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R. S. GAUGLER
REFRIGERATING APPARATUS
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2,945,954

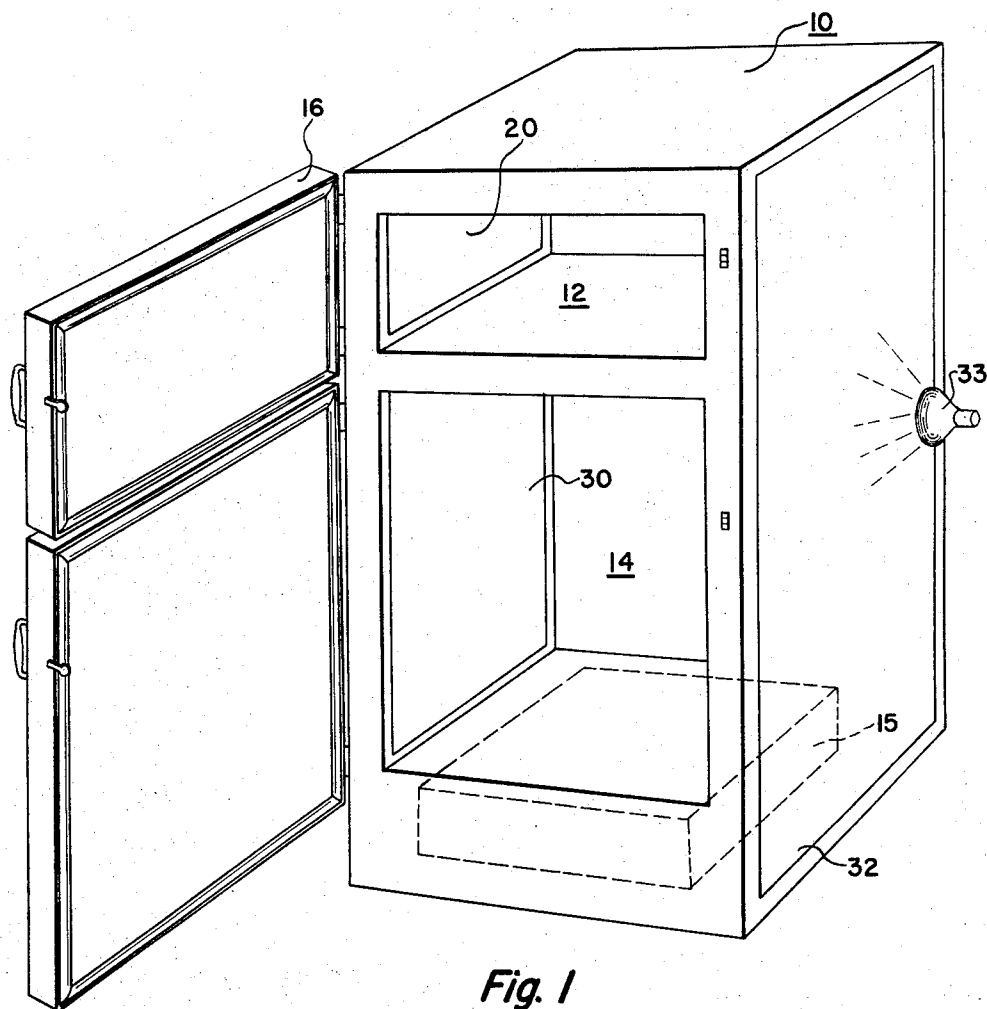


Fig. 1

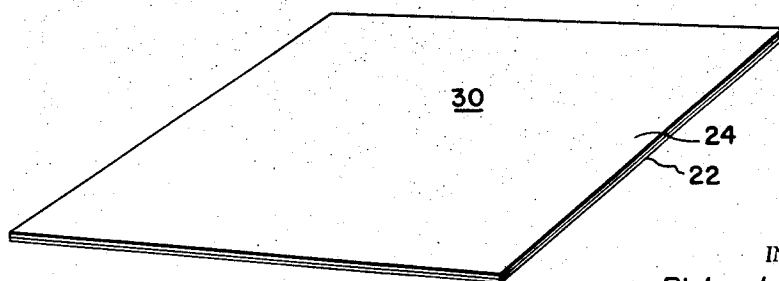


Fig. 2

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REFRIGERATING APPARATUS

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2 Claims. (Cl. 250—71)

This invention relates to refrigerating apparatus and more particularly to a method and apparatus for indicating temperature variations over a wall area of a refrigerator cabinet or the like.

It is an object of this invention to utilize thermographic phosphorous for detection or measurement of variations of temperature in different parts of a food compartment of a refrigerator.

It is another object of this invention to provide improved means for detecting imperfections in wall insulation.

More particularly it is an object of this invention to provide an improved arrangement for applying thermographic phosphorous to various surfaces of a refrigerator whereby it is possible to use the thermographic phosphorous material over and over again.

Thus it is an object of this invention to place a layer of thermographic phosphorous on a thin film of material having a high electrostatic charge which will cause the film to adhere to the surface being tested.

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

In the drawings:

Figure 1 is a perspective view showing a refrigerator having means for visually indicating temperature variations in different parts of a refrigerator cabinet and for testing for imperfections in the wall insulation; and

Figure 2 is a perspective view, on an exaggerated scale, of a film used in detection of variations of temperature.

Referring now to the drawing, reference numeral 10 designates a conventional household refrigerator cabinet having a frozen food storage compartment 12 provided in the upper portion of the cabinet and a refrigerated food storage compartment 14 in the lower portion of the cabinet. For purposes of illustration the cabinet shown is of the type which has an insulated door 16 for closing the frozen food storage compartment 12 and a separate insulated door 18 for closing the food storage compartment 14.

In the refrigerator shown for purposes of illustrating the invention, the inner liner 20 for the frozen food storage compartment 12 is in the form of a sheet metal evaporator which serves to refrigerate the contents of the compartment 12. The compartment 14 may be refrigerated in any conventional manner such as by heat leakage from the evaporator 20 into the lower compartment 14 or by a separate evaporator (not shown) disposed directly in the compartment 14 or in an air flue adjacent the compartment 14. Reference numeral 15 designates a conventional refrigerant liquefying unit for supplying liquid refrigerant to the evaporator 20 in accordance with conventional practice.

It has been found that imperfections in the insulation

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forming the walls of the refrigerator can be detected by applying a layer of thermographic phosphorous material 32 to the outside wall of the cabinet while heat is being added to the interior of the refrigerator and then exposing the thermographic phosphorous material to ultraviolet radiation from any suitable source such as that shown at 33. When the thermographic phosphorous material is exposed to ultraviolet radiation differences in temperature on various parts of the surface to which the thermographic phosphorous material is applied will cause the thermographic phosphorous material to exhibit marked changes of brightness with differences of temperature. Thus imperfections in the insulation would cause the coating to appear much darker at the points where the insulation was inadequate. Any suitable source of heat, such as an electric heater, could be used for heating the interior of the refrigerator.

The thermographic phosphorous material and its properties are well known and may be of the type disclosed in U.S. Patent No. 2,642,538 and sold by the U.S. Radium Corporation of Norristown, New Jersey, under the trademark "Radelin Phosphor No. 1807." The usual practice of applying the thermographic phosphorous in the form of paint which is applied directly to the surface to be tested has the disadvantage that the amount of material required to paint a large number of objects is objectionable and furthermore the need for removing the thermographic material from the surface at the completion of the test presents a problem. According to this invention, thermographic material 22 (see Figure 2) is applied to a sheet of material 24 such as Mylar, polyethylene, Saran (a copolymer of vinyl chloride and vinylidene chloride), or Hycar vinyl (a mixture of vinyl chloride-vinyl acetate copolymer and butadiene-acrylonitrile copolymer). Films of this material will take a high electrostatic charge and will therefore adhere very closely to any surface on which the film is placed with the result that the film will have a temperature corresponding to the temperature of the surface to which it adheres. By applying such a film to either an inner or outer wall of a refrigerator cabinet and exposing the film to ultraviolet light, slight variations in temperature can readily be detected by visual observation. The Mylar or other plastic film is preferably between .0005 and .001 inch thick and the thickness of the thermographic phosphorous material is preferably .005 inch.

In Figure 1 of the drawing a film 30 has been applied to an inner side wall of the refrigerator and a film 32 has been applied to an outer side wall of the refrigerator. By applying the film to the inside wall in this manner and then closing the door and operating the refrigerator for a period of time long enough to stabilize the temperatures therein and then opening the door and exposing the film to ultraviolet light, the film will readily show up differences in the temperature in different parts of the refrigerator. Likewise by placing a sheet or film of the material 32 on an exterior surface of a refrigerator in operation any imperfection in the insulation within the refrigerator will cause a spot or spots to show up in the thermographic phosphorous material. In place of checking variations in brightness of the film 32 while the refrigerator is in operation, one could apply heat within the refrigerator while the refrigeration system is inoperative and then check the brightness of the film to detect imperfections in the insulation as explained hereinabove.

For purposes of illustration the film has been shown applied directly to the flat wall portions of the refrigerator cabinet but due to the flexibility of the film material it can be used very effectively in testing temperature differences across the breaker strip and other parts of the cabinet since the electrostatic charge which is inherent in

the film material will cause the thin film material to closely adhere to very uneven surfaces such as those which occur in many conventional refrigerator cabinet designs. The film is readily transferable from one surface to another and needs no means for holding it in place as the electrostatic charge inherently in the material holds it in place on the surface to be checked.

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, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. The method of testing temperature differentials in different parts of refrigerator cabinets which comprises suspending a sheet of thermographic phosphorous material within a food compartment of a refrigerator cabinet, directing ultraviolet light onto said thermographic material and observing the amount of light admitted on different portions of said thermographic material.

2. The method of testing temperature differentials in different parts of refrigerator cabinets which comprises electrostatically adhering to the wall of a refrigerator a flexible sheet having thereon a coating of thermographic phosphorous material, directing ultraviolet light onto said thermographic material and observing the light intensity on different portions of said thermographic material.

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