Dec. 30, 1947. M. DI ZOPPOLA 2,433,655

QUICK FREEZE UNIT

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Fig. 1.

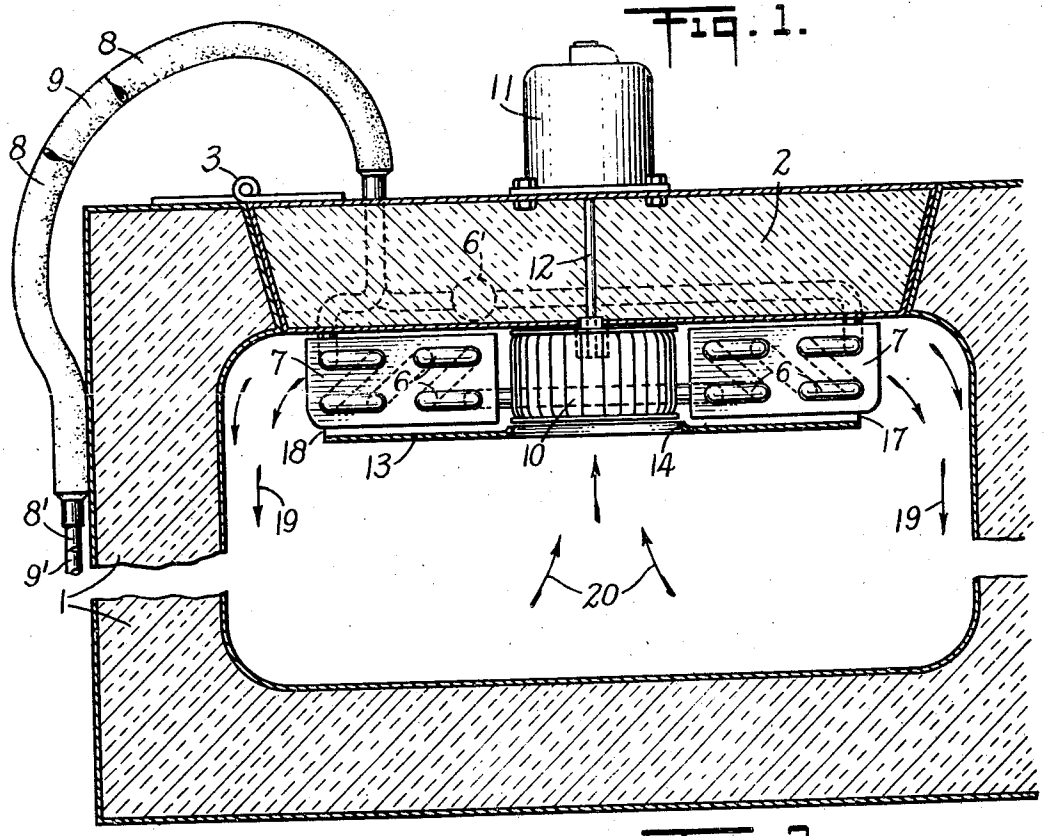
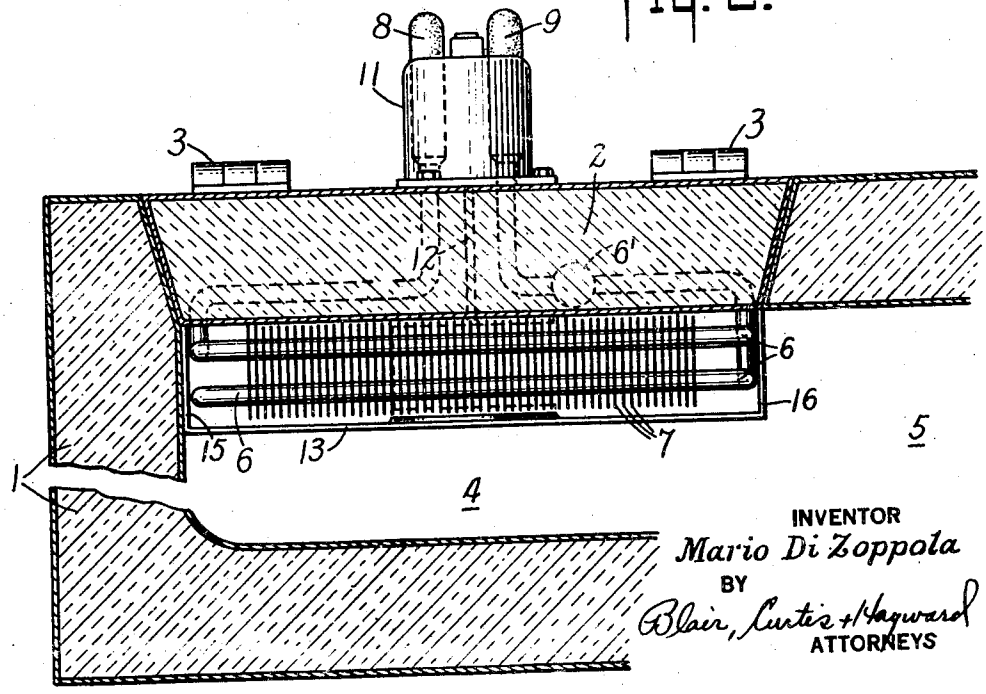


Fig. 2.



4 5

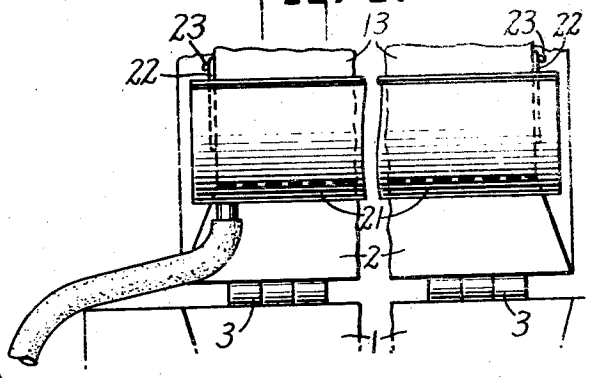
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QUICK FREEZE UNIT

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Fig. 4.



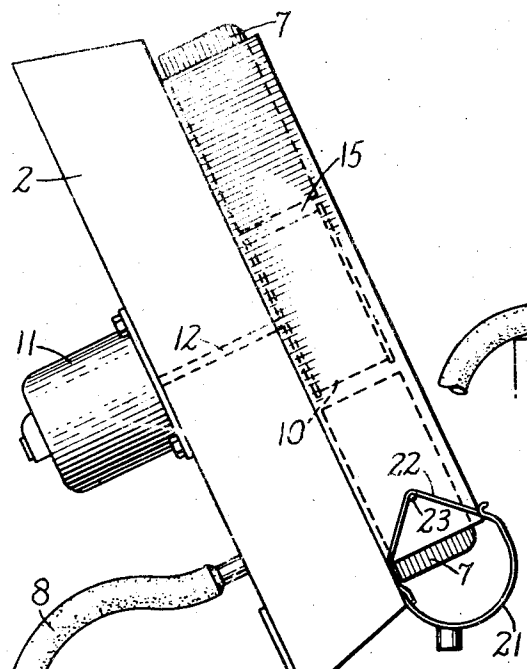


Fig. 3.

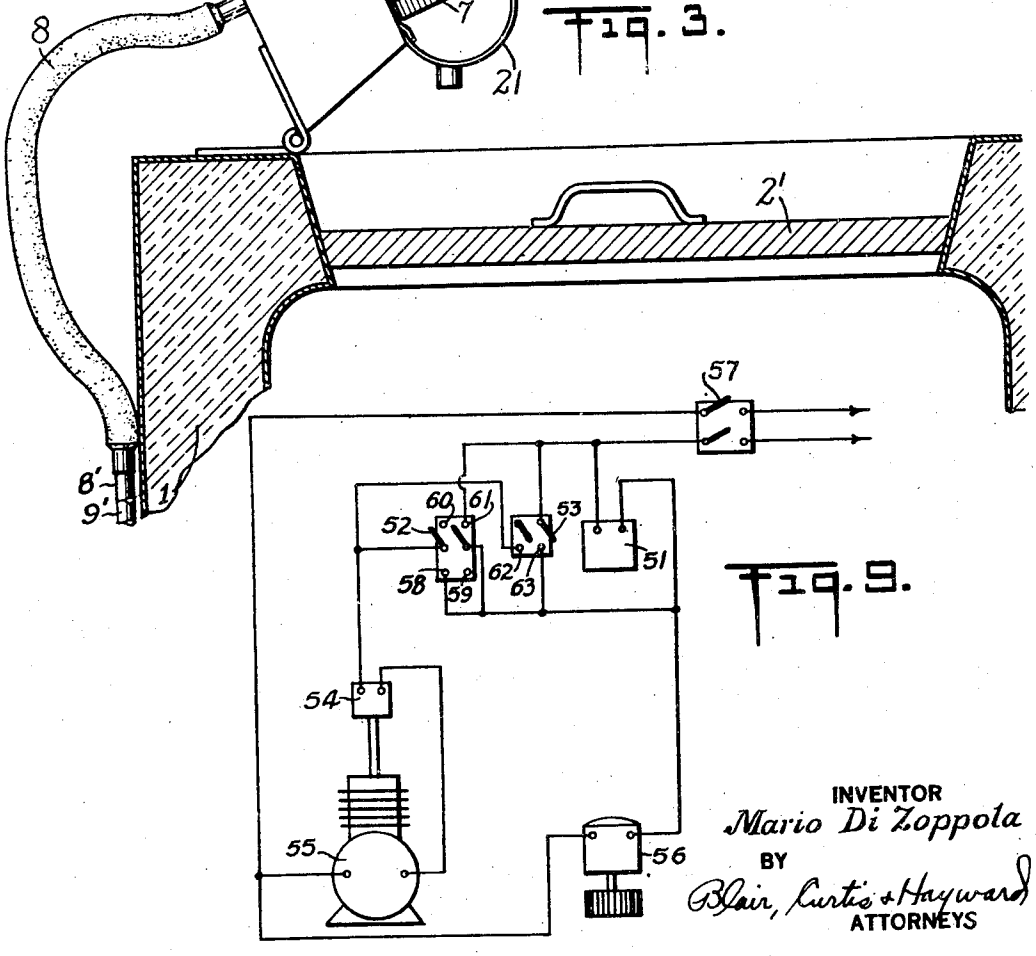


Fig. 9.

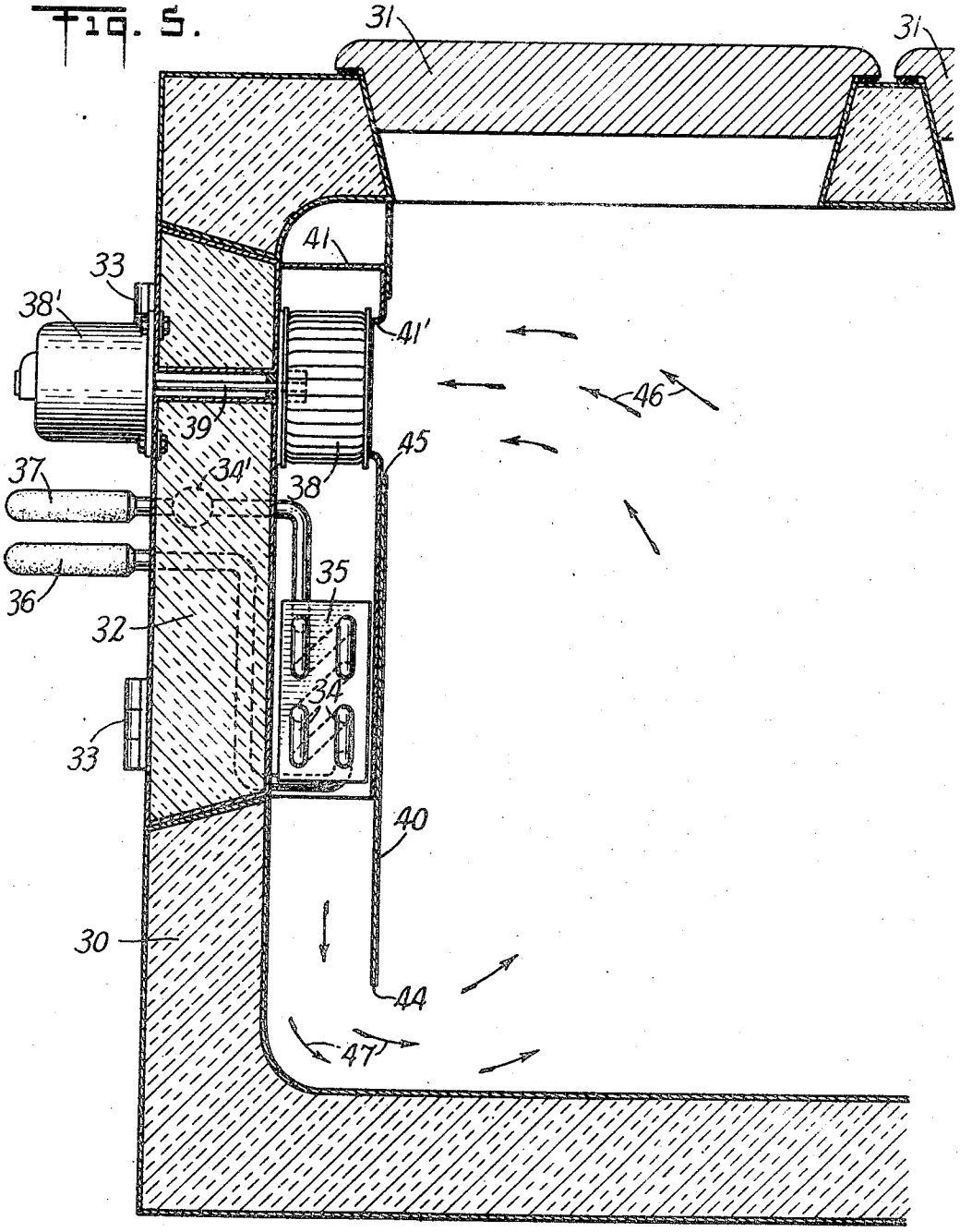
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QUICK FREEZE UNIT

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Fig. 5.



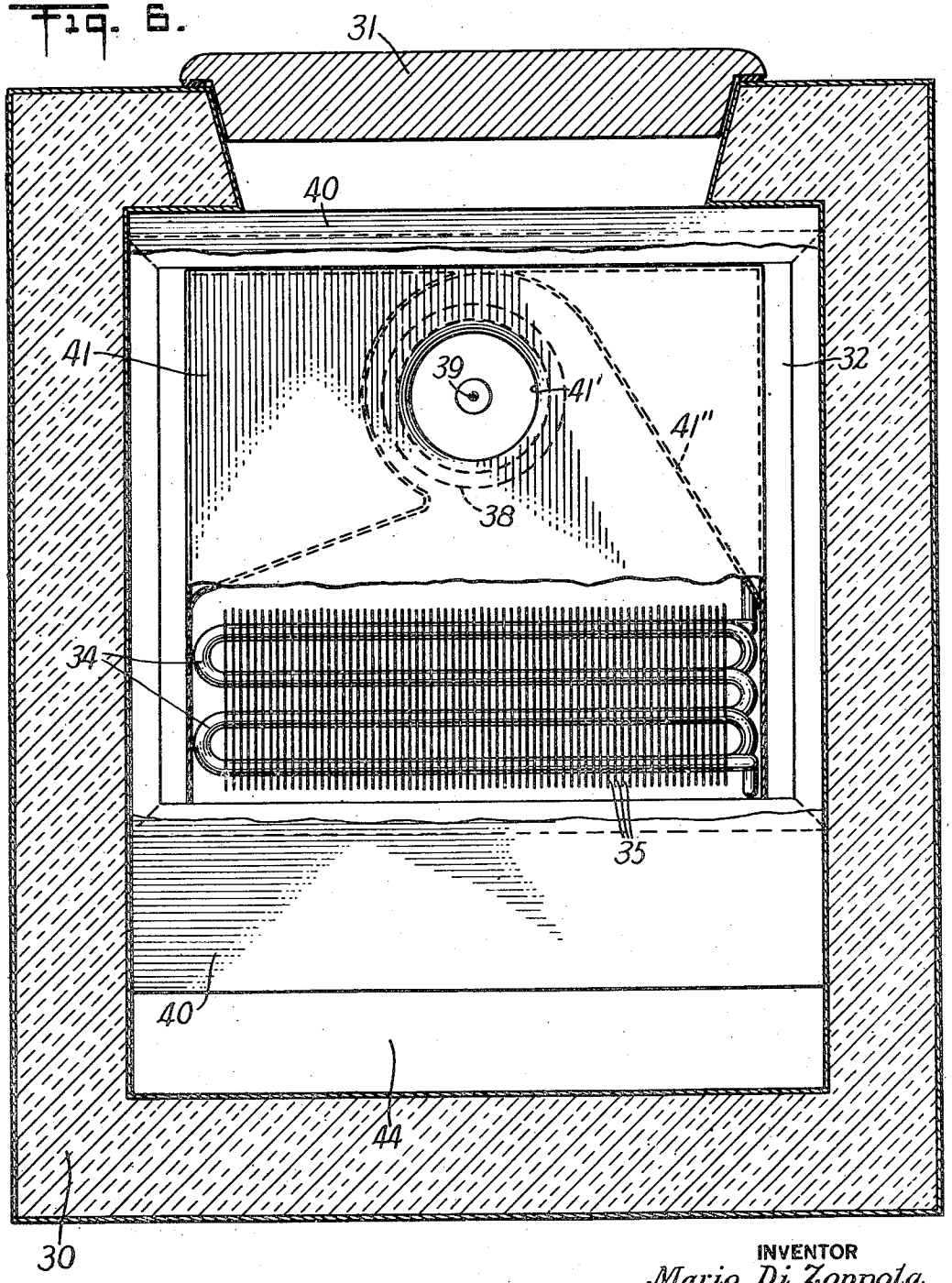
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Fig. 6.



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Fig. 8.

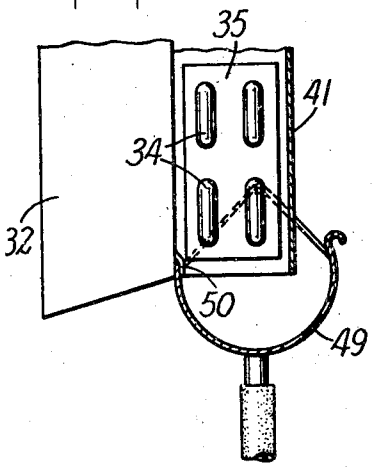


Fig. 7.

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Patented Dec. 30, 1947 2,433,655

UNITED STATES PATENT OFFICE

2,433,655

QUICK-FREEZE UNIT

Mario di Zoppola, New York, N. Y., assignor, by mesne assignments, to Reconstruction Finance Corporation, New York, N. Y., a corporation of the United States

Application January 26, 1945, Serial No. 574,706

7 Claims. (Cl. 62—115)

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This invention relates to a low temperature cooling and defrosting device.

An object of the invention resides in the provision of a device of the above character which may be incorporated in new cabinets and may also be applied to already existent cabinets.

A further object of the invention resides in so constructing the device that it will act to normally close the cabinet during use and so that it may be removed from its cabinet closing position for defrosting purposes.

It is a still further object of the invention to so construct the device that during the defrosting operation the temperature within the cabinet will be prevented from rising to a detrimental extent.

Another object of the invention resides in the incorporation of means within the device which will set up a forced circulation of air through the cabinet when the device is in its cabinet closing position, and which will assist in the quick defrosting of the heat exchange elements when the device is removed from its cabinet closing position.

Other objects of the invention will appear as the description progresses and it is thought unnecessary to here point them out in detail.

In the drawings in which I have shown two embodiments of my device:

Figure 1 is a vertical sectional view of an embodiment of my invention;

Figure 2 is a similar view taken at right angles to Figure 1;

Figure 3 is a view partly in elevation and partly in vertical section showing the device removed from its cabinet closing position for defrosting purposes and showing the temporary cover applied and the drip pan in position;

Figure 4 is a detail of the drip pan showing the manner in which it is mounted;

Figure 5 is a vertical section of another form of my invention;

Figure 6 is a vertical section taken at right angles to Figure 5;

Figure 7 is a horizontal sectional view showing the device swung to its defrosting position and showing the temporary closure for the cabinet;

Figure 8 is a detail of the drip pan and its mounting; and

Figure 9 is a wiring diagram of the control.

Referring now to the construction shown in Figures 1 through 4, it is pointed out that it is quite common in the art to provide a low temperature and cooling cabinet which includes a top

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cover or door, the cabinet and door or cover being of the general form illustrated in these figures.

I contemplate the substitution of my device for the top door or cover referred to, or the incorporation of my device in a new cabinet of this character.

In these figures the cabinet 1, which is properly insulated, is normally closed by a door or cover 2, which is hinged at 3. This cabinet may of course include a low temperature portion which is indicated at 4 in Figure 2 and adjacent storage space or spaces indicated at 5 in Figure 2. Cooling coils 6, which are provided with expansion valve 6' and with diffusers 7, are carried by the door or cover 2 at its inner face and are connected to a compressor of a condenser unit 55 [conventionally represented in the drawings] for the cooling fluid by fluid inlet and outlet flexible tube connectors 8 and 9 and rigid pipes 8' and 9' that are attached to the cabinet wall.

In order that a circulation of air may be set up within the receiving space of the cabinet I have mounted a fan 10 of the centrifugal blower type which is driven by a motor 11 through a shaft 12, the motor being permanently mounted on the outside of the door or cover 2.

The fan 10, the heat exchange or cooling coil 6 and the diffusers 7 are located within a baffle in the form of a housing which is for the purpose of controlling the direction of the circulation of air. This baffle includes a lower wall 13, which has an opening 14 aligned with the fan to permit the air to be drawn from the cabinet space into the fan. It also includes side walls 15 and 16, but is open at its ends at 17 and 18 to permit the fan to force air from the housing in two directions into the cabinet.

Thus when the door or cover 2 is closed, as in the position shown in Figure 1, and the fan is in operation, the air will be circulated within the cabinet, passing downwardly in the general direction indicated by the arrows 19 and being drawn upwardly in the general direction indicated by the arrows 20. Of course, by the proper regulation of the refrigerant fluid, the rapidity and degree of cooling may be controlled as desired.

When the door or cover is swung to the position illustrated in Figure 3, which is permitted by the flexibility of the connectors 8 and 9, the opening to the cabinet is closed by a temporary cover or door 2', which will prevent, to a great degree, the rise of temperature within the cabinet.

When the door or cover 2 is in the position

shown in Figure 3, the flow of refrigerant fluid is stopped, with the result that the heat exchange unit will immediately begin to defrost, being exposed to the warm ambient air. This defrosting will be accelerated by the continued operation of the fan 10 so that the defrosting may be accomplished without any rise of temperature within the cabinet due to the defrosting operation and without any appreciable rise of temperature within the cabinet during the defrosting operation.

In order that the water resulting from the defrosting of the heat exchange unit may be carried away to a convenient disposal point, I have provided a drip pan 21 which may be attached, by means of wire bales 22 and pins 23, to the end walls 15 and 16 of the fan baffle, as indicated in Figure 4 of the drawings.

In the embodiment of the invention shown in Figures 5 through 8, which illustrate the application of the invention to a new cabinet construction, the insulated cabinet is indicated by the reference numeral 30. This cabinet is closed by one or more covers 31, through which access to the cabinet may be had. An insulated door, 32, which is shown as in one side of the cabinet, is hinged thereto at 33 so that it may be opened and closed. The heat exchange or cooling coils 34, which are provided with diffusers 35, are carried by the door 32 and connected to the flexible connector inlet and outlet tubes 36 and 37 which extend to the compressor, the tubes being carried by the door 32.

A fan 38 of the type heretofore described is mounted on the door 32 above the heat exchange coils 34 and is actuated by a motor 38' through a shaft 39.

A baffle 40 is mounted fixedly within the cabinet and is provided with an inlet opening 45 in alignment with the fan to permit the air to enter the fan as indicated by the arrows 46 so that the air may be circulated from the top to the bottom through the opening 44 as indicated by the arrows 47.

A fan housing 41, carried by the door 32, is also provided with an air inlet opening 41' in alignment with the opening 45 and with a bottom opening which is substantially coextensive with the diffusers. This baffle encloses the fan's scroll 41''.

In this form of the invention, when the door 32 is open for defrosting purposes, the opening into the cabinet may be closed by a temporary door 48, which will result in the lessening of the liability of any undesirable raising of temperature within the cabinet. In this form of the invention, when the door is open, the water resulting from the defrosting operation may be caught in the drip pan described in connection with the embodiment disclosed in Figure 1 of the drawings, which drip pan is here indicated by the reference numeral 49. The drip pan is held in position by wire bales similar to those previously described and by the interengagement of one edge of the pan with a flange 50 on the door.

Of course in operation, when the door is in open position for defrosting purposes, the defrosting operation is shortened by the continued operation of the fan as in the form heretofore described, and this defrosting operation may be carried out without any detrimental raising of the temperature within the cabinet itself.

In both instances the temperature effecting and air circulating apparatus is carried by the door or cover and is entirely removed from the cabinet during the defrosting operation, leaving

the cabinet, upon the insertion of the temporary door or cover, completely closed and unaffected by any direct communication with the outside atmosphere.

It will be noted that the location of the condensing unit or compressor beyond the cabinet itself makes it possible to use a door or cover for the heat transfer and air circulating mechanisms which is not materially different in configuration or size than the ordinary door or cover that is commonly used.

I have provided means for automatically controlling the operation of the device so that the establishment and maintenance of a given temperature within the cabinet itself may be accomplished, and so that the fan, during the defrosting operation, will operate continuously and independently of the temperature controlling devices of the cabinet.

In Figure 9 of the drawings I have illustrated the electric controls which accomplish these results. In this figure, 51 indicates a refrigeration temperature controller in the form of a thermostatic switch with its bulb located in the proper position within the cabinet; 52 indicates a double pole, double throw switch, 53 indicates a double pole, single throw switch; 54 indicates a pressure-responsive control switch; 55 indicates the compressor unit referred to above which includes a compressor and a condenser; and 56 indicates the fan which corresponds to fan 10 in Figures 1 to 4 and fan 38 in Figures 1 to 7. The circuit which is illustrated may be provided with a safety switch 57.

When the cabinet is filled with frozen foods the switch 52 is thrown so that one of its blades makes contact at 58 and the other engages the dummy contact 59 at which time no contact is established by the switch at either 60 or 61. When the temperature within the cabinet reaches a point such as will cause the closing of the thermostatic switch 51, the fan 56 will be thrown into circuit and will establish the circulation of air through the cooling coils and within the cabinet. Through contact 58 and switch 52 the thermostatic switch 51, when it closes, will also start the operation of the compressor condenser unit 55. It is of course to be understood that the thermostatic switch 51 may be set to operate at various temperatures within the cabinet.

When the door or cover of the cabinet is swung open for defrosting purposes, in the manner which has heretofore been described, one blade of the switch 52 is thrown to make contact at 61 while the other blade engages the dummy contact 60. At this time the operating mechanism of the compressor condenser unit is out of circuit because of the breaking of the contact at 58, but the fan continues to operate because of the contact of the switch 52 at 61 so as to accelerate the defrosting operation. This operation is quite independent of any control by the thermostatic switch 51.

When quick freezing of new foods is required within the cabinet calling for a lower temperature than is required for storing foods already frozen, the switch 53 is closed, making contacts at 62 and 63, thus throwing both the compressor condenser unit and the fan into circuit independently of the thermostat; the temperature in the freezing compartment of the cabinet is then regulated by the condenser pressure control 54 which may be set as desired.

While I have illustrated and described an embodiment of my invention, I do not wish to be

limited to the details of construction therein shown, as it is obvious that variations may be made within the skill of the art and without exceeding the scope of the claims.

What I claim is:

1. A low temperature device including a chambered cabinet having an opening extending into the interior thereof, a removable closure for said opening, a cooling device, a circulation fan, means for directing the flow of air from said fan over said cooling device and within said cabinet, all of said elements being carried on the inner side of said closure, means for supplying fluid to said cooling device, means responsive to the temperatures within the chamber of said cabinet for controlling the joint operation of said fan and said means for supplying fluid to said cooling device, and manually controlled means for controlling the operation of said fan independently of the last-named means whereby said fan may be continued in operation when the closure is removed for defrosting of the cooling device.

2. A low temperature device including a chambered cabinet having an opening extending into the interior thereof, a hinged closure for said opening, a heat exchange device, a circulation fan, a baffle located adjacent said heat exchange device and having an air entry opening aligned with said fan and for directing air from said fan over said heat exchange device and thence around the chamber in said cabinet, all of said elements being mounted on the inner side of said hinged closure whereby when said closure is hingedly swung from its closing position all of said elements will be removed from said chamber.

3. A low temperature device including a chambered cabinet having an opening extending into the interior thereof, a removable closure for said opening, a cooling fluid expansion coil, a circulation fan, means for directing the flow of air from said fan over said coil and into said cabinet which includes a baffle arranged on one side of said coil and a plurality of diffusers arranged substantially normal to said baffle, all of said elements being mounted on the inner side of said closure whereby when said closure is removed from said cabinet all of said elements will be removed from the chamber of said cabinet for defrosting, and a motor mounted on the outside of said closure and having an actuating shaft connection with said fan whereby said fan may be actuated for quick defrosting of said coil when said closure is removed from said cabinet.

4. In a low temperature refrigerator construction including a cabinet having a product storage chamber therein and having an opening into said chamber from the exterior of said cabinet, a hinged closure for said opening, a cooling unit mounted on the inner side of said closure including an evaporator and a circulation fan adjacent said evaporator and means including walls forming an air passageway and an opening aligned with said fan, the walls of said passageway being arranged to direct air from said fan into heat-exchange relationship with said evaporator and thence into the body of air within the chamber, said cooling unit being so constructed and arranged that it is removed from said chamber when said closure is swung from the position wherein it closes said opening whereby said evaporator may be defrosted.

5. Apparatus as described in claim 4 which includes an electric motor mounted on said closure and adapted to drive said fan, and control means for said motor whereby said motor may be operated when said closure is swung from the position wherein it closes said opening.

6. Apparatus as described in claim 5 wherein, said opening is in the top wall of said cabinet and said evaporator is in two sections, and wherein said fan directs the air horizontally in two paths past said sections of said evaporator.

7. Apparatus as described in claim 5 wherein, said opening is in the side wall of said cabinet and a separate opening is provided for access to said chamber, and fixed baffle means directing the stream of air from said fan downwardly within the cabinet.

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The following references are of record in the file of this patent:

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