

F. H. STOLP.

RADIATOR.

APPLICATION FILED JULY 15, 1909.

1,048,107.

Patented Dec. 24, 1912.

Fig. 1.

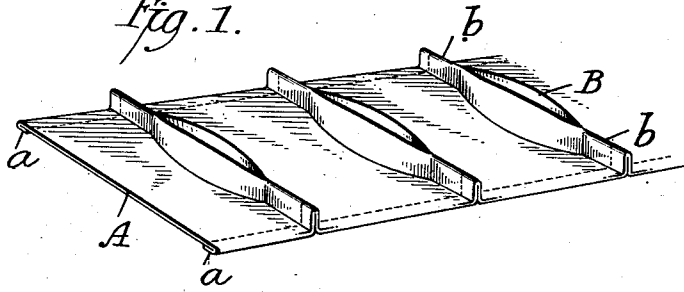


Fig. 2.

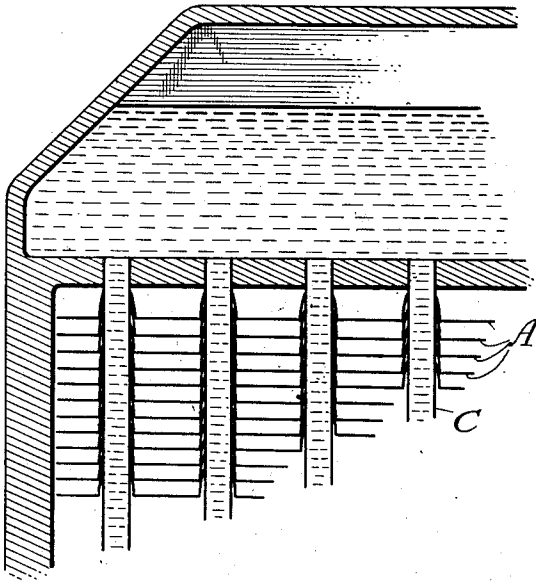


Fig. 3.

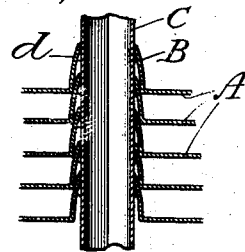


Fig. 4.

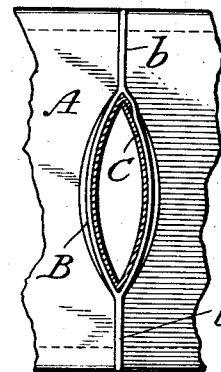
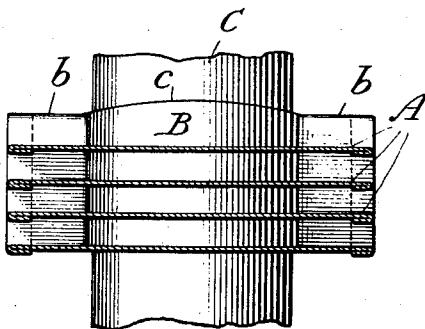


Fig. 5.



Witnesses:
L. J. Shaw
J. L. Ertel

Frank H. Stolp Inventor
By his Attorney
E. M. Bentley

UNITED STATES PATENT OFFICE.

FRANK H. STOLP, OF ROME, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
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RADIATOR.

1,048,107.

Specification of Letters Patent.

Patented Dec. 24, 1912.

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To all whom it may concern:

Be it known that I, FRANK H. STOLP, a citizen of the United States, residing at Rome, Oneida county, State of New York, have invented certain new and useful Improvements in Radiators, the following being a full, clear, and exact disclosure of the one form of my invention which I at present deem preferable.

For a detailed description of the present form of my invention, reference may be had to the following specification and to the accompanying drawings forming a part thereof, in which—

Figure 1 is a view of one of the component metal strips; Fig. 2 is a longitudinal section of a portion of my radiator; Figs. 3, 4 and 5 are detail views.

My invention relates to radiators and particularly to such as are suitable for automobile service.

My purpose is to reduce materially the dimensions and weight of a radiator of a given capacity, particularly the transverse dimensions in the direction of air flow, and I therefore employ extremely thin material, say about seven one-thousandths of an inch in thickness, comparable to paper, and provide a construction which, with such thin metal will still be strong and rugged. I employ but a single row of water tubes and the parallel radiating surfaces are not more than one-eighth of an inch apart. By these means I am enabled to reduce by one-half the transverse thickness of a radiator having a given capacity, the standard transverse thickness of my radiator being but one and one-half inches.

Referring to the drawings, A is a strip of very thin metal, preferably copper, which is folded or crimped at exact intervals, the crimps being about one-eighth of an inch or less in height and each being split and expanded at its center into a tube B of a double arch form, as appears in Fig. 4. Previous to crimping, the edges of the strip A are folded over as shown at a to form a bead and the bead is then folded into the crimps. The arch form of the tube gives strength, and the tube is also protected on each side by the unsplit portions b, b of the crimp, while the bead gives strength and stiffness to the exposed edges of the strip and when folded into the crimp gives strength and stiffness to its exposed

end. These features are of importance in connection with the thin material. The upper edge of the tube on each side is curved upward, as shown at c in Fig. 5, and slightly dished, see d, Fig. 3.

A series of strips A, each of the desired length of the radiator, are laid one upon another as shown in Figs. 2, 3 and 5, the tubes B of one strip registering with those of the next and the upwardly curved and dished extremity of one tube entering a slight distance into the larger base opening of the one adjacent to it in the next strip. This produces a continuous duct from top to bottom of the pile of strips, while between the ducts so formed extend the thin strips about one-tenth of an inch apart serving as radiating surfaces exposed to the air which passes through from front to back of the radiator. This radiating surface in the aggregate is greatly increased by the multiplicity of thin strips containable in a given space. The heat is also on the surface instead of the interior of the strips and the strips themselves are in unbroken metallic connection with the tubular portion so that the heat of the water in the tubes is readily conducted to and throughout the strips. My radiator is therefore of the same temperature front and back, the air being free to flow through without becoming overheated in its passage but capable of abstracting the heat uniformly from the entire area of the radiating surfaces.

To seal the tubes against leakage, I dip one side of an assemblage of strips in a bath of solder and the thickness is so small that the solder will be drawn by capillary attraction up into all of the crevices between succeeding tubes and effectively seal them. I prefer, however, to add as a precaution an interior lining C. This is made of similar thin material folded over as shown in Fig. 4 to form an arched tube fitting easily into the sectional duct formed by the tubes B. The lining C is inserted after the strips have been inserted and before the soldering above referred to and without having its overlapping edges previously soldered. By this means the linings can enter without obstruction; moreover, being of such thin material they can be thrust into the ducts in the previously assembled pile of plates as distinguished from first setting up the lining tubes and forcing the strips down over them.

After the linings are in place, the soldering operation will follow which will simultaneously seal the overlapping edges of the lining tubes, seal together the tubes B, B and secure the tubes B, B to the lining.

A radiator constructed as above described presents a neat appearance, the edges of the strips being stiff and straight and uniformly spaced; while it is also strong and rugged in spite of the paper-like thinness of the material employed in its construction and the water ducts are protected against the leak-producing effect of external blows. It will also be manifest that the thin material would not permit of the tubular sections being struck up from the strip itself without the fold or crimp to furnish the necessary material for the tubes.

The oblong form of the ducts, with their longer dimension lying across the strips or plates, but of less length than the width of the strips or plates, affords a free space for the circulation of air through the radiator from front to back. I also prefer that the strips shall be superposed in a horizontal series, so that their integral tubular extensions will be alined to form fluid ducts which are vertical and so transverse to the horizontal strips.

What I claim as new and desire to secure by Letters Patent is:

1. A radiator formed of a series of superposed spaced apart strips, each strip being transversely folded and the fold punched to form tubular extensions, said extensions being alined to provide fluid ducts.

2. A radiator formed of a series of slightly separated superposed parallel strips of sheet metal, said strips being folded transversely and said folds being punched to form tubular extensions, said extensions being joined to form a single row of fluid ducts of less width than the strips.

3. A radiator formed of a series of superposed strips of sheet metal folded transversely at intervals and said folds being punched to form integral tubular extensions of oblong cross section, said extensions being joined to form fluid ducts.

4. A radiator comprising a series of superposed spaced apart sheet metal strips, said strips being provided at intervals with transverse crimped portions extending the full width of the respective strips, said crimped portions being shaped to provide tubes, said strips being connected by said tubular portions.

5. A radiator comprising a series of superposed spaced apart sheet metal strips, said strips being provided at intervals with

transverse crimped portions, said crimped portions being slitted and expanded to form tubular portions, said strips being connected by said tubular portions.

6. A radiator comprising a series of superposed spaced apart sheet metal strips, said strips being provided at intervals with transverse crimped portions, said crimped portions being slitted and expanded to form tubular portions, said strips being connected by said tubular portions, said tubular portions being of a length less than the width of the strips.

7. A radiator comprising a series of superposed but separated strips connected at intervals by integral oblong tubes extending across the strips a distance less than the width of the strips and having reinforcing extensions reaching to the edges of the strips.

8. A radiator formed of a series of superposed strips of sheet metal folded transversely, said folds being shaped to provide integral tubular extensions, and lining tubes within said extensions.

9. A radiator comprising a series of superposed spaced apart sheet metal strips, said strips being provided at intervals with crimped portions, said crimped portions being shaped to provide tubes, said strips being connected by said tubes, and lining tubes within said tubes.

10. A radiator comprising a series of superposed spaced apart sheet metal strips, said strips being provided at intervals with transverse crimped portions extending the full width of the respective strips, and said crimped portions being shaped to provide tubes, said strips being connected by said tubes, and lining tubes within said tubes.

11. A radiator strip of sheet metal having tubular projections formed thereon at intervals by punched and expanded folds or crimps in the metal of the strip.

12. A radiator strip formed of sheet metal plate having a folded or crimped portion, the fold being slit and expanded to form a tubular projection.

13. A radiator strip of thin metal having beaded edges and a tubular section formed by a slitted fold or crimp including the beaded edge.

In witness whereof I have hereunto set my hand before two subscribing witnesses, this 9th day of July, 1909.

FRANK H. STOLP.

Witnesses:

L. N. FLACK,
C. H. SIMON.