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CAPILLARY ADAPTOR

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Fig. 1.

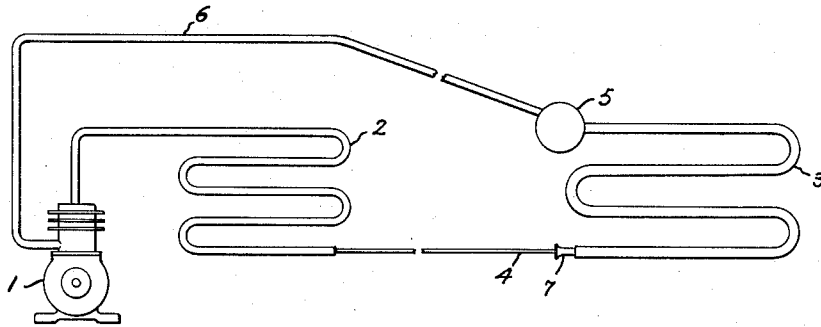
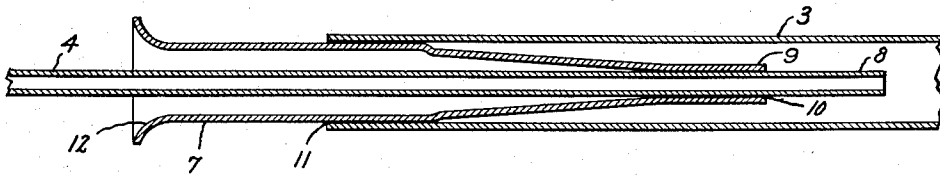


Fig. 2.



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CAPILLARY ADAPTOR

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2 Claims. (Cl. 62—126)

My invention relates to refrigerating systems and more particularly to capillary adaptors for use in such systems.

In many present day refrigerating systems a restricting, or capillary, tube is employed between the condenser and the evaporator thereof for metering flow of refrigerant and for maintaining the desired pressure difference between the condenser and the evaporator. This capillary tube consists of a substantial length of tubing of relatively small diameter so as to effect the necessary pressure drop. On the other hand, the tubing of the evaporator to which the capillary tube is connected is of a substantially greater diameter since it is necessary to provide for relatively easy flow of refrigerant through the evaporator, and particularly it is necessary that the diameter be of sufficient size that blocking of flow is not effected as a result of vaporization of refrigerant in the evaporator. It is customary to provide an adaptor for connecting the relatively small capillary tube to the larger tubing of the evaporator. In accordance with my invention, the adaptor is arranged so that a predetermined length of capillary projects beyond the end thereof and so that the adaptor itself serves to limit the movement of the capillary during handling in the assembly operation so as to minimize strain on the brazed joint between the capillary and the adaptor.

It is an object of my invention to provide an improved assembly including an adaptor for connecting a capillary tube to tubing of larger diameter.

It is another object of my invention to provide an improved arrangement for minimizing noise in refrigerating systems.

It is a further object of my invention to provide an adaptor assembly which limits the strain on the joint between the capillary tube and the adaptor.

It is still another object of my invention to provide an improved method for assembling an adaptor to connect a capillary tube and evaporator tubing of larger diameter.

Further objects and advantages of my invention will become apparent as the following description proceeds and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

In carrying out the objects of my invention, the capillary tube is assembled to extend through the length of the adaptor and a predetermined distance beyond the small end thereof, and the capillary tube is brazed to the adaptor at this small end. This assembly of the capillary tube and the adaptor is then inserted within the end of the evaporator tube with the small end of the adaptor and the projecting end of the capillary tube extending into the evaporator tubing. The assembly is completed by brazing the large end of the adaptor to the evaporator tubing.

For a better understanding of my invention, reference may be had to the accompanying drawing in which

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Fig. 1 is a schematic diagram of a refrigerating system incorporating an embodiment of my invention.

Fig. 2 is an enlarged sectional view of a portion of the refrigerating system of Fig. 1 showing the adaptor arrangement.

Referring to Fig. 1, there is shown a hermetically-sealed refrigerating system which includes a refrigerating unit 1 from which compressed refrigerant is discharged to a condenser 2. Liquefied refrigerant is discharged from the condenser 2 and supplied to the evaporator 3 through a restricting, or capillary, tube 4. Vaporized refrigerant collects in a header 5 of the evaporator and is returned to the refrigerating unit 1 through a section line 6.

A capillary tube is used in many present day refrigerating systems for metering liquid refrigerant from the condenser to the evaporator and for maintaining the necessary pressure drop between the condenser and the evaporator. To accomplish these results, the capillary tube 4 is of substantial length and is necessarily of relatively small diameter. On the other hand, the evaporator 3, which may be of the type widely used at present, is made from tubing or conduit which is of a substantially larger diameter than the capillary tube 4. This is necessary in order that ready flow of refrigerant through the passes of evaporator 3 be permitted and in order that vaporization of refrigerant in the evaporator not cause any substantial blocking of flow therethrough. An adaptor 7 is provided for connecting the small capillary tube in sealed relationship with the much larger tubing of the evaporator 3.

The specific construction shown is illustrated in Fig. 2. As there shown, the adaptor comprises an elongated tapering tube of substantial length. The capillary tube 4 extends entirely through the length of the adaptor 7 and the end 8 of the capillary tube projects a predetermined distance beyond the small end 9 of the tapering adaptor 7. The capillary tube 4 is brazed or otherwise secured to the small end 9 of the adaptor, as indicated at 10, to form a sealed joint at this point. The large diameter end of the adaptor 7 is brazed or otherwise secured, as indicated at 11, to the end of the tubing or conduit of the evaporator 3 to provide a sealed joint at this point. The end of the adaptor may extend beyond the end of the tubing of the evaporator 3, as shown in Fig. 2, and includes a flared mouth 12.

Brazing of the capillary tube at 10 removes some of the temper from the tube and somewhat weakens the tube. It will be realized that refrigerating systems of the type disclosed receive a substantial amount of handling during assembly thereof within refrigerator cabinets, freezers, or the like, and there is necessarily, with the length of tubing involved, a bending force applied to the tubing. Repeated bending of the capillary tube during such assembly of the refrigerating system, particularly bending through a substantial arc as is possible with conventional assemblies, may in some cases cause a breaking of the capillary tube in the region of the brazed area 10. By the arrangement here disclosed, however, the capillary tube in the region extending from this brazed area 10 is enclosed within the surrounding adaptor 7 for a substantial distance and the maximum bending of the capillary tube, insofar as this bending is applied at the joint 10, is limited by engagement of the capillary tube with the mouth 12 of the adaptor.

In conventional systems, it has been customary to seal the large end of the adaptor to the end of the evaporator tubing with the small end of the adaptor projecting beyond the end of the evaporator tubing. It has then been customary to merely insert the end of the capillary tube into the small end of the adaptor, brazing the capillary tube to this small end. It can be seen that this type of

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construction provides no limit for the bending of the capillary tube during the subsequent operations of assembling the system in an appropriate cabinet and this bending force, in large measure, is applied to the weakened area in the region of the brazed joint between the capillary tube and the adaptor. A tendency toward breakage of the capillary tube in the weakened brazed area and the resultant breaking of the seal of the hermetic system is minimized by the strain-limiting adaptor arrangement of my invention.

In the conventional arrangement described above, moreover, it is impossible to tell with any degree of accuracy the extent to which the free end of the capillary tube projects into the adaptor from the small end thereof. Since this free end of the capillary tube has a tendency to vibrate, acting somewhat as a reed at low natural frequency an unduly great length projecting into the adaptor gives rise to an undesirably high noise level. By the adaptor arrangement of my invention, the capillary tube extends entirely through the adaptor, and the free end of the capillary tube extends beyond the small end of the adaptor. The exact length of capillary tube so projecting is, therefore, clearly visible at the time the brazed joint is made. The capillary tube can therefore easily be made to project any desired predetermined distance beyond the end of the adaptor.

In making the assembly shown in Fig. 2, the capillary tube is first inserted from the large end of the adaptor 7 in a manner to extend entirely through the adaptor with the end 8 of the capillary tube projecting or extending slightly beyond the small end 9 of the adaptor. At this point in the manufacture of the assembly, the length of capillary tube so projecting can be clearly determined by easy inspection and this length is set to the desired amount previously determined. The end 9 of the adaptor is then brazed, as indicated at 10, to the capillary tube 4 to form a sealed joint. After this operation has been completed, the assembly including the capillary tube and the adaptor is inserted in the end of the tubing of the evaporator 3 with the projecting end 8 of the capillary tube and the small end 9 of the adaptor 7 projecting into the tubing of the evaporator. The large end of the adaptor 7 is then brazed, as indicated at 11, to the evaporator tubing to form a sealed joint at that point. It can be seen that the length of capillary tube projecting beyond the small end 9 of the adaptor can be set exactly since it is clearly visible for inspection at the time this portion of the assembly is being made. It can be seen further that with the construction employed which includes an adaptor of substantial length and with a capillary tube extending through the full length of this adaptor, the bending of the capillary tube and the strain imported to the brazed joint 10

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thereby is limited by engagement of the capillary tube with the large end or mouth 12 of the adaptor 7.

While I have shown and described a specific embodiment of my invention, I do not desire my invention to be limited to the particular construction shown and described and I intend by the appended claims to cover all modifications within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a refrigerating system, a capillary tube, an evaporator including continuous tubing of larger diameter than said capillary tube, an adaptor for connecting said capillary tube and said evaporator tubing, said adaptor comprising an elongated tapering tube, said capillary tube extending through said adaptor and projecting a predetermined distance beyond the small end of said adaptor, said small end of said adaptor being brazed to said capillary tube said adaptor being assembled in said evaporator tubing with the small end of said adaptor and the projecting end of said capillary tube extending into said evaporator tubing, the larger end of said adaptor being brazed to the end of said evaporator tubing adjacent the point of maximum taper diameter, said larger end of said adaptor extending a substantial distance beyond the end of said evaporator tubing to limit the bending movement of said capillary tube.

2. In a refrigerating system, a capillary tube, an evaporator including continuous tubing of larger diameter than said capillary tube, an adaptor for connecting said capillary tube and said evaporator tubing, said adaptor comprising a tapering tube of said substantial length, said capillary tube extending through said adaptor and projecting a predetermined distance beyond the small end of said adaptor, said small end of said adaptor being brazed to said capillary tube, said adaptor being assembled in said evaporator tubing with the small end of said adaptor and the projecting end of said capillary tube extending into said evaporator tubing, the larger end of said adaptor being brazed to the end of said evaporator tubing adjacent the point of maximum taper diameter, said larger end of said adaptor extending a substantial distance beyond the end of said evaporator tubing and terminating in a flared mouth, said capillary tube engaging said flared mouth after a predetermined bending movement of said capillary tube for limiting said bending movement and for limiting strain on the brazed portion of said capillary tube.

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