Sept. 15, 1959 L. H. GRENELL 2,903,763

FUSED ALUMINUM TO COPPER PIPE COUPLING

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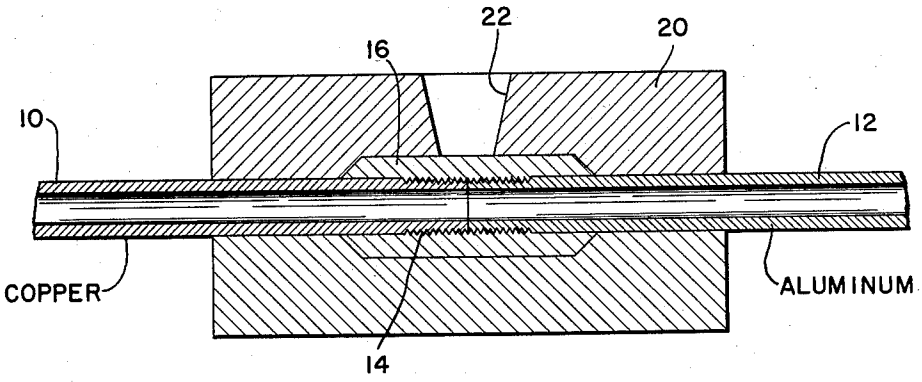


Fig. 1

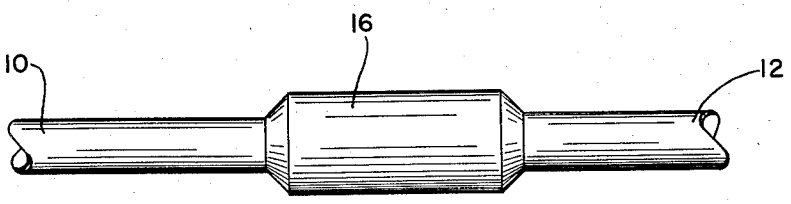


Fig. 2

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1 Claim. (Cl. 22—203)

This invention relates to refrigerating apparatus and more particularly to a method and means for joining a copper refrigerant line to an aluminum refrigerant line to form a leak proof joint.

It is an object of this invention to provide a joint between sections of copper and aluminum tubing which may be manufactured at a low cost by mass production methods.

Another object of this invention is to provide a joint between sections of copper and aluminum tubing which is capable of withstanding the pressures of the refrigerant system without danger of leakage.

A further object of this invention is to provide a means for joining unlike sections of tubing in the refrigerant system without the use of injurious fluxes which might contaminate the refrigerant within the system or which might cause corrosion of the joint if moisture should condense on the cold refrigerant line.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 is a vertical sectional view showing the manner in which an aluminum ferrule is cast around the meeting ends of aluminum and copper tubing; and,

Figure 2 is an elevational view showing the finished joint.

Referring now to the drawing wherein a preferred embodiment of the invention has been shown, reference numeral 10 generally designates a section of copper tubing which is adapted to be joined to a section of aluminum tubing 12. The meeting ends of the tubing are provided with a plurality of concentric thread-like formations 14 which terminate in thin pointed projections as shown. The ends of the tubing are then inserted into a cast or mold 20 having a top inlet opening 22.

An aluminum ferrule 16 is then cast about the threaded portions 14 by pouring molten aluminum into the mold 20. The mold is removed upon solidification of the aluminum which then forms a solid aluminum ferrule 16.

The purpose of the thread-like formations 14 is not only to provide a good mechanical interlock between the ferrule and the tube but also to cause fusion to take place between the aluminum ferrule 16 and the material forming the peaks of the thread-like formations 14. Thus there is formed between the ferrule and portions only of the formations 14 a combined mechanical and metallurgical bond which effectively prevents unscrewing either of the tubes from the ferrule after the joint has been completed. It is recognized that the melting point

of the copper is much higher than the melting point of aluminum and that the temperatures used in casting the ferrules 16 are not high enough to melt the copper but it has been found that intermetallic fusion takes place between the molten aluminum and the thin points of the thread-like portions 14 so as to provide a series of leak proof fused circular joints capable of withstanding the refrigerant pressures which may be encountered in a refrigerating system.

By virtue of using a relatively thick ferrule adjacent the copper tubing the amount of electrolytic action which may take place between the copper and the aluminum next to the copper is not enough to eat away the material forming the aluminum ferrule. Any corrosion caused by electrolytic action would first attack the aluminum which forms the ferrule and since the aluminum used in making the ferrule can be made of any desired thickness, it is obvious that the joints can be made heavy enough to last for the life of the refrigerating system.

By virtue of the fact that the meeting ends of the tube are machined during the process of forming the thread-like formations thereon, it is obvious that a very clean surface is provided which further facilitates forming a leak proof connection between the ferrule and the ends of the tubing.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claim which follows.

What is claimed is as follows:

The method of joining aluminum tubing to an abutting section of copper tubing which comprises forming a series of thin pointed projections on the outer surface of the ends of said tubes, abutting the ends of the tubes and casting an aluminum ferrule around the meeting ends of said tubes, the aluminum being in a molten state and of such a mass and at such a regulated maximum temperature that fusion and integration of a portion only of said projections with said molten aluminum will take place, and controlling the cooling point of said molten aluminum to a temperature where a substantial mass of said projections remains unfused with said molten aluminum whereby a mechanical and a metallurgical bond is had between said copper and aluminum tubing sections and said ferrule.

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