

Feb. 20, 1951

E. O. HANSON ET AL
MEANS FOR PREVENTING CONDENSATION OF
MOISTURE ON REFRIGERATOR WINDOWS

2,542,136

Filed Jan. 10, 1949

4 Sheets-Sheet 1

Fig. 2.

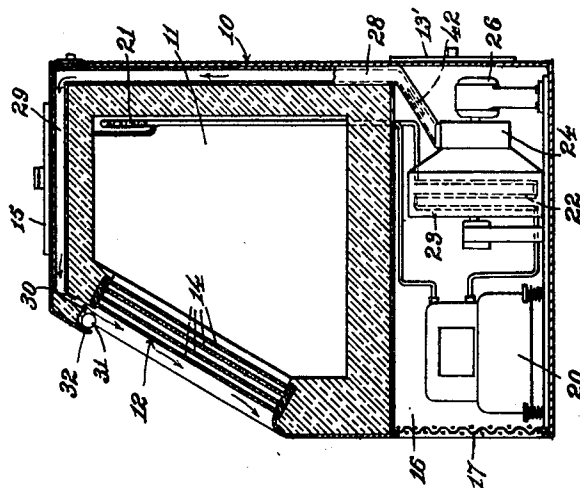
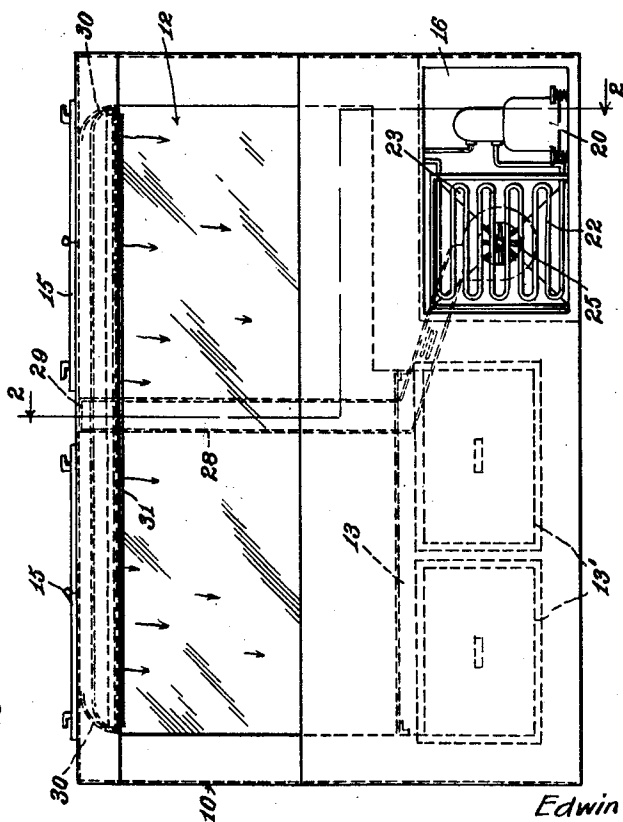


Fig. 1.



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Fig. 3.

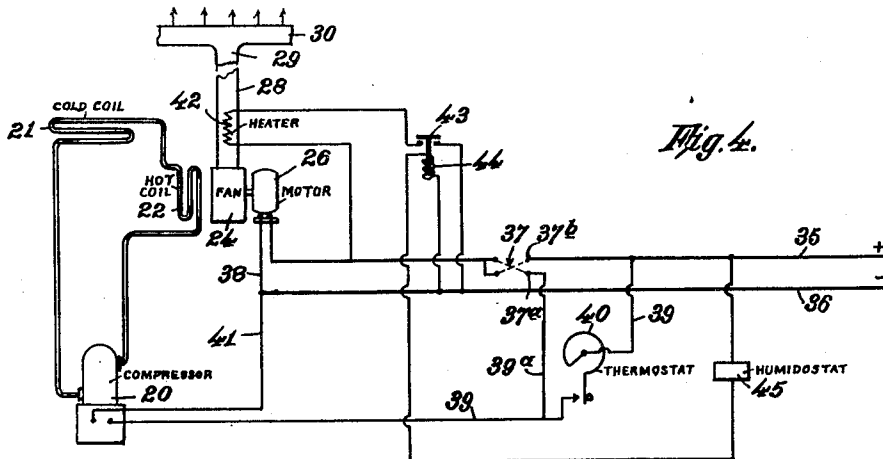
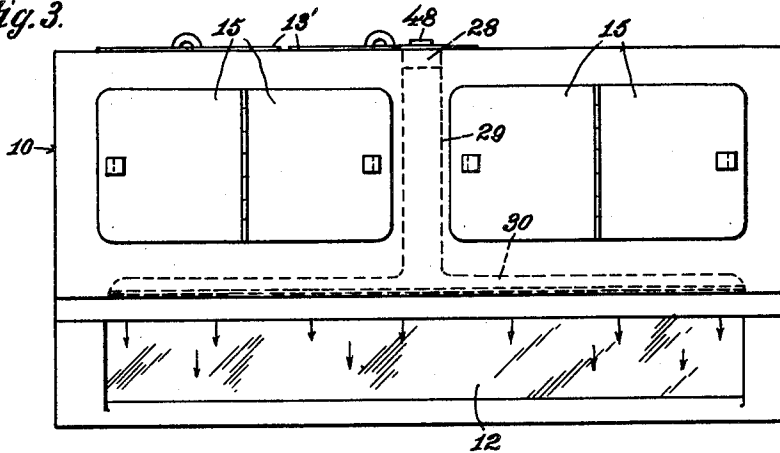


Fig. 4.

Fig. 5.

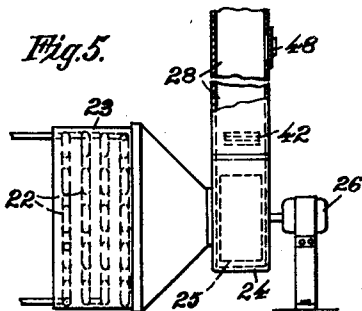


Fig. 6.

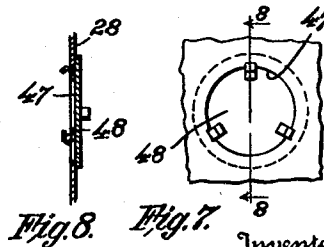
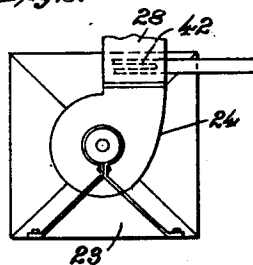


Fig. 8.

Fig. 7.

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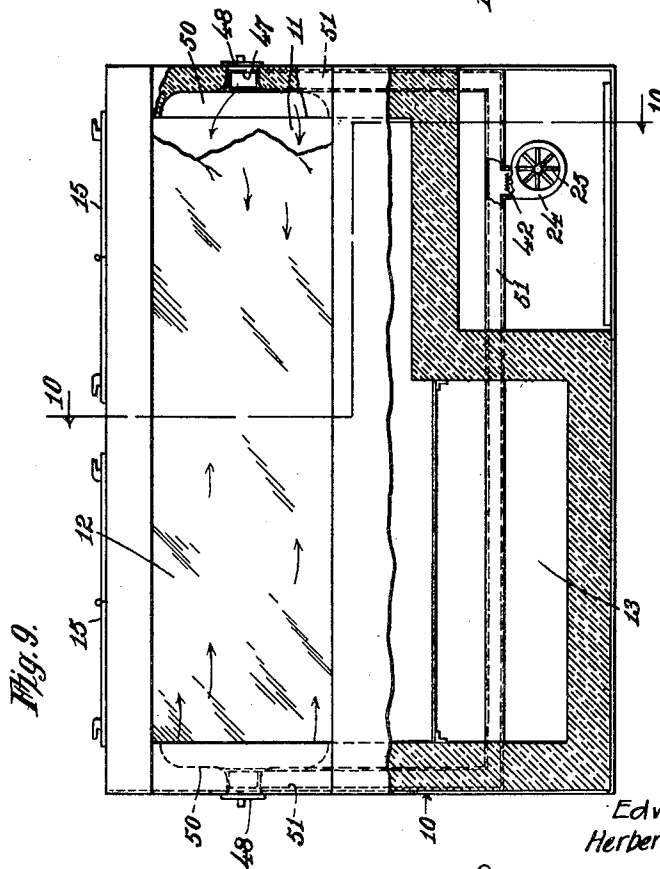
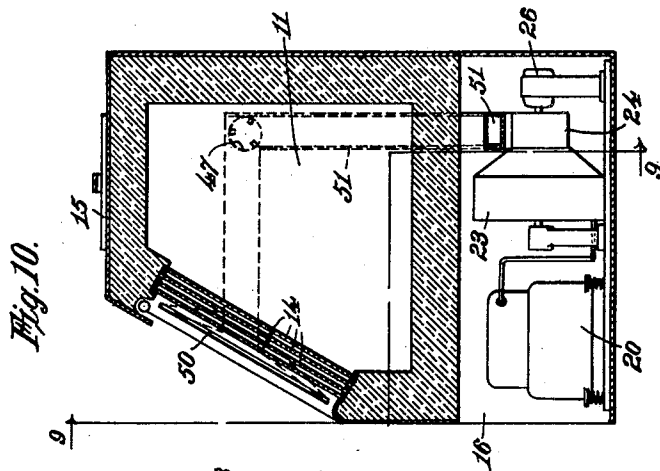
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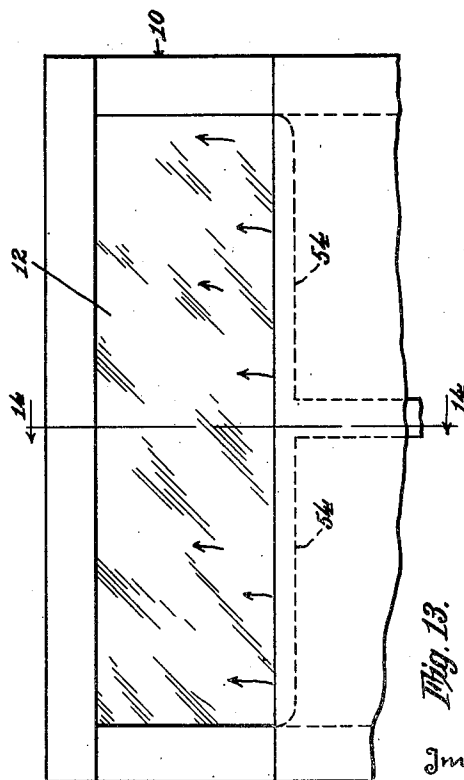
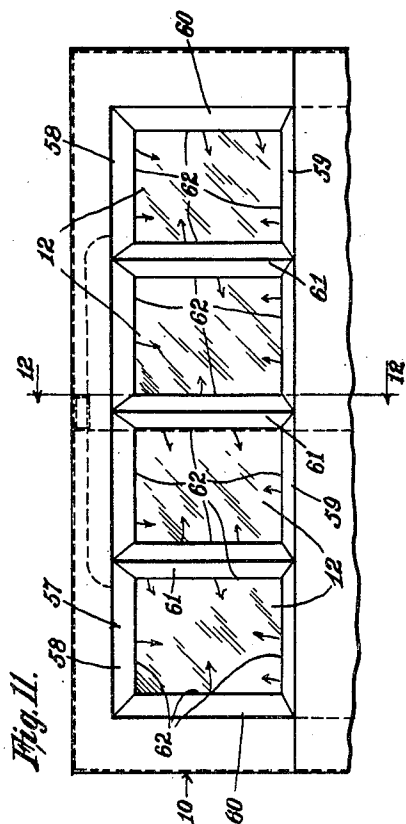
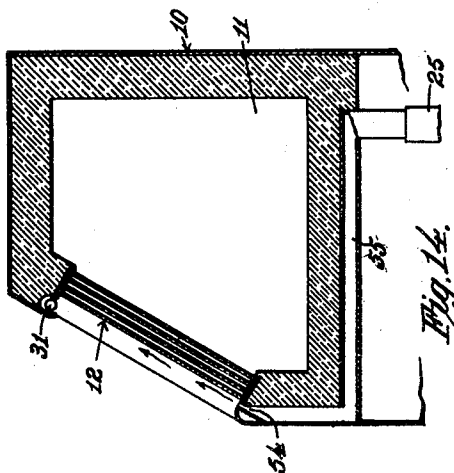
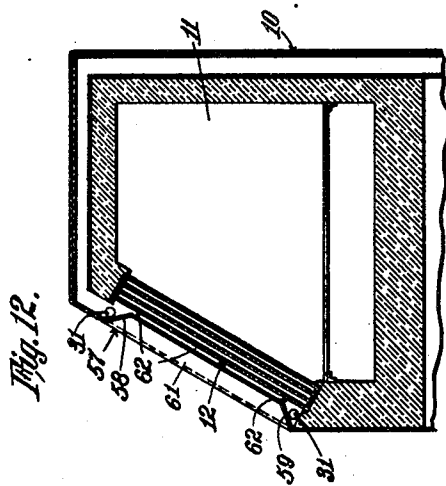
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UNITED STATES PATENT OFFICE

2,542,136

MEANS FOR PREVENTING CONDENSATION
OF MOISTURE ON REFRIGERATOR WIN-
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Application January 10, 1949, Serial No. 70,128

4 Claims. (Cl. 62—89.5)

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This invention relates to display cabinets for frozen or frosted foods; and particularly to means for preventing the accumulation of condensed moisture on the display windows thereof.

In refrigerators wherein frozen foods are displayed through glazed windows or panels, difficulty has been experienced in preventing the accumulation of moisture or frost upon the windows and thereby preventing a clear view of the contents on display. The display windows of such refrigerator cabinets usually comprise a plurality of parallel, spaced panes forming dead air spaces between them for the purpose of insulation. To avoid condensation of moisture in said spaces upon the several panes, the air is frequently exhausted or rarefied, or means are provided for circulating air between the panes. However, such means requires a complicated construction and does not always accomplish the desired purpose especially when very low temperatures are required.

The object of the present invention is to provide improved means to prevent the accumulation of condensation of moisture on the window or windows of a display cabinet for frozen food.

Display cabinets of the class under consideration include a chamber for the foods, and refrigerating mechanism including generally a compressor usually located under said chamber, a cold or refrigerating coil in said chamber, and a hot or radiator coil from which the heat is exhausted into the atmosphere.

In carrying out the present invention, the usually wasted heat from the hot or radiator element is utilized to keep moisture from condensing on the display window. To this end the hot or radiator coil is arranged within a hood communicating with the housing of a rotary fan from which a duct or ducts lead to an air discharge head or heads located so as to force the warm air over the outer surface of the window. Usually, when it is desired to keep the display windows clear of condensation or frosting, the fan is run continuously. However, when the thermostatically controlled compressor is in operation it is necessary to operate the fan to dispel the heat from the hot coil. To this end means are provided whereby the fan may be continuously operated or automatically operated only when the compressor is in operation.

A further object of the invention is to provide a humidity controlled heater for the air located within the air duct which is serviceable upon humid days and particularly when the compressor is not in operation.

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Other objects will appear hereinafter.

The invention will be more readily understood by reference to the accompanying drawings forming a part of this application and in which:

Fig. 1 is a front elevation of a refrigerator display cabinet embodying this invention,

Fig. 2 is a transverse section on the line 2—2 of Fig. 1,

Fig. 3 is a top plan view of the cabinet shown in Figs. 1 and 2,

Fig. 4 is a diagram of the electric circuit for controlling the refrigeration unit and the means for preventing the condensation of moisture,

Fig. 5 is a side elevation of the housed compression coil of the refrigerating unit and associated fan,

Fig. 6 is an end elevation thereof,

Fig. 7 is a view illustrating a clean-out opening in the warm air duct, and the closure for the same,

Fig. 8 is a section on the line 8—8 of Fig. 7,

Fig. 9 is a view partly in elevation and partly in section, of a modified form of the invention, on substantially the line 9—9 of Fig. 10, a portion of the upper part of the cabinet at one end also being illustrated in section,

Fig. 10 is a transverse section on substantially the line 10—10 of Fig. 9,

Fig. 11 is a front elevation of the upper or display portion of a cabinet embodying a further modification,

Fig. 12 is a transverse section on substantially the line 12—12 of Fig. 11,

Fig. 13 is a view similar to Fig. 11 illustrating a still further modification, and

Fig. 14 is a section on the line 14—14 of Fig. 13.

Referring to Figs. 1 to 6 inclusive of the drawings, 10 indicates a display cabinet having a display chamber 11 provided with a display window 12, and a storage space 13 which may be provided with one or more drawers 13'. The window 12 comprises a plurality of parallel spaced panes 14 from between which the air is preferably exhausted. Top doors 15 provide access to the chamber 11. Below the chamber 11 is a chamber 16 for the operating mechanism and said chamber 16 is usually open on one side for ventilation. If preferred, a protective grid 17 may be provided for the open side of the chamber, as indicated in Fig. 2. The grid is omitted from Fig. 1 to avoid confusion.

Arranged within the chamber 16 is a compressor 20 connected to a cold or refrigerating coil 21 in the display chamber 12, and to a hot or radiating coil 22 which is arranged within a

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hood or open housing 23. Other details of the refrigerating mechanism are omitted as being unnecessary for a complete understanding of the invention. The hood 23 is connected for direct communication with a fan housing 24 for a circulation fan 25 driven by a motor 26.

From the fan housing 24 an air duct 28 extends upwardly at the back of the cabinet to the top thereof, and then forwardly as at 29, communicating with a slotted discharge head 30 in the wall of the chamber 11 directly above the display window 12 and preferably extending the full width thereof. When air is forced from the nozzle 30, as will be more fully described hereinafter, it is directed downwardly across the entire face of the window 12, which is preferably inclined downwardly and outwardly as illustrated in Fig. 2.

A fluorescent tube or tubes 31 for lighting the display are arranged on the outside of the cabinet and concealed by a reflector 32 which also covers the discharge head of the air duct.

In Fig. 4 is illustrated a diagram of the main elements of the invention, including the electric circuits, of which 35 and 36 indicate the line wires leading from a source of supply. The fan motor 26 is connected to the line wire 35 through a selector switch 37 and directly to the wire 36 by a conductor 38. The compressor 20 is connected by a conductor 39 and interposed thermostat 40 to the line 35, and by a conductor 41 to the line 36. A conductor 39^a connects the conductor 39, on the compressor side of the thermostat, to a pole 37^a of the selector switch 37.

When the switch is positioned in contact with the pole 37^a of the switch 37, the fan motor 26 will run continuously, thereby forcing air at room temperature or warmer, from the chamber 16 through the ducts 28—29 to the discharge head 30 from which it is sprayed across the surface of the window thereby dissipating any moisture which may have accumulated on the window before the device went into operation, and preventing further accumulation of moisture or frost while the operation continues. The heat generated by the compressor will usually be sufficient to maintain the air at ample temperature for effective use inasmuch as the compressor continues to operate intermittently as controlled by the thermostat 38.

On cool days, and at night or other times when the store is closed, the switch 37 is thrown into engagement with the pole 37^a so that the fan motor will run only when the circuit is closed to the compressor by the thermostat 40, the motor and compressor then being in parallel. This will dissipate the heat generated by the compressor.

In some localities, and at certain times in any locality, the humidity of the atmosphere is so great that additional heating of the air passing to the spraying nozzle is required in order that the device shall work at full efficiency. As such conditions usually prevail for comparatively short intervals, means should be provided for automatically supplying the additional heat only when required.

To this end an electric heater 42 is arranged in the air duct 28 adjacent the fan housing 24. The heater is connected across the lines 35—36 through a normally open switch 43, which is closed upon energization of a solenoid 44 by a humidostat 45 connected across the lines 35—36. When the relative humidity of the air is great, the humidostat closes the switch 43 to the heater 42 which heats the air in the duct 28 to a higher

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degree than is possible with the condenser alone. This lowers the relative humidity of the air impelled through the ducts thereby increasing its capacity to hold moisture, and consequently to keep the window free from frost or fog. Also the display window is warmed up by the heated air, thereby further reducing the possibility of condensation. When the atmosphere becomes drier, the humidostat permits the switch 43 to open, thereby cutting off the current to the heater 42.

Openings 47 are provided at convenient locations in the air ducts to admit a cleaning brush or the like; and are furnished with readily removable closures 48.

It is obvious that the invention is not limited to a construction wherein the air is directed downwardly across the windows from the upper position thereof, but that the air may be directed across the window or windows in any direction.

In Figs. 9 and 10 is illustrated a form of the invention wherein the discharge heads 50 are arranged at the opposite ends of the window and connected to the fan casing 24 by ducts 51. The operating mechanisms are the same as in the preceding form and further description would be mere repetition.

Figs. 13 and 14 illustrated a further modification wherein the air is directed upwardly from a discharge head 54 arranged at the lower edge of the window and connected to the fan housing, by a duct 55.

A further modification of the invention is illustrated in Figs. 10 and 11. In this form of the device, a panelled framework 57 of sheet material is arranged over the window or windows 12, dividing the same into sections. The upper and lower edges 58 and 59 respectively of the frame are sloped inwardly toward the window terminating in closely spaced relation to the window, as are also the side or end edges 60. A plurality of spaced elements 61, which are of inverted V-shape cross-section, connect the portions 68 and 69, the whole forming a series of rectangular discharge heads 62 from which the air is forced in all directions over each of the several sections of the window.

It is to be understood that various further modifications and arrangements of parts may be made without departing from the invention as described and as set forth in the following claims.

Having described our invention, what we claim is:

1. A refrigerating chamber having a display window, a discharge head adjacent an edge of said window and adapted to discharge air over the outer face of said window, in combination with refrigerating means including a compressor, a fan and fan casing adapted to receive air heated by said compressor, a source of electric supply for said refrigerating means, a duct leading from said fan casing to said discharge head, an electric heater in said duct and connected to said source of electric supply, and a humidostat interposed in the circuit to said heater.

2. A refrigerating chamber having a display window in combination with refrigerating means including a compressor, a cold coil in said chamber, and a heat radiating coil, a source of electric supply connected to said compressor, a thermostat interposed in the circuit to said compressor, a fan and fan casing adapted to receive the air heated by said radiating coil, a duct leading from said fan casing and terminating in

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means for directing the air from said fan over the outer face of said window, a motor for said fan connected to said source of supply, and a selective switch interposed in the connection to said fan motor to connect said motor directly to said source of supply or in parallel with said compressor.

3. The combination set forth in claim 2 further characterized by a heater in said duct and connected to said source of electric supply, and a humidostat controlling the circuit to said heater.

4. A refrigerating chamber having a display window, discharge heads adjacent a plurality of edges of said window and adapted to discharge air in different directions over the outer face thereof, in combination with refrigerating means including a compressor, a fan and fan casing adapted to receive air heated by said compressor, a source of electric supply for said refrigerating

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means, a duct leading from said fan casing to said discharge heads, an electric heater in said duct and connected to said source of electric supply, and a humidostat interposed in the circuit to said heater.

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