

COUNTERTOP FREEZERRelated Applications

5 **[0001]** This application claims the benefit of provisional patent application serial number 63/291,155, filed December 17, 2021, the disclosure of which is hereby incorporated herein by reference in its entirety and claims the benefit of provisional patent application serial number 63/413,756, filed October 6, 2022, the disclosure of which is hereby incorporated herein by reference in its entirety.

10 Field of the Disclosure

[0002] The present disclosure relates to a thermoelectric refrigeration system and more particularly relates to controlling thermoelectric devices to effectively maintain a desire set point temperature in a thermoelectric refrigeration system.

15 Background

[0003] Today, refrigeration systems are large and cumbersome and do not allow adequate floor space in retail and hospitality applications. Entities require a more efficient way to manage the sale of product.

[0004] Current methods for refrigerated/frozen product storage and vending
20 are inefficient and inconvenient. Improved systems and methods for cooled product storage and vending are needed.

Summary

[0005] A countertop freezer and systems and methods for removing moisture
25 from a refrigeration system are provided. In some embodiments, the countertop freezer includes a bin. In some embodiments, the bin includes a removable insert that is adaptable to the type(s) of products to be sold. In some embodiments, the countertop freezer includes a sliding mechanism that causes the bin to slide outward as the door is opened. In some embodiments, the
30 countertop freezer includes a lighting mechanism on the door that is

modular/serviceable and shines light at an angle to allow the product to be illuminated both when the door is closed and when the door is opened.

5 [0006] Some of these embodiments enable the countertop freezer to be at the point of sale. This can fit into spaces where previous freezers were not able to fit.

[0007] In some embodiments, the lighting is provided such that the products for sale are illuminated while the door is closed and illuminated when the door is open. By providing an internal bin that slides out when the door is opened, this can make it easier for a user to access and choose the products.

10 [0008] Those skilled in the art will appreciate the scope of the present disclosure and realize additional aspects thereof after reading the following detailed description of the preferred embodiments in association with the accompanying drawing figures.

[0009] There is a need for a thermoelectric refrigeration that provides a
15 natural way to capture condensation or frost as a result of frequent door opening. Condensation occurs in refrigerators, while frost is seen in freezers. When the door is opened, warm air is trapped inside the unit and condensation or desublimation occurs yielding water droplets or frost on the top and side surfaces.

20 [0010] For a freezer without auto defrost system, it is desirable to capture frost in a specific place which can be cleaned out without having to warmup up the entire unit.

[0011] For the fridge, the water droplets creep to the bottom of the refrigerator. Over time these droplets will form a pool of water that will spill out of
25 the unit. This situation is not desirable for customers' application. Those skilled in the art will appreciate the scope of the present disclosure and realize additional aspects thereof after reading the following detailed description of the preferred embodiments in association with the accompanying drawing figures.

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detailed description of the preferred embodiments in association with the accompanying drawing figures.

Brief Description of the Drawing Figures

- 5 **[0013]** The accompanying drawing figures incorporated in and forming a part of this specification illustrate several aspects of the disclosure, and together with the description serve to explain the principles of the disclosure.
- [0014]** Figure 1A illustrates a potential embodiment of a countertop freezer or refrigerator, according to some embodiments of the present disclosure;
- 10 **[0015]** Figure 1B illustrates an opening angle ~ 65 degrees, according to some embodiments of the present disclosure;
- [0016]** Figures 2A and 2B illustrate alternative embodiments of Figures 1A and 1B for ease of illustration, according to some embodiments of the present disclosure;
- 15 **[0017]** Figure 3A illustrates an example of the countertop freezer with the internal bin removed, according to some embodiments of the present disclosure;
- [0018]** Figure 3B illustrates an example of the internal bin removed from the countertop freezer, according to some embodiments of the present disclosure;
- [0019]** Figure 4 illustrates an alternative embodiment of the internal bin shown
- 20 in Figure 3B, according to some embodiments of the present disclosure;
- [0020]** Figure 5 illustrates multiple assembly components for the countertop freezer, according to some embodiments of the present disclosure;
- [0021]** Figures 6A and 6B illustrate embodiments of an opening mechanism. In some embodiments, the door opens with a Scotch yoke type design, according
- 25 to some embodiments of the present disclosure;
- [0022]** Figure 7 illustrates an enlarged view of the hinge and Scotch yoke type design, according to some embodiments of the present disclosure;
- [0023]** Figure 8 illustrates an exploded view of some components of the door. In some embodiments, the door includes one or more of: a door frame; a fascia;
- 30 a VIG; an inner panel; a metal door frame; a Light Emitting Diode (LED) housing;

door slider pins; a hinge knuckle; and/or door sensor magnets, according to some embodiments of the present disclosure;

[0024] Figure 9 illustrates an exemplary door frame and inner panel, according to some embodiments of the present disclosure;

5 **[0025]** Figure 10 illustrates additional parts of the door, according to some embodiments of the present disclosure;

[0026] Figure 11 illustrates a portion of the door assembly, according to some embodiments of the present disclosure;

[0027] Figure 12 illustrates some features of the bin according to some
10 embodiments, according to some embodiments of the present disclosure;

[0028] Figure 13 illustrates parts of the cabinet according to some embodiments, according to some embodiments of the present disclosure;

[0029] Figure 14 illustrates portions of a hinged base and suction feet, according to some embodiments of the present disclosure;

15 **[0030]** Figures 15A through 15C illustrate some features of the inner liner, according to some embodiments of the present disclosure;

[0031] Figure 16 illustrates the outer liner with: a reduced edge fillet, according to some embodiments of the present disclosure;

[0032] Figure 17 illustrates a rear panel with: a molded-in leads for electrical
20 connection from thermoelectric cooler to the Control Board; and a deep pocket design, according to some embodiments of the present disclosure;

[0033] Figure 18 illustrates some embodiments of the gasket with: a 3-flange barb with reduced length; a magnet pocket; and a 3-chamber design, according to some embodiments of the present disclosure;

25 **[0034]** Figure 19 illustrates some embodiments of the assembly, according to some embodiments of the present disclosure;

[0035] Figure 20 illustrates components of the rear cover and fan filters, according to some embodiments of the present disclosure;

[0036] Figure 21A through 21D illustrate thermal components, according to
30 some embodiments of the present disclosure;

[0037] Figure 22 illustrates an example of the thermal flow, according to some embodiments of the present disclosure;

[0038] Figures 23A through 23C illustrate details of the thermoelectric cooler, according to some embodiments of the present disclosure;

5 **[0039]** Figure 24 illustrates some the electronic components, according to some embodiments of the present disclosure;

[0040] Figure 25 illustrates a bottom inner liner, according to some embodiments of the present disclosure;

10 **[0041]** Figure 26 illustrates a condensate tray for refrigerator only, according to some embodiments of the present disclosure;

[0042] Figure 27 illustrates a passthrough feature to use warm air from condenser to evaporate water in the tray, according to some embodiments of the present disclosure;

15 **[0043]** Figure 28 illustrates a refrigeration unit with bin, according to some embodiments of the present disclosure;

[0044] Figure 29 illustrates a cross section of refrigeration unit with frost catch features, according to some embodiments of the present disclosure; and

[0045] Figure 30 illustrates a bin with frost catching feature, according to some embodiments of the present disclosure.

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Detailed Description

[0046] The embodiments set forth below represent the necessary information to enable those skilled in the art to practice the embodiments and illustrate the best mode of practicing the embodiments. Upon reading the following
25 description in light of the accompanying drawing figures, those skilled in the art will understand the concepts of the disclosure and will recognize applications of these concepts not particularly addressed herein. It should be understood that these concepts and applications fall within the scope of the disclosure and the accompanying claims.

30 **[0047]** Improved systems and methods for cooled product storage and vending are needed. Some embodiments disclosed herein relate to a countertop

freezer. In some embodiments, the countertop freezer includes a bin. In some embodiments, the bin includes a removable insert that is adaptable to the type(s) of products to be sold. In some embodiments, the countertop freezer includes a sliding mechanism that causes the bin to slide outward as the door is opened. In some embodiments, the countertop freezer includes a lighting mechanism on the door that is modular/serviceable and shines light at an angle to allow the product to be illuminated both when the door is closed and when the door is opened.

[0048] Figure 1A illustrates a potential embodiment of a countertop freezer or refrigerator. Figure 1A shows an optional window in the front that can aid in displaying the products for sale or distribution. Inside the countertop freezer is an optional drawer with slots that can be configurable based on the items to be vended.

[0049] In some embodiments, the external dimensions are approximately: H x W x D ~ 303x510x331 (MP1: 280x502x280). Depth from front of door (minus handle) to flat rear is approximate to MP1. In some embodiments, the opening angle ~ 65 degrees as is shown in Figure 1B. In some embodiments, an auto-close feature is included for when the door is ~ 10 degrees. In some embodiments, the percent of bin exposure when open ~ 55% Interior volume.

[0050] Figures 2A and 2B illustrate alternative embodiments of Figures 1A and 1B for ease of illustration.

[0051] Figure 3A illustrates an example of the countertop freezer with the internal bin removed. In some embodiments, the interior volume of the cabinet is ~ 14.79 L (0.52 ft³) (MP1: 0.41 ft³). Figure 3B illustrates an example of the internal bin removed from the countertop freezer. In some embodiments, the interior volume of the bin is ~ 7.63 L (0.27 ft³). Figure 4 illustrates an alternative embodiment of the internal bin shown in Figure 3B.

[0052] Figure 5 illustrates multiple assembly components for the countertop freezer. These components include: a door; an internal bin; a cabinet, a thermal reject subsystem; electronic components; and a rear cover. In some embodiments, the electronic components include a thermoelectric system. In some embodiments, the thermoelectric system includes features disclosed in

“Thermoelectric refrigeration system control scheme for high efficiency performance” issued as U.S. Patent 10,012,417, the disclosure of which is hereby incorporated by reference herein in its entirety. Additionally, any of the units from “Thermoelectric heat exchanger component including protective heat spreading lid and optimal thermal interface resistance” issued as U.S. Patent 8,893,513, the disclosure of which is hereby incorporated herein by reference in its entirety may be included. The thermoelectric system might also include any features from “Thermoelectric heat pump with a surround and spacer (SAS) structure” issued as U.S. Patent 9,144,180 hereby incorporated by reference herein in its entirety.

[0053] Figures 6A and 6B illustrate embodiments of an opening mechanism. In some embodiments, the door opens with a Scotch yoke type design. As the door rotates, the bin travels linearly out of the cabinet. In some embodiments, the pin is on the door and the slot is on the bin. In some embodiments, all hinge components are removed from the inside of the cabinet and are instead included underneath. In some embodiments, the door angle is limited by a stop feature molded into the door to distribute stress from an aggressive opening pull. Figure 7 illustrates an enlarged view of the hinge and Scotch yoke type design. In some embodiments, the bin is removable. In some embodiments, there are guides in the slot that make it easier to put the bin into the cabinet and ensure that the fit is correct. In some embodiments, there are also features that guide the bin into place for a lateral placement. In some embodiments, there are mechanisms for controlling how far the bin travels in one or both directions.

[0054] Figure 8 illustrates an exploded view of some components of the door. In some embodiments, the door includes one or more of: a door frame; a fascia; a VIG; an inner panel; a metal door frame; an LED housing (and optionally a cover); door slider pins; a hinge knuckle; and door sensor magnets. In some embodiments, the countertop freezer includes a lighting mechanism on the door that is modular/serviceable and shines light at an angle to allow the product to be illuminated both when the door is closed and when the door is opened. Making

these LED modules (or other lighting technology) modular/serviceable can extend the lifetime and effectiveness of the countertop freezer.

[0055] Figure 9 illustrates an exemplary door frame and inner panel: A. Pull handle and edge curve; B. Door opener stop; C. Perimeter frame for assembly ease; D. Blind molded-in inserts for sturdy; hinge knuckle (4x); E. LED harness hole; F. Magnet pocket; G. LED housing mounting locations (3x); H. Blind molded-in inserts for removable; pin slider (4x); I. Rim for metal frame mounting.

[0056] In some embodiments, both parts are White ABS with National Science Foundation (NSF) Certification.

[0057] Figure 10 illustrates additional parts of the door. This shows the pin slider, hinge knuckle, LED housing, and LED cover: A. Slot for wiring; B. Hard mounted for serviceability (4x); C. Geometry optimizes space and available area for spring(s); D. Polished outer surface for low friction with bin. In some embodiments, parts are subject to change based on specific spring design.

Some embodiments include 6 Lbs*in @ 15 degree open to achieve auto close. In some embodiments, the Pin Slider, Hinge Knuckle, and LED Housing are White ABS with NSF certification (knuckle has option to be glass filled); LED cover is clear Polycarbonate.

[0058] Figure 11 illustrates a portion of the door assembly: A. Assembled face down; B. Channel between Frame and Fascia for sealant; C. Channel between VIG and Inner Panel for sealant; D. Inner panel clamped on with screws and metal frame; E. Foam Volume: 0.63L ~ 0.022 ft³ Bin.

[0059] Figure 12 illustrates some features of the bin according to some embodiments: A. Yoke slot molded into bin side; B. Height and Width extensions at the top minimize bin movement while in cabinet and during install; C. Cut out for thermistor; D. Front face to be clear to show product and the rest 'frosted' to simulate cold; E. Inserts to be made to keep product stable; F. Notch to give secure "snap" when assembling. In some embodiments, the material is Polycarbonate.

[0060] Figure 13 illustrates parts of the cabinet according to some embodiments. These include one or more of: a gasket; an inner Liner (w/ VIP

(e.g., Vacuum Insulation Panel), HXA Bracket, Accept HXA); an Outer Liner (w/ VIP); a Rear Panel (w/ VIP); a Hinge Base; Suction Feet.

[0061] Figure 14 illustrates portions of a hinged base and suction feet. A. Hinge Base designed to mate with Hinge Knuckle. B. Features for LED cable routing; secure to loop. In some embodiments, the material is White Acrylonitrile Butadiene Styrene (ABS).

[0062] Figures 15A through 15C illustrate some features of the inner liner. A. refers to a retention feature added into a gasket track. B. refers to a bracket that combines stand-off and clamp functions. Figure 15B illustrates a close up of the retention feature added into a gasket track. Figure 15C illustrates pedestals added for updated thermal design (thermoelectric cooler, covered in Thermal). In some embodiments, bossed added on clamp to aid with HXA Accept positioning.

[0063] In some embodiments, the Thermal Break is White ABS with NSF certification; the Inner Liner: Al with white, NSF powder coat on the inside; the HXA Bracket: Plastic (option for Stainless Steel), no color needed.

[0064] Figure 16 illustrates the outer liner with: A. Reduced edge fillet. In some embodiments, the material is Cold rolled steel (CRS) with White powder coat on the outside.

[0065] Figure 17 illustrates a rear panel with: A. Molded-in leads for electrical connection from thermoelectric cooler to the Control Board; B. Deep pocket design. In some embodiments, the material is White ABS with flame rating.

[0066] Figure 18 illustrates some embodiments of the gasket with: A. 3-flange barb with reduced length; B. Magnet pocket; C. 3-chamber design. In some embodiments, the gasket design could be subject to change. Other barb geometries could be used.

[0067] Figure 19 illustrates some embodiments of the assembly with: A. Flanged front edge of Outer Liner mates lap-mates with Thermal Break for flush mount around outer surface; B. Positioning bosses on Thermal Break aid alignment; C. Magnet in gasket seals with metal door strip; D. Jogged back edge of Outer Liner tucks into Rear Panel for flush mount around outer surface.

[0068] Figure 20 illustrates components of the rear cover and fan filters. This could include: A. Straight fins for simple molding; B. Narrowed profile for flush mate with rear panel. In some embodiments, the material is Black ABS with flame rating.

5 **[0069]** Figure 21A through 21D illustrate thermal components. Figure 21A illustrates a HXA reject subsystem: A. Straight reject fins (in some embodiments, 135mm length); B. In-line tubes; C. Folded fin design. Figure 21B illustrates a HXA accept subsystem: D. Pedestals added for updated thermal design (thermoelectric cooler, covered in Thermal); E. Updated copper block size to
10 accommodate thermoelectric cooler; F. Charge tube to be foamed in. Figure 21C illustrates a thermoelectric cooler. Figure 21D illustrates an example fan.

[0070] Figure 22 illustrates an example of the thermal flow. Airflow in through fans and directed horizontally to electronics and vertically and out through HXA Reject.

15 **[0071]** Figures 23A through 23C illustrate details of the thermoelectric cooler with: A. a PCP 88 almost cartridge; B. a Sealant cavity; C. an electrical connection, cart; D. an electrical connection, Printed Circuit Board (PCB); E. For EB1, insert brass tabs, glue, then solder wires in between. In some embodiments, the mold is inserter later.

20 **[0072]** Figure 23B illustrates an embodiment for how the thermoelectric module can make an electrical contact with the rest of the system. Sealing out the environment is important to maintain good functioning of the thermoelectric modules. Especially in uses where there are large temperature differential, humidity and corrosion are detrimental to the operation. A sealable low-cost
25 electrical connection to the thermoelectric module /PCB is desirable.

[0073] In the example shown, there are male pins molded into the enclosure. These can connect to other parts of the electrical system. This molding allows for a better/easier seal to be created. In this illustration, the thermoelectric module/PCB has a corresponding female connector (potentially multiple
30 depending on the electrical connections that need to be made). During assembly, these female connectors can be fit onto the male connectors that are

molded into the system. This can make assembly more tolerant with less precision being needed to obtain the correct connection. This in turn can reduce the cost of the connection.

5 **[0074]** Additionally, since the electrical connections are made through the molding, the sealant cavity shown as B. is easier to maintain a good seal. This can be further enhanced by providing specific surfaces or surface shapes. This is easier and lower cost than sealing a similar cavity with electrical connections running through the cavity.

10 **[0075]** In some other embodiments, the connections between the thermoelectric module /PCB can be any other type of connector. By using electrical contacts that are molded into the frame, the seal can be improved and/or made with reduced cost.

15 **[0076]** Figure 24 illustrates some the electronic components. In some embodiments, an AC Power supply is included. A board accommodates an on-board thermoelectric cooler. Additional components are used for the LED.

20 **[0077]** The embodiments set forth below represent the necessary information to enable those skilled in the art to practice the embodiments and illustrate the best mode of practicing the embodiments. Upon reading the following description in light of the accompanying drawing figures, those skilled in the art will understand the concepts of the disclosure and will recognize applications of these concepts not particularly addressed herein. It should be understood that these concepts and applications fall within the scope of the disclosure and the accompanying claims.

25 **[0078]** Figure 25: Bottom Inner liner;

[0079] Figure 26: Condensate Tray for refrigerator only;

[0080] Figure 27: Passthrough feature to use warm air from condenser to evaporate water in the tray;

[0081] Figure 28: Refrigeration unit with bin;

[0082] Figure 29: Cross section of refrigeration unit with frost catch features;

30 **[0083]** Figure 30: Bin with frost catching feature.

[0084] Embodiment 1: A refrigeration system comprising one or more of: (1) an internal fan, and (2) bin, one or more of:

[0085] In some embodiments, a fan that is mounted and position to the top surface of the inner liner to enable circulated air.

5 **[0086]** In some embodiments, a bin with frost catching features comprising: (1) an arrangement of hole precisely placed through bin, and (2) an arrangement of protrusions on the back surface of the bin to form fins.

[0087] The composition of holes and fins, their placement, and fan speed allow cold humid air to flow and be drawn over the fins' surface and accumulate
10 frost on said surface.

[0088] Embodiment 2: A refrigeration system of embodiment 1 with an integrated condensation sub system comprising; (1) An Inner Liner, (2) a Condensate Tray, (3) Condensate Tube, (4) Pass Through feature, and (5) A fan.

[0089] In some embodiments, an Inner liner with a bottom is mated to the Top
15 inner liner assembly and positioned to collect condensation from the walls and divert water to the condensate tube.

[0090] In some embodiments, a Condensate Tray is connected to the Rear Panel and positioned to catch condensation from the condensate tube.

[0091] In some embodiments, a Condensate Tube is mated to the Bottom
20 Inner liner and positioned to direct water to the Condensate Tray.

[0092] In some embodiments, a Passthrough feature is positioned vertically above the Condensate tray and aligned below the external fan. The Passthrough feature alignment allows air to move from the fan to the condensate tray to evaporate fluid.

25 **[0093]** Those skilled in the art will recognize improvements and modifications to the preferred embodiments of the present disclosure. All such improvements and modifications are considered within the scope of the concepts disclosed herein.

[0094] The following references are incorporated herein by reference:

30 **[0095]** 1 U.S. Patent No. 10,741,741 Multi header for thermoelectric device

- [0096] 2 U.S. Patent No. 10,718,551 Hybrid vapor
compression/thermoelectric heat transport system
- [0097] 3 U.S. Patent No. 10,520,230 Enhanced heat transport systems
for cooling chambers and surfaces
- 5 [0098] 4 U.S. Patent No. 10,473,345 Cooled fan for micro-climate
control
- [0099] 5 U.S. Patent No. 10,458,683 Systems and methods for
mitigating heat rejection limitations of a thermoelectric module
- [00100] 6 U.S. Design Patent No. D833,588 Thermoelectric heat pump
- 10 [00101] 7 U.S. Design Patent No. D825,723 Thermoelectric heat pump
- [00102] 8 U.S. Patent No. 10,012,417 Thermoelectric refrigeration
system control scheme for high efficiency performance
- [00103] 9 U.S. Design Patent No. D816,198 Thermoelectric heat pump
- [00104] Those skilled in the art will recognize improvements and modifications
15 to the preferred embodiments of the present disclosure. All such improvements
and modifications are considered within the scope of the concepts disclosed
herein and the claims that follow.

Claims

What is claimed is:

1. A countertop freezer, the method comprising:
 - 5 a bin for holding products;
 - a door for accessing the bin;
 - a sliding mechanism that causes the bin to slide outward as the door is opened; and
 - a thermal assembly comprising a thermoelectric heat pump operable to
 - 10 actively cool the interior of the countertop freezer.
2. The countertop freezer according to claim 1 wherein the bin comprises a removable insert that is adaptable to a type(s) of products to be sold.
- 15 3. The countertop freezer according to any of claims 1 to 2 further comprising:
 - a lighting mechanism configured to shine light at an angle to allow the product to be illuminated both when the door is closed and when the door is
 - opened.
 - 20
4. The countertop freezer according to any of claims 1 to 3 wherein the lighting mechanism is on the door.
5. The countertop freezer according to any of claims 1 to 4 wherein the
- 25 lighting mechanism is modular and/or serviceable.
6. The countertop freezer according to any of claims 1 to 5 wherein the door comprises an auto-close feature.
- 30 7. The countertop freezer according to any of claims 1 to 6 wherein the door opens with a Scotch yoke type design.

8. The countertop freezer according to claim 7 wherein a hinge pin is on the door and a hinge slot is on the bin.

9. The countertop freezer according to any of claims 7 to 8 wherein all hinge
5 components are included underneath the countertop freezer.

10. The countertop freezer according to any of claims 1 to 9 wherein the door angle is limited by a stop feature molded into the door to distribute stress from an aggressive opening pull.

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11. The countertop freezer according to any of claims 1 to 10 further comprising: one or more guides in the slot that make it easier to put the bin into the cabinet and ensure that the fit is correct.

15 12. The countertop freezer according to any of claims 1 to 11 further comprising: mechanisms for controlling how far the bin travels in one or both directions.

13. The countertop freezer according to any of claims 1 to 12 further
20 comprising a magnet included in a gasket seal for the door.

14. The countertop freezer according to any of claims 1 to 13 wherein the thermal assembly comprises: a sealable electrical connection.

25 15. The countertop freezer according to claim 14 wherein the sealable electrical connection comprises pins molded into the enclosure that can connect to other parts of the electrical system, allowing for a better/easier seal to be created.

30 16. The countertop freezer according to any of claims 1 to 15 wherein the bin comprises an arrangement of holes to enhance air flow.

17. The countertop freezer according to any of claims 1 to 16 further comprising a fan that is mounted and/or positioned to enhance air circulation over a frost catcher feature.

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18. The countertop freezer according to claim 17 further comprising an arrangement of protrusions.

19. A refrigeration system comprising:

10 a bin comprising an arrangement of holes to enhance air flow;
a moisture catcher feature comprising an arrangement of protrusions; and
a fan that is mounted and/or positioned to enhance air circulation over the moisture catcher feature.

15 20. The refrigeration system according to claim 19 further comprising an arrangement of protrusions.

21. The refrigeration system according to any of claims 19 to 20 wherein a composition of holes and protrusions, their placement, and fan speed allow
20 humid air to flow and be drawn over the surface of the protrusions and accumulate moisture on the protrusions.

22. The refrigeration system according to any of claims 19 to 21 further comprising:

25 an inner liner;
a condensate tray;
a condensate tube; and
a pass through feature.

23. The refrigeration system according to any of claims 19 to 22 wherein the inner liner is positioned to collect condensation from the walls and divert it to the condensate tube.

5 24. The refrigeration system according to any of claims 19 to 23 wherein the condensate tray is connected to a rear panel and positioned to catch condensation from the condensate tube.

25. The refrigeration system according to any of claims 19 to 24 wherein the
10 condensate tube is mated to a bottom inner liner and positioned to direct water to the condensate tray.

26. The refrigeration system according to any of claims 19 to 25 wherein a
15 passthrough feature is positioned vertically above the condensate tray and aligned below a fan.

27. The refrigeration system according to claim 26 wherein the passthrough feature alignment allows air to move from the fan to the condensate tray to
evaporate fluid.