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DEFROSTING CONTROL ARRANGEMENT

Filed May 25, 1944

FIG. 1

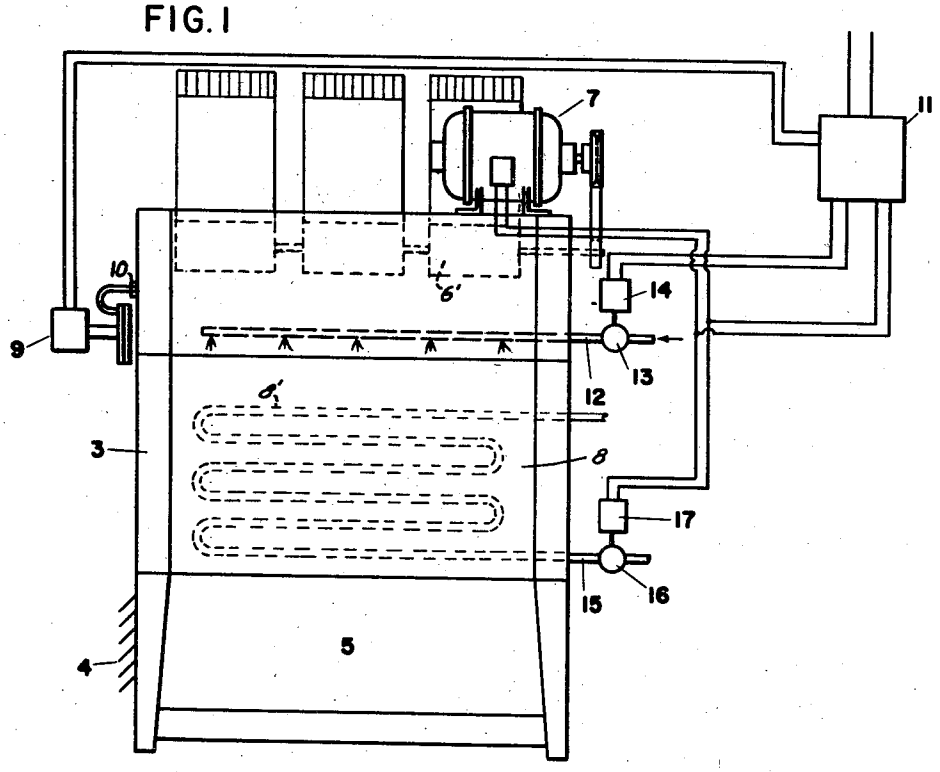
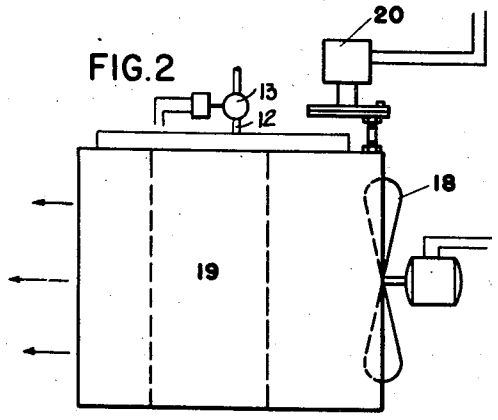


FIG. 2



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DEFROSTING CONTROL ARRANGEMENT

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8 Claims. (Cl. 62—2)

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This invention relates to a system of defrost control adapted for use with cold diffusers and similar apparatus in which accumulations of frost become excessive to the point where efficiency of operation is undesirably reduced.

The general object of the invention is to provide a system of control responsive to variation in pressure resulting from reduced flow of air accompanying excessive accumulations of frost on an evaporator or cooler coil.

A principal feature of the invention is the provision of a static pressure control preferably located in the path of air flow to reflect a reduction or increase in pressure resulting from excessive accumulations of frost.

Other features and advantages flowing from applicant's simple and relatively inexpensive arrangement will be more apparent from the following description of typical forms of the invention to be read in connection with the accompanying drawings in which:

Fig. 1 is a diagrammatic, schematic arrangement of control shown in connection with a cold diffuser unit; and

Fig. 2 illustrates a modified form of application of the control.

Considering the drawings, numeral 3 designates a cold diffuser in which air is admitted from any desired source through dampers 4 in intake section 5. The fan section 6 at the upper end of the unit houses one or more fans 6' shown in dotted outline operated by a fan motor 7. The course of the air is upwardly through coil section 8 in which is positioned one or more cooling coils 8' through which refrigerant is circulated. Such refrigerant may be of a chemical type adapted to be expanded within the coils in section 8; or if desired, cold brine at a suitable low temperature may be circulated by a pump or the like.

Under operating conditions where the temperature of the coils in section 8 is below the freezing point, the precipitation of moisture on the coils as a result of contact of the air passing through section 8 will result, as is well known, in accumulations of frost. When the accumulations exceed a certain thickness, the flow of air will be materially reduced and the efficiency of the unit will be seriously impaired.

Applicant provides for automatic removal of such accumulations of frost by positioning static pressure stat 9 at the discharge side of coil section 8 with the static pressure line 10 connected to fan section 6, between the coils to be defrosted and the fans circulating the air in order that

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static pressure within section 6 may be reflected by pressure-stat 9.

When the accumulation of frost on the coils of section 8 exceeds a predetermined amount, the air pressure in the fan section will drop. When the drop exceeds a predetermined minimum the pressure stat will cause an electrical contact to be made to complete a circuit actuating automatic reset timer 11. The automatic reset timer is made by the Paragon Electric Company of Manitowoc, Wisconsin, and since it forms no part of the invention per se, it will not be described. This is a standard device well known to those skilled in the art.

While any form of defrosting may be employed, for purposes of illustration a liquid defrosting arrangement is shown in which water (or brine) from any desired source is fed to line 12 serving a series of sprays employed to distribute the water over the coils in section 8 for the melting and consequent removal of frost therefrom. Valve 13 controls the admission of water to line 12 and solenoid 14 is operative responsive to the reaction of timer 11.

Refrigerant enters coil section 8 through inlet line 15 controlled by valve 16 which in turn is opened and closed by solenoid 17 actuated by the timer 11. The fan motor 7, as illustrated, is on the same electrical circuit as is the control for admission of refrigerant.

In operation, when pressure stat 9, upon a drop in pressure in fan section 6, causes the operation of timer 11, the timer will cause the circuit serving the fan motor to open whereupon the fan will become inoperative; and simultaneously cause solenoid 17 to close valve 16 so that the supply of refrigerant to the coil section is interrupted. Within a few seconds, the timer will cause solenoid 14 to open valve 13 so that water will proceed to the sprays and effect the desired defrosting.

After a suitable interval timer 11 will break the circuit including solenoid 14 whereupon valve 13 will resume its normally closed position and defrosting will be over. After another suitable interval, the timer closes the circuit which simultaneously causes the fan motor to operate the fans and actuates solenoid 17 to resume admission of refrigerant to coil section 8.

In Fig. 2 a similar arrangement is employed except that a push through fan 18 is provided instead of the draw through fans of Fig. 1. Valve 13 in line 12 controls admission of water to the sprays. Upon an undesirable increase in accumulation of frost on the coils in section 19 of

Fig. 2, the pressure in the space between the fan 18 and the coils will be increased. Static pressure stat 20 responds to this increase, in the same way as static pressure stat 9 in Fig. 1 responded to a decrease beyond a certain point. The operation of the defrosting arrangement would then be the same in the case of Fig. 2 as in the case of Fig. 1.

Therefore, applicant by a simple pressure responsive device has provided a sensitive and foolproof control for assuring defrosting when desired without the limitations present in previous systems which made for failure or uncertainty in operation.

I claim:

1. A method of defrosting a cold diffuser or the like consisting in measuring the static pressure between a coil to be defrosted and a fan circulating air over the coil, causing a timing device to be actuated responsive to change in such pressure beyond a predetermined limit, and effecting the following chain of operations automatically responsive to the actuation of said timing device: first opening an electrical circuit to make inoperative said fan and to halt the supply of refrigerant to said coil, then causing an electrical circuit to close to make operative a device for causing defrosting of said coil, next opening said last mentioned circuit, and finally closing the first mentioned circuit to cause the fan to resume to circulation of air and to cause refrigerant again to be admitted to the coil.

2. A method of control for defrosting a refrigerated coil consisting in measuring the static pressure between a coil to be defrosted and a fan circulating air over the coil, actuating a timing device in response to a change in static pressure resulting from an accumulation of frost on said coil beyond a predetermined amount, defrosting said coil, and causing said timing device to control the operation of said fan and coil prior to, during, and subsequent to the defrosting of said coil.

3. In a defrosting sytem of the character described, a coil, means for feeding refrigerant to said coil, means for defrosting said coil, a fan for circulating air in contact with the coil, and static pressure responsive means for operating said means responsive to a predetermined change in static pressure existing between the coil and the fan for defrosting the coil after causing the fan to become inoperative and halting the flow of refrigerant to said coil.

4. In a defrosting system according to claim 3, said static pressure responsive means causing said fan to become operative and causing the flow of refrigerant to said coil to be resumed after said coil has been defrosted.

5. In a defrosting system according to claim 3, said static pressure responsive means being operative responsive to a drop in static pressure below a predetermined lower limit when said fan draws air through the coil.

6. In a defrosting system according to claim 3, said static pressure responsive means being operative responsive to a rise in static pressure above a predetermined upper limit when said fan blows air through the coil.

7. The combination with a cold diffuser including a casing, a fan section in said casing and a refrigerated coil on which frost accumulates disposed in the casing, of means operative responsive to variations in static pressure in the fan section for causing defrosting apparatus alternately to become operative and inoperative, said means including a static pressure regulator, an element connecting the fan section and the regulator to permit the regulator to respond to static pressure in the fan section and an automatic reset timer actuated by said regulator, said timer serving to actuate defrosting apparatus to remove an accumulation of frost from the coil and, upon the removal of frost, to permit flow of refrigerant through the coil.

8. The combination with a cold diffuser including a casing, a fan disposed in said casing, and a refrigerated coil in said casing on which frost accumulates, of means for defrosting said coil, said means including a valve for halting the flow of refrigerant through the coil, a defrosting device, static pressure responsive means, an element disposed between the coil and the fan connecting the responsive means to the casing to permit said means to respond to a predetermined change in static pressure in the casing, and an automatic reset timer, said static pressure responsive means reflecting the change in static pressure between the coil and the fan and actuating said timer in response to change in such pressure beyond a predetermined limit, the timer serving to actuate the defrosting device to remove an accumulation of frost from the coil and to actuate the valve upon removal of frost to permit the supply of refrigerant to the coil.

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