G. C. ANDREWS & E. H. WILLIAMS.
HOT WATER AND STEAM RADIATOR.
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Fig. 1.

Fig. 2.

Witnesses.
Harry Opsahl.
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Inventors.
George C. Andrews.
Edward H. Williams.
By their Attorney.

Williamson & Chambers.
To all whom it may concern:

Be it known that we, GEORGE C. ANDREWS and EDWARD H. WILLIAMS, citizens of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Hot-Water and Steam Radiators; and we do hereby 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.

Our invention has for its object to provide an improved hot water and steam radiator.

Particularly, the invention relates to the improvement of sheet steel radiators and has for its primary objects, cheapness of construction, increased heat radiating efficiency in a radiator occupying a predetermined space, lightness in weight, durability, low cost, and neatness in appearance.

To the above ends the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings: Figure 1 is a view chiefly in plan but with some parts in horizontal section showing the improved radiator; Fig. 2 is a view chiefly in elevation but with some parts in vertical section taken on the line \( a' \) \( a' \) of Fig. 1, showing the said radiator; Fig. 3 is a fragmentary plan showing a portion of the radiator illustrated in Fig. 1 and Fig. 2; Fig. 4 is a transverse section taken on the irregular line \( a' \) \( a' \) of Fig. 3; Fig. 5 is a fragmentary view showing a portion of one of the sheet metal plates of which the radiator is formed; Fig. 6 is a transverse vertical section taken on the same line as Fig. 4, showing on a larger scale, the upper portion of one of the radiator sections; Fig. 7 is a detail in vertical section taken on the line \( a'' \) \( a'' \) of Fig. 6; and Figs. 8 and 9 are views corresponding respectively with Figs. 1 and 2 but illustrating a slightly modified construction.

The body of the improved radiator is preferably made from two plates 1 of sheet steel bent into zigzag form so that the alternate folds are interlapped, that is, the folds of the one plate are interposed within the folds of the other plate and the two plates are closely positioned but spaced apart to form a thin zigzag channel 2 for the water, steam, or other heating medium. The folds of the said radiator are preferably V-shaped in horizontal cross-section. At their vertical extremities and at their horizontal upper and lower edges, the said plates 1 are brought together and united by steam tight joints, which joints are preferably formed by welding of the contiguous abutting edges of the said plates. The welding may be conveniently accomplished by what is known as the oxy-acetylene process.

Our invention relates particularly to a novel formation of the upper and lower edges of the radiator forming plates whereby, in a neat and efficient manner, the said edges of the plates may be united to close the top and bottom of the zigzag water or steam chamber of the radiator. In the consideration of this construction, attention is called particularly to Figs. 5, 6, and 7. Fig. 5 shows one of the radiator forming plates laid out flat. At their upper and lower edges both of the radiator forming plates 1 are provided with suitably spaced V-shaped portions 1', and from the upper points of the V-shaped portions 1', said upper and lower edges converge slightly downward to the imaginary line 1. To form the radiator sections, the plate will be bent on the vertical lines indicated by the dotted lines marked 1'. The upper and lower edges of the plate are bent on oblique lines marked 1' to thereby form oblique triangular surfaces 1'. The edges of the triangular sections 1' of the one plate 1 are thus made to closely fit the correspondingly bent edges of the other plate and these edges are adapted to be united by welded joints indicated at \( y \) and \( y' \). The welded joints \( y \) lie at the top and bottom of the radiator, lie in horizontal planes, while the joints \( y' \) lie in oblique planes. The joints \( y' \) give a beveled effect to the front and rear of both the upper and lower portions of the radiator, and the upper joints \( y \) lie in the same horizontal plane and, hence, afford a support upon which articles may be conveniently set. This will be seen by reference, particularly, to Fig. 3. The horizontal joints \( y \) cross the radiator sections obliquely and extend from the inner angle of the one section to the inner angle of the other section. Joints formed, as above described, require a minimum of
bending of plates with the least possible labor and they do not deform the main body portions of the radiator sections.

In some instances, the bodies of the radiator sections will be made, substantially, flat, but indented at numerous points, as indicated at 3, so as to bring the plates together and adapt the same to be rigidly connected by welding of the contacting portions. Preferably, however, the bodies of the radiator plates will be corrugated horizontally, as best shown in Figs. 2 and 4. This stiffens the radiator plates and makes it unnecessary to unite the intermediate portions thereof, and furthermore, increases the radiating surface of the radiator.

The radiator shown is reinforced both at its upper and lower portions by light tie bars 4 which are preferably welded to the edges thereof, and the radiator, also as shown, is supported by legs 5 welded to the lower portion thereof.

The radiator described has, in practice, been found highly efficient for the purpose of view, and furthermore, it has been found that it may be constructed at comparatively small cost, and while light is, nevertheless, very strong and durable. The peculiar formation of the upper edges of the radiator plates give the same a neat, and somewhat ornamental appearance.

What we claim is:

1. A radiator made up of laterally spaced sheet metal plates, alternately bent so that the folds thereof are approximately V-shape in cross-section, the said plates being interlapped and spaced apart to form a zigzag chamber for the heating medium, and the upper and lower extremities or ends of the plates being formed with obliquely bent triangular portions, the edges of the triangular portions of the two plates being united by steam-tight joints.

2. A radiator made up of laterally spaced sheet metal plates, alternately bent, so that the folds thereof are approximately V-shape in cross-section, the said plates being interlapped and spaced apart to form a zigzag chamber for the heating medium, the vertical end edges of said plates being brought together and connected by welded joints, the upper and lower edges of the plates are notched with V-shape notches at alternate lines of bending of the plates into folds, the metal between the point of the notch and the other alternate line of bending 1 between two notches is bent on a line from the point of said notch to the intersection of line of bending 1 with the edge of the metal sheet, to form an oblique triangle, and the edges of the said oblique triangles of the two plates being brought together and united by welded joints.

3. A radiator made up of laterally spaced sheet metal plates, alternately bent, so that the folds thereof are approximately V-shape in cross-section, the said plates being interlapped and spaced apart to form a zigzag chamber for the heating medium, and the upper and lower edges of the plates are notched with V-shape notches at alternate lines of bending of the plates into folds, the metal between the point of the notch and the other alternate line of bending 1 between two notches is bent on a line from the point of said notch to the intersection of line of bending 1 with the edge of the metal sheet, to form an oblique triangle, and the edges of the said oblique triangles of the two plates being brought together and united by welded joints.

In testimony whereof we affix our signatures in presence of two witnesses.

GEORGE C. ANDREWS.
EDWARD H. WILLIAMS.

Witnesses:
BERNICE G. WHEELER,
HARRY D. KILGORE.