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SPECIFICATION

TITLE OF THE INVENTION

Cold Storage

BACKGROUND OF THE INVENTION

The present invention relates to a cold storage in which racks are installed within a storage chamber constructed within a heat insulating box body.

Conventionally, this kind of cold storage, particularly, a low temperature show case for displaying and selling food products and drink products forms a storage chamber having a front surface open within a heat insulating box body and installs racks for displaying articles within the storage chamber, for example, as shown in Japanese Patent Unexamined Publication No. 4-295309 and the like. In this case, the racks are installed in supports for receiving the racks, the supports being mounted to a wall surface of the storage chamber, however, in this case, it is necessary to independently provide with the supports and a volume within the storage is reduced at a thickness of the supports.

Then, a description will be given of a structure in which an inner box itself constituting a heat insulating box body receives the racks with reference to the accompanying drawings. Figs. 7 to 9 show a structure of a low temperature show case 101 in accordance with a conventional art. In the drawings, reference numeral 102 denotes a heat insulating box body open to a front surface, and the heat insulating box body 102 is constituted by foaming and charging a heat

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insulating material 106 between an outer box 103 and an inner box 104, both being made of a steel plate.

A back plate 107 is provided at the back of the inner box 104 at an interval with respect to a back surface of the inner box 104, a portion between the back plate 107 and the inner box 104 is set to a duct 108, and a portion in front of the back plate 107 is set to a storage chamber 109. The duct 108 is communicated with an inner portion of the storage chamber 109 by a discharge port 111 disposed at a lower end thereof and a suction port 112 disposed at an upper end thereof, and an evaporator 113 constituting a refrigerating cycle of a cooling apparatus is vertically provided at an upper portion within the duct 108. Then, a blower 114 is provided at a position corresponding to the suction port 112 and in an upper side of the evaporator 113.

Further, a front opening of the storage chamber 109 is closed in a freely opening and closing manner by a glass door 116 pivotally supported to a side of a front end of the heat insulating box body 102 in such a manner as to freely rotate, and a plural stages of racks 117 are installed within the storage chamber 109.

In this case, a rack receiving groove 118 recessed to the heat insulating material 106 is formed in right and left side walls 104A and 104A of the inner box 104 substantially in a horizontal direction from the front portion to a portion near the back plate 107 at the back portion. The rack receiving groove 118 is open to a front portion and an inner

portion of the storage chamber 109, and is structured such as to insert both end portions of the rack 117 into the rack receiving groove 118 from the front portion in a state of opening the glass door 116 so as to insert to a back portion of the storage chamber 109, when installing the rack 117.

In this case, a machine chamber 119 is constructed in a lower portion of the heat insulating box body 102, a compressor 121, a condenser 122 and a condenser blower 123 constituting a refrigerating cycle of the cooling apparatus are placed within the machine chamber 119. Further, a high temperature refrigerant pipe 124 flowing a high temperature refrigerant in the cooling cycle is arranged in a side of the heat insulating material 106 of the outer box 103 positioned at a peripheral edge of an opening of the storage chamber 109.

When the compressor 121 and each of the blowers 114 and 123 are operated, the refrigerant having a high temperature and a high pressure discharged from the compressor 121 radiates heat in the condenser 122 and the high temperature refrigerant pipe 124 so as to be condensed, is reduced a pressure by a pressure reduction apparatus (not shown), thereafter is flowed into the evaporator 113 so as to be evaporated, and is returned to the compressor 121.

At this time, a cooling operation is performed in the evaporator 113, and a cold air within the duct 108 cooled by the cooling operation is discharged from the discharge port 111 to the storage chamber 109 by the blower 114. Accordingly, the inner portion of the storage chamber 109 is

cooled to a predetermined refrigerating temperature, and the cold air after cooling the inner portion of the storage chamber 109 is again sucked within the duct 108 from the suction port 112, so that this circulation is repeated.

Further, the opening edge of the outer box 103 is cooled by the cooling operation, however, since the high temperature refrigerant discharges heat in the high temperature refrigerant pipe 124 so as to heat the outer box 103, a generation of a dew condensation in the opening edge of the outer box 103 is prevented or restricted.

In this case, this kind of low temperature show case requires a thickness for insulating heat of the heat insulating box body of 60 mm in a normal design and of 40 mm in a refrigeration design. When the thickness is smaller than the above value, there is a risk that a dew condensation is generated on an outer surface of the outer box due to the cooling operation from the storage chamber (the inner box). However, when forming the rack receiving groove 118 from the front portion of the side walls 104A and 104A in the inner box 114 to the rear portion thereof in a recessed manner as mentioned above, the thickness for insulating heat in this portion is insufficient and there is generated a risk that a dew condensation is generated on the outer surface of the outer box 103 at a position corresponding to the rack receiving groove 118.

In this case, the high temperature refrigerant pipe 124 is provided at the opening edge of the outer box 103, thereby

affecting a heating operation to the outer surface of the outer box 103, however, the heating operation is hard to be transmitted to the rear portion, and in particular, there is a problem that a dew condensation is generated in the rear portion of the outer surface in the outer box 103.

Further, since the rack receiving groove 118 is formed from the front portion of the right and left side walls 104A and 104A to the back portion, it is necessary to pull out the rack 117 to the front side till the rear end thereof is taken out from the rack receiving groove 118, at a time of taking out the rack 117. Accordingly, in the case that the glass door 116 can not be opened to a position of an opening angle as shown in Fig. 9 due to a restriction of a place for arranging the low temperature show case 101, the rack 117 is brought into contact with the glass door 116, so that there is a problem that the rack can not be pulled out without taking out the glass door 116.

On the contrary, for example, as shown in Fig. 10, if the right and left side walls 104A and 104A of the inner box 114 are projected to the side of the storage chamber 109 between the front portion and the back portion and a rack receiver 126 is formed here, the disadvantage due to the reduction of the thickness for insulating heat mentioned above is not generated, however, in accordance with the structure, an inner volume of the storage chamber 109 is reduced in the same manner as the publication mentioned above.

SUMMARY OF THE INVENTION

The present invention is made by solving the problem in the conventional art, and an object of the present invention is to provide a cold storage having racks installed within a storage chamber, which solves a problem generated by a reduction of a heat insulating performance without generating a reduction of an inner volume of a storage chamber.

A cold storage in accordance with the present invention comprises:

a storage chamber having an open front surface, the storage chamber being disposed within a heat insulating box body having a heat insulating material charged between an outer box and an inner box; and

racks installed within the storage chamber,

wherein there are provided rack receiving grooves formed in front portions of both side walls in the inner box and recessed in a side of the heat insulating material, rack receiving portions formed at back portions within the storage chamber, front supporting portions formed at front portions in both sides of the racks and protruding outward, and rear supporting portions formed at rear ends of the racks, the rear supporting portions are held by the rack receiving portions and the front supporting portions are held within the rack receiving grooves.

A cold storage in accordance with the present invention comprises:

a storage chamber having an open front surface, the storage chamber being disposed within a heat insulating box



body having a heat insulating material charged between an outer box and an inner box; and

racks installed within the storage chamber,

wherein there are provided rack receiving grooves formed in front portions of both side walls in the inner box, recessed in a side of the heat insulating material and opened to a front portion and an inner portion of the storage chamber, rack receiving portions formed at back portions within the storage chamber and opened to a front portion, front supporting portions formed at front portions in both sides of the racks and protruding outward, and rear supporting portions formed at rear ends of the racks and protruding rearward, the rear supporting portions are inserted within the rack receiving portions and the front supporting portions are inserted within the rack receiving grooves.

In accordance with the present invention, since there is provided the cold storage comprising:

the storage chamber having the open front surface, the storage chamber being disposed within the heat insulating box body having the heat insulating material charged between the outer box and the inner box; and

the racks installed within the storage chamber,

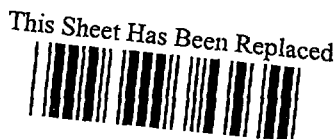
wherein the rack receiving grooves recessed in the side of the heat insulating material is formed in the front portions of the both side walls in the inner box, the rack receiving portions are formed at the back portions within the



storage chamber, the front supporting portions protruding outward are formed at the front portions in the both sides of the racks, and the rear supporting portions are formed at the rear ends of the racks, the rear supporting portions are held by the rack receiving portions and the front supporting portions are held within the rack receiving grooves, the front and rear supporting portions of the racks can be supported to the rack receiving grooves and the rack receiving portions without reducing the volume within the storage chamber, thereby being stably installed within the storage chamber.

At this time, since the recessed rack receiving grooves are only formed at the front portions of the both side walls in the inner box, it is possible to restrict an influence of a temperature to the outer box due to a reduction of the thickness for insulating heat to a minimum limit. Particularly, in the case that a heating apparatus for preventing a dew condensation is provided in a side of the heat insulating material of the outer box positioned at the opening edge of the storage chamber as stated in claim 4, it is possible to position the rack receiving groove within the range at which the heat from the heating apparatus is transmitted, so that it is possible to more effectively prevent a dew condensation from generating on the outer surface of the outer box.

Further, since the racks become free within the storage chamber when the racks are pulled out, the rear supporting



portions are apart from the rack receiving portions and the front supporting portions are taken out from the rack receiving grooves, attachment and detachment of the racks can be performed in a significantly easy manner even in a placing condition that the door for closing the opening of the storage chamber is provided and an angle for opening is restricted.

Particularly, since it is possible to insert and install the front supporting portions and the rear supporting portions of the racks from the front side to the rack receiving grooves and the rack receiving portions, a mounting operability of the racks can be significantly improved.

Further, in the cold storage in accordance with the present invention, a steel back plate is provided at a back portion of the storage chamber and a burring hole formed on the back plate constitutes the rack receiving portion.

In accordance with the structure mentioned above, since the steel back plate is provided at the back portion of the storage chamber and the burring hole formed on the back plate constitutes the rack receiving portion, the existing back plate can be employed and the rack receiving portion can be constituted only by forming the burring hole thereon, so that it is possible to significantly improve a productivity and reduce a production cost.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a low temperature show case corresponding to an embodiment of a cold storage in



accordance with the present invention;

Fig. 2 is a vertically cross sectional side elevational view of the low temperature show case shown in Fig. 1;

Fig. 3 is a plan cross sectional view of the low temperature show case shown in Fig. 1;

Fig. 4 is a vertically cross sectional front elevational view of a heat insulating box body of rack receiving groove portion in the low temperature show case shown in Fig. 1;

Fig. 5 is a plan cross sectional view of the low temperature show case shown in Fig. 1 which explains an operation of taking out a rack;

Fig. 6 is a perspective view of the low temperature show case shown in Fig. 1 which similarly explains an operation of taking out the rack;

Fig. 7 is a vertically cross sectional side elevational view of a low temperature show case in accordance with a conventional art;

Fig. 8 is a plan cross sectional view of the low temperature show case shown in Fig. 7;

Fig. 9 is a plan cross sectional view of the low temperature show case shown in Fig. 7 which explains an operation of taking out a rack; and

Fig. 10 is a cross sectional front elevational view of a heat insulating box body of a rack receiving portion in a low temperature show case in accordance with another conventional art.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Hereinafter, an embodiment in accordance with the present invention will be described below with reference to the accompanying drawings. In the drawings, reference numeral 2 denotes a heat insulating box body opening to a front surface, and the heat insulating box body 2 is constituted by foaming and charging a heat insulating material 6 between an outer box 3 and an inner box 4, both being made of a steel plate.

A back plate 7 made of steel is provided at the back of the inner box 4 at an interval with respect to a back surface of the inner box 4, a portion between the back plate 7 and the inner box 4 is set to a duct 8, and a portion in front of the back plate 7 is set to a storage chamber 9. The duct 8 is communicated with an inner portion of the storage chamber 9 by a discharge port 11 disposed at a lower end thereof and a suction port 12 disposed at an upper end thereof, and an evaporator 13 constituting a refrigerating cycle of a cooling apparatus is vertically provided at an upper portion within the duct 8. Then, a blower 14 is provided at a position corresponding to the suction port 12 and in an upper side of the evaporator 13.

Further, a front opening of the storage chamber 9 is closed in a freely opening and closing manner by a glass door 16 pivotally supported to a side of a front end of the heat insulating box body 2 in such a manner as to freely rotate by a hinge 15, and a plural stages of racks 17 are installed

within the storage chamber 9.

In this case, a rack receiving groove 18 recessed to a side of the heat insulating material 6 is formed in front portions of right and left side walls 4A and 4A of the inner box 4 substantially in a horizontal direction in a range extending from a position a little backward from a front opening edge thereof to a predetermined length backward position. The rack receiving groove 18 is opened to the front portion and the inner portion of the storage chamber 9.

On the contrary, the rack receiving portion 26 is formed at a position having the same height as that of the rack receiving groove 18 in the both side portions of the back plate 7. The rack receiving portion 26 is constructed by a burring hole burred on the back plate 7 and is opened in a longitudinal direction.

On the other hand, the rack 17 is constructed by a frame member 27 comprising a front line and both side lines, ledge members 28 extending in a lateral direction on the frame member 27 and a plurality of linear rods 29 extending in a longitudinal direction thereto, and front supporting portions 31 and 31 protruding outward are formed in a front portion of both side lines of the frame member 27 at a predetermined length in a longitudinal direction. Further, rear ends of the both side lines of the frame member 27 are protruded rearward so as to form rear supporting portions 32 and 32. Still further, bosses 35 for preventing a removal are respectively formed on bottom surfaces of the rear

supporting portions 32 and 32.

When installing the rack 17, the front supporting portion 31 of the rack 17 is inserted into the rack receiving groove 18 from the front portion, and the rear supporting portion 32 is inserted into the rack receiving portion 26. Accordingly, the both sides of the front portion and the both sides of the rear portion in the rack 17 are respectively held by the rack receiving grooves 18 and 18 and the rack receiving portions 26 and 26, and the rack 17 is stably installed within the storage chamber 9.

In this case, the machine chamber 19 is constructed in the lower portion of the heat insulating box body 2, and a compressor 21, a condenser 22 and a condenser blower 23 constituting a refrigerating cycle of a cooling apparatus are placed within the machine chamber 19. Further, a high temperature refrigerant pipe (a heating apparatus) 24 flowing a high temperature refrigerant in the refrigerating cycle is arranged in a side of the heat insulating material 6 of the outer box 3 positioned at a peripheral edge of an opening of the storage chamber 9.

When the compressor 21 and the blowers 14 and 23 are operated, the refrigerant having a high temperature and a high pressure discharged from the compressor 21 radiates heat in the condenser 22 and the high temperature refrigerant pipe 24 so as to be condensed, is reduced a pressure by a pressure reduction apparatus (not shown), thereafter is flowed into the evaporator 13 so as to be evaporated, and is returned to

the compressor 21.

At this time, a cooling operation is performed in the evaporator 13, and a cold air within the duct 8 cooled by the cooling operation is discharged from the discharge port 11 to the storage chamber 9 by the blower 14. Accordingly, the inner portion of the storage chamber 9 is cooled to a predetermined refrigerating temperature, and the cold air after cooling the inner portion of the storage chamber 9 is again sucked within the duct 8 from the suction port 12, so that this circulation is repeated.

Further, the opening edge of the outer box 3 is cooled by the cooling operation, however, since the high temperature refrigerant discharges heat in the high temperature refrigerant pipe 24 so as to heat the outer box 3, a generation of a dew condensation in the opening edge of the outer box 3 can be prevented or restricted.

In this case, a thickness of the heat insulating box body 2 is set to 40 mm without the portion having the rack receiving groove 18, and the portion having the rack receiving groove 18 has a thickness for insulating heat thinner than that of the above portion, however, in accordance with the present invention, since the rack receiving grooves 18 are only formed in the front portions of the both side walls 4A and 4A in the inner box 4, it is possible to restrict a temperature influence applied to the outer box 3 due to a reduction of the thickness for insulating heat to a minimum limit. Particularly, since the

heat from the high temperature refrigerant pipe 24 is transmitted to a range in which the rack receiving groove 18 exists, it is possible to effectively prevent a dew condensation from generating on the outer surface of the outer box 3 in the portion corresponding to the rack receiving groove 18.

Further, when taking out the rack 17 from the storage chamber 9, at first the rear supporting portion 32 is pulled out from the rack receiving portion 26 if the rack 17 is a little pulled out as shown by an arrow in Fig. 6. Then, when further pulling out and the rear end of the front supporting portion 31 is taken out in front of the rack receiving groove 18 as shown in Fig. 5, the rack 17 becomes free. Accordingly, since it is possible to obliquely take out the front rack 17 by lifting up the front portion of the rack 17 as shown by an arrow in Fig. 6 thereafter, it is possible to take out the rack 17 out of the storage chamber 9 without being obstructed even in a placing condition that the glass door 16 is opened only at about 90 degrees as shown in Fig. 5.

As in detail mentioned above, in accordance with the present invention, since there is provided the cold storage comprising:

the storage chamber having the open front surface, the storage chamber being disposed within the heat insulating box body having the heat insulating material charged between the outer box and the inner box; and

the racks installed within the storage chamber,

wherein the rack receiving grooves recessed in the side of the heat insulating material is formed in the front portions of the both side walls in the inner box, the rack receiving portions are formed at the back portions within the storage chamber, the front supporting portions protruding outward are formed at the front portions in the both sides of the racks, and the rear supporting portions are formed at the rear ends of the racks, the rear supporting portions are held by the rack receiving portions and the front supporting portions are held within the rack receiving grooves, the front and rear supporting portions of the racks can be supported to the rack receiving grooves and the rack receiving portions without reducing the volume within the storage chamber, thereby being stably installed within the storage chamber.

At this time, since the recessed rack receiving grooves are only formed at the front portions of the both side walls in the inner box, it is possible to restrict an influence of a temperature to the outer box due to a reduction of the thickness for insulating heat to a minimum limit. Particularly, in the case that a heating apparatus for preventing a dew condensation is provided in a side of the heat insulating material of the outer box positioned at the opening edge of the storage chamber, it is possible to position the rack receiving groove within the range at which the heat from the heating apparatus is transmitted, so that it is possible to more effectively prevent a dew condensation

from generating on the outer surface of the outer box.

Further, since the racks become free within the storage chamber when the racks are pulled out, the rear supporting portions are apart from the rack receiving portions and the front supporting portions are taken out from the rack receiving grooves, attachment and detachment of the racks can be performed in a significantly easy manner even in a placing condition that the door for closing the opening of the storage chamber is provided and an angle for opening is restricted.

Particularly, since it is possible to insert and install the front supporting portions and the rear supporting portions of the racks from the front side to the rack receiving grooves and the rack receiving portions, a mounting operability of the racks can be significantly improved.

Further, since the steel back plate is provided at the back portion of the storage chamber and the burring hole formed on the back plate constitutes the rack receiving portion, the existing back plate can be employed and the rack receiving portion can be constituted only by forming the burring hole thereon, so that it is possible to significantly improve a productivity and reduce a production cost.

WHAT IS CLAIMED IS:

1. A cold storage comprising:

a storage chamber having an open front surface, the storage chamber being disposed within a heat insulating box body having a heat insulating material charged between an outer box and an inner box; and

racks installed within the storage chamber,

wherein there are provided rack receiving grooves formed in front portions of both side walls in said inner box and recessed in a side of said heat insulating material, rack receiving portions formed at back portions within said storage chamber, front supporting portions formed at front portions in both sides of said racks and protruding outward, and rear supporting portions formed at rear ends of said racks, the rear supporting portions are held by the rack receiving portions and said front supporting portions are held within said rack receiving grooves.

2. A cold storage comprising:

a storage chamber having an open front surface, the storage chamber being disposed within a heat insulating box body having a heat insulating material charged between an outer box and an inner box; and

racks installed within the storage chamber,

wherein there are provided rack receiving grooves formed in front portions of both side walls in said inner box, recessed in a side of said heat insulating material and opened to a front portion and an inner portion of the storage



chamber, rack receiving portions formed at back portions within said storage chamber and opened to a front portion, front supporting portions formed at front portions in both sides of said racks and protruding outward, and rear supporting portions formed at rear ends of said racks and protruding rearward, the rear supporting portions are inserted within said rack receiving portions and said front supporting portions are inserted within the rack receiving grooves.

3. A cold storage as claimed in claim 2, wherein a steel back plate is provided at a back portion of the storage chamber and a burring hole formed on the back plate constitutes the rack receiving portion.

4. A cold storage as claimed in claim 1, 2 or 3, wherein a heating apparatus for preventing a dew condensation is provided in a side of a heat insulating material of the outer box positioned at an opening edge of the storage chamber.



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