Aug. 26, 1969 P. L. REID ET AL 3,462,966

CONDENSATION REMOVING MEANS FOR REFRIGERATED CABINETS

Filed Dec. 5, 1967 3 Sheets-Sheet 1

Fig. 1

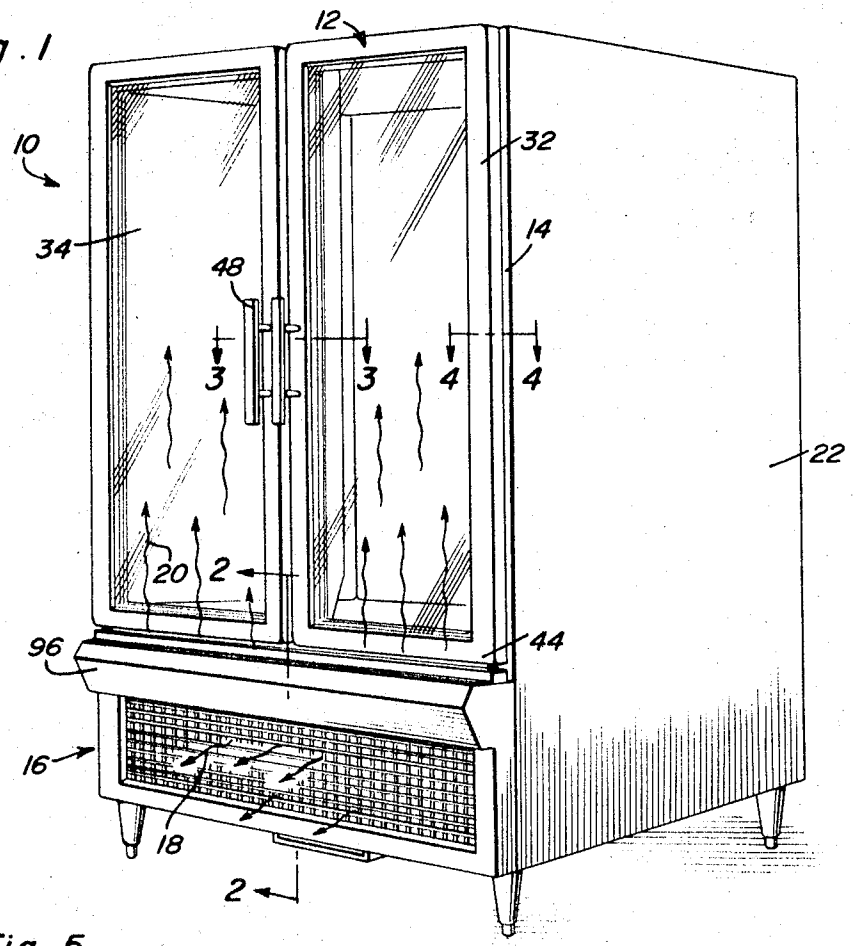
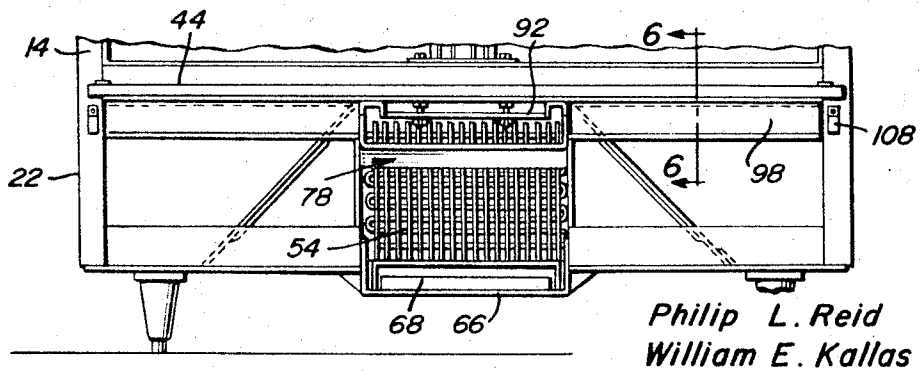


Fig. 5



Philip L. Reid
William E. Kallas
Claude A. Wilson
INVENTORS

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

CONDENSATION REMOVING MEANS FOR REFRIGERATED CABINETS

Filed Dec. 5, 1967 3 Sheets-Sheet 2

Fig. 2

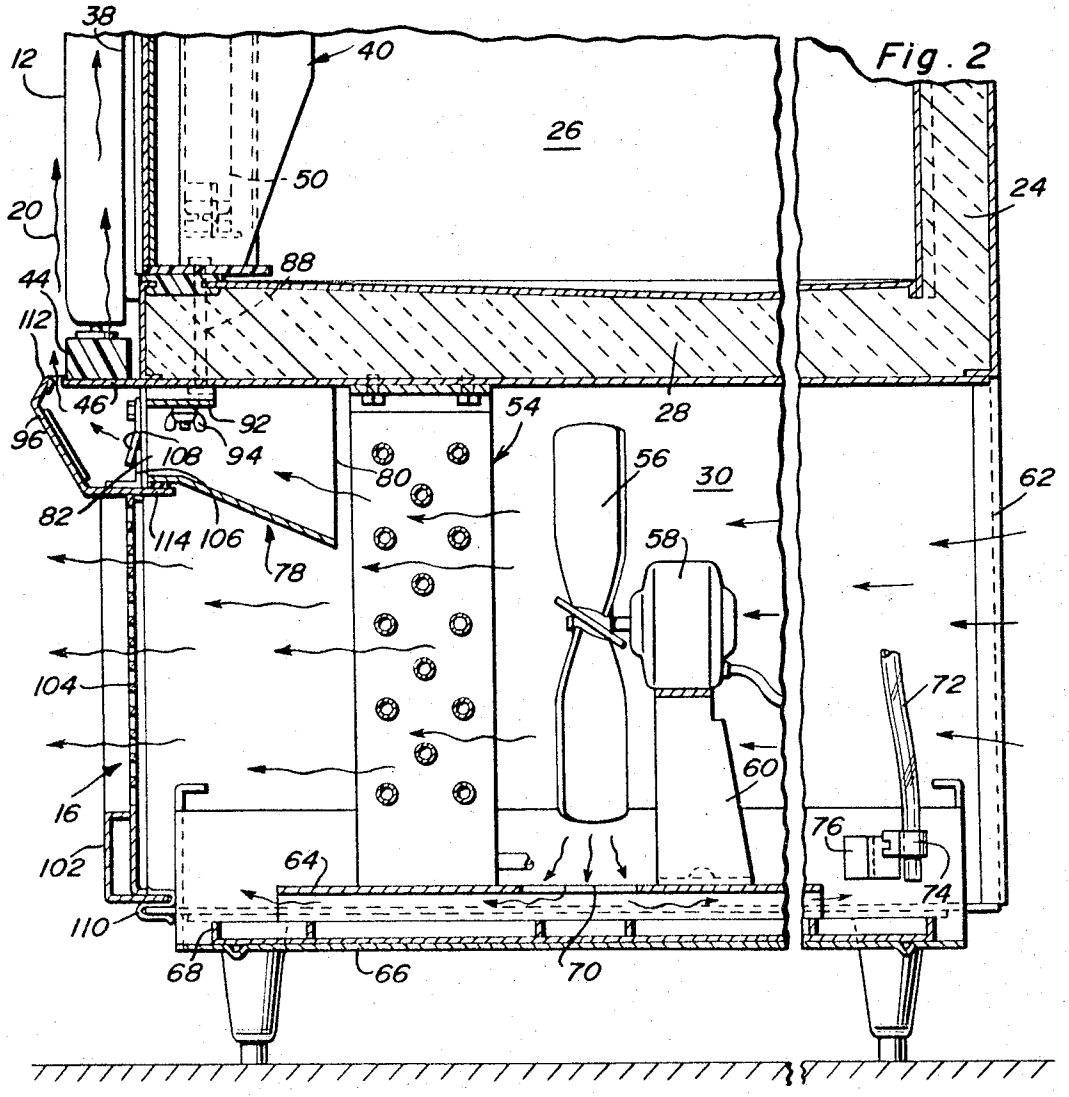
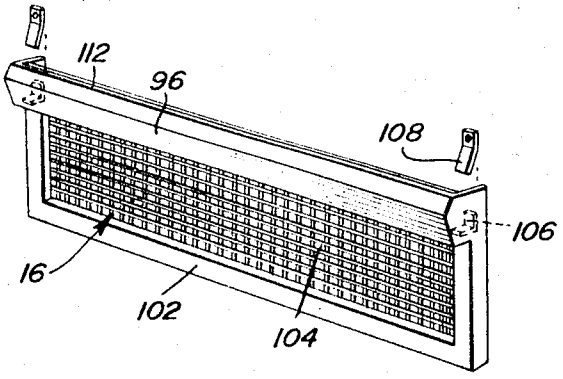


Fig. 7



Philip L. Reid
William E. Kallas
Claude A. Wilson
INVENTORS

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

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CONDENSATION REMOVING MEANS FOR REFRIGERATED CABINETS

Filed Dec. 5, 1967 3 Sheets-Sheet 3

Fig. 3

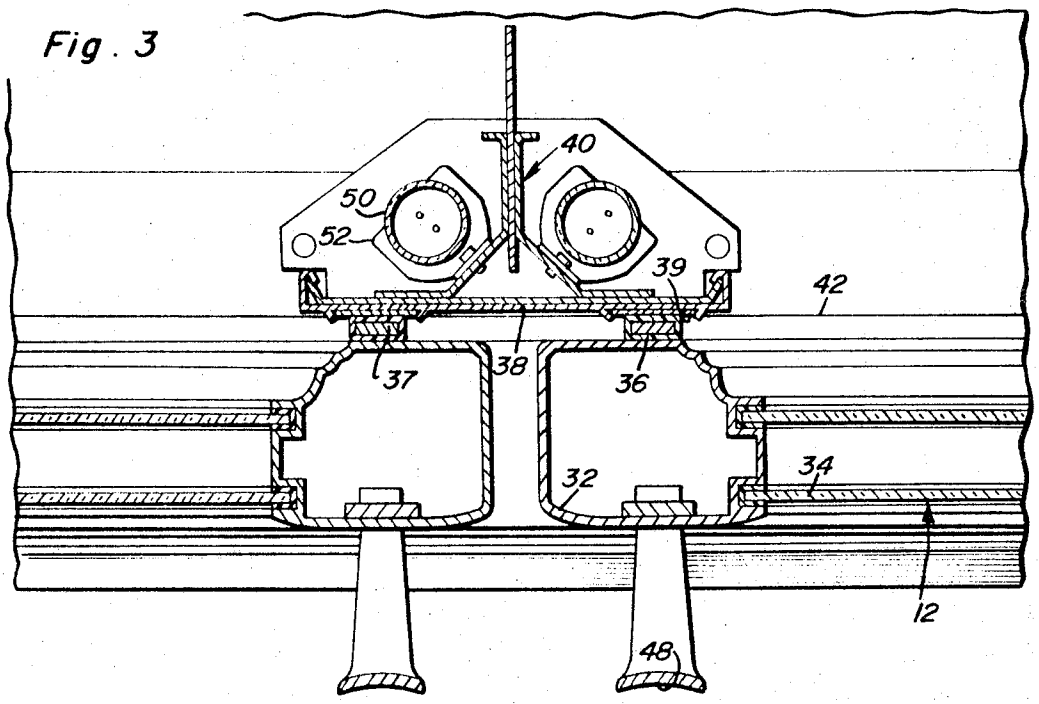


Fig. 4

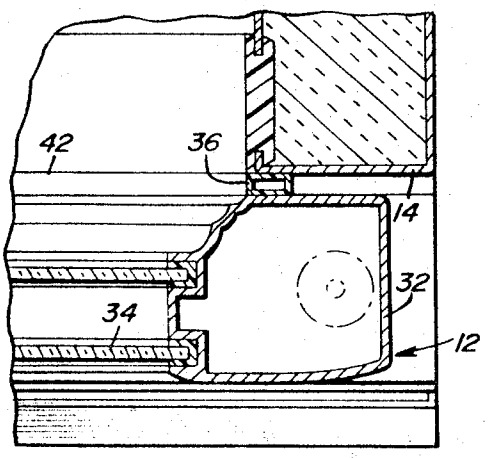


Fig. 6

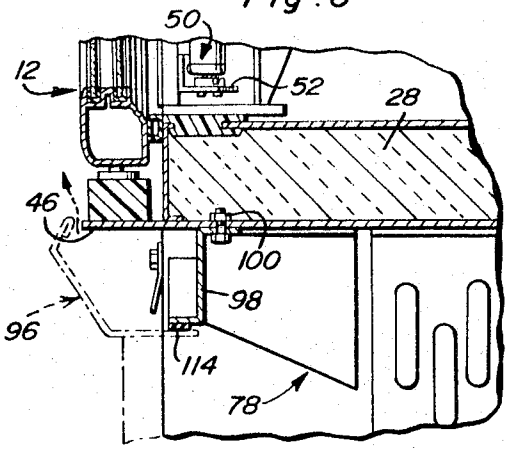
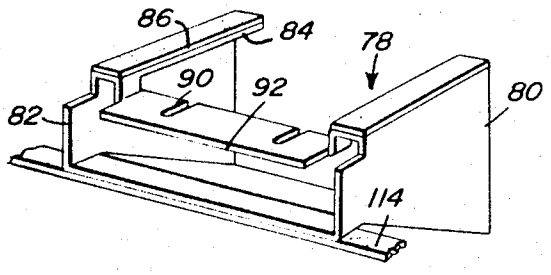


Fig. 8



Philip L. Reid
William E. Kallas
Claude A. Wilson
INVENTORS

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

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CONDENSATION REMOVING MEANS FOR REFRIGERATED CABINETS

Philip L. Reid, Spartanburg, S.C., William E. Kallas, Punxsutawney, Pa., and Claude A. Wilson, Spartanburg, S.C., assignors to Beverage-Air Company, a corporation of Delaware

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U.S. Cl. 62—248 15 Claims

ABSTRACT OF THE DISCLOSURE

A refrigerated cabinet is provided with facilities for establishing an air curtain in front of its opening to prevent condensation on its glass door panels when closed and entry of warm air into the refrigerated space when opened. Condensate collected within a pan is also evaporated by the flow of air from which the air curtain is established to eliminate the need for any condensate drain.

This invention relates to the control of moisture in connection with refrigerated cabinets and more particularly to a refrigerated cabinet modified so as to prevent fogging of its glass door panels and accommodate defrosting by removal of condensate without any drainage facilities.

Refrigerated enclosures having glass panels through which merchandse may be displayed, will sometimes accumulate condensation on the glass panels. This moisture must be removed in order to maintain visibility through the glass panels. The establishment of a flow of warm air over the glass panels, is a well known solution to this problem. The condensation removing airflow has been established either by directing heated air from a blower or from the discharge side of the condenser unit associated with the refrigerating equipment. Flow diverting conduits, flues and duct-work must acordingly be provided which has required expensive modification of the refrigerated cabinet and has complicated removal of the refrigerating unit for repair purposes.

An important object of the present invention therefore is to provide facilities for removing condensation from glass panels of refrigerated cabinets with a minimum amount of cabinet modification and without seriously complicating disassembly and removal of the refrigerating unit for repair purposes. Furthermore, the arrangement of the present invention will supply heated air more efficiently to the access opening of the refrigerated space to not only remove condensation from the glass panels closing the refrigerated space but to also establish a fluid barrier that will reduce heat exchange by convection between the refrigerated space and atmosphere when the closure panels are opened. In addition to the foregoing objectives, the arrangement of the present invention will remove condensate, collected from the condenser unit and drained from the refrigerated space, by evaporation.

In accordance with the present invention, horizontal airflow induced through a non-refrigerated space of the cabinet is partially diverted by means of a removable scoop device into a laterally extending ductwork positioned immediately adjacent to the frame portions of the refrigerator cabinet closure panels. Heated air is accordingly distributed and discharged in a vertical direction for establishment of the air curtain aforementioned over the surface of the glass panels and on both sides of the panel frames. The closure panels are mounted on the front edge portions of the cabinet walls externally of the cabinet so that the panel frames are not directly exposed

to the cold zone of the refrigerated space and extend substantially to the non-refrigerated space overlapping the partition wall which separtes the refrigerated space from the non-refrigerated space. Some of the airflow incluced through the non-refrigerated space is also directed into a condensate collecting pan so that it may evaporate any condensate deposited therein.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view showing a typical refrigerated cabinet embodying the facilities associated with the present invention.

FIGURE 2 is an enlarged partial sectional view taken substantially through a plane indicated by section line 2—2 in FIGURE 1.

FIGURE 3 is an enlarged partial sectional view taken substantially through a plane indicated by section line 3—3 in FIGURE 1.

FIGURE 4 is an enlarged partial sectional view taken substantially through a plane indicated by section line 4—4 in FIGURE 1.

FIGURE 5 is a partial front elevational view of the lower portion of the refrigerated cabinet with the front grill removed.

FIGURE 6 is a partial sectional view taken substantially through a plane indicated by section line 6—6 in FIGURE 5.

FIGURE 7 is a perspective view showing the disassembled front grill.

FIGURE 8 is a perspective view showing the disassembled air scoop device associated with the present invention.

Referring now to the drawings in detail, FIGURE 1 illustrates a refrigerated cabinet generally referred to by reference numeral **10** which incorporates the features of the present invention. In the illustrated embodiment, the cabinet **10** is of the vertically upright type having a pair of closure panels **12** hingedly mounted on the front edge portions **14** of the cabinet walls so as to close a refrigerated space. Warm air is discharged from the lower portion of the cabinet through a front grill generally referred to by reference numeral **16** which extends horizontally across the front of the cabinet and is removably mounted thereon. The front grill in addition to forwardly discharging warm air as indicated by arrows **18**, also vertically discharges in an upward direction, a diverted portion of the warm airflow as indicated by the arrows **20** in order to form a warm air curtain in front of the access opening closed by the door panels **12**.

Referring now to FIGURES 2, 3 and 4, it will be observed that the cabinet is formed by interconnected, insulated side walls **22** and back wall **24** to enclose a refrigerated space **26** above an insulated, bottom partition wall **28** which separates the refrigerated space from the non-refrigerated space **30**. Each of the door panels **12** is provided with a peripheral, tubular frame **32** which mounts a pair of glass panels **34**. The door panel assemblies **12** as hereinbefore indicated are hingedly mounted on the forward edge portions **14** of the side walls **22** by means of conventional hinges (not shown) connected to the panel frames **32**. A peripheral sealing element **36** is mounted on the tubular frame **32** of each door panel assembly for contact with the foreward edge portions of the side walls **22**, partition wall **28** and the top wall as well as a plastic breaker **38** secured to a center post assembly **40** fixedly mounted within the refrigerated space **26** adjacent to the front access opening. The access open-

ing is formed in a plane indicated by reference numeral **42** in FIGS. 3 and 4 with which the front edge portions **14** of the cabinet walls are alined. Magnetic strips **37** within the sealing element **36** cooperating with magnetic inserts **39** in the plastic breaker **38** hold the door panels closed. It will be apparent therefore, that the door panel assemblies **12** are disposed externally of the cabinet rather than being recessed in the edge portions of the cabinet walls as in prior constructions. Because of this arrangement the frames **32** of the door panels are not directly exposed to the cold zone of the refrigerated space **26**. The door panels also extend downwardly beyond the refrigerated space **26** as more clearly seen in FIGURE 2 overlapping the front edge portion of the partition wall **28**, terminating in close spaced relation to the sealing strip **44** mounted on the top of the projecting portion **46** of the partition wall **28**. Thus, the air rising from the front grill **16** immediately contacts the tubular frames **32** of the door panel assemblies with little heat loss flowing upwardly in front of the outside of the frames **32** and the glass panels **34** as well as on the inside of the frames at the forward edge portions **14** and between the door panel assemblies. When the door panel assemblies are opened by means of the handles **48** secured to the frames adjacent the center post **40**, the upward airflow will form an air curtain or barrier between the atmosphere and the refrigerated space **26**, this air curtain being more effective in defogging the door panels because of the panel mounting externally of the cabinet.

As more clearly seen in FIGURES 2 and 3, a pair of fluorescent lamp tubes **50** are mounted just behind the center post assembly **40** by lamp sockets **52** fixedly secured to the center post assembly. The lamp tubes will accordingly provide illumination for the refrigerated space and the heat therefrom will help prevent condensation on the lamp tubes and the outer surfaces of the center post assembly.

Referring now to FIGURE 2 in particular, it will be observed that a condenser coil assembly **54** is mounted within the non-refrigerated space **30** together with a blower including the fan **56** and motor **58** fixedly supported within the non-refrigerated space rearwardly of the condenser coil assembly by means of the bracket **60**. Thus, the condenser coil assembly and blower form part of the refrigerating equipment mounted within the non-refrigerated space **30** through which an airflow is induced upon rotation of the fan **56** drawing air inwardly through the opening **62** at the rear of the refrigerator cabinet. The airflow so induced passes between the coils of the condenser coil assembly **54** for heat exchange purposes resulting in the discharge of heated air through the front grill **16**. The fan and condenser coil assembly are mounted on top of a duct **64** secured to the bottom wall **66** in enclosing relation to a removable drain pan **68** within which condensate may collect. An opening **70** is formed in the duct **64** below the fan **56** so that some of the air will be discharged by the fan into the duct **64** causing evaporation of any condensate collected within the pan **68**. Condensate may be brought to the condensate collecting pan **68** from the refrigerated space by means of the tube **72**, the lower discharge end of which is removably held in position by the clip **74** secured to the bracket **76**.

Centrally mounted within the non-refrigerated space **30** at the forward end is an air scoop device **78**. The scoop device is provided with a dimensionally enlarged inlet end **80** alined with the condenser coil assembly **54** and in close adjacency thereto as more clearly seen in FIGURE 2. The scoop device converges forwardly from its inlet end to an outlet end **82** positioned just below the forward edge portion of the partition wall **28**. The scoop device is provided with a pair of sealing flanges **84** as more clearly seen in FIGURE 8. Sealing strips **86** are adhesively secured to the flanges for abutment with the underside of the partition wall **28** to which the scoop device is removably secured by a pair of bolts **88** extending through the slots **90** formed in the mounting element **92** which bridges the flanges **84**. Wing nuts **94** hold the scoop device **78** assembled on the underside of the partition wall **28** through the bolts **88**. Thus, a portion of the heated air which passes through the condenser coil assembly **54** will be diverted through the scoop device **78** into the upper deflecting portion **96** of the front grill just below the projecting portion **46** of the partition wall **28**. The heated air will also flow laterally from the scoop device along the duct forming members **98** that are fastened to the underside of the partition wall **28** by spaced fasteners **100** on either side of the removable scoop device **78** as more clearly seen in FIGURES 5 and 6.

The front grill **16** includes a frame portion **102** which mounts the grillwork **104** below the forwardly extending, air deflecting portion **96** aforementioned. Mounting tabs **106** as shown in FIGURES 2 and 7 are secured to the sides of the frame portion **102** and are received beneath the holding clips **108** secured to the edge portions **14** of the side walls. Additional holding clips **110** may yieldably hold the lower portion of the frame **102** on the cabinet as shown in FIGURE 2. Thus, when the front grill **16** is mounted on the cabinet the upper edge **112** of the deflecting portion **96** will be closely spaced from the projecting portion **46** of the partition wall **28** to form a horizontally elongated outlet opening through which a vertical upflow of heated air is discharged. The deflecting portion **96** of the grillwork cooperates with the scoop device **78** and the duct forming members **98** to laterally distribute the air flowing upwardly from the opening and is sealed to both the scoop device **78** and the duct forming members **98** by an elongated sealing strip **114** when the front grillwork is mounted in position.

It will be apparent from the foregoing description, that the front grillwork **16** when removed will also permit removal of the air scoop device **78** exposing the refrigerating equipment within the non-refrigerated space **30** so that it may be readily removed for repair or maintenance purposes. The scoop device in its readily removable position will also more efficiently and directly conduct a diverted portion of the heated air to the door panel assemblies because of their mounting externally of the refrigerated cabinet and extension downwardly in overlapping spaced relationship to the partition wall **28**. While the arrangement illustrated and hereinbefore described shows the mounting of the refrigerating equipment within the lower portion of the refrigerator cabinet, it should be appreciated that it may be mounted on top of the cabinet and a diverted portion of the airflow through the condenser coil assembly conducted vertically downwardly utilizing the same principles as hereinbefore described. As another alternative, a separate heater and blower may be mounted below the refrigerated space for establishing the warm air curtain in order to also effect evaporation of condensate from the condensate collecting pan.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. In combination with an insulated cabinet having a partition wall and enclosing refrigerated and non-refrigerated spaces separated by said partition wall, said partition wall having a forward edge portion substantially in a plane with an access opening to the refrigerated space, means for inducing flow of heated air from the non-refrigerated space, closure means mounted on the cabinet externally of said refrigerated space for closing said access opening to the refrigerated space said closure means extending beyond the refrigerated space overlapping the forward edge portion of the partition wall

externally of the cabinet, and flow diverting means mounted on the partition wall within the non-refrigerated space for directing said heated air upwardly from the forward edge portion of the partition wall about the closure means.

2. The combination of claim 1 including condensate collecting means mounted within the non-refrigerated space, and means for conducting a flow of air induced by said flow inducing means through the collecting means to evaporate condensate.

3. The combination of claim 2 wherein said flow diverting means includes a scoop device aligned with the flow inducing means having an outlet vertically spaced below the access opening discharging said heated air adjacent the closure means, and duct forming means mounted laterally of the scoop device for distributing the dsicharged air horizontally along the closure means.

4. The combination of claim 3 including a front grill closing the non-refrigerated space at a location from which the heated air is discharged, said grill having a deflecting portion cooperating with the scoop device and the duct forming means to direct said heated air vertically.

5. The combination of claim 4 wherein said flow inducing means includes a condenser coil assembly mounted in close adjacency to the flow diverting means and a blower mounted rearwardly of the condenser coil assembly above the condensate collecting means.

6. In combination with an insulated cabinet having a partition wall and enclosing refrigerated and non-refrigerated spaces separated by said partition wall, means for inducing flow of heated air from the non-refrigerated space, closure means mounted on the cabinet for closing an access opening to the refrigerated space, said closure means extending beyond the refrigerated space substantially to the non-refrigerated space overlapping the partition wall externally of the cabinet, and flow diverting means mounted on the partition wall within the non-refrigerated space for directing a portion of said heated air about the closure means, condensate collecting means mounted within the non-refrigerated space, and means for conducting a flow of air induced by said flow inducing means through the collecting means to evaporate condensate, said flow diverting means including a removable scoop device aligned with the flow inducing means for discharging said heated air adjacent the closure means, and duct forming means mounted laterally of the scoop device for distributing the discharged air along the closure means, a front grill closing the non-refrigerated space at a location from which the heated air is discharged, said grill having a deflecting portion cooperating with the scoop device and the duct forming means to direct said heated air vertically, said flow inducing means includng a condenser coil assembly mounted in close adjacency to the flow diverting means and a blower mounted rearwardly of the condenser coil assembly above the condensate collecting means, said cabinet being formed by walls having edge portions aligned in a vertical plane in which said access opening is formed, said closure means comprising panels hinged on said edge portions and disposed externally of the cabinet.

7. The combination of claim 6 wherein each of said panels includes a frame and sealing means mounted on the frame for contact with said edge portions, a center post fixed to the cabinet within the refrigerated space and engageable by the sealing means and lamp means mounted rearwardly of the center post closely adjacent to the access opening.

8. The combination of claim 1 wherein said flow diverting means includes a scoop device aligned with the flow inducing means having an outlet vertically spaced below the access opening discharging said heated air adjacent the closure means, and duct forming means mounted laterally of the scoop device for distributing the discharged air horizontally along the closure means.

9. The combination of claim 8 including a front grill closing the non-refrigerated space at a location from which the heated air is discharged, said grill having a deflecting portion cooperating with the scoop device and the duct forming means to direct said heated air vertically.

10. The combination of claim 1 wherein said flow inducing means includes a condenser coil assembly mounted in close adjacency to the flow diverting means and a blower mounted rearwardly of the condenser coil assembly above the condensate collecting means.

11. The combination of claim 1 wherein said cabinet is formed by walls having edge portions aligned in a vertical plane in which said access opening is formed, said closure means comprising panels hinged on said edge portions and disposed externally of the cabinet.

12. In combination with an insulated cabinet having a partition wall and enclosing refrigerated and non-refrigerated spaces separated by said partition wall, means for inducing flow of heated air from the non-refrigerated space closure means mounted on the cabinet for closing an access opening to the refrigerated space, said closure means extending beyond the refrigerated space substantially to the non-refrigerated space overlapping the partition wall externally of the cabinet, and flow diverting means mounted on the partition wall within the non-refrigerated space for directing a portion of said heated air about the closure means, said cabinet being formed by walls having edge portions aligned in a vertical plane in which said access opening is formed, said closure means comprising panels hinged on said edge portions and disposed externally of the cabinet, each of said panels including a frame and sealing means mounted on the frame for contact with said edge portions, a center post fixed to the cabinet within the refrigerated space and engageable by the sealing means and lamp means mounted rearwardly of the center post closely adjacent to the access opening.

13. In combination with an insulated cabinet having a partition wall and enclosing refrigerated and non-refrigerated spaces separated by said partition wall, means for inducing flow of heated air from the non-refrigerated space, closure means mounted on the cabinet for closing an access opening to the refrigerated space, condensate collecting means mounted within the non-refrigerated space and flow diverting means for directing said flow of heated air across the access opening and through the condensate collecting means.

14. The combination of claim 13 wherein said flow inducing means includes a condenser coil assembly mounted in close adjacency to the flow diverting means and a blower mounted rearwardly of the condenser coil assembly above the condensate collecting means.

15. The combination of claim 13 wherein said flow diverting means includes a scoop device aligned with the flow inducing means for discharging said heated air adjacent the closure means vertically spaced below the access opening, duct forming means mounted laterally of the scoop device for distributing the discharged air along the closure means, and a front grill closing the non-refrigerated space at a location from which the heated air is discharged, said grill having a deflecting portion cooperating with the scoop device and the duct forming means to direct said heated air vertically.

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WILLIAM J. WYE, Primary Examiner

U.S. Cl. X.R.

52—171; 98—90