



(51) International Patent Classification:
F25D 25/02 (2006.01) *A47F 3/04* (2006.01)

(21) International Application Number:
PCT/NO2010/000219

(22) International Filing Date:
10 June 2010 (10.06.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
20092233 10 June 2009 (10.06.2009) NO

(71) Applicant (for all designated States except US): **ENJOY GROUP AB** [SE/SE]; Box 177, S-84060 Bräcke (SE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **ANDERSEN, John** [NO/NO]; Bjørndalsveien 24, N-1605 Fredrikstad (NO).
SJÖLANDER, Håkan [SE/SE]; Box 153, S-84060 Bräcke (SE).

(74) Agent: **ACAPO AS**; Postboks 1880 Nordnes, N-5817 Bergen (NO).

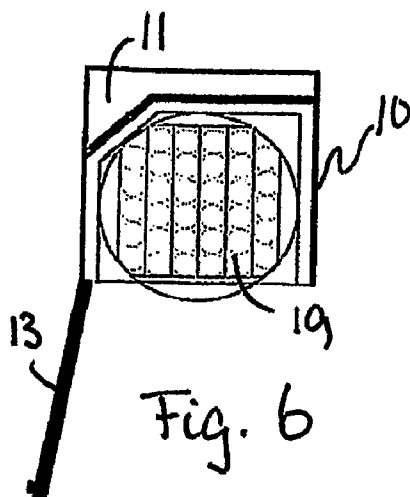
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: A REFRIGERATOR WITH ROTATABLE SHELVES



(57) Abstract: The invention relates to a refrigerator comprising a cabinet (10) with rotatable shelves for the re-filling of cooled products, said cabinet (10) having walls and a bottom and a roof; a refrigeration module (11) including a refrigeration machine (16) and an associated wall unit (14), the wall unit (14) extending in parallel with and covers a wall section of one of the walls of the cabinet (10), such that that the cabinet (10) is cooled by the refrigeration machinery (16), the refrigeration module (11) being detachable 15 from the cabinet (10). The refrigeration machine (16) and the corresponding wall unit (15) form an integral unit which is arranged at the lower part of the cabinet (10).

REFRIGERATOR*Technical Field*

The present invention relates to a refrigerator comprising a cabinet for products to be cooled, such as for example beverage bottles. The cabinet has a surrounding wall system and a bottom and a roof. The refrigeration module
5 includes a refrigeration machine and compressor placed on the rear side of the cabinet, the cabinet being provided with one or more shelves which are arranged to rotate about a vertical axis with respect to the cabinet, and which
10 preferably is provided with shelves, sloping downwards towards the opening when in its display position, ready for delivering products at the front.

Background

15 Refrigerators of various types are used in commercial environments, such as shops and stores in order to secure that the products shelved in the refrigerator are maintained at proper temperature, so that the products are not harmed or become contaminated due to high temperature. Refrigerators are
20 also used in order to cool down beverages to a pleasant temperature for consume.

Many of these products must for various reasons, such as open-dating or refrigeration reasons, be supplied in such manner that the oldest products are first taken, the most
25 resent or fresh products being re-filled from the rear end of the shelves.

One example of such type of refrigerator is disclosed in WO 2008/060222 A1, showing a shelf assembly comprising a shelving section with a front and a rear. WO 2008/060222
30 belongs to the applicant and is herewith included by the reference with respect to the configuration and shape of the

shelves. The shelving section comprises a plurality gravity feeding shelves and a base plate. The shelving section is placed on a shelving section support and arranged on the same to be rotatable about an axis which is arranged by a first
5 engaging means, which is placed on the base plate and rotatable engaged with a second engaging means, placed on the shelving section support. The rear of the shelving section is in its refill position located further away from the rear boundary surface than the front of the shelving section in the
10 display position. The shelving section is rotatable substantially within limited space. The cabinet described in WO 2008/060222 consists of three plane walls in addition to a front door.

EP 1 780 485 A1 describes a refrigerator comprising a
15 cabinet for cooled products, consisting of walls and a roof and including a refrigeration module in the form of a refrigerating machine and a wall unit. The wall unit of the refrigeration module extends in parallel with and covers a wall section of one of the walls of the cabinet, such that the
20 cabinet is cooled by the refrigeration machine and such that the refrigeration module is detach-able from the cabinet.

EP 1 736 724 A1, discloses a refrigerator where the inner shelf carriage supports a plurality of gravity shelves and being movably arranged between a display position where the
25 shelves are accessible from the front side and an intermediate position where the shelves are accessible from the rear. The cabinet is movably arranged in such way that the shelf carriage may be moved out of the cabinet and also rotated around a vertical axis on a supporting trolley, providing
30 access to the rear side of the shelves.

EP 1 749 461 A1 disclose a refrigerator comprises a cabinet supported by a support plate, where the cabinet as such, including the shelves of the gravity type, may be

rotated around a vertical axis on the support plate, enabling the shelves to be accessed from the rear of the cabinet.

For such types of refrigerators, it is a requirement to be able to re-fill the product in such way that the new, 5 refilled products are placed behind the products previously placed in the refrigerator, securing that the oldest products are taken by the consumer prior to removal of newer products.

Further, there is a need for both exposing the products in the refrigerator and also to reduce the need of re-filling 10 frequent as much as possible, thus enhancing promotion of sale as much as possible by visual display and availability of the products inside the refrigerator. It is also a need for reducing the required space and foot print of the refrigerator as much as possible.

15 A further need is to provide a solution which from a production point of view is as simple in construction and cheap in fabrication as possible, and also to keep clean and free from bacterial growth.

Also there is a need of a refrigerator having as reduced 20 depth as possible, without renouncing on the internal storage space.

Summary of the Invention

An object of the present invention is to provide an 25 improved cooler which from a production point of view also is more simple and cost effective from a manufacturing point of view, and at the same time has improved storage and display capacity compared with existing coolers. Consequently an additional object is to be able to increase the number of 30 bottles to be placed inside the cabinet in one setting.

A further object of the invention is to reduce the total depth of the refrigerator and position the refrigeration machinery including the compressor without jeopardizing to any

extent the storage capacity, thus minimizing the volume reducing effects and depth wise footprint of such machinery.

Another object of the present invention is to provide a solution which easily may be assembled and which may easily be
5 disassembled, enhancing pre-separation of sources and the efficiency in such separation processes.

Another object of the present invention is to utilize the space formed between rotatable shelves and the rear side and/or side for housing and containing the refrigeration
10 machinery.

The above objects are achieved by a solution as further defined by the independent claim, while alternatives are defined by the dependent claims.

According to one embodiment of the invention, the refrigerator comprises a cabinet(10) for products to be cooled,
15 said cabinet having a surrounding wall system and a bottom and a roof; a refrigeration cassette including refrigeration machinery placed on the rear side of the cabinet, the cabinet being provided with one or more shelves which are
20 arranged to be rotating with respect to the cabinet, and which preferably are sloping downwards towards the opening when the shelves are in its operative displaying position, ready for delivering products at the front. The cabinet has a curved wall structure with a substantial plane
25 or slightly curved front door and the refrigeration cassette including a compressor forms an integral unit which is positioned at a lower rear corner or edge of the cabinet, side wise displaced.

The cabinet wall system may preferably have a curved
30 surface or curved side and/or rear walls, and the horizontal foot print of the cabinet may have a more or less cylindrical shape with circular, oval or polygonal cross section and/or

with plane or slightly curved front/door(s). Alternatively, the cabinet wall system may have a U-shaped cross section in vertical direction.

5 The shelves inside the cabinet may be are rotatably arranged around a vertical axis arranged substantially centrally in laterally direction of the cabinet while the axis of rotation in depth is positioned closer to the front of the shelving section than to the rear of shelving section, the axis of rotation substantially coinciding with the centre of a
10 geometric circle whose diameter corresponds to the width of the space and is tangent to the lateral surfaces and the rear boundary surface of the space, while the shelving section is rotatably arranged.

Alternatively, the shelves may rotate arranged around an
15 vertical axis which are arranged substantially centrally both depth wise and sidewise.

Further the shelves may be rotatably configured with respect to the cabinet, either as a unit, or as separate, individual entities.

20 Preferably, the shape of the part housing the compressor is configured in such way that the foot print of said part has more or less a shape of a triangle. Said triangle for example be more or less right-angled, where the one legs or cathetus of the triangle is aligned with one of extreme side edge of
25 the cabinet, while the other leg or cathetus is aligned with the middle extreme back side of the cabinet.

It should be appreciated that the refrigeration cassette may be formed as a separate module which is removably or detachably arranged with respect to the cabinet.

30 In refrigerators of this type, the compressor is the unit requiring the larges footprint and space, both in height and width. By placing the compressor in a corner at the lower, rear end of the cabinet, and designing the cabinet with curved

wall(s), several advantages are obtained. In case of a rotating shelf system for re-filling of bottles, such corner would in any case become idle due to the more or less circular shape of each shelf. Further, the opposite corner section of the cabinet may be used to house the duct for communicating cold air from the top of corner section down into the cabinet.

One advantage with the present invention is that the unit containing the refrigeration machinery may be substituted as a unit in case of break down or malfunction of the refrigeration machine. The defect refrigeration machine may be in a simple manner be transported back to the factory for maintenance and repair in controlled environments. Further, this means that a non-skilled person may detach the defect unit and install a new unit, thus not requiring any insight or technological skills and further transport the defect unit back to the workshop for repair by skilled persons. As a consequence, the costs for repair and installation may be reduced.

Another advantage by placing the cooling unit in association with the lower, rear part and in particular in one of the rear corners of the cooling cabinet, is that it will be possible to provide two additional shelves as a substitution and compensation for the reduction of a restricted width at the inner part of the lower part of the cabinet, due to the oblique rear corner. Hence, according to the present invention it will be possible to use seven shelves in lieu of the convention five shelves in conventional coolers.

Yet an advantage is that due to a simple replacement of a defect refrigeration machinery as an entity or unit, there is no need for repair activity

Further, if a rotating shelf system is used, it will be possible to gain a reduction of 60-80% when re-filling the cooler.

Since it is possible to form the refrigeration panel and machinery as a single, replaceable unit, it is also possible to arrange such unit at one side of the cooler cabinet instead of at the rear. Such solution may for example be chosen in cases where the available depth in a system is limited, so that it will not be possible to let the unit be arranged at the rear.

A combination of rotating shelves and the replaceable refrigeration machine is beneficial, since the vacant space in either of the two may be utilized to house at least parts of the refrigeration machinery.

Short Description of the Drawings

An embodiment of the present invention shall in the following be described, referring to the drawings, wherein:

Figure 1 shows schematically in perspective a view of a cooler cabinet with detachable refrigeration module according to the present invention;

Figure 2 shows schematically in perspective a view of the cooler cabinet shown in Figure 1, where the refrigeration module is disconnected;

Figure 3 shows schematically in perspective a rear view of the refrigeration cabinet with refrigeration module in installed position;

Figure 4a shows schematically a top view of the refrigeration plant with the refrigeration module in installed position, the refrigerating machine arranged at the lower, rear, left corner and rear side of the cooler cabinet;

Figure 4b shows schematically the top view shown in Figure 4a, where the refrigeration module disconnected from the cooler cabinet;

Figure 5a shows schematically a top view of the refrigeration plant with the refrigeration module in installed

position, the refrigerating machine arranged at the lower, rear, right corner and rear side of the cooler cabinet;

Figure 5b shows schematically the top view shown in Figure 5a, where the refrigeration module disconnected from the cooler cabinet;

Figure 6 shows schematically a horizontal section through a module provided with a rotatable shelf system and a refrigeration machinery module according to the present invention;

Figures 7a and 7b show an alternative embodiment, where the refrigeration module is placed at the lower end at the backside of the cooling cabinet, Figure 7a showing a vertical section through the cooler cabinet seen from the side with the refrigeration module in operation position; and Figure 7b showing the cabinet with the refrigeration module detached;

Figure 8 shows a front view in perspective of the refrigeration module shown in figures 7a and 7b, indicating the position of the refrigeration machine;

Figure 9 shows schematically an alternatively shaped embodiment of a cabinet according to the present invention;

Figures 10a-10d show a horizontal cross section through a cabinet, indicating different types of doors;

Figures 11a-11b show schematically in perspective the rear side of an alternative embodiment of the cabinet shown in Figure 9;

Figures 12a-12e show another embodiment of the present invention; and

Figures 13a-13e show a double chambered cabinet according to the present invention.

Detailed Description of the Invention

In the following detailed description of the invention referring to the drawing the same reference numbers are used

for the same elements or parts of the cooler cabinet. It should be noted that in the following, the term refrigeration machinery 16 may be of any known type and includes a compressor, a motor for the compressor, control means, condensers, an evaporator and pipelines extending between the various parts. Further, the refrigeration machinery functions in a conventional manner. Further, it should be noted that the walls, bottom and the roof of the cooler cabinet 10 is provided with conventional insulation material, thereby reducing the power consumption as much as possible.

Figure 1 shows schematically in perspective a front of a cooler 10 with detachable refrigeration module 11 according to the present invention. The cooler comprises a cooler cabinet including a space 12 for storing cooled products. The cabinet has two insulated sidewalls, a front opening closed by a front door 13, rear wall and a bottom and a roof.

As indicated in Figure 2, the refrigeration module 11 is releasable from the cooler 10 and is easily moveable. In order to ease the removal, the refrigeration module may be provided with wheels (not shown) at the bottom thereof. By means of the wheels, the refrigeration module may easily be pushed around like a carriage. The refrigeration module comprises a corner section 14 and a vertical panel 15, the refrigeration machine 16 being arranged at the lower end of the corner section 14. Further, the rear vertical panel 15 is provided with an evaporator 16 which fits into a corresponding part of the rear wall of the cabinet. The shape of the refrigeration module 11, i.e. the vertical panel 15, only extending a certain height of the total height of the cooler cabinet, and the corner section 14, containing the refrigeration machine 16 have a shape and form adapted to the relevant side of the cooler cabinet 10 so that the refrigeration module is flush with the remaining surface of the cooler when attached.

Figure 2 shows schematically in perspective a view of the cooler cabinet shown in Figure 1, seen from the rear, where the refrigeration module is disconnected from the cooler cabinet 10. As shown, the compressor 17 and a condenser 18 are also indicated. As further indicated in Figure 3, the compressor 17 and its motor are arranged in the corner part 14, such corner part having an enlarged volume, enabling positioning of the compressor. According to the preferred embodiment shown in Figure 3, the corner part of the refrigeration module has a triangular foot print, thereby providing sufficient space for the compressor, while the remaining vertical panel 15 has a rectangular foot print, said panel 15 extending only a short distance up, such as for example one third of the total height of the cooler cabinet. The vertical panel 15 has a reduced depth, thereby allowing an increased number of bottles to be placed inside the cabinet 10. Reference is also made to Figure 3 showing schematically, in perspective, a rear view of the refrigeration cabinet with refrigeration module in installed position.

Reference is also made to figures 4 and 5, wherein Figure 4a and 5a show schematically a top view of the refrigeration plant with the refrigeration module in installed position, the compressor 16 being arranged at the lower, rear, left corner (Figure 4a) or at the lower, rear, right corner (Figure 5a).

Further, Figure 4b and 5b show schematically the top view shown in Figure 4a and 5a respectively, showing the refrigeration module either in a disconnected from the cooler cabinet (Figure 4b) or in a position, connected to the cooler cabinet 10 (Figure 5b). As seen from Figures 4 and 5, the foot print of storing space 12 of the cooler cabinet may be optimized in that only one corner and a thin panel is prevented from storage of bottles, while the entire volume of

the cooler cabinet 10 above refrigeration panel 11 may be used for such storage.

It should be appreciated that the refrigeration panel 11 may be positioned alongside a side of the cooler cabinet, i.e. either along the right or the left side of the cooler cabinet, without thereby deviating from the inventive idea. In any case, the preferred position of the compressor 17 is still in a rear corner, either the right or the left corner.

According to the present invention, only the three lower heights of bottles of a total of for example seven heights will be exposed to a reduced number of bottles in each height due to the corner 14 and the vertical panel 15 of the refrigeration panel 11.

Figure 6 is showing a preferred embodiment of the shelf system, comprising gravity shelves 19 which are rotating around a vertical centre axis (not shown), securing that the old bottles to been taken out prior to placing new bottles, whereupon the new bottles is placed from the rear of the shelves 19. Such centre axis may be arranged in the vicinity or near the front opening of the space in the cabinet, i.e so that the distance between the axis of rotation and the rear edge of the shelf (and the rear wall of the cabinet) is greater than the distance between the axis of rotation and the front edge of the shelf (and the front door). Reference is made to the applicants own publication WO 2008/06022, the content of which with respect to the shape, function and configuration of the shelves hereby being incorporated by the reference. According to this preferred embodiment, the shelf system is rotated when re-filling at least partly the shelves 19 with new, fresh bottles. By rotating the shelf system 180°, the rear end of the shelves 19 is accessible, allowing the new bottles to be placed behind the old ones. When the placing of bottles onto the shelf system is completed, the shelf system

is then rotated 180° in either direction, securing that the oldest bottles always to be firstly accessed by the consumer upon opening the door 13. According to this embodiment, the shelves 19 need not be pulled out of the cabinet 10 for

5 refilling.

The shelf systems shown in Figure 6 may either be of the standard type, i.e. having horizontally arranged shelves 19, or the gravity type, i.e. shelves 19 slanted downwards towards the door 13, whereby the bottles will, due to gravity, auto-
10 matically slide towards the door 13 when a bottle is removed by a consumer.

Figure 7a shows schematically gravity shelves 19, while Figure 7b shows the cooler cabinet 10 seen from the side with the refrigeration module 11 in operation position.

15 Figure 8 shows a front view in perspective of the refrigeration module 11 shown in figures 7b, indication the position of the compressor 16.

Figure 9 shows schematically an alternative embodiment of a cabinet according to the present invention. According to
20 this embodiment the cabinet has a U-shaped cross section with a curved rear wall having a semi-circular shape. Figure 10a-10d show a horizontal cross section through the cabinet 10, shown in Figure 9, where Figure 10a and 10b show an embodiment where the door 13 is hinged to the cabinet 10 on the right
25 side, the door 13 being curved; Figure 10c showing an embodiment where the cabinet is provided with two doors; and Figure 10d shows an alternative where the door 13 is plane. The front door may either be hinged to either of the cabinet sides or to both sides in case of a two-doors solution. The
30 embodiment shown in Figure 9 and 10 is provided with shelves 19 having a circular shape, the axis of rotation coinciding with the axis of curvature for the cabinet. At its lower end

the cabinet 10 is provided with a refrigeration panel 11 according to the present invention.

Figures 11a-11d show an alternative embodiment of the present invention, where the cabinet 10 is assembled of two halves 10' with an intermediate unit 20. said intermediate unit may also be use for reinforcement, taking care of the weight of the shelves with for example bottles filled with beverages. Figure 10a show the two cabinet halves 10' and the intermediate unit 20 in an assembled state, seen from behind, while Figure 11b shows the cabinet 10 in an exploded view. Figure 11d shows the refrigeration panel 11, prior to being mounted on the rear side of the cabinet.

Figure 12a shows a cross section through the cabinet 10 with the shelves 19 removed, also showing the removable refrigeration unit 11 with the compressor 16; Figure 12b shows a corresponding cross sectional view, also indicating the shelves 19; Figure 12c shows the section in an exploded view; Figure 12d shows the cabinet 10 seen from the rear side with the refrigeration unit 11 in an attached state; and 12e shows an exploded view of the view as shown in Figure 12d.

Figure 13a-13d show an alternative embodiment comprising twin shelf racks, thus giving the cabinet 10 a wider shape and having preferably two doors 13 (not shown), hinged to the two cabinet sides. The cabinet 10 is provided with two shelf racks, rotatably arranged around separate axis of rotation. The shape and diameter of each the two set of shelves, correspond in general to the shelves shown in Figure 6 and Figure 12. As indicated in the Figure, two neighbouring shelves may overlap slightly, the shelves being for example slightly displaced in vertical direction. Alternatively, a segment may be removed on two adjoining sides of the shelf. Also the embodiment shown has a U-shaped form with rounded rear corners.

In stead of positioning the compressor 16 in the corner as shown in Figure 13, the compressor may be placed at the rear end between the two racks of shelves, thereby being able to reduce the depth of the cabinet further.

5 The solution shown in Figures 9-13 is given such shape that the slip angle, i.e. the angle of the tool for moulding the outer walls of the cabinet is enabling easily removal of the moulded part from the tool. Further, it is more easy to foam the insulation used.

10 It should also be appreciated that the solution shows space efficiency. Further, separation of the technical and structural parts makes the recycling process less complicated and expensive. The shape and the design of the cabinet will make a pure polyurethane structure possible in the future.
15 This will reduce total cost and reduce the recycling process of cabinets to a minimum.

Also, such shape makes it more easy to maintain a clean surface of the interior of the cabinet, due to the curved surfaces without any complicated shapes or outwards or inwards
20 projections complicating the cleaning process.

C l a i m s

1. A refrigerator comprising a cabinet(10) for products to be cooled, said cabinet (10) having a surrounding wall system and a bottom and a roof; a refrigeration module (11) including a refrigeration machine (16) placed on the rear side of the cabinet (10), the cabinet (10) being provided with one or more shelves (19) which are arranged to be rotating with respect to the cabinet (10), and which preferably is provided with shelves, sloping downwards towards the opening when the shelves are in its operative position, ready for delivering products at the front, characterized in that the cabinet (10) has a curved wall structure with a substantial plane or slightly curved front door and that the refrigeration machine (16) with a compressor forms an integral unit which is arranged at the lower part of the cabinet (10), side wise displaced, and positioned at a lower, rear corner or edge of the cabinet (10).
2. Refrigerator according to claim 1, wherein the cabinet wall system has cylindrical shape with circular, oval or polygonal cross section.
3. Refrigerator according to claim 1, wherein the cabinet wall system has a U-shaped cross section in vertical direction.
4. A refrigerator according to one of the claims 1-3, where the shelves (19) are rotatably arranged around an axis which are arranged substantially centrally in laterally direction of the cabinet (10) while the axis of rotation in depth is

arranged closer to the front of the shelving section than the rear of shelving section, the axis of rotation substantially coinciding with the centre of a geometric circle whose diameter corresponds to the width of the space and is tangent to the lateral surfaces and the rear boundary surface of the space, while the shelving section is rotatably arranged.

5. Refrigerator according to one of the claims 1-3, where the shelves (19) are rotatably arranged around an vertical axis which are arranged substantially centrally both depth wise and sidewise.

6. Refrigerator according to any one of claim 1-5, wherein the shelves are rotatably configured with respect to the cabinet, either as a unit, or as separate, individual units.

7. Refrigerator according to one of the claims 1-5, wherein the shape of the part housing the compressor (16) is configured in such way that the foot print more or less has a shape of a triangle.

8. Refrigerator according to claim 7, wherein said triangle are more or less right-angled, where the one legs or cathetus is aligned with one of extreme side edge, while the other leg or cathetus is aligned with the middle extreme back side of the cabinet.

9. Refrigerator according to one of the claims 1-8, wherein the refrigeration module is formed as a separate unit which is removably arranged as unit from the refrigerator.

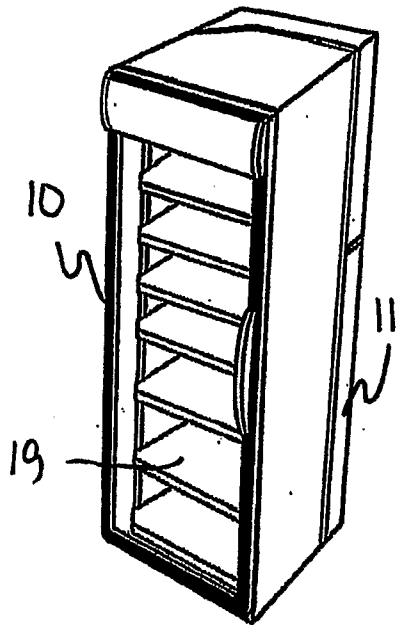


Fig. 1

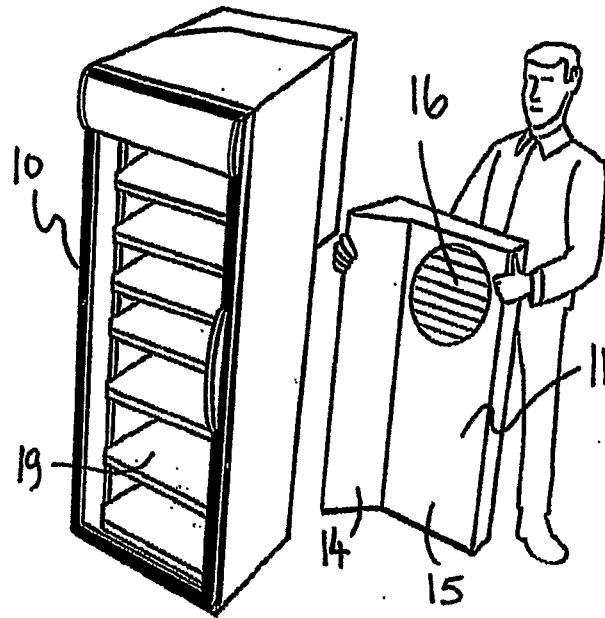


Fig. 2

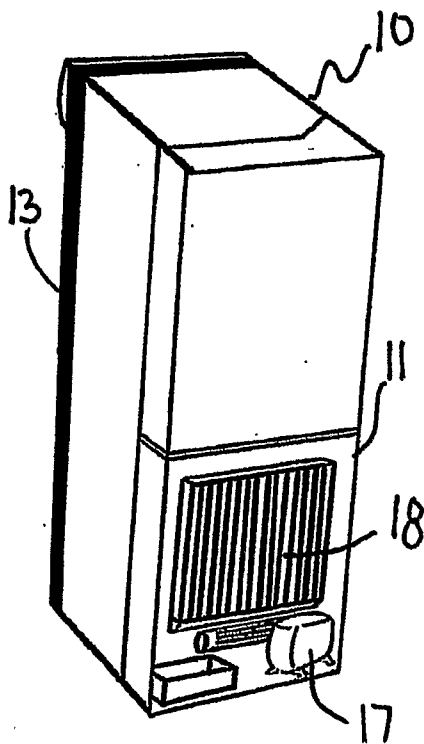


Fig. 3

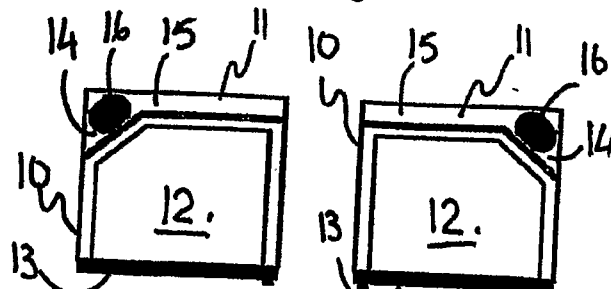


Fig. 4a

Fig. 5b

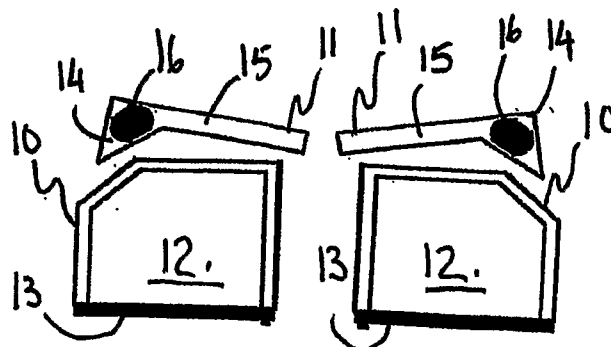
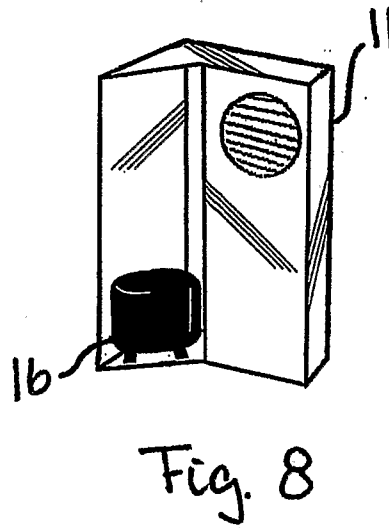
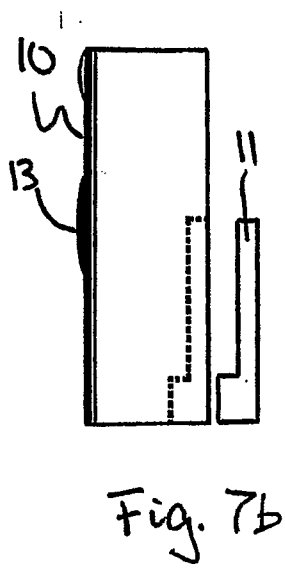
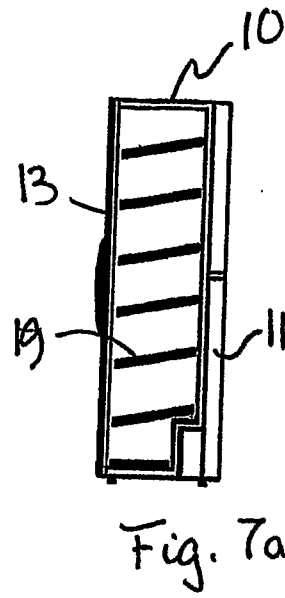
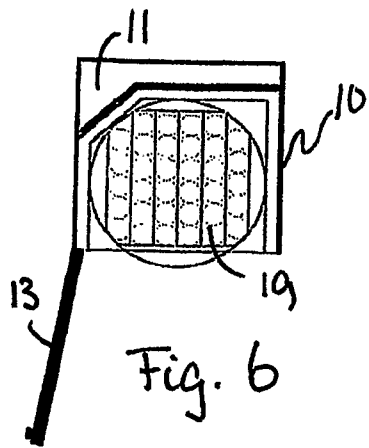
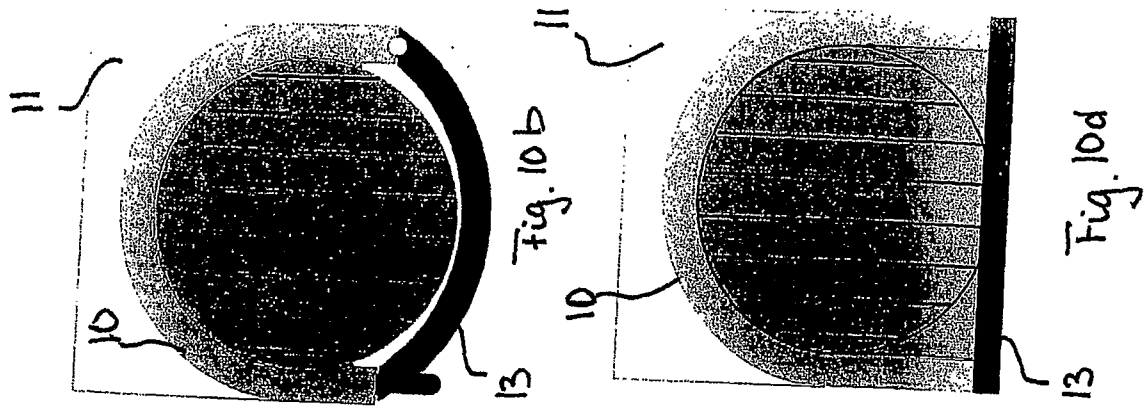
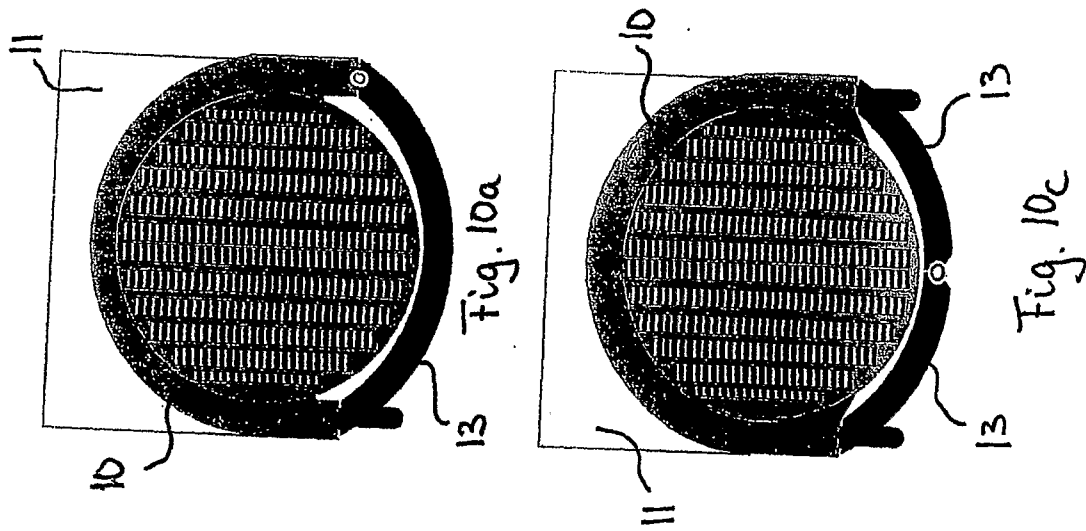
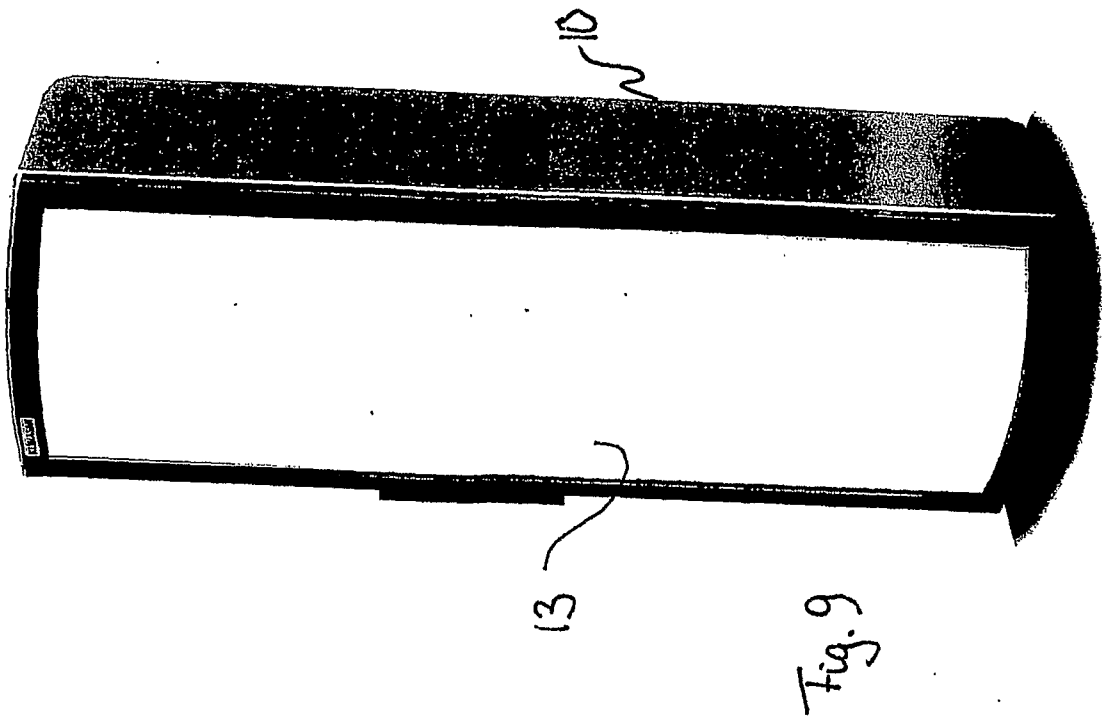
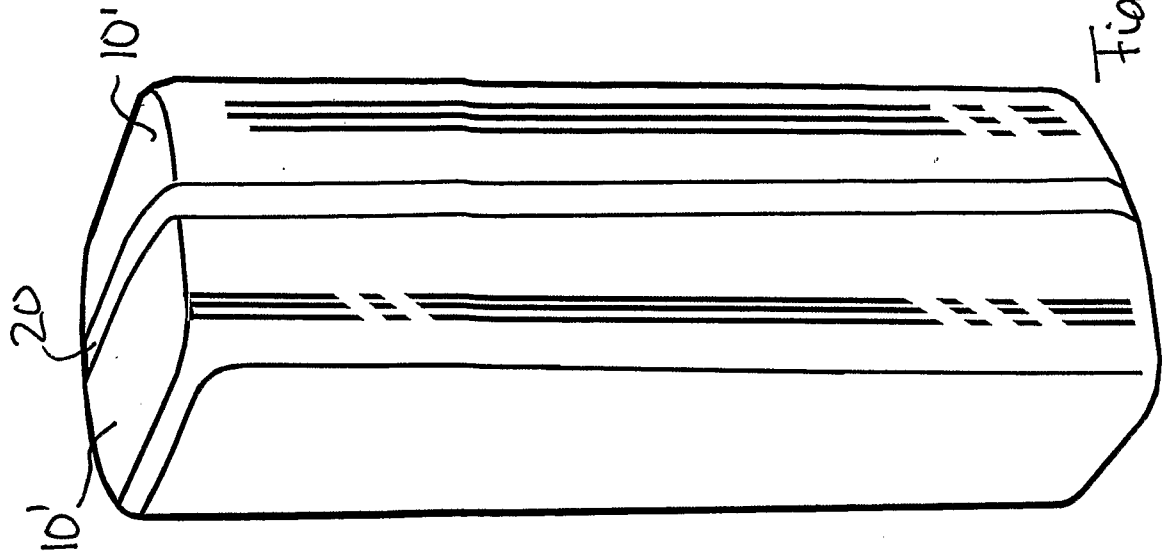


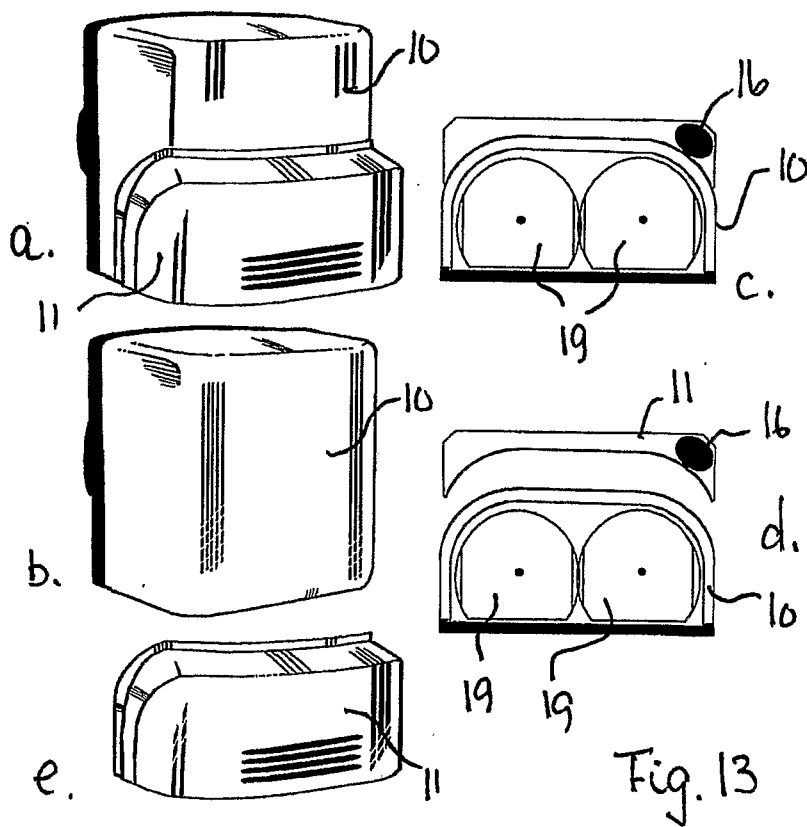
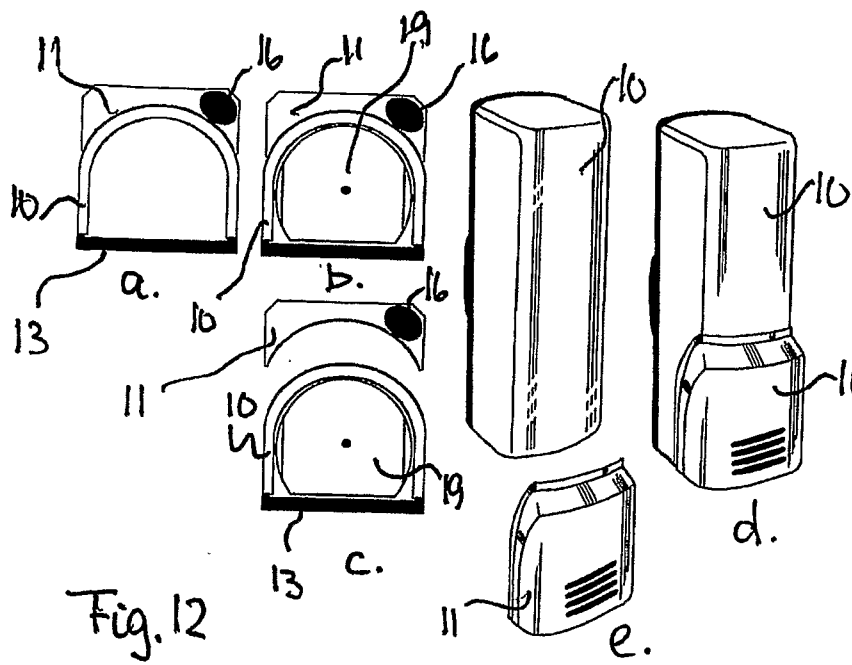
Fig. 4b

Fig. 5b









INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO2010/000219

A. CLASSIFICATION OF SUBJECT MATTER

IPC: 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)

IPC:A47F, F25D

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

SE, DK, FI, NO classes as above

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

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2008060222 A1 (ENJOY GROUP AB ET AL), 22 May 2008 (2008-05-22); abstract; page 5, line 35 - page 5, line 36; figures 1, 5a	1, 2, 5, 9
X	US 2157754 A (GOULD RICHARD E), 9 May 1939 (1939-05-09); page 1, column 2, line 22 - page 1, column 2, line 44; page 2, column 1, line 2 - page 2, column 1, line 20; figures 3-4	1, 3-4, 6-8
A	WO 2006021809 A2 (APPLIED DESIGN & ENG LTD ET AL), 2 March 2006 (2006-03-02); page 7, line 18 - page 8, line 21; page 15, line 6 - page 15, line 13; figures 3-4, 28	1-9
A	EP 1780485 A1 (ENJOY SALES AB), 2 May 2007 (2007-05-02); paragraph [0010]; figure 2	9
A	WO 2009065200 A1 (WHIRLPOOL SA ET AL), 28 May 2009 (2009-05-28); abstract; figure 1	9
A	US 2795474 A (CARBARY RICHARD J), 11 June 1957 (1957-06-11); figure 2	1-8

☒ 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	"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
"E" earlier application or patent but published on or after the international filing date	"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 such documents, such combination being obvious to a person skilled in the art
"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)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 14-09-2010	Date of mailing of the international search report 16-09-2010
Name and mailing address of the ISA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86	Authorized officer Fredrik Timoteusson Telephone No. + 46 8 782 25 00

CORRECTED

INTERNATIONAL SEARCH REPORTInternational application No.
PCT/NO2010/000219

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2139441 A (CLARKE DOUGLAS C), 6 December 1938 (1938-12-06); figures 1, 13 -- -----	1-8

Continuation of: second sheet

International Patent Classification (IPC)

F25D 25/02 (2006.01)

A47F 3/04 (2006.01)

Download your patent documents at www.prv.se

The cited patent documents can be downloaded:

- From "Cited documents" found under our online services at www.prv.se (English version)
- From "Anförda dokument" found under "e-tjänster" at www.prv.se (Swedish version)

Use the application number as username. The password is **NAUZOGRFF**.

Paper copies can be ordered at a cost of 50 SEK per copy from PRV InterPat (telephone number 08-782 28 85).

Cited literature, if any, will be enclosed in paper form.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/NO2010/000219

WO	2008060222 A1	22/05/2008	EP	2091391 A4	11/11/2009
			SE	0602400 A	14/05/2008
			SE	530595 C2	15/07/2008
			US	20100176074 A1	15/07/2010
US	2157754 A	09/05/1939	NONE		
WO	2006021809 A2	02/03/2006	NONE		
EP	1780485 A1	02/05/2007	NONE		
WO	2009065200 A1	28/05/2009	BR	PI0704213 A2	04/08/2009
US	2795474 A	11/06/1957	NONE		
US	2139441 A	06/12/1938	NONE		