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(54) **DISPLAY REFRIGERATOR WITH MULTI-TRAY RADIAL ARRANGEMENT**

(57) The present display refrigerator with a multi-tray radial arrangement having a radial arrangement from which a number of trays detach, depending on the requirements of the seller. The trays are shaped as circle sectors defined by two radii and the arc formed between both, and are fastened to a central shaft on which they slide to modify the height thereof depending on the size of the product to be stored on said tray. In this way, maximum use is made of the internal volume of the refrigerator, with each tray set at a different level depending on the product to be displayed therein. Also, the radial arrangement is connected to a rotating mechanism which causes homogenous cooling for all products displayed in the refrigerator. Ergonomically, the refrigerator provides a marked competitive advantage since the external design thereof affords more display in less physical space.

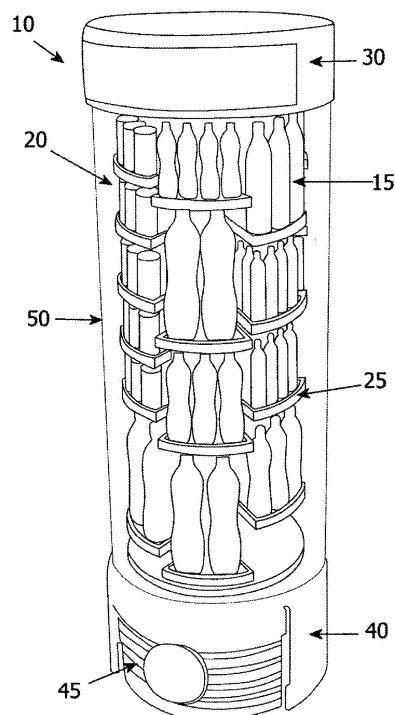


Figure 1

Description**FIELD OF THE INVENTION**

[0001] This invention is associated with a refrigerator for commercial products and particularly, products such as drinks. Specifically, this invention is associated with a refrigerator having a design that allows displaying products in radial arrangements. These arrangements are fixed to a rotator axis and both the shape of the refrigerator, which promotes efficient air circulation, and the rotator axis provide a homogenous cooling in this piece of furniture.

BACKGROUND OF THE INVENTION

[0002] For a long time, commercial establishments have needed refrigerators to display drinks, given the significant change in flavour of said drinks due to temperature at which drinks are stored.

[0003] U.S. Patent No. 5,755,108, granted to Kysor Industrial Corporation, is an example of a display refrigerator to display drinks in trays or racks shaped in a certain shape, either circular or polygon-shaped cylinders. The object of this invention is to provide cooling trays or racks of an unusual shape, with a particular air flow to provide for an efficient refrigerator performance. These refrigerators are not practical, since these refrigerators require considerable room in commercial establishments, tray arrays do not allow for product arrangement in a way such as to maximize the use of these refrigerators internal volume, which interferes with providing a better product display, and finally, the cubical outer shape of these refrigerators restricts the level of product display for consumers.

[0004] U.S. Patent No. 5,458,407, granted to L&P Property Management Company and U.S. Patent No. 5,567,026, granted to Master-Bilt, are clear examples of cooling devices with one or two circular tray systems for product display. These patents provide a device with circular rotator trays which allow for a free access to a wide range of products, preventing the outflow of cooling air. This provides a commercial arrangement having an air flow which is more efficient than in the previous art. However, these refrigerators are not very useful given the ample room these refrigerators required in commercial establishments, the circular rotational tray array does not allow a product arrangement in way such as to maximize the use of these refrigerators internal volume, which would provide a better display of products, and finally, the outer shape of these refrigerators restricts, to some extent, the level of product display for consumers.

[0005] U.S. Patent No. 6,883,887, granted to Timothy Mogensen, reveals a food storage system, wherein said system is constituted by a number of circular trays rotating around a central axis at 360° turns. The central axis whereto trays are fixed is constituted by a line, which allows for tray repositioning at different heights such as user may desire. These refrigerators are not very useful, given the ample room they require in commercial establishments, the circular rotational tray array does not allow for product arrangement in a way such as to maximize the use of these refrigerators internal volume, which would allow for a better product display, and finally, the outer shape of these refrigerators restricts product display capabilities for consumers.

[0006] Finally, U.S. Patent No. 4,314,458, granted to Dalcon Marketing Inc., is a clear example of a cooling device used to display food and drinks in trays or racks. This device provides circular trays or racks for which air flow flows successively from the upper part of the refrigerator to the inferior part of the refrigerator, and the air flow flows in the internal and external part of each tray. The refrigerator does not have any solid barrier, such as glass doors, which facilitates access by the consumer to the product being sold. This refrigerator provides a free-access multi-tray array and an outer design which allows of a 360° display, keeping internal temperature of the refrigerator at less than 40°F (-4.44°C). This patent is not very useful, since the circular tray array does not allow for a product arrangement in a way such as to maximize the use of the internal volume of the refrigerator, which would allow a better product display, and the outer shape of the refrigerator, deprived of any kind of solid barrier which would isolate the refrigerator from room temperature, causes some of the cold air to flow away.

[0007] As can be seen from the above, the state of the art demands a display refrigerator offering a larger display area per refrigerator volume. Furthermore, the need exists for a refrigerator which may allow dividing trays and consumer selection at each tray height. Finally, the need exists to provide homogenous cooling for all the products displayed in the display refrigerator. The multi-tray radial display refrigerator of this invention resolves all the aforementioned issues by providing a new display refrigerator which will be detailed in the following description.

DESCRIPTION OF THE DRAWINGS**[0008]**

Figure 1 is an upper front perspective view of the right side of the multi-tray radial display refrigerator.

Figure 2 is an upper front perspective view of the right side of the radial arrangement of the display refrigerator.

Figure 3 is an upper cross-section view of the multi-tray radial display refrigerator.

Figure 4 is detailed view of the upper cross-section view of the multi-tray radial display refrigerator from Figure 3. Figure 5 is an exploded upper front perspective view of the right side of the radial display refrigerator arrangement. Figure 6 is a side lengthwise section of the right side of the multi-tray radial display refrigerator. Figure 7 is an upper front perspective view of the right side of an alternate embodiment of the multi-tray radial display refrigerator. Figure 8 is an upper front perspective view of the right side of an alternate embodiment of the display refrigerator with a radial arrangement.

[0009] To easily understand this invention, reference numbers, component parts and characteristics mentioned in the drawings are shown in Table 1.

TABLE 1 - REFERENCE NUMBERS			
NO.	COMPONENT PART	NO.	COMPONENT PART
10	Display refrigerator	15	Product
20	Radial arrangement	21	Central axis
22	Rail profile	24	Tray support
25	Radial tray	28	Cover
29	Base	30	Top frame
31	Ball Bearing	32	Turning mechanism
40	Bottom frame	41	Bottom Ball Bearing
42	Cooling system	43	Compressor
44	Condenser	45	Vent slots
46	Fan	50	Transparent body
51	Pivotal means	52	Closing means
55	Back body	110	Alternate display refrigerator
120	Alternate radial arrangement	121	Cylindrical coupling
123	Lengthwise axis	125	Alternative radial tray
128	Cover	129	Base
130	Top frame	140	Bottom frame
150	Transparent body		

DESCRIPTION OF THE PREFERRED EMBODIMENT AND ALTERNATE EMBODIMENTS

[0010] The preferred embodiment of this invention is shown in figure 1. The invention consists in a display refrigerator (10) having a top frame (30), a bottom frame (40), a transparent body (50) and a back body (not shown) conforming said display refrigerator. Preferably, the display refrigerator has a substantially cylindrical shape. However, the refrigerator shape may vary among any of regular or irregular straight prism with a base having a triangular, square, pentagon, hexagon, heptagon, octagon, etc., shape.

[0011] Top frame (30) and bottom frame (40) support the cooling transparent body (50) and back body and said frames keep inside the performance mechanisms of the display refrigerator. A multi-tray radial arrangement (20) on which products (15) are arranged and displayed is housed inside the transparent body (50) and the back body.

[0012] Figure 2 shows the radial arrangement (20) constituted in said arrangement's ends by a top cover (28) and a base (29). In the preferred embodiment described, said top cover (28) and base (29) are joint by a central axis (21) running along the lengthwise axis of said radial arrangement (20). A plurality of radial trays (25) is placed on the central axis (21). Trays (25) are grouped in two or more radial sections and tray height is adjusted by sliding the trays along the central axis (21), which allows displaying products in the gaps between trays.

[0013] Figure 3 is an upper cross-section view of the display refrigerator according to this invention. This embodiment show both how the radial trays (25) are shaped as circle sections defined by two radii and the arc formed between these two radii. Furthermore, this figure shows the back body (55). This figure also shows that the transparent body (50) ends

are supported by pivotal means (51) and closing means (52). These means allow the transparent body (50) to act as a door that can be pulled by the user to have access to the products (15) inside the display refrigerator (10). Preferably, the transparent body (50) is a curved glass or plastic that allows consumer to see the contents inside the display refrigerator.

[0014] Notwithstanding the foregoing paragraph, the door may have several opening and closing means which may be, without limitation, a slide door opening towards the inside part of the back body, a slide door activated by any automatic or semi-automatic means, a pivoted door in both ends and divided into two centrally-opening doors, a folding door towards any of the door ends.

[0015] In accordance with figures 4 and 5, said figures show how the central axis (21) is encircled by a rail profile (22) wherein each rail defines the circular sections that the display refrigerator (10) will have. Also, both figures show that each tray (25) has, in each tray's back part, a tray support (24) with sliding means within the rails in the rail profile (22). The foregoing allows for the selection of each tray's (25) height before fixing the tray in place by any fixing means known. Furthermore, figure 5 shows a top ball bearing (31) and a bottom ball bearing (41) on which the central axis (21) is placed and turns.

[0016] It should be noted that, in this invention, the rail profile (22) may vary in shape or number of rails, and the tray support (24) adapted to each profile may also vary, but the performance remains the same.

[0017] Figure 6 is a right side lengthwise-section of the display refrigerator (10). This figure shows the part of the cooling system (42) housed in the bottom frame (40) and comprising a compressor (43), a condenser (44) to spread heat into the outside through vent slots (45) (shown in figure 1) by means of a fan (46). A tube line (not shown) which is part of the cooling system, mounts along the back body (55) and reaches the gap housed in the top frame (30), where cold air is sent from into the inside part of the refrigerator. Since cold air is denser than the air within the refrigerator, cold air drops through the radial arrangement (20). Thus, a constant temperature is maintained inside the display refrigerator (10) and in all the products (15) therein. Finally, an automatic turn mechanism (not shown) is located within the top frame (30) and is coupled to the central axis (21) in order to make the radial arrangement (20) turn. Preferably, this mechanism may be constituted by a motor coupled to a gear-based reducing mechanism, but a number of known turning mechanisms may be used.

[0018] Finally, Figures 7 and 8 show one of the several potential alternate embodiments. This alternate embodiment consists in a display refrigerator (110) having a top frame (130), a bottom frame (140), a transparent body (150) and a back body (not shown). A multi-tray radial arrangement on which multi-trays, products (15) are arranged and displayed (120) is housed inside the display refrigerator (110). The radial arrangement (120) comprises, in its ends, a top cover (128) and a base (129). In this alternate embodiment, said top cover (128) and base (129) are joined by a plurality of lengthwise axis (123) in a vertical position. A plurality of radial trays (125) is mounted on said lengthwise axis (123). Said trays (125) are grouped into two or more radial sections, and the height of said trays (125) is adjusted by sliding said trays (125) along the lengthwise axis (123) which go through the trays (125), thus fixing the trays (125) in place by any fixing means known and allowing for the display of the products (15) in the gaps between each tray.

[0019] Furthermore, in order to connect the radial arrangement (120) to the turning mechanism, cylindrical couplings (121) are provided in the center of the top cover (128) and the base (129). These cylindrical couplings (121) are connected to the turning mechanism, allowing for an appropriate performance of the display refrigerator.

[0020] The advantages of the above display refrigerators (10 and 110) are homogenous cooling evenly spread into all the products (15) inside the radial arrangements (20 and 120), respectively. A further advantage of this invention is providing a 360° display area, in contrast with display refrigerators where the display area is equal to the front face of those refrigerators. One last advantage of this invention is versatility and maximized use of room available, which allows using multiple trays arranged in sections and adjusted to a desired height. The multi-tray radial display refrigerator may be compared to a bunch of grapes where each product finds its place in a harmonic and natural arrangement.

[0021] Based on the above description, a number of embodiments and details have been described as an illustration of this invention, and it will be evident for those skilled in the art that a plurality of variations and modifications may be made to this invention within the scope of this invention.

Claims

1. A display refrigerator having a top frame, a bottom frame, a transparent body and a back body, wherein:

the performance mechanisms of the display refrigerator are kept inside said top and bottom frames;

a multiple tray arrangement, on which the products are placed and displayed, is housed in the transparent body and the back body;

characterized in that:

the multiple tray arrangement is a radial arrangement having in the ends thereof a top cover and a base that

are joint one to another by a central axis along the lengthwise axis of said arrangement;
the central axis is encircled by a rail profile;
the trays are grouped in two or more radial sections;
each try has a back part attached to a tray support with sliding means capable of sliding within the rails of the
5 rail profile to adjust tray height;
the cooling system releases cold air into the interior of the refrigerator from the top frame, thus maintaining a
constant temperature inside the display refrigerator and in all the products contained therein; and
the display refrigerator has an automated turning mechanism coupled to the central axis in order to make the
radial arrangement to turn.

2. The display refrigerator according to claim 1, wherein the shape of the display refrigerator is substantially cylindrical.

3. The display refrigerator according to claim 1, wherein the refrigerator shape may vary among any of regular or
irregular straight prism with a base having a triangular, square, pentagon, heptagon[sic], heptagon, octagon, etc.
15 shape.

4. The display refrigerator according to claim 1, wherein radial trays are shaped as sections of a circle defined by two
radii and the arc formed between said two radii.

5. The display refrigerator according to claim 1, wherein the transparent body is preferably a curved glass or plastic
that allows the user to see the interior of the display refrigerator.

6. The display refrigerator according to claim 1, wherein the ends of the transparent body are supported by pivotal
means and closing means that allow the transparent body to act as a door.

7. The display refrigerator according to claim 1, wherein the transparent body acts as a door that may have a plurality
of opening and closing means, such as, without limitation, a slide door that may slide towards the inside part of the
back body, a slide door activated by some automatic or semi-automatic means, a pivoted door in both ends and
divided into two centrally-opening doors, a folding door towards any of the door ends.

8. The display refrigerator according to claim 1, wherein each tray is fixed in place by any known fixing means.

9. The display refrigerator according to claim 1, wherein the central axis lays on and turns around a top ball bearing
and a bottom ball bearing.

10. The display refrigerator according to claim 1, wherein the rail profile may vary in shape or number of rails, and the
tray support adapted to each profile may also vary.

11. The display refrigerator according to claim 1, wherein the turning mechanism is located inside the top frame and
may be a motor coupled to a gear-based reducing mechanism, although a plurality of known turning mechanisms
may be used.

12. A display refrigerator having a top frame, a bottom frame, a transparent body and a back body, wherein:

the performance mechanisms of the display refrigerator are kept inside said top and bottom frames;
a multiple tray arrangement, on which the products are placed and displayed, is housed in the transparent body
and the back body;

characterized in that:

the arrangement is a radial arrangement having in its ends a top cover and a base that are joint one to another
by a plurality of lengthwise axis;

a plurality of radial trays is mounted on the lengthwise axis;

radial trays are grouped in two or more radial sections;

each tray may slide over the lengthwise axis running through said trays, thus adjusting tray height;

the cooling system releases cold air towards the interior of the refrigerator from the top frame, thus maintaining
a constant temperature inside the display refrigerator and in all the products located therein; and

the display refrigerator has an automated turning mechanism coupled to the central axis to cause the radial
arrangement to turn.

13. The display refrigerator according to claim 12, wherein the display refrigerator has a substantially cylindrical shape.
14. The display refrigerator according to claim 12, wherein the refrigerator shape may vary among any of regular or irregular straight prism with a base having a triangular, square, pentagon, heptagon[sic], heptagon, octagon, etc. shape.
15. The display refrigerator according to claim 12, wherein radial trays are shaped as sections of a circle defined by two radii and the arc formed between said two radii.
16. The display refrigerator according to claim 12, wherein the transparent body is preferably a curved glass or plastic that allows the user to see the interior of the display refrigerator.
17. The display refrigerator according to claim 12, wherein the ends of the transparent body are supported by pivotal means and closing means that allow the transparent body to act as a door.
18. The display refrigerator according to claim 12, wherein the transparent body acts as a door that may have a plurality of opening and closing means, such as, without limitation, a slide door that may slide towards the inside part of the back body, a slide door activated by some automatic or semi-automatic means, a pivoted door in both ends and divided into two centrally-opening doors, a folding door towards any of the door ends.
19. The display refrigerator according to claim 12, wherein each tray is fixed in place by any known fixing means.
20. The display refrigerator according to claim 12, wherein the top cover and the base have in their center a plurality of cylindrical couplings to be connected to the turning mechanism in order to provide an appropriate display refrigerator performance.
21. The display refrigerator according to claim 20, wherein the cylindrical couplings rest on and turn around a top ball bearing and a bottom ball bearing.
22. The display refrigerator according to claim 12, wherein the turning mechanism is located inside the top frame and may have a motor coupled to a gear-based reducing mechanism, although a plurality of known turning mechanisms may be used.

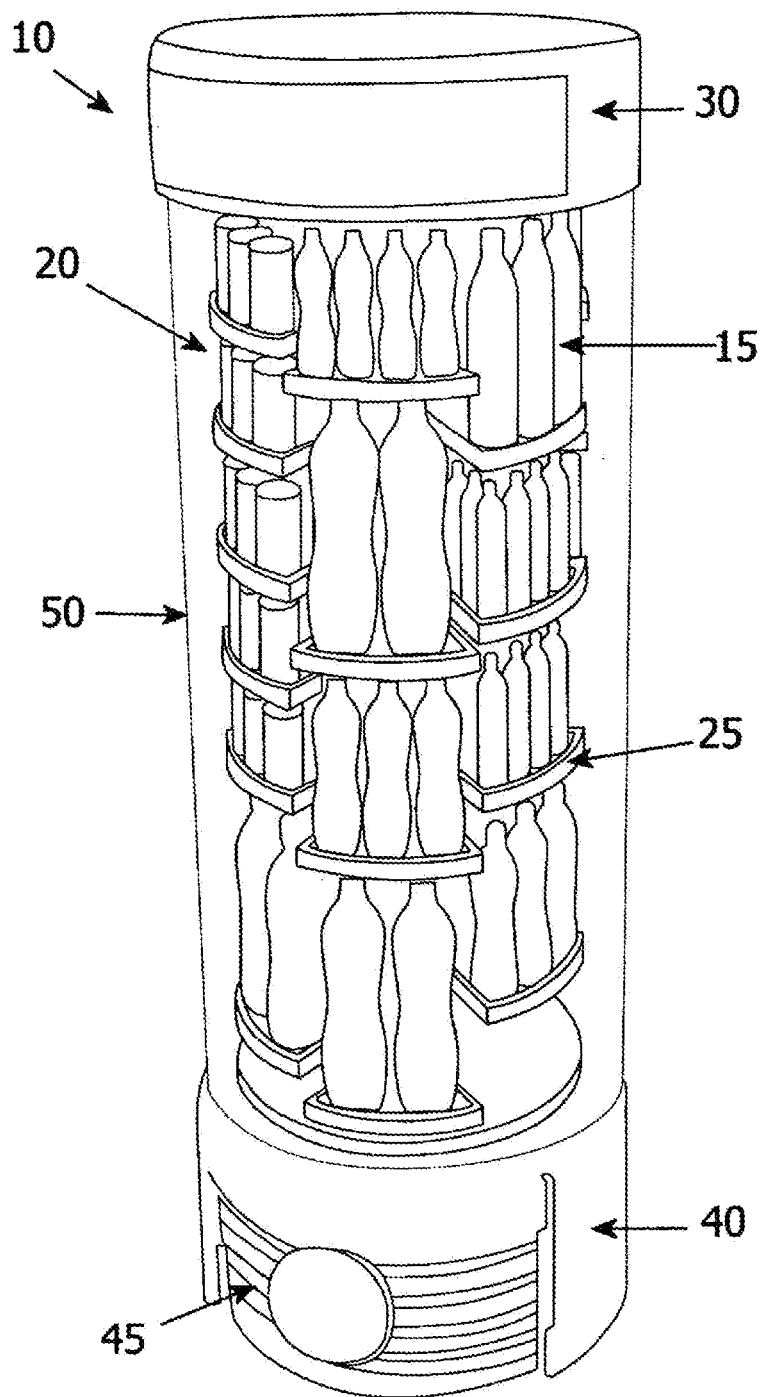


Figure 1

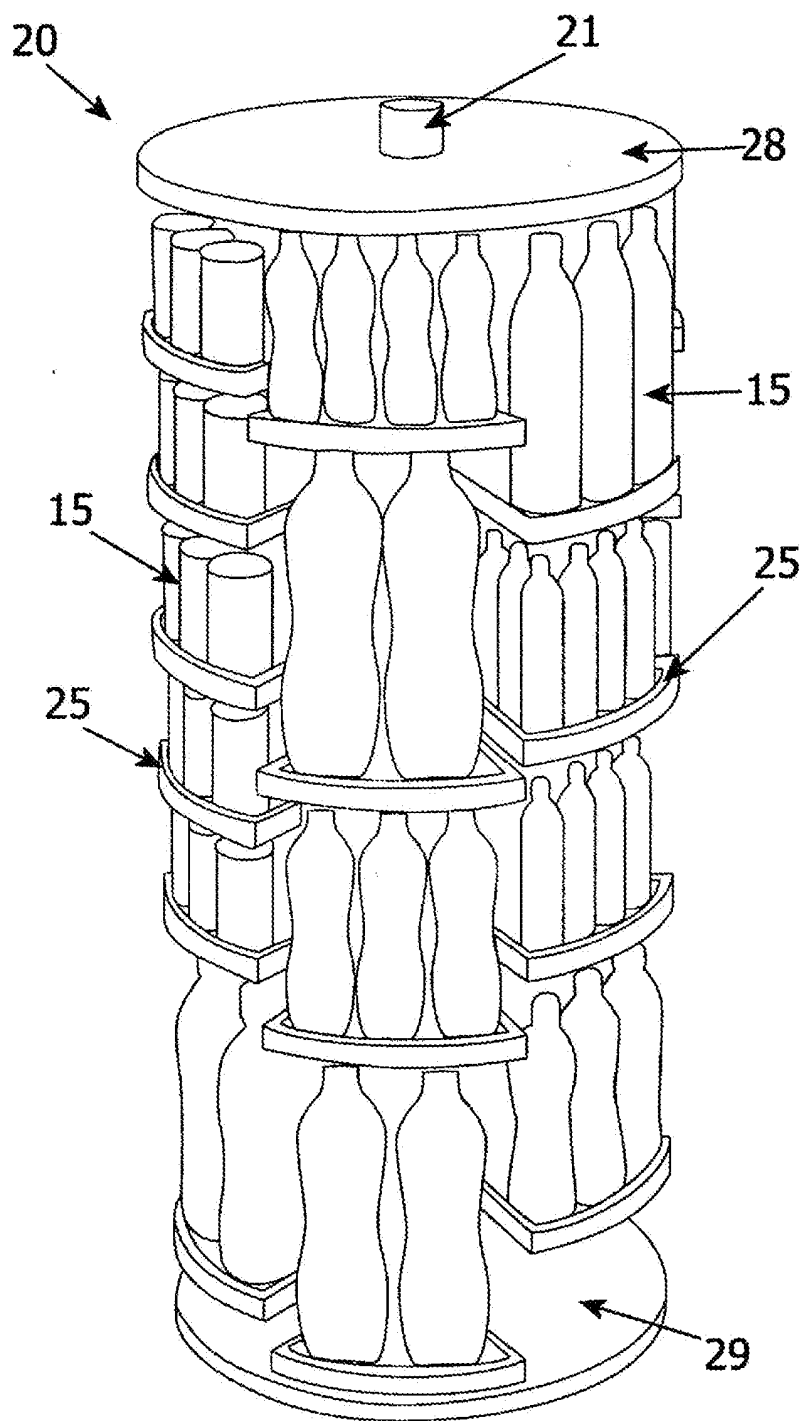


Figure 2

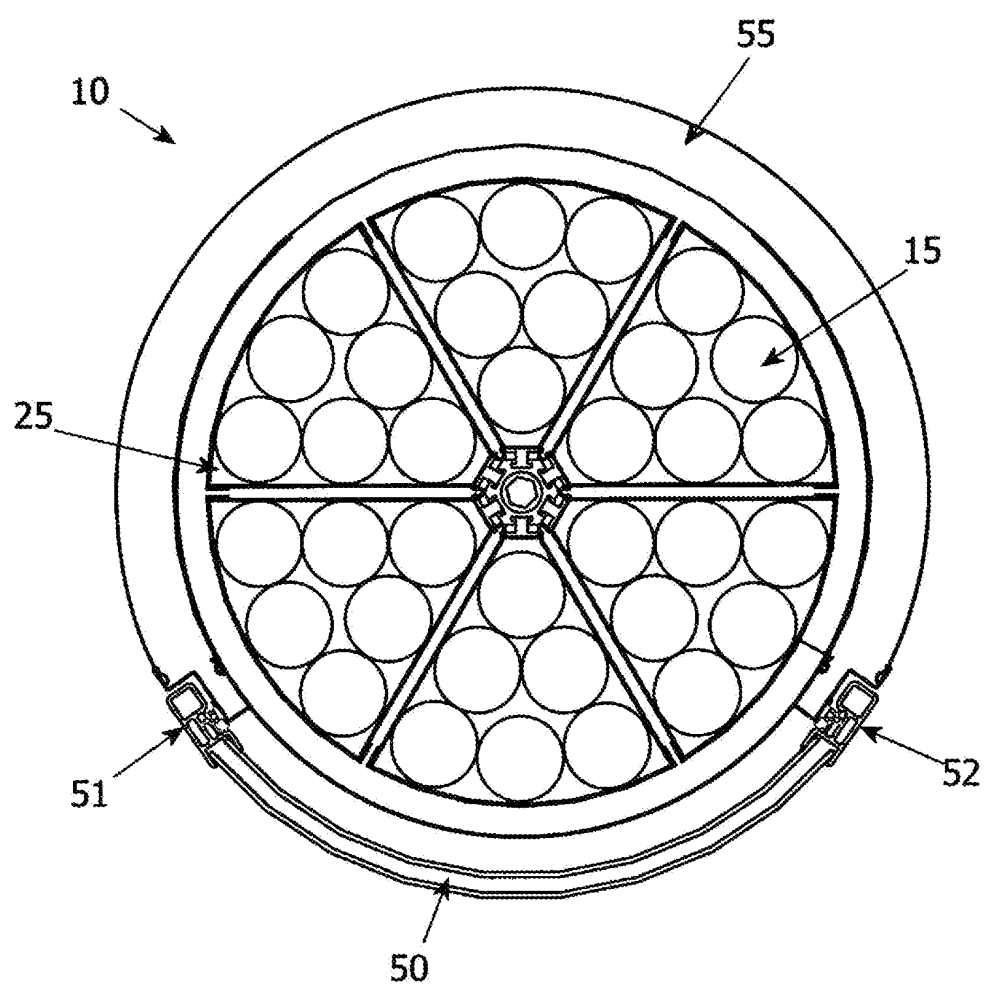


Figure 3

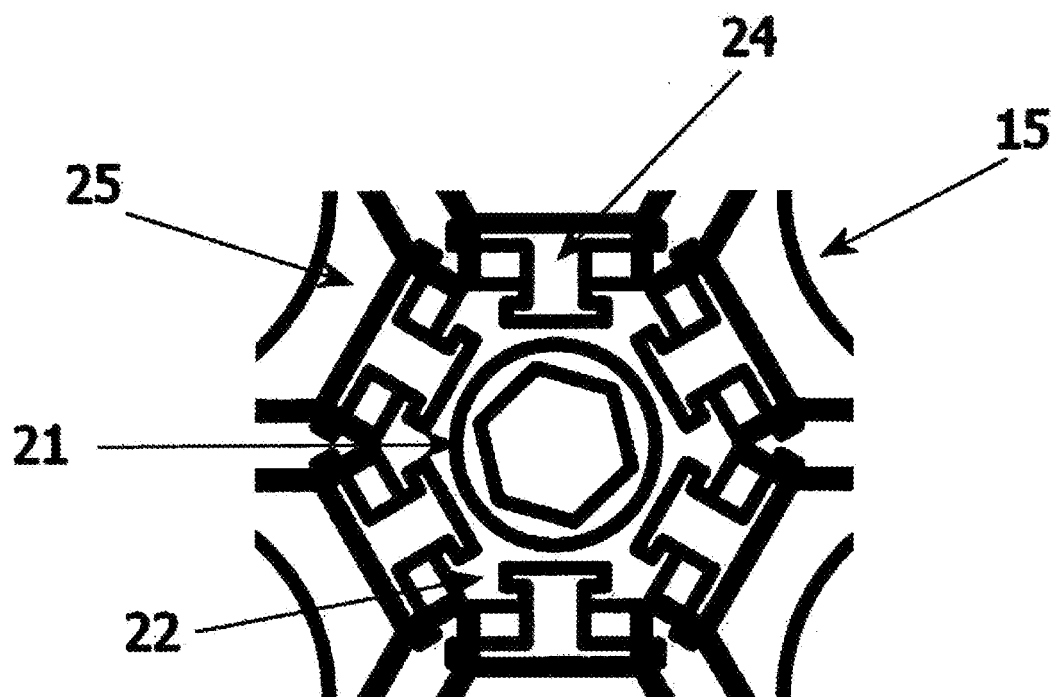


Figure 4

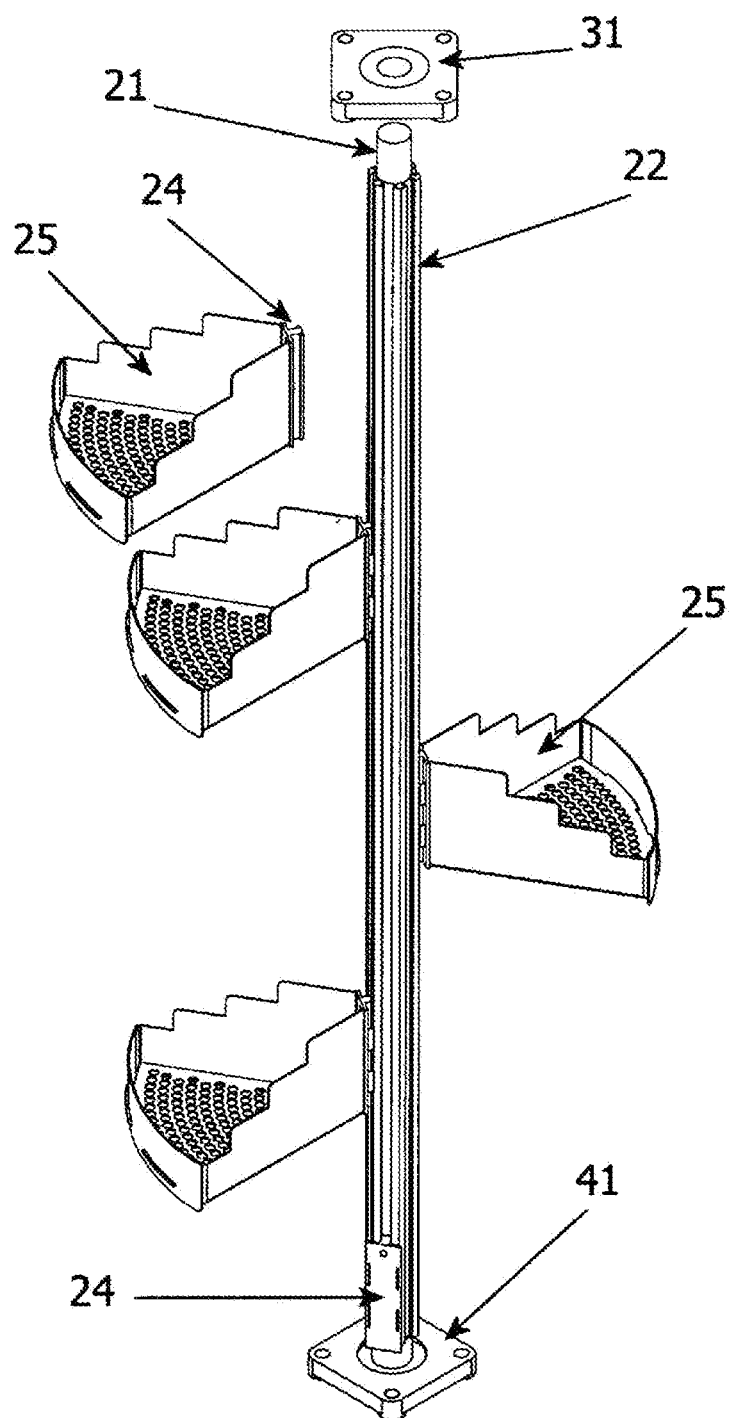


Figure 5

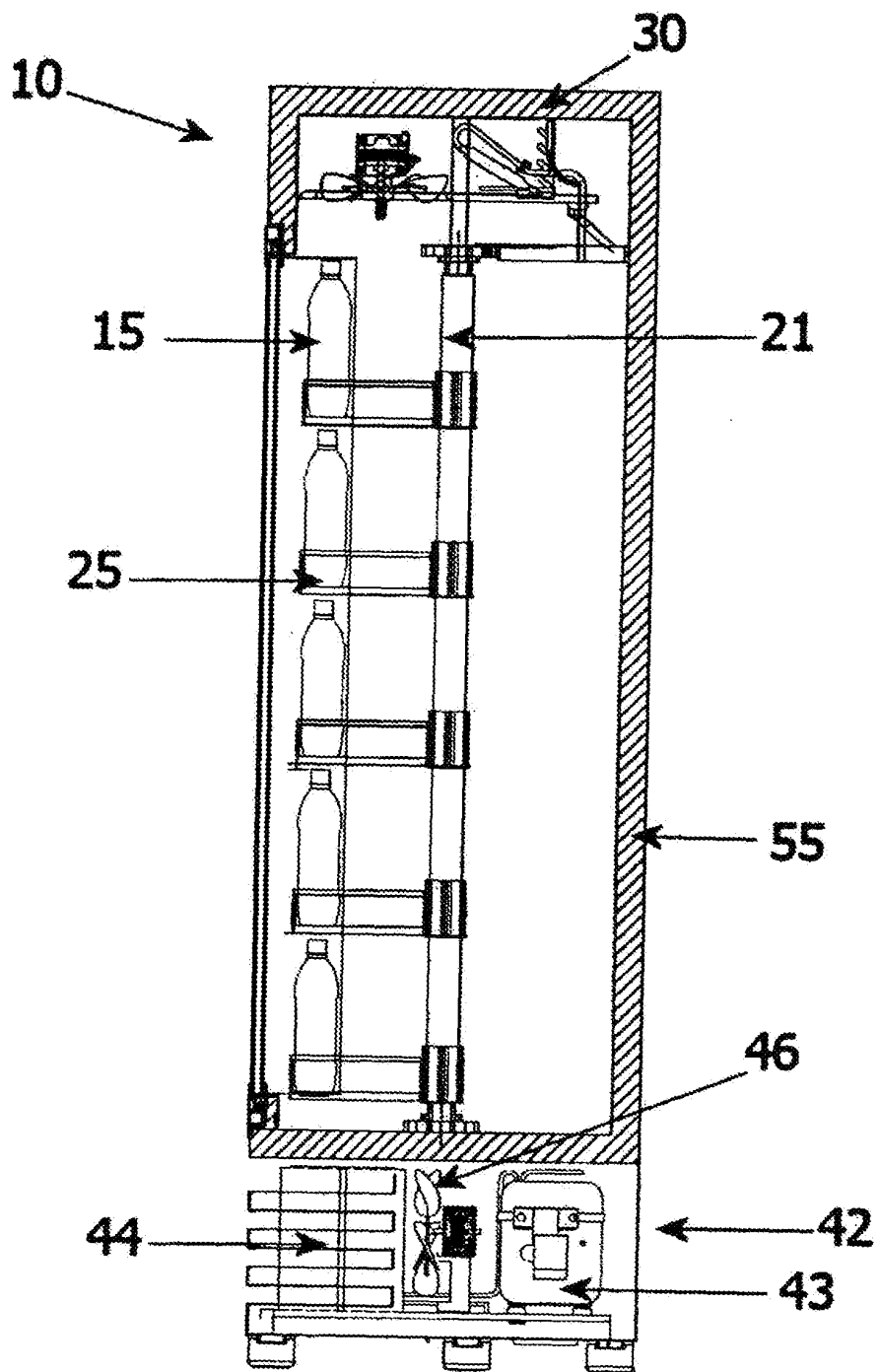


Figure 6

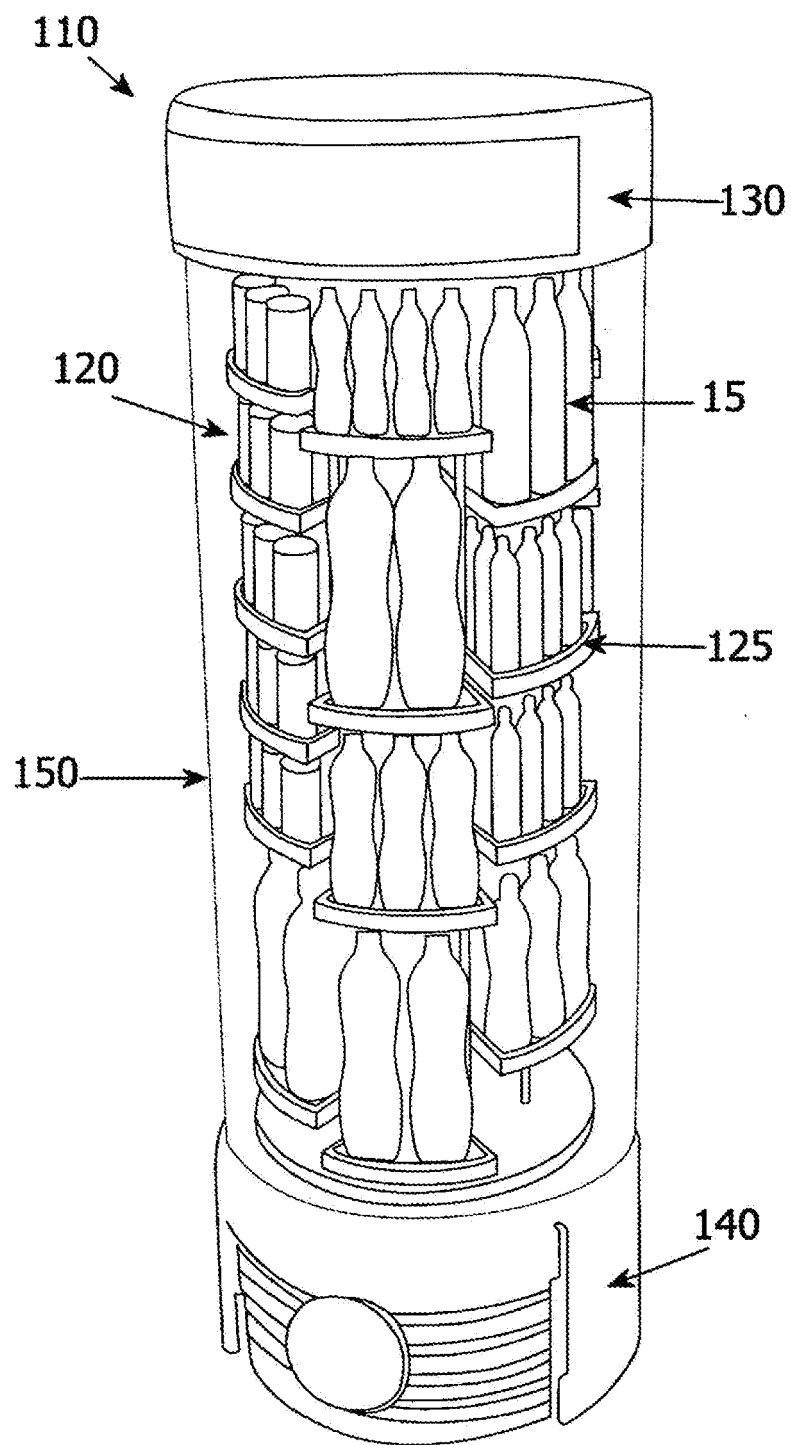


Figure 7

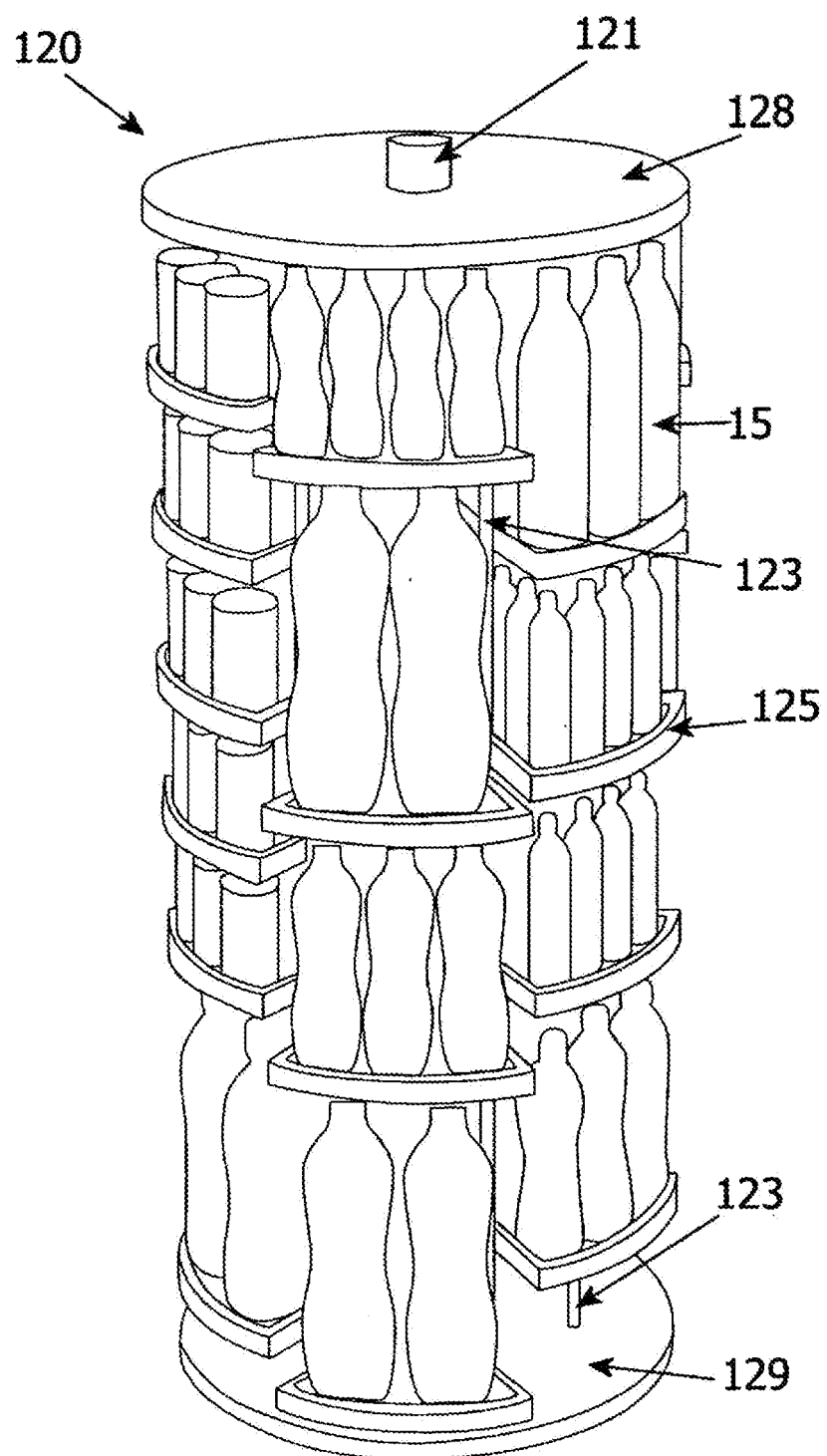


Figure 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB 2007/003234

A. CLASSIFICATION OF SUBJECT MATTER

see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CIBEPAT, EPODOC, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance.		
"E" earlier document but published on or after the international filing date		
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"O" document referring to an oral disclosure use, exhibition, or other means	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents, such combination being obvious to a person skilled in the art
"P" document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB 2007/003234

C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of documents, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/ IB 2007/003234

CLASSIFICATION OF SUBJECT MATTER

A47F 3/04 (2006.01)

A47F 3/10 (2006.01)

A47F 5/00 (2006.01)

REFERENCES CITED IN THE DESCRIPTION

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