March 16, 1937. W. L. BIRD 2,073,863

CAPILLARY TUBE DEVICE

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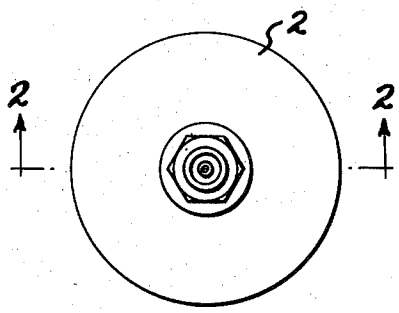

FIG. 1.

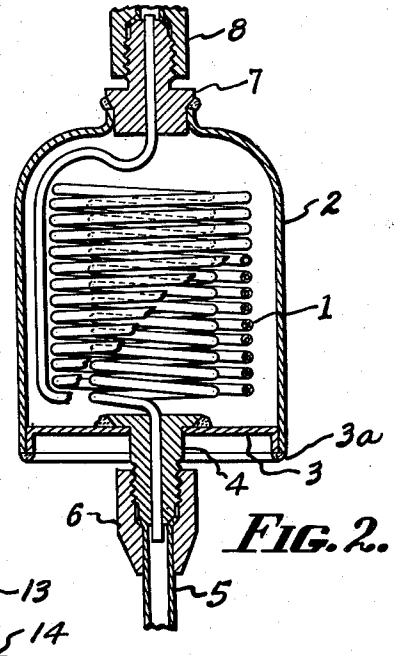

FIG. 2.

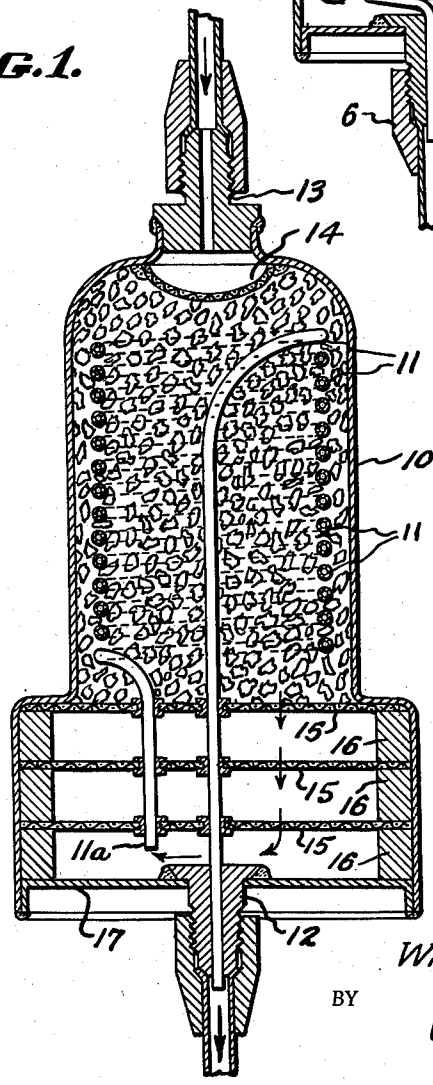

FIG. 3.

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CAPILLARY TUBE DEVICE

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7 Claims. (Cl. 138—41)

My invention relates to capillary tube devices as used in refrigerators, particularly domestic refrigerators, for control of the passage of condensed refrigerant from the condenser parts to the evaporator parts of the refrigeration unit.

In the past the capillary tube has been used with success for the purpose indicated, but is subject to a defect which has given rise to some trouble. If the capillary tube becomes punctured for any reason, either because of defective nature, or from an accident arising during manufacture, shipment, or use, the refrigerant will leak out, and also the pressure balance of the system will be ruined.

It is in order to obviate the results of such puncturing of the capillary tube that my invention is directed. Also, incident to my structure, it becomes practical to house the entire capillary tube together with drying agents and screens, in a compact and strong housing.

I accomplish my objects by that construction and arrangement of parts of which several examples will be described, the novelty inherent therein being set forth in the appended claims, to which reference is hereby made.

In the drawing:—

Fig. 1 is a top plan view of one of my devices.

Fig. 2 is a central vertical section of the device illustrated in Fig. 1.

Fig. 3 is a modification of the device of Fig. 1, in which other desirable adjuncts to the capillary tube are installed together with the tube in the device.

Referring first to Figs. 1 and 2, the capillary tube, to the full length that it is employed in the refrigeration unit, is indicated at 1, formed into a compact coil and enclosed in a sealed housing. The housing is formed of a shell 2, with a flanged closing plate 3, set into the shell and welded thereto along the abutting exposed edges as indicated at 3a. In the plate 3 is a suitable fitting 4, to which is connected the tube 5 from the condenser by means of a coupling piece 6. The capillary tube is housed in the fitting, as shown, and passes out through the shell through the fitting 7, which is set into the upper end of the shell, and welded in place. A coupling 8 serves to secure the outlet pipe to the evaporator, about the fitting. In this construction either end can be the inlet, and the other the outlet.

As so constructed, if the capillary tube springs a leak, the refrigerant will fill the shell, and cannot escape therefrom. After the shell is filled, the capillary tube functions as it did before the leak occurred.

By this construction the trouble of defective capillary tubes is done away with, and in addition, the tube is protected in use against any chance accident.

In the form shown in Fig. 3, I have added other features to the device. It is desirable to cause the refrigerant to pass through screens prior to entering the capillary tube. It is also desirable to have any moisture withdrawn therefrom. To these ends I provide a larger shell 10. This shell has a capillary tube therein as indicated at 11. The outlet end of this tube passes out through a fitting 12, as in the first instance. The inlet end of the capillary tube is exposed near the base of the shell and receives the refrigerant from the contents of the shell.

The refrigerant is led into the shell through the fitting 13, there being a small screen 14 welded in place on the inside of the shell about the fitting opening to confine the drying chemical. The shell is filled with a drying chemical, such as aquavated alumina, which surrounds the coiled capillary tube and fills the spaces left within its coils.

Below the point where the main body of the tube coil is housed, I provide for a series of screens 15, set between rings 16 so as to form, say, three screening surfaces for filtering the refrigerant. The shell is closed by a flanged base plate 17, as in the first instance.

The inlet end 11a of the capillary tube is exposed below the screens, however many there are, and the outlet end of the tube extends down from the upper portion of the coil so as to be secured in the outlet fitting 12 as already noted.

The result of this structure is that the refrigerant is dried and filtered within the shell, and that any breakage of the capillary tube resulting in a leak will not affect the operation of the device. The interior of the shell will always be filled with refrigerant, and the entire length of the tube will have to be traversed by the refrigerant.

In these two examples, I have provided against defective operation of the refrigeration units due to leaky capillary tubes, and have protected the tubes. Of course if several breaks occurred in a capillary tube, it might be that some of the refrigerant would shunt a length of the tube. However, since the orifice of any leak in the tube will be quite small, the resistance to flow will be great, where the refrigerant passes through the puncture and once the shell is filled with lubricant, any series of punctures could have little or no

effect in shunting the operation of the full length of the coil.

It will be evident that various structural modifications could be made within the general principles of the structures described, and I do not wish to be limited in my invention on account thereof.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is:—

1. In a refrigeration system, a capillary tube, a shell surrounding the tube, and closed so as to permit exit of refrigerant from said shell only through the tube.

2. In a refrigeration system, a capillary tube formed in a coil, a shell surrounding said coil and closed so as to permit exit of refrigerant from said shell only through the tube.

3. In a refrigeration system, a capillary tube, a shell surrounding the tube and closed so as to permit exit of refrigerant from said shell only through the tube, and an entrance opening in the shell for connecting the capillary tube to a supply of refrigerant.

4. In a refrigeration system, a capillary tube, a shell surrounding the tube and closed so as to permit exit of refrigerant from said shell only through the tube, and means for conducting refrigerant to the tube in said shell.

5. In a refrigeration system, a capillary tube, a shell surrounding the tube and closed so as to permit exit of refrigerant from said shell only through the tube, and means for conducting refrigerant to the tube in said shell, the inlet end of the tube being exposed in the said shell.

6. In a refrigeration system, a capillary tube, a shell surrounding the tube and closed so as to permit exit of refrigerant from said shell only through the tube, means for conducting refrigerant to the tube in said shell, the inlet end of the tube being exposed in the said shell, and screens located in said shell between the inlet end of the tube and the means for conducting refrigerant into said shell.

7. In a refrigeration system, a capillary tube, a shell surrounding the tube and closed so as to permit exit of refrigerant from said shell only through the tube, means for conducting refrigerant to the tube in said shell, the inlet end of the tube being exposed in the said shell, screens located in said shell between the inlet end of the tube and the means for conducting refrigerant into said shell, and a body of drying material for the refrigerant located in another portion of the shell.

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