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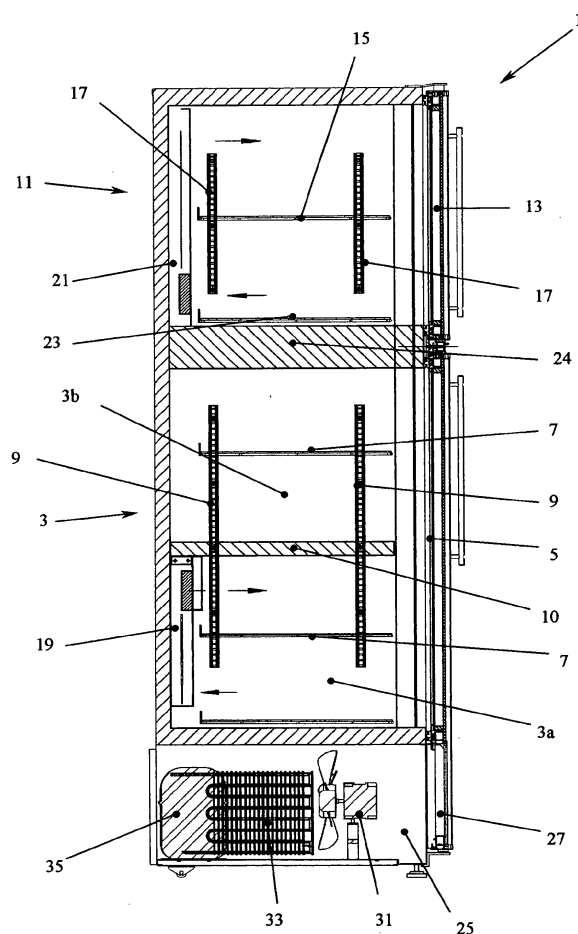
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(54) **Multi-temperature operating refrigerating exhibitor**

(57) A refrigerated exhibitor (1) with multi-temperature operation is described, comprising at least one first refrigerating cell (3) having therein a multi-temperature operation and at least one first heating cell (11) having therein a single-temperature operation.



**FIG. 1**

## Description

**[0001]** The present invention refers to a multi-temperature operating refrigerated exhibitor.

**[0002]** In the prior art there are refrigerated exhibitors, in particular aimed to the wine sector for preserving wines at adequate temperatures, with multi-temperature operation. The peculiarity of such multi-temperature refrigerators is obtaining in the same volume of the refrigerating cell a wide temperature distribution without having to use separators or delimiting elements adapted to thermally insulate the volumes with different temperatures. This distribution is generally delimited by the equipment manufacturers with areas with a "defined" temperature, with a variation from 2°C to 5°C from area to area, that can be easily located and used. Usually, the areas are located by means of the shelves supplied by the manufacturer. The thermo-technical plant is anyway unique, since a plurality of plants are not provided, for example one per area. In the types of multi-temperature refrigerators, there are typically temperatures included between 2°C and 6°C in the lower area of the refrigerating cell, up to 16°C to 18°C in the upper area. Between the two extreme values, there can be a plurality of areas at intermediate temperature levels.

**[0003]** These temperature areas therefore allow storing the various types of beverages and/or foods at the desired, and usually pointed-out, temperatures for their consumption and/or their eating. Examples of such exhibitors are disclosed in FR2676798, JP2001272163, US3135316, EP0893664, GB2201014.

**[0004]** The art further proposes heated exhibitors aimed for exhibiting and selling hot products: examples of such exhibitors are disclosed in GB1379852, US40151, US3911248, WO2010002243, GB2388185, CH695329.

**[0005]** The art further proposes refrigerators equipped with a product-unfreezing cell: examples of such refrigerators are disclosed in KR20090075057, DE102008018372.

**[0006]** What is not proposed by the prior art is a refrigerated exhibitor that allows storing and exhibiting for sales both refrigerated products, namely products at a lower temperature than the ambient one, and heated products, namely products at a upper temperature than the ambient one.

**[0007]** Documents US-A1-2009/090734, WO-A1-2005/074759 and DE-A1-3149187 disclose refrigerated exhibitors according to the preamble of claim 1.

**[0008]** Therefore, object of the present invention is solving the above prior art problems, by providing a multi-temperature operating refrigerated exhibitor that allows storing and exhibiting for sales both refrigerated products, namely products at a lower temperature than the ambient one, and heated products, namely products at a upper temperature than the ambient one.

**[0009]** Another object of the present invention is providing a multi-temperature operating refrigerated exhib-

itor in which product-cooling and/or heating temperatures can be easily adjusted by a user.

**[0010]** The above and other objects and advantages of the invention, as will result from the following description, are obtained with a multi-temperature operating refrigerated exhibitor as claimed in claim 1. Preferred embodiments and non-trivial variations of the present invention are the subject matter of the dependent claims.

**[0011]** It will be immediately obvious that numerous variations and modifications (for example related to shape, sizes, arrangements and parts with equivalent functionality) can be made to what is described, without departing from the scope of the invention as appears from the enclosed claims.

**[0012]** The present invention will be better described by some preferred embodiments thereof, provided as a non-limiting example, with reference to the single enclosed drawing, in which Figure 1 shows a side sectional view of a preferred embodiment of the refrigerated exhibitor according to the present invention.

**[0013]** To be brief, herein below the descriptions will be omitted that are related to operating modes of common parts and components with other refrigerators and necessary for the basic operation of the refrigerator itself, that are anyway deemed widely known in the art, such as, for example, electric supply, air-conditioning, compression and channalisation systems for refrigerating gases, etc., in order to describe in detail the aspects and components that characterise the refrigerated exhibitor according to the present invention

**[0014]** With reference then to the Figure, it is possible to note an embodiment of the refrigerated exhibitor 1 with multi-temperature operation according to the present invention. Such refrigerated exhibitor 1 comprises:

- at least one first refrigerating cell 3 having therein a multi-temperature operation with the following modes, such refrigerating cell 3 being obviously closed by at least one first insulating door 5, and equipped therein with a plurality of shelves 7, preferably of the height-adjustable type due to positioning brackets 9 or other known adjusting systems; the internal volume of the refrigerating cell 3 is divided by at least one separating bulkhead 10 into a lower area 3a, that is at the lower temperature of the defined temperature range, and into an upper area 3b that is at the upper temperature of the above range, such refrigerating cell 3 being internally equipped with at least one first temperature detector, preferably arranged next to such separating bulkhead 10, adapted to detect at least one mean temperature value between such lower area 3a and such upper area 3b, and with at least one cold action actuator;
- at least one first heating cell 11, having therein a single-temperature operation, also closed by at least one second insulating door 13 and equipped therein with a plurality of shelves 15 that can be height-adjustable due to positioning brackets 17 or other

- known adjusting systems; such first heating cell 11 being internally equipped with at least one second temperature detector adapted to detect at least one internal temperature value for the heating cell 11 itself and with at least one hot action actuator;
- means for controlling the internal temperatures of the first refrigerating cell 3 and the first heating cell 11; such means are adapted to control and manage the operation of the cold action actuator and/or the hot action actuator depending on temperatures detected by the first and second temperature detector, and comparing the mean temperature value detected inside the first refrigerating cell 3 with at least one lower temperature set point and at least one upper temperature set point in order to keep the correct multi-temperature operation inside the refrigerating cell 3 and/or comparing the detected temperature value inside the first heating cell 11 with a single temperature set point. Moreover, the control means can be equipped with external displaying and command means, such as for example a display equipped with an appropriate data selecting and entering device, to allow a user to set, in particular, the operating modes of the refrigerated exhibitor 1 according to the present invention. The above temperature set point values can already be residing in a hardware memory of the control means; alternatively, to allow a better customisation of the refrigerated exhibitor 1, the temperature set point values both for the refrigerating cell 3 and for the heating cell 11 can be set by the user through displaying and command means.

**[0015]** In addition, in order to keep the temperature range inside the first refrigerating cell 3 as homogeneous as possible, it is possible to provide that the refrigerated exhibitor 1 comprises a first ventilation system 19 arranged inside the first refrigerating cell 3, and preferably inside the lower area 3a. The cold action actuator then takes care of cooling the first refrigerating cell 3 and the first ventilation system 19, through a suitable cooperation with the first temperature detector and the means for controlling the internal temperatures, takes care of re-circulating the air cooled by such actuator inside the first refrigerating cell 3 to obtain, in the lower area 3a, a lower temperature of the defined temperature range substantially equal to the lower temperature set point, and, in the upper area 3b, an upper temperature of the defined temperature range substantially equal to the upper temperature set point. Preferably, the lower temperature set point is substantially equal to 4°C and the upper temperature set point is substantially equal to 20°C. In order to more easily and quickly obtain the multi-temperature range inside the first refrigerating cell 3, the refrigerated exhibitor 1 can be equipped with a first heating system arranged inside the first refrigerating cell 3, such first heating system comprising at least one first heating plate (not shown) arranged on the surface or inside the sepa-

rating bulkhead 10 and operatively cooperating with the cold action actuator, the first temperature detector and the means for controlling the internal temperatures in order to optimise when the desired temperature set points are reached and kept. In addition, the first refrigerating cell 3 could be equipped with a third temperature detector cooperating with the first temperature detector and the means for controlling the internal temperatures in order to make more accurate the measure of the temperature ranges inside the lower area 3a and the upper area 3b and, consequently, to reach and keep the desired temperature set points.

**[0016]** In parallel, in order to keep the temperature range inside the first heating cell 11 as homogeneous as possible, it is possible to provide that the refrigerated exhibitor 1 comprises a second ventilation system 21 arranged inside the first heating cell 11. The hot action actuator then takes care of heating the first heating cell 11 and the second ventilation system 22, through a suitable cooperation with the second temperature detector and the means for controlling the internal temperatures, and takes care of re-circulating the air heated by such actuator inside the first heating cell 11 to obtain a more homogeneous temperature range around the desired temperature set point value. Preferably, the temperature set point of the first heating cell 11 is substantially equal to 42°C. Also in this case, in order to more easily and quickly obtain the desired temperature inside the first heating cell 11, the refrigerated exhibitor 1 can be equipped with a second heating system arranged inside the first heating cell 11, such second heating system comprising at least one second heating plate 23 arranged on the surface or inside the insulating material 24 separating the first refrigerated cell 3 from the first heating cell 11, and operatively cooperating with the cold action actuator, the second temperature detector and the means for controlling the internal temperatures in order to optimise when the desired temperature set point is reached and kept.

**[0017]** Obviously, it can be provided that the possible internal ventilation created by the ventilation systems 19, 21 can be disabled by the control means under particular situations, such as for example in case of opening of the related door 5 or 13.

**[0018]** The refrigerated exhibitor 1 according to the present invention is further equipped with at least one technical room 25, preferably arranged below the first refrigerating cell 3, adapted to contain therein the components of the refrigerating plant adapted to supply the cold-action actuator, such as condenser, compressor, etc., such room 25 communicating with the external environment by interposing at least one suction grid 27, such refrigerating plant comprising in cascade at least one pressing fan 31, at least one condenser 33 and at least one compressor 35.

**[0019]** As variation, the inventive exhibitor 1 can comprise a third ventilation system (not shown) arranged inside the first refrigerating cell 3: such third ventilation system cooperates with a third temperature detector and the

means for controlling the internal temperatures, and is arranged preferably inside the upper area 3b, in order to allow having also such area 3b cool.

[0020] Moreover, the means for controlling the refrigerating cell 3 and the heating cell 11 can have a menu on which temperatures can be pre-set: for example, the heating cell 11 can be at 40 °C and the refrigerating cell 3 at 4 °C, so that the upper area 3b can be set to 20 °C. As alternative examples, it can be provided that the heating cell 11 is at 20 °C and the refrigerating cell 3 at 4 °C, together with the upper area 3b; or still, the heating cell 11 is at 20 °C, the refrigerating cell 3 at 2 °C, and the upper area 3b at 10 °C.

[0021] Finally, it is possible to anyway have the independent adjustment of the individual setpoints.

## Claims

1. Refrigerated exhibitor (1) with multi-temperature operation comprising at least one first refrigerating cell (3) operating therein at multiple temperatures and at least one first heating cell (11) operating therein at a single temperature, **characterised in that** said refrigerating cell (3) is internally divided by at least one separating bulkhead (10) into a lower area (3a), that is at a lower temperature of a defined temperature range, and into an upper area (3b) that is at an upper temperature of said range, said refrigerating cell (3) being internally equipped with at least one first temperature detector adapted to detect at least one mean temperature value between said lower area (3a) and said upper area (3b), said refrigerating cell (3) being internally equipped with at least one cold action actuator, and **in that** said first heating cell (11) is equipped therein with at least one second temperature detector adapted to detect at least one internal temperature value of said heating cell (11) and at least one hot action actuator, and **in that** it comprises means for controlling the internal temperatures of said first refrigerating cell (3) and said first heating cell (11), said means being adapted to control and manage an operation of said cold action actuator and/or said hot action actuator depending on said temperatures detected by said first and second temperature detector comparing said detected mean temperature value inside said first refrigerating cell (3) with at least one lower temperature set point and at least one upper temperature set point and/or comparing said detected temperature value inside said first heating cell (11) with a single temperature set point.
2. Refrigerated exhibitor (1) according to claim 1, **characterised in that** it comprises a first ventilation system (19) arranged inside said first refrigerating cell (3), said first ventilation system (19) cooperating with said first temperature detector and said means for

controlling the internal temperatures, said first ventilation system (19) being arranged preferably inside said lower area (3a).

3. Refrigerated exhibitor (1) according to claim 1 or 2, **characterised in that** it comprises a third ventilation system arranged inside said first refrigerating cell (3), said third ventilation system cooperating with a third temperature detector and said means for controlling the internal temperatures, said third ventilation system being arranged preferably inside said upper area (3b).
4. Refrigerated exhibitor (1) according to any one of the previous claims 1 to 3, **characterised in that** it comprises a first heating system arranged inside said first refrigerating cell (3), said first heating system operatively cooperating with said cold action actuator, said first temperature detector and said means for controlling the internal temperatures.
5. Refrigerated exhibitor (1) according to claim 4, **characterised in that** said first heating system comprises at least one first heating plate arranged on the surface of or inside said separating bulkhead (10).
6. Refrigerated exhibitor (1) according to any one of the previous claims 1 to 5, **characterised in that** it comprises a second ventilation system (21) arranged inside said first heating cell (11), said second ventilation system (21) cooperating with said second temperature detector and said means for controlling the internal temperatures.
7. Refrigerated exhibitor (1) according to any one of the previous claims 1 to 6, **characterised in that** it comprises a second heating system arranged inside said first heating cell (11), said first heating system operatively cooperating with said hot action actuator, said second temperature detector and said means for controlling the internal temperatures.
8. Refrigerated exhibitor (1) according to claim 7, **characterised in that** said second heating system comprises at least one second heating plate (23) arranged on the surface of or inside an insulating material (24) separating said first refrigerating cell (3) from said first heating cell (11).

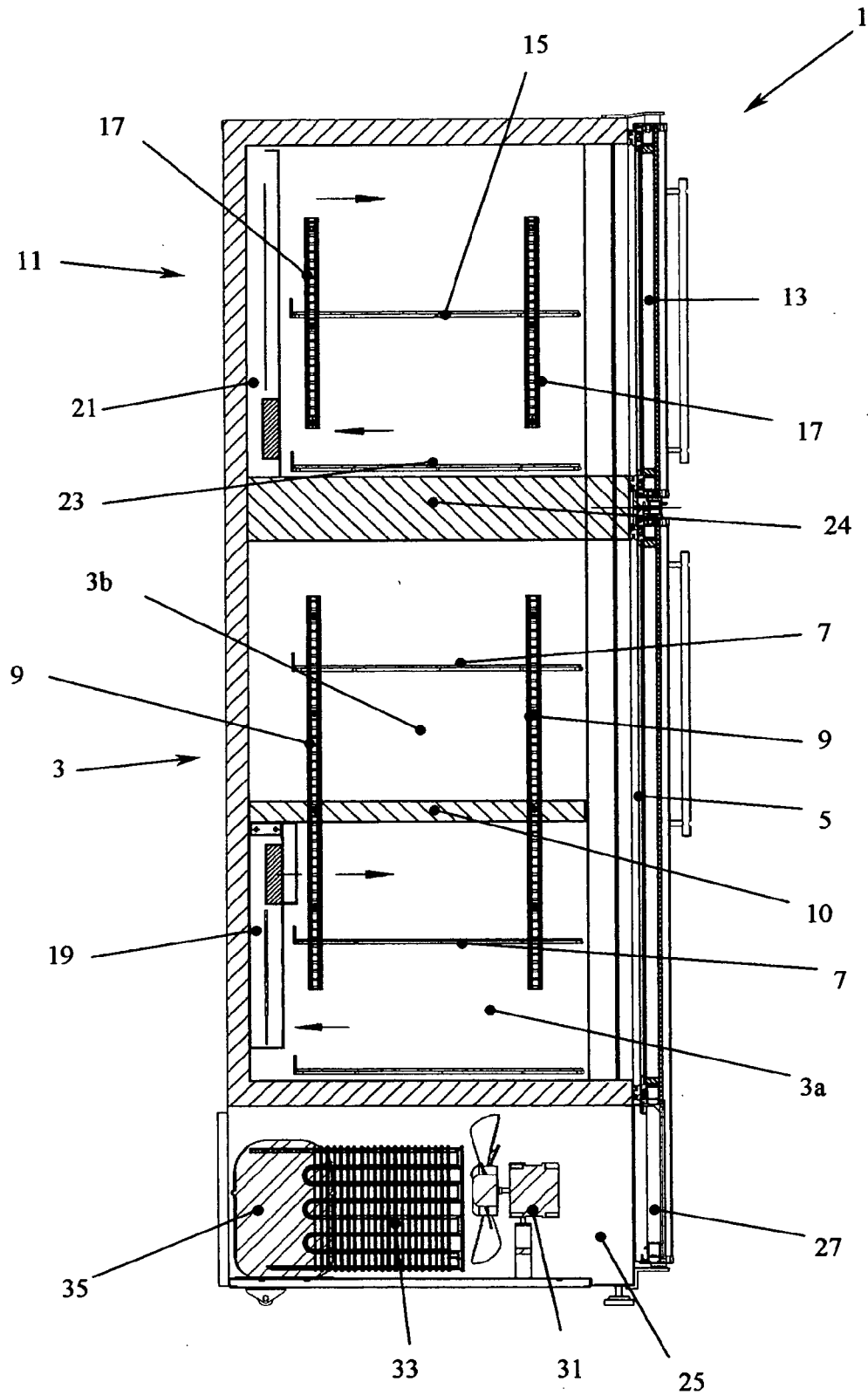


FIG. 1

**REFERENCES CITED IN THE DESCRIPTION**

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