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(54) MODULAR REFRIGERATION SYSTEM

(75) Inventors: **Michael D. Grassmuck**, Chesterfield, MO (US); **Martin J. Duffy**, University City, MO (US)

Correspondence Address:
MICHAEL BEST & FRIEDRICH, LLP
100 E WISCONSIN AVENUE
MILWAUKEE, WI 53202 (US)

(73) Assignee: **Hussmann Corporation**, Bridgeton, MO

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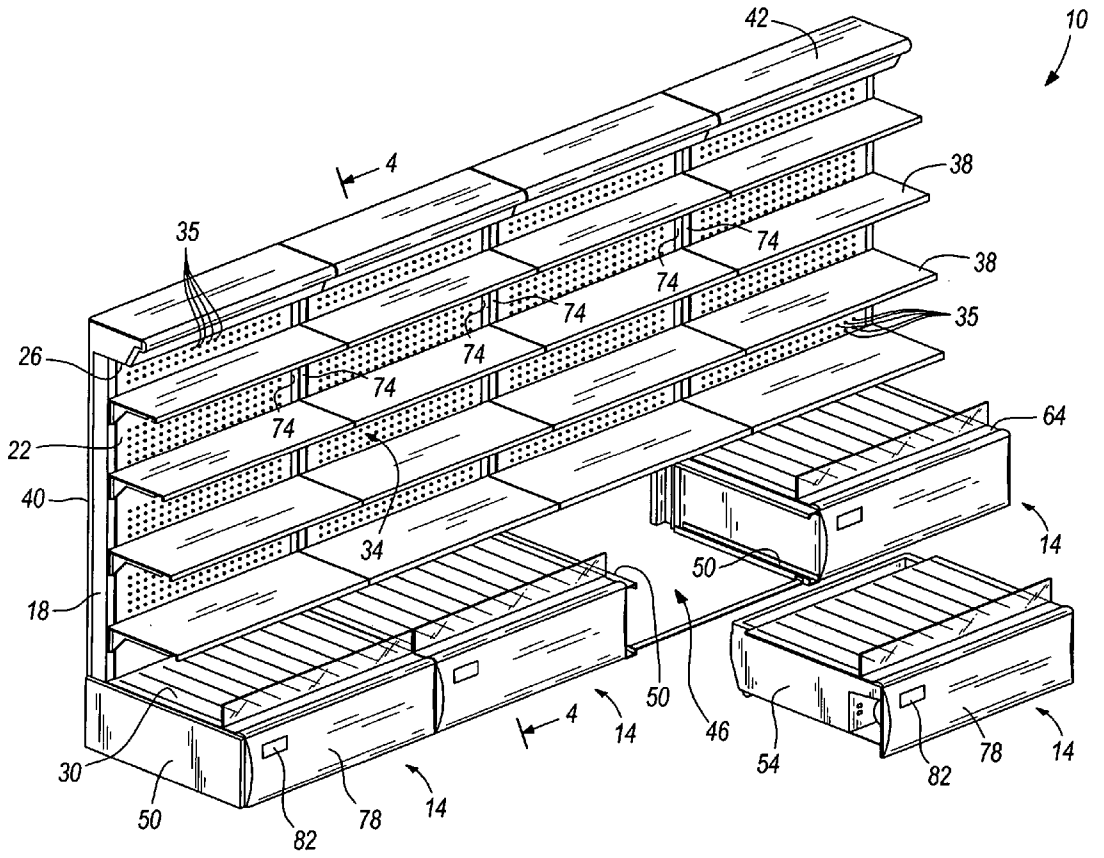
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(57) ABSTRACT

A refrigerated merchandiser and a method for operating a refrigerated merchandiser. The refrigerated merchandiser can include a case, a first modular refrigeration unit, and a second modular refrigeration unit. The first modular refrigeration unit can be removably coupled to the case in fluid communication with a first refrigeration zone to maintain the first refrigeration zone at a first temperature. The second modular refrigeration unit can be removably coupled to the case in fluid communication with a second refrigeration zone to maintain the second refrigeration zone at a second temperature. The method can include removably positioning the first modular refrigeration unit and the second modular refrigeration unit in the refrigerated merchandiser, and maintaining the first refrigerated zone at a first temperature and the second refrigerated zone at a second temperature.



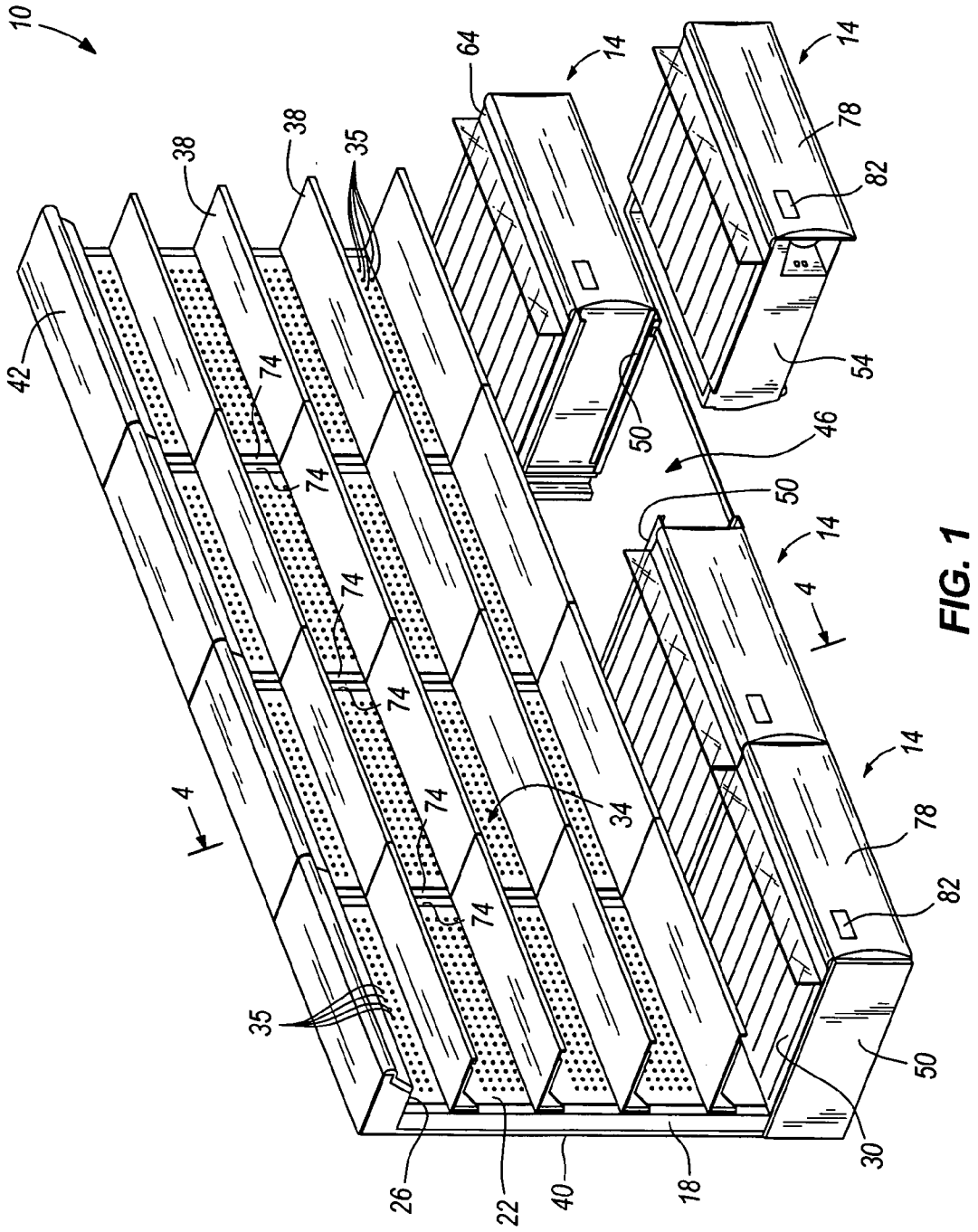

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FIG. 1

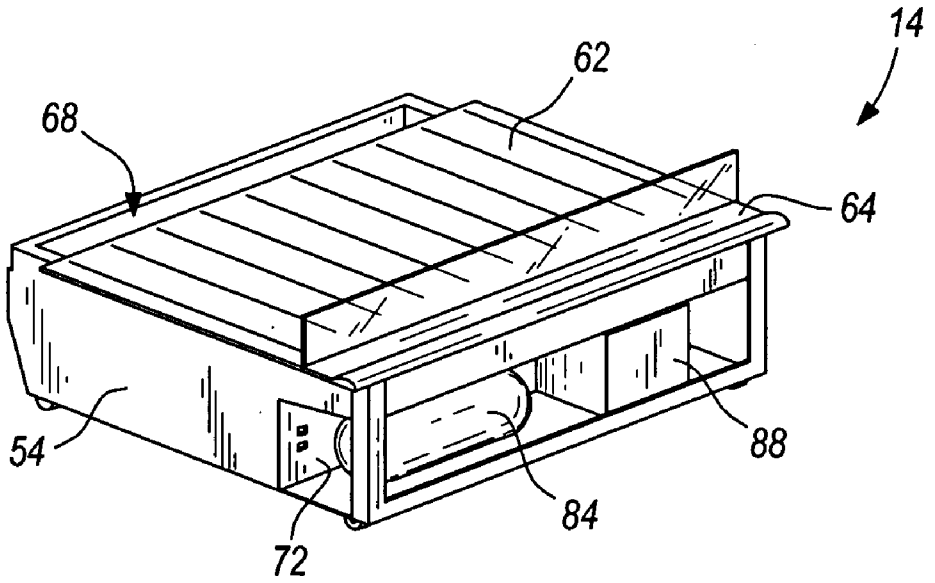


FIG. 2

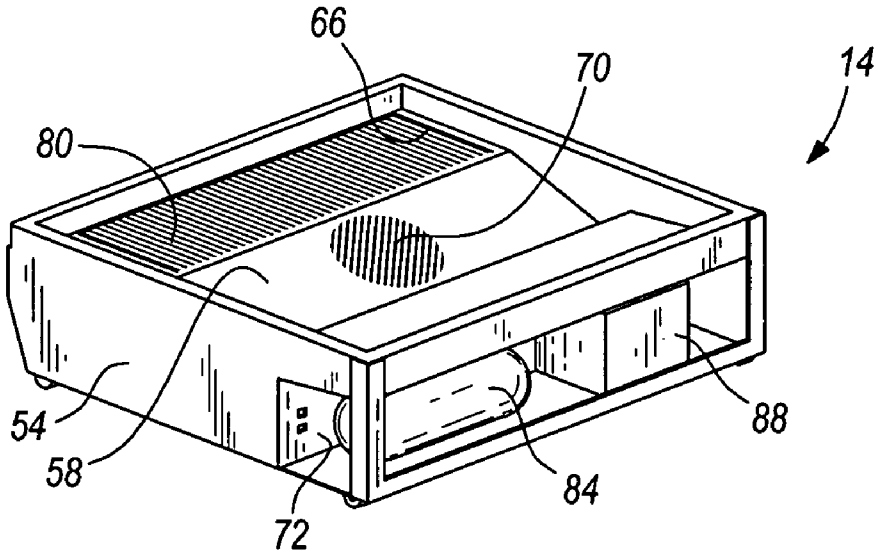


FIG. 3

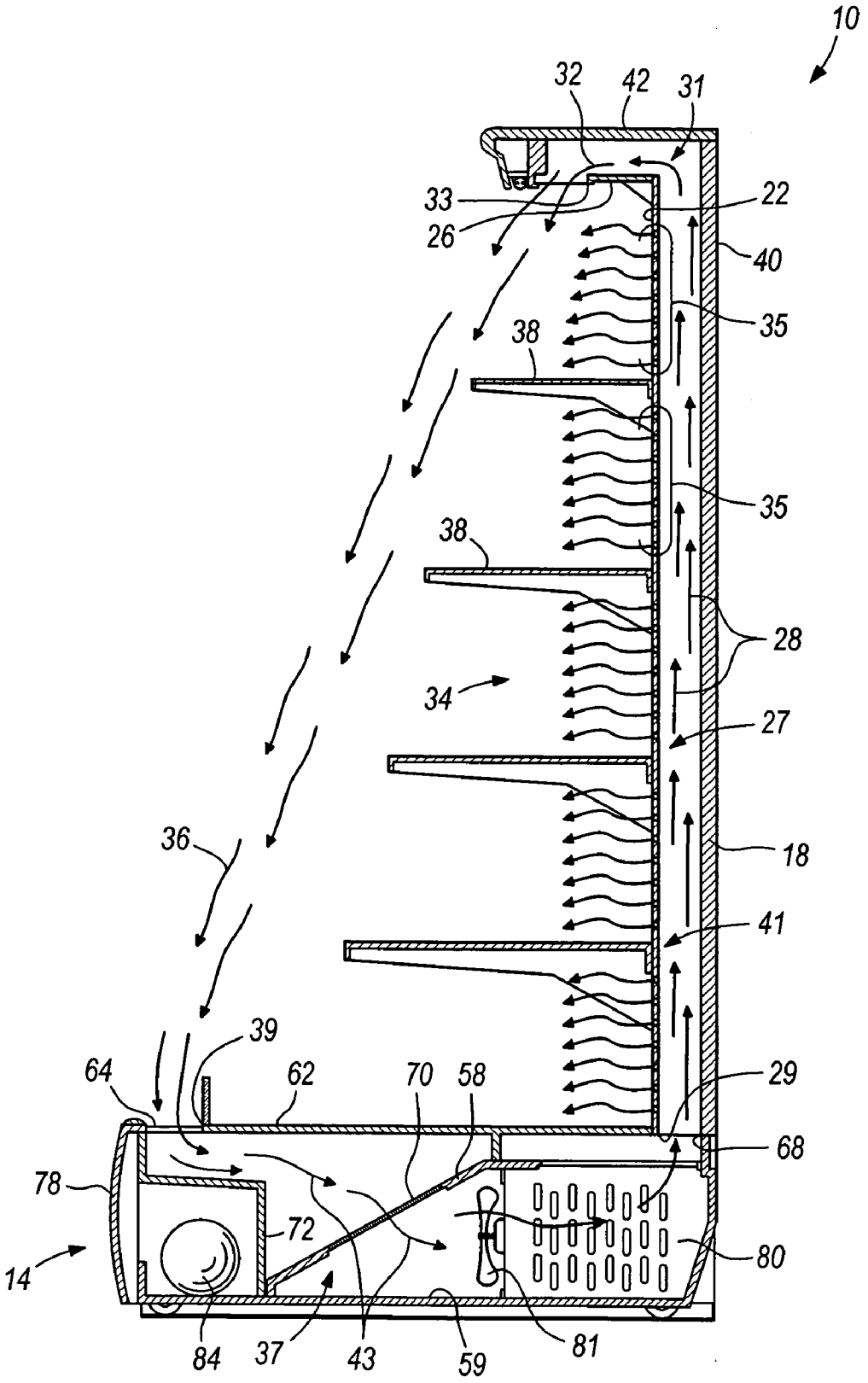

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FIG. 4

MODULAR REFRIGERATION SYSTEM

RELATED APPLICATIONS

[0001] Priority benefit is claimed to U.S. Provisional Patent Application Ser. No. 60/529,556, filed Dec. 15, 2003.

FIELD OF THE INVENTION

[0002] This invention relates to a refrigeration system for a refrigerated merchandiser of the type used in retail stores, convenience stores, snack bars, and restaurants for storing and cooling food and/or beverage products.

BACKGROUND OF THE INVENTION

[0003] Typically, refrigerated merchandisers have a refrigerated compartment or product display area that is accessible to a consumer through an open face of the merchandiser or through glass doors which may be hinged or which may slide for easy access to the display shelves positioned within the product display area. The product display area is typically cooled by a refrigeration system that includes an evaporator assembly and a condenser assembly arranged in a closed circuit. Typically, the evaporator assembly, generally including an evaporator, fan, and expansion valve, is positioned in the merchandiser, while the condenser assembly, generally including a compressor and a condenser, is remotely positioned from the merchandiser.

[0004] In a retail store setting including multiple refrigerated merchandisers in a closed-circuit refrigeration system, one or more compressors may be positioned in a back room to compress the refrigerant, while one or more condensers may be positioned on the rooftop of the retail store to receive compressed, substantially vaporized refrigerant from the compressor and discharge pressurized, substantially liquid refrigerant to evaporators that are individually positioned in the merchandisers.

[0005] In the merchandiser, the pressurized, substantially liquid refrigerant is metered to the evaporator by the expansion valve. The fan distributes incoming return air from the product display area through the evaporator, where heat exchange between the return air and the refrigerant occurs, to reintroduce cooled air into the product display area. The refrigerant exits the evaporator in a substantially vaporized state and is drawn back into the compressor to repeat the refrigeration cycle.

[0006] In addition, the evaporator assembly is typically sized to provide the product display area of the merchandiser with a fixed refrigeration capacity. As a result, the merchandiser may only be suited to store a narrow range of products, and dedicated merchandiser configurations may be required to store specific products.

SUMMARY OF THE INVENTION

[0007] In accordance with one aspect of the invention, there is provided a modular refrigeration system for use in cooling a product display area of a refrigerated merchandiser. The refrigeration system comprises one or more modular refrigeration units that are positionable in an accessible compartment of the merchandiser and are capable of cooling at least a portion of the product display area of the merchandiser. The modular refrigeration units can be easily installed into and removed from the accessible compartment. The refrigeration units may also be interchangeable with one another.

[0008] Some embodiments of the present invention provide a refrigerated merchandiser that can include a case including a first accessible compartment and a second accessible compartment spaced from the first accessible compartment. The refrigerated merchandiser can further include a first modular refrigeration unit configured to be installed into the first accessible compartment such that the first modular refrigeration unit is in fluid communication with a first refrigeration zone when installed in the first accessible compartment to maintain the first refrigeration zone at a first temperature. The first modular refrigeration unit can include a first evaporator assembly and a first condenser assembly. The refrigerated merchandiser can further include a second modular refrigeration unit configured to be installed into the second accessible compartment such that the second modular refrigeration unit is in fluid communication with a second refrigeration zone when installed in the second accessible compartment to maintain the second refrigeration zone at a second temperature. The second modular refrigeration unit can include a second evaporator assembly and a second condenser assembly.

[0009] In some embodiments of the present invention, a method for operating a refrigerated merchandiser is provided. The method can include providing a first refrigerated zone in a case of the refrigerated merchandiser, and providing a second refrigerated zone in the case. The method can further include removably positioning a first modular refrigeration unit in the refrigerated merchandiser such that the first modular refrigeration unit is in fluid communication with the first refrigerated zone. The first modular refrigeration unit can include an evaporator assembly and a condenser assembly. The method can further include maintaining the first refrigerated zone at a first temperature with the first modular refrigeration unit. The method can further include removably positioning a second modular refrigeration unit in the refrigerated merchandiser such that the second modular refrigeration unit is in fluid communication with the second refrigerated zone. The second modular refrigeration unit can include an evaporator assembly and a condenser assembly. The method can further include maintaining the second refrigerated zone at a second temperature with the second modular refrigeration unit.

[0010] Some embodiments of the present invention provide a refrigerated merchandiser including a case, and a first modular refrigeration unit removably coupled to the case in fluid communication with a first refrigeration zone to maintain the first refrigeration zone at a first temperature. The first modular refrigeration unit can include an evaporator assembly and a condenser assembly. The refrigerated merchandiser can further include a second modular refrigeration unit removably coupled to the case in fluid communication with a second refrigeration zone to maintain the second refrigeration zone at a second temperature. The second modular refrigeration unit can include an evaporator assembly and a condenser assembly.

[0011] Other features and aspects of the present invention will become apparent to those skilled in the art upon review of the following detailed description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] In the drawings, wherein like reference numerals indicate like parts:

[0013] **FIG. 1** is a perspective view of the modular refrigeration system of the present invention, illustrating multiple modular refrigeration units coupled to a refrigerated merchandiser.

[0014] **FIG. 2** is a perspective view of one of the modular refrigeration units of **FIG. 1**.

[0015] **FIG. 3** is a perspective view of the modular refrigeration unit of **FIG. 2**, illustrating a support panel or shelf removed.

[0016] **FIG. 4** is a cross-sectional view of the modular refrigeration system of **FIG. 1**, taken along line **4-4**.

[0017] Before any features of the invention are explained in detail, it is to be understood that the invention is not limited in its application to the details of construction and the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced or being carried out in various ways. Also, it is understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of "including" and "comprising" and variations thereof herein is meant to encompass the items listed thereafter and equivalents thereof as well as additional items. The use of letters to identify elements of a method or process is simply for identification and is not meant to indicate that the elements should be performed in a particular order.

DETAILED DESCRIPTION

[0018] Referring to **FIG. 1**, a modular refrigeration system is shown comprising a refrigerated merchandiser **10** and a plurality of modular refrigeration units **14** that are removably coupled to the merchandiser **10**. Although the exemplary merchandiser **10** of **FIG. 1** is configured to be positioned against a wall, the merchandiser **10** of the present invention may also include any of a number of different forms of merchandisers (e.g., an island merchandiser, a convertible merchandiser, a service merchandiser, and so forth).

[0019] The refrigerated merchandiser **10** includes a case **18** generally defining an interior rear wall **22** and an interior top wall **26**, while each modular refrigeration unit **14**, when coupled to the merchandiser **10**, generally defines at least a portion of an interior bottom wall **30** of the case **18**. The area bounded by the interior bottom wall **30**, interior rear wall **22**, and the interior top wall **26** defines a refrigerated compartment, or a product display area **34**, in which food and/or beverage products are stored on a plurality of shelves **38**. The case **18** includes an open front face to allow customers access to the food and/or beverages stored in the case **18**. Alternatively, the product display area **34** may be enclosed by hinged or sliding front door panels.

[0020] The case **18** also generally defines an exterior rear wall **40** adjacent the interior rear wall **22** and an exterior top wall **42** adjacent the interior top wall **26**. A rear flue **27** is defined between the interior and exterior rear walls **22**, **40** to allow for a substantially vertical refrigerated airflow **28** throughout the rear flue **27**. An opening **29** into the rear flue **27** is defined between the interior and exterior rear walls toward the bottom of the merchandiser **10**. An upper flue **31** is defined between the interior and exterior top walls **26**, **42** and is fluidly connected with and adjacent to the rear flue **27**. The upper flue **31** allows for substantially horizontal airflow **32** throughout the upper flue **31**. The interior top wall **26** includes an opening **33** to communicate with the upper flue **31** and allow the airflow **32** in the upper flue **31** to be discharged from the upper flue **31** into the product display area **34**.

[0021] The interior rear wall **22** includes a plurality of apertures **35** therein. The apertures **35** may be positioned in groups along the height of the interior rear wall **22** to fluidly connect the product display area **34** and the rear flue **27**. The apertures **35** allow some of the refrigerated air of the airflow **28** in the rear flue **27** to exit the rear flue **27** and enter the product display area **34**. Products located in the product display area **34** may then be cooled by the refrigerated air.

[0022] The remaining portion of the refrigerated airflow **28** that does not pass through the apertures **35** is routed vertically through the rear flue **27**, and horizontally through the upper flue **31** before being discharged from the upper flue **31** via the opening **33** in the interior top wall **26**. After being discharged from the opening **33** in the interior top wall **26**, the refrigerated air moves downwardly along the open front face of the refrigerated merchandiser **10** to form an air curtain **36** over the open front face of the case **18**.

[0023] A plurality of spaces in the bottom of the merchandiser **10** generally define a plurality of accessible compartments **46** capable of accommodating a single modular refrigeration unit **14**. As shown in **FIG. 1**, the modular refrigeration units **14** are removably coupled with the merchandiser **10** via brackets **50** in each accessible compartment **46**. In the illustrated construction, brackets **50** are positioned on opposing sides in each accessible compartment **46** to support the respective opposing sides of each modular refrigeration unit **14**. The brackets **50** may be configured in any of a number of conventional forms to inter-engage corresponding structure (not shown) on the modular refrigeration units **14**. Alternatively, the modular refrigeration units **14** may be coupled to their respective accessible compartments **46** via other methods known to those skilled in the art.

[0024] Each modular refrigeration unit **14** generally includes a housing **54** substantially enclosing the refrigeration components of the refrigeration system. In addition, the housing **54** generally at least partially defines a lower flue **37** between a fan plenum **58** (see **FIG. 3**) of the housing **54** and a bottom wall **59** of the housing **54** through which the refrigerated air produced by the refrigeration components is allowed to move. Each refrigeration unit **14** may also include a shelf **62** supported on the top portion of the housing **54** to support products thereon.

[0025] The lower flue **37** may also be at least partially defined between the shelf **62** and the fan plenum **58**, such that incoming return air from the air curtain **36** may enter the lower flue **37** via one or more openings **39** in the front portion of the top shelf **62** or a gap between the front edge of the top shelf **62** and the housing **54** to be drawn into the housing **54**. A filter **64** may be positioned in the gap between the front edge of the top shelf **62** and the housing **54** or

adjacent the one or more openings **39** in the top shelf **62** such that debris and/or dust may be filtered from the incoming return air from the air curtain **36**. The filter **64** may be configured in any of a number of different forms such that particulate debris entrained in the incoming return air is separated from the incoming return air, while the filtered incoming return air is allowed to pass through the filter **64**. In addition, cooled air discharged from the housing **54** may exit the lower flue **37** via a gap **68** between the rear edge of the top shelf **62** and the housing **54**.

[**0026**] Upon coupling the modular refrigeration unit **14** and the merchandiser **10**, the lower flue **37** is fluidly connected with the rear flue **27** via the gap **68** between the rear edge of the top shelf **62** and the housing **54**, and into the rear flue **27** via the opening **29** in the rear flue **27**. When combined, the lower flue **37**, the rear flue **27**, and the upper flue **31** comprise an air passage **41** separate from the product display area **34**.

[**0027**] Each modular refrigeration unit **14** includes refrigeration components, such as an evaporator assembly and a condenser assembly, supported by the housing **54**. The evaporator and condenser assemblies may be separated from each other by a dividing wall **72** in the housing **54**.

[**0028**] The evaporator assembly may include an evaporator **80** and a motorized fan **81** to move air through the evaporator **80**. As shown in **FIG. 3**, the evaporator **80** is positioned substantially horizontally in the discharge opening **66** of the housing **54**. In addition, the fan is positioned adjacent the fan plenum **58** to draw an airflow **43** through the intake opening **70**. In the illustrated construction of the modular refrigeration unit **14**, the fan draws the airflow **43** into the housing **54** such that the airflow **43** is upwardly re-directed by a bottom wall **59** of the housing **54** to flow horizontally through the evaporator **80** for cooling. Alternatively, the evaporator **80** may be oriented substantially vertically in the discharge opening **66** such that the airflow **43** is caused to travel a different path (e.g., vertically) to exit the housing **54**. As a further alternative, the evaporator **80** may extend above the upper portions of the housing **54**, such that a notch is required in the case **18** to allow clearance for the evaporator **80** when inserting the modular refrigeration unit **14** into the accessible compartment **46**. The housing **54** may then include an upstanding panel to complement, or "fill in" the notch in the case **18** when the modular refrigeration unit **14** is inserted into the accessible compartment **46**.

[**0029**] Multiple fans may also be used to move air through the evaporator **80**. The evaporator assembly may also include an expansion valve to provide the modular refrigeration unit **14** with a desired refrigeration capacity.

[**0030**] The condenser assembly may include a compressor **84**, a motorized fan (not shown), and a condenser **88**. To decrease the amount of vibration transmitted by the compressor **84**, the compressor **84** may be mounted to the housing **54** through vibration damping mounts. The condenser **88** may be mounted to the housing **54** through a support tray, and the fan may be mounted to the condenser **88**. The condenser assembly may also include a receiver (not shown) in which to store liquid refrigerant. With reference to **FIGS. 2-3**, the fan may generate an airflow through the condenser **88** in any of a number of different directions. In the illustrated construction, the fan may generate an airflow moving from side to side of the housing **54** or from front to back of the housing **54**. In other embodiments, the condenser **88** can be fluid cooled by, for example, a glycol solution provided by a central fluid distribution system, which supplies cooling fluid to each of the modular refrigeration units **14**. In this embodiment, cooling lines of the condenser unit can be coupled to the central fluid distribution system when the modular refrigeration unit **14** is installed into the refrigerated merchandiser **10**.

[**0031**] Refrigerant may be circulated in a closed circuit between the evaporator assembly and the condenser assembly, leaving the evaporator as a low-pressure gas for compression by the compressor. From the compressor **84**, the refrigerant may be discharged through the condenser **88**, in which the refrigerant is substantially condensed to a high-pressure liquid before being fed to the evaporator assembly by an expansion valve.

[**0032**] The modular refrigeration units **14** may be powered using line power. The merchandiser **10** may include a power distribution system (not shown) to distribute power from a single source of line power (e.g., a power cord) to the one or more modular refrigeration units **14**. The power distribution system may include electrical connectors (e.g., conventional quick-release electrical connectors, not shown) positioned in the accessible compartments **46** that are configured to engage mating electrical connectors (not shown) coupled to the individual modular refrigeration units **14**. Further, the electrical connectors coupled to the individual modular refrigeration units **14** may be electrically connected to one or more of the refrigeration components (e.g., the compressor **84**) to provide line power distributed by the power distribution system.

[**0033**] Since all of the refrigeration components associated with providing a refrigerated airflow to the product display area **34** are located in the housing **54** of the modular refrigeration unit **14**, repairs to the refrigeration components may be readily performed without affecting the products stored in the product display area **34**. For example, if a particular modular refrigeration unit **14** stops functioning, it can be easily replaced with a functioning stand-by modular refrigeration unit **14** to avoid loss of any of the refrigerated products. The non-functioning or ill-functioning modular refrigeration unit **14** may then be repaired at a location remote from the merchandiser **10**.

[**0034**] In addition, since the modular refrigeration units **14** are self-contained, a skilled technician may not be required to install and/or remove the modular refrigeration unit **14** from the merchandiser **10**. Rather, if repairs are required of a particular modular refrigeration unit **14**, it may be removed from the merchandiser **10** by an employee of the retail store in which the merchandiser **10** is used, and shipped to a repair facility for repair by a skilled technician. As a result, the costs associated with maintaining the merchandiser **10** may be reduced compared to a conventional merchandiser.

[**0035**] Each modular refrigeration unit **14** may be independently configured to provide a desired refrigeration capacity. As a result, the plurality of modular refrigeration units **14** may provide the product display area **34** with a plurality of different refrigeration zones. A refrigeration zone may be considered a portion of the product display area **34** that is maintained at a different temperature than an adjacent portion of the product display area **34**. In the

illustrated construction of **FIG. 1**, four modular refrigeration units **14** are shown that could potentially be configured to provide the product display area **34** with four different refrigeration zones in which to store products. By providing the capability of multiple different refrigeration zones in a single merchandiser **10**, the usefulness of the merchandiser **10** is enhanced as being able to store a wider variety of products, as opposed to a conventional merchandiser, which has a fixed refrigeration capacity and may only be suited to store a narrow range of products.

[**0036**] The modular refrigeration units **14** are interchangeable with one another, such that the refrigeration zones in the product display area **34** may be re-configured by interchanging one modular refrigeration unit **14** for another. This allows the merchandiser **10** to be tailored to the products to be stored therein, as opposed to conventional merchandisers, which are custom-built to store a particular range of products.

[**0037**] Each modular refrigeration unit **14** may be constructed having a pre-selected refrigeration capacity. Alternatively, each modular refrigeration unit **14** may include user-manipulatable controls (not shown) accessible to an operator to vary the refrigeration capacity of the modular refrigeration unit **14**. For example, such user-manipulatable controls may be configured to adjust a temperature level of the modular refrigeration unit **14**, which, in turn, may adjust the capacity of the compressor. The user manipulatable controls may be located in a front panel **78** of each refrigeration unit **14**. A display window **82** on the front panel may display the temperature on which the refrigeration unit **14** is set. Additionally, the user manipulatable controls may be located within the display window **82**.

[**0038**] A plurality of dividing walls **74** may also be positioned in the rear flue **27** and/or the upper flue **31** of the merchandiser **10** to fluidly separate the rear flue **27** and/or the upper flue **31** into a plurality of rear flues **27** and/or upper flues **31** associated with the plurality of modular refrigeration units **14**. As a result, the refrigerated airflow from each modular refrigeration unit **14** may be maintained within its associated rear flue **27** and/or upper flue **31** before being discharged into the product display area **34**.

1. A refrigerated merchandiser comprising:

a case including a first accessible compartment and a second accessible compartment spaced from the first accessible compartment;

a first modular refrigeration unit configured to be installed into the first accessible compartment such that the first modular refrigeration unit is in fluid communication with a first refrigeration zone when installed in the first accessible compartment to maintain the first refrigeration zone at a first temperature, the first modular refrigeration unit comprising a first evaporator assembly and a first condenser assembly; and

a second modular refrigeration unit configured to be installed into the second accessible compartment such that the second modular refrigeration unit is in fluid communication with a second refrigeration zone when installed in the second accessible compartment to maintain the second refrigeration zone at a second temperature, the second modular refrigeration unit comprising a second evaporator assembly and a second condenser assembly.

2. The refrigerated merchandiser of claim 1, wherein the second temperature is different from the first temperature.

3. The refrigerated merchandiser of claim 1, wherein the first refrigeration zone and the second refrigeration zone define at least a portion of a product display area.

4. The refrigerated merchandiser of claim 1, wherein the first modular refrigeration unit and the second modular refrigeration unit are interchangeable.

5. The refrigerated merchandiser of claim 1, wherein the first modular refrigeration unit and the second modular refrigeration unit each include a pre-selected refrigeration capacity.

6. The refrigerated merchandiser of claim 1, wherein the first modular refrigeration unit and the second modular refrigeration unit each include a variable refrigeration capacity.

7. The refrigerated merchandiser of claim 1, wherein the first evaporator assembly and the second evaporator assembly each include an evaporator.

8. The refrigerated merchandiser of claim 1, wherein the first condenser assembly and the second condenser assembly each include a compressor and a condenser.

9. The refrigerated merchandiser of claim 1, wherein:

the first modular refrigeration unit at least partially defines the first refrigeration zone when installed in the first accessible compartment, and

the second modular refrigeration unit at least partially defines the second refrigeration zone when installed in the second accessible compartment.

10. The refrigerated merchandiser of claim 1, wherein:

the first modular refrigeration unit comprises a first shelf that at least partially defines at least one of:

the first refrigeration zone, and

an air passage through which air is circulated between the first modular refrigeration unit and the first refrigeration zone

when the first modular refrigeration unit is installed in the first accessible compartment.

11. The refrigerated merchandiser of claim 1, wherein:

the first modular refrigeration unit creates a first airflow to maintain the first temperature of the first refrigeration zone,

the second modular refrigeration unit creates a second airflow to maintain the second temperature of the second refrigeration zone, and

at least a portion of the first airflow is separated from at least a portion of the second airflow by at least one dividing wall.

12. A method for operating a refrigerated merchandiser, the method comprising:

providing a first refrigerated zone in a case of the refrigerated merchandiser;

providing a second refrigerated zone in the case;

removably positioning a first modular refrigeration unit in the refrigerated merchandiser such that the first modu-

lar refrigeration unit is in fluid communication with the first refrigerated zone, the first modular refrigeration unit comprising an evaporator assembly and a condenser assembly;

maintaining the first refrigerated zone at a first temperature with the first modular refrigeration unit;

removably positioning a second modular refrigeration unit in the refrigerated merchandiser such that the second modular refrigeration unit is in fluid communication with the second refrigerated zone, the second modular refrigeration unit comprising an evaporator assembly and a condenser assembly; and

maintaining the second refrigerated zone at a second temperature with the second modular refrigeration unit.

13. The method of claim 12, further comprising

removing the first modular refrigeration unit from the refrigerated merchandiser, and

removably positioning a third modular refrigeration unit in the refrigerated merchandiser such that the third modular refrigeration unit is in fluid communication with the first refrigerated zone.

14. The method of claim 12, wherein the first modular refrigeration unit has a first refrigeration capacity and the second modular refrigeration unit has a second refrigeration capacity, and further comprising varying at least one of the first refrigeration capacity and the second refrigeration capacity.

15. The method of claim 12, further comprising interchanging the first modular refrigeration unit and the second modular refrigeration unit.

16. The method of claim 15, further comprising:

maintaining the first refrigeration zone at the second temperature; and

maintaining the second refrigeration zone at the first temperature.

17. A refrigerated merchandiser comprising:

a case;

a first modular refrigeration unit removably coupled to the case in fluid communication with a first refrigeration zone to maintain the first refrigeration zone at a first temperature, the first modular refrigeration unit comprising an evaporator assembly and a condenser assembly; and

a second modular refrigeration unit removably coupled to the case in fluid communication with a second refrigeration zone to maintain the second refrigeration zone at a second temperature, the second modular refrigeration unit comprising an evaporator assembly and a condenser assembly.

18. The refrigerated merchandiser of claim 17, wherein the second temperature is different from the first temperature.

19. The refrigerated merchandiser of claim 17, wherein the first refrigeration zone and the second refrigeration zone define at least a portion of a product display area.

20. The refrigerated merchandiser of claim 17, wherein the first modular refrigeration unit and the second modular refrigeration unit are interchangeable.

21. The refrigerated merchandiser of claim 17, wherein the first modular refrigeration unit and the second modular refrigeration unit each include a pre-selected refrigeration capacity.

22. The refrigerated merchandiser of claim 17, wherein the first modular refrigeration unit and the second modular refrigeration unit each include a user-manipulatable refrigeration capacity.

23. The refrigerated merchandiser of claim 17, wherein the first evaporator assembly and the second evaporator assembly each include an evaporator.

24. The refrigerated merchandiser of claim 17, wherein the first condenser assembly and the second condenser assembly each include a compressor and a condenser.

25. The refrigerated merchandiser of claim 17, wherein:

the first modular refrigeration unit at least partially defines the first refrigeration zone, and

the second modular refrigeration unit at least partially defines the second refrigeration zone.

26. The refrigerated merchandiser of claim 17, wherein:

the first modular refrigeration unit comprises a first shelf that at least partially defines at least one of:

the first refrigeration zone, and

an air passage through which air is circulated between the first modular refrigeration unit and the first refrigeration zone.

27. The refrigerated merchandiser of claim 17, further comprising:

a first air passage defined in the refrigerated merchandiser through which air is circulated between the first refrigeration zone and the first modular refrigeration unit; and

a second air passage defined in the refrigerated merchandiser through which air is circulated between the second refrigeration zone and the second modular refrigeration unit, and wherein at least a portion of the second air passage is separated from at least a portion of the first air passage by at least one dividing wall.

28. The refrigerated merchandiser of claim 17, wherein:

the first refrigeration zone and the second refrigeration zone are two of a plurality of refrigeration zones, and

the first modular refrigeration unit and the second modular refrigeration unit are two of a plurality of modular refrigeration units, each of the plurality of modular refrigeration units removably coupled to the case in fluid communication with one of the plurality of refrigeration zones.

29. The refrigerated merchandiser of claim 17, wherein the first refrigeration zone and the second refrigeration zone are each independently controlled.

* * * * *