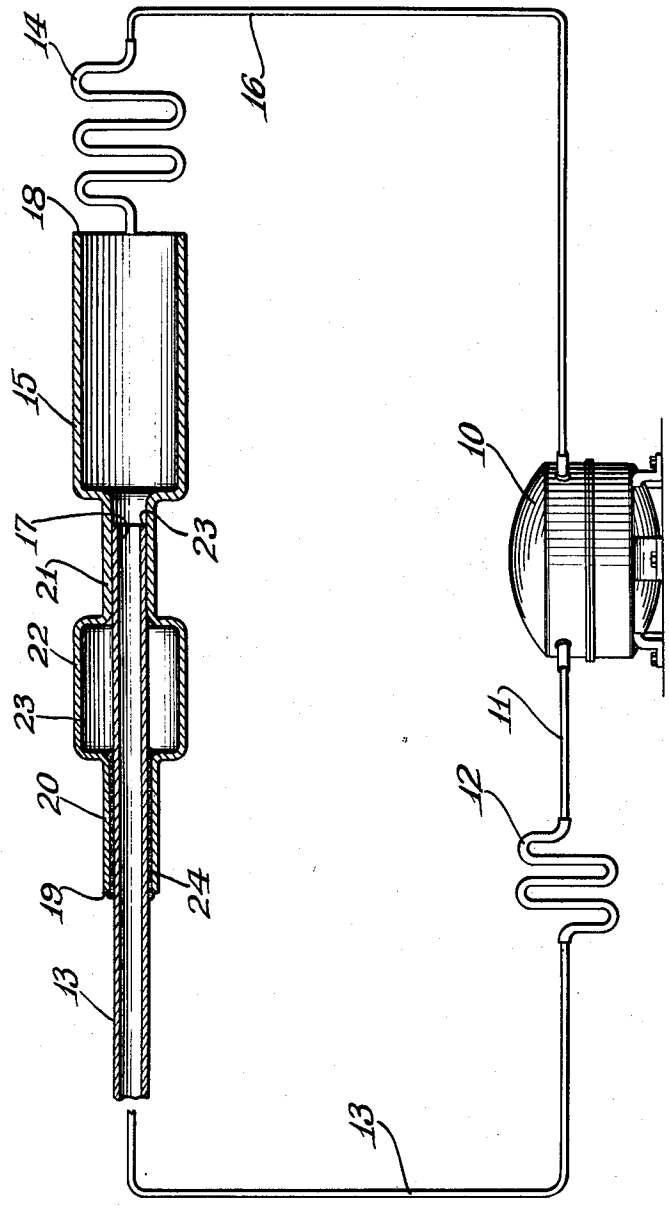
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TUBE JOINT IN REFRIGERATION SYSTEM

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TUBE JOINT IN REFRIGERATION SYSTEM

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1 Claim. (Cl. 62—127)

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This invention relates generally to tube joints and more particularly to a joint between an evaporator inlet tube and a restrictor tube of a refrigeration system.

In a refrigeration system having a restrictor tube, commonly termed capillary tube, for controlling the flow of refrigerant to an evaporator, the problem of excessive evaporator noise has been encountered. It has been found that this noise originates at the outlet of the restrictor tube. As the refrigerant flows from the small bore of the capillary tube into the larger bore of the evaporator inlet tube, it expands instantly and causes a great amount of turbulence. It is common in the art to braze the restrictor tube to the evaporator inlet tube at a point spaced from the end of the restrictor tube in order to prevent the bonding material from flowing over the end of the restrictor tube and closing the bore of the restrictor tube. In such a design, the end portion of the restrictor tube is unsupported and the turbulence set up by the expanding refrigerant causes the end portion to vibrate severely. This vibrating end portion strikes the evaporator inlet and causes an objectionable noise which is amplified considerably by the evaporator. Accordingly, it is an object of the present invention to provide a simplified and easily assembled joint between a restrictor tube and an evaporator inlet tube whereby the end of the restrictor tube will be securely supported in a manner which will prevent any bonding material from closing the bore of the restrictor tube.

Further objects and advantages of the present invention will be readily understood by reference to the following specification and claim and to the drawing which accompany and form a part of the specification and in which the single figure is a diagrammatic view of a refrigeration system showing a tube joint, which embodies features of the invention, in vertical central section and on a larger scale.

Referring now to the drawing, there is illustrated a hermetically sealed refrigerating system comprising a motor-compressor unit 10 which compresses the refrigerant and then delivers it through a conduit 11 to a condenser 12. The refrigerant is liquefied in the condenser 12 and then conducted by a capillary or restrictor tube 13 through an evaporator inlet tube 15 into the evaporator 14. Refrigerant vaporized in the evaporator 14 is withdrawn therefrom through a conduit 16 and returned to the motor-compressor unit 10.

The restrictor tube 13 has an internal diameter

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of only a few thousandths of an inch in order that the flow of refrigerant therethrough is restricted. In the manufacture of hermetically sealed refrigeration systems which employ restrictor tubes, an end portion of the restrictor tube is generally brazed to the evaporator inlet tube in order to provide a gas-tight joint. The joint should be made in such a manner that the internal diameter of the restrictor tube will not be closed by the bonding material and the end of the restrictor tube will be securely supported. If a path were open for the bonding material to follow to the end of the restrictor tube, there is the possibility that it would flow over the end and obstruct the bore of the restrictor tube. Since this bore is only a few thousandths of an inch in diameter, the slightest trace of bonding material would prevent the proper performance of the refrigerant as it issues from the restrictor tube.

In the present invention the evaporator inlet tube 15 serves as the outer member of the joint into which the inner member or restrictor tube 13 extends. One end 18 of the evaporator inlet tube is secured to the evaporator 14 in any suitable manner. The other end 19 of the evaporator inlet tube is swaged down to provide a reduced rib-like portion 20 having an inner diameter a few thousandths of an inch larger than the outer diameter of the restrictor tube 13. The evaporator inlet tube 15 is provided with a second reduced rib-like portion 21 spaced inwardly from the reduced portion 20 having an inner diameter slightly larger than the outer diameter of the restrictor tube 13. The portion of the evaporator inlet tube 22 between the reduced portions 20 and 21 is shaped like an annular groove and forms a chamber or reservoir 23 around the restrictor tube 13.

In assembling the joint, the restrictor tube 13 is first fluxed and then inserted into reduced portions 20 and 21 with the end 23 of the restrictor tube terminating within the confines of reduced portion 21. A bonding material 24 is then applied around the restrictor tube 13 adjacent the outer edge 19 of the evaporator inlet tube and heat is applied to the joint. Since the clearance between restrictor tube 13 and reduced portion 20 is of capillary thickness, the bonding material 24 will flow therebetween and distribute itself throughout by capillary attraction. In the drawing the clearance between the restrictor tube 13 and reduced portion 20 has been exaggerated in order to show the bonding material 24 therebetween. Any bonding material which flows beyond the reduced portion 20 will run into and

collect in reservoir 23. The reservoir is of sufficient size to hold any excess bonding material and there will be no possibility of the bonding material flowing between reduced section 21 and restrictor tube 13 and over the end 23 of the restrictor tube. Therefore, the internal diameter of restrictor tube 17 will be free of any bonding material.

Reduced portion 21 has an internal diameter which is slightly larger than the outer diameter of restrictor tube 13 in order that the end 23 of the restrictor tube may be easily inserted therein. Since the clearance therebetween is small, the reduced portion 21 will grip the end 23 and hold it securely in place so that any turbulence set up as the refrigerant issues from the restrictor tube will not cause the end 23 of the restrictor tube to vibrate.

While only one embodiment of the invention has been specifically shown and described in this application, it will be understood that this embodiment is merely for the purpose of illustration and description and that various other forms may be devised within the scope of the invention as defined in the appended claim.

What is claimed is:

In a refrigeration system, an evaporator, a metering device, said metering device comprising a length of capillary tubing, means for supplying refrigerant to one end of said capillary tubing and for drawing refrigerant from one end of said evaporator, means interconnecting the other end of said capillary tubing and the other end of said evaporator, said means consisting of two annular reduced portions of said other end of said evaporator, one of said reduced portions positioned at the extremity of said other end of said evaporator and the other of said reduced portions spaced some distance from said one of said reduced portions, the portion of said other end of said evaporator positioned between said reduced portions being undisturbed, said restrictor tube mounted to extend through said

first reduced portion, through said undisturbed portion, and terminating within said second reduced portion, whereby the end of said capillary tube is held in a fixed position and the internal circumference of said joint increases in steps from the end of said capillary tube, to said second reduced portion, to said evaporator, so that vibrations of the end of said capillary tube and turbulence of said refrigerant flowing from the end of said capillary tube are minimized, a bonding material disposed longitudinally of the outer surface of said capillary tube and the inner surface of said first reduced portion between the ends of said first reduced portion, said undisturbed portion of said other end of said evaporator serving to collect any excess bonding material flowing from between said first reduced portion and said capillary tube, said undisturbed portion of said other end of said evaporator being substantially greater in volume than the volume of any excess bonding material, whereby none of said excess bonding material flows between said capillary tube and said second reduced portion.

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