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REFRIGERATOR INCLUDING DEFROST MEANS

Filed Sept. 8, 1967

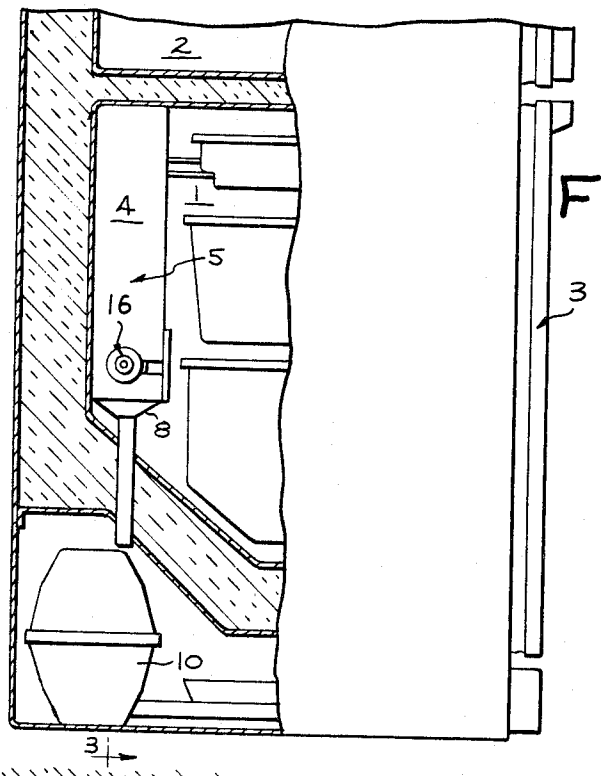


FIG.1

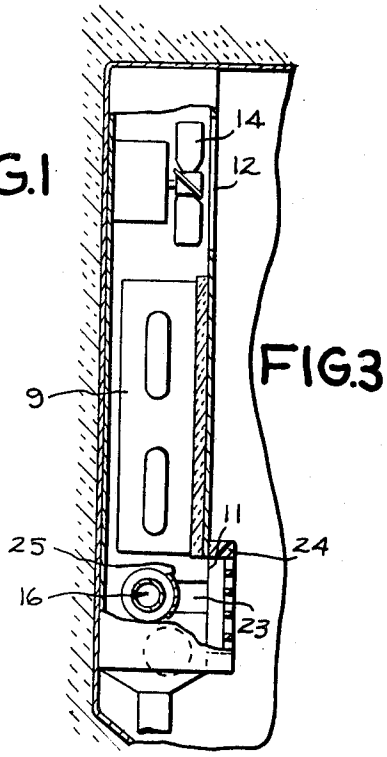


FIG.3

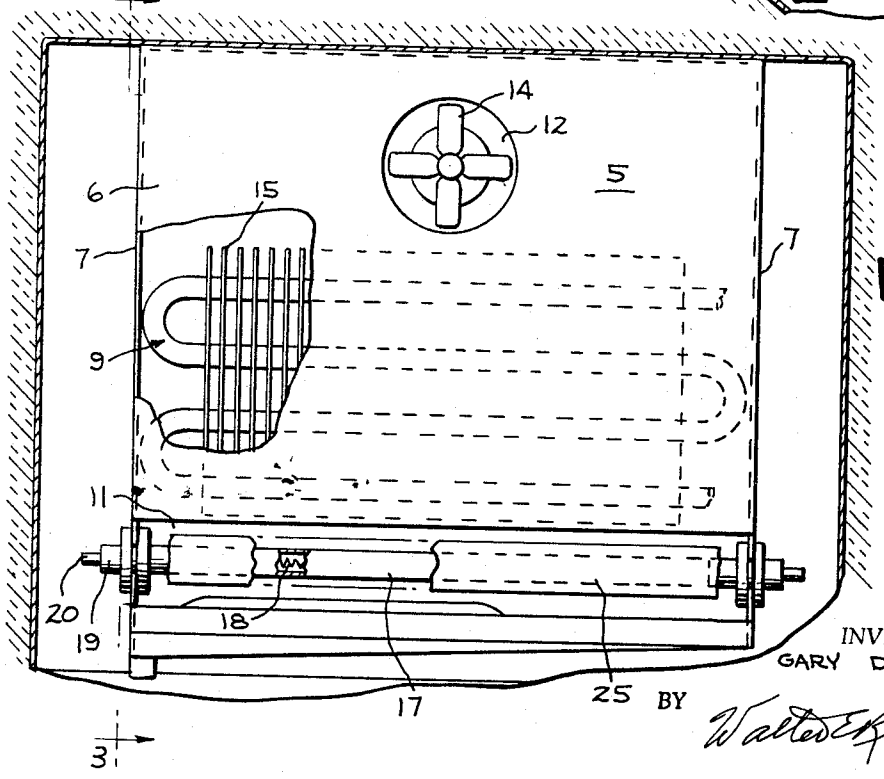


FIG.2

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REFRIGERATOR INCLUDING DEFROST MEANS

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Continuation of application Ser. No. 490,930, Sept. 28, 1965. This application Sept. 8, 1967, Ser. No. 672,410
6 Claims. (Cl. 62—276)

ABSTRACT OF THE DISCLOSURE

A refrigerator including a housing containing an evaporator and a radiant heat defrost means mounted below the evaporator for servicing through an air passage in the front wall of the housing. Means are provided to prevent heat radiating from the defrost means to the refrigerator compartment.

This is a continuation of application Ser. No. 490,930, filed Sept. 8, 1965, now abandoned.

The present invention relates to household refrigerators and is more particularly concerned with a refrigerator including an evaporator structure comprising a radiant heater for periodically warming the evaporator to defrosting temperatures.

Many modern refrigerators include electric resistance heaters for periodically raising the temperature of the evaporator to defrosting temperatures. The heaters are generally mounted in direct heat conducting relationship with the evaporators and are frequently embedded directly into the fin core structure thereof. When the heater fails, its replacement is an expensive procedure and frequently the entire evaporator structure must be replaced.

An object of the present invention is to provide a refrigerator including an evaporator adapted to collect frost during normal operation thereof and improved, low cost means for periodically warming the evaporator to defrosting temperatures.

Another object of the invention is to provide in a defrostable evaporator structure, radiant heater defrost means which is separate from the evaporator component of the structure so that it can be readily serviced or replaced.

Further objects and advantages of the invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

In accordance with the illustrated embodiment of the present invention, there is provided a household refrigerator including a storage compartment and an evaporator unit within the compartment. The unit comprises a housing including a front wall having at least one air passage therein communicating with the compartment. An evaporator which normally operates at frost collecting temperatures is contained within the housing. For the purpose of periodically defrosting the evaporator, there is provided radiant heater defrost means also positioned within the housing below the evaporator and in an accessible position adjacent the air passage. To shield the contents of the storage compartment from radiant heat during operation of the heater, a shield is provided between the heater and the air passage. In accordance with the preferred embodiment of the invention, the housing is so designed that the radiant heater can be removed from the housing through the air passage and to this end the air passage is in the form of a slot extending the full width of the front wall of the housing while the adjacent side walls of the housing are provided with slots communicating with the air passage and adapted to support the opposite ends of a radiant heater in operative position relative to the evaporator.

For a better understanding of the invention reference may be had to the accompanying drawing in which:

FIGURE 1 is an elevational view partly in section of a portion of a refrigerator cabinet embodying the present invention;

FIGURE 2 is a front elevational view of a portion of the evaporator unit or structure forming part of the refrigerator of FIGURE 1; and

FIGURE 3 is a vertical sectional view taken generally along line 3—3 of FIGURE 2.

Referring now to the drawing, there is illustrated a refrigerator cabinet of the two temperature type and including a freezer compartment **1** and a fresh food storage compartment **2**. The freezer compartment **1** is provided with a drawer structure generally indicated by the numeral **3** for the storage of frozen foodstuffs.

For the purpose of maintaining the contents of the freezer compartment **1** at below freezing temperatures there is provided an evaporator unit **4** supported along the rear wall of the freezer compartment. This evaporator structure comprises a housing **5** including a front wall **6**, opposed side walls **7** and a sloping generally V-shaped bottom wall **8**. A fin-on-tube evaporator **9** is contained within the housing **4** intermediate the top and bottom ends thereof.

In order to cool the contents of the freezer compartment **1** to sub-freezing temperatures, air from the compartment is circulated through the housing and over the evaporator **9**. The illustrated air circulating means includes an inlet air passage **11** in the lower portion of wall **6** and a second air passage **12** in the upper portion of the wall **6**. The evaporator **9** is generally disposed within the housing between these two air passages. A motor driven fan **14** adjacent the upper air passage **12** provides means for drawing air from the freezer compartment into the housing through the air passage **11** and this air after passing upwardly between the fins **15** forming part of the evaporator **9** is discharged from the housing through the air passage **12**. The evaporator **9** forms part of a refrigeration system including a compressor **10** and a condenser (not shown) by means of which condensed or liquid refrigerant is fed to the evaporator.

During operation of the evaporator at below freezing temperatures, moisture contained in the air circulated from the compartment **1** through the housing tends to collect as frost on the evaporator and particularly on the lower portions of the evaporator adjacent the air inlet passage **11**. In order to periodically warm the evaporator to defrosting temperatures, there is provided heating means in the form of tubular heater **16** extending transversely of the housing below the evaporator **9**. This heater comprises a tubular member **17** of quartz or similar glass-like insulating material such as "Vycor" having good thermal shock and radiant heat transmitting properties and a heater coil **18** within the tubular member **17**. Such heaters are so designed that a substantial portion of the heating is by radiation although convective heat transfer may also be an important factor.

The radiant heater structure also includes at the opposite ends of the tubular member **17** end caps **19** for closing the opposite ends of the tubular member **17** and terminal members **20** for connecting the opposite ends of the heater coil **18** to a source of electric power.

In order that the heating means **16** be readily accessible for repair or replacement purposes, the air inlet passage **11** extends the full width of the front wall **6** of the housing and the end walls **7** of the housing are provided with slots **23** extending rearwardly from the passage **11** and designed respectively to receive and support the end caps **19** on the opposite ends of the radiant heater structure **16**. By this arrangement, the radiant heater structure can be inserted into or removed from the housing through the air passage

11 after first removing an appearance grille 24 if such is employed as a decorative member overlying the passage 11.

For the purpose of shielding the contents of the freezer compartment 1 from direct exposure to the radiant heat from the defrost heater 16, there is provided a metal shield 25, in the position such that the shield is between the radiant heater and the air passage 11 or in other words in a position such that it prevents heat rays from radiating directly to the compartment 1. The ends of the shield 25 may also be supported in slots 23.

It will be understood that the operation of the heater can be controlled by any suitable means. For example, defrosting of the evaporator may be controlled by a defrost timer which periodically energizes the heater coil 18 during a period when the compressor 10 is not operating. Various alternative means of controlling the defrost operation are also well known. The defrost water collects in the bottom wall 8 of the housing from which it is drained from the cabinet by any suitable means.

From the above description it will be seen that there has been provided a defrostable evaporator structure including a low cost radiant heater and adapted to warm the evaporator and the adjacent portions of the housing including the drain system to defrost temperatures. This heater is located below the evaporator in the most advantageous heating position for both radiant and convective heating and is adjacent an area of the evaporator on which the major portion of the frost collects. The housing portion of the evaporator structure is designed not only to support the heater or more specifically the end caps thereof but also to provide easy replacement of the heater in the event that it should fail. As the electrical terminals 20 are outside of the housing 5, they are therefore not directly exposed to the defrost water within the housing during defrosting of the evaporator 9.

While there has been shown and described a particular embodiment of the invention, it is to be understood that the invention is not limited thereto and it is intended by the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States:

1. A refrigerator comprising:
a storage compartment,
an evaporator unit in said compartment,
said unit comprising a housing including a front wall facing said compartment and means including an air passage in the lower portion of said front wall and communicating with said compartment for circulating air from said compartment through said housing,
an evaporator normally operated at frost collecting temperatures positioned in said housing above said air passage,
radiant heater defrost means for periodically warming said evaporator to defrosting temperatures comprising a tube of insulating, heat transmitting material and a radiant heater coil in said tube, said radiant heater defrost means being positioned in said housing below said evaporator and adjacent said passage,
and a shield supported in said housing between said heater and said passage for shielding the contents of said compartment from radiant heat from said heater during operation thereof.

2. A refrigerator comprising:
a storage compartment,
an evaporator unit in said compartment,
said unit comprising a housing, said housing including a front wall facing said compartment and having an inlet air passage extending transversely thereof,

side walls including slots therein extending rearwardly from the ends of said passage and a bottom wall forming a drain trough,
an evaporator normally operated at frost collecting temperatures positioned in said housing,
radiant heater defrost means for periodically warming said evaporator and said drain trough to defrosting temperatures comprising a tube of insulating, heat transmitting material and a radiant heater coil in said tube, said radiant heater defrost means being positioned in said housing adjacent said passage and having the ends thereof supported in said slots,
and a shield positioned in said housing between said heater and said passage with the ends thereof supported in said slots for shielding the contents of said compartment from radiant heat from said heater during operation thereof.

3. A refrigerator comprising:
a storage compartment,
an evaporator unit,
said unit comprising a housing including a front wall facing said compartment and means including an air passage in said wall and communicating with said compartment for circulating air from said compartment through said housing,
an evaporator normally operated at frost collecting temperatures positioned in said housing,
radiant heater defrost means for periodically warming said evaporator to defrost temperatures comprising a tube of insulating, heat transmitting material and a radiant heater coil in said tube, said radiant heater defrost means being positioned in said housing adjacent said passage and in radiant heating relationship with said evaporator,
and means for preventing heat rays from radiating directly from said heater through said passage to said compartment during operation of said heater.

4. A refrigerator comprising:
a storage compartment,
an evaporator unit,
said unit comprising a housing including a front wall facing said compartment and means including an air passage in said wall and communicating with said compartment for circulating air from said compartment through said housing,
an evaporator normally operated at frost collecting temperature positioned in said housing,
radiant heater defrost means for periodically warming said evaporator to defrosting temperatures comprising a tube of insulating, heat transmitting material and a radiant heater coil in said tube, said radiant heater defrost means being positioned in said housing adjacent said passage and in radiant heating relationship with said evaporator,
and a shield supported in said housing between said heater and said passage for preventing heat rays from radiating directly from said heater to said compartment during operation of said heater.

5. The refrigerator of claim 4 in which said air passage is in the lower portion of said wall.

6. The refrigerator of claim 4 in which said radiant heater defrost means is positioned adjacent the lower portion of said evaporator.

References Cited

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MEYER PERLIN, *Primary Examiner.*