

Oct. 4, 1960

L. W. OHLSSON

2,954,683

OVERCOUNTER WATER DISPOSAL SYSTEM

Filed Jan. 2, 1958

3 Sheets-Sheet 1

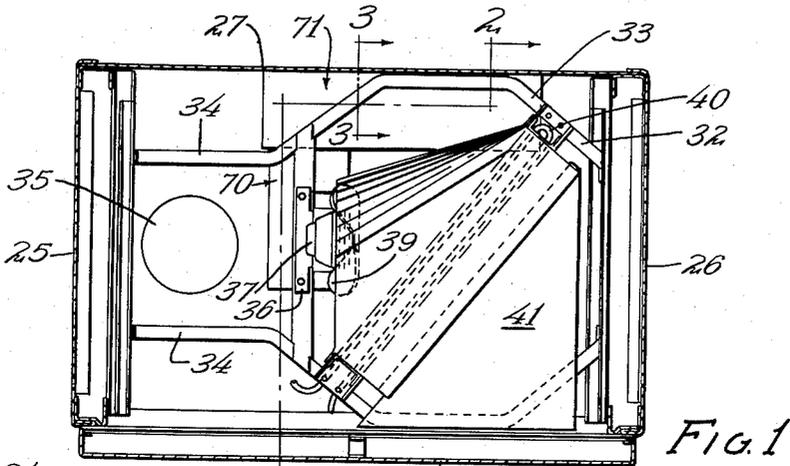


FIG. 1

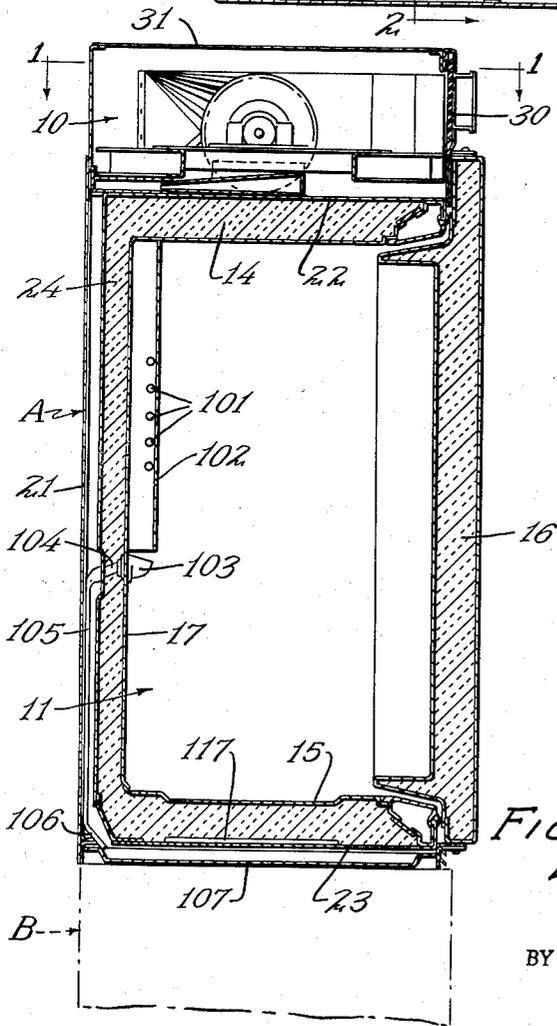


FIG. 2

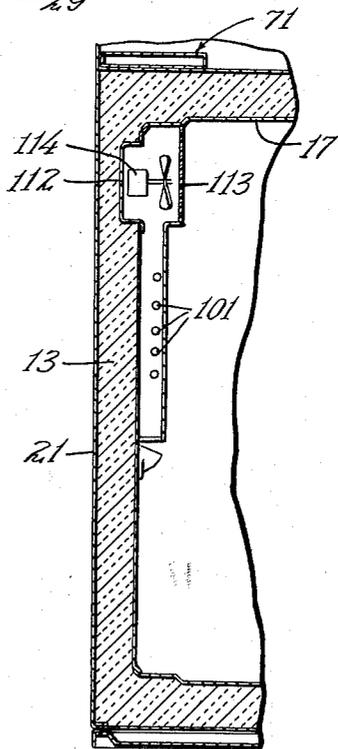


FIG. 3
INVENTOR

Leonard W. Ohlsson

BY

Roberton Dunning

ATTORNEY

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L. W. OHLSSON

2,954,683

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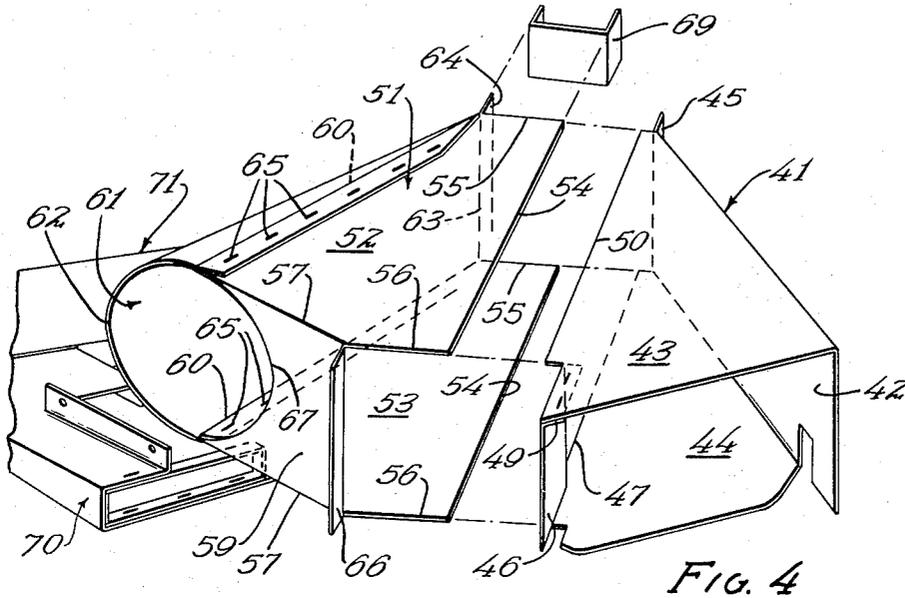


FIG. 4

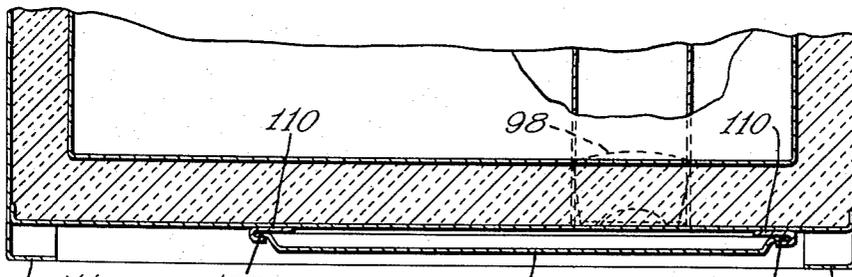


FIG. 12

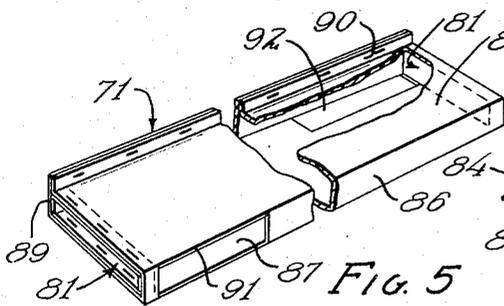


FIG. 5

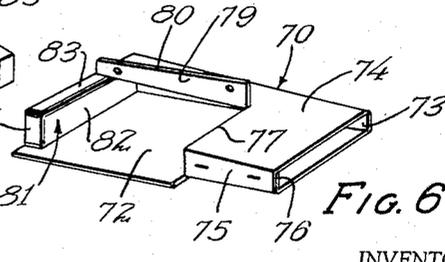


FIG. 6

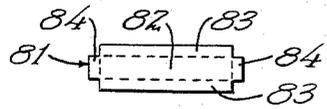


FIG. 7

INVENTOR
Leonard W. Ohlsson

BY *Robert M. Dunning*
ATTORNEY

Oct. 4, 1960

L. W. OHLSSON

2,954,683

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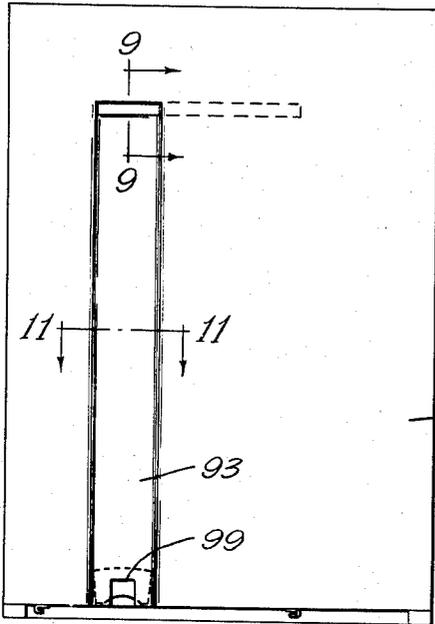


FIG. 8

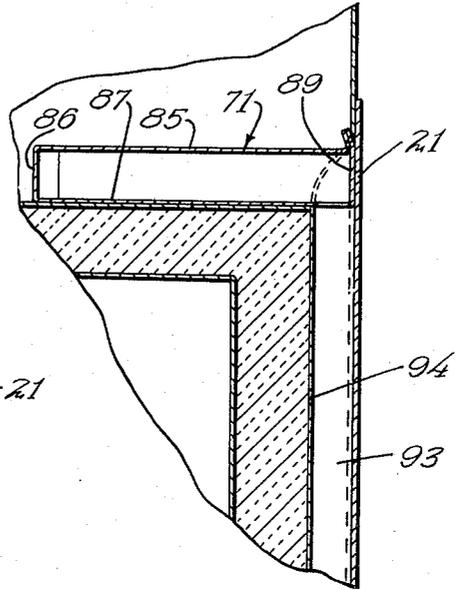


FIG. 9

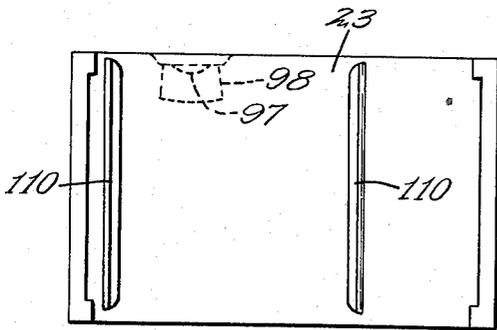


FIG. 13

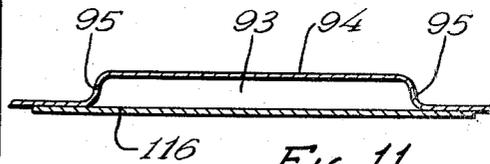


FIG. 11

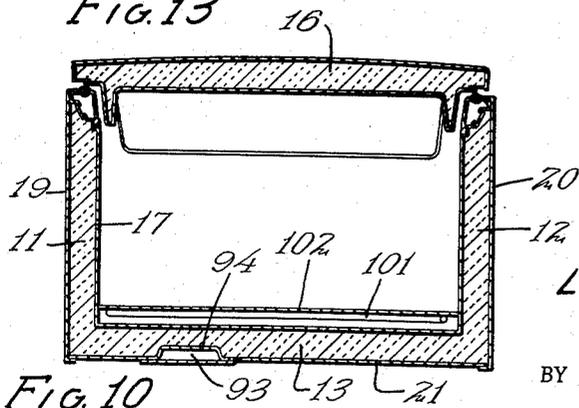


FIG. 10

INVENTOR

Leonard W. Ohlsson

BY

Robert M. Dunning

ATTORNEY

2,954,683

OVERCOUNTER WATER DISPOSAL SYSTEM

Leonard W. Ohlsson, Minneapolis, Minn., assignor to Whirlpool Corporation, St. Joseph, Mich., a corporation of Delaware

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9 Claims. (Cl. 62-277)

This invention relates to an improvement in overcounter water disposal system and deals particularly with a means of dispersing waste water collected in a refrigerator unit when the evaporator coils are defrosted.

In defrosting an electric refrigerator to remove the frost which collects upon the evaporator coils, it is usual practice to permit the evaporator coils to heat above the freezing temperature to melt the frozen liquid and to conduct the liquid to a suitable receptacle. The receptacle is then emptied when the defrosting operation is completed. One of the difficulties of this system occurs when the water collection pan is not emptied at sufficiently frequent intervals. The water collection pan then overflows and must be wiped up when the pan is emptied. Where the refrigerator rests directly upon the floor, no serious difficulty is usually experienced when the water collection pan overflows. However, where the refrigerator is of the type mounted above a cabinet the problem is somewhat accentuated due to the fact that the waste water may drain down over the cabinet and possibly into the same. It is this problem which the present application is designed to eliminate.

An object of the present invention resides in the provision of a moisture collecting trough which is mounted beneath the evaporator coils of a refrigerator and into which the water may drop as the coils are defrosted. The water collection trough is provided with an outlet leading to a water collection pan which distributes the moisture over a relatively large area. A fan is provided which acts to direct a stream of air across the surface of the water collection pan at all times when the compressor is in operation. The air passing over the body of water gradually absorbs the water and carries it from the refrigerator. Thus the moisture created by the defrosting of the coils is gradually dispersed into the surrounding atmosphere.

A feature of the present invention resides in the provision of a refrigerator having a forced air circulating system which admits air from the outer atmosphere and forces a portion of the air through the refrigerant condenser and over the compressor to cool the refrigerant in the condenser and to cool the compressor. A portion of this air is deflected through suitable ducts to the areas of the water collection pan to cause an increased rate of evaporation of the water in this pan into the air.

A further feature of the present invention resides in the provision of a water collection system which delivers waste water created by the defrosting of the evaporator coils to a water collection pan located beneath the refrigerator and in providing a heating element in conjunction with the bottom wall of the refrigerator just above the water collection pan. This heating element serves the purpose of preventing condensation from collecting on the bottom wall of the refrigerator and also assists in the evaporation of any moisture which might collect on this surface. The heater also serves to radiate heat to the collection pan to assist in evaporating water collected within the pan.

These and other objects and novel features of the present invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of the specification:

5 Figure 1 is a horizontal sectional view through the upper portion of an over counter refrigerator, the position of the section being indicated by the line 1-1 of Figure 2.

10 Figure 2 is a vertical sectional view through the apparatus shown in Figure 1, the position of the section being indicated by the line 2-2 of Figure 1.

Figure 3 is a vertical sectional view through the back of the refrigerator, the position of the section being indicated by the line 3-3 of Figure 1.

15 Figure 4 is a perspective exploded view of a portion of the baffle arrangement used in guiding the air through the air system.

Figure 5 is a perspective view of a portion of the air conduit leading from the air circulating fan.

20 Figure 6 is a perspective view of another portion of the conduit for conducting air from the fan.

Figure 7 is a diagrammatic view of one of the ends of the conduits shown in Figures 5 and 6.

25 Figure 8 is an elevational view of the back of the refrigerator showing the location of the vertical flue through the rear wall of the refrigerator.

Figure 9 is a sectional view through the inner section of the air conduit and air flue, the position of the section being indicated by the line 9-9 of Figure 8.

30 Figure 10 is a horizontal sectional view through the refrigerator showing the general arrangement of parts therein.

35 Figure 11 is an enlarged sectional view through the air flue, the position of the section being indicated by the line 11-11 of Figure 8.

Figure 12 is a vertical section through the lower portion of the refrigerator on a plane parallel to the front and rear walls thereof.

40 Figure 13 is a bottom plan view of the refrigerator with the water collection pan removed.

In the particular construction illustrated, an overcounter refrigerator is indicated in general by the letter A and is designed to rest upon a cabinet illustrated in general by the letter B. The refrigerator is constructed with a refrigeration unit compartment 10 mounted on top of the refrigerator cabinet 11. As indicated in Figure 10 of the drawings, the cabinet includes parallel side walls 11 and 12 and a connecting rear wall 13. The cabinet also includes a top wall 14 and a bottom wall 15 as is evident from Figures 2 and 3 of the drawings. 45 These walls form a generally rectangular body structure having an open front which is normally closed by a pivotally supported door 16. As is conventional in such constructions, all of the walls include an inner liner 17 which may be drawn of a single piece or may be fabricated of angularly related panels. These walls also include outer panels, the side walls including outer panels 19 and 20 respectively and the rear wall 13 including an outer covering panel 21. The top wall 14 includes an outer or upper panel 22 while the bottom wall 15 includes an outer or lower panel 23. The space between the inner liner 17 and the various outer wall panels is, for the most part, filled with insulation 24.

50 The refrigeration unit compartment 10 is shown in Figure 1 of the drawings to include side walls 25 and 26 which form continuations of the outer side wall panels 19 and 20 and a rear wall panel 27 which is substantially flush with the rear wall panel 21. The compartment 10 is provided on its forward face with a louver structure 29 comprising a series of parallel inclined louvers 30 through which air may pass. A top wall 31 closes the upper extremity of the compartment 10.

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A mechanism supporting frame 32 is mounted in any suitable way within the housing 10 and includes a generally octagonal portion 33 and a pair of parallel arms 34 emanating therefrom. The arms 34 support the refrigerator compressor which is diagrammatically illustrated at 35. The frame 32 also supports a fan mounting bracket 36 which supports a fan motor 37 and its fan blade 39. The fan is arranged with its axis substantially parallel the front and rear walls of the refrigerator and with its axis directed toward the compressor 35.

The frame 32 also supports a condenser 40 which extends diagonally between opposite sides of the octagonal portion 33 of the frame. The condenser 40 extends through an air conduit which is intended to guide air from approximately one-half of the length of the louver assembly 29 to the fan blade 39. The intake portion of this conduit is best illustrated in Figure 4 of the drawings.

The inlet portion of the conduit is indicated in general by the numeral 41 and includes a side wall 42 which is supported substantially parallel to the compartment side wall 25 and which is connected along its top and bottom edges to substantially triangular panels 43 and 44. An attachment flange 45 is connected to the rear edge of the side wall 42. A short side wall 46 extends upwardly from the angular edge 47 of the triangular bottom plate 44 and is provided at its upper extremity with an angularly turned flange 49 which is secured in surface contact with an edge portion of the upper triangular panel 43. The wall 46 is offset inwardly a short distance from the remainder of the edge 47 of the bottom panel 44 and the remainder of the edge 50 of the upper triangular panel 43 so as to provide short projecting portions designed to overlap the adjoining portion of the conduit.

The adjoining conduit portion is indicated in general by the numeral 51 and includes spaced upper and lower panels 52 and 53 which are designed to overlap the edges 50 and 47 of the panels 43 and 44. The upper and lower panels 52 and 53 are substantially identical in shape and are five sided in outline including an edge 54 designed to overlap the inlet portion 41, and substantially right angularly extending adjoining edges 55 and 56 which define three sides of a substantially rectangular area. The panels 52 and 53 are also bounded by lateral edges 57 and which are connected by a vertical wall panel 59. The edges 57 and 55 are connected by an angularly extending edge 60.

The edges 60 of the panels 52 and 53 are connected by a wall 61 which is bent to be substantially semi-circular at its forward edge 62 and flat at its rear edge 63. An attachment flange 64 is connected to the rear edge 63. The upper and lower marginal edges of the connecting member 61 are stitched or otherwise secured as indicated at 65 to the marginal edges 60 of the panels 52 and 53.

The conduit portions 41 and 51 are separately formed as illustrated so that they can be assembled about the condenser 40. The front wall 59 is provided with a flange 66 extending vertically along its forward edge and is cut to provide a semi-circular notch 67 in its rear edge. As the connecting member 61 terminates in the plane of the front wall 59 the curved forward end 62 of this connecting member combines with the semi-circular notch 67 in the front wall 59 to provide a generally circular aperture.

The conduit member 51 is positioned mainly on one side of the condenser 40 with a portion of the panel 53 extending beneath the condenser and with a portion of the panel 52 extending above the condenser. The edges 54 of the panels 52 and 53 are overlapped with the edges 50 and 47 of the panels 43 and 44 of the inlet section 41 and the panels are secured in overlapping relation. The flanges 64 and 66 extend on one side of the condenser 40 while the flange 45 and wall 46 extend on the other side thereof. As the condenser does not extend the full height of the baffle structure, generally U-shaped connecting members 69 may be inserted between the flanges

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64 and 45 at one end of the condenser and between the flange 66 and wall 46 at the other end of the condenser to complete this portion of the baffle structure.

As is perhaps best illustrated in Figure 1 of the drawings, the fan blade 39 is preferably mounted in the circular opening of the baffle structure which has been described. The fan draws air through the portion of the louver structure 29 which is forwardly of the inlet section 41 of the baffle and is drawn through the condenser 40 and through the circular baffle opening. The main portion of the air circulated by the fan is directed into the portion of the refrigeration unit chamber 10 outwardly of the conduit or baffle structure. Thus the air is directed toward the compressor 35 and is free to leave the compartment through the portion of the louver unit exteriorly of the baffle or conduit. However, a portion of the air is deflected into a pair of right angularly arranged conduit members which are designed to conduct the air to the lower portion of the refrigerator.

The conduit sections 70 and 71 illustrated in Figures 6 and 5 of the drawings, similarly to the baffle or conduit sections 41 and 51 previously described, may be formed of material such as water proof fiberboard or light metal. The conduit section 70 is designed to provide an air scoop forwardly of the lower portion of the fan blade 39 and to direct it through the remainder of the conduit system. The section 70 includes a bottom panel 72 which is generally rectangular and which is provided along one longitudinal edge with a right angular tapered wall 73 which is narrower at its outlet end. The upper edge of the wall 73 is connected to a top panel 74, and the opposite edge of the top panel 74 is provided with a relatively short flange 75. This flange 75 is secured in overlapping relation with an upwardly extending flange 76 cut from the bottom panel 72 to form a tubular tapered outlet portion.

The top panel 74 is cut away at one end to provide a generally right angular notch 77. A flange 79 is connected along the edge of the notch 77 parallel to the tapered wall 73 and this flange 79 is preferably tapered in a direction in reverse to the taper of the wall 73 so that the upper edge 80 of the flange 79 is substantially parallel to the bottom wall 72.

An end member 81 of the type illustrated in Figure 7 and which is of a type commonly referred to as an inverted cover is secured between the bottom panel 72 and top panel 74 as illustrated in Figure 6. The end member 81 includes a substantially rectangular base panel 82 having top and bottom flanges 83 connected to its upper and lower longitudinal edges and end flanges 84 connected to its opposite ends. The flanges 83 and 84 are bent at right angles to the base panel 82 forming a hollow box shaped tray which is stitched or otherwise secured to the adjoining panels.

The conduit section 71 comprises an elongated tubular member including a substantially rectangular top panel 85, side wall panel 86, bottom wall panel 87, and side wall panel 89. A flange 90 extends upwardly from the edge of the top panel 85 opposite that connected to the side wall 86 and is stitched or otherwise secured to the upper edge of the side wall 89. End members 81 of the type previously described are inserted into the ends of the tubular member and are stitched in place to close these ends. The side wall 86 is provided with an aperture 91 therethrough of a size to snugly accommodate a portion of the tubular end of conduit section 70. A second aperture 92 is provided in the bottom panel 87 adjoining the side wall 89 and at the end of the conduit opposite that containing the aperture 90.

As is evident from Figure 1 of the drawings and Figure 4 thereof, the conduit sections 70 and 71 are arranged in right angular relation with the upwardly extending flange 79 of section 70 spaced forwardly of the fan blade 39 and substantially normal to the axis of the blade and with the conduit section 71 extending along the rear wall 27 of the compartment 10. These conduit sections rest

upon the top panel 22 of the refrigerator cabinet as may be seen from Figure 2 of the drawings.

With reference now to Figures 8 through 11 of the drawings, it will be noted that a vertical flue 93 is provided in the rear wall panel 21 of the refrigerator cabinet extending to the lower extremity thereof. The flue 93 is formed by forwardly offsetting a vertical strip portion 94 of the back panel 21, the offset portion remaining connected to the remainder of the rear panel by short connecting walls 95. As is indicated in Figure 9 of the drawings, the upper end of the offset wall 94 terminates just beneath the level of the bottom panel 87 of the conduit forming member 71.

As will be evident from Figures 2 and 8 of the drawings, the rear panel 21 is notched centrally of the offset portion 94 at the lower end thereof.

As is shown in Figures 2 and 13 of the drawings, the bottom panel 23 is also notched at an adjacent point as indicated at 97, the notch in the panel 21 being identified by the numeral 99. A metal angle member 98 is secured to the inner surface of the offset portion 94 and to the upper surface of the bottom panel 23 adjoining these notches. The notches and the angle corner member 98 are for the purpose of accommodating the lower end of a water draining tube which will be described.

As shown in Figures 2 and 3 of the drawings, the evaporator coils 101 are mounted within the refrigerator cabinet along the rear wall 13 thereof between the liner 17 and a baffle plate 102. A drip trough 103 extends across the rear of the refrigerator beneath the coil 101 to catch moisture dropping therefrom when the coil is defrosted. A low point on the drip trough 103 is connected by nipple 104 to a drain pipe 105 which is located within the flue 93. The lower end 106 of the drain pipe 105 is angled forwardly and downwardly to extend through the notches 99 and 100 to terminate above the rear end of the water collecting pan 107. As indicated in Figure 12 of the drawings, the water collecting pan 107 is provided with outwardly directed side flanges 109 which are slidably engaged in a pair of channel tracks 110 mounted upon the undersurface of the bottom panel 23. The water collecting pan 107 may be pulled forwardly for removal. Short legs 111 on opposite sides of the refrigerator and beneath the bottom panel 23 provide the necessary space for the accommodation of the pan 107.

As indicated in Figure 3 of the drawings, a hollow cavity 112 is formed in the rear wall 13 near the upper extremity of the refrigerator cabinet and is lined by a portion of the liner 17. A louvered grill 113 is mounted forwardly of the cavity 112 so that air may be drawn through the grill. A fan 114 is mounted in the cavity 112 and acts to draw air through the grill 113 and to force the air over the evaporator coils 101. This forced air circulates through the interior of the cabinet so as to equalize the temperature throughout the body of the cabinet. In normal construction, the fan 114 is electrically operated and the circuit to the fan is controlled by a door actuated switch, not shown in the drawings, so that the circulation of air will be discontinued when the door of the refrigerator is opened.

The operation of the refrigerator will now be described. The fan 114 normally operates continuously except when the refrigerator door is opened as described. Air is blown over the evaporator coils and is cooled by contact therewith. This air is circulated throughout the entire body of the refrigerator cabinet.

During this operation, the moisture carried by the air tends to collect on the evaporator coils 101 in the form of frost. From time to time, the refrigerator is defrosted in any suitable manner by permitting the evaporator coils to raise in temperature above the freezing temperature. This may be accomplished by either circulating hot refrigerant gas through the coils or else by merely interrupting the operation of the compressor for a sufficient length of time to permit the evaporator coils to attain

a temperature above the freezing point. When this occurs, the frost and ice collected upon the evaporator coils melts and water drips downwardly from the coils into the collecting trough 103. From this trough 103 the liquid is conveyed through the nipple 104 and drain pipe 105 into the water collecting pan 107.

At the completion of the defrosting operation, the compressor 35 is again energized and the fan motor 37 simultaneously starts operation. Air is drawn through the louvered grill 29 and into the inlet section 41 of the baffle or conduit. The air is drawn through the condenser 40, lowering the temperature of the refrigerant contained therein. The fan blade 39 forces the air into the portion of the refrigerator unit compartment 10 externally of the baffle or duct structure and particularly around the compressor 35 to assist in cooling the same. The air is free to flow from the compartment 10 through the portion of the louvered grill assembly 29 which is not forwardly of the conduit inlet section 41.

As the scoop section 70 of the conduit is positioned forwardly of the fan blade during the lower portion of its rotary movement, a desired proportion of the air enters the open portion of the conduit section 70 beneath the flange 79 and is deflected through the tubular portion 74. This air is thus directed through the opening 91 of the conduit section 71 and is deflected longitudinally of this conduit section to flow through the aperture 92 which is in registry with the upper portion of the flue 93. A covering strip 116 overlies the inwardly offset portion 94, bridging this inwardly offset portion and forming a vertical tubular conduit or flue. This air is thus forced beneath the refrigerator bottom panel 23 and over the water collecting pan 107 suspended beneath the bottom panel 23. As the air moves over the water within the collecting pan, it picks up water vapor and assists in evaporating the collected water. The water in the collecting pan thus gradually evaporates and is dispersed into the atmosphere.

Thus, it will be seen that the water collected during the defrosting period of the evaporator coil is dispersed from the collecting pan into the air. The rate of evaporation is sufficiently high to normally evaporate all of the water between defrosting periods. In order to prevent the collection of moisture upon the undersurface of the bottom panel 23, a continuously operable heating element 117 is attached to the upper surface of the bottom panel 23, heating this bottom panel to a temperature somewhat above the normal temperature of the air circulating over the water collection pan. This heating element serves to prevent the collection of condensation on the bottom refrigerator surface and to assist the evaporation of the moisture. The heating element 117 also acts to radiate heat to the collection pan and evaporates water from the collection pan.

In accordance with the patent statutes, I have described the principles of construction and operation of my improvement in overcounter water disposal system, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A water disposal system for use in conjunction with a refrigerator including a cabinet enclosing cooling compartment, an evaporator within said compartment, a compressor externally of said compartment above said compartment, a cooling fan in conjunction with said compressor, a water collecting member in said compartment beneath said evaporator, a water collecting pan beneath said cabinet, a conduit extending from said water collecting member to said water collecting pan through which water in said member may be conducted to said pan, a duct supported in the path of a portion of the air circulated by said fan, said duct extending to a point adja-

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cent to said water collecting pan to direct air passing therethrough over said pan.

2. The structure of claim 1 and in which said refrigerator includes a condenser into which compressed refrigerant is forced by said compressor, said condenser being above said compartment and in the path of movement of air circulated by said fan.

3. The structure of claim 1 and in which the refrigerator includes a condenser above said compartment and into which compressed refrigerant is forced by said compressor, and including a duct through which air circulated is drawn, said condenser being in said last mentioned duct.

4. A water disposal system in combination with a refrigerator including a cabinet enclosing a refrigeration compartment, a refrigerant unit mounted above said compartment in said cabinet and including a compressor, and a condenser, an evaporator within said compartment, a cooling fan, an air duct enclosing said condenser through which air is drawn by said fan, a duct in the path of movement of some of the air circulated by said fan, the remainder of the circulated air being directed toward said compressor, said last named duct extending to a point adjacent the bottom of said cabinet to circulate air beneath said cabinet, a water collecting member beneath said evaporator within said compartment, a water receiving pan beneath said cabinet, a drain conduit connecting said water collecting member to said receiving pan, said last named duct directing air over said pan.

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5. The structure of claim 4 and in which said refrigerator unit is enclosed within the upper portion of said cabinet, and in which said cabinet includes an air inlet communicating with said first named duct and an air outlet communicating with the interior of the upper portion of said cabinet.

6. The structure of claim 4 and in which said evaporator extends along a wall of the compartment, and including a baffle partially enclosing said evaporator, and means circulating air between said baffle and said wall.

7. The structure of claim 4 and in which a portion of said last named duct comprises a vertical inwardly offset portion in said rear wall, and a strip bridging said inwardly offset portion and forming a tubular conduit portion.

8. The structure of claim 4 and including parallel slide means slidably supporting said water collecting pan.

9. The structure of claim 1 and including a heating element in heat exchange relation with the portion of said cabinet overlying said water collecting pan.

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