Feb. 19, 1935. J. L. KNIGHT 1,992,011

REFRIGERATOR CABINET

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Fig. 1.

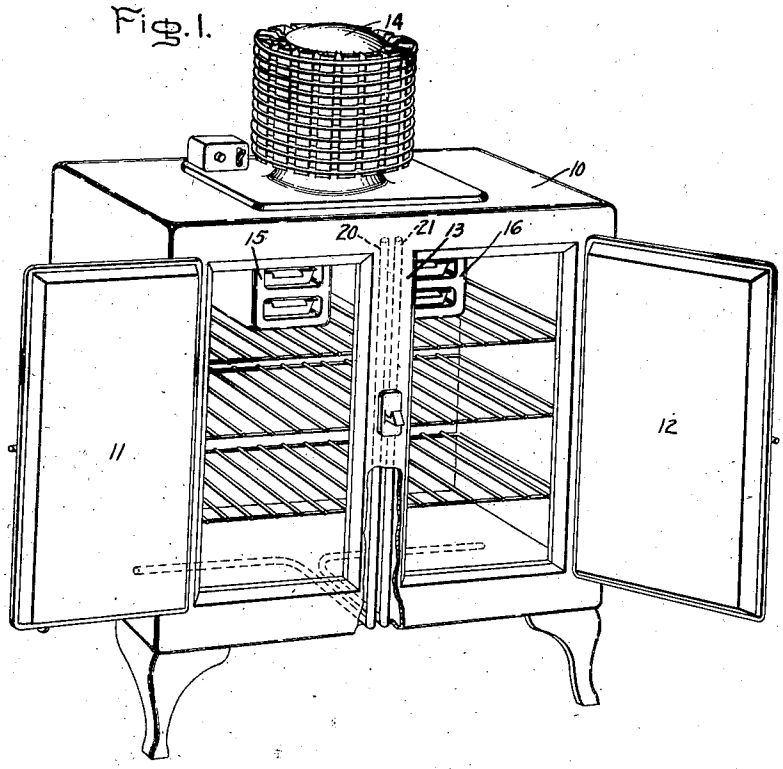


Fig. 2.

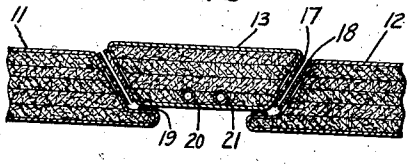
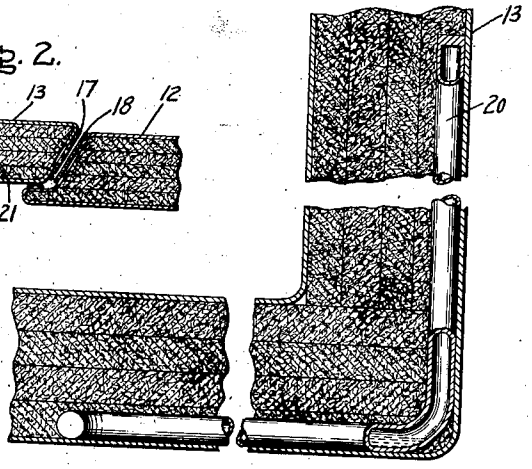


Fig. 3.



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1,992,011

REFRIGERATOR CABINET

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6 Claims. (Cl. 62—89)

My invention relates to refrigerator cabinets and particularly to devices for preventing condensation of moisture on the outside of such cabinets.

Refrigerator cabinets in some cases are required to be of such construction that a portion of the outer surface of the cabinet is cooled below the dew point of the surrounding air and in consequence there is a tendency for moisture to condense on the cabinet wall. The two-door cabinet is an example of such construction for in it a post or mullion is provided between the doors. The mullion is insulated from the door surface by the door gaskets, so that there is little flow of heat from the door and cabinet surfaces to raise the temperature of the outer surface of the mullion. The outer surface of the mullion is cooled more than that of the remainder of the surface of the cabinet and below the dew point of the surrounding air by the circulation of cold cabinet air in the space between the door and the mullion, by the conduction of heat through the two insulated side faces of the mullion, which are relatively close together, and by the conduction of heat from the outer surface of the mullion to the inner surface thereof.

It is an object of my invention to provide a device for preventing reduction in the temperature of portions of the outer surfaces of refrigerator walls to such an extent as to cause the condensation of moisture thereon.

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

For a better understanding of my invention reference may be had to the accompanying drawing in which Fig. 1 shows a two-door refrigerator cabinet embodying my invention; Fig. 2 shows an enlarged cross-sectional view of the mullion of the cabinet shown in Fig. 1 with the doors in their closed position; and Fig. 3 shows an enlarged fragmentary sectional view of the mullion of the cabinet shown in Fig. 1.

Referring to the drawing, in Fig. 1 I have shown a household refrigerator comprising a cabinet 10 having doors 11 and 12 and a central mullion 13 of relatively small cross-sectional area between the door openings. A condensing and compressing refrigerating unit 14 is arranged on top of the cabinet, and two evaporators 15 and 16, having freezing compartments therein, are suspended from the upper wall of the cabinet below the refrigerating unit for cooling the air space within the cabinet. It is readily seen in Fig. 2 that the mullion 13 has a greater inner than outer surface; which increases the tendency to cool the outer surface. Insulating strips 17 on either side of the mullion both serve to conduct some heat from the outer surface. It will also be noted that there is an air space between the strips 17 and strips 18 which are on the doors. Cold air circulating in this space also conducts heat from the mullion surface. While the cold air also cools the door surface there is sufficient surface to prevent excess cooling, but the outer surface of the mullion is separated along both sides by the cushioning strips or gaskets 19 secured to the doors, and little heat can flow thereto from the cabinet and door surfaces. The outside surface of the mullion will therefore be cooled more than the outside surface of the remainder of the refrigerator cabinet, and in many cases this cooling effect is sufficient to lower the temperature of the outside surface of the mullion below the dew point of the surrounding air and thereby to cause condensation of moisture. Moisture formed on the mullion surface is obviously undesirable and may in some cases prove injurious to the cabinet and its fittings. Should the formation of moisture be excessive it may also run down and collect on the floor, which may result in rotting or other injury to the floor.

In accordance with my invention I provide two tubes or containers 20 and 21 hermetically sealed at both ends and patially filled with a liquid refrigerant, or other volatile liquid, and arranged within the mullion and cabinet walls. Each of the tubes 20 and 21 has an upright portion arranged along the entire length of the mullion and in contact with the inside surface of the outer wall thereof, the tubes being surrounded by the insulation within the mullion, as can be seen in Figs. 2 and 3. The tubes are bent at right angles and the remaining portions are arranged on the bottom of the refrigerator cabinet in contact with the outside metal wall of the refrigerator. The portion of each of these tubes not filled with liquid refrigerant is filled with gaseous refrigerant, the liquid refrigerant under normal conditions being preferably about sufficient to half fill that portion of the tubes extending along the bottom of the refrigerator, thus providing a maximum surface which facilitates vaporization. The tubes are arranged in close contact with the outside walls of the refrigerator in order that heat may be readily transferred be-

tween the tubes and the outside metallic walls. It will readily be understood that the major portion of the outer surface of the refrigerator cabinet is at substantially the temperature of the surrounding air, and that the portions of the tubes 20 and 21 which contain liquid refrigerant may be arranged in contact with any suitable part of the major portion of the outer wall of the refrigerator cabinet which is at a sufficiently high temperature.

In the operation of the embodiment of my invention shown in the drawing, when the refrigerating mechanism is in operation and the interior of the cabinet is cold, there will be a tendency for heat to flow from the outside of the refrigerator to the cold cabinet. And, as has been pointed out above, the outer surface of the mullion will be cooled more than the remainder of the cabinet surface. However, in accordance with my invention the tubes 20 and 21 are so arranged that there will be a transfer of heat from the bottom of the refrigerator to the outer surface of the mullion, which raises the temperature of the outer surface of the mullion sufficiently to prevent the condensation of moisture on the outside due to the lowering of the temperature of the outside walls. The cold mullion will cool the tubes 20 and 21 and condense the gas in the upper portions thereof. This gas will liquefy and run down to the lower portions of the tubes and will be replaced by gas boiled from the liquid in the lower portions of the tubes along the bottom of the refrigerator. The gas which is condensed in the upper portions of the tubes 20 and 21 supplies the heat necessary to maintain the outer surface of the mullion at a temperature above the dew point of the surrounding air. It will be apparent that this heat transfer device needs no attention whatsoever and will operate continuously as long as a temperature difference prevails between the mullion and the bottom of the cabinet. The portions of the tubes containing the liquid refrigerant may be placed in any part of the refrigerator cabinet, which is at a higher temperature than the mullion itself, it being understood that the tubes must be arranged to permit the flow of condensed liquid refrigerant back to the main body of liquid refrigerant.

While I have described my invention in connection with a household refrigerator of the type having a mullion between the doors, it will be apparent that it is applicable to other constructions in which it is desired to transfer heat from one part of the cabinet structure to another. I do not, therefore, desire my invention to be limited to the particular construction shown and described and I intend in the appended claims to cover all modifications thereof which do not depart from the spirit and scope of my invention.

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

1. A refrigerator cabinet having a major portion of the outer surface thereof at substantially the temperature of the surrounding air and having another portion of said outer surface which may be cooled below the dew point of the surrounding air by transfer of heat to the interior of said cabinet, and means for transferring sufficient heat from a part of said major portion of said outer surface to said other portion to maintain the temperature of said other portion above the dew point of the air surrounding said cabinet.

2. A refrigerator cabinet having a major portion of the outer surface thereof at substantially the temperature of the surrounding air and having another portion of said outer surface which may be cooled below the dew point of the surrounding air by transfer of heat to the interior of said cabinet, and means including a hermetically sealed container partially filled with a volatile liquid for transferring sufficient heat from a part of said major portion of the surface of said cabinet to said other portion of said outer surface to maintain said other portion at a temperature above the dew point of the surrounding air.

3. A refrigerator cabinet having a major portion of the outer surface thereof at substantially the temperature of the surrounding air; a plurality of doors for said cabinet, a mullion having an outer surface which may be cooled below the dew point of the surrounding air by transfer of heat to the interior of said cabinet, and means for transferring sufficient heat from a part of said major portion of the outer surface of said cabinet to the outer surface of said mullion to maintain the temperature of the outer surface of said mullion above the dew point of the surrounding air.

4. A refrigerator cabinet having a mullion, a hermetically sealed tube containing a volatile liquid and arranged within the walls of said cabinet and said mullion, a portion of said tube being in contact with the outer wall of said mullion over substantially the entire length thereof, and another portion of said tube being in contact with the outer wall of said cabinet at the bottom thereof.

5. A refrigerator cabinet having thermally insulated walls, one portion of said walls having a relatively small outer surface area thermally insulated from the remainder of the outer surface of said cabinet along the major portion of the boundary of said small surface area, a hermetically sealed container having a gas therein and partially filled with a volatile liquid, said container having a part thereof arranged within said one portion of said walls and another part thereof containing liquid arranged in another portion of said cabinet, below said first part.

6. A refrigerator cabinet having doors opening from a mullion, and means for preventing condensation of moisture on the outer wall of said mullion, said means including an elongated metal container partially filled with liquid refrigerant, one portion of said container being arranged adjacent the outer wall of said mullion and another portion being arranged adjacent the outer wall of said cabinet below the portion adjacent said mullion.

JAMES L. KNIGHT.