Nov. 24, 1925. 1,563,182

F. GARGIULO

RADIATOR UNIT

Filed March 24, 1921

Fig. 1.

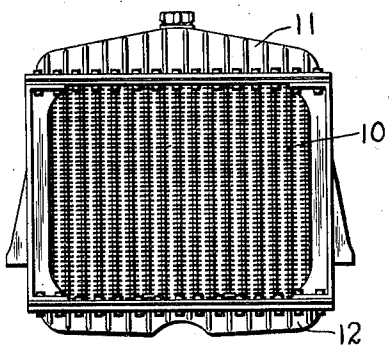


Fig. 3.

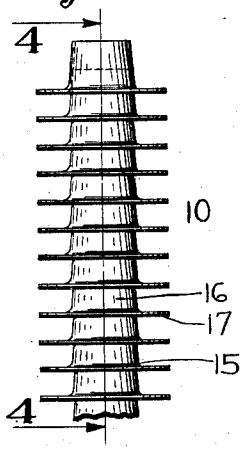


Fig. 2.

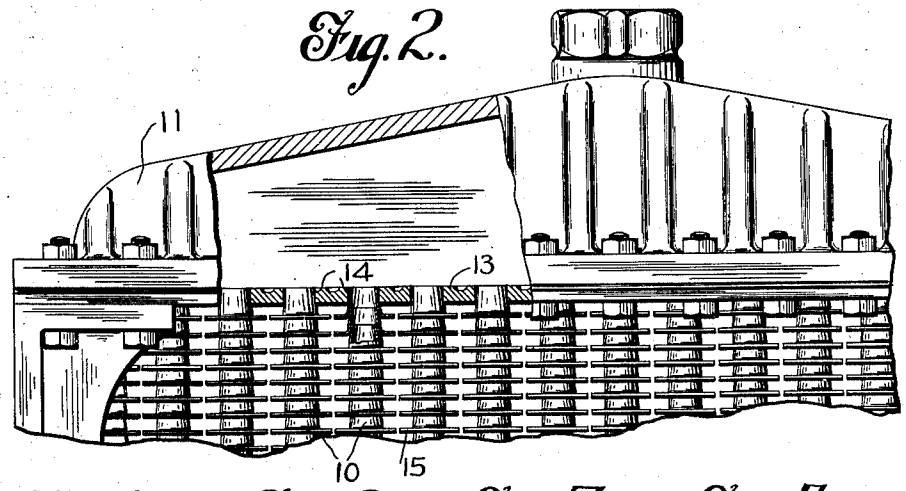


Fig. 4.

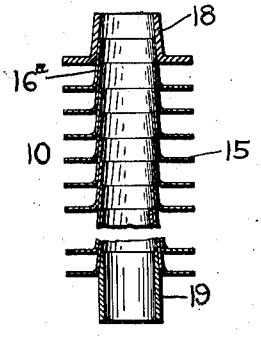


Fig. 6.

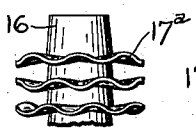


Fig. 7.

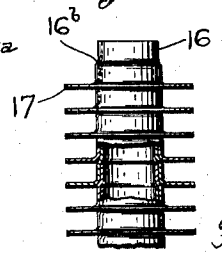
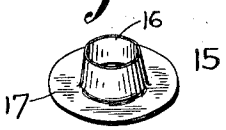


Fig. 5.



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UNITED STATES PATENT OFFICE.

FREDERICK GARGIULO, OF NEW HAVEN, CONNECTICUT.

RADIATOR UNIT.

Application filed March 24, 1921. Serial No. 455,065.

To all whom it may concern:

Be it known that I, FREDERICK GARGIULO, a citizen of the United States, residing in the city and county of New Haven, State of Connecticut, have invented certain new and useful Improvements in Radiator Units, of which the following is a full, clear, and exact description.

This invention relates to radiators, and more particularly radiators for cooling the engines of automotive vehicles, and is especially concerned with elongated radiator units of a generally tubular shape adapted for use in the construction of such radiators. While the invention may be found particularly useful in connection with radiators of this type, the principles thereof are not limited to such radiators, however, but may be used in connection with others.

Heretofore it has been common practice to provide tubular radiator units consisting of tubes of appropriate material such as brass, copper or other suitable metal having a plurality of fins or flanges suitably secured to the exterior surface of the tube as by soldering, such fins being spaced from each other by appropriate intervals and being usually in the shape of a disk or plate, the purpose of such fins being to increase the effective radiating surface of the tube and thereby increase the cooling effect.

One of the objects of my invention is to provide a tubular radiator unit made up of separately formed tube sections which may be associated together and connected to form a watertight tube.

Another object of my invention is to provide an improved radiator unit, the fins of which will be formed integrally with the tube sections or with the wall of the tube itself.

A still further object of my invention is the construction of a tubular unit for radiators from separate tube sections in such a manner that a tube of any desired length may be formed from the separate sections without waste of material.

Further, while the tube sections may be formed of comparatively thin material, they may be, if desired, associated together in such a way that the wall of the tube formed thereby will be of double or triple thickness, so that the required rigidity of the tube may be obtained, notwithstanding the fact that the sections themselves are formed of thin material. These tube sections may be formed with laterally extending flanges, which, when the sections are nested together, will be properly spaced so that air will freely circulate between them and being formed integrally with the sections of the tube themselves will increase the effective radiating surface in a very efficient manner.

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

In the accompanying drawings:

Fig. 1 is a front elevational view of an engine cooling radiator embodying my improvements;

Fig. 2 is a detail elevational view of a portion of the same, some parts being shown in section;

Fig. 3 is a detail elevation of a portion of one of the tubular units;

Fig. 4 is a sectional view on line 4—4 of Fig. 3;

Fig. 5 is a detail perspective view of one of the tube sections;

Fig. 6 is a detail elevational view of a modified construction; and

Fig. 7 is a similar view showing a further modification, some parts being shown in section.

I have selected for illustration an engine cooling radiator particularly adapted for use on automotive vehicles, for example motor trucks driven by internal combustion engines, in which case the water for cooling the engine circulates in a generally vertical direction between upper and lower tanks, as customary, through vertical tubes connecting the tanks, the cooling effect being produced by the passage of air between the tubes in a generally horizontal direction. It will be understood, however, that the invention is applicable to other uses and that it is not restricted to cases where the fluid to be cooled consists of water passing through the tubes and the cooling fluid consists of atmospheric air, nor to cases where an interchange of heat is effected between fluids of these two kinds.

In the drawing, the radiator tubes or units 10 are shown as set in between and connected with upper and lower water tanks 11 and 12, respectively.

The upper tank 11 is more fully shown in Fig. 2, wherein it is shown as bolted to a

header plate 13, which forms the lower base of the tank 11 and is provided with a plurality of openings or perforations 14 for the insertion of the tubular units which provide the communication between the upper and the lower headers or tanks.

The invention is particularly concerned with the construction of the tubular units 10, which, as has been stated, are preferably built up or fabricated from separate sections. These sections are connected together in any suitable way, such as soldering, for example, so that a continuous watertight tube may be formed, the wall of which will be made up of the walls of the separate tube sections.

As shown in Fig. 5, these tube sections 15 may preferably consist of a tube portion 16 having the configuration of a frustum of a cone and a laterally extending flange portion 17, which may be and preferably is formed integrally with the tubular portion 16 and stands out laterally therefrom.

The conical shape of the tube portion 16 of the section 15 provides for the nesting together of a plurality of these sections in such a manner that the flanges 17 will be spaced from each other, and so that there will be a substantial portion of the tubular part of one section received within the tubular part of the adjacent section. As these sections are made of relatively thin material, it may be found desirable to so shape the portion 16 of the tube sections that approximately one-half of this portion will be received within the adjacent section. Such a construction is shown in Fig. 4, wherein it will be obvious that the tubular portion of one of the sections 15 will extend as far as the flange or base of the second section from the one under consideration, so that a double tube wall is provided for the completed tubular unit 10.

The sections 15 may be formed in any suitable way, one preferred way being to draw these sections into the desired shape shown in Fig. 5 from a flat disk of appropriate material and thickness. This, it will be obvious, will provide a flange which will be integrally formed of the material of the tube section itself and this will prove a factor in bringing about greater efficiency in the completed unit.

It will be seen that when the tubular unit 10 is formed in the manner just described, a portion of the uppermost tube section, as shown in Fig. 4, and designated as 16^a will project above the top of the next lower section and at that portion of the tube a single thickness only would be provided for the tube wall. To overcome any disadvantage which might arise from this fact, a section 18 of the same general shape as the sections 15 is provided at the top of the unit, but which is formed of thicker material, for instance material of double the thickness of that from which the sections 15 are formed. Of course, the exact thickness of the top section is not important, as such changes as found desirable may be made in this respect. To connect the lower end of the tubular unit with its header plate (not shown) there is provided a thimble or nipple 19 shown in Fig. 4, one end of which is received within the lowermost section, and the other end is inserted within the perforations in the header plate.

When the sections are nested together and a tube of the desired length is formed, the parts are firmly secured in a suitable manner, such as by dipping the unit in a bath of solder or the like and then allowing it to drain after its removal therefrom. The solder will fill any openings which might exist between the sections and render the unit watertight.

In Fig. 6 I have shown a modified form of my invention wherein the flanges 17^a of the tube sections are formed with undulations or waves to increase the turbulence of the air which passes through the radiator. It will, of course, be obvious that these undulations may be very readily formed in the flanges of the tube sections when the same are in the process of construction.

In Fig. 7, I have shown a still further modification of my invention wherein the tube portions of the sections are formed with shoulders 16^b, which will positively limit the length of one tube which may be inserted or nested within the adjacent tube. This shoulder is provided by reducing the end of the tube which is remote from the flange, the reduction being made at a point intermediate the two ends of the tube, so that approximately one-half of the tube portion of the section will lie above the shoulder and the remaining half below it. This construction which, of course, may be varied, as desired, to form the shoulder at any point longitudinally of the tube section, will provide for the nesting together of the sections, as shown in Fig. 7, so that a double walled tube will be formed, as in the case of the sections having the conically shaped tubes shown in Fig. 4.

It will be apparent that when the tubular units are constructed by my improved method, there will be no waste of material, as tubular units of any length may be constructed, the length being determined by the number of the sections used. Moreover, the diameter of the tubes may also be determined by the diameter of the tube portion of the sections, so that it will not be necessary to provide stock tubes of different diameters to manufacture radiators having tubes of different diameters. It will also be obvious that when the flanges are formed integrally with the walls of the tubes, the

effective radiation will be increased, as better conduction of heat will take place between these flanges and the tube itself.

While I have shown and described a preferred form of my invention, it is to be understood that the same is not to be limited thereto in all of its details, but is capable of many modifications and variations, all of which will lie within the spirit of the invention and within the scope of the appended claims.

What I claim is:

1. A radiator tube including a plurality of disklike sections, each section composed of a tubular portion and a flanged portion, said tubular portion having a reduced end forming an intermediate annular stop shoulder, said sections being nested together with said reduced ends entering the unreduced portions of the tubular parts of adjacent sections and contacting with the stop shoulders thereof, said shoulders being located so that the resulting tube has a wall consisting of two superposed layers at substantially all points throughout its length.

2. A radiator tube formed of a plurality of nested sections, each section being provided with an annular shoulder to limit the entrance of same into the adjacent section, said shoulder being located intermediate the ends of said section whereby said radiator tube will be double walled and have a substantially smooth bore.

3. In a radiator for automobiles or the like, upper and lower water tanks, header plates therefor, radiating units comprising a series of interconnected tubular sections, having integral flanges thereon, the tubular sections at each end of the radiating units being of thicker material than the remainder, said header plates being adapted to receive the end portions of said radiating units in openings therein, said sections having reduced upper ends, whereby they may be nested together and whereby the thicker upper sections may be snugly received in the openings in the header plates.

4. In a radiator, upper and lower liquid containers, a plurality of tubular radiator units interconnecting said containers, each of said units comprising a plurality of nested sections, each section being provided with an annular shoulder to limit the entrance of the same into the adjacent section, said shoulder being located intermediate the ends of said section, whereby said radiator unit will be double walled and have a substantially smooth bore.

5. In a radiator, upper and lower liquid containers, a plurality of tubular radiator units interconnecting said containers, each of said units comprising a series of interconnected tubular sections having integral flanges thereon, the tubular sections at each end of the unit being of thicker material than the remainder, and adapted to be entered and snugly received in openings in the opposing walls of said container.

In witness whereof, I have hereunto set my hand on the 22nd day of March, 1921.

FREDERICK GARGIULO.