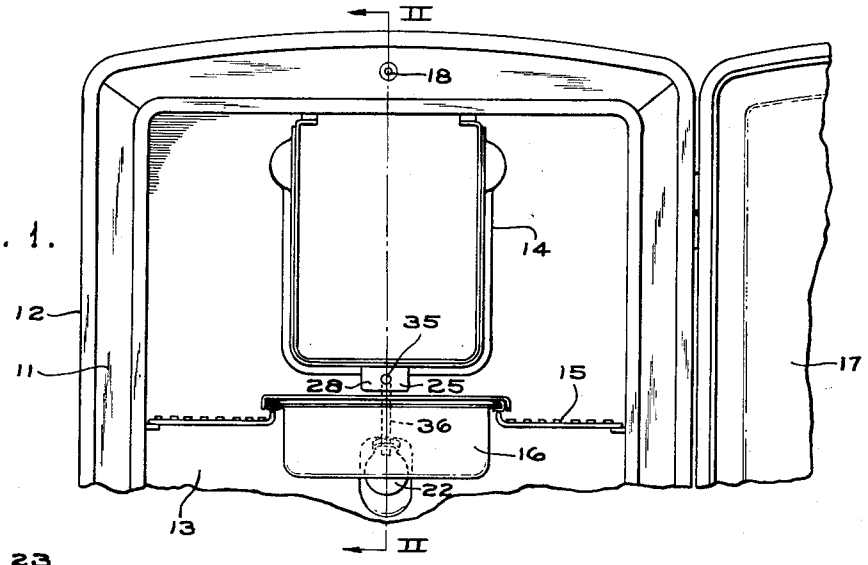
Dec. 24, 1940. H. D. SHAW 2,225,932

REFRIGERATION APPARATUS

Filed July 15, 1939

FIG. 1.



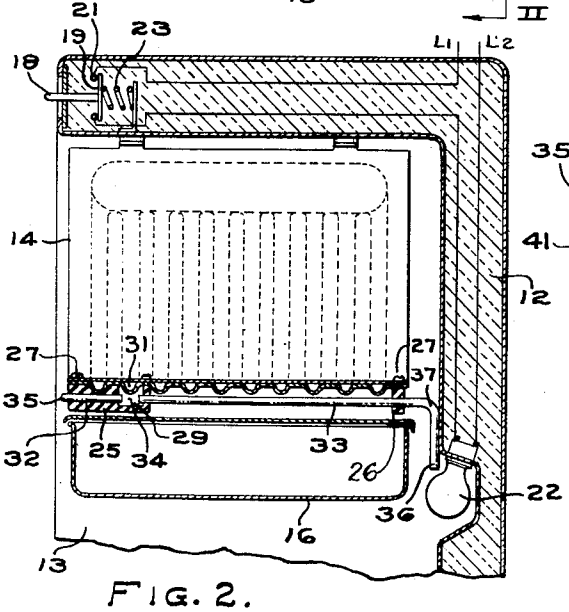


FIG. 2.

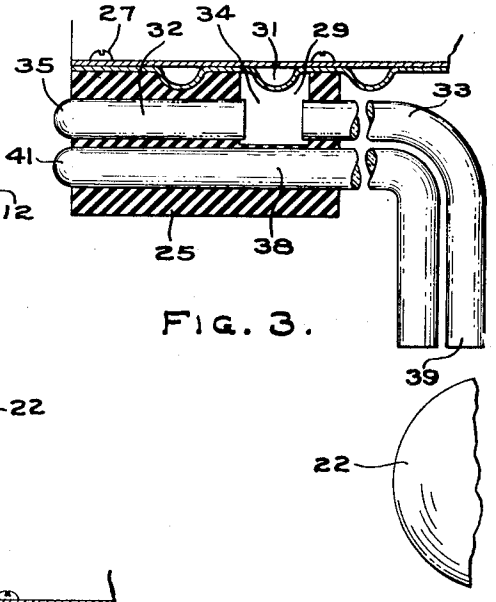


FIG. 3.

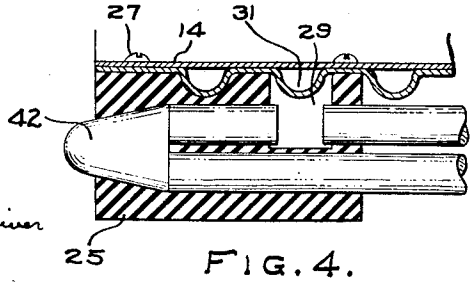


FIG. 4.

WITNESSES:

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UNITED STATES PATENT OFFICE

2,225,932

REFRIGERATION APPARATUS

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5 Claims. (Cl. 62—1)

My invention relates to refrigeration apparatus and particularly to a defrosting signal for refrigeration apparatus.

In refrigeration apparatus, particularly of the domestic type, it is well known that frost builds up on the evaporator or cooling element of the refrigerator and that periodic defrosting is necessary. While many automatic defrosting schemes have been suggested, it is still advantageous for reasons of cleanliness and cost of manufacture to manually defrost the cooling element. However, the operator of the refrigerator in many instances neglects to defrost the cooling element and, if frost builds up to a sufficient thickness, it deleteriously affects the operation and efficiency of the refrigerating mechanism.

It is, therefore, an object of my invention to provide a visual signal which indicates when the cooling element of the refrigerator should be defrosted.

It is another object of my invention to provide a visual defrosting signal which utilizes the same light source that is used for illuminating the food storage compartment of the refrigerator.

It is another object of my invention to provide for changes either in quality or quantity of light which is transmitted from a light source to indicate when defrosting is necessary.

It is a further object of my invention to provide a novel light transmitting means for indicating when defrosting is necessary.

These and other objects are effected by my invention as will be apparent from the following description and claims taken in connection with the accompanying drawing, forming a part of this application, in which:

Fig. 1 is a front view of a portion of a domestic refrigerator illustrating one embodiment of my invention;

Fig. 2 is a sectional view of the refrigerator shown in Fig. 1 taken on line II—II thereof;

Fig. 3 is a fragmentary detailed view of a portion of a refrigerator illustrating a second embodiment of my invention; and,

Fig. 4 is a fragmentary detailed view of a portion of a refrigerator illustrating a third embodiment of my invention.

Referring specifically to Figs. 1 and 2 for a detailed description of my invention, numeral 11 generally indicates a refrigerator cabinet including heat insulated walls 12 which define a food storage compartment 13. A cooling element 14, preferably of the evaporative type, abstracts heat from the food storage compartment 13, refrigerant being circulated therethrough by a conventional refrigerating system (not shown). A shelf 15 is positioned in the food storage compartment and supports a receptacle 16 for storing meats and the like directly below the evaporator 14.

A door 17 closes the food storage compartment 13 and, when in its closed position, forces a plunger 18 of a door-operated switch 19 inwardly, thus breaking an electrical circuit from line L_1 L_2 to contacts 21 and to an incandescent lamp 22. When the door 17 is opened, the plunger 18 is forced outwardly by a spring 23 so that the contacts 21 are closed and the incandescent lamp 22 is energized to illuminate the interior of the food storage compartment 13.

In accordance with the first embodiment of the invention shown in Figs. 1 and 2, heat-insulating blocks 25 and 26 are attached to the bottom of the evaporator 14 by screws 27, the block 25 being positioned near the front of the evaporator and the block 26 near the rear thereof. The front block 25 is provided with an ornamental front surface 28 and with a cut-out portion 29 in communication with the compartment 13 and preferably adjacent a corrugation 31 of the evaporator 14.

As best shown in Fig. 2, a light-transmitting device 30 comprises two rods 32 and 33. The rods 32 and 33 are supported by the blocks 25 and 26 and are spaced apart at 34 in the cut-out portion 29 of the block 25. One end 35 of the rod 32 extends outwardly of the block 25 and an end 36 of the rod 33 is bent downwardly at 37 and extends in close proximity to the incandescent lamp 22. The rods are preferably formed of a methyl methacylate resin known by the trade-marked name "Lucite", although they may be formed of fused quartz, glass or any fairly efficient light-transmitting material. The trade-marked material "Lucite" is especially applicable because it is an efficient light transmitter, may be made of different colors, and transmits light around bends with very little loss in intensity.

In operation, when the cooling element 14 is not in need of defrosting and the door 17 is opened, the incandescent lamp 22 is energized and light therefrom not only illuminates the food storage compartment 13, but is also transmitted along rod 33, across the space 34 between the rods and through rod 32 to the visible end 35 thereof. The end 35 therefore glows and shows that the cooling element 14 is not in need of defrosting. When frost builds up on the cooling element 14 to a predetermined degree, for example, ¼ of an inch, it also builds up on corrugation 31 and closes the space 34 between rods 32 and 33.

When this occurs, light is no longer transmitted to the front rod 32 and the exposed end 35 thereof ceases to glow, thereby giving a visual indication that the cooling element 14 should be defrosted. Either or both rods 32 and 33 may be made of colored material so that colored light is visible at the exposed end 35 of the rod 32.

In the second embodiment of my invention shown in Fig. 3, the rods 32 and 33 are arranged as shown in Figs. 1 and 2 but a third continuous rod 38 is also supported by the blocks 25 and 26. Rod 38 has one end 39 adjacent the incandescent lamp 22 and the other exposed end 41 thereof positioned directly below end 35 of rod 32. The advantage of such an arrangement is that the end 41 of rod 38 will always glow when door 17 is open whether defrosting is necessary or not, thus calling the operator's attention to the defrost indicator. If desired, end 35 of rod 32 may glow with light of one color, for example, green, while end 41 of rod 38 may glow with another color, for example, red.

The third embodiment of my invention disclosed in Fig. 4 of the drawing is constructed exactly the same as that shown in Fig. 3 except that an exposed colorless focusing device 42 collects light from rods 32 and 33 so that, if rods 32 and 33 are of different colors, as frost builds up in the space 34 between rods 32 and 33, the color of the light will change in the focusing device 42, this indicating the need for defrosting. This embodiment also has the advantage that the device 42 always glows when the door 17 is open with some color of light, thus calling the operator's attention to the defrost indicator.

From the foregoing, it will be apparent that I have provided an improved defrosting indicator for refrigerators in which the source of light which illuminates the interior of the food storage compartment is utilized. I furthermore provide a defrosting indicator which is attractive in appearance and inexpensive to install in a refrigerator.

While I have shown my invention in several forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. In refrigeration apparatus, the combination of a cooling element which collects frost during normal operation, a source of light and means for transmitting light from the source to a location where it is readily visible and for varying the light transmitted as a signal when defrosting is necessary, said means comprising a light-transmitting material having at least a part thereof disposed adjacent to the cooling element and having a break therein so positioned that when the frost builds up on the cooling element to a predetermined degree it enters the break and varies the light transmitted by said light-transmitting material.

2. In refrigeration apparatus, the combination of a cooling element which collects frost during normal operation, a source of light and means for transmitting light from the source to a location where it is readily visible and for varying the light transmitted as a signal when defrosting is necessary, said means comprising a plurality of light-transmitting devices, at least one of which is disposed adjacent the cooling element with a break therein so arranged that when the frost on the cooling element builds up to a predetermined thickness it enters the break and varies the light transmitted by one of the devices.

3. In refrigeration apparatus, the combination of a cooling element which collects frost during normal operation, a source of light, means for transmitting light from the source to a location where it is readily visible and for varying the light transmitted as a signal when defrosting is necessary, said means comprising a plurality of light-transmitting devices, at least one of which is disposed adjacent to the cooling element with a break therein so arranged that when the frost on the cooling element builds up to a predetermined thickness, it enters the break and varies the light transmitted by one of the devices, and means for focusing the light from both of said devices at a single point.

4. In refrigeration apparatus, the combination of a cooling element which collects frost during normal operation, a source of light, means for transmitting light from the source to a location where it is readily visible and for varying the light transmitted as a signal when defrosting is necessary, said means comprising a plurality of light-transmitting devices, at least one of which is disposed adjacent to the cooling element with a space therein so arranged that when the frost on the cooling element builds up to a predetermined thickness, it enters the space and varies the light transmitted by one of the devices, and means for focusing the light for both of said devices at a single point, said devices transmitting different colored light so that the color changes at said point when the frost builds up to a predetermined thickness.

5. In refrigeration apparatus, the combination of a refrigerator cabinet embodying a food storage compartment and having an access opening thereto, a door for closing the access opening, a cooling element disposed in the food storage compartment which collects frost during normal operation, a source of light, means for transmitting light from the source to a location where it is readily visible and for varying the light transmitted as a signal when defrosting is necessary, said means comprising a light-transmitting material having at least a part thereof disposed adjacent to the cooling element and having a break therein so positioned that when the frost builds up on the cooling element to a predetermined degree it enters the break and varies the light transmitted by said light-transmitting material, said source of light also serving to illuminate the food storage compartment and means for energizing the source of light only when the door is open.

HAROLD D. SHAW.