

July 7, 1931.

C. OPPE

1,813,079

RADIATOR

Filed July 8, 1927

Fig. 1.

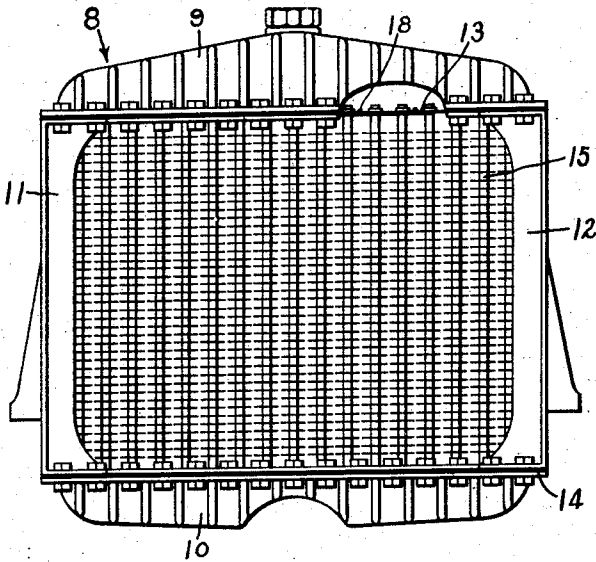


Fig. 2.

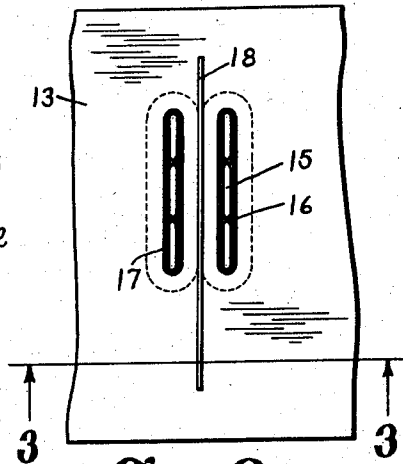


Fig. 3.

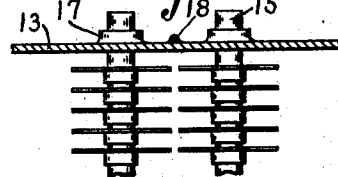


Fig. 5.

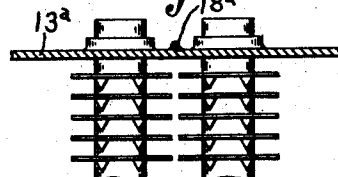
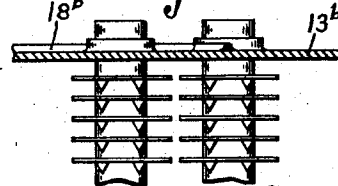


Fig. 7.



Inventor

Fig. 4.

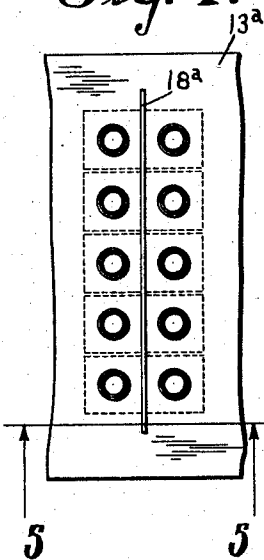
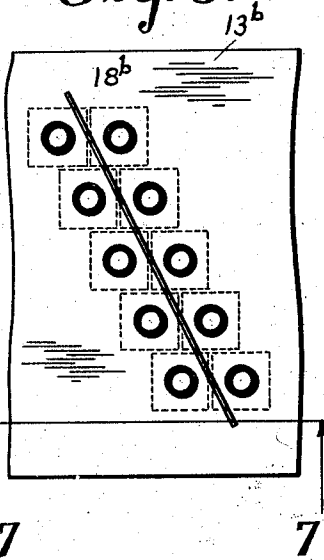


Fig. 6.



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## UNITED STATES PATENT OFFICE

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## RADIATOR

Application filed July 8, 1927. Serial No. 204,306.

This invention relates to radiators, and more particularly to a radiator suitable for use in connection with an internal combustion engine for cooling the water, or other liquid, used for cooling the engine.

Such radiators, and especially those used upon automobile trucks, often consist of cast metal top and bottom tanks and side columns, into which the cooling cores are bolted through the medium of header plates through which the ends of the water tubes constituting the core are inserted. In service I have found that the header plates have more or less of a diaphragm action, and that sometimes they will break as a result of this action after short service. The primary object of the invention is to provide a header plate for a radiator of this type in which the danger of breakage is eliminated, or at least reduced to a minimum.

In a specific aspect, it is an object of the invention to provide a reinforcing means for header plates adapted to dampen the flexing of the plate while in use.

Another object of the invention is to provide a relatively light header plate having reinforcing means attached thereto, and having the same stiffness and rigidity against flexing while in use, as is provided by the use of heavier, and correspondingly more expensive, header plates.

To these and other ends, the invention consists in the novel features and combination of parts to be hereinafter described and claimed.

In the drawings,

Fig. 1 is a front elevation of a radiator, broken away to show a header plate, according to my invention, supporting the upper ends of the cooling tubes;

Fig. 2 is a fragmentary plan view of a header plate, showing one form of cooling tubes arranged therein;

Fig. 3 is a sectional view along line 3—3 of Fig. 2;

Fig. 4 is a view similar to Fig. 2, but showing a different arrangement of cooling tubes;

Fig. 5 is a sectional view, along line 5—5 of Fig. 4;

Fig. 6 is a view of a header plate, with still another arrangement of cooling tubes; and

Fig. 7 is a sectional view, taken along line 7—7 of Fig. 6.

Referring to the drawings in which I have shown a preferred embodiment of my invention, the reference numeral 8 indicates, in general, a truck radiator, having an upper tank 9, a lower tank 10, side columns 11 and 12, header plates 13 and 14, and cooling tubes 15 extending through the header plates 13 and 14 and into the interior of tanks 9 and 10.

Each of the header plates 13 and 14 is preferably made of relatively thin metal having appropriate holes punched or otherwise produced therein, and the cooling tubes being received in and extending through the holes. In the form shown in Fig. 2, the header comprises a plate 13 having elongated openings 16, and around the openings 16 the metal of the plate is displaced upwardly to form flanges 17, through which openings 16 extend. Tubes 15 are received in the openings 16 and may be secured therein by soldering, if desired.

It will be noted that the tubes constituting the water core of the radiator are supported on and between the header plates, the latter being secured in the radiator by being clamped therein around their edges. The constant vibratory movement of the tubes, produced for the most part by the unevenness of roads, causes a diaphragm action of the header plates which in time brings about a rupture in these plates due to fatigue of the metal of which they are made. In addition, the plates are flexed by the constant expansion and contraction of the tubes as they are heated and cooled. This displacement of the header plates is greatest along the center line thereof and decreases towards the edges.

In order that the header plates may take care of the strains thrown thereon, it is necessary that these plates to a certain extent be flexible, but in order to prevent un-

due flexing of the header plate 13, and the corresponding lower header plate (herein not shown in detail) and to increase the rigidity thereof the desired amount, I propose to secure to these plates stiffening means which, in the preferred embodiment disclosed, takes the form of wires or rods 18, soldered, or otherwise secured, to the surfaces of the plates. These wires may be arranged to extend across the weakest portions of the plates or at right angles to the bending axis of the plate in flexing. As shown in Fig. 2, a single wire is used between the tubes 15, which are relatively long and narrow in cross-section.

In Fig. 4 I have shown a header plate 13<sup>a</sup> having a different type of tubes secured therein, and between the adjacent rows of tubes are rods 18<sup>a</sup> soldered, or otherwise secured, to the plate 13<sup>a</sup>.

Fig. 6 shows another arrangement of radiator cooling tubes in which the tubes are placed in diagonal rows, and the wire 18<sup>b</sup> is soldered on the header plate 13<sup>b</sup> in a diagonal position between the tubes.

I have found that from five to nine wires on each plate will generally produce the desired result, but it will be readily understood that the wires are soldered on the header plates in such numbers as may be required, and so arranged as to oppose and dampen the bending or flexing of the plates while in use. Although in Figs. 2, 4 and 6, it appears that the wires do not extend the entire width of the plate, it will be understood that when the plates are secured in the radiator the plate clamping means extends over substantially adjacent to the ends of the wires.

It will be understood that although I have described the means for fastening the wires or rods to the plates as soldering, it would be within the scope of the invention to braze or weld the rods thereon, and while I have found that round wires are highly effective in dampening the flexing of the plates while still leaving them to a certain extent flexible, it would also be within the scope of the invention to use other types of stiffening means in place of the wires; for instance, rods of various other types of cross-section.

While I have shown a preferred embodiment of my invention, it will be understood that the same is not to be limited to the specific details shown, but is capable of modification and variation within the spirit of the invention and the scope of the appended claims.

What I claim is:

1. A header for a radiator comprising a relatively long thin metal plate, and rod-like stiffening means secured to said plate, said stiffening means extending substantially at right angles to the length of said plate.

2. A header for a radiator comprising a relatively long thin metal plate, and independently formed stiffening means secured to said plate, said stiffening means extending generally at right angles to the length of said plate and being of relatively small cross-sectional area.

3. A header for a radiator comprising a relatively thin metal plate, said metal plate being provided with aligned rows of holes adapted to receive cooling tubes therein, and flexible vibration dampening elongated members secured to the surface of said plate between said holes.

4. A header for a radiator comprising a relatively thin metal plate, and flexible wires soldered to said plate transversely thereof and adapted to dampen vibrations therein.

5. In a radiator, an elongated header plate made of relatively thin metal, holes in said plate adapted to receive cooling tubes therein, and independently formed rod-like stiffening elements secured to the surface of said plate between said holes, said stiffening elements extending substantially across said plate, and substantially at right angles to the longest dimension thereof.

In witness whereof, I have hereunto set my hand this 1st day of July, 1927.

CHAS. OPPE.