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H. E. RHOADS

1,564,446

RADIATOR

Filed Jan. 6, 1919

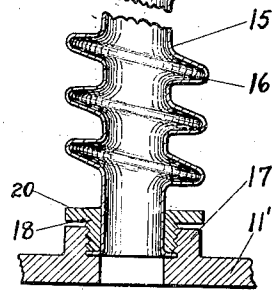
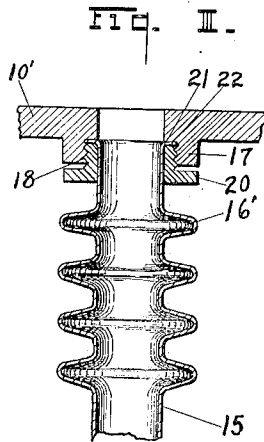
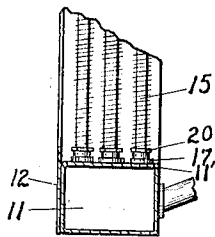
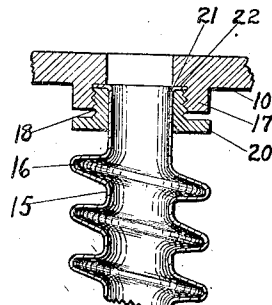
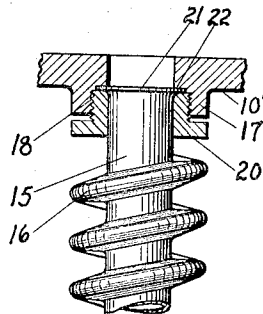
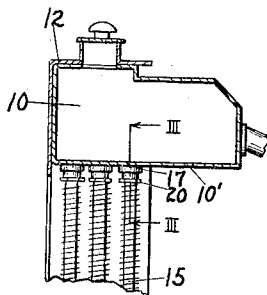
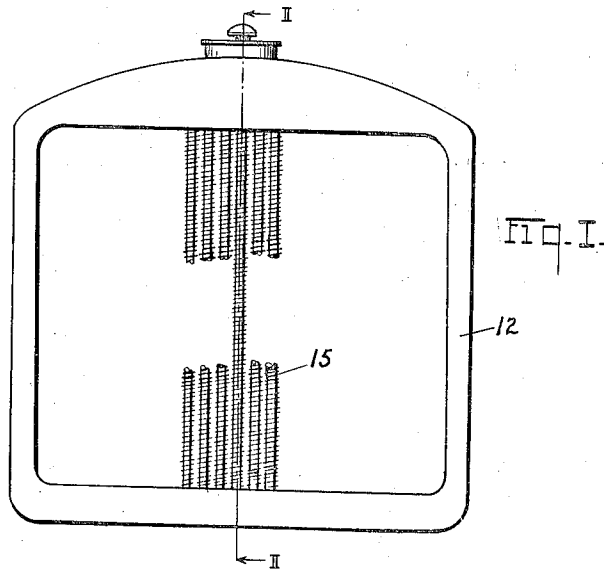


Fig. I.

Fig. II.

Fig. V.

Fig. IV.

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UNITED STATES PATENT OFFICE.

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RADIATOR.

Application filed January 6, 1919. Serial No. 269,898.

To all whom it may concern:

Be it known that I, HARRY E. RHOADS, a citizen of the United States, residing at Toledo, county of Lucas, and State of Ohio, have invented certain new and useful Improvements in Radiators, of which I declare the following to be a full, clear, and exact description.

This invention relates to automobile radiators, and has for its object to provide an improved type of tube construction and the assembly thereof in a radiator, to provide a radiator tube with an increased cooling capacity, and make a structure which may be readily assembled as well as readily repaired in case of any damage or leaks in any of the several tubes making up the radiator core. The invention particularly relates to a novel type of radiator tube per se having, as stated, a materially enlarged cooling area or surface, and one in which a form of radiating fin on the tube is formed integral with the tube itself and may also constitute enlargements forming the increased surface area of the tubes.

The invention also contemplates the provision of a character of tube having the features referred to, in which the circulation of the water is facilitated rather than hindered by the enlargements referred to, and the efficiency of the radiator as a whole is thus materially increased by the character of tube units used.

The invention further has for its objects to provide a novel arrangement for fixedly securing the several tubes to the radiator headers by a simplified type of construction, which may be readily manipulated as referred to.

Further objects of the invention relate to methods of manufacturing, in which considerable economy is obtained and in the details of construction, which are such as to readily lend the device to manufacture in an efficient manner. I accomplish the objects of my invention in one instance by the arrangement and devices described in the following specification, but it is evident that the same may be varied widely without departing from the scope of the invention, as pointed out in the appended claims. A structure constituting certain embodiments of my invention, one of which may be the preferred, is illustrated in the accompany-

ing drawing, forming a part hereof, in which:

Figure I is a front elevation of the assembled radiator showing some of the tubes located in place therein.

Figure II is a cross sectional view taken on the line II—II of Figure I.

Figure III is a sectional view taken on the line III—III of Figure II showing the tube on an enlarged scale and the method of joining the same to the radiator header.

Figure IV is an enlarged view showing a modified type of tube.

Figure V is an enlarged view showing in section the tube illustrated in Figure III.

In the drawings, there is illustrated a usual type of upper tank 10 and a lower receiving tank 11, the same being surrounded by an enclosing casing 12 usually employed in radiator construction. Between the upper header 10 and the lower receiving receptacle 11 there is arranged a plurality of tubes 15 adapted to convey water from the upper tank, the same being received therein from the engine jacket and delivered to the lower tank 11, the transverse passage of air past the tubes 15 operating to cool the water therein. The present invention is concerned with the particular type of tubes 15 employed, together with the manner of assembling the same in the upper and lower heads described.

In order to obtain an enlarged cooling area and form each tube with heat-radiating fins integral with the tube, I have shown herein a type of construction in which the tube 15 is provided with a laterally extending hollow enlargement 16 which, in the form illustrated in Figures III and V, winds helically from end to end of the tube 15. This extension 16 is integral with the tube, as will be apparent from an inspection of the drawing. The relative sizes of the projection 16 and the diameter of the tube 15 may be made any ratio desired, but preferably is such that the extension 16 operates as radiating fin to efficiently dissipate the heat contained in the entire body of water within the tube 15. By the helical arrangement of the enlargement 16, it will be seen that the water in passing therethrough is given a swirling movement tending to increase circulation and prevent the accumulation of sediment or dirt of any character whatever.

The skin surface of the water in passing through the tube is also greatly enlarged and, therefore, the heat transferring capacity of the tube is thereby increased.

In the modification shown in Figure IV, the hollow enlargements 16' are arranged in a horizontal plane extending laterally of the tube 15, and consist of a plurality of separate extensions rather than a continuous helically arranged enlargement 16 shown in Figures III and V. It will be seen that the character of tube illustrated in Figure IV has certain advantages over the construction illustrated in Figures III and V, and represents a different embodiment of the invention contained therein.

This invention is also concerned with a simplified type of assembly between the several tubes 15 and the radiator headers 10 and 11. The lower wall 10' of the upper tank 10 may be provided with a plurality of cupped projections or seats 17 screw-threaded as indicated at 18 for receiving the nipple or union 20 which operates to clamp a lateral flange 21 formed on the end of the tube 15 against a ledge 22 formed by the bottom wall 10' at the base of the hollow cups 17. When the nipple 20 is screw-threaded home the flange 21 is clamped between the end of the nipple and the base ledge 22 of the cup 17. The upper wall 11' of the lower tank 11 is likewise provided with a plurality of hollow upstanding projections 17, each adapted to receive a similar union joint and thereby effectively clamp the other end of the tube 15 in place and bind the same between the upper and lower headers of the radiator. From the construction shown, it will be seen that the several tubes may be readily assembled in place and, moreover, that any individual tube may be readily removed and a new one inserted therefor without displacing or affecting any of the other tubes. Moreover, any one of the tubes may be entirely removed and the opening into the headers plugged up while on the road, and thus the leakage of water from the radiator due to a damaged tube may be readily prevented. The tubes 15 are formed of extremely thin metal and the enlargements 16 formed therein are of such depth as to permit the tubes to be compressed or extended in the direction of their lengths to quite an appreciable degree whereby when it is found desirable to remove one of the tubes, such tube can be compressed to clear the projections 17 and the tube which is to be substituted therefor can be readily inserted in place by first compressing the same in the direction of its length and then placing the end portions thereof within the seats formed in the upper and lower headers, whereupon the ends of the substituted tube may be clamped firmly to its seats by threading up the corresponding union 20.

From the construction described, it will be apparent that the embodiments of the invention disclosed constitute certain means for carrying the invention into effect, and it will be seen that a very simplified type of construction has been provided. In addition to the advantages referred to it will be apparent that the enlargements or hollow fins 16, either helically arranged or annularly placed on the tubes, operate as expansible portions on the several tubes which will tend to prevent bursting due to freezing. Moreover, the tubes will be more flexible and will be more readily adapted to changes in temperature during the use of the radiator under all operating conditions.

While I have described my invention in more or less detail, and as being embodied in certain precise forms, I do not desire or intend to be limited thereto, as on the contrary my invention contemplates broadly all proper changes as well as the omission of immaterial elements and the substitution of equivalents therefor, as circumstances may suggest or expediency render necessary.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a device of the class described, in combination, an upper and a lower header of a radiator, a seat formed in the bottom wall of said upper header and a second seat formed in the top wall of the said bottom header, annular screw threaded projections surrounding said seats, a radiating tube extending between said headers and adapted to be placed in communication therewith at either end, and a lateral flange formed on each end of said radiator tube and adapted to bear against its adjacent header, and a union or nipple surrounding said tube at either end thereof and provided with screw-threaded means to engage the corresponding projection to bind said flange against said seat, said tube being formed throughout a substantial portion of its length with peripheral corrugations of a depth sufficient to permit the tube to be contracted to clear one of said annular projections.

2. In a radiator, a header provided with an opening therethrough, an annular projection surrounding said opening, a radiator tube provided with an integral flange formed upon one end thereof and adapted to fit within the annular projection formed upon the header, and a union surrounding said tube and adapted to engage the annular projection to bind the flange on the tube between the header and the union said tube being formed intermediate its ends with peripheral corrugations of a depth sufficient to permit the tube to be contracted to clear said annular projection.

3. In a radiator, a header provided with an opening therethrough, an annular projec-

tion surrounding said opening, a radiator tube provided with an integral flange formed upon one end thereof and adapted to fit within the annular projection formed upon the header, a union surrounding said tube and adapted to engage the annular projection to bind the flange on the tube between the header and union, said tube being provided with a helical corrugation extending throughout a substantial part of its length, the pitch and depth of the corrugation being such as to permit the tube to be contracted to clear said annular projection.

4. In a radiator, the combination of spaced upper and lower headers having flat seats, 15 and tubes connecting said headers having flanged portions engaging said seats, each of said headers having tube securing portions projecting beyond said seats toward the opposite header and said tubes being corru- 20 gated whereby their cooling surface is increased and whereby they may be compressed longitudinally during assembly so as to clear said projecting portions.

In testimony whereof, I affix my signature.

HARRY E. RHOADS.