The temperature of an accommodating room is adjusted without causing drop of melting water from an upper evaporator onto the accommodated food materials. A cold storage showcase includes a cooling circuit in which an upper evaporator provided on an upper side of an accommodating room and a lower evaporator provided on a lower side of the accommodating room are connected to a cooling apparatus. The upper evaporator and the lower evaporator are connected in parallel with the cooling apparatus. An electromagnetic valve for supplying or interrupting circulation of a cooling medium in the lower evaporator is provided halfway a second route on an upstream side of the lower evaporator. When temperature detecting means detects a drop in temperature of the accommodating room, the electromagnetic valve is closed to stop the cooling by the lower evaporator. On the other hand, when the temperature detecting means detects a rise in temperature of the accommodating room, the electromagnetic valve is opened to adjust the temperature by cooling the accommodating room by the lower evaporator.
Fig. 4
[PRIOR ART]
COLD STORAGE SHOWCASE

BACKGROUND OF THE INVENTION

1. Field of the Invention
The present invention relates to a cold storage showcase which is installed in a counter in an eating-house or the like in order to preserve materials accommodated in an accommodating room in cold storage while displaying the materials, and more particularly to a cold storage showcase constructed such that an accommodating room is cooled by evaporators which are provided on an upper portion and a lower portion of the accommodating room, respectively.

2. Description of the Related Art
A neta case which is installed in a counter, for example, in a sushi bar or the like in order to preserve perishable food materials such as sushi neta accommodated in cold storage while displaying them to customers has been known as a cold storage showcase for preserving food materials such as foods and drinks in cold storage (refer to Japanese Unexamined Patent Publication (Koho) No. 2000-139633). For example, as shown in FIG. 3, in a cold storage showcase 10, an accommodating room 14 for preserving food materials in cold storage, and a machine room 16 in which a cooling apparatus (cooling system) including a compressor, a condenser and the like (which are not shown in FIG. 3) for cooling the accommodating room 14 are provided adjacent to each other. The accommodating room 14 is defined inside a heat insulating box 12 in which a heat insulating construction is adopted for an upper portion, side portions and a bottom portion. In addition, a glass cover 30 is fitted into a front portion of the accommodating room 14 so that the inside of the accommodating room 14 can be seen from the front side. Also, a food material door 31 to the accommodating room 14 is provided in a rear face side of the heat insulating box 12, and slide doors 32, 32 are slidably attached to the food material door 31. Thus, the slide doors 32, 32 are slid horizontally to open the food material door 31 to the accommodating room 14, thereby allowing the food materials to be taken out from or put into the accommodating room 14 (refer to FIG. 4).

As shown in FIG. 4, on the upper side of the accommodating room 14, an upper evaporator 40 connected to the above-mentioned cooling apparatus is provided being exposed to the accommodating room 14. A cooling medium is circulatingly supplied from the cooling apparatus to the upper evaporator 40, thereby directly cooling the accommodating room 14. In addition, a lower evaporator 42 which is connected in communication with the upper evaporator 40 is provided in a meandering manner on an external bottom surface facing a heat insulating material 18 side in a bottom plate 24 constituting a bottom surface of the accommodating room 14 so as to tightly contact the external bottom surface of the bottom plate 24. The cooling medium is circulatingly supplied to the lower evaporator 42 to cool the bottom plate 24, thereby indirectly cooling the accommodating room 14.

In the manner as described above, the food materials which are displayed in the accommodating room 14 are cooled from both the upper and lower sides. That is to say, as shown in FIG. 5, a cooling circuit 20 of the cold storage showcase 10 has a cycle in which a vaporized cooling medium which is obtained through compression in a compressor CM is cooled to be condensed to be liquefied by a fan motor FM in a condenser CD provided in a downstream side, and the resulting liquefied cooling medium which is reduced with its pressure in an expansion valve EV through a drier (moisture removing unit) 44 turns into the vaporized cooling medium held at a low temperature in both the upper evaporator 40 and the lower evaporator 42 to cool the accommodating room 14 to be fed back to the compressor CM again. Here, the units constituting the cooling circuit 20 are connected through a cooling medium pipeline 46 to one another, and the upper evaporator 40 and the lower evaporator 42 are connected in series with each other. At that, in the cooling circuit 20, the cooling medium pipeline 46 extending from the drier 44 to the expansion valve EV, and the cooling medium pipeline 46 extending from both the upper evaporator 40 and the lower evaporator 42 to the compressor CM are made close to each other only within a certain section in order to carry out the heat exchange between them. Also, the liquefied cooling medium which flows from the drier 44 to the expansion valve EV is cooled by the vaporized cooling medium, at a relatively low temperature, which flows out from both the upper evaporator 40 and the lower evaporator 42, thereby enhancing a cooling efficiency of the cooling circuit 20.

The above-mentioned cold storage showcase 10 is constructed so as to cool the accommodating room 14 to a predetermined temperature (set temperature) which a user previously set in accordance with the accommodated food materials and an outside air temperature. Thus, the cold storage showcase 10 automatically adjusts the temperature in correspondence to a fluctuation in outside air temperature or a change in temperature of the accommodating room 14 due to opening and closing of the slide doors 32, 32. As a result, the accommodating room 14 is held at a set temperature. With regard to a method of adjusting the temperature of the above-mentioned accommodating room 14, there is a method in which when the temperature of the accommodating room 14 is above a set temperature, the compressor CM is driven to circulatingly supply the cooling medium to both the upper evaporator 40 and the lower evaporator 42, thereby cooling the accommodating room 14, while when the temperature of the accommodating room 14 is below a set temperature, the compressor CM is stopped to halt the circulation of the cooling medium, thereby preventing supercooling of the accommodating room 14. Here, the moisture contained in the ambient atmosphere of the accommodating room 14 sticks in the form of dew to the upper evaporator 40 provided exposed to the accommodating room 14 along with the cooling operation, and the dew freezes with the progress of the cooling operation to turn into frost with which the surface of the upper evaporator 40 is covered. That is to say, there is a possibility that when the cooling operation is suspended for temperature adjustment, the frost sticking to the upper evaporator 40 becomes to melt and falls down therefrom as a water drop onto accommodated food materials.

Then, there is another temperature adjusting method in which control is carried out such that the compressor CM continuously operates irrespective of the temperature of the accommodating room 14, and a constant pressure expansion valve is used as the expansion valve EV to adjust a flow rate of the cooling medium, whereby even when the outside air temperature or the like changes, the accommodating room 14 can be held at a set temperature. However, with this temperature adjusting method using the constant pressure expansion valve, since the expansion.
valve EV opens and closes in accordance with pressures in both the upper evaporator 40 and the lower evaporator 42, it becomes impossible to follow a major change in outside air temperature. For example, it is feared that although if a set temperature of the accommodating room 14 is adjusted to a low temperature range, the accommodated food materials can be suitably cooled even when the outside air temperature becomes high, if the outside air temperature drops, the temperature of the accommodating room 14 drops too much to supercool the accommodated food materials, so that the accommodated food materials are likely to be spoiled due to freezing or the like. On the other hand, if the set temperature of the accommodating room 14 is set at a high temperature range, the accommodated food materials cannot be sufficiently cooled when the outside air temperature rises, and thus a disadvantage that the deterioration of the accommodated food materials may be accelerated is pointed out. That is to say, the user needs to frequently carry out the temperature adjustment of the accommodating room 14, which is troublesome.

In addition, a cold storage showcase 10 as described in Japanese Unexamined Patent Publication (Koho) No. 2000-139633, is proposed which is constructed such that a droplet receptacle 70 for receiving the melting water is provided below the upper evaporator 40 in order to prevent the melting water from dropping onto the accommodated food materials. However, when the droplet receptacle 70 is provided, there are disadvantages that the droplet receptacle 70 not only blocks the light introduced into the inside through the glass cover 30 and makes the visibility worse to impair the quality of display of the accommodated food materials, but also impedes the circulation of the ambient atmosphere within the accommodating room, which becomes cooled air through the heat exchange in the upper evaporator 40, resulting in lowering cooling efficiency. In addition, the inconvenience is also pointed out in which the room space of the accommodating room 14 is reduced, the cleaning of the droplet receptacle 70 is complicated, and so forth.

SUMMARY OF THE INVENTION

That is to say, in view of the above-mentioned problems in the cold storage showcase according to the prior art, the present invention is proposed in order to suitably solve those problems. Thus, it is an object of the present invention to provide a cold storage showcase in which melting water is prevented from dropping from an upper evaporator onto any of accommodated materials, and the temperature of the accommodating room can be suitably adjusted.

In order to attain the expected object by overcoming the above-mentioned problems, according to the present invention, there is provided a cold storage showcase including an upper evaporator provided on an upper portion of an accommodating room for materials, a lower evaporator provided on a lower portion of the accommodating room, and a cooling system to which the upper evaporator and the lower evaporator are connected, a cooling medium being circulatingly supplied from the cooling system to both the upper evaporator and the lower evaporator to cool the accommodating room, in which the upper evaporator and the lower evaporator are connected in parallel with the cooling system, and pipe conduit opening/closing means is provided in a cooling medium supplying pipe conduit through which the lower evaporator is connected to the cooling system, and while the cooling medium is continuously supplied to the upper evaporator, the pipe conduit opening/closing means is opened or closed to supply or interrupt supply of the cooling medium in the lower evaporator.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side sectional view showing a cold storage showcase according to a preferred embodiment of the present invention;

FIG. 2 is a schematic view showing a cooling circuit in the cold storage showcase according to the embodiment of the present invention;

FIG. 3 is a schematic perspective view showing a conventional cold storage showcase when viewed from a front side;

FIG. 4 is a cross sectional view taken on line A-A of FIG. 3; and

FIG. 5 is a schematic view showing a cooling circuit in the conventional cold storage showcase.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

A cold storage showcase according to an embodiment of the present invention will be described hereinafter in detail with reference to the accompanying drawings. At that, for the sake of convenience of a description, the same constitutional elements as those of the cold storage showcase shown in FIGS. 3 to 5 are designated with the same reference numerals to omit their detailed description.

EXAMPLE

As shown in FIG. 1, in a cold storage showcase 11 according to the embodiment of the present invention, an accommodating room 14 for preserving materials such as perishable foods and drinks is defined inside a heat insulating box 12 in which a heat insulating material 18 made of, for example, polyurethane foam is filled in a space defined between an inner box 22 and an outer box 26. A glass cover 30 made of a multiple layer transparent glass is fitted in a front side of the accommodating room 14, i.e., in a front side of the heat insulating box 12 which faces customers when the cold storage showcase 11 is placed on a counter or the like, so that the customers can view materials accommodated in the accommodating room 14 from a front side. On the other hand, a material door 31 is formed on the rear side of the heat insulating box 12, and slide doors 32, 33 which are held with their upper and lower sides by rails 34 and 35, respectively, are horizontally slidably provided in the material door 31. The material door 31 is thus structured to open and close. The bottom surface of the accommodating room 14 is inclined downward from the slide door 32 side to the glass cover 30 side, and food materials are displayed on a stand (not shown) such as a drainboard which is placed on the bottom surface of the accommodating room 14. Thus, food materials accommodated in the accommodating room 14 are easily viewed by the customers from the front side. Then, a drain hole 36 is provided in an inclined lower end (the glass cover 30) side of the bottom surface of the accommodating room 14, so that water collected within the
accommodating room 14 is discharged to the outside of the cold storage showcase 11 through a drain pipe 38 connected to the drain hole 36.

[0018] The cooling apparatus (cooling system) for cooling the accommodating room 14 is provided in the machine room 16 which is defined inside a cabinet which is provided adjacent to and integrally with the heat insulating box 12. The cooling apparatus includes a compressor CM, a condenser CD, a fan motor FM, expansion valves EV1 and EV2, and the like (refer to FIG. 2). The upper evaporator 40 connected to the cooling apparatus extends transversely to be provided in a zigzag manner on an upper side of the accommodating room 14. The cooling medium is circulatingly supplied to the upper evaporator 40 to cool the ambient atmosphere within the accommodating room 14, thereby directly cooling the accommodating room 14. In addition, the lower evaporator 42 connected to the cooling apparatus is provided in a zigzag manner in tight contact with an external bottom surface, facing the heat insulating material 18 side, in the bottom plate 24 constituting the bottom surface of the accommodating room 14. The cooling medium is circulatingly supplied to the lower evaporator 42 to cool the bottom plate 24, thereby indirectly cooling the accommodating room 14. In such a manner, when the cooling operation is performed, the food materials displayed in the accommodating room 14 are cooled from both the upper and lower sides by both the upper evaporator 40 and the lower evaporator 42 which are provided on the upper and lower sides of the accommodating room 14, respectively.

[0019] Temperature detecting means Th such as a thermostat for controlling opening and closing of an electromagnetic valve SV as pipe conduit opening/closing means which will be described later in accordance with the result of detection of the temperature of the accommodating room 14 is provided in the cold storage showcase 11. Giving a description in terms of an electric circuit, for example, when a contact point of the temperature detecting means Th which is provided in series on the electric circuit with the electromagnetic valve SV is closed along with detection of the set temperature to charge across the electromagnetic valve SV, a current is caused to flow through a coil of the electromagnetic valve SV, so that a plunger which has opened the pipe conduit closes the pipe conduit to interrupt the circulation of the cooling medium. In addition, the mounting position of the temperature detecting means Th is not especially limited as long as the temperature detecting means Th do not excessively protrude to the inside of the accommodating room 14 to become a hindrance, and is hardly influenced by the temperature of any of the portions other than the accommodating room 14. Moreover, an electronics portion (not shown) for controlling an operation of the cooling apparatus is provided inside the machine room 16. The electronics portion automatically controls the opening and closing of the electromagnetic valve SV in accordance with the result of detection of the predetermined temperature (set temperature) of the temperature detecting means Th. Also, the electronics portion performs the control so as to operate the units constituting the cooling apparatus in accordance with the manipulation of an operation switch provided in a control panel (not shown). At that, a manipulation port for adjusting the set temperature of the temperature detecting means Th is also provided in the control panel.

[0020] As shown in FIG. 2, a cooling circuit 50 is constructed in the cold storage showcase 11 of this embodiment. That is to say, the cooling circuit 50 includes the cooling apparatus having a compressor CM, a condenser CD, a fan motor FM, a drier (moisture removing unit) 44, a first expansion valve EV1, a second expansion valve EV2, an electromagnetic valve SV and the like which are all provided in the machine room 16, and an upper evaporator 40 and a lower evaporator 42 which are provided on the accommodating room 14 side. Also, a cooling medium can circulate in the cooling circuit 50 by connecting the units in communication with one another through the cooling medium pipeline 46. That is to say, in the cooling circuit 50, the vaporized cooling medium which is compressed in the compressor CM is condensed to be liquefied in the condenser CD through the cooling medium pipeline 46, and the moisture contained in the cooling medium is removed by the drier 44. After that, the resulting cooling medium is gradually reduced in pressure in the first expansion valve EV1 and the second expansion valve EV2, respectively, and is then expanded to evaporate all at once in the upper evaporator 40 and the lower evaporator 42, respectively, whereby both the upper evaporator 40 and lower evaporator 42 are forced cooled to perform heat exchange with the accommodating room 14, thereby cooling the accommodating room 14. In addition, the cooling circuit 50 is constructed so as to repeatedly perform a cycle in which the vaporized cooling medium which is obtained through the evaporation in the upper evaporator 40 and the lower evaporator 42 is led back to the compressor CM through the cooling medium pipeline 46. At that, in FIG. 2, reference symbol FM designates a fan motor which operates during the cooling operation to air-cool the condenser CD.

[0021] In the cooling circuit 50, the upper evaporator 40 and the lower evaporator 42 are connected in parallel with the cooling apparatus, and include the first expansion valve EV1 and the second expansion valve EV2 on their upstream sides (on the upstream side in the cooling medium circulation direction), respectively (refer to FIG. 2). More specifically, the cooling medium pipeline 46 branches on the downstream side of the drier 44 into a first route R1 connected to the upper evaporator 40, and a second route (cooling medium supply pipe conduit) R2 connected to the lower evaporator 42. The first expansion valve EV1 is provided in the middle of the first route R1. Thus, while the compressor CM is driven (at the cooling operation of the cold storage showcase 11), the cooling medium is supplied to the upper evaporator 40 through the first expansion valve EV1 at all times. On the other hand, the electromagnetic valve SV and the second expansion valve EV2 are provided in this order from the upstream side in the second route R2. Thus, while the compressor CM is driven, the cooling medium is supplied to the lower evaporator 42 through the electromagnetic valve SV and the second expansion valve EV2. Opening and closing of the electromagnetic valve SV are automatically controlled in accordance with the result of detection of the temperature of the accommodating room 14 by the temperature detecting means Th. That is to say, when the temperature of the accommodating room 14 is above the set temperature, the electromagnetic valve SV is opened to allow the cooling medium to circulate in the second route R2. On the other hand, when the temperature of the accommodating room 14 is below the set temperature, the electromagnetic valve SV is closed to interrupt the circulation of the cooling medium in the second route R2. Then, the cooling medium pipelines 46, 46 which are connected to the
discharge sides of the upper evaporator 40 and the lower evaporator 42, respectively, join again on the upstream side of the compressor CM, so that the vaporized cooling medium which is obtained through the heat exchange in both the upper evaporator 40 and the lower evaporator 42 flows into the compressor CM. Consequently, in the cold storage showcase 11, while the cooling operation is performed, the accommodating room 14 is cooled by the upper evaporator 40 at all times, and the temperature of the accommodating room 14 can be adjusted in accordance with ON/OFF of the cooling state of the lower evaporator 42 made by the opening/closing operation of the electromagnetic valve SV based on the result of detection of the temperature by the temperature detecting means Th.

[Operation of Cold Storage Showcase According to the Embodiment]

[0022] Next, a description will be given with respect to the operation of the cold storage showcase according to this embodiment of the present invention. In the cold storage showcase 11, when the operation switch provided in the control panel is turned ON, the compressor CM is driven to start the circulation of the cooling medium in the cooling circuit 50. At the same time, the fan motor FM is driven to be rotated, thereby beginning to air-cool the condenser CD. Then, the accommodating room 14 is gradually cooled through the heat exchange with the upper evaporator 40 and the lower evaporator 42 which has been forced cooled by the vaporized cooling medium supplied to both of the evaporators 40 and 42. Note that the set temperature has been adjusted in advance in accordance with the food materials accommodated in the accommodating room 14 and the outside air temperature by manipulating the manipulation portion for adjusting the temperature detecting means Th provided in the control panel.

[0023] When the temperature of the accommodating room 14 reaches the set temperature and further drops with the progress of cooling operation, the temperature detecting means Th detects that the temperature of the accommodating room 14 drops below the set temperature, and the electromagnetic valve SV provided in the middle of the second route R2 is closed in accordance with the result of detection of the temperature obtained by the temperature detecting means Th. As a result, the supply of the cooling medium to the second route R2 is interrupted to stop the cooling for the accommodating room 14 by the lower evaporator 42. On the other hand, since the cooling medium continuously circulates in the first route R1 having a parallel relationship with the second route R2, the accommodating room 14 is continuously cooled by the upper evaporator 40. When the cooling by the lower evaporator 42 is stopped, the temperature drop in the accommodating room 14 which has been cooled by both the upper evaporator 40 and the lower evaporator 42 stagnates to prevent the supercooling of the accommodating room 14. At the same time, since the accommodating room 14 is continuously cooled by the upper evaporator 40, a rise in temperature of the accommodating room 14 due to inflow of the air caused by the opening or closing of the slide doors 32, 32, and slight outflow or the like of the cooled air through the glass cover 30, the slide doors 32, 32 and the heat insulating box 12 which define the accommodating room 14 is suppressed. As a result, the temperature of the accommodating room 14 is assured to be constant. Moreover, the implementation of the continuous cooling by the upper evaporator 40 offers the buffer action against an abrupt rise in outside air temperature. It is therefore possible to prevent deterioration of the accommodated food materials since no abrupt increase in temperature of the accommodating room 14 occurs. There is no possibility that the state of the accommodating room 14 develops to a supercooled state even when the accommodating room 14 is continuously cooled by the upper evaporator 40.

[0024] When the temperature of the accommodating room 14 rises to become equal to or higher than the set temperature due to fluctuations in outside air temperature, or frequent opening, closing or the like of the slide doors 32, 32, the temperature detecting means Th detects that the temperature of the accommodating room 14 has risen to be equal to or higher than the set temperature, and the electromagnetic valve SV which is provided in the middle of the second route R2 is opened in accordance with the result of detection of the temperature. As a result, the supply of the cooling medium to the second route R2 is restarted, and the cooling of the accommodating room 14 by the lower evaporator 42 is started. That is to say, when the temperature of the accommodating room 14 is above the set temperature, the accommodating room 14 is cooled by both the upper evaporator 40 and the lower evaporator 42 to cause the temperature of the accommodating room 14 to rapidly drop, which makes it possible to suppress the deterioration of the accommodated food materials. On the other hand, when the temperature of the accommodating room 14 is below the set temperature, the lower evaporator 42 is stopped, and the accommodating room 14 is cooled only by the upper evaporator 40, which makes it possible to avoid problems such as freezing due to the supercooling of the accommodated food materials. As a result, it is possible to carry out the efficient cooling operation which is capable of maintaining the temperature of the accommodating room 14 constant. In addition, compared with the temperature adjustment by a constant pressure expansion value mentioned in the prior art example, since the present invention adopted a construction in which the electromagnetic valve SV is opened or closed in accordance with the result of detection of the temperature of the accommodating room 14 by the temperature detecting means Th, the temperature adjustment by the lower evaporator 42 can rapidly respond to fluctuations in temperature of the accommodating room 14. Hence, satisfactory adaptability to outside air temperature fluctuations is obtained and thus it is possible to avoid harmful effects such as supercooling or deterioration of the accommodated food materials.

[0025] As described above, since the upper evaporator 40 and the lower evaporator 42 are connected in parallel with each other in the cooling circuit 50, even when the second route R2 having the lower evaporator 42 connected thereto is closed by closing the electromagnetic valve SV, the cooling medium is continuously supplied to the upper evaporator 40 connected to the first route R1 at all times during the cooling operation. That is to say, the cooling state of the upper evaporator 40 is not interrupted irrespective of changes in temperature of the accommodating room 14. Hence, even when frost is produced on the surface of the upper evaporator 40, the frost does not melt during the cooling operation. Therefore, the melting water is prevented from dropping onto the accommodated food materials and staining the accommodated food materials. Consequently,
is unnecessary to provide means, such as a droplet receptacle 70, for receiving the melting water on a lower side of the upper evaporator 40 as described in the conventional example, so that the quality of display of the food materials accommodated in the accommodating room 14 is not impaired, the room space of the accommodating room 14 can be efficiently utilized and the cleaning can also be suitably performed. Moreover, since a time zone is provided during which the cooling by the lower evaporator 42 is stopped, the excessive reduction of the moisture contained in the accommodating room 14 is suppressed, and thus the accommodated food materials are hardly dried.

[0026] In the cold storage showcase 11 of this embodiment, the expansion valves EV1 and EV2 are used on the upstream of the two evaporators 40 and 42, as the means for holding a pressure difference between both the first evaporator 40 and the second evaporator 42, and the cooling apparatus. However, the present invention is not intended to be limited to this construction. That is to say, capillary tubes may also be adopted which are provided for the first evaporator 40 and the second evaporator 42, respectively. In addition, while the electromagnetic valve SV is used as the pipe conduit opening/closing means for the second route B2, for example, a motor operated valve can also be adopted as long as such a valve can open or close the pipe conduit in accordance with the result of detection of the temperature by the temperature detecting means Th. With respect to the cooling circuit 50 of this embodiment as well, while the cooling medium pipeline 46 extending from the drier 44 to both the first expansion valve EV1 and the second expansion valve EV2, and the cooling medium pipeline 46 extending from both the first evaporator 40 and the second evaporator 42 to the compressor CM are disposed close to each other within a certain section in order to perform heat exchange between them, a heat exchanger may be provided, whereby the liquefied cooling medium flowing from the drier 44 to both the first expansion valve EV1 and the second expansion valve EV2 1 is cooled by the cold vaporized cooling medium flowing out from the first evaporator 40 and the second evaporator 42, thereby making it possible to enhance the cooling efficiency of the cooling circuit.

[0027] According to the cold storage showcase of this embodiment of the present invention, the upper evaporator and the lower evaporator are connected in parallel with the cooling system, and the pipe conduit opening/closing means for performing the opening/closing operation to supply or interrupt supply of the cooling medium in the lower evaporator is provided in the cooling medium supply pipeline of the lower evaporator. Hence, even when the supply or suspension of supply of the cooling medium to the lower evaporator is controlled, the cooling medium is supplied to the upper evaporator at all times. Thus, the cooling state of the upper evaporator is not interrupted at all, which makes it possible to prevent the frost sticking to the upper evaporator from melting to stain the accommodated food materials. In addition, the pipe conduit opening/closing means is designed so as to automatically operate in accordance with the temperature detected by the temperature detecting means for detecting the temperature of the accommodating room. Hence, when during the cooling operation, the temperature detecting means detects that the temperature of the accommodating room has dropped below the predetermined temperature, the pipe conduit opening/closing means is closed to stop the cooling by the lower evaporator. On the other hand, when, during the cooling operation, the temperature detecting means detects that the temperature of the accommodating room has risen above the predetermined temperature, the pipe conduit opening/closing means is opened to restart the cooling made by the lower evaporator. As a result, the temperature of the accommodating room can be automatically adjusted. Moreover, when the detected temperature is above the set temperature, the temperature of the accommodating room can be rapidly lowered by cooling the accommodating room by both the upper evaporator and the lower evaporator, thereby making it possible to suppress the deterioration of the accommodated food materials. On the other hand, when the temperature of the accommodating room is below the set temperature, the lower evaporator is stopped, and thus the accommodating room is cooled only by the upper evaporator. As a result, the problems such as freezing caused by supercooling of the accommodated food materials can be avoided, and thus the efficient cooling operation can be carried out which is capable of maintaining the temperature of the accommodating room constant. Furthermore, since no melting water drops from the upper evaporator onto the accommodated food materials, it is unnecessary to provide a droplet receptacle. As a result, no disadvantages such as impairing the quality of display of food materials accommodated in the accommodating room, reduction of the cooling efficiency due to the obstruction of the circulation of the cooled air, and reduction in room space are caused.

What is claimed is:

1. A cold storage showcase comprising an upper evaporator provided on an upper side of an accommodating room for materials, a lower evaporator provided on a lower side of the accommodating room, and a cooling system to which said upper evaporator and said lower evaporator are connected, a cooling medium being circulatingly supplied from said cooling system to both said upper evaporator and said lower evaporator to cool said accommodating room, wherein said upper evaporator and said lower evaporator are connected in parallel with said cooling system, and pipe conduit opening/closing means is provided in a cooling medium supplying pipe conduit through which said lower evaporator is connected to said cooling system, and while said cooling medium is continuously supplied to said upper evaporator, said pipe conduit opening/closing means is opened or closed to supply or interrupt supply of said cooling medium to said lower evaporator.

2. The cold storage showcase according to claim 1, wherein said pipe conduit opening/closing means is designed to automatically operate in accordance with the result of detection of the temperature obtained by temperature detecting means for detecting the temperature of said accommodating room.

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