PUBLISHED

APRIL 27, 1943.

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TEMPERATURE-RESPONSIVE CONTROL MECHANISM, ESPECIALLY FOR REFRIGERATING APPARATUS

Filed March 30, 1940

Serial No. 327,080

Fig. 1

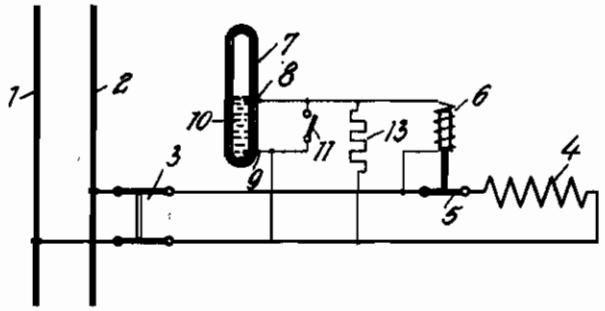


Fig. 2

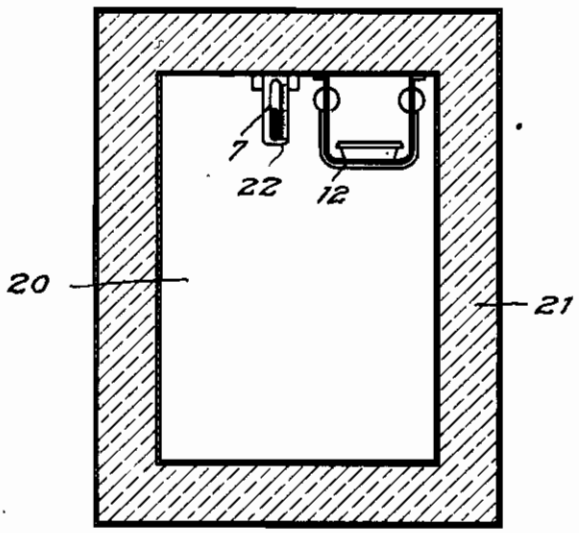
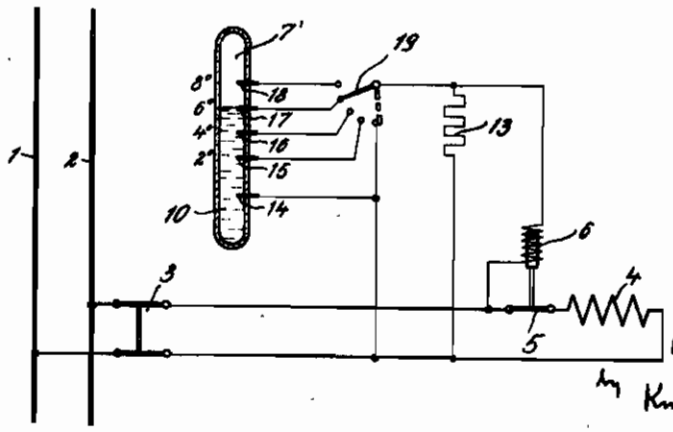


Fig. 3



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Published Apr. 27, 1943

Serial No. 327,080

ALIEN PROPERTY CUSTODIAN

TEMPERATURE RESPONSIVE CONTROL MECHANISM, ESPECIALLY FOR REFRIGERATING APPARATUS

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Application filed March 30, 1940

The present invention relates to temperature-responsive control mechanism, especially for refrigerating apparatus.

For operating refrigerating apparatus in responsive to changes in temperature and for thus controlling the amount of energy supplied, for example, to the motor-compressor unit of a refrigerator, it has been customary to employ thermostatic devices consisting of a closed gas-filled container the contents of which, responsive to changes in temperature of a part of the refrigerating apparatus, are subjected to changes in pressure, thus effecting the respective control operations. These types of thermostatic devices, however, have the disadvantage of easily inclining to leak and of then controlling the temperature of the refrigerator incorrectly.

For ensuring proper operation, these thermostats are usually mounted so that the heat-responsive elements thereof are in direct heat exchanging contact with the evaporator of the refrigerating apparatus resulting in relatively large variations in temperature between the times of turning on and off the supply of energy of the apparatus. Such arrangement of the thermostat, however, requires additional adjusting means for controlling the apparatus also in accordance with the varying temperature of the outside atmosphere. These adjusting means are, however, of relatively complicated design and increase the cost of the control mechanism of the refrigerator considerably.

It is the object of the present invention to provide a temperature-responsive control mechanism for refrigerating apparatus which overcomes the disadvantages of the prior art as described above and forms a simple, inexpensive means for accurately controlling the operation of household refrigerators.

A feature of the invention resides in a temperature-responsive control mechanism, especially for household refrigerators, including a contact thermometer for controlling the operation of a relay in accordance with the changes in temperature of a certain portion of the refrigerator, which relay, in turn, is used for switching on and off the supply of energy for operating the refrigerating apparatus.

A complementary feature of the invention is a device for disconnecting the contact thermometer or rendering the same inactive, and for connecting the control relay directly to the source of energy so that the refrigerating apparatus may be controlled either automatically in response to the operation of the contact thermometer to maintain a certain temperature in the cooling chamber, or manually by connecting the refrigerating apparatus continuously to the source of energy for freezing any kind of food products or obtaining ice cubes within a short time.

In its simplest form, the invention consists in a thermometer connected to a source of current and having a single fixed contact for controlling the operation of the relay in accordance with a certain temperature, and a simple switch connected to the thermometer for bridging, when in closed position, the contact thermometer to connect the control relay directly to the source of current. Since the cooling chamber of a refrigerator, and especially a household refrigerator is usually maintained at a certain temperature determined by experience, for example +6° C, it is only necessary according to the invention to secure the single controlling contact at a point of the thermometer corresponding to such temperature. It has been found advisable to mount the thermometer so as to indicate the temperature of the cooling chamber and not to be in direct heat exchanging contact with the evaporator.

Further objects, features and advantages of the invention will appear from the following detailed description and the accompanying drawing, in which

Fig. 1 is a diagrammatic showing of one embodiment of the invention,

Fig. 2 discloses the manner of mounting the thermometer according to Fig. 1 within a refrigerator casing, and

Fig. 3 is a diagrammatic showing of a modification of the invention.

As shown in the drawing, the invention may, for example, be applied to a refrigerator provided with a compressor driven by an electromotor. The current is supplied by the mains 1 and 2 through a main switch 3 to the winding 4 of the motor for driving the compressor (not shown). A control relay 5 having a winding 6 automatically opens or closes the circuit of the motor 4 in accordance with the temperature of a portion of the refrigerator. For this purpose, a thermometer 7 having a pair of fixed contacts 8 and 9 is provided in the circuit of the relay winding 6 in the manner shown in Fig. 1. Thus, as soon as the mercury column 10 of the thermometer 7 rises sufficiently to connect the contacts 8 and 9, the circuit of the relay winding 6 as well as the contacts of the relay 5 are closed to start the motor 4. The contact 8 is preferably fixed at a point of the thermometer corresponding to the

desired temperature of the cooling chamber of the refrigerator.

Although the cooling chamber of the refrigerator will generally be maintained automatically at a certain temperature by the controlling action of the contact thermometer, a manual control may sometimes be desirable for obtaining a higher or lower temperature for a limited time, for example, for freezing food products or for obtaining ice cubes within a short time. For this purpose, the invention provides a manually operated switch 11 which, when in closed position, bridges the contacts 8 and 9 of the thermometer so that the motor 4 is driven continuously until the switch is open when the refrigerator is again controlled automatically by the contact thermometer 7.

As indicated in Fig. 2, the contact thermometer 7 is preferably mounted in the cooling chamber of the refrigerator, for example, on the rear inner wall thereof, so as to indicate the temperature of the air therein. It may be provided with the temperature scale facing the door of the refrigerator, thus permitting a reading of the temperature of the cooling chamber regardless of whether the switch 11 is opened or closed. It may also be desirable to operate the contact thermometer 7 and the relay 6 with a current lower than that supplied by the mains 1 and 2. This may be easily achieved by providing a resistance 13 in the manner shown in Fig. 1 and of a size corresponding to the resistance of the relay winding 6.

If it is desirable that the automatic controlling action of the contact thermometer be adjustable to permit different predetermined temperatures to be maintained at different times in the cooling chamber of the refrigerator, the thermometer may be provided with two or more controlling contacts and a suitable switch or the like for selecting one or the other contact, or for disconnecting the thermometer entirely from the relay circuit if the refrigerator is to operate continuously, as described relative to Fig. 1.

According to this embodiment of the invention as shown in Fig. 3, the contact thermometer 7' may, for example, be provided with five stationary contacts 14 to 18, the contact 14 forming the lead-in contact and contacts 15, 16, 17 and 18 the temperature controlling contacts corresponding, for example, to the temperatures of 2°, 4°, 6° and 8°C, respectively. The contacts 15 to 18 are connected to the corresponding contacts of a single manually operated switch 19, the fifth contact of which is connected to the lead-in contact 14 of the thermometer.

The operation of the device is similar to that described relative to Fig. 1. If the switch 18 is placed, for example, in the position indicated in Fig. 3, the cooling chamber is automatically maintained at a temperature of 6°C. As soon as the mercury column 10 connects the lead-in contact 14 with the control contact 17, the circuit of the relay 6 is closed causing a closing of the relay contacts 5 so that the motor 4 starts to operate. For quick-freezing purposes, the switch 19 is placed in the position shown in dotted lines, thus bridging the control contacts 15 to 18 and maintaining the relay 6 continuously energized.

Although the invention has been described with particular reference to refrigerators operated by a motor-compressor unit, obviously it may also be applied to other types of refrigerators and especially those operated by continuous absorption in which case the winding 4 may be substituted by a heating coil or the like.

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