

SPECIFICATION

TITLE OF THE INVENTION

REFRIGERATING STORAGE

5 BACKGROUND OF THE INVENTION

The present invention relates to a refrigerating storage in which a refrigerating unit in which a compressor or a evaporator is integrally constituted is incorporated under a heat insulating case constituting a storeroom
10 therein.

This type of refrigerating storage which has been conventionally used as a low-temperature showcase constitutes a machine chamber below a storeroom constituted in a heat insulating case, and a cold air discharge opening
15 and a cold air suction opening communicating with the inside of the machine chamber are formed on a bottom wall of the heat insulating case. A refrigerating box having an opening on an upper surface thereof is provided in contact with the bottom wall of the heat insulating case in the
20 machine chamber, and a evaporator and a refrigerating fan constituting a refrigerating unit are arranged in this refrigerating box. Further, the inside of the storeroom communicates with the refrigerating box through the cold air suction opening and the cold air discharge opening.
25 Furthermore, a compressor, a condenser, a condenser fan and the like as well as the evaporator constituting the refrigerating unit are arranged on an attachment base

provided with movement casters on a bottom surface on the lower side of the refrigerating box of the machine chamber, thereby constituting a known refrigerant circuit.

Moreover, the refrigerating box is provided at an upper portion of the attachment base and can be attached to/detached from the bottom surface of the heat insulating case. The refrigerating box, the evaporator, the refrigerating fan, the compressor, the condenser and the like can be freely accommodated in or removed from the machine chamber together with the attachment base by utilizing the casters, and the refrigerating unit can be separated from the heat insulating case (see, e.g., Japanese Patent Application Laid-open No. 2000-105058).

However, in the conventional structure mentioned above, since cold air leaks from a gap generated between the upper surface opening of the refrigerating box and the cold air discharge opening and the cold air suction opening, the refrigerating box having the evaporator and the refrigerating fan are arranged therein must be lifted up and fixed to the bottom wall of the heat insulating case by using a fixture or the like after the attachment base is accommodated in the machine chamber. There is, therefore, a problem that a refrigerating unit attachment operability becomes complicated. Additionally, at this moment, the refrigerating box must be fixed at a position corresponding to the cold air suction opening and the cold air discharge opening formed on the bottom wall of the heat insulating

case, and hence there is a problem that positioning is hard and the operability is further deteriorated.

SUMMARY OF THE INVENTION

5 In order to solve the technical problems in the prior art, it is, therefore, an object of the present invention to provide a refrigerating storage which can attach a refrigerating unit having a compressor, a condenser, a refrigerating box and others integrated
10 therein on a bottom wall of a heat insulating case without trouble, and constitute a cold air circulation which discharges cold air subjected to heat exchange with a evaporator into a storeroom from a cold air discharge opening and sucks it from a cold air suction opening into a
15 refrigerating chamber, thereby refrigerating the storeroom.

 According to the present invention, there is provided a refrigerating storage which constitutes a machine chamber below a storeroom constituted in a heat insulating case, comprising: a refrigerating unit in which
20 a evaporator and a fan accommodated in a refrigerating chamber constituted in a refrigerating box, a compressor, a condenser and others are provided and integrated; a cold air discharge opening and a cold air suction opening which are formed on a bottom wall of the heat insulating case
25 which serves as a ceiling of the machine chamber, and cause the inside of the storeroom with the inside of the machine chamber; a pair of suspension rails respectively provided

at upper portions on both sides of the refrigerating unit;
and a pair of support rails which are positioned on both
sides of the cold air discharge opening and the cold air
suction opening and provided on the bottom wall of the heat
5 insulating case, wherein a discharge side and a suction
side of the refrigerating chamber correspond to a lower
side of the cold air discharge opening and the cold air
suction opening in a state where the suspension rails are
supported on the support rails, and a push-up mechanism
10 which pushes up the refrigerating unit in a direction of
the bottom wall in this state is provided.

According to the refrigerating storage of the
present invention, the refrigerating unit can be pushed up
to the heat insulating case side, and the refrigerating box
15 can be pressed to the bottom wall side of the heat
insulating box. As a result, the refrigerating unit having
the compressor, the condenser, the refrigerating box and
others integrated therein can be attached to the bottom
wall of the heat insulating case without trouble, a cold
20 air circulation which discharges cold air subjected to heat
exchange with the evaporator into the storeroom from the
cold air discharge opening and sucks it from the cold air
suction opening into the refrigerating chamber can be
constituted, thereby refrigerating the storeroom. In
25 particular, since the pair of suspension rails are provided
at upper portions on both sides of the refrigerating units
and the suspension rails are supported on the support rails

on the bottom wall of the heat insulating case, end portions of the suspension rails can be mounted and slid on the support rails, thereby facilitating the refrigerating unit attachment operation.

5 Further, according to the refrigerating storage of the present invention, in the above-described invention, the cold air suction opening on the bottom wall of the heat insulating case is formed an inclined wall whose front portion is inclined low toward the rear side.

10 According to this invention, in addition to the above-described invention, since the cold air suction opening on the bottom wall of the heat insulating case is formed the inclined wall whose front portion is inclined low toward the rear side, cold air on the front side in the
15 heat insulating case can be effectively led into the refrigerating chamber.

 Furthermore, according to the refrigerating storage of the present invention, in the above-described invention, the cold air suction opening on the bottom wall
20 of the heat insulating case is formed an inclined wall whose front and rear walls are inclined low toward the inner side.

 According to this invention, in addition to the above-described invention, since the cold air suction
25 opening on the bottom wall of the heat insulating case is formed the inclined wall whose front and rear walls are inclined low toward the inner side, the cold air suction

opening formed to the refrigerating box can be formed small, thereby reducing a size of the refrigerating unit itself.

Moreover, according to the refrigerating storage of the present invention, in each of the foregoing

5 inventions, the push-up mechanism is provided to the support rails, comes into contact with the suspension rails and pushes up both end portions of the suspension rails in the longitudinal direction in cooperation with the suspension rails.

10 According to this invention, in addition to the above-described invention, since the push-up mechanism is provided to the support rails, is in contact with the suspension rails and pushes up both end portions of the suspension rails in the longitudinal direction in
15 cooperation with the suspension rails, the suspension rails can be supported on the support rails, and both end portions of the refrigerating unit on the both sides can be simultaneously pushed up in a state that the discharge side and the suction side of the refrigerating chamber
20 respectively correspond to the cold air discharge opening and the cold air suction opening lower side. As a result, the push-up operation can be smoothly performed, and the sealing properties between the refrigerating box and the heat insulating case become excellent.

25 Additionally, according to the refrigerating storage of the present invention, in the above-described invention, the push-up mechanism includes push-up arms each

of which is attached to each of the support rails by a swiveling shaft at an upper end portion so as to be capable of swiveling and has a predetermined length dimension, the push-up arm has a cam surface which has a variable radius from the swiveling shaft and comes into contact with each of the suspension rails, and each of the suspension rails is pushed up when the cam surface at a part where the radius from the swiveling shaft becomes large upon swiveling comes into contact with each of the suspension rails.

According to this invention, in addition to the above-described invention, the push-up mechanism comprises the push-up arms which are attached to the support rails by swiveling shafts at the upper end portions so as to be capable of swiveling and have a predetermined length dimension, each push-up arm has a cam surface which has a variable radius from the swiveling shaft and comes into contact with each suspension rail, and each suspension rail is pushed up when the cam surface at a part where the radius from the swiveling shaft becomes large upon swiveling comes into contact with each suspension rail. Therefore, the weighty refrigerating unit can be readily pushed up by utilizing the rotation of the cam surface of each push-up arm and applying the principle of leverage.

Further, according to the refrigerating storage of the present invention, in the above-described invention, the push-up arms are respectively attached at the both end

portions of the support rails in the longitudinal direction, and coupled with each other through a link arm for linkage.

According to this invention, in addition to the above-described invention, since the push-up arms are
5 respectively attached to the both end portions of the support rails in the longitudinal direction and coupled with each other through a link arm for linkage, the push-up arms positioned at the both end portions of the support rails in the longitudinal direction can cooperate with each
10 other by the link arm, and the both end portions of the refrigerating unit on the both sides can be simultaneously pushed up.

Furthermore, according to the refrigerating storage of the present invention, in each of the above-
15 described inventions, a guide member is provided to a bottom portion of the machine chamber, and the suspension rails are placed on an upper side of the support rails in a state where a bottom portion of the refrigerating unit has moved on the guide member.

20 According to this invention, in addition to each of the above-described inventions, since the guide member is provided on a bottom portion of the machine chamber and the suspension rails are positioned on the upper side of the support rails with the bottom portion of the
25 refrigerating unit having been moved on the guide member, positioning of the refrigerating unit and the operation which causes the suspension rails to be supported on the

support rails can be simultaneously performed, thereby further facilitating the refrigerating unit attachment operation.

Moreover, according to the refrigerating storage
5 of the present invention, in each of the above-described inventions, stoppers which prevent the suspension rails from moving in the longitudinal direction in a state where the refrigerating unit is pushed up are provided at the both end portions of the support rails in the longitudinal
10 direction.

According to this invention, in addition to each of the foregoing inventions, since the stoppers which prevent the suspension rails from moving in the longitudinal direction with the refrigerating unit being
15 pushed up are provided at the both end portions of the support rails in the longitudinal direction, accurate positioning of the refrigerating unit can be effected, and displacement in the front-and-back direction after attachment can be avoided.

20 Additionally, according to the refrigerating storage of the present invention, in each of the above-described inventions, a suction opening cover which prevents short circuit of cold air from the cold air discharge opening is attached on the storeroom side of the
25 cold air suction opening.

According to this invention, in addition to each of the foregoing inventions, since a suction opening cover

which prevents short circuit of cold air from the cold air discharge opening is attached on the storeroom side of the cold air suction opening, short circuit of cold air from the cold air discharge opening can be suppressed, and the entire storeroom can be excellently cooled.

Further, according to the refrigerating storage of the present invention, in each of the above-described inventions, the plurality of cold air discharge openings and cold air suction openings are formed on the bottom wall of the heat insulating case, and the plurality of refrigerating units corresponding to the respective cold air discharge openings and cold air suction openings are attached.

According to this invention, in addition to each of the foregoing inventions, since the plurality of cold air discharge openings and cold air suction openings are formed on the bottom wall of the heat insulating case and the plurality of refrigerating units corresponding to the respective cold air discharge openings and cold air suction openings are attached, the plurality of refrigerating units can be attached in accordance with a capacity of the storeroom. Furthermore, the storeroom can be partitioned so that respective partitioned rooms can be cooled at different temperatures by the different refrigerating units.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view of a refrigerating storage;

FIG. 2 is a perspective front view of a lower portion of the refrigerating storage;

FIG. 3 is a vertical sectional side view of the refrigerating storage;

5 FIG. 4 is a perspective view of a refrigerating unit;

FIG. 5 is a vertical sectional side view of the refrigerating storage;

10 FIG. 6 is a perspective view of a suction opening cover;

FIG. 7 is a partially enlarged perspective view of a lower portion of the refrigerating storage;

FIG. 8 is a perspective view of a bottom wall depicted in FIG. 7;

15 FIG. 9 is a perspective view of close fixing mechanism components;

FIG. 10 is a perspective view showing FIG. 9 from a different direction;

20 FIG. 11 is a partially enlarged side view showing a state in which a push-up mechanism is lowered;

FIG. 12 is a partially enlarged side view showing a state in which the push-up mechanism is pushed up;

FIG. 13 is a vertical sectional front view of FIG. 11;

25 FIG. 14 is a vertical sectional front view of FIG. 12;

FIG. 15 is a perspective view of right and left

guide members;

FIG. 16 is a cross-sectional view of the guide member;

FIG. 17 is a plan view of the guide member;

5 FIG. 18 is a side view of the guide member;

FIG. 19 is a side view when the refrigerating unit is accommodated;

FIG. 20 is a front view when the refrigerating unit is accommodated;

10 FIG. 21 is a perspective view of the lower portion of the refrigerating storage in a state where the push-up mechanism is lowered;

FIG. 22 is a perspective view of the lower portion of the refrigerating storage in a state where the push-up mechanism is pushed up; and

15 FIG. 23 is an enlarged perspective view of a lower portion of a refrigerating storage according to another embodiment.

20 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Embodiments according to the present invention will now be described in detail hereinafter with reference to the accompanying drawings.

25 A main body of a refrigerating storage 1 according to an embodiment comprises a rectangular heat insulating case 2 which is opened to the front side. This heat insulating case 2 comprises an outer box 3 which has an

opening on a front surface thereof and formed of a copper plate, an inner box 4 which has an opening on a front surface thereof, and a heat insulating material 5 which is foamed and filled between the inner and outer boxes 3 and 4.

5 Further, a storeroom 6 which is opened to the front side is formed in the heat insulating case 2, and the front opening of the storeroom 6 is closed by glass doors 7 and 7 through which the inside can be seen so that the front opening can be opened/closed without restraint. The glass doors 7 and

10 7 are sliding type doors which can slide in a right-and-left direction without restraint. Furthermore, a plurality of shelf boards 11 ... on which food products and others are placed are installed on a shelf catch 9 in the storeroom 6.

A base leg angle 12 having a predetermined height is attached on a bottom surface of the heat insulating case 12, and both side surfaces of the base leg angle 12 as well as both side surfaces of the heat insulating case 2 are covered with each face panel 13. As a result, a machine chamber 21 is formed at a lower portion of the heat

20 insulating case 2. It is to be noted that guide members 62 and 62 which will be described in detail later are attached to a front lower side of the base leg angle 12 constituting a bottom portion of this machine chamber 21. Moreover, a cold air suction opening 14 and a cold air discharge

25 opening 15 are formed in a front-and-back direction in such a manner that they pierce the heat insulating material 5. This cold air suction opening 14 is formed as an inclined

wall 14A that a front edge portion and a rear edge portion thereof are formed low at a slant toward the inner side as shown in FIG. 3.

A refrigerating box 22 having an opening on an upper surface thereof is provided in contact with a lower surface of a bottom wall 2A of the heat insulating case 2 which serves as a ceiling of the machine chamber 21. A refrigerating chamber 23 is formed in this refrigerating box 22, a evaporator 24 constituting a refrigerating device is provided in the refrigerating chamber 23, and a refrigerating fan 25 is provided on the front side of the evaporator 24. It is to be noted that a cold air suction opening 27 and a cold air discharge opening 28 on the refrigerating box 22 side are formed by such a partition plate 26 as shown in FIG. 4. These cold air suction opening 27 and cold air discharge opening 28 correspond to the cold air suction opening 14 and the cold air discharge opening 15 formed on the bottom wall 2A of the heat insulating case 2, respectively. Additionally, a sealing material 29 which is appressed against and in contact with the lower surface of the bottom wall 2A of the heat insulating case 2 is attached at an opening edge of the refrigerating box 22. It is to be noted that a mechanism which closely fixes the upper surface of the refrigerating box 22 to the lower surface of the bottom wall 2A of the heat insulating case 2 will be described later in detail.

On the other hand, a partition plate 31

constituting a duct 30 which causes the cold air discharge opening 15 formed on the bottom wall 2A to communicate with the upper portion of the storeroom 6 is attached on the inner side of a rear wall 2B of the heat insulating case 2.

5 A plurality of non-illustrated openings which supply cold air discharged from the refrigerating fan 25 are formed on this partition plate 31. As a result, cold air can be effectively supplied into the storeroom 6. It is to be noted that an engagement portion with which the shelf
10 boards 11 are engaged together with the shelf catch 9 may be formed to this partition plate 31.

Further, in this embodiment, such a suction opening cover 40 as shown in FIG. 6 is attached on the bottom wall 2A of the heat insulating case 2 in accordance
15 with a position at which the cold air suction opening 14 is formed. This suction opening cover 40 is a rectangular member which is opened to the lower side and formed of a copper plate, and a plurality of suction holes 41 are formed on a front surface, an upper surface and both side
20 surfaces except a rear end surface, an upper rear portion and both side rear portions. As a result, suction of cold air from the rear portion of the suction opening cover 40 can be suppressed. Therefore, cold air discharged from the cold air discharge opening 15 formed behind the cold air
25 suction opening 14 can suppress short circuit of cold air directly sucked from the cold air suction opening 14, thereby excellently refrigerating the entire storeroom 6.

Furthermore, this suction opening cover 40 can suppress an inconvenience that commercial products and others placed in the storeroom 6 fall into the cold air suction opening 14.

On the other hand, an attachment base 32 which
5 constitutes a bottom portion of a refrigerating unit R is accommodated in the machine chamber 21, and a compressor 33 (which is shown in FIG. 4 only), a condenser 34, a condenser fan 35, a non-illustrated control box as well as the evaporator 24 and the like which constitute a
10 refrigerating device are provided on this attachment base 32. Moreover, a panel 36 which can be opened/closed is attached on the front surface of the machine chamber 21, and covers the machine chamber 21. It is to be noted that a plurality of air holes 37 are formed to this panel 36 in
15 accordance with the front side of the condenser 34.

In this example, the evaporator 24 in the refrigerating box 22 is connected with the compressor 33, the condenser 34 and the like on the attachment base 32 through a refrigerating pipe arrangement, thereby
20 constituting a known refrigerant circuit. Additionally, the refrigerating box 22 is detachably held by refrigerating box supports 38 ... respectively provided at positions corresponding to four corners of the lower surface of the refrigerating box 22. As a result, the
25 refrigerating unit R comprising the refrigerating box 22, the evaporator 24, the refrigerating fan 25, the compressor 33, the condenser 34 and the like can be accommodated

in/removed from the machine chamber 21 together with the attachment base 32, and separated from the heat insulating case 2.

A mechanism which closely fixes the refrigerating box 22 to the lower surface of the bottom wall 2A of the heat insulating case 2 mentioned above will now be described with reference to FIGS. 7 to 14. FIG. 7 is a partially enlarged perspective view of a lower portion of the refrigerating storage 1, FIG. 8 is a perspective view of the bottom wall 2A depicted in FIG. 7, FIG. 9 is a perspective view of close fixing mechanism components, FIG. 10 is a perspective view showing FIG. 9 from a different direction, FIG. 11 is a partially enlarged side view showing a state where a push-up mechanism 55 is lowered, FIG. 12 is a partially enlarged side view showing a state where the push-up mechanism 55 is pushed up, FIG. 13 is a vertical sectional front view of FIG. 11, and FIG. 14 is a vertical sectional front view of FIG. 12.

A close fixing mechanism which closely fixes the refrigerating box 22 to the lower surface of the bottom wall 2A comprises a pair of suspension rails 45 and 45, a pair of support rails 51 and 51, and a push-up mechanism 55. The suspension rails 45 and 45 are rail members which are fixed at upper portions on both sides of the refrigerating unit R, i.e., upper portions on both sides of the refrigerating box 22, and each suspension rail 45 has a substantially-U-shaped cross section which is opened to the

lower side as shown in FIG. 9. A plurality of screw holes 45B are formed on a side surface 45A of the suspension rail 45 positioned on the refrigerating box 22 side, and this suspension rail 45 is fixed to the refrigerating box 22 by screw members 46 (shown in FIGS. 13 and 14 only).

The support rails 51 and 51 are rail members which are positioned on both sides of the cold air suction opening 14 and the cold air discharge opening 15 and fixed to the lower surface of the bottom wall 2A of the heat

insulating case 2, and each support rail 51 has a substantially-U-shaped cross section which is opened to the upper side as shown in FIG. 9. Furthermore, an upper end

of a side surface 51A of the support rail 51 positioned on the opposite side of the refrigerating box 22 is formed to be higher than an upper end of a side surface 51B

positioned on the refrigerating box 22 side by a predetermined dimension, and has an attachment surface 51C bent outwards at substantially right angle formed thereto.

A plurality of screw holes 51D are formed on the attachment surface 51C, and the support rail 51 is fixed to the lower surface of the bottom wall 2A of the heat insulating case 2 by screw members 52 (shown in FIGS. 13 and 14 only). It is

assumed that, at this moment, the support rails 51 and 51 are attached at positions where the cold air suction opening 27 and the cold air discharge opening 28 correspond to the lower side of the cold air suction opening 14 and the cold air discharge opening 15 of the storeroom 6 with

the suspension rails 45 and 45 being supported.

Moreover, a plurality of, which is two in this embodiment, screw holes 51E which are used to attach the push-up mechanism 55 are formed at front and rear end portions of the side surface 51B positioned on the refrigerating box 22 side. Additionally, stoppers 53 and 54 are formed at a front end and a rear end of this support rail 51 from the side surface 51A toward the side surface 51B side.

In this embodiment, the push-up mechanism 55 comprises push-up arms 56 and 56 two of which are attached at each of front and rear ends of each support rail 51 in a front-and-back direction, and a link arm 57 which swivels the push-up arms 56 and 56 attached in the front-and-back direction in cooperation therewith. The push-up arm 56 is an arm member having a predetermined length dimension, and a shaft hole 56A through which a swiveling shaft 58 can be inserted is formed at an upper end portion of the push-up arm 56. This shaft hole 56A is fastened with a screw hole 51E formed to the support rail 51 by the swiveling shaft 58 so as to be capable of swiveling.

Further, a cam surface 56B which can swivel around the swiveling shaft 58 is formed at the upper end portion of the push-up arm 56, and this cam surface 56B comes into contact with an upper wall of the suspension rail 54 in a state where the suspension rail 45 is supported on the support rail 51. Furthermore, the cam surface 56B is

formed in such a manner that its radius from the swiveling shaft 58 is increased as the push-up arm 56 swivels frontward around the swiveling shaft 58. Therefore, as shown in FIGS. 11 and 13, after each push-up arm 56 is set

5 in a vertical state and each suspension rail 45 is supported on each suspension rail 51, each push-up arm 56 is swiveled frontward around the swiveling shaft 58 to enter a horizontal state. As a result, as shown in FIGS. 12 and 14, the suspension rail 45 which is in contact with the cam surface 56B is pushed up by an amount corresponding to an increase in radius of the cam surface 56B.

10 It is to be noted that a horizontal surface is formed to each of the upper end and the front surface of the push-up arm 56 constituting the cam surface 56B, and hence the suspension rail 45 can be stably held when the push-up arm 56 is set in the substantially vertical state and the substantially horizontal state. That is, when the push-up arm 56 is set in the substantially horizontal state, the suspension rail 45 is separated from the support rail 51 and held on the cam surface 56B of the push-up arm 56 only. However, the suspension rail 45 can be stably held in a state where the suspension rail 45 is being pushed up.

Moreover, a link arm attachment portion 56C which is, e.g., substantially perpendicularly bent to the suspension rail 45 side and then substantially perpendicularly bent to the rear side is formed at the rear end of the push-up arm 56 as shown in FIG. 10. A screw

hole 56D is formed to each link arm attachment portion 56C so that the link arm 57 is fixed over the link arm attachment portions 56C and 56C of the front and rear push-up arms 56 and 56 by screw members 60 and 60.

5 As a result, the front and rear push-up arms 56 and 56 are coupled with each other through the link arm 57, and hence the rear push-up arm 56 can be smoothly operated in cooperation with the front push-up arm 56 by manipulating the front push-up arm 56.

10 A guide member 62 provided to the bottom portion of the machine chamber 21 will now be described with reference to FIGS. 15 to 18. FIG. 15 is a perspective view of right and left guide members 62, FIG. 16 is a cross-sectional view of the guide member 62, FIG. 17 is a plan
15 view of the guide member 62, and FIG. 18 is a side view of the guide member 62. The guide member 62 is provided at a front lower side of the base leg angle 12 constituting the bottom portion of the machine chamber 21 and at a position corresponding to each of both side ends of the attachment
20 base 32 of the refrigerating unit R, and the guide member 62 comprises a plate-like member formed of a copper plate. This guide member 62 comprises an attachment surface 62A fixed at a front lower side of a base leg angle 12 constituting the bottom portion of the machine chamber 21,
25 an inclined surface 62B formed by substantially perpendicularly bending a side end of the attachment surface 62A, a support surface 62C formed by substantially

perpendicularly bending a side end of the inclined surface 62B, a guide surface 62D formed by substantially perpendicularly bending a side end of the support surface 62C.

5 Screw holes 62E which are used to fix the guide member 62 to the base leg angle 12 by screwing are formed to the attachment surface 62A in a front-and-back direction. An upper end of the inclined surface 62B is formed to be greatly increased from the front side toward the rear side, and the support surface 62C is also formed to be greatly inclined from the front side toward the rear side. It is to be noted that a gradient of this support surface 62C is formed to have such a height that a rear end of each suspension rail 45 attached to the refrigerating unit R matches with a front end of each support rail 51 fixed to the heat insulating case 2 when the refrigerating unit R set on the front end is pushed up along the support surface 62C.

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20 A description will now be given as to an operation of accommodating the refrigerating unit R in the machine chamber 21 and fixing the refrigerating box 22 based on the above-mentioned structure with reference to FIGS. 19 to 22. First, as shown in FIG. 19, both rear ends of the attachment base 32 of the refrigerating unit R are mounted on the respective guide members 32 fixed to the base leg angle 12. It is to be noted that the refrigerating unit R can be mounted on the guide members 32 by just lifting up a

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part of the attachment base 32 to a small elevation, and hence the burden of an assembling operation can be alleviated.

Thereafter, the refrigerating unit R can be
5 accommodated in the machine chamber 21 by moving up the refrigerating unit R along the support surface 62C of each guide member 32. At this moment, since the support surface 62C is formed to be greatly inclined from the front side toward the rear side, the rear end of each suspension rail
10 45 attached to the refrigerating unit R can be smoothly placed on the upper side of the front portion of each support rail 51 fixed to the heat insulating case 2. As a result, positioning of the refrigerating unit R and the operation of supporting each suspension rail 45 on the
15 support rail 51 can be simultaneously performed by just sliding the refrigerating unit R toward the rear side along the guide members 32, thereby facilitating the operation of attaching the refrigerating unit R.

The refrigerating unit R is slid toward the rear
20 side until the rear end of the suspension rail 45 on the refrigerating unit R side comes into contact with the stopper 54 formed at the rear end of the support rail 51 on the heat insulating case 2 side (see FIG. 21). As a result, accurate positioning can be effected so that the cold air
25 suction opening 27 and the cold air discharge opening 28 formed to the refrigerating box 22 of the refrigerating unit R correspond to the lower side of the cold air suction

opening 14 and the cold air discharge opening 15 formed on the bottom wall 2A of the heat insulating case 2. It is possible to simplify the attachment operation and suppress leakage of cold air due to displacement in the front-and-back direction after fixing the refrigerating box 22.

Furthermore, in a state where the cold air suction opening 27 and the cold air discharge opening 28 of the refrigerating box 22 are positioned on the lower side of the cold air suction opening 14 and the cold air discharge opening 15 of the bottom wall 2A, such right and left push-up arms 56 constituting the push-up mechanism 55 as described above are substantially perpendicularly swiveled frontward. At this moment, since the right and left push-up arms 56 and 56 are respectively coupled with the push-up arms 56 and 56 provided on the rear side through the link arm 57, the push-up arms 56 ... provided at four positions can be swiveled by simultaneously operating the right and left push-up arms 56 and 56.

As a result, each suspension rail 45 supported on the support rail 51 is pushed up by an amount corresponding to a fluctuation in radius of the cam surface 56B of each push-up arm 56 from the swiveling shaft 58 as described above (see FIG. 22). Consequently, the refrigerating box 22 to which each suspension rail 45 is attached is also pushed up, and the upper surface opening of the refrigerating box 22 can come into contact with the lower surface of the bottom wall 2A of the heat insulating case 2.

At this moment, since the sealing material 29 is disposed to the opening edge of the refrigerating box 22 as described above, the upper surface opening of the refrigerating box 22 can be closely pressed against the bottom wall 2A by expansion and contraction of the sealing material 29.

Therefore, the refrigerating unit R in which the compressor 33, the condenser 34, the refrigerating box 22 and the like are integrated can be attached to the bottom wall 2A of the heat insulating case 2 without trouble, and a cold air circulation which discharges cold air subjected to heat exchange with the evaporator 24 into the storeroom 6 from the cold air discharge opening 15 by the refrigerating fan 25 and sucks cold air into the refrigerating chamber 23 from the cold air suction opening 14 can be constituted, thereby refrigerating the inside of the storeroom 6. In particular, since the end portion of each suspension rail 45 attached at upper portions on both sides of the refrigerating unit R can be mounted and slid on each support rail 51 attached to the bottom wall 2A of the heat insulating case 2, the operation of attaching the refrigerating unit R can be also facilitated.

Moreover, in this embodiment, the cold air suction opening 14 formed on the bottom wall 2A of the heat insulating case 2 is formed the inclined wall 14A that the front and rear edge portions thereof are inclined low toward the inner side, cold air on the front side of the

storeroom 6 can be effectively led into the refrigerating chamber 23. Additionally, the cold air suction opening 14 on the refrigerating chamber 23 side can be reduced in size with respect to the storeroom 6 side, and hence the cold
5 air suction opening 27 on the refrigerating box 22 side which communicates with the cold air suction opening 14 can be also reduced in size, thereby minimizing the entire refrigerating unit R.

Further, since the push-up arms 56 constituting
10 the push-up mechanism 55 are constituted in such a manner that they push up the both end portions of each suspension rail 45 in the longitudinal direction in cooperation with each other by the link arm 57, each suspension rail 45 can
15 be supported on each support rail 51, and the both end portions on the both sides of the refrigerating unit R can be simultaneously pushed up in a state where the cold air discharge opening 28 and the cold air suction opening 27 of
20 the refrigerating chamber 23 correspond to the lower side of the cold air suction opening 14 and the cold air discharge opening 15 of the heat insulating case 2. The push-up operation can be smoothly carried out, and the sealing properties between the refrigerating box 22 and the heat insulating case 2 become excellent.

Particularly, in this embodiment, the push-up
25 mechanism 55 is such a mechanism as that a radius of each push-up arm 56 from the swiveling shaft 58 varies, the push-up arm 56 has the cam surface 56B which comes into

contact with the suspension rail 45, and the suspension rail 45 is pushed up when the cam surface 56B at the part where the radius from the swiveling shaft 58 becomes large upon swiveling comes into contact with the suspension rail 45. Therefore, the weighty refrigerating unit R can be easily pushed up by utilizing rotation of the cam surface 56B of the push-up arm 56 and the principle of leverage.

Additionally, in this embodiment, in a state where the refrigerating box 22 is being pushed up by each push-up arm 56, the front end of each suspension rail 45 is restricted in movement in the front-and-back direction by the stopper 53 formed at the front end of each support rail 51, thereby enabling further stable attachment.

It is to be noted that, in this embodiment, the description has been given as to the refrigerating storage 1 in which the pair of cold suction opening 14 and the cold air discharge opening 15 are formed on the bottom wall 2A of the heat insulating case 2 and the refrigerating unit R corresponding to these openings is attached as described above, but the present invention can be also applied to an example where a storeroom in a heat insulating case 2 is divided into two storerooms 106 and 106 by a partition wall 101 and two refrigerating units R corresponding to the respective storerooms 106 and 106 are provided like such a refrigerating storage 100 as shown in FIG. 23. That is, cold air suction openings 114 and 114 and cold air discharge openings 115 and 115 corresponding to the

respective storerooms 106 and 106 are formed on the bottom wall 2A of the heat insulating case 2, and the refrigerating units R and R corresponding to these cold air suction openings and cold air discharge openings are attached like the foregoing embodiment. It is to be noted that the inside of the heat insulating case 2 is divided into two chambers and the two refrigerating units R are provided in this example, but the present invention is not restricted thereto.

10 As a result, a number of refrigerating units R can be attached in accordance with a capacity of the storeroom, and the inside of the storeroom can be partitioned so that the respective storerooms can be refrigerated at different temperatures by using different refrigerating units R.

WHAT IS CLAIMED IS:

1. A refrigerating storage which constitutes a machine chamber below a storeroom constituted in a heat insulating case, comprising:

5 a refrigerating unit in which a evaporator and a fan accommodated in a refrigerating chamber constituted in a refrigerating box, a compressor, a condenser and others are provided and integrated;

10 a cold air discharge opening and a cold air suction opening which are formed on a bottom wall of the heat insulating case which serves as a ceiling of the machine chamber, and cause the inside of the storeroom to communicate with the inside of the machine chamber;

15 a pair of suspension rails respectively provided at upper portions on both sides of the refrigerating unit; and

20 a pair of support rails which are positioned on both sides of the cold air discharge opening and the cold air suction opening and provided on the bottom wall of the heat insulating case,

25 wherein a discharge side and a suction side of the refrigerating chamber correspond to a lower side of the cold air discharge opening and the cold air suction opening in a state where the suspension rails are supported on the support rails, and a push-up mechanism which pushes up the refrigerating unit in a direction of the bottom wall in this state is provided.

2. The refrigerating storage according to claim 1, wherein the cold air suction opening on the bottom wall of the heat insulating case is formed as an inclined wall whose front portion is inclined low toward the rear side.

5 3. The refrigerating storage according to claim 1, wherein the cold air suction opening on the bottom wall of the heat insulating case is formed as an inclined wall whose front and rear walls are inclined low toward the inner side.

10 4. The refrigerating storage according to claim 1, claim 2 or claim 3, wherein the push-up mechanism is provided to the support rails, comes into contact with the suspension rails and pushes up both end portions of the suspension rails in the longitudinal direction in cooperation with the suspension rails.

15 5. The refrigerating storage according to claim 4, wherein the push-up mechanism includes push-up arms each of which is attached to each of the support rails by a swiveling shaft at an upper end portion so as to be capable of swiveling and has a predetermined length dimension, the
20 push-up arm has a cam surface which has a variable radius from the swiveling shaft and comes into contact with each of the suspension rails, and each of the suspension rails is pushed up when the cam surface at a part where the
25 radius from the swiveling shaft becomes large upon swiveling comes into contact with each of the suspension rails.

6. The refrigerating storage according to claim 5, wherein the push-up arms are respectively attached at the both end portions of the support rails in the longitudinal direction, and coupled with each other through a link arm
5 for linkage.

7. The refrigerating storage according to claim 1, claim 2, claim 3, claim 4, claim 5 or claim 6, wherein a guide member is provided to a bottom portion of the machine chamber, and the suspension rails are placed on an upper
10 side of the support rails in a state where a bottom portion of the refrigerating unit has moved on the guide member.

8. The refrigerating storage according to claim 1, claim 2, claim 3, claim 4, claim 5, claim 6 or claim 7, wherein stoppers which prevent the suspension rails from
15 moving in the longitudinal direction in a state where the refrigerating unit is pushed up are provided at the both end portions of the support rails in the longitudinal direction.

9. The refrigerating storage according to claim 1, claim 2, claim 3, claim 4, claim 5, claim 6, claim 7 or
20 claim 8, wherein a suction opening cover which prevents a short circuit of cold air from the cold air discharge opening is attached on the storeroom side of the cold air suction opening.

10. The refrigerating storage according to claim 1, claim 2, claim 3, claim 4, claim 5, claim 6, claim 7, claim
25 8 or claim 9, wherein the plurality of cold air discharge

openings and cold air suction openings are formed on the bottom wall of the heat insulating case, and the plurality of refrigerating units corresponding to the respective cold air discharge openings and cold air suction openings are attached.

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