T. D. ROBINSON.

RADIATOR.

APPLICATION FILED APR. 11, 1910.

1,021,334.

Patented Mar. 26, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

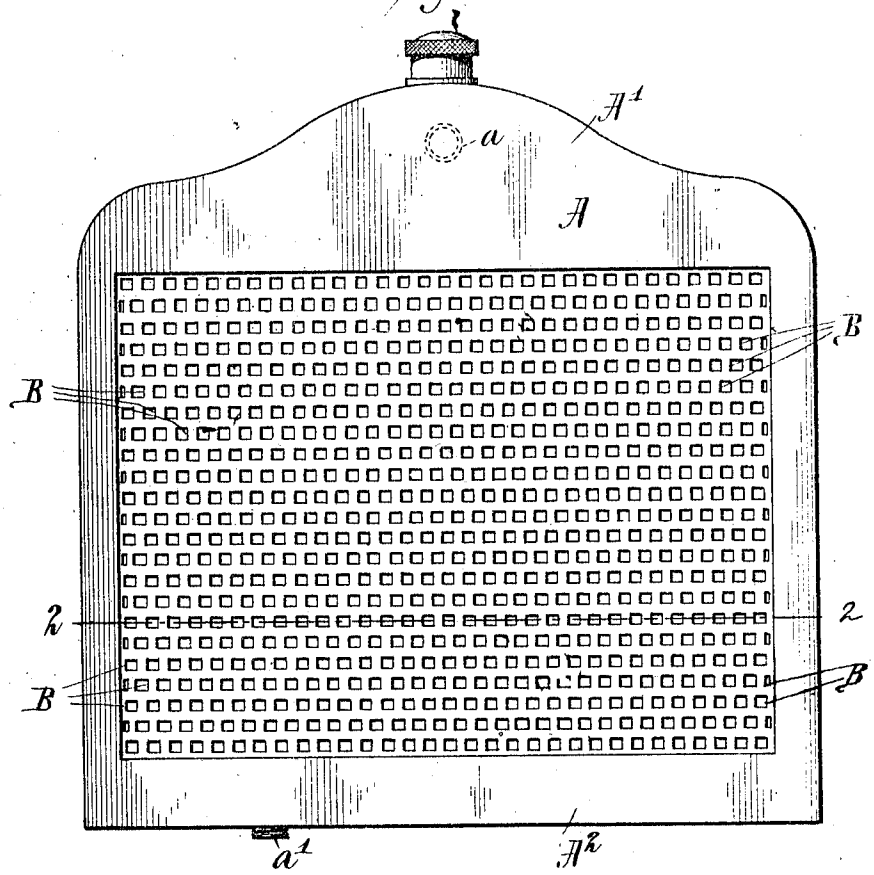
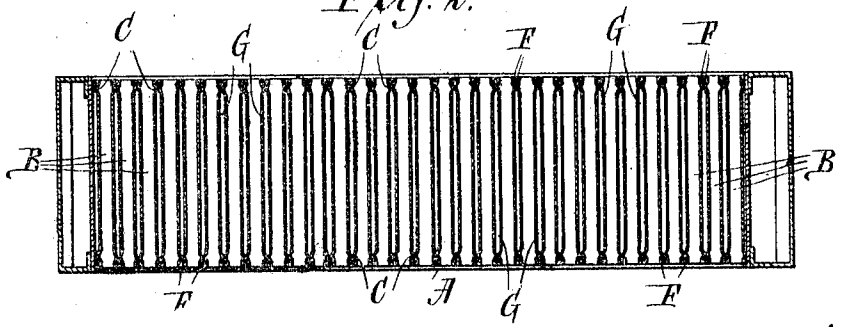


Fig. 2.



Witness,
Christ Feinle Jr.,
Jacob L. Obert, Jr.

Theodore D. Robinson, Inventor.
By Emil Neukart
Attorney.

T. D. ROBINSON.

RADIATOR.

APPLICATION FILED APR. 11, 1910.

1,021,334.

Patented Mar. 26, 1912.

2 SHEETS—SHEET 2.

Fig. 3

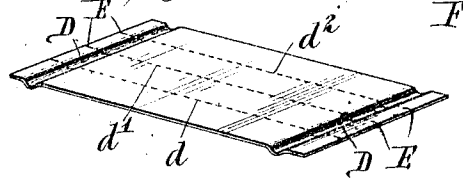


Fig. 4.

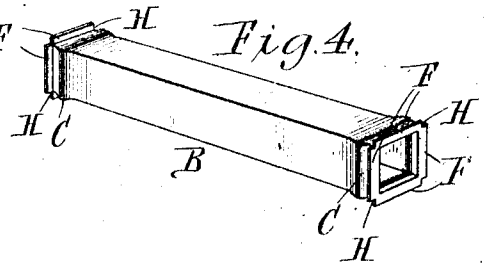


Fig. 5

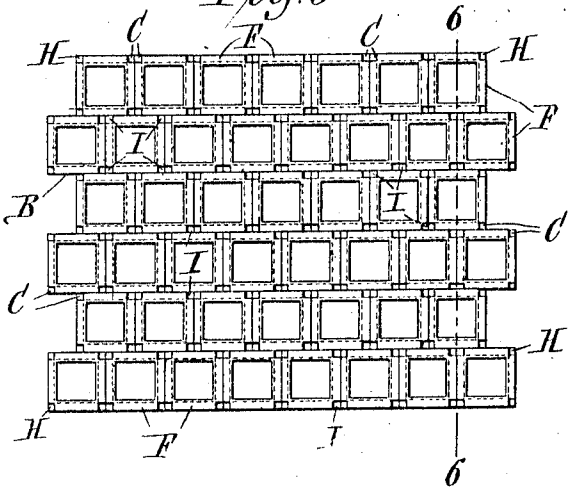
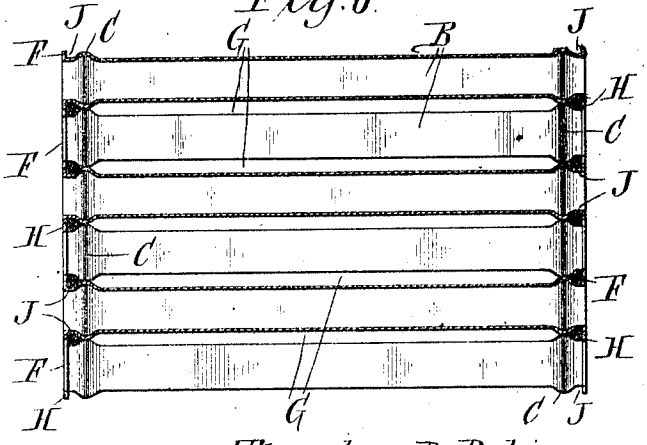


Fig. 6.



Witnesses:
Christ Feinle, Jr.,
Jacob L. Oberst, Jr.

Theodore D. Robinson, Inventor.
By Emil Neuhart
Attorney

UNITED STATES PATENT OFFICE.

THEODORE D. ROBINSON, OF LOCKPORT, NEW YORK.

RADIATOR.

1,021,334. Specification of Letters Patent. Patented Mar. 26, 1912.

Application filed April 11, 1910. Serial No. 554,655.

To all whom it may concern:

Be it known that I, THEODORE D. ROBINSON, a citizen of the United States, and resident of Lockport, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Radiators.

My invention relates to improvements in radiators for automobiles for rapidly cooling the water passing through the water jackets of the automobile engine.

In radiators employed for such purpose, the water enters the same in a heated and sometimes boiling condition and after passing through the radiator is discharged therefrom in a comparatively cool condition. During its passage through the radiator, the latter is subjected to severe strains due to the uneven contraction and expansion of the parts brought on by the water cooling as it travels toward the outlet of the radiator. This is particularly true of a tube-radiator wherein individual air-tubes are assembled in block-form and united at the ends to form water-passages therebetween; the tubes nearest the inlet of the radiator or at the upper end thereof being necessarily subjected to greatest strain due to the fact that the water is hottest as it enters the radiator and when stopping the engine, the water throughout will become cooled, thus the maximum contraction and expansion takes place at the upper end of the radiator and is graduated from the highest point to the lowest point causing uneven strain which tends to separate the joints between the several tubes.

It is the object of my invention to so construct and unite the several air-tubes of the radiator that the expansion and contraction force is confined to points between separating means located near opposite ends of the tubes and provide means to positively retain the uniting solder between adjoining tubes in the event of the solder becoming loosened under uneven strain; also to provide means for protecting the uniting solder between the ends of the tubes.

To these ends the invention consists in the construction of the air-tubes and in the arrangement and combination of parts to be hereinafter described and particularly pointed out in the subjoined claims.

Reference is had to the accompanying drawings which form a part of this specification, and in which,—

Figure 1 is a front elevation of a radiator constructed according to my invention. Fig. 2 is a horizontal section taken on line 2—2, Fig. 1. Fig. 3 is a perspective view of a sheet of copper fashioned and operated upon to construct my improved air-tube. Fig. 4 is a detached perspective view of one of the air-tubes. Fig. 5 is an enlarged front elevation of a number of assembled tubes showing the outstanding retainer flanges of adjoining tubes in contact and showing also the openings between the flanges for the admission of the uniting solder. Fig. 6 is a vertical section taken on line 6—6, Fig. 5; in this view, however, the solder is shown between the spacing-ribs and the outstanding retainer flanges.

Referring to the letters of reference shown in the drawings, A represents a casing into the upper end of which is directed an inlet-pipe *a*, shown in dotted lines in Fig. 1, through which the heated water from the water jacket of an engine is delivered, the water entering the radiator at a high point, as is common, and discharging from the radiator at a low point, as at a^1.

The upper portion of the radiator A^1 is made hollow as is common in radiators of this type, and the lower portion A^2 is likewise constructed. Between the upper and lower portions of the radiator the assembled tubes B are situated, these air-tubes being preferably arranged in horizontal rows extending from side to side of the casing and in order to give the water passing through the radiator a circuitous travel, these air-tubes are staggered from the top to bottom. Each tube has a continuous bead C near each end formed by bulging the metal outward so as to form a gentle slope from the point of greatest expansion outward to the edge of the tubes and inward to the intermediate portion of the tube which is of normal size, the passage through the tube being of equal diameter throughout except where these beads are arranged. Said beads may

serve as means for spacing the tubes and may therefore be termed "spacing-beads."

Since the beads of each air-tube lie in contact with the beads of adjoining air-tubes, they provide shallow grooves between the extremities of the tubes whose walls gradually converge inwardly and also provide the water-passages between the intermediate portions of the tubes through which the water from the upper portion of the radiator passes in its travel to the lower portion.

In the construction of my improved air-tubes I preferably utilize thin sheet copper cut to the proper length and width as shown in Fig. 3, and in the sheet I form a transverse groove D near each end which form the spacing-beads C of the tube. The copper sheet is to be folded along the dotted lines d, d^1, d^2, shown in Fig. 3, and the sheets are slit at opposite ends, as at E, so that after folding the sheet into the form of a tube, these slits appear at the corners of the tube, the extremities of the four walls of the tube are then bent outward at a right-angle to form retainer flanges F; this being permitted by the slits d, d^1, d^2, just referred to.

The tubes so formed are assembled in the manner shown in Fig. 5 so that the spacing ribs of adjoining tubes contact to form the water-passages G. The outstanding retainer flanges F at each tube abut with their edges against the edges of adjoining tubes; but at the corners of the tubes, these flanges leave a cut-away portion H. The cut-away portions of abutting flanges in the same horizontal row coincide and form openings I. After the tubes are assembled and held in assembled condition in any practicable manner, the ends are dipped in molten solder so that the solder enters the grooves J formed between the spacing beads and the retainer flanges, access being had to said grooves through the openings I formed at the angles of the tubes.

By dipping the ends into molten solder in this manner, the entire surface of the tubes at the front and rear is coated with solder so that the joints between the tubes are rendered invisible, as clearly shown in Fig. 1.

If through the expansive and contractive properties of the tube or for any other reason, such as undue jarring of the car or coming in contact with an obstruction, the solder breaks loose from the walls of the tubes, the retainer flanges F retain the solder in proper position and by means of an ordinary soldering-iron a secure joint can be made at the defective point of the radiator.

By providing the tubes with spacing beads and retaining flanges spaced therefrom, a convenient means is provided for uniting the tubes by means of solder and a secure union assured.

Having thus described my invention, what I claim is,—

1. A radiator comprising a casing and a plurality of assembled tubes set into said casing, each tube having a bead near one end formed by expanding the metal outward and a retainer flange spaced from said bead, said tubes having the beads of adjoining tubes and the edges of the retainer flanges of adjoining tubes lying in contact to provide solder-receiving grooves between the beads and flanges, and solder in said grooves uniting said tubes.

2. A radiator comprising a casing and a plurality of assembled tubes set within said casing, each tube having spacing-means near opposite ends and an outstanding retainer flange at each end separated from the adjacent separating-means to form solder-receiving grooves, said tubes having their separating-means lying in contact with the separating-means of adjoining tubes to form water passages, and solder in said solder-receiving grooves for uniting said tubes.

3. A radiator comprising a casing and a plurality of assembled air-tubes set within said casing, each tube having outstanding retainer flanges at opposite ends, separating-means between said tubes spaced from said flanges to form solder-receiving grooves, and solder in said grooves uniting said tubes.

4. A radiator comprising a casing and assembled air-tubes set within said casing, said air-tubes having spacing beads near opposite ends and outstanding retainer-flanges at each end separated at the corners of the tubes, the spacing beads of adjoining tubes and the retainer flanges of adjoining tubes lying in contact, the spacing flanges of each tube being formed to provide openings for solder in the space between said flanges and said beads, and solder in said grooves uniting said tubes.

5. An angular tube for radiators having beads near opposite ends and outstanding retainer flanges at its ends separated from said beads by intervening spaces, said flanges being cut-away at the angles of the tube, as and for the purpose specified.

6. A rectangular tube for radiators formed of a sheet of thin metal having transverse beads near opposite ends and slits at each end extending toward said beads, said sheet of metal to be folded lengthwise in line with said slits to form the tube and the ends of the tubes thus formed being bent outward between said slits.

7. A radiator comprising a casing and a plurality of assembled tubes set within said casing, said tubes being expanded near opposite ends to form spacing beads which recede from their points of greatest expansion outward to the edges of the tube and in-

ward to the unexpanded intermediate body portion, said tube having also outstanding retainer flanges at their outer edges, the beads and flanges of each tube lying in contact with those of adjoining tubes to form solder-receiving grooves having inwardly-converging walls, and solder within said grooves for uniting said tubes.

In testimony whereof, I have affixed my signature in the presence of two subscribing witnesses.

THEODORE D. ROBINSON.

Witnesses:
ELLA C. PLEUCKHAHN,
JACOB L. OBERST, Jr.