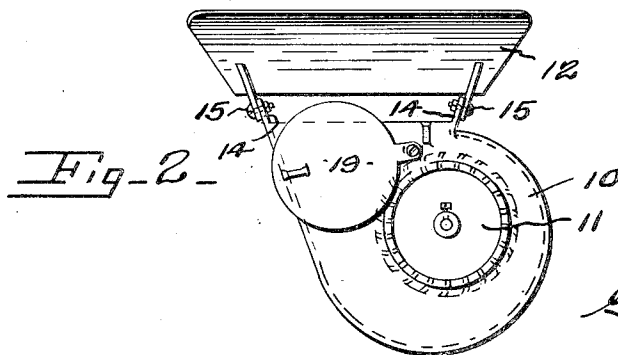
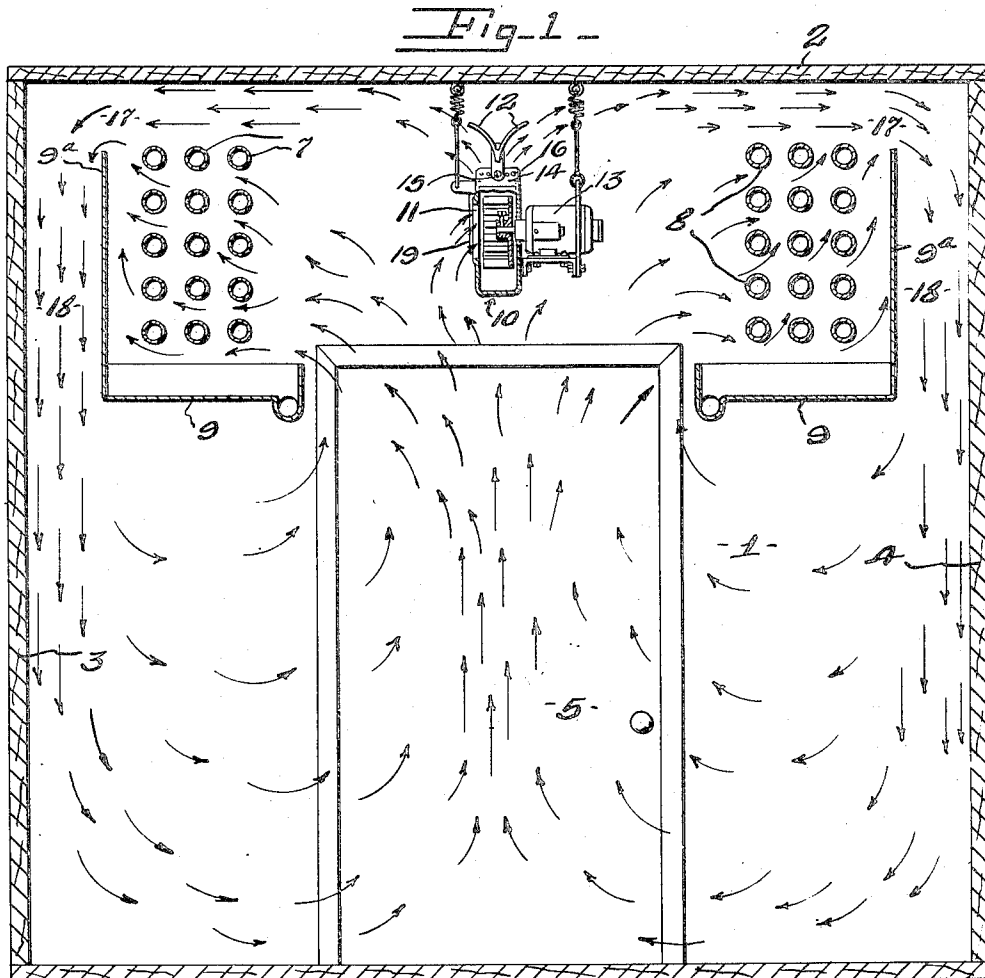


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METHOD AND MEANS FOR PREVENTING RAPID FORMATION
OF FROST ON REFRIGERATING CONDUITS
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METHOD AND MEANS FOR PREVENTING
RAPID FORMATION OF FROST ON REFRIG-
ERATING CONDUITS

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6 Claims. (Cl. 62—102)

This invention has for its object, a method and means for preventing the rapid formation of frost on the refrigerator pipes or conduits of refrigerators.

In refrigerators, such as are used in food stores and markets etc., it is necessary to periodically defrost the refrigerator conduits, or coils, that is, the coils through which the brine or other refrigerating medium is circulated. This requires several hours, and sometimes as long as two days, and a shutting down of the refrigerator plant for that period. The frost and ice is filthy and contaminates the food products, and the food products are liable to spoil, or deteriorate during the cleaning process. Also, when frost forms on the coils, moisture is withdrawn from the contents of the refrigerator. Meats become slimy, and vegetables dry. This condition increases as the frost and ice forms. Or, in other words, the frost is formed from moisture absorbed from the meat, or other food, stored in the refrigerator, and due to the absorption the meat, or food, deteriorates, and hence, in the refrigerators heretofore used, the meat, or food, deteriorates in the normal operation of the refrigerator.

It has been customary to circulate air more or less haphazard fashion through the refrigerator, but the ordinary circulation aggravates the conditions. That is, it does not keep the conduits from frosting, nor prevent the absorption of moisture from the food, as in the circulating system, the refrigerated air being heavier leaves the coils by gravity and hence, hovers around the coils long enough for the moisture to freeze on the coils.

The object of my invention is an air circulating system, or means for circulating the air. The refrigerated air is moved from the coils continuously against gravity, without blowing directly against the coils so that the warmer air from the interior of the refrigerator room passes continuously by convection among, or between the coils.

The method therefore consists in moving the body of air upwardly through the coils then downwardly at one side of the coils from the upper portion of the refrigerator to the lower part thereof where the food or contents are stored so that the warmer air moves slowly or almost by convection upwardly between or among the coils at such a rate of speed that the air is chilled, but a large portion thereof does not contact the coils and hence, very little condensation deposited on the coils, which condensation is removed when the ice machine shuts down under its thermostatic control. A fan, or a blower creates an air current of sufficient force to create a moving body of air

above and transversely of the coils so that its action lifts, injector fashion, some of the air slowly and without undue turbulence through the coils.

The apparatus consists in the relative arrangement of coils in the refrigerator room, or cabinet, and the fan, or blower, and in the method and combination and construction hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawing, in which like characters designate corresponding parts in all the views.

Figure 1 is a vertical, sectional view through a refrigerator room, or cabinet, embodying one form of my invention.

Figure 2 is a side elevation of the blower.

I have here shown my invention as applied to a refrigerator room, or cabinet, such as is ordinarily used in grocery stores and meat markets.

1 designates the room, or cabinet, which includes a top wall 2, opposite side walls 3, 4, and front and rear walls, one of which is provided with a door 5. The cabinet, or room, is closed, except when the door is opened to enter or leave the cabinet or room.

7 and 8 designate coils, or conduits, for a refrigerating medium, or through which the medium circulates, and 9 are pans having shields 9^a extending between the side walls 3 and 4, and the coils with the pans extending under the coils. The cabinet coils and pans are the same as in any refrigerating cabinet, such as are used in stores and meat markets. Ordinarily, the coils become gradually covered with frost, and the coils must be defrosted periodically. The defrosting operation is an expensive and filthy operation which heretofore has been necessary and unavoidable. It requires a shutting down of the refrigerating plant for several hours, and results in deterioration, if not complete spoiling of the contents of the refrigerator. If not defrosted periodically, the refrigerator will not function efficiently.

10 designates a blower of any suitable construction located near the top of the cabinet, or room, and midway between the coils 7 and 8, the blower having outlets directed laterally over the tops of the coils, or toward the space between the coils and the top wall. The blower also has a suitable intake at 11, this being also located between the coils. As here shown, the blower is provided at its discharge end with an air splitter or deflector 12, this air splitter being adjustable laterally

to adjust the amount of air current that is deflected in opposite directions.

The rotor of the blower is actuated in any suitable manner, as by an electric motor 13. The splitter is here shown as adjustable along means as transverse flanges 14 at the outlet of the blower, and held in adjusted position by bolts 15, or other clamping means, the flanges being formed with a series of holes 16 for the bolts.

In operation, the blower discharges air through its outlet against the deflector, or splitter, from which it passes laterally through passages 17 between the top wall 2 and the coils 7, then downward assisted by gravity through passages 18 between the side walls 3, 4, and the coils, and thence throughout the lower part of the refrigerator where the food is stored, where it absorbs heat, then upwardly and by convection between the coils, most of the upward air current being taken in at the fan and recirculated, but some of it moving between or about the coils. The air current created by the fan keeps the body of air in the cabinet in motion throughout a definite path, and prevents the air from hovering around the pipes.

The air current is of sufficient force to push against the body of air in the passage 17 and displace it laterally in the passage 18 where it falls by gravity. This lateral displacement causes the warmer air to rise by convection through, or around the coils where it becomes refrigerated and heavier, but prevented from falling or hovering about the coils. The action of the forced draft created by the fan on the body of air above the coils in the passage 17 causes a suction, or ejector action among the coils, so that the air being cooled flows slowly but continuously among the coils.

The flow of the brine, or other refrigerating medium through the coils is adjusted for maintaining the desired temperature, and the movement of the air current regulated by means of an adjustable shutter 19 at the intake of the blower. The fan forces air in a path around each refrigerating unit and out of contact with the same causing refrigerated air about the conduits of each refrigerating unit to be sucked upwardly against gravity through the refrigerating unit by the ejector action of the air passing horizontally over the top of the refrigerating unit. The refrigerated air from the refrigerating unit mixes with the unrefrigerated air as the same enters and passes downward through the side passage 18 to the lower portion of the refrigerator before the mixed refrigerated and unrefrigerated air comes in contact with the food products and other contents of the refrigerator. The air warmed by the food products and other contents of the refrigerator passes upward to the fan and to the coils of the refrigerating units. The fan in circulating the air draws most of the air through it but some of the warmed air passes upward through the refrigerating unit to replace the refrigerated air removed from the refrigerating unit by the ejector action of the forced air passing over the top of the unit. Due to this action of the fan in creating these currents rapid formation of frost is prevented because only a portion of the air contacts with the coils and the refrigerated air does not have a chance to hover around the coils but passes upward through the same through the said ejector action of the forced unrefrigerated air passing over the coils. Some of the air passing upward through the refrigerating unit does not come in contact with

the coils and retains some of its moisture. Also the air passing through the fan and discharged in a transverse current over the refrigerating unit and not coming in contact with the coils thereof retains its moisture so that the mixed unrefrigerated air and refrigerated air passing downward through the side passage 18 is not as dry as the air would be if all of the air came in contact with the refrigerating coils and the circulation of the mixed air through the food products will not have the drying effect on the same as refrigerated air from which all of the moisture has been removed through contact with refrigerating coils. In operation, the shutter 14 is usually adjusted so that a sufficient amount of air is circulated to prevent the formation of frost on the coils at all times, but if desired the air circulation may be regulated by the adjustment of the shutter so that there will be a slight formation of frost on the coils during the operation of the compressor of the ice machine, which frost will be absorbed by the air circulation when the compressor shuts off by its thermostatic control. My invention is particularly advantageous in refrigerators such as are used in meat markets and grocery and general produce stores where a temperature of above and near freezing is maintained.

My invention, although simple, entirely and satisfactorily solves a long existent problem in the refrigerator art, particularly in connection with refrigerators used in meat markets, stores etc., and permits the refrigerator system to be operated without stopping and without variations in temperature of more than a one-half degree during the entire operation, and further avoids the inconvenience of frequent stopping of the refrigerator to defrost the conduits as is ordinarily required, and prevents the rapid formation of frost on the pipes, and the absorption of moisture from the food products. Further, my invention results in great economy in power, as electric current is running the refrigerator to maintain a predetermined temperature as in the refrigerators heretofore used more power is required to operate the refrigerator to maintain a given temperature as the frost forms on the coils as the frost acts as an insulator.

What I claim is:

1. In a refrigerator comprising a cabinet having refrigerating coils arranged near the top and one side wall and spaced apart therefrom forming air passages between the top and side walls and the coils, and a blower near and spaced apart from the top of the cabinet and from said coils and having its outlet arranged to discharge toward the passage between the coils and the top wall, for forcing unrefrigerated air in a horizontal direction over the coils to create an ejector action to suck refrigerated air in and about the coils upwardly into the horizontal passage against the action of gravity, said fan having its intake arranged to receive part of the warmer air current passing upwardly from the lower part of the cabinet.

2. A refrigerator comprising a cabinet having top, bottom, and side walls, refrigerator coils located in the upper portion of the cabinet near the top wall and the opposite side walls and spaced apart from the top and side walls forming air passages, a blower located in the upper part of the cabinet near the top wall thereof and between the coils, the blower having outlets discharging laterally into the space between the top wall and the coils, and an intake located at a

level between the coils and arranged to receive air from the lower portion of the cabinet, said blower casing air currents having an injector action sucking the colder air upward laterally and downwardly along opposite sides of the cabinet to the lower portion thereof where it receives heat from the lower part of the cabinet and then upwardly between and about the coils, a part of the upward current passing through the blower.

3. The method of preventing rapid formation of frost on the refrigerating conduits of refrigerating units of refrigerators consisting in forcing unrefrigerated air in a continuous path over and around a refrigerating unit and out of contact with the same and causing refrigerated air about the conduits of the refrigerating unit to be sucked upwardly against gravity through the refrigerating unit, and mixing the refrigerated air with the unrefrigerated air before the mixed air contacts with the articles to be cooled.

4. The method of preventing rapid formation of frost on the refrigerating conduits of refrigerating units of refrigerators consisting in forcing unrefrigerated air in a continuous path in a horizontal direction above a refrigerating unit and around the same and out of contact with the conduits of the unit, creating an ejector action above the refrigerating unit by the horizontal path of the unrefrigerated air and causing the refrigerated air about the conduits of the refrigerating unit to be sucked upward against gravity through the refrigerating unit, and mixing the refrigerated air with the unrefrigerated air before the mixed air comes in contact with the articles to be cooled.

5. The method of preventing rapid formation of frost on the refrigerating conduits of refrigerating units of refrigerators consisting in forcing unrefrigerated air in a continuous path over and around a refrigerating unit and out of contact with the same and causing refrigerated air about the conduits of the refrigerating unit to be sucked upwardly against gravity through the refrigerating unit, mixing the refrigerated air with the unrefrigerated air before the mixed air contacts with the articles to be cooled, and displacing the air warmed by the heat absorbed from the contents of the refrigerator, upward to replace the refrigerated air removed from and about the conduits causing a continuous current of air to pass upwardly through the refrigerating unit and counteracting the tendency of refrigerated air to fall.

6. A refrigerating apparatus including a cabinet having refrigerating coils in the upper portion thereof spaced from the top and side walls providing horizontal and vertical cold air passages and means for causing unrefrigerated air to positively and continuously pass laterally into the horizontal passage over the refrigerating coils to the vertical passage and then downwardly to displace upwardly the air in the lower areas of the cabinet, the unrefrigerated air passing over the coils creating an ejector effect and causing the refrigerated air to be sucked upwardly against gravity and mixed with the unrefrigerated air as the latter moves downwardly in the said vertical passage and before the mixed air contacts with the articles to be cooled.

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