

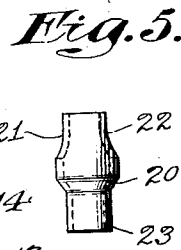
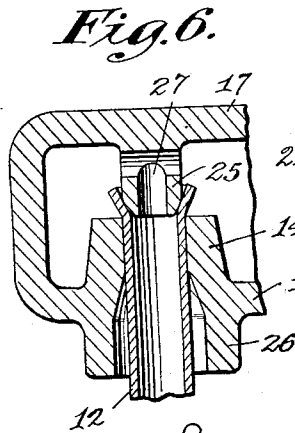
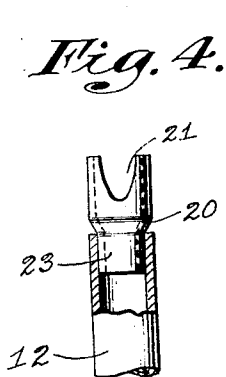
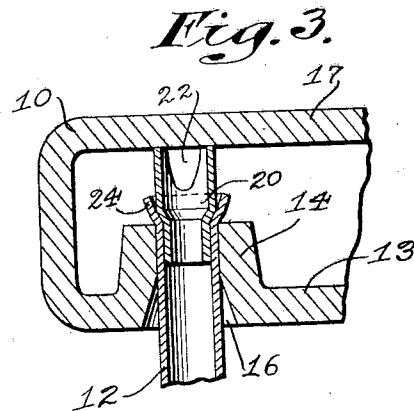
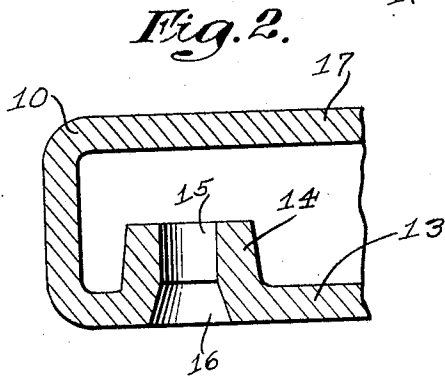
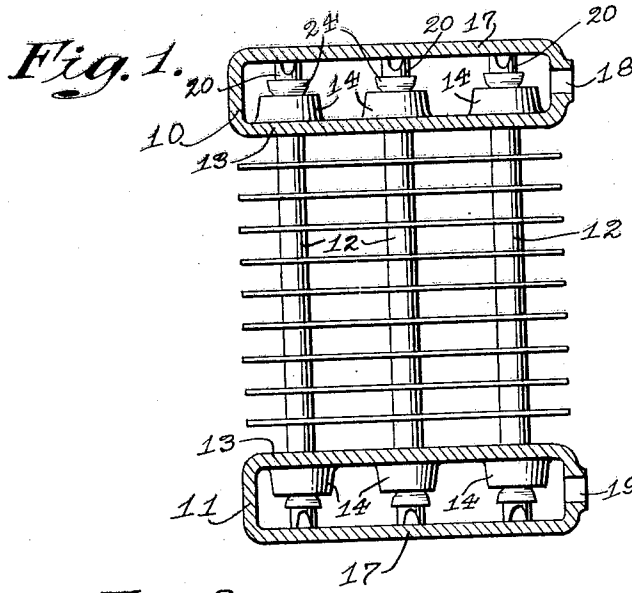
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RADIATOR HEADER AND TUBE CONNECTION

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UNITED STATES PATENT OFFICE

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RADIATOR HEADER AND TUBE CONNECTION

Application filed December 5, 1929. Serial No. 411,829.

This invention relates to radiators, and more particularly to a water-tight connection between a radiator tube and header, said connection being formed automatically within the interior of the header by the process of assembling the tube in the header.

One object of this invention is to provide a radiator tube connection which will have no parts projecting beyond the end of the header and which will be hermetically sealed without requiring the use of solder, couplings, etc.

A further object is to provide a device of the above nature which will be simple in construction, easy and inexpensive to manufacture, and very efficient and durable in use.

With these and other objects in view there have been illustrated on the accompanying drawings two forms in which the invention may be conveniently embodied in practice.

Fig. 1 represents a transverse sectional view of a fin-type tubular radiator embodying the invention.

Fig. 2 is a fragmentary sectional view on an enlarged scale of one end of a radiator header showing the shape of the interior boss for surrounding and supporting the end of the tube.

Fig. 3 is a fragmentary view similar to Fig. 2, showing the tube and spreading ferrule in their final condition after the joint has been formed.

Fig. 4 is a fragmentary sectional view in elevation, showing the ferrule located in the end of the radiator tube preparatory to insertion in the header.

Fig. 5 is a view in elevation, taken at right-angles to the view shown in Fig. 4, of the tube-spreading ferrule, prior to its insertion in the end of the tube.

Fig. 6 is a fragmentary view similar to Fig. 3, showing a modified form of the invention in which a projection on the header takes the place of the ferrule.

In the manufacture of tubular radiators in the past, it has been necessary, in order to flange over or expand the ends of the tubes, to have said ends exposed or accessible from the exterior. In some cases this was accomplished by providing a removable section or

cover for the header, and in other cases by cutting holes in the outer wall of the header in alinement with the tubes in order to permit the insertion of the expanding tool. The holes in the outer wall of the header were then closed with screw plugs.

By means of the present invention, a tubular radiator has been produced in which it is unnecessary to provide removable covers for or to cut openings in the outer wall of the header, the tubes being hermetically sealed within the openings in the inner wall of the header automatically and without the use of any tools.

Referring now to the drawings in which like reference numerals denote corresponding parts throughout the several views, the numerals 10 and 11 indicate respectively a pair of headers forming the ends of the radiator, said headers being joined by a plurality of tubes 12. The inner wall 13 of each header has a plurality of openings arranged in rows for receiving the tubes 12, and each opening is reinforced within the interior of the header by a tapered boss 14. As more clearly shown in Figs. 2 and 3, each boss 14 has an inner cylindrical passage 15 adapted to form a driving fit on said tube 12 and a tapered outer passage 16 to facilitate the ready insertion of the tube 12 into the header. The outer walls 17 of the headers 10 and 11 are free from openings or protuberances of any kind.

In order to permit the circulation of a suitable heating fluid, such as steam or hot water, through the radiator, the headers 10 and 11 are provided at their ends with inlet and outlet openings 18 and 19, said openings 18 and 19 being fitted with suitable pipes, not shown.

In order to cause the end of the each tube 12 to be spread outwardly about the inner edge of the corresponding boss 14, when the radiator is being assembled, provision is made of an expanding tubular ferrule 20, which is adapted to be inserted in the end of each tube 12. Each ferrule 20 is cut away at its outer edge to form opposed slots 21 and 22, whereby free circulation of the heating fluid from the headers into the tubes is

provided. Each ferrule 20 is provided at its inner end with a reduced section 23 adapted to fit snugly within the interior of the tube 12, as clearly shown in Figs. 3 and 4.

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Operation

In operation, when it is desired to assemble the radiator tubes 12 in the headers 10 and 11, the ferrules 20 will first be inserted into the ends of said tubes, as shown in Fig. 4. The tubes 12 and ferrules 20 will next be inserted through the openings in the inner sides 13 of the headers 10 and 11 until the ferrules 20 strike the inner sides of the outer walls 17 of said headers. The radiators will then be placed within a press or other apparatus capable of exerting a compressive force upon the headers 10 and 11 for forcing them toward one another until the intermediate shoulders on the ferrules 20 expand the ends of the tubes 12 from the condition shown in Fig. 4 to the condition shown in Fig. 3.

The tubes 12 will thus be locked within the headers 10 and 11 by the interior flanges 24 thus formed, and water-tight joints will be produced without the use of solder, couplings, expanding tools, or other instruments.

In the modified form of the invention shown in Fig. 6, no ferrule is employed, but instead, the inside of the outer wall 17 of the header is provided with a plurality of integral projecting plugs 25, one of which is located opposite the position of each tube 12. Each of the plugs 25 is provided with a T-shaped passage 27 for permitting the circulation of heating fluid therethrough. Moreover, the construction is strengthened somewhat by providing outer bosses 26 on the inner face 13 of the header for surrounding the tubes 12. The operation of this form of the invention is similar to that of the first form.

While there have been disclosed in this specification two forms in which the invention may be embodied, it is to be understood that these forms are shown for the purpose of illustration only, and that the invention is not to be limited to the specific disclosures but may be modified and embodied in various other forms without departing from its spirit. In short, the invention includes all the modifications and embodiments coming within the scope of the following claims.

Having thus fully described the invention, what is claimed as new, and for which it is desired to secure Letters Patent, is:

1. In a radiator, a pair of headers, a plurality of tubes for connecting said headers, each of said tubes having a tapered tubular ferrule inserted in each end for engaging the inside of the outer walls of said headers to automatically spread said ends when the

headers are forced together, and thereby form water-tight joints.

2. In a radiator, a header having an opening in the inside wall thereof, a tube passing through said opening, and tube-spreading means located in the end of said tube for engagement with the inside of the outer wall of said header, whereby when the tube is forcibly driven into said header, the end of said tube will be enlarged to form a water-tight joint with said header.

3. In a radiator, a header having an opening in the inside wall thereof, a tube passing through said opening, and a tube-spreading ferrule located in the end of said tube for engagement with the inside of the outer wall of said header, whereby when the tube is forcibly driven into said header, the end of said tube will be enlarged to form a water-tight joint with said header.

4. In a radiator, a header having an opening in the inside wall thereof, a tube passing through said opening, and a tube-spreading ferrule located in the end of said tube for engagement with the inside of the outer wall of said header, whereby when the tube is forcibly driven into said header, the end of said tube will be enlarged to form a water-tight joint with said header, said ferrule having an opening in its outer end to permit the circulation of a heating fluid therethrough.

5. In a radiator, a header having an opening in the inside wall thereof, a tube passing through said opening, and a tube-spreading ferrule located in the end of said tube for engagement with the inside of the outer wall of said header, whereby when the tube is forcibly driven into said header, the end of said tube will be enlarged to form a water-tight joint with said header, said ferrule having a plurality of openings in its outer end to permit the circulation of a heating fluid therethrough.

6. In a radiator, a hollow header having parallel inner and outer sides, said inner side having an opening for a tube, an inwardly projecting boss surrounding and reinforcing said opening, a tube projecting through said opening and boss, a shouldered tubular ferrule in said tube, said tube having its inner end enlarged by driving it against said ferrule to form a water-tight locking flange.

7. In a radiator, a hollow header having an opening in one side, a tube extending through said opening, a tubular spreading ferrule in the end of said tube, said tube having a flange formed by forcibly driving it against said ferrule for sealing and locking it in position.

8. In a radiator, a hollow header having an opening in the side, a tube extending through said opening, a tubular spreading ferrule in the end of said tube and adapted to abut against the inside of the outer wall of said header, a boss surrounding and rein-

forcing the interior of said opening, said tube having a flange formed by forcibly driving said tube into said header.

9. The process of making a water-tight connection between a radiator tube and a hollow header which comprises inserting a tubular spreading ferrule in the end of said tube, placing the end of said tube and ferrule through an aperture in said header with the ferrule abutting against the inside of the outer wall of said header, and applying pressure upon said tube to spread the end thereof into contact with the edge of said aperture.

10. In a radiator, a hollow header having parallel inner and outer sides, said inner side having an opening for a tube, an inwardly projecting boss surrounding and reinforcing said opening, a tube projecting through said opening and boss, an expanding member within said header in alinement with said tube, said tube having its inner end enlarged by driving it against said expanding member to form a water-tight locking flange.

11. In a radiator, a header having an opening in the inside wall thereof, a tube passing through said opening, and tube-spreading means within said header located in alinement with the end of said tube for engagement with the inside of the outer wall of said header, whereby when the tube is forcibly driven into said header, the end of said tube will be enlarged to form a water-tight joint with said header.

12. In a radiator, a hollow header having an opening in one side, an inside boss surrounding and reinforcing said opening, a tube extending through said opening, a tubular spreading ferrule in the end of said tube, said tube having a flange formed by forcibly squeezing it between said ferrule and boss for sealing and locking it in position.

In testimony whereof I have affixed my signature to this specification.

GUSTAVE HILDING ANDERSON.