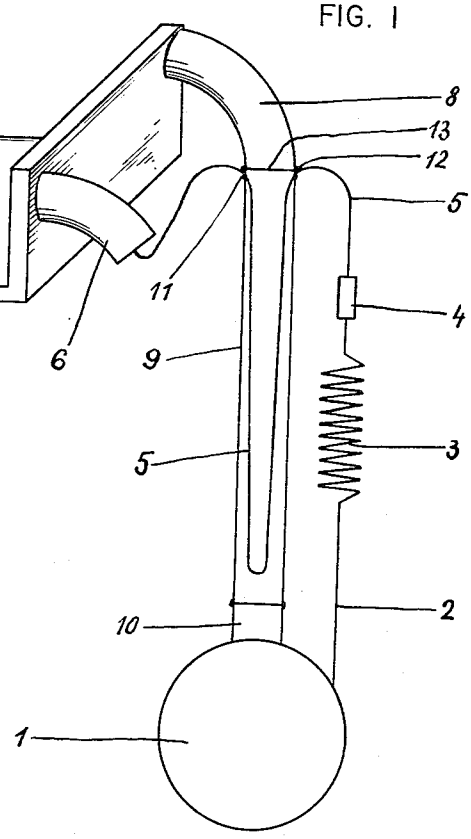
July 10, 1962 G. SARUKHANIAN 3,043,119

REFRIGERANT CIRCULATION SYSTEM

Filed Jan. 21, 1960

FIG. 1



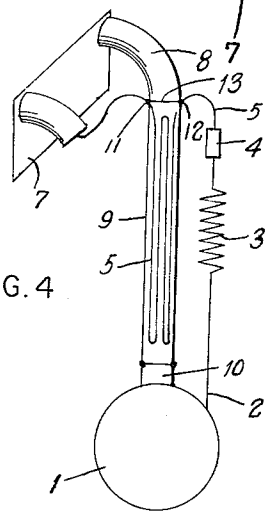
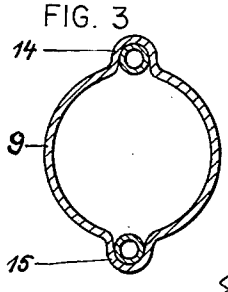


FIG. 4

FIG. 3



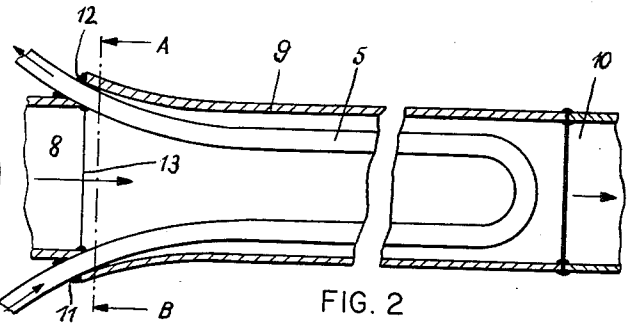


FIG. 2

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REFRIGERANT CIRCULATION SYSTEM

Georg Sarukhanian, Berlin-Charlottenburg, Germany, assignor to Siemens-Electrogerate Aktiengesellschaft, Berlin, Germany, a corporation of Germany

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9 Claims. (Cl. 62—513)

My invention relates to refrigerators of the compression type.

Such refrigerators, as a rule, have a capillary tube connecting the condenser with the evaporator for maintaining the necessary difference in pressure. The refrigerant condensate passing through the tube to the evaporator has a comparatively high temperature. It is known to precool the condensate by exchange of heat from the refrigerant vapor passing from the evaporator to the compressor. For this purpose the capillary tube has been soldered to the exterior wall of the compressor suction conduit, or has been mounted so that a portion of the tube length passes through the interior of the conduit.

My invention, relating to refrigerating apparatus of the type having a capillary tube passing through the interior of the suction conduit, has for its object to secure a more intensive heat exchange between the condensate and the cold refrigerant vapor flowing back to the compressor. another object, akin to the one just mentioned, is to improve the refrigerating apparatus in manufacturing respects by reducing the number of solder joints in the coolant circulating system.

According to my invention the portion of the capillary tube located in the interior of the suction conduit is made longer than the conduit. According to a more specific feature, the portion of the capillary tube located in the suction conduit between evaporator and compressor is given the shape of a hairpin loop, or, if desired, is shaped to a plurality of loop or hairpin turns within the suction conduit.

According to another feature of the invention, the portion of the capillary tube within the suction duct is so dimensioned and mounted that points where the capillary tube enters and leaves the suction conduit are located at the same side of the suction conduit, preferably at the evaporator side. As a result, practically a single soldering joint at the evaporator side of the suction conduit suffices for connecting the suction conduit with the evaporator and for also fastening and sealing both ends of the capillary tube where they enter into and pass out of the suction conduit.

By thus placing the capillary tube in form of a hairpin loop into the suction tube, a considerably greater proportion of the total tube length can be accommodated within the suction conduit and a correspondingly incerased heat exchange between the warm condensate and the cold refrigerant gas returning to the compressor is attained. When mounting the capillary tube in several hairpin loops within the correspondingly dimensioned cross section of the suction conduit, substantially the entire length of the capillary tube can be placed into the conduit. This has the further advantage that the capillary tube, enclosed in the suction conduit, is well protected from external mechanical stresses as may occur for example when transporting the apparatus.

At the location where, according to one of the above-mentioned features, the two ends of the capillary tube enter and leave the suction conduit, the conduit may be given a widened cross section in a manner known as such.

The invention is applicable for suction conduits of copper, aluminum, steel or any other material.

The foregoing and other advantages and features of my invention will be apparent from the embodiments described in the following with reference to the accompanying drawing in which:

FIG. 1 shows schematically a refrigerant circulation system improved in accordance with the invention.

FIG. 2 is a partly sectional view of the suction conduit and of the capillary tube in the system of FIG. 1; and

FIG. 3 is a cross section along the line A—B in FIG. 2.

FIG. 4 shows a modification of a refrigerant system shown in FIG. 1.

Denoted by 1 in FIG. 1 is the compressor-motor capsule of the refrigerator. During operation, the compressed coolant passes through a pressure line 2 into the condenser 3. The outlet end of the condenser is connected to a dryer cartridge 4 from which the liquefied coolant passes through a capillary tube 5 to the inlet duct 6 of the evaporator 7. The evaporated coolant leaves the evaporator through an outlet duct 8 and enters into the suction conduit 9 from which it passes through the suction inlet duct 10 of the capsule 1 back to the compressor.

For securing a particularly effective heat exchange between the warm coolant condensate and the cold coolant vapors passing through the suction conduit 9, the capillary tube 5 within the suction conduit 9 has a bent, hairpin-like shape, so that the entrance and exits points 11 and 12 of the capillary tube and the junction of the evaporator gas-outlet duct 8 are located at the same end of the suction conduit 9. Consequently a single solder junction suffices to connect and seal the suction conduit 9 with the evaporator outlet duct 8 and to also fasten and seal the two penetration points of the capillary 5 to the conduit, as is particularly apparent from FIG. 2.

Indicated in FIG. 2 by arrows is the flow direction of the coolant. The end of the suction conduit 9 at the evaporator side is widened, at the locations denoted in FIG. 3 by 14 and 15, for facilitating the insertion and fastening of the capillary-tube ends in the suction conduit. Denoted by 11, 12, 13, are the locations where a single solder joint is sufficient for fastening the tube 5 to the conduit 9 and for simultaneously fastening the conduit 9 to the gas-outlet duct 8 of the evaporator.

It will be apparent that by virtue of the hairpin shape, a considerably greater proportion of the total tube length can be accommodated in the suction conduit so that an especially intensive heat exchange between the warm condensate liquid and the cold refrigerant vapors is obtained.

It will be obvious to those skilled in the art, upon a study of this disclosure, that my invention permits of various modifications with respect to design and mounting features and hence may be given embodiments other than particularly illustrated and described herein, without departing from the essential features of my invention and within the scope of the claims annexed hereto.

I claim:

1. A refrigerant circulation system comprising a compressor capsule having inlet and outlet ducts, an evaporator having an inlet and outlet, a suction conduit extending between said capsule inlet duct and said evaporator outlet, a condenser connected to said capusle outlet duct, a capillary tube connecting said condenser with said evaporator inlet and having a loop-shaped elongated portion extending longitudinally within said suction conduit, said capillary tube having respective entrance and exit ends which are both located at the evaporator side of said conduit, said conduit having a flaring end portion at its evaporator side, and said tube ends being located in said flaring end portion, and a single solder joint bonding said ends to said conduit and said conduit to said evaporator outlet.

2. A refrigerant circulation system comprising a compressor capsule having inlet and outlet ducts, an evapo-

rator having an inlet and outlet, a suction conduit extending between said capsule inlet duct and said evaporator outlet, a condenser connected to said capsule outlet duct, a capillary tube connecting said condenser with said evaporator inlet and having a hairpin-shaped elongated portion extending longitudinally within said suction conduit, said capillary tube having respective entrance and exit ends which are both located at the evaporator side of said conduit, said conduit having a flaring end portion at its evaporator side, and said tube ends being located in said flaring end portion, and a single solder joint bonding said ends to said conduit and said conduit to said evaporator outlet.

3. A refrigerant circulation system comprising a compressor capsule having inlet and outlet ducts, an evaporator having an inlet and outlet, a suction conduit extending between said capsule inlet duct and said evaporator outlet, a condenser connected to said capsule outlet duct, a capillary tube connecting said condenser with said evaporator inlet and having a plurality of hairpin-shaped loops extending longitudinally within said suction conduit and having respective entrance and exit ends which are both located at the evaporator side of said conduit, said conduit having a flaring end portion at its evaporator side, and said tube ends being located in said flaring end portion, and a single solder joint bonding said ends to said conduit and said conduit to said evaporator outlet.

4. A refrigerant circulation system comprising a compressor, a condenser connected to said compressor, an evaporator, a suction conduit connecting said evaporator with said compressor, said conduit having end portions respectively connected to said evaporator and said compressor and forming junctions with said evaporator and said compressor, a capillary tube connecting said condenser with said evaporator and having a loop-shaped elongated portion extending longitudinally within said suction conduit, said capillary tube having respective entrance and exit ends which are both secured in the same one of said end portions and extend through the respective junction.

5. A refrigerant circulation system comprising a compressor, a condenser connected to said compressor, an evaporator, a suction conduit connecting said evaporator with said compressor, said conduit having an end portion connected to said evaporator and forming a junction therewith, a capillary tube connecting said condenser with said evaporator and having a loop-shaped elongated portion extending longitudinally within said suction conduit, said capillary tube having respective entrance and exit ends which are both located in said evaporator end portion and extend through the beforementioned junction.

6. A refrigerant circulation system comprising a compressor, a condenser connected to said compressor, an evaporator, a suction conduit connecting said evaporator with said compressor, said conduit having an end portion connected to said evaporator and forming a junction

therewith, a capillary tube connecting said condenser with said evaporator and having a loop-shaped elongated portion extending longitudinally within said suction conduit, said capillary tube having respective entrance and exit ends which are both secured in said evaporator end portion and extend through said junction, and a single solder joint bonding said ends to said conduit and said conduit to said evaporator.

7. A refrigerant circulation system comprising a compressor, a condenser connected to said compressor, an evaporator, a suction conduit connecting said evaporator with said compressor, said conduit having an end portion connected to said evaporator and forming a junction therewith, a capillary tube connecting said condenser with said evaporator and having a loop-shaped elongated portion extending longitudinally within said suction conduit, said capillary tube having respective entrance and exit ends which are both secured in said end portion at said junction, said capillary tube extending longitudinally within said suction conduit over substantially the entire length of said conduit.

8. A refrigerant circulation system comprising a compressor, a condenser connected to said compressor, an evaporator, a suction conduit connecting said evaporator with said compressor, said conduit having an end portion connected to said evaporator and forming a junction therewith, a capillary tube connecting said condenser with said evaporator and having a hairpin-shaped elongated portion extending longitudinally within said suction conduit, said capillary tube having respective entrance and exit ends which are both secured in said end portion at said junction, said capillary tube extending longitudinally within said suction conduit over substantially the entire length of said conduit.

9. A refrigerant circulation system comprising a compressor capsule having inlet and outlet ducts, an evaporator having an inlet and an outlet, a single-piece suction conduit extending between said capsule inlet duct and said evaporator outlet, a condenser connected to said capsule outlet duct, said conduit having end portions respectively connected to said evaporator and said compressor and forming junctions with said evaporator and said compressor, a capillary tube connecting said condenser with said evaporator inlet and having a loop-shaped elongated portion extending longitudinally within said suction conduit, said capillary tube having respective entrance and exit ends which are both secured in the same one of said end portions and extend through the respective junction.

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