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2,988,432

ODOR DESTROYER

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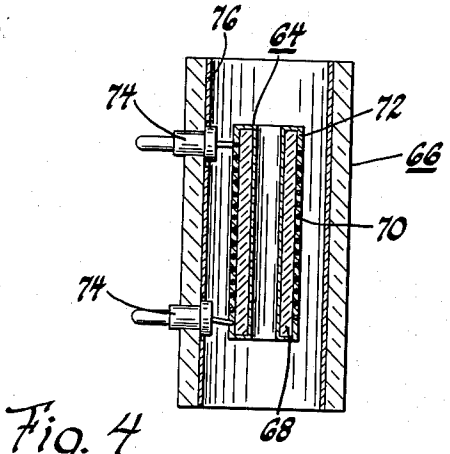


Fig. 4

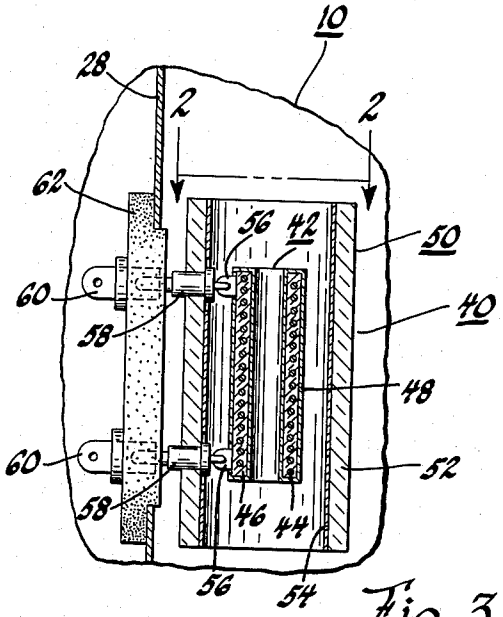


Fig. 3

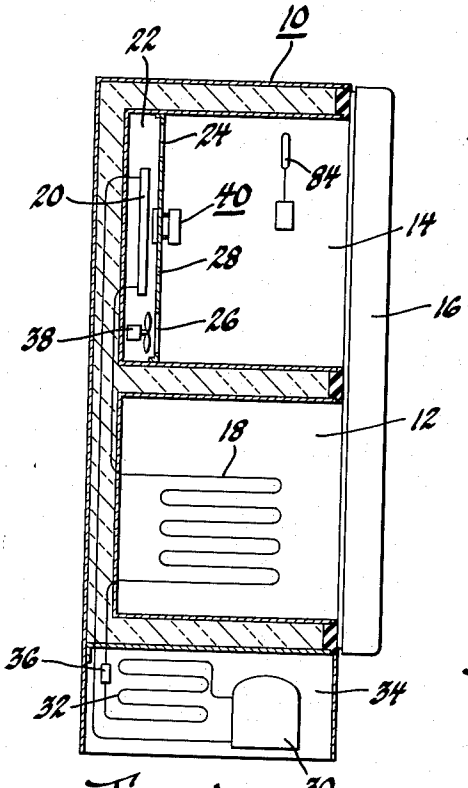


Fig. 1

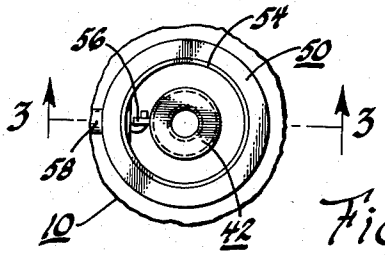


Fig. 2

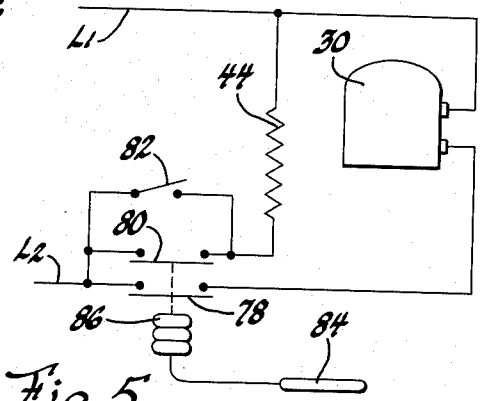


Fig. 5

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ODOR DESTROYER

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This invention relates to refrigerating apparatus and more particularly to apparatus for destroying food odors within a food storage compartment of a refrigerator.

One of the problems encountered in present day refrigerators is the controlling or minimizing of food odors within the food storage compartment of the refrigerator. In the past, attempts have been made to solve this problem by passing the air within the food storage compartment through a purifier such as activated charcoal or the like, and in other instances, ozone has been mixed with the air of the refrigerator compartment to destroy odors.

In contrast to the above mentioned methods for destroying odors in a refrigerated compartment, it is an object of this invention to provide a refrigerated storage compartment with a catalytic member that operates to destroy food odors that come in contact with the catalytic member.

Another object of this invention is to provide a refrigerated storage compartment with an electrically heated catalytic member that operates to destroy odors within the compartment.

Still another object of this invention is to provide an odor destroyer that comprises an open ended hollow wire wound resistor element that is coated with a catalytic substance.

Still a further object of this invention is to provide an odor destroyer for a refrigerated compartment that includes a heating element that is coated with a catalytic substance, and having an open ended hollow member having an internal reflective coating surrounding the heating element to concentrate the heating effect of the heating element and to provide a chimney effect for air passing through the hollow member.

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 side view with parts broken away of a refrigerator that is provided with the odor destroying apparatus of this invention.

FIGURE 2 is an enlarged top view of the odor destroying apparatus of this invention taken along line 2—2 of FIG. 3.

FIGURE 3 is an enlarged sectional view of the odor destroying apparatus shown in FIGURE 1 taken along line 3—3 of FIGURE 2.

FIGURE 4 is a sectional view of a modified odor eliminator unit that may be substituted for the unit shown in FIG. 3.

FIGURE 5 is a circuit diagram illustrating the connections for energizing the catalytic odor destroyer of this invention.

Referring now to the drawings, and more particularly to FIGURE 1, a refrigerator generally designated by reference numeral 10 is shown. The refrigerator has a low temperature frozen food compartment 12, a food storage compartment 14 and a door 16 which closes both compartments. An evaporator 18 is mounted so as to cool the low temperature compartment 12 and is connected in series with a second evaporator 20 located in a compartment 22 that is immediately adjacent the compartment 14. The compartments 14 and 22 are connected by openings

24 and 26 formed in a dividing wall 28 that separates the compartments. The evaporators 18 and 20 are connected by suitable tubing with an electrically motor driven compressor 30 and with a condenser 32 both of which are located in machinery compartment 34. A conventional restrictor 36 is connected between the condenser 32 and evaporator 18.

With the arrangement just described the frozen food compartment 12 will be cooled to a temperature sufficient to freeze articles located therein, whereas the compartment 14 is operated at a temperature above freezing. An electric motor driven fan 38 is disposed behind the opening 26 in wall 28 and continuously circulates air between compartments 14 and 22, the air being forced out of opening 26 and into opening 24. This air is cooled when it contacts the evaporator 20.

The food storage compartment 14 of the refrigerator is provided with a catalytic food odor destroyer generally designated by reference numeral 40 that is attached to the dividing wall 28. As shown in FIGURE 3 this catalytic food odor destroyer comprises a heating element 42 that is formed as a wire wound resistor. The wire wound resistor comprises a coil of resistance wire 44 that is embedded in an open ended cylindrical tube of ceramic material 46. The resistance wire has a predetermined resistivity in order that the ceramic tube 46 will be heated by I^2R losses of the coil when the coil of resistance wire is connected across a suitable voltage supply. The open ended cylindrical tube of ceramic material is coated both inside and out with a catalytic substance 48 of platinum or the like. When the catalytic substance is heated by the wire wound resistor food odors in the form of hydrocarbons contacting the catalytic substance will be destroyed by oxidation.

The wire wound resistor 42 is supported within a tubular member 50 that comprises a tube of ceramic material 52 that is coated interiorly thereof with a coating of reflective material 54 such as silver or the like. The resistance wire coil 44 is connected with terminals 56 which in turn are secured to conductor elements 58. The conductor elements 58 fit within electrical conducting members 60 that are supported within an insulating block 62 which is suitably secured to dividing wall 28. The connection between members 58 and 60 may be of the permanent type or the connectors 58 may be designed to plug into the connector 60.

With the arrangement just described the energization of the resistance wire 44 will heat the ceramic body 46 and catalytic coating 48 to provide a very efficient odor destroying action. When the wire wound resistor 42 and tubular member 50 are mounted in a vertical position a chimney effect is produced which draws air upwardly through the central bore of the wire wound resistor 42 and also upwardly between the outer periphery of the wire wound resistor 42 and the outer tubular member 50. This provides for a natural circulation of air within the food storage compartment 14. The reflective coating 54 on tubular member 50 also intensifies the heating action of the wire wound resistor 42 by reflecting heat back towards the resistor to provide for very efficient heating of the catalytic coating 48.

A modified catalytic odor destroyer is shown in FIGURE 4, wherein a wire wound resistor generally designated by reference numeral 64 is disposed within an outer tubular member generally designated by reference numeral 66. The wire wound resistor comprises an open-ended tube of ceramic material 68, which carries a coil of resistor wire 70 on the exterior thereof. The ceramic body 68 is coated both exteriorly and interiorly with a catalytic substance 72 that may be of platinum or the like. In this embodiment the resistance wire is also coated with the catalytic substance. The resistance wire

70 is connected with terminals 74 that are arranged to be connected to terminals of the type designated by reference numeral 60 in FIGURE 3. The inner cylindrical surface of tube member 66 in contrast to the structure shown in FIGURE 3 is provided with a coating of a catalytic substance 76 that may be of platinum or the like. With the arangement shown in FIGURE 4 a considerably greater area of catalytic substance is heated than with the structure shown in FIGURE 3, in that the tube 66 is coated with a catalytic substance. In other respects the structure shown in FIGURES 3 and 4 are generally similar and the structure shown in FIGURE 4 may be substituted for the structure shown in FIGURE 3 by connecting the terminals 74 with the terminals 60 of FIGURE 3.

The heating element 44 of the catalytic odor destroyer is preferably connected in an electrical circuit as shown in FIGURE 5. In this figure the voltage input lines L_1 and L_2 are connected in series with switches 78, 80, and 82. The switches 80 and 82 are connected in series with lines L_1 and L_2 and in series with the resistance wire 44. The motor of compressor 30 is connected in series with switch 78 and in series with lines L_1 and L_2. The switches 78 and 80 are preferably controlled by a thermostat 84 that includes a conventional thermostatic bulb 84 and a bellows 86. The bulb is filled with a suitable fluid that operates to actuate switches 78 and 80 during a change in temperature. The bulb 84 is disposed within the food storage compartment 14 and responds to temperature therein. The switch 82 is preferably of the manually operable type. With the circuit arrangement shown in FIGURE 5 the resistance heating element 44 will be energized whenever the temperature within the food storage compartment 14 drops to a predetermined point to cycle the compressor 30. Moreover, the heating element 44 may be energized at the will of the operator at any other time by closing manually operable switch 82.

Although a particular type of refrigerator has been illustrated in connection with the odor destroying apparatus of this invention it will be apparent to those skilled in the art that the odor destroyer may be used with any refrigerated storage compartment.

The catalytic odor destroyer of this invention is highly efficient since all of the area of the wire wound resistors 42 and 64 in the embodiments shown are coated with a catalytic substance. In addition the odor destroyer is relatively cheap in construction and provides a natural chimney effect for air in refrigerated storage compartments thus insuring that a good volume of air will pass in contact with the catalytic coated resistor element during energization of the resistor element.

This application is a continuation-in-part of my copending application, S.N. 606,425, filed August 27, 1956, which issued on September 20, 1960, as Patent 2,953,357.

While the embodiments of the present invention as herein disclosed constitute a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In combination, a member having a vertically disposed bore extending therethrough, a layer of reflective material on said bore, a block of ceramic material in said bore having outer walls spaced from said bore wall, a length of resistance wire supported by said block in heat transfer relationship therewith, and a coating of a catalytic material on said block of ceramic material.

2. In combination, a first member having a vertically disposed bore extending therethrough, a second member in said bore having outer walls spaced from said bore wall, a length of resistance wire supported by said second member in heat transfer relationship therewith, and a coating of a catalytic substance on one of said members located in heat transfer relationship with the space between said members.

3. In combination, a member having a vertically extending bore, a coating of catalytic material on said bore, a block of ceramic material in said bore carrying a length of resistance wire, said block being smaller than said bore and spaced from said member, and a layer of a catalytic substance on the outer wall of said ceramic block.

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