MODULAR REFRIGERATION CASSETTE WITH CONDENSATE EVAPORATIVE TRAY

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Related U.S. Application Data

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The interior space within a refrigeration unit cassette associated with a refrigerated merchandiser is divided by a division wall (68) into a first section in air flow communication with interior product display space, and a second section isolated from said first section and in fluid flow communication with the environment exterior of the cabinet. An evaporator module (160) is disposed within the first section, and a condenser module (170) is disposed within the second section. The division plate has a forward portion sloping downwardly from an upper forward region of the first section to an aft portion thereby forming a converging channel. The aft portion extends generally horizontally in spaced relationship above the base plate forming an exhaust channel. A condensate tray is disposed in the exhaust channel generally beneath the evaporator module to collect condensate draining from the evaporator module.
MODULAR REFRIGERATION CASSETTE WITH CONDENSATE EVAPORATIVE TRAY

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application Ser. No. 60/663,112, filed Mar. 18, 2005, and entitled MODULAR REFRIGERATION CASSETTE DESIGN FOR USE IN REFRIGERATED MERCHAN-DISER, which application is incorporated herein by reference in its entirety.

[0002] This application is related to the following applications subject to assignment to the common assignee of this application and filed with the United States Patent and Trademark Office on the same date as this application:


FIELD OF THE INVENTION

[0008] The present invention relates to refrigerated merchandisers in general and, more particularly, to a refrigerated merchandiser including a refrigeration unit stowed in a compartment separate from the refrigerated interior product space of the refrigerated cabinet.

BACKGROUND OF THE INVENTION

[0009] Refrigerated merchandisers have a refrigeration system associated therewith for providing the cooled environment within a refrigerated interior product space defined within the cabinet of the refrigerated merchandiser. The refrigeration systems of such refrigerated merchandisers commonly employ a conventional refrigeration cycle and include an evaporator and an evaporator fan operatively associated with the refrigerated interior product space of the refrigerated cabinet, as well as a condenser, a condenser fan, and compressor. In stand alone cabinets, the compressor, condenser and condenser fan are housed in an equipment compartment separate from and insulated from the refrigerated interior product space of the refrigerated cabinet. Refrigerant lines connect the compressor, the condenser, and the evaporator in a conventional manner to form a closed circuit. A refrigerant is circulated by the compressor through the condenser and the evaporator before returning to the compressor. Air within the insulated refrigerated interior product space of the refrigerated cabinet is circulated by the evaporator fan through the evaporator in heat exchange relationship with the refrigerant so as to cool the air. The evaporator and evaporator fan may be disposed within the cooled interior of the refrigerated cabinet, for example in the upper region thereof.

[0010] However, it is well-known that the evaporator and evaporator fan may also be housed in the equipment compartment in a section of the equipment compartment insulated from the compressor, condenser and condenser fan. Among other uses, refrigerated merchandisers of this type may be used as product display cabinets for refrigerated or frozen foods, as vending machines, and as cold beverage merchandisers in supermarkets, grocery stores, gas stations, convenience stores, and other retail establishments. For example, cold beverages, such as soft drinks, beer, wine coolers, etc. are commonly displayed in refrigerated merchandisers for self-service purchase by customers. Conventional beverage merchandisers of this type include an insulated cabinet defining a refrigerated interior product display space having one or more glass doors that provide access to that product display space. The beverage product, typically in cans or bottles, single or in six-packs, is stored on shelves within the refrigerated display space of the cabinet. To purchase a beverage, the customer opens one of the doors and reaches into the refrigerated cabinet to retrieve the desired product from the shelf.

[0011] Refrigerated merchandisers equipped with refrigeration units disposed beneath the refrigerated cabinet are disclosed, for example, by Rudick et al. in U.S. Pat. Nos. 5,347,827; 5,402,654; 5,417,079; and 5,417,081. In these refrigerated merchandisers, the refrigerated air from the refrigeration unit flows up from the equipment compartment through a flow duct along the back wall of the cabinet, along the top wall of the cabinet toward the front of the cabinet and down the front of the cabinet to the floor of the product display zone. Refrigerated air may also enter the product display zone from the rear flow duct through a plurality of openings in the panel separating the flow duct from the product display zone. The refrigerated air from the product display zone returns to the equipment compartment, entering thereto upstream of the evaporator refrigeration unit through an air return inlet opening through the cabinet floor.

[0012] The refrigeration unit disclosed therein includes an evaporator, condenser and compressor collectively arranged on a base supported on a plurality of skids affixed to the bottom of the base. The compressor and condenser are positioned on the front portion of the base, and are separated from the evaporator by an insulated vertical partition disposed therebetween. The evaporator is disposed atop an evaporator pan which collects water condensed from the air passing through the evaporator. The collected water drains out of the evaporator pan into a shallow condenser pan located on the floor of the base in the exhaust path of the condenser fan whereby the heated air exhausting from the condenser pan passes over the condenser pan and evaporates the water collected therein.

[0013] In U.S. Pat. No. 5,953,929 and 6,070,424, Bauman et al. disclose a modular refrigeration unit including a base having an evaporator pan and a condenser pan integrally formed therein. The evaporator pan is elevated relative to the condenser pan so that condensate dripping from the evaporator coil into the evaporator pan drains into the condenser
The condenser is mounted above the condenser pan and condensate collected in the condenser pan is evaporated by the ambient air passing through the condenser theabov.

[0014] Due to the generally low velocity of the air flowing through the condenser or exhausting from the condenser fan, the evaporation of condensate by the condenser air flow passing over the surface of the condensate collected in the condensate tray is relatively slow. One means for increasing the rate of evaporation of the condensate is disclosed in U.S. Pat. No. 5,966,958, to Maynard. A condensate tray for a condenser assembly of a refrigeration assembly is disclosed that includes an upper liner associated with a lower tray bottom which are spaced from each other to accommodate a refrigerant coil disposed therewithin through which hot refrigerant passing from the compressor to the condenser flows. The condensate tray is disposed beneath the condenser and receives condensate draining from an evaporator pan disposed beneath the evaporator. The condensate collected in the condensate tray is evaporated in part by the ambient air flowing through the condenser and in part by the hot refrigerant vapor flowing through the refrigerant coil, thereby increasing the rate of evaporation.

[0015] It is also known in the art to provide a series of a vertically standing wicks in the condensate tray. Each wick has a lower portion immersed in the condensate collected in the tray and an upper portion extending into the condenser airflow passing over the surface of the collected condensate. The upper portion of the wick is wetted by condensate drawn upwardly from the lower portion of the wick. By increasing the wetted area in contact with the condenser air flow passing over the surface of the collected condensate, the rate of evaporation is increased.

[0016] Although effective in increasing the rate of evaporation to a degree, the aforementioned techniques involve increased components and increased expense. The need exists for a refrigeration cassette wherein the cassette is adapted to provide improved evaporation of condensate collected in the condensate tray without adding expense and components.

SUMMARY OF THE INVENTION

[0017] In one aspect, it is an object of the invention to provide a refrigeration cassette adapted to provide improved evaporation of condensate collected in a condensate tray.

[0018] It is a further object of the apparatus aspect of the invention to provide a refrigeration cassette adapted to increase the velocity of the condenser airflow passing over the surface of condensate collected in a condensate tray.

[0019] In one aspect, it is an object of the invention to provide an improved method for evaporating condensate collected in a condensate tray of a refrigeration cassette.

[0020] It is a further object of the method aspect of the invention to provide an improved method for increasing the velocity of the condenser airflow passing over the surface of condensate collected in a condensate tray.

[0021] In the apparatus aspect of the invention, a modular refrigeration cassette for a refrigerated merchandiser having a cabinet having a refrigerated interior space for housing a product in a refrigerated environment intended for selection by consumers is adapted to provide improved evaporation of condensate collected in a condensate tray. The refrigeration cassette includes a generally box-like structure defining an interior space having a first section in air flow communication with the refrigerated interior space of the cabinet, and a second section isolated from said first section and in fluid flow communication with the environment exterior of the cabinet. A division plate divides the interior space within the box-like structure into the respective first and second sections. An evaporator module is disposed within the first section. A condenser module and a compressor are disposed within the second section. The compressor is connected in refrigerant flow communication with the evaporator module and the condenser module for circulating refrigeration through the evaporator module and the condenser module.

[0022] In an embodiment, the box-like structure includes a front plate, a back plate, a pair of side plates and a base plate collectively defining an interior space, and the division plate extends between the respective side plates. The condensate tray may be formed integrally in the base plate. The evaporator module may include a housing, an evaporator coil disposed within the housing, and an evaporator fan/motor assembly operatively associated with the evaporator coil and mounted to the housing. The condenser module may include a condenser coil and a condenser fan/motor assembly operatively associated with the condenser coil. At least one baffle member may be provided in association with the condensate tray for limiting wave action in the condensate collected in the condensate tray.

[0023] In the method aspect of the invention, a method is provided for evaporating condensate draining from an evaporator coil in a refrigeration unit including a condenser coil and a condenser fan/motor assembly operatively associated with said condenser for passing air over the condenser coil. The method of the invention includes the steps of collecting the condensate draining from the evaporator module in a condensate tray, accelerating the relatively hot air having passed through the condenser coil to a relatively higher velocity, and passing this higher velocity air over the surface of the condensate collected condensate tray. The method of the invention may also include the step of drawing ambient air from externally of the refrigeration unit over the condenser coil. The method of the invention may also include the step of exhausting the air having passed over the surface of the condensate collected in the condenser tray to externally of the refrigeration unit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] For a further understanding of these and objects of the invention, reference will be made to the following detailed description of the invention which is to be read in connection with the accompanying drawing, where:
FIG. 1 is a sectioned side elevation view of a refrigerated merchandiser equipped with a modular refrigeration cassette;

FIG. 2 is a sectional side elevation view taken along line 2-2 of FIG. 1;

FIG. 3 is a perspective view of an embodiment of a modular refrigeration cassette in accordance with the invention;

FIG. 4 is a sectioned side elevation view of the modular refrigeration cassette depicted in FIG. 3;

FIG. 5 is a plan view taken along section 5-5 of FIG. 4; and

FIG. 6 is a perspective view illustrating an embodiment of a liner for the modular refrigeration cassette depicted in FIG. 3.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIGS. 1 and 2 in particular, there is depicted a refrigerated cold beverage merchandiser, designated generally by the reference numeral 10, including an interior product display space 100 for holding product 110 to be purchased, such as for example bottled or canned soda, milk, water, juices, fruit drinks, beer and other beverages. Although the invention will be described herein with reference to the depicted embodiment of a refrigerated cold beverage merchandiser, it is to be understood that the invention may be applied to other refrigerated display merchandisers for displaying perishable and frozen consumables and beverages, including for example meats, poultry, fish, dairy products, prepackaged frozen foods, and other products that need to be maintained in a controlled environment.

The beverage merchandiser 10 includes a cabinet 20 housing a refrigerated interior product display space 100 and a separate equipment compartment 55 disposed separate from, and may be heat transfer insulated from, the refrigerated interior product display space 100. The cabinet 20 has a top wall 22 and a surrounding side wall structure including a rear wall 34, a front wall 32, and opposed generally vertically extending side walls 36 and 38. The cabinet also includes a lower wall 24 disposed between the refrigerated interior product display space 100 located thereabove and the equipment compartment 55 located therebeneath. The interior product display space 100 may be accessed from exteriorly of the cabinet 20 through an access opening, which in the depicted embodiment is an open area at the front of the cabinet. This open area may be open to the environment or may be covered, as in the depicted embodiment, by at least one door 40 mounted to the cabinet 20. The door 40 extends across the open area and has a transparent viewing area, for example a glass panel, through which at least a portion of the interior product display space 100 can be viewed. The door 40 is selectively positional between a closed position covering the open area and an open position in which consumers may access the interior product display space 100 to remove a product for purchase. Although the embodiment of the display chassis 10 depicted in the drawing has only one door 40, it is to be understood that the display merchandiser may have one, two, three or more doors that collectively cover the open area when in the closed position. The door or doors 40 may be mounted to the cabinet 20 in a conventional manner, for example on hinges for pivotal movement or on a track for sliding movement between an open and closed position.

In the depicted embodiment, the top wall 22, the lower wall 24, rear wall 34 and the side walls 36 and 38 are heat transfer insulated for insulating the refrigerated interior product display space 100, from the environment exterior of the interior product display space 100. A plurality of shelves 112 are disposed within the interior product display space 100. The shelves 112 are adapted as appropriate to support the particular product being displayed for purchase. The specific number, arrangement and configuration of the shelves 112 is not germane to the invention and is within the skill of one of ordinary skill in the art to select for the particular product being displayed.

A rear panel 134 is provided spaced inwardly of the rear side wall 34 to establish, in part, a refrigerated air supply duct 104 between the rear side wall 34 and a rear panel 134. The interior product display space 100 within the refrigerated interior of the display cabinet 20 is bounded by the top wall 22, the lower wall 24, the side walls 36, 38, and in part by each of the rear wall 34 and the rear panel 134. In the depicted embodiment, refrigerated air enters into the product display space 100 to cool product displayed therein in part through an air outlet 109 at the upper end of the air supply duct 104 and in part through a plurality of openings 135 provided in the rear panel 134. Refrigerated air exits the product display space 100 through an opening 102 provided in the lower wall 24.

The equipment compartment 55 is located within the cabinet 20 beneath the lower wall 24 and is separated by the lower wall 24 from the refrigerated interior product display space 100 of the cabinet 20. The lower wall 24 forms a common wall separating the refrigerated interior space and the equipment compartment. The lower wall has a top surface that forms the floor or deck of the interior product display space and has an under surface that faces the refrigeration unit cassette 50 of the refrigeration unit 15 housed within the equipment compartment. The refrigeration unit 15 includes an evaporator module 160, including an evaporator coil 60 disposed within a housing 61 and at least one associated evaporator fan/motor assembly 62, a condenser module 170 including a condenser coil 70 and at least one associated condenser fan/motor assembly 72, and a compressor 74. The evaporator coil 60 and its associated evaporator fan/motor assembly 62 are housed within a first section 53 of the refrigeration unit cassette 50 which is separated by division wall 68 from a second section 57 of the refrigeration unit cassette 50 wherein the condenser coil 70, its associated condenser fan/motor assembly 72 and the compressor 74 are housed. The first section 53 of the refrigeration unit cassette 50 is sized to accommodate a range of evaporator modules 160 having different capacities and the second section 57 of the refrigeration unit cassette 50 is sized to accommodate a range of condenser modules 170 of different capacities, thereby ensuring that a given cassette design may be used over a relatively wide range of refrigeration capacities.

Referring now also to FIGS. 3, 4 and 5, the refrigeration cassette 50 comprises a generally rectangular box-like structure defining an interior space having a top flange 52, a base plate 54, and a surrounding wall structure.
extending generally vertically between the top flange 52 and the base plate 54 formed of a front plate 56A, a back plate 56B, and opposed side plates 56C. The division wall 68 extends between the opposed side plates 56C from an upper, forward region of the cassette 50 to the back plate 56B to separate the interior of the refrigeration unit cassette 50 into the aforementioned first section 53 and second section 57. The various plates forming the box-like structure and the division plate may be made of galvanized steel or other suitable metallic material. The box-like structure of the cassette 50 could also be formed of suitable non-metallic material, such as for example high density polyurethane foam or other structural foams or reaction injected molded plastics and like materials. The condenser coil 70, its associated condenser fan/motor assembly 72, and the compressor 74 are mounted to the base plate 54 which forms the floor of the cassette refrigeration unit 50. The condenser coil 70 and its associated condenser fan/motor assembly may be mounted to a common support plate, which is adapted to be mounted to the base plate 54, thereby forming the condenser module 170. The base plate 54 is slidably mounted within the compartment 55 to facilitate disposition of the cassette 50 into and out of the compartment 55 in order to facilitate servicing of the refrigeration equipment therein, including removal and replacement of the evaporator module 160 and the condenser module 170 as distinct units. A condensate tray 76 may be provided to collect condensate dripping from the evaporator coil 60. The condensate tray 76 serves as a condensate evaporation tray wherein condensate collecting therein is evaporated by hot air exhausted from the condenser as the hot air passes over the condensate tray 76.

The evaporator coil 60, the condenser coil 70 and the compressor 74 are coupled in a closed-loop refrigerant circulation circuit (not shown) in a conventional manner for refrigerating air from the interior product display space 100. The condenser fan/motor assembly 72, typically a single fan and motor, is operative, typically only when the compressor 74 is in operation, to draw air from outside the refrigerated merchandiser 10, such as for example from the ambient environment external thereof through the front grille 12 provided in the lower front of the cabinet 20 through an opening 59 provided in the front plate 56A of the cassette 50 and over the condenser coil 70. As the external air passes over the condenser coil 70 in heat exchange relationship with the refrigerant being passed there through by the compressor 74, the refrigerant is cooled and the air heated. Having traversed the condenser coil 70, the hot air is exhausted out of the compartment 55 to return to the external environment through exhaust channel 77 formed beneath the first section 53 in the aft portion of the second section 57 of the cassette 50. A portion of the air drawn through the cassette 50 by the condenser fan passes over the compressor 74 to assist in cooling the compressor.

The cooled refrigerant is circulated from the condenser coil 70 through the closed-loop refrigerant circulation circuit (not shown) to the evaporator coil 60. The evaporator fan/motor assembly 62, which may be a single fan and motor or a plurality of fans with associated motors, is operative to draw air into the first section 53 of the refrigeration unit 50, also referred to as the evaporator compartment, from the interior product display space 100 through the air return inlet opening 102 in the lower wall 24 and then pass the air over the evaporator coil 60 to and through the refrigerated air supply duct 104 to return to the product display space 100. As the circulating air passes over the evaporator coil 60, the air is cooled as it passes in heat exchange relationship with the chilled refrigerant circulated through the evaporator coil 60 by the compressor 74 and the refrigerant is heated and evaporated. The evaporator fan 62 circulates refrigerated air having traversed the evaporator coil 60 from the evaporator compartment 53 back into the refrigerated interior product display space 100 through a return air outlet 108 located in the lower wall 24 aft of rear panel 134 and into refrigerated air supply duct 104.

A cover plate 120 may be disposed over the return air inlet 102 in spaced relationship with and superadjacent the lower wall 24 thereby forming flow passage between the cover plate 120 and the lower wall 24 through which refrigerated air returning from the product display space 100 flows into the air return inlet 102. The cover plate 120 covers the air return inlet 102, thereby causing the downwardly directed refrigerated air to flow outwardly toward the surrounding walls of the cabinet as the refrigerated air approaches the lower region of the product display space 100 in order to pass beneath the cover plate 120 into the air return inlet 102 in the lower wall 24. In doing so, the refrigerated air passes through the product on the lower shelves to more evenly cool that product and to block the refrigerated air from funneling downwardly directly into the return air return inlet 102. The cover plate 120 also restricts the flow of spills or leaks from product in the product display space 100 from flowing directly into the evaporator compartment 53 and fouling the evaporator and/or evaporator fan assembly.

In one embodiment, the cover plate 120 includes a peripheral flange 126 extending generally vertically to the lower wall 24 for supporting the cover plate 120 over the air return inlet 102 in the lower wall 24. A plurality of circumferentially spaced openings 125 are provided in the circumferential flange 126 to form the air flow passage connecting the refrigerated interior space 100 in flow communication with the air return inlet 102 to the evaporator compartment 53 of the refrigeration unit cassette 50.

The division plate 68 has a forward portion 68A and an aft portion 68B. The aft portion 68B of the division plate 68 extends generally horizontally beneath the evaporator assembly in spaced relationship with and above the base plate 54 to form a channel 77 in the aft portion of the condenser compartment 57. The channel 77 constitutes an exhaust channel through which hot air exiting the condenser coil 70 passes out of the equipment compartment 55 to the environment external of the refrigerated merchandiser 10 through an opening at the back of the cabinet 20. The condenser coil 70, its associated condenser fan/motor assembly 72, and the compressor 74 are mounted to the forward portion of the base plate 54. The forward portion 68A of the division plate 68 slopes downwardly from an upper, forward region of the condenser compartment 57 to the meet the aft portion 68B of the division plate 68. In doing so, a converging channel 73 is defined between the base plate 54 and the forward portion 68A of the division plate extending form the outlet of the condenser 70 to open to the exhaust channel 77. The converging channel 73 in effect defines a nozzle for accelerating the condenser exhaust airflow passing therethrough to a relatively higher velocity, that is a velocity substantially higher than the velocity of the condenser exhaust airflow exiting the condenser module.
170. The forward section 68A of the division plate 68 is depicted as having two sections of different slope. It is to be understood, however, that the forward section 68A of the division plate 68 may have a constant slope or even a curvilinear slope, as desired.

[0042] The condensate dripping from the evaporator coil 60, which is disposed in the aft portion of the evaporator compartment 53, drains therefrom through a drain tube 89 passing through the division wall 68 into the condensate tray 76 disposed in the exhaust channel 77 beneath the evaporator compartment 53 to collect condensate dripping from the evaporator 60. The condensate tray 76 may be integrally formed in the base plate 54. For example, the condensate tray 76 may be defined by a raised rim 78 stamped or otherwise formed in the base plate 54 as illustrated in FIGS. 4 and 5. Alternatively, the condensate tray 76 could be a separate insert secured to the base plate 54. In such case, the condensate tray could be formed of a different material than the base plate, such as a non-metallic material, for example ABS plastic, or stamped or otherwise formed from aluminum or other metallic material.

[0043] The condenser fan 72 draws ambient air through the condenser coil 70 to absorb heat from the refrigerant passing through the condenser coil as in conventional practice to condense the refrigerant. The hot air exiting the condenser module 170 accelerates in velocity as it passes through the converging channel 73 and into the exhaust channel 77, for example to a velocity that is about 3 times the velocity leaving the condenser fan and that lies in the range of from about 600 feet per minute to about 1000 feet per minute as the high velocity, hot air passing through the exhaust channel 77 passes over the surface of the condensate collected in the condensate tray 76. The high velocity characteristic of the hot air passing through the exhaust channel 77 enhances the evaporation of condensate collected in the condensate tray 76 as the rate of evaporation of the condensate is increased due to increased air to condensate contact. One or more baffle members 79 may be disposed within the condensate tray 76 for limiting wave action in the condensate collected in the condensate tray. In the absence of at least one baffle member, wave action could result due the increased velocity of the condenser exhaust airflow flowing through the exhaust channel 77 and passing over the surface of the condensate collected in the condensate tray 76. Such wave action, if unchecked, could lead to condensate spilling out of the condensate tray 76.

[0044] Referring now to FIGS. 3, 4 and 6 in particular, a plastic liner 80 may be inserted within the evaporator compartment 53 to protect the surfaces of the metal plates forming the structure of the refrigeration unit cassette 50 from chemical attack by liquids that might spill or flow into the cassette from the product display region 100. The plastic liner 80 constitutes a formed body having a flange 82 extending circumferentially thereabout, a downdraft sloping floor 84 at its forward end and bowl-like depression 86 at its aft end. The plastic liner 80 is formed to fit within the compartment 53 superadjacent the division wall 68 with the flange 82 supported on the top flange 52 of the cassette 50. The bowl-like depression 86 is adapted to receive the evaporator module 65, which constitutes the evaporator 60, its housing 64, and its associated evaporator fan/motor assembly 62 mounted to the evaporator housing 64 by means of support bracket 66. The evaporator module 65 is releasably secured, for example by bolts or screws, to the sides of liner 80 and or the side walls 56C of the refrigeration unit cassette 50. It is to be understood that the liner 80 may be formed from a non-plastic, formable material being more chemically resistant than the metal walls of the refrigeration cassette 50 and sufficient strength to support the evaporator module, such as for example fiberglass.

[0045] The plastic liner 80 may be contoured to have generous radii in order to minimize airflow losses as the refrigerated air passes from the product display region 100 through the evaporator 60 and into the refrigerated air supply duct 104. Additionally, a trough 88 may be formed in the sloping floor 84 of the liner 80 to collect and direct any liquid that may spill or flow into the refrigeration unit cassette 50.

[0046] A sealing system is provided including a sealing member 58 positioned between the lower wall 24 and the refrigeration cassette 50 and a positioning apparatus 150 for placing the refrigeration unit cassette 50 into sealing relationship with the common wall, which in the depicted embodiment is the lower wall 24 that separates the refrigerated interior product display space 100 from the equipment compartment 55. The sealing system prevents refrigerated air returning to the refrigeration unit 15 from the product display space 100 from bypassing the evaporator 60 and instead flowing directly into the inlet 108 to the air supply duct 104 from the air return inlet 102. The sealing system also prevents ambient air from externally of the refrigeration unit cassette 50, such as the ambient air that has been drawn through the front grille 12 to pass through the condenser 70, from being drawn into the refrigerated air returning to the refrigeration unit 15 through the air return inlet 102 in the lower wall 24.

[0047] The sealing member 58 may be mounted to the under surface of the lower wall 24 about the opening 102 in the lower wall 24, or may be mounted or simply carried upon to the upper surface of the top flange 52 of the refrigeration unit cassette 50. The sealing member 58 extends at least about the opening 51A to the refrigeration cassette 50, as illustrated in FIG. 3, which is substantially commensurate with and is in flow communication with the opening 102 in the lower wall 24. The sealing member 58 also may extend about the opening 51B provided rearward of the opening 51A, as illustrated in FIG. 3, which opens in flow communication with opening 108 in the lower wall 24. In the depicted embodiment the sealing member 58 takes the form of a rectangular frame extending along the top flange 52 with a cross member 58A extending along the top of the housing 64 of the evaporator module 60.

[0048] The sealing member 58 may comprise one or more compressible seals provided on the refrigeration unit cassette 50 which are compressed against the lower wall 24 when the cassette refrigeration unit 50 is raised within the compartment 55 by operation of the positioning apparatus 150. However, the sealing member 58 may also comprise one or more non-compressible seals, such as contact seals, that coat with the respective opposing surfaces of the refrigeration unit cassette and of the common wall separating the refrigerated interior space from the equipment compartment and surrounding the respective openings therein to provide the desired sealing arrangement therebetween when
the cassette refrigeration unit 50 is positioned by operation of the lifting apparatus 150 to sandwich the sealing member 58 therebetween.

[0049] The refrigeration cassette of the present invention has been described herein with reference to the exemplary embodiments depicted in the drawings for purposes of illustration and to facilitate understanding of the invention. Those skilled in the art will realize that modifications, some of which may have been alluded to hereinbefore, may be made to the depicted embodiments without departing from the spirit and scope of the present invention.

We claim:

1. A refrigeration cassette for a refrigerated merchandiser having a cabinet having a refrigerated interior space for housing a product in a refrigerated environment intended for selection by consumers; said refrigeration cassette comprising:

   a generally box-like structure defining an interior space having a first section in air flow communication with the refrigerated interior space of the cabinet, and a second section isolated from said first section and in fluid flow communication with an environment exterior of the cabinet;

   an evaporator module disposed within said first section;

   a condenser module disposed within said second section; and

   a compressor connected in refrigerant flow communication with said evaporator module and said condenser module for circulating refrigeration through said evaporator module and said condenser module;

   a division plate dividing the interior space within said box-like structure into said first and second sections, said division plate having a forward portion and an aft portion, the forward portion sloping downwardly from an upper forward region of the interior space to the aft portion thereby forming a converging channel, the aft portion extending beneath said first section in spaced relationship with and above said base plate thereby forming an exhaust channel; and

   a condensate tray disposed in said exhaust channel generally beneath said evaporator module to collect condensate draining from said evaporator module.

2. A refrigeration cassette as recited in claim 1 wherein said condensate tray is formed integrally in said base plate.

3. A refrigeration cassette as recited in claim 1 wherein said box-like structure has a front plate, a back plate, a pair of side plates, and a base plate cooperatively defining the interior space within said box-like structure, and said division plate extends between the respective side plates.

4. A refrigeration cassette as recited in claim 3 wherein the aft portion of said division plate extends generally horizontally in spaced relationship above said base plate to said back plate.

5. A refrigeration cassette as recited in claim 1 wherein said evaporator module includes a housing, an evaporator coil disposed within the housing, and an evaporator fan/motor assembly operatively associated with the evaporator coil and mounted to the housing.

6. A refrigeration cassette as recited in claim 1 wherein said condenser module includes a condenser coil and a condenser fan/motor assembly operatively associated with the condenser coil.

7. A refrigeration cassette as recited in claim 1 further comprising at least one baffle member associated with said condensate tray for limiting wave action in the condensate collected in said condensate tray.

8. A refrigeration cassette for a refrigerated merchandiser comprising:

   a generally box-like structure having a front plate, a back plate, a pair of side plates, and a base plate cooperatively defining an interior space within said box-like structure;

   a division plate dividing the interior space into a first section in air flow communication with the refrigerated interior space of the cabinet, and a second section isolated from said first section and in fluid flow communication with an environment exterior of the cabinet, said division plate having a forward portion and an aft portion, the forward portion sloping downwardly from an upper forward region of the interior space to the aft portion thereby forming a converging channel and an aft portion extending beneath said first section in spaced relationship with and above said base plate thereby forming an exhaust channel; and

   a condensate tray disposed in said exhaust channel generally beneath said first section.

9. A refrigeration cassette as recited in claim 8 wherein the aft portion of said division plate extends generally horizontally in spaced relationship above said base plate to said back plate.

10. A refrigeration cassette as recited in claim 8 further comprising at least one baffle member associated with said condensate tray for limiting wave action in the condensate collected in said condensate tray.

11. A method for evaporating condensate draining from an evaporator coil in a refrigeration unit including a condenser coil and a condenser fan/motor assembly operatively associated with said condenser for passing air over said condenser coil, said method comprising the steps of:

    collecting the condensate draining from the evaporator module in a condensate tray;

    accelerating the relatively hot air having passed through the condenser coil to a relatively higher velocity; and

    passing said higher velocity air over the surface of the condensate collected in the condensate tray.

12. A method for evaporating condensate as recited in claim 7 further comprising the step of drawing ambient air from externally of the refrigeration unit over said condenser coil.

13. A method for evaporating condensate as recited in claim 8 further comprising exhausting the air having passed over said condensate tray to externally of the refrigeration unit.

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