

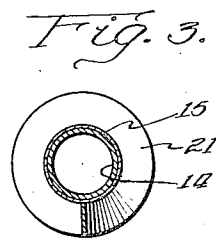
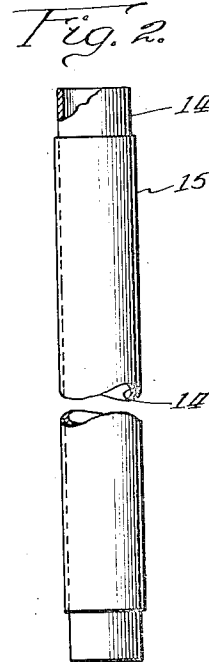
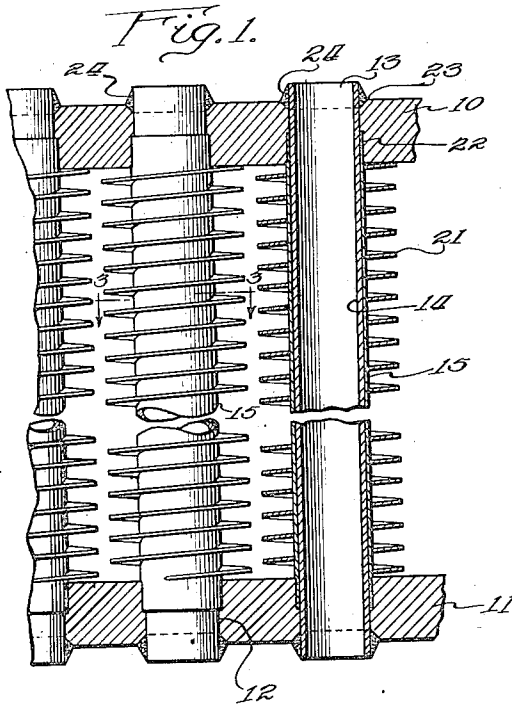
May 13, 1930.

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RADIATOR

Filed March 6, 1929



Witnesses

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UNITED STATES PATENT OFFICE

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RADIATOR

Application filed March 6, 1929. Serial No. 344,755.

This invention relates to heat transfer devices and particularly radiators for cooling internal combustion engines.

In certain localities, the air available for cooling a radiator is polluted with gases such as hydrogen sulphide which in the presence of moisture forms acids that rapidly eat into the exterior of the parts of the radiator. Similarly, in many localities, the water that is circulated through the radiator frequently contains alkali or other material that attacks the interior thereof. Both of these conditions prevail in the oil producing fields of the South and West.

The main object of this invention is to provide an improved radiator construction having metals suitable for resisting the different chemical actions in the interior and exterior portions of the radiator and arranged in a way which will avoid either electrolytic or chemical decomposition of the material.

In the accompanying drawing, I have illustrated a specific embodiment of my invention in which:

Figure 1 is a fragmentary elevation partly in section.

Fig. 2 is a detail of a radiator tube and

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 1.

In the form shown, headers 10 and 11, preferably comprising iron plates having tube apertures 12 therein, form the bottom and top walls respectively, of upper and lower tanks, not shown in the drawings.

Conduits 13, preferably comprising outer aluminum tubes 15 are extended at their upper ends into the apertures of the top header 10, and at their lower ends into apertures in the bottom header 11.

The outer diameter of the copper tubes 14 is slightly greater than the inner diameter of the aluminum tube 15.

Before the two tubes are assembled the inner surface of the aluminum tube and the outer surface of the copper tube are thoroughly cleaned of dirt and oil and the outer tube is heated to expand it sufficiently to accommodate the copper tube 14. When the tubes are cooled, the outer tube contracts and firmly grips the inner tube causing a pressure

contact to be maintained between the two tubes throughout the entire length of the aluminum tube. Contact between the inner surface of the aluminum tube and the outer surface of the copper tube may be increased by a draw bench method of inserting a drawing tool inside of the copper tube and increasing its diameter to press the outer surface of the copper tube against the entire inner surface of the aluminum tube.

The copper tube 14 is longer than the aluminum tube 15 and the latter is positioned centrally on the copper tube and the copper tube extends substantially equal distance in advance of the both ends of the aluminum tube.

After the apertures 12 are formed in the header plates 10 and 11, the latter are counter-bored from the outside and inside surfaces of the plates as indicated at 22 and 23 respectively. The counter bores 23 on the inner side of the plates are slightly larger in diameter than the outside diameter of the copper tubes and the sides are beveled. The counter bores 22 on the outer side of the plates are slightly smaller than the outside diameter of the aluminum tubes and the sides of the counter bores are substantially parallel to the sides of the apertures 12.

When the tubes have been assembled they are inserted into the apertures 12 and the ends of the aluminum tubes are forced or pressed into the counter bores 22. The ends of the copper tubes fit loosely into the apertures 12 and they are sweat soldered to the inner sides of the headers 10 and 11, the counter bores 22 being completely filled with solder 24. The soldered joints between the inner copper tubes and the header plates and the forced fit between the aluminum tubes and the header plates prevent the atmosphere from gaining access to the copper tube and also prevent the liquid in the inner tubes from leaking onto the aluminum outer tubes.

Helical, or other forms of fins 21, preferably aluminum, are mounted on the outer tube 15, as illustrated in Fig. 1, between the top and bottom headers 10 and 11 respectively in the usual way.

In the form shown, the composite tubes, or

conduits 13, are constructed of copper and aluminum for preventing internal and external corrosion where the exterior is subjected to oxidization by an acid and the interior is subjected to the chemical action of an alkali. The tubes, however, may be constructed of any material, suitable for resisting the particular corrosive action to be coped with.

Electrolytic decomposition of the metals is avoided by the arrangement illustrated which prevents single electrolyte from engaging both metals at one time.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. In radiator construction, a water conduit comprising an inner copper tube for resisting reducing solutions, and an outer aluminum sleeve for resisting oxidizing agents.

2. A radiator comprising upper and lower headers having apertures therein, the apertures being counter bored from the inner non-facing sides of the headers and from the outer facing sides of the headers, aluminum tubes extending at their end portions into the outer counter bores and having a forced fit with the sides thereof, inner copper tubes concentric with said aluminum tubes and extending beyond the inner sides of said headers, and a solid joint between said headers and the extremities of said inner tube filling the inner counter bores.

Signed at Racine, Wis., this 2nd day of March, 1929.

FRED M. YOUNG.

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