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TEMPERATURE RESPONSIVE ELEMENT

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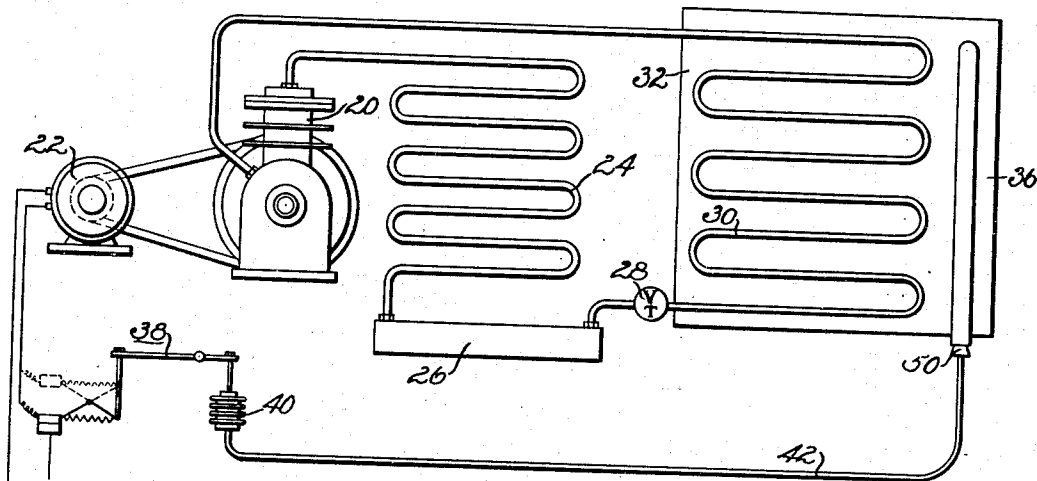


Fig. 1

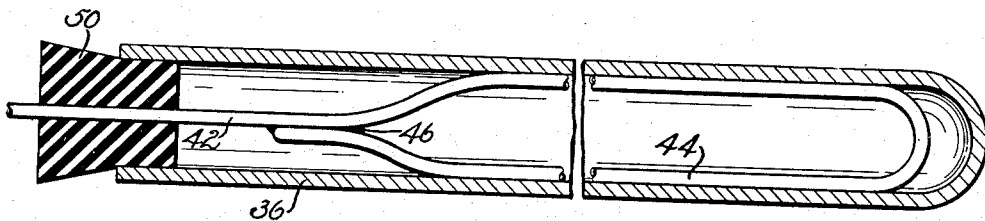


Fig. 2

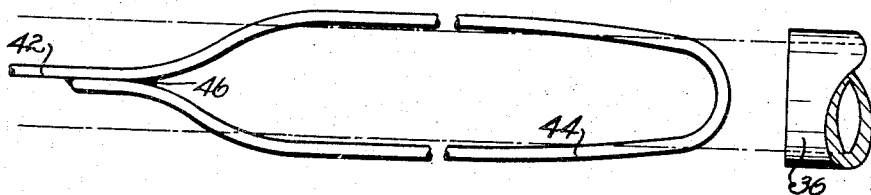


Fig. 3

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TEMPERATURE RESPONSIVE ELEMENT

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3 Claims. (Cl. 297—3)

This invention relates to the fluid type of temperature responsive elements for refrigerating apparatus and other applications.

Heretofore, such temperature responsive elements generally were formed of capillary tubing provided with a larger bulb at the end thereof. This construction is somewhat expensive, especially under the present conditions. Various attempts have been made to wrap the capillary tube at its end to approximate a bulb. Such forms involve a wrapping problem and, where a well is used, they do not provide very good contact with the well.

It is an object of my invention to provide an end upon a capillary tube which will fit into a well and provide good thermal contact with the well.

It is another object of my invention to provide an end upon a capillary tube which will press firmly against the interior walls of the well over a considerable length of tubing to provide good thermal contact.

It is another object of my invention to provide an end of a capillary tube which will use the inherent spring or elasticity of the tubing to press sections of the tubing tightly against the interior walls of a well.

These objects are attained by providing a closed loop upon the end of the capillary tube which is slightly larger than the well so that the well will receive the looped end in a compressed condition.

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

In the drawing:

Fig. 1 is a diagrammatic view of a refrigerating system embodying one form of my invention;

Fig. 2 is an enlarged sectional view of the looped end of the capillary tubing in the well as shown in Fig. 1; and

Fig. 3 is a view of the looped end as it is withdrawn from the well.

Referring now to the drawing, there is shown a refrigerating system including a compressor 20 driven by an electric motor 22 for compressing the refrigerant and for forwarding the compressed refrigerant to a condenser 24 where it is liquefied. The liquefied refrigerant is collected in a receiver 26 and conducted, under the control of a suitable expansion valve 28, to an evaporating means 30, shown bonded to the walls of a container 32 to be kept cool. The refrigerant

evaporates within the evaporator 30 under reduced pressure and is returned to the compressor 20. The container 32 is provided with a well 36 in intimate contact therewith. The operation of the system is controlled by a snap-acting switch means 38 connected in series with one of the conductors of the electric motor 22. This switch 38 is operated by a bellows 40, to which is connected a capillary tube 42 of sufficient length to reach the interior of the well 36.

This capillary tube 42 and the bellows 40 are preferably charged with a volatile liquid or vapor so that the pressure within the tube and bellows will correspond to the temperature at the coldest point in the tubing. The coldest point of the tubing is naturally in the portion in the well 36. It is desirable that the capillary tubing within the well respond as closely as possible to the temperature of the container 32. This requires very good thermal contact between the well 36 and the capillary tube 42.

In order to secure this good thermal contact, I reverse the end of the capillary tube 42 upon itself to provide a reversed section 44 which is formed substantially into the shape of an ellipse and soldered to the other portion of the tubing 34, as designated by the reference character 46. This forms the end of the tube into a full elliptical spring since the capillary tubing naturally has a certain amount of spring or resiliency common to all metal tubing. This spring or resiliency naturally depends upon the characteristics of the metal used, and it is therefore desirable, in order to carry out this invention, that the capillary tubing be formed of some suitable metal which provides sufficient resiliency.

As shown in Fig. 3, the loop should have its sides so formed that they extend in a bowed fashion when not compressed so that they may be spread somewhat wider than the interior of the well 36. When shaped in this manner, the tube is compressed when inserted into the well, as shown in Fig. 2, and the sides of the loop are pressed tightly against the interior walls of the well for a considerable length due to the spring action of the elliptical shape of the loop. In this way, very good thermal contact is obtained between the looped end of the capillary tube 42 and the well 36 so that the control of the system by the switch 38 very closely conforms to the temperature of the container 32 in order that the container may be kept at the desired temperature by the refrigeration system. The well may be sealed by a suitable stopper 50.

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, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A temperature responsive element including a fluid motor and a fluid containing tube having at least a limited amount of resiliency, a section of the tube being reversed upon itself, and the free end portion of the reversed section of the tube being fastened to the other section to form a complete resilient looped section generally in the form of an ellipse capable of acting to a limited degree as a full elliptic spring, said tube forming the complete looped section as well as the sole fluid connection between the looped section and the motor.

2. A temperature responsive element including a fluid motor and a fluid containing tube having at least a limited amount of resiliency, a section of the tube being reversed upon itself, the free end portion of the reversed section of the tube being fastened to the other section to form a complete resilient looped section generally in the form of an ellipse capable of acting to a limited degree as a full elliptic spring, and a

well smaller transversely than the looped section receiving said looped section in a compressed condition so that the inherent resiliency of the looped section causes the opposite sides of the loop to be pressed against the interior sides of the well to insure good thermal contact, said tube forming the complete looped section as well as the sole fluid connection between the looped section and the motor.

3. A temperature responsive element including a fluid motor and a fluid containing tube of substantially capillary size having at least a limited amount of resiliency, a section of the tube being reversed upon itself by a normal bend in the tube, and a well smaller than the reversed section receiving said reversed section in a compressed condition so that the inherent resiliency of the reversed section causes the opposite sides of the reversed section and the adjacent section to be pressed tightly against the interior walls of the well to insure good thermal contact, said tube forming the complete looped section as well as the sole fluid connection between the looped section and the motor.

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