

Application filed January 25, 1927. Serial No. 163,536.

This invention relates to radiators and more particularly to a novel and improved header and fin construction embodied in a heating or cooling radiator.

One of the objects of my invention is to provide a radiator which is extremely light in construction having a maximum heating area or surface and capable of being installed at any desired location within a casing or housing and within the path of a natural or artificial draft of air to be either heated or cooled preliminary to its discharge into a room.

Another object of my invention is to construct a radiator embodying end headers and fluid conducting tubes having a series of contiguous thin, copper fins or plates in intimate contact therewith providing a maximum heating surface or cooling area and permitting either a vertical or horizontal discharge of air therethrough in accordance to its intended use.

A further object of my invention is to embody in a radiator particularly adapted for installation in heating and ventilating units, having end headers associated with fluid conducting tubes and copper fins or plates in positive thermal contact therewith, said tubes and fins being capable of adjustment relative to the headers as a unit whereby a natural or artificial heating or cooling medium may be directed through or between the fins.

To enable others skilled in the art to more fully comprehend the underlying features of my invention that they may embody the same in the many practical advantages over similar devices employed for the uses and purposes hereinafter to be pointed out in more detail, reference is had to a preferred form of the invention in which

Fig. 1 is a front view showing the radiator, parts being broken away to illustrate the fins or plates.

Fig. 2 is a top plan.

Fig. 3 is an end view of the inlet header.

Fig. 4 is a sectional view taken on the line 4—4 of Figure 3.

Fig. 5 and Fig. 6 are front and edge views respectively showing the copper fins or plates.

Referring now to the drawings wherein like reference numerals designate corresponding parts throughout the several views, 5 designates in its entirety a header provided with an outside boss 6, internally threaded at 7 for connection to a steam pipe for instance, not shown. The header is preferably rectangular, the steam inlet 8 communicating with the interior chamber 9 as clearly shown by Fig. 4 of the drawing.

The inner face of the header is formed with four bosses 10 which are faced, turned and flanged with a male thread 11 for connection to the copper tubes, further to be described. The opposite header is similar in construction and may be provided with a drain or outlet 12 somewhat smaller in diameter than the inlet 8.

Between the headers, there is provided an assembly of copper tubes 13, substantially of the same interior diameter as the interior diameter of the bosses 10, being arranged for connection therewith. Each end of the copper tubes are spun or flanged as indicated at 14 and preliminary to the spinning or flanging of said ends, nuts 15 which are interiorly threaded and provided with a lip 16 are positioned on the copper tubes which prevent the nuts from becoming disconnected. The threaded nuts 15 are adapted to cooperate with the threaded bosses so that when tightened, the spun or flanged ends 14 abut and are brought into intimate contact with the header faces.

The copper tubes 13 also support a series of copper fins or plates 17, each having annular flanges or bosses 18 which in this type of radiator are pressed on to the tubes under a pressure of substantially 6800 pounds. No outside connecting or binding medium or agency such as soldering, tinning or dipping is required and positive thermal contact between the surface of the tubes and the fins is made. The pressure required depends to a great extent upon the resistance of the material employed, the size of the tubes and the fins and the diameters of the tubes and the annular flanges or bosses 18 since it will be understood that the diameter of the tubes must be slightly less than the diameter of the flanges or bosses in order to effect the proper connection. This pressure insures absolute and positive thermal contact between the tubes 13 which hold the heat or steam and the fins which carry the

heat present a maximum surface to the air being blown through or between the fins. In the details shown by Figs. 5 and 6 it will be noted that the fins are provided with bent edges 19, 20, which when positioned on the tubes are in contact with but which uniformly space the fins throughout their length.

As shown by Fig. 1 of the drawing, the tube and fin assembly are disposed to permit air to be blown up between the said fins which act as heat conductors, the heat radiating from the tubes containing the heating medium. Under different conditions and when it is desired to discharge the air horizontally between the fins, instead of furnishing a new radiator, it is only necessary to detach the headers by loosening the nuts 15 and then revolving the fin section with the tubes through ninety degrees and then tighten the nuts to the headers. The bent edges of the fins will thus be at the top and bottom instead of at the front and back with the result that the radiator may be employed in the same capacity whether it is desired to blow air up between the fins vertically or in a horizontal direction.

I am aware that other types of fin radiators have been manufactured in which contact between the tubes and fins have been effected by lead dipping and soldering and in other instances where the fins are merely slid over the core. These practices have all been found to be objectionable either because of the introduction of a film of metal between the core and the fins or an air gap causing more resistance to the heat to travel. However, by forcing the fins on to the tube under a very high pressure, the copper tube and the copper fin are practically fused producing a perfect thermal contact

In the square or box type of radiator above shown and described, the tubes are arranged and located symmetrically with relation to the distance that the heat must travel so that all parts of the fin will acquire as near a uniform heat as possible. By connecting headers in this type of fin radiator as above described, it will be seen that the outlet or drain will be disposed in the lowest position, considered from a horizontal plane, so that the steam condensate may flow from the tubes and consequently the direction of flow of air either upwardly between the fins or horizontally as desired or required.

Having shown and described my invention what I now claim as new and desire to secure by Letters Patent is:

1. A radiator of the class described comprising end headers having an inlet and outlet respectively, a plurality of fluid conducting tubes between said headers, a series of closely associated fins mounted on said tubes free of a connecting medium, and means for locking the ends of said tubes against the inner faces of the headers, said tubes and fins being adjustable as a unit relative to said headers.

2. A radiator of the class described comprising end headers having an inlet and outlet respectively, a plurality of fluid conducting tubes between said headers, a series of closely associated fins mounted on said tubes free of a connecting medium and means for locking the ends of said tubes against the inner faces of the headers, said tubes and fins being reversible as a unit relative to said headers whereby air may be directed between said fins in at least two positions.

3. A radiator of the class described comprising end headers having an inlet and outlet respectively, threaded bosses on the inner faces of said headers, a plurality of fluid conducting tubes arranged in end to end relation with respect to said bosses, a series of closely associated fins mounted on said tubes free of a connecting medium and means for locking the ends of said tubes with the bosses, said tubes and fins being reversible as a unit relative to said headers whereby air may be directed between said fins in at least two positions.

4. A radiator of the class described comprising end headers having an inlet and outlet respectively, threaded bosses on the inner faces thereof, a plurality of fluid conducting tubes having flanged ends arranged in end to end relation with said bosses, a series of closely associated fins mounted on said tubes free of a connecting medium and threaded locking means connecting the said flanged ends with the faces of said bosses, said tubes and fins being reversible as a unit relative to said headers whereby the air may be directed between said fins in a vertical or horizontal position.

5. A radiator of the class described comprising end headers provided with an inlet and an outlet respectively, hollow bosses on the inner faces of each of said headers, fluid conducting tubes having spun ends arranged in end to end relation with said bosses, fins carried by said tubes and locking nuts connecting the spun ends of the tubes with said bosses, said tubes and fins being adjustable as a unit relative to said headers whereby air may be directed upwardly between said fins in one position and horizontally between said fins in a second position.

6. A radiator of the class described comprising end headers provided with an inlet and an outlet respectively, threaded bosses on the inner faces of each of said headers, fluid conducting tubes having spun ends arranged in end to end relation with said bosses, locking nuts on said tubes cooperating with the threaded bosses for drawing the spun ends into intimate thermal contact with the faces of said bosses and a series of closely associated fins mounted on said tubes in

thermal contact therewith throughout the length thereof, said tubes and fins being adjustable relative to said headers whereby air may be directed between said fins in a vertical or horizontal direction.

7. A radiator of the class described comprising end headers having bosses on the inner faces thereof, fluid conducting tubes arranged in end to end relation and locking nuts for drawing said ends into intimate contact with the faces of the bosses and a series of fins having spaced flanges joined to the tubes in thermal contact therewith throughout the length thereof and free of a connecting medium, said tubes and fins being adjustable relative to said headers whereby air may be directed between the fins in either a vertical or horizontal direction.

8. A radiator of the class described comprising end headers having an inlet and outlet respectively, bosses on the inner faces of said headers, fluid conducting tubes arranged in end to end relation and locking nuts for drawing said ends into intimate contact with the faces of the bosses and a series of fins fused to the tubes, said fins having bent edges arranged in contact relation, said tubes and fins being reversible as a unit and locked to the headers to permit air to be driven upward between said fins in one position and horizontally between said fins in a second position.

9. A radiator of the class described comprising end headers having an inlet and an outlet respectively, bosses on the inner faces of said headers, fluid conducting tubes having spun ends adapted to be set in end to end relation with the bosses, a locking nut for each end of each of the said tubes, a lip formed with each of the locking nuts whereby the spun ends of said tubes are drawn into intimate relation with the faces of the bosses and a series of closely associated fins mounted on said tubes and adjustable therewith as a unit relative to said headers to permit air to travel upward between said fins in one position or horizontally between said fins in a second position.

In testimony whereof I affix my signature.

PERCIVAL P. HENSHALL.