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T. N. COFFELDER

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METHOD OF MAKING RADIATOR CORE STRUCTURE

Filed Aug. 3, 1928

Fig. 1

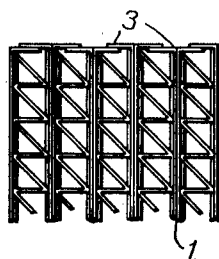


Fig. 2

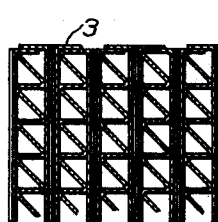


Fig. 3

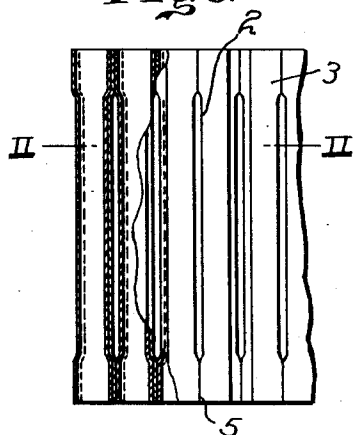


Fig. 4

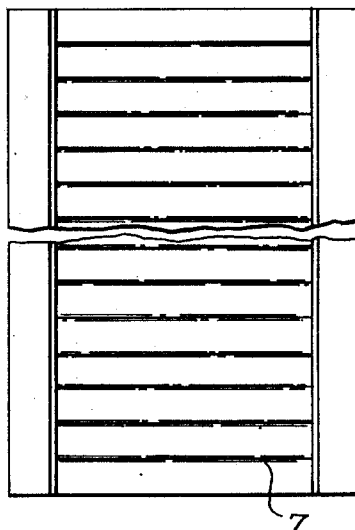


Fig. 5

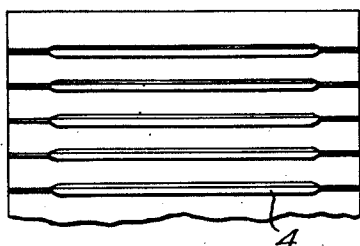


Fig. 6



Fig. 7



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METHOD OF MAKING RADIATOR CORE STRUCTURES

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This invention relates to radiator core structures for automobiles and it is among the objects thereof to provide a radiator structure which shall be of simple durable mechanical construction which shall be of relatively large cooling capacity and which shall be efficient in its function for cooling the water in the engine jacket with which it is connected.

10 In radiator structures heretofore proposed, the tubes through which the cooling water is circulated, are provided with supporting fins of various forms which are designed to conduct the heat from the tubes and to provide an open cooling structure of relatively large surface area through which the cooling air passes by forced circulation. An important feature to the attainment of good heat conductivity from the tubes of the fins is intimate contact between these members and in most constructions such contact is made available by soldered connections between the joining elements and fin, the fin being part of the tube.

25 I have discovered that a soldered joint for radiator construction is not efficient for the conduction of heat from the circulating tubes and furthermore such joints are readily broken by the vibrations and stresses to which the radiator is subjected in use.

30 In accordance with my present invention, I produce intimacy of contact between the fin and tube structures of radiators without the use of soldering in such manner that the metal of the tubes envelops the contacting edges of the fins whereby intimate contact is assured. With this construction, a radiator cannot be damaged by freezing since there is nothing to rupture as in the soldered connections of the common types.

35 In the accompanying drawing constituting a part hereof and in which like reference characters designate like parts, Fig. 1 is a front elevational view of a radiator structure embodying the principles of this invention; Fig. 2 a cross-sectional view taken along the line II—II, Fig. 3; Fig. 3 a plan view partly in section and partly in elevation; Fig. 4 a side elevational view between the tube and fin members; Fig. 5 an elevational view of the

fin; Fig. 6 an end view of the fin shown in Fig. 5; and Fig. 7 a cross-sectional view of the fin and a section of the tube illustrating the manner of their engagement in accordance with this invention.

In the structure shown in Fig. 1, the tubes 1 are made of copper strips which are rolled to form indentations 2 which when joined form the tubes or slotted openings through which the water circulates. A pair of the copper strips form a single tube and they are arranged with their ends flanged as at 3, and alternate tubes, are disposed with their flanges overlapping, as clearly shown in Figs. 1 and 2.

Ordinarily, the thickness of the tubing is about .005 of an inch but I have found that a heavy gauge metal is more satisfactory for constructing radiators in accordance with my invention and I employ sheet copper strips that are preferably from .006 to .007 in thickness.

The fin structure is preferably of saw-tooth shape (Figs. 6 and 7) and is made of brass with indentations 4 which correspond in length to the width of the depressions 2 forming the tube structures so that when the fins are assembled between adjacent tubes the depressed portions 4 lie snugly against the projecting portions 2 of the tubing. I prefer to form the fin of saw-tooth form since I have found that this form of tooth lends itself more readily to a readjustment of the structure after freezing, thus preventing rupture of the joints. After the tubing and fins are assembled in the manner shown in Figs. 1, 2 and 3, they are provided with end chambers and the assembled structure after soldering at the flanged joints 3 and along the joining edges 5 of the tubes, is subjected to hydraulic pressure ranging from 20 to 30 pounds. The pressure in the tubes is effective in expanding the soft copper whereby the outer walls of the tubes are forced against the edges of the fins resulting in the copper enveloping the edges of the teeth of the fin in the manner exaggeratedly shown in Fig. 7. The effect of the pressure is such as to produce a riblike effect as at 7 which indicates that intimate contact between the fins and tubes is obtained

without the use of solder or other joining medium.

I have found that with the copper and brass contact, without any solder interposed, the fin is more capable of conducting the heat from the tubes, thus producing a radiator structure of increased cooling efficiency which greatly increases the capacity of the radiator for cooling the water to the extent that a core section of lesser thickness may be employed for the practice of my invention than is possible with other forms of radiator core structures.

If the radiator is subjected to freezing temperature, the tubes are permitted to expand because of the flexibility of the saw tooth fin which is capable of coming back to its original form without rupturing the connection with the tube.

It is evident from the foregoing description of this invention that radiator core structures made in accordance herewith are relatively inexpensive to manufacture and efficient for cooling water circulating therein.

Although one embodiment of the construction has been herein illustrated and described it will be obvious to those skilled in the art that various modifications may be made in the details of construction without departing from the principles herein set forth.

I claim herein as my invention:

1. The method of making radiator core structures which comprises assembling a plurality of circulating tubes between cooling fins of corrugated form, joining the assembled tubes and fins to constitute a unitary structure, and subjecting said structure to internal pressure to expand the tubes against the contacting edges of the cooling fins.

2. The method of making radiator core structures which comprises assembling a plurality of circulating tubes between cooling fins of corrugated form, joining the assembled tubes and fins to constitute a unitary structure, and subjecting said tubes to internal pressure to expand the same against the contacting edges of the cooling fins.

3. The method of making radiator core structures which comprises assembling a plurality of circulating tubes between cooling fins of corrugated form, joining the assembled tubes and fins to constitute a unitary structure, and subjecting said tubes to internal pressure of from 15 to 30 pounds per square inch to expand the same against the contacting edges of the cooling fins.

4. The method of making radiator core structures which comprises forming depressions in strips of soft sheet copper, assembling said strips with their depressions adjacent one another to constitute tubes, assembling said tubes between corrugated brass strips constituting cooling fins, and subjecting said tubes to internal pressure to expand

the same against the contacting edges of the said corrugated strips.

5. The method of making radiator core structures which comprises forming depressions in strips of sheet copper, assembling said strips with their depressions adjacent one another to constitute tubes, assembling said tubes between corrugated brass strips, constituting cooling fins, and subjecting said tubes to internal pressure to expand the same whereby the tubes intimately contact with adjacent edges of said fins in the region of their depressions.

6. The method of making radiator core structures which comprises forming depressions in strips of sheet copper, assembling said strips with their depressions adjacent one another to constitute tubes, assembling said tubes between corrugated brass strips having their corrugations flattened along the portions contacting with the depressions in said tubes, and subjecting said tubes to internal pressure to expand the same to produce intimate contact with the flattened edges of said brass strips.

In testimony whereof, I have hereunto set my hand.

THOMAS N. COFFELDER.