ELECTRICAL HEATERS FOR REFRIGERATORS

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Field of Search 62/273, 275; 219/534, 538, 219/335, 336

References Cited

UNITED STATES PATENTS
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2,604,760 7/1952 Southern.................................. 62/275
3,003,048 10/1961 Scott.................................... 219/473
3,042,780 7/1962 Gursahaney................................ 219/487
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FOREIGN PATENTS OR APPLICATIONS

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ABSTRACT

Structure for controlling moisture collection on an insulated wall, such as a divider wall, in a refrigeration apparatus. The moisture controlling device includes an elongated socket which is adapted to be inserted into the insulation material of the wall with the tip of the device being tapered for facilitated penetration. The socket defines an outer open end through which electrical connections to a heater within the socket are brought. In the application of the device to a divider wall type refrigeration cabinet, the socket may be inserted from an edge of the divider wall to dispose the tip portion adjacent a through passage in the divider wall such as provided for circulating refrigerated air between the compartments on opposite sides thereof.

11 Claims, 5 Drawing Figures
1 ELECTRICAL HEATERS FOR REFRIGERATORS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to moisture control devices and in particular to devices for controlling moisture condensation on refrigeration apparatus walls.

2. Description of the Prior Art

Electrical heaters have been developed for controlling condensation of moisture on the cabinet surfaces of refrigeration apparatuses. One such heater is illustrated in U.S. Pat. No. 3,254,503 of William G. Rundell. The heater therein comprises a heater wire 52 received in a molding track secured to the wall of the cabinet by suitable means. The heater is specifically adapted to prevent freezing of condensation between the sealing gasket of the door and the adjacent surface of the cabinet.

The present invention comprehends utilizing a heater which is in the form of a probe adapted to be inserted into the insulation of an insulative wall of such a refrigeration apparatus. A number of different probe-like heaters have been developed over the years. Thus, as shown in U.S. Pat. No. 1,312,270 of Percy Russell, a dental implement is provided with a sharp tip portion, or needle, with a handle portion carrying the needle and provided internally with an electric heater. In U.S. Pat. No. 3,003,484 of George A. Scott, a meat thermometer is provided which utilizes a combined meat probe and heater element adapted to be inserted into food to be cooked. The probe includes a handle portion for facilitating the insertion of the tip and body of the probe into the meat or other food product to be controlled.

In U.S. Pat. No. 3,042,780 of Kishin J. Gurshaheny, a lead-in conductor arrangement is provided wherein the electrical conductors are enclosed in a metal sheath and spacing means which extends through a space between the surface of the foam and an inner panel of the insulated cabinet wall.

It is further conventional in refrigeration apparatuses wherein a divider wall is provided between a freezer compartment and an above-freezing refrigerated compartment in a common cabinet, to provide an air flow passage between the freezer and refrigerator chambers. Moisture in the relatively high humidity refrigerator compartment air under certain conditions tends to collect in the form of frost at such a through passage, thereby reducing the efficiency of the apparatus.

SUMMARY OF THE INVENTION

The present invention comprehends an improved means for controlling moisture collection on a wall surface, and more specifically, on a wall surface of a refrigeration apparatus such as the divider wall therein. The moisture controlling means herein comprises an elongated socket element adapted to be inserted into the insulation of the apparatus wall by means of a tapered tip. A heater is provided within the socket element and is electrically energized by electrical connection means extending through an outer open end of the socket means. The socket means is installed in the divider wall with the outer end opening to exteriorly of the wall for facilitates servicing.

The socket may be installed in the divider wall closely adjacent the inner surface of the liner for maximum heat transfer efficiency to moisture collecting on the outer surface. The socket has a length preselected to permit disposition of the tip closely adjacent the through passage of the divider wall to provide improved heating of the wall and wall surfaces closely adjacent the through passage.

The socket element may be formed of a rigid, thin wall material, such as sheet metal. The open end of the socket may be outwardly flared for facilitated installation of the heater and for effecting desirable limitation on the insertion of the socket element into the wall.

BRIEF DESCRIPTION OF THE DRAWING

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a front elevation of a refrigeration apparatus having a moisture controlling means embodying the invention;

FIG. 2 is a fragmentary enlarged vertical section taken substantially along the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary enlarged vertical section taken substantially along the line 3—3 of FIG. 1;

FIG. 4 is a horizontal section taken substantially along the line 4—4 of FIG. 2; and

FIG. 5 is a diametrical section of the moisture controlling means.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the exemplary embodiment of the invention as disclosed in the drawing, an apparatus generally designated 10 is provided with a moisture controlling device generally designated 11 for controlling moisture collection on a portion of the cabinet 12. In the illustrative embodiment, apparatus 10 comprises a refrigeration apparatus wherein the cabinet is provided with a central dividing wall 13 defining within the cabinet an above freezing temperature refrigerator space 14 and a freezer space 15 at opposite sides of the divider wall. The cabinet may be provided with conventional doors 16 and 17 for selectively closing the refrigerator and freezer spaces, respectively.

As discussed briefly above, in such side-by-side refrigeration apparatuses, air flow is permitted between the chambers 14 and 15 by means of through passages in the divider wall, such as lower through passage 18 and upper through passage 19. A problem of condensation and freezing of moisture from the relatively moist refrigerator compartment air occasionally arises in such apparatuses during use under unusual conditions, and the present invention is directed to the provision of an improved heater means for effectively precluding such undesirable moisture and frost collection. The heater means structure of the present invention, as shown in FIG. 5, includes a tubular socket element 20 having a sharp tapered tip 21 at its inner end and an outwardly flared open outer end 22. A U-shaped electrical heater 23 is provided within the socket and includes connector means 24 at the outer end 22 for connecting the heater to a suitable power source for electrical energization thereof.

The length of the socket element 20 is preselected to permit the disposition of the tip 21 closely adjacent the through openings 18 and 19 in the divider wall, as illustrated in FIGS. 3 and 2, respectively. As shown in FIG. 2, the device 11 may be inserted into the divider wall 13 through the top edge 25 of the divider wall 13 to dis-
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pose the tip 21 closely adjacent the upper passage 19. As shown in FIG. 3, a similar device 11 may be inserted through the rear edge 26 of the divider wall 13 to dispose the tip 21 thereof closely adjacent the lower passage 18. As further illustrated in FIG. 4, the device 11 may be inserted into the insulation 27 closely adjacent the liner 28 of the divider wall 13 so as to be in substantially direct thermal transfer association with the liner for improved heating of the outer surface adjacent the through passage for effectively maximum control of the moisture collection threat and thereby effectively minimizing frosting problems. In the case of existing refrigerator cabinet constructions divider wall 13 is partially or entirely removed from the cabinet 12 to facilitate installation of socket element 20. While the divider wall 13 is displaced, the refrigerator wiring harness is accessible for connection of heater 23 thereto.

The sharp metal tip facilitates insertion of the socket element into the insulation so that the device 11 may be inserted at any time such as in existing cabinet constructions. The length of the socket element may be varied for coordination with the desired wattage rating of the heater 23 as the tip 21 may be juxtaposed to the openings by this positioning of the device in the insulation notwithstanding a wide variation in the length thereof.

The socket element is preferably formed of a heat conductive material, such as metal, and in the illustrated embodiment, is formed of sheet metal. The socket element is sufficiently strong to provide an enclosure for the heater and provides an increased area of heat transfer for maximizing the heat transfer to the liner surface.

The facilitated insertion of the device 11 permits its use not only by servicemen, but by the user of the refrigerator and, thus, may be provided as a do-it-yourself device for eliminating undesirable excessive moisture conditions therein.

Further, as the outer end of the socket element is open, the heater may be replaced as for servicing or for substitution of a different wattage heater, as desired. The heater is installed in the socket with a U-bend so as to provide a frictional retention without requiring further securing devices.

The flare 22 further serves as means for facilitating the insertion of the socket element in providing an enlarged manipulating portion at the outer end thereof.

The heater may be wired to the refrigerator wiring harness in parallel with existing heaters in the refrigeration apparatus such as the stile heaters thereof.

The rigid socket element and sharp tip permit the insertion of the heater into relatively rigid insulation materials, such as foamed-in-place insulation, as well as softer insulation, such as fiberglass insulation.

As the heater extends the length of the socket element, the heat dissipation to the liner is spread out over a relatively large area as well as closely adjacent the flow passage so as to provide further improved moisture collection elimination in the refrigerator cabinet. By permitting the installation of the device after the cabinet construction is completed, improved accurate positioning thereof is facilitated. The device is relatively small in cross section, as best seen in FIG. 4, so that minimum force and operation of the insulation material is required.

The socket element may be removed if desired. Alternatively, the socket element may be retained in the cabinet wall with the heater removed therefrom.

Thus, the invention comprehends an improved moisture control means which is extremely simple and economical of construction while yet providing the highly desirable features discussed above.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

Having described the invention, the embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In an apparatus having an insulative wall, means for controlling moisture collection in the wall comprising:

an elongated socket element formed of a thermally conductive material having a tapered tip inserted into a preselected portion of said wall having a surface on which moisture collection is to be controlled, and an outer end opening to exteriorly of said wall;

an electric heater element received in said socket element;

and means at said outer socket end for electrically connecting the heater to a power source for heating said preselected wall portion whereby moisture collection on said surface at said preselected portion is effectively controlled.

2. The moisture controlling apparatus of claim 1 wherein said heater element is U-shaped.

3. The moisture controlling apparatus of claim 1 wherein said tip is sharply pointed for facilitated insertion into said wall.

4. The moisture controlling apparatus of claim 1 wherein said insulative wall defines a body of foamed-in-place insulation and said tip is adapted to piercingly penetrate said insulation.

5. The moisture controlling apparatus of claim 1 wherein said socket element is formed of rigid thin wall material.

6. The moisture controlling apparatus of claim 1 wherein said socket element is formed of metal.

7. The moisture controlling apparatus of claim 1 wherein said open end of the socket element is outwardly flared.

8. In a refrigeration apparatus having a cabinet provided with an insulative material dividing wall having an outer liner and an inner insulation, means for controlling moisture collection on the liner comprising:

an elongated socket element formed of a thermally conductive material having a tapered tip inserted into a preselected portion of said divider wall insulation, and an outer open end opening outwardly to exteriorly of the wall;

an electric heater element received in said socket element; and

means at said outer socket end for electrically connecting the heater to a power source for heating said preselected wall portion whereby moisture collection on said liner at said preselected portion is effectively controlled.

9. The refrigeration apparatus of claim 8 wherein said divider wall is provided with a through passage and said socket element tip is disposed adjacent said through passage.
10. The refrigeration apparatus of claim 8 wherein said socket element extends through the rear of said dividing wall forwardly into said dividing wall closely adjacent said liner.

11. The refrigeration apparatus of claim 8 wherein said socket element extends downwardly through the top of said dividing wall into the dividing wall.