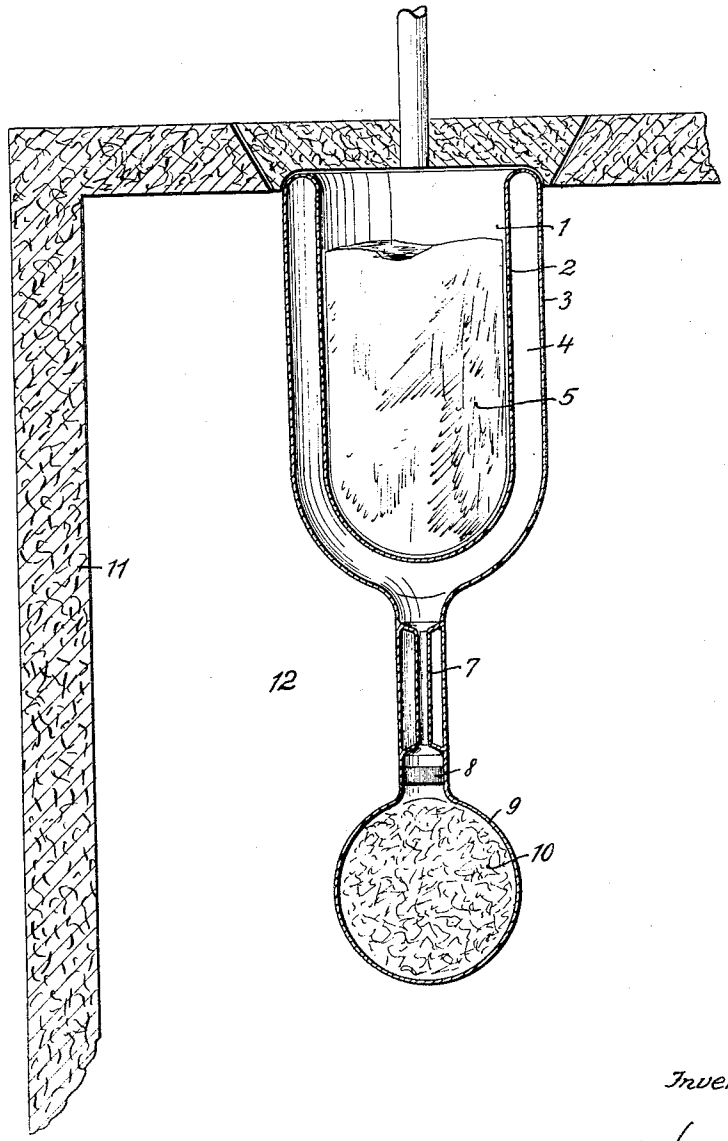
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METHOD OF REGULATING THE COOLING EFFECT OF A REFRIGERANT

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UNITED STATES PATENT OFFICE

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METHOD OF REGULATING THE COOLING EFFECT OF A REFRIGERANT

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My invention relates to a method of regulating the cooling effect of cooling means for cooling rooms or goods.

According to my invention the container or the tube containing the cooling means such as a volatile liquid, brine or solid carbon dioxide, is not in direct contact with the room or goods to be cooled. I use a double walled container or a double walled tube for the cooling means, and thus the exchange of heat between the cooling room and the cooling means is due to the molecules of the gas in the space between those two walls. If there is a high vacuum in this space between the two walls no transmission of warmth can take place.

It is the aim of my invention to regulate the transmission of warmth by changing the pressure of the gas enclosed in the space between the two walls.

My invention is further adapted to regulate the pressure of the gas in accordance with the temperature of the cooling room or of the goods to be cooled, and to do this fully automatically, thus providing a thermostat which keeps up a constant temperature.

The change of the pressure of the enclosed gas can be effected with the aid of a pump connected with the room in which the gas is enclosed, creating a vacuum in this room when the temperature in the cooling room is low enough.

A by far better way to regulate the pressure of the enclosed gas is to adsorb the gas with the aid of adsorbing material, such as silica-gel, active coal, or the like. According to one form of my invention the container with the adsorbing material is installed inside the cooling room in order to be influenced by its temperature.

The container for the adsorbing material is connected with the space between the two walls of said double walled container or tube for the cooling means by a tube. This tube is preferably made with a capillary diameter to avoid a disturbing diffusion of cold gas from the double walled room to the container for the adsorbing material.

I prefer to fill the system with such an amount of gas that at the temperature which shall be kept constant in the cooling room, all of the gas is adsorbed so that a very low pressure is maintained in the space between the two walls. When the temperature in the cooling room rises, gas is desorbed from the adsorbing material and enters the space between the two walls, raising the pressure of the enclosed gas and transporting warmth from the outer wall which is in contact with the air of the cooling room to the inner wall which is in contact with the cooling means. So the cooling room gets cooled and likewise the container with the adsorbing material. Then the gas is adsorbed again and the pressure in the space between the two walls is reduced.

In the annexed drawing the object of the invention is illustrated by way of example. In this exemplification a cooling room (12)—shown partly with its walls (11)—is cooled with the aid of solid carbon dioxide. The container (1) for the carbon dioxide (5) is double walled and the space (4) between the two walls (2) and (3) is filled with gas, the pressure of which can be varied. The container (1) is connected with a container (9) by a capillary tube (7). The adsorbing material (10) in the container (9) is prevented by a filter (8) from penetrating into the connection tube (7).

I prefer to use a gas of high molecular weight, e. g. carbon dioxide, with a suitable adsorption character. Of course it depends too on the applied temperatures, which of the various gases is to be used as filling gas. For instance, under certain conditions hydrogen would be a satisfactory gas to use.

A special advantage of a thermostat based on this new method is to function reliably even at very low temperatures.

An apparatus as shown in the drawing can be made preferably of glass in order to secure a good vacuum. When used in connection with tubes, containing brine, or with evaporators of refrigerating machines, sheet metal is used as material for such a thermostat.

It will be clear from the preceding explanation that my invention is based upon two principles, namely—first, that any material (like silica gel, charcoal, etc.) has definite adsorption rates at various temperatures; and second, that the conduction of a vacuum space depends primarily upon the pressure of gas within the space. These two principles are utilized for automatically regulating the temperature of a room or the like. My invention has nothing to do with a secondary refrigerating cycle, as in prior devices, but operates wholly on a conductivity principle. When the gaseous pressure in bulb 9 is less than the pressure in space 4, the material 10 withdraws gas from the space and thereby reduces its conductivity. This occurs when the temperature in room 12 reaches a predetermined low limit. On the other hand, when the temperature in room 12 rises to a certain point, the material 10 gives up some of the adsorbed gas which now flows into space 4 and increases its conductivity. It will thus be seen that the capillary tube 7 is not for the purpose of permitting a circulation of gas, but to permit the flow of gas either from bulb 9 to space 4 or in the reverse direction.

I have herein described and shown the method and one practical construction, especially for the use of solid carbonic dioxide, but it will be apparent that the construction is susceptible of embodiment in various alternative forms and I therefore reserve the privilege of resorting to all such legitimate changes as may be fairly embodied within the spirit and the scope of the invention as claimed in the appended claims.

What I claim is:

1. The method of automatically regulating the cooling effect of cooling means, which comprises separating the cooling means from the room to be cooled by a closed space containing a suitable gas, and subjecting said gas to the action of an adsorbing medium whose temperature depends upon the temperature of said room, whereby said medium withdraws gas from said space when the room temperature falls to decrease the heat conductivity of said space, and whereby said medium at rising room temperature gives up adsorbed gas which flows into said space to increase its conductivity.

2. Refrigerating apparatus comprising a chamber to be cooled, a double-walled container in said chamber adapted to hold a refrigerant, the space between said walls being closed and adapted to contain a suitable gas, and a closed receptacle communicating with said space and containing adsorbing material, which is subjected to the temperature of the chamber, said material automatically withdrawing gas from said space to decrease its heat conductivity when the temperature of the chamber falls, whereas an increase in the temperature of the chamber causes said material to give up adsorbed gas which flows into said space to increase its conductivity.

In testimony whereof I affix my signature.

PETER SCHLUMBOHM.