

DESCRIPTION

TITLE OF THE INVENTION: PACKAGE-TYPE COMPRESSOR

TECHNICAL FIELD

[0001]

The present invention relates to a package-type compressor.

BACKGROUND ART

[0002]

A package-type compressor is known in which various mechanisms for driving the compressor are accommodated in a package to improve transportation and installation convenience. For example, Patent Document 1 discloses a package-type compressor in which a compressor main body, a motor that drives the compressor main body, a gas-cooling type heat exchanger that cools compressed air, and the like are accommodated in a package.

PRIOR ART DOCUMENT

PATENT DOCUMENT

[0003]

Patent Document 1: JP 2015-172371 A

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0004]

In a package-type compressor, an intake port is formed in a package, and various mechanisms in the package are

cooled by air taken in from the intake port. However, in the package-type compressor of Patent Document 1, an intake port is small and depends on the outer shape of the motor. Therefore, the package-type compressor of Patent Document 1 has room for improvement from the viewpoint of intake performance and cooling performance.

[0005]

An object of the present invention is to improve intake performance and cooling performance in a package-type compressor.

MEANS FOR SOLVING THE PROBLEMS

[0006]

The present invention provides a package-type compressor including a box-shaped package having an intake port and an exhaust port, a compressor main body that compresses gas in the package, a motor that drives the compressor main body in the package, a gas-cooling type heat exchanger that exchanges heat between cooling gas taken in from the intake port and exhausted from the exhaust port and compressed gas compressed by the compressor main body to cool the compressed gas in the package, a cooling fan that blows air toward the gas-cooling type heat exchanger in the package, and an intake duct member constituting at least part of an intake flow path that is a flow path of the cooling gas and extends from the intake port into the package,

wherein the intake port is provided over a generally entire length of a side face of the package in a height direction.

[0007]

According to this configuration, the gas is compressed by the compressor main body driven by the motor in the package. The compressed gas rises in temperature due to the compression heat, but is cooled by the gas-cooling type heat exchanger and supplied to a supply destination outside the package. The cooling gas is taken in from the intake port through the intake flow path. The cooling gas cools various mechanisms in the package, and is blown toward the gas-cooling type heat exchanger by the cooling fan. In the gas-cooling type heat exchanger, the cooling gas and the compressed gas exchange heat, the compressed gas is cooled, and the cooling gas is heated. The cooling gas used for cooling the compressed gas in the gas-cooling type heat exchanger is exhausted from the exhaust port. In such a package-type compressor, since the intake port is provided over the generally entire length of the side face of the package in the height direction, a sufficient amount of intake air can be secured. Therefore, intake performance can be improved, and a significant rise in temperature in the package can be suppressed by sufficient intake air, so that cooling performance can be improved.

[0008]

The generally entire length of the intake port in the height direction may be 50% or more of an entire length of the side face of the package in the height direction.

[0009]

According to this configuration, intake performance and cooling performance suitable for the package-type compressor can be achieved.

[0010]

The intake port and the intake flow path may be partitioned into a plurality of divided intake ports and a plurality of divided intake flow paths by the intake duct member, and the intake duct member may be disposed such that the compressor main body and the cooling fan cannot be directly viewed even when an inside of the package is viewed from an outside through at least one of the divided intake ports and at least one of the divided intake flow paths.

[0011]

According to this configuration, the intake duct member is disposed such that a noise source such as the compressor main body and the cooling fan cannot be directly viewed even when the inside of the package is viewed from the outside through at least one of the divided intake ports and at least one of the divided intake flow paths. In other words, since the intake duct member is disposed between the divided intake ports and the noise source, noise from the

noise source will go around the intake duct member to leak out of the package. Therefore, the noise from the noise source can be prevented from directly leaking from the divided intake ports, so that the quietness of the package-type compressor can be improved. Specifically, when a large intake port extending over the entire length in the height direction of the side face of the package is provided as described above, noise leaking through the intake port may also increase, and thus the above configuration is effective for a package-type compressor having such a large intake port.

[0012]

At least one of the divided intake flow paths may include the intake duct member and an inner face of the package.

[0013]

According to this configuration, since the at least of one of the divided intake flow paths is not composed of only the intake duct member, the installation amount of the intake duct member can be reduced. In addition, since the inner face of the package is effectively used as a member constituting the divided intake flow paths, the package-type compressor can be downsized without requiring an additional member.

[0014]

Two adjacent paths of the divided intake flow paths partially share the intake duct member.

[0015]

According to this configuration, it is not necessary to provide the intake duct member for each of the divided intake flow paths, and the installation amount of the intake duct member can be reduced.

[0016]

At least one of the divided intake flow paths may be curved.

[0017]

According to this configuration, noise leaking out of the package through the divided intake flow paths can be prevented from linearly leaking out of the package, so that the quietness of the package-type compressor can be improved.

[0018]

The package-type compressor may further include an outer fan attached to the motor, wherein the intake flow path may extend from the intake port to the outer fan.

[0019]

According to this configuration, since the cooling gas reaches the outer fan through the intake flow path, the flow of the cooling gas in the intake flow path can be promoted by the outer fan. Therefore, the intake performance and the cooling performance can be further improved.

[0020]

The outer fan is disposed at a lower position of the package, and the plurality of divided intake ports is disposed side by side in a vertical direction, and the lower a divided intake port among the divided intake ports is disposed, the larger opening the divided intake port has.

[0021]

According to this configuration, since the lower a divided intake port among the divided intake ports is disposed, the larger opening the divided intake port has, the closer a divided intake port among the divided intake ports is to the outer fan (the end of the intake duct member) disposed at a lower position of the package, the larger the opening. Therefore, since the shorter length a divided intake flow path among the divided intake flow paths has, the more the flow rate of the cooling gas can be increased. Accordingly, the pressure loss can be reduced and the intake efficiency can be improved.

[0022]

The lower divided intake flow path, among the divided intake flow paths, the intake duct member constitutes, the larger a sound absorbing material attached to the intake duct member may be.

[0023]

According to this configuration, as described above,

when the lower a divided intake port among the divided intake ports, the larger opening the divided intake port has, noise is more likely to leak from the lower divided intake port, so that the lower the divided intake flow path among the divided intake flow paths, where noise is more likely to leak from the lower divided intake port, the larger the sound absorbing material attached, whereby noise leakage is efficiently suppressed.

[0024]

An exhaust duct that accommodates the cooling fan and extends from the motor to the gas-cooling type heat exchanger may be further included.

[0025]

According to this configuration, since the flow of the cooling gas in the package can be defined by the exhaust duct, the cooling performance can be further improved.

EFFECTS OF THE INVENTION

[0026]

According to the present invention, in the package-type compressor, since the intake port is provided over the generally entire length of the side face of the package in the height direction, the intake performance and the cooling performance can be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027]

Fig. 1 is a front perspective view of a package-type compressor according to an embodiment of the present invention;

Fig. 2 is a rear perspective view of the package-type compressor of Fig. 1;

Fig. 3 is a front view illustrating the interior of the package-type compressor viewed from a direction of an arrow A1 in Fig. 1;

Fig. 4 is a side view illustrating the interior of the package-type compressor viewed from a direction of an arrow A2 in Fig. 2;

Fig. 5 is a first perspective view illustrating an arrangement of an intake duct member in a package;

Fig. 6 is a second perspective view illustrating the arrangement of the intake duct member in the package; and

Fig. 7 is a third perspective view showing the arrangement of the intake duct member in the package.

MODE FOR CARRYING OUT THE INVENTION

[0028]

Hereinafter, embodiments of the present invention will be described with reference to the accompanying drawings.

[0029]

Referring to Figs. 1 and 2, a package-type compressor 1 of the present embodiment accommodates various mechanisms associated with driving of a compressor in a box-shaped

package 10. Hereinafter, air will be described as an example of the compressed gas, but the type of the compressed gas is not particularly limited. For convenience, a longitudinal direction of the package 10 is defined as an X direction, a direction orthogonal to the X direction in a horizontal plane is defined as a Y direction, and a height direction (vertical direction) of the package 10 is defined as a Z direction.

[0030]

The package-type compressor 1 of the present embodiment includes cooling air flow paths f1 to f3 (see Figs. 3 and 4 to be described later) through which cooling air flows, and compressed air flow paths F1 to F6 (see Figs. 3 and 4 to be described later) through which compressed air flows. The compressed air is air to be compressed by a compressor main body 20 described later. The cooling air is not air to be compressed but air for cooling various mechanisms inside the package 10.

[0031]

The package 10 is formed of a metal plate such as a steel plate, and specifically includes four side faces 11 to 14, an upper face 15, and a floor face 16 (see Figs. 3 and 4 described later). The package 10 has an intake port 11a for taking in cooling air, an exhaust port 15a for exhausting cooling air, a suction port 12a for sucking air to be compressed, and an ejection port 11b that discharges

compressed air. In other words, the cooling air flow paths f1 to f3 extend from the intake port 11a to the exhaust port 15a, and the compressed air flow paths F1 to F6 extend from the suction port 12a to the ejection port 11b.

[0032]

The intake port 11a is provided at a side face 11 of the package 10. Specifically, the intake port 11a is provided over the generally entire length of the side face 11 of the package 10 in the height direction (Z direction). The generally entire length of the intake port 11a in the height direction (Z direction) may be, for example, 50% or more or 65% or more of the height of the side face 11 of the package 10. The intake port 11a occupies about 40% of the area of the side face 11.

[0033]

The intake port 11a is formed by assembling a plurality of holes. In the present embodiment, the plurality of elliptical holes are disposed generally evenly, but a mode thereof is not particularly limited.

[0034]

The exhaust port 15a is provided generally at the center of the upper face 15 of the package 10, and occupies about 30% of the area of the upper face 15. In the present embodiment, the exhaust port 15a is formed by assembling a plurality of elliptical holes similarly to the intake port

11a, but a mode thereof is not particularly limited.

[0035]

The suction port 12a is provided at a side face 12 opposite to the side face 11 at which the intake port 11a is formed. The suction port 12a is a portion for sucking air to be compressed. Similarly to the intake port 11a and the exhaust port 15a, it is formed by assembling a plurality of elliptical holes. The suction port 12a is formed to be smaller than the intake port 11a and the exhaust port 15a. An intake port 12b for taking in cooling air is formed below the suction port 12a. In the package 10, a soundproof wall 17 (see Figs. 3 and 4) is provided adjacent to and facing the intake port 12b. The soundproof wall 17 can suppress noise from leaking from the intake port 12b. However, the intake port 12b is not necessarily provided.

[0036]

The side face 11 at which the intake port 11a is formed also has the ejection port 11b. The ejection port 11b is a portion that discharges the compressed air. The ejection port 11b is provided at the upper corner, of the side face 11 of the package 10, adjacent to the intake port 11a.

[0037]

Fig. 3 is a front view of the interior of the package 10 when viewed in a direction of an arrow A1 (see Fig. 1) with one side face 13 of two opposing side faces (side walls)

13 and 14 having no intake port 11a and no suction port 12a removed. Fig. 4 is a side view of the interior of the package 10 when viewed from a direction of an arrow A2 (see Fig. 2) with the side face (side wall) 12 removed. In Fig. 3, part of an exhaust duct 41 to be described later is also removed, and the inside of the exhaust duct 41 is shown to be visible.

[0038]

Configurations of the compressed air flow paths F1 to F6 will be described with reference to Figs. 3 and 4.

[0039]

The compressor main body 20, an oil collector 30, and a gas-cooling type heat exchanger 40 are disposed at the compressed air flow paths F1 to F6 in the package 10.

[0040]

The compressor main body 20 is fixed to the floor face 16 in the package 10, and includes a suction portion 21 and an ejection portion 22. The suction portion 21 is fluidly connected to the suction port 12a via a pipe 5a, that is, connected to the outside air. The compressor main body 20 takes in air from the suction port 12a (see arrow F1), compresses air sucked from the suction portion 21 (see arrow F2), and ejects the compressed air from the ejection portion 22 (see arrow F3). A bellows flow path unit 23 and a suction filter 24 are disposed midway along the pipe 5a fluidly

connecting the suction portion 21 and the suction port 12a. The suction port 12a, the bellows flow path unit 23, the suction filter 24, and the suction portion 21 of the compressor main body 20 are disposed in this order at the compressed air flow paths F1 and F2.

[0041]

The bellows flow path unit 23 is a box-shaped member in which an internal flow path has a bellows shape (not illustrated). Due to the bellows-like flow path, air (that is, sound waves) cannot travel linearly, and noise in the package 10 does not directly leak out of the package 10 from the suction port 12a. Preferably, a sound absorbing material is attached to the inner face of the bellows flow path unit 23. The sound absorbing material may be, for example, a nonwoven fabric formed in a mesh shape with a plurality of fibers, a porous urethane sponge, or the like. The sound absorbing material to be mentioned hereinafter may be the sound absorbing material same as the above.

[0042]

The suction filter 24 is a component that removes dust from the air sucked through the suction port 12a and the bellows flow path unit 23. The suction filter 24 can be of a general-purpose. Air from which dust was removed by the suction filter 24, is sent to the suction portion 21 of the compressor main body 20 (see arrow F2), and compressed by

the compressor main body 20.

[0043]

The compressor main body 20 of the present embodiment is of a screw type. A pair of male and female screw rotors (not illustrated) is disposed in the compressor main body 20. The screw rotor is mechanically connected to a motor 25 and can be rotationally driven. The pair of male and female screw rotors rotate while meshing with each other, whereby air is compressed in the compressor main body 20. An outer fan 26 is attached to the motor 25. In the present embodiment, the outer fan 26 is an axial fan that rotates by receiving a rotational driving force from the motor 25. The motor 25 is also fixed on the floor face 16 within the package 10, as in the compressor main body 20. Therefore, the compressor main body 20, the motor 25, and the outer fan 26 are disposed at a lower position of the package 10.

[0044]

The compressor main body 20 is of an oil supply type. Therefore, oil is supplied to the screw rotor in the compressor main body 20 for cooling, lubrication, and sealing. Here, the oil used for cooling, lubrication, and sealing is ejected together with the compressed air from the ejection portion 22 (see arrow F3). The ejection portion 22 of the compressor main body 20 is fluidly connected to the oil collector 30 through a pipe 5b, and the compressed air

containing oil is supplied to the oil collector 30 (see arrow F4).

[0045]

Referring to Fig. 4, the oil collector 30 has a generally columnar shape extending in the vertical direction (Z direction), and separates and collects oil from compressed air containing oil ejected from the compressor main body 20. The collected oil is stored in the oil collector 30 and supplied to the compressor main body 20 again. The oil collector 30 is fluidly connected to the gas-cooling type heat exchanger 40 through a pipe 5c, and the compressed air from which the oil is separated by the oil collector 30 is supplied to the gas-cooling type heat exchanger 40 through the pipe 5c (see arrow F5).

[0046]

In the gas-cooling type heat exchanger 40, heat is exchanged between the compressed air supplied through the pipe 5c and cooling air to be described later. The compressed air supplied to the gas-cooling type heat exchanger 40 is heated by the compression heat when compressed by the compressor main body 20. The cooling air supplied to the gas-cooling type heat exchanger 40 has generally the same temperature as the normal temperature air outside the package 10. Therefore, in the heat exchange in the gas-cooling type heat exchanger 40, the compressed air

is cooled and the cooling air is heated. As described later, the gas-cooling type heat exchanger 40 is disposed immediately below the exhaust port 15a, and the cooling air heated when passing through the gas-cooling type heat exchanger 40 is exhausted from the exhaust port 15a. The gas-cooling type heat exchanger 40 is fluidly connected to the ejection port 11b through a pipe 5d, and the compressed air cooled by the gas-cooling type heat exchanger 40 is ejected from the ejection port 11b and supplied to a supply destination (not shown) (see arrow F6 in Fig. 3).

[0047]

Configurations of the cooling air flow paths f1 to f3 will be described with reference to Figs. 3 and 4.

[0048]

An intake duct member 50, the outer fan 26, the motor 25, the compressor main body 20, a turbo fan (cooling fan) 42, and the gas-cooling type heat exchanger 40 are disposed at the cooling air flow paths f1 to f3 in the package 10.

[0049]

The intake duct member 50 extending into the package 10 is attached to the intake port 11a. The intake duct member 50 constitutes at least part of the intake flow path f1. Here, the intake flow path f1 is part of the cooling air flow paths f1 to f3. Specifically, the intake flow path f1 is a flow path through which cooling air passes during

intake, and extends from the intake port 11a to the outer fan 26.

[0050]

The intake port 11a is partitioned by the intake duct member 50 into a plurality of (three in the present embodiment) divided intake ports 11a1 to 11a3. The divided intake ports 11a1 to 11a3 are disposed side by side in the vertical direction (Z direction) at the side face 11 of the package 10. The lower a divided intake port among the divided intake ports 11a1 to 11a3 is disposed, the larger opening the divided intake port has (see Fig. 1). In the present embodiment, the divided intake port 11a2 at the middle stage has an opening area that is, for example, about 1.3 times as large as that of the divided intake port 11a1 at the upper stage. The divided intake port 11a3 at the lower stage has an opening area that is, for example, about 2.3 times that of the divided intake port 11a1 at the upper stage.

[0051]

The intake flow path f1 is partitioned into a plurality of (three in the present embodiment) divided intake flow paths f1-1 to f1-3 by the intake duct member 50. Specifically, the divided intake flow paths f1-1 to f1-3 are provided corresponding to the divided intake ports 11a1 to 11a3, respectively. The divided intake flow paths f1-1 to

f1-3 join together at the outer fan 26 disposed at a lower position of the package 10. Therefore, the divided intake flow path f1-1 extending from the divided intake port 11a1 at the upper stage is the longest flow path, the divided intake flow path f1-2 extending from the divided intake port 11a2 at the middle stage is the second longest flow path, and the divided intake flow path f1-3 extending from the divided intake port 11a3 at the lower stage is the shortest flow path. Details of the divided intake flow paths f1-1 to f1-3 will be described later.

[0052]

The cooling air that has reached the outer fan 26 through the divided intake flow paths f1-1 to f1-3 is blown by the outer fan 26 to cool the motor 25 and the compressor main body 20 adjacent to the outer fan 26.

[0053]

The exhaust duct 41 having a rectangular shape in plan view and extending to the gas-cooling type heat exchanger 40 in the vertical direction (Z direction) is installed in the vicinity of and above the motor 25. That is, the exhaust duct 41 extends from the motor 25 to the gas-cooling type heat exchanger 40. The turbo fan 42 which is a centrifugal blower is disposed in the exhaust duct 41. The turbo fan 42 blows air toward the gas-cooling type heat exchanger 40, and a flow direction of air in the exhaust duct 41 is defined by

the turbo fan 42. In the present embodiment, the cooling air flows from the lower side to the upper side in Fig. 3 (see arrows f2, f3).

[0054]

As described above, the gas-cooling type heat exchanger 40 is disposed immediately below the exhaust port 15 adjacent to the exhaust port 15a. Therefore, the cooling air flowing upward in the exhaust duct 41 and reaching the gas-cooling type heat exchanger 40 rises in temperature due to heat exchange in the gas-cooling type heat exchanger 40, and then is exhausted from the exhaust port 15a (see arrow f3). As described above, at this time, the compressed air exchanges heat with the cooling air to be cooled.

[0055]

The divided intake flow paths f1-1 to f1-3 will be described in detail with reference to Figs. 5 to 7. Figs. 5 to 7 are each a perspective view of the vicinity of the intake port 11a when viewed from the inside of the package 10. Fig. 6 illustrates a state in which a lid plate 53 of Fig. 5 is removed, and Fig. 7 illustrates a state in which a lid plate 54 of Fig. 6 is removed. In Figs. 5 to 7, some components may not be illustrated for clarity of illustration.

[0056]

The intake duct member 50 constitutes the intake flow path f1 extending from the intake port 11a to the outer fan

26 (see also Fig. 3). The intake duct member 50 includes two U-shaped members 51 and 52 (particularly see Fig. 7) and two lid plates 53 and 54 (particularly see Fig. 5).

[0057]

The divided intake flow path f1-3 at the lower stage having the largest flow path cross section among the divided intake flow paths is configured by the U-shaped member 52 and the lid plate 54. The U-shaped member 52 has a U-shape opened downward when viewed from the intake direction (X direction) (see Fig. 7), and is attached to the divided intake port 11a3. The lid plate 54 is attached to the U-shaped member 52 so as to face the side face 11. With this configuration, in the divided intake flow path f1-3, the cooling air taken in in the horizontal direction (X direction) from the divided intake ports 11a3 hits the lid plate 54 and changes its direction vertically downward (downward in the Z direction), then hits the floor face 16 and changes its direction horizontally (X direction), and reaches the outer fan 26 (see Fig. 3).

[0058]

The divided intake flow path f1-2 at the middle stage having the second largest flow path cross section among the divided intake flow paths is configured by the U-shaped members 51 and 52 and the lid plates 53 and 54. The U-shaped member 51 has a U-shape opened downward when viewed from the

intake direction (X direction), and is attached to the divided intake port 11a2. The lid plate 53 is attached to the U-shaped member 51 so as to face the side face 11. The U-shaped members 51 and 52 are disposed vertically adjacent to each other, and the U-shaped member 51 extends longer in the intake direction (X direction) than the U-shaped member 52 (see also Fig. 3). In the present embodiment, the lid plate 53 also constitutes part of the exhaust duct 41 and extends generally to the upper face 15 of the package 10. With this configuration, in the divided intake flow path f1-2, the cooling air taken in in the horizontal direction (X direction) from the divided intake ports 11a2 hits the lid plate 53 and changes its direction vertically downward (downward in the Z direction), then flows downward along the lid plate 54, hits the floor face 16 and changes its direction in the horizontal direction (X direction), and reaches the outer fan 26 (see Fig. 3).

[0059]

Here, the U-shaped member 52 constituting the upper face of the divided intake flow path f1-3 at the lower stage also constitutes the lower face of the divided intake flow path f1-2 at the middle stage. Therefore, two adjacent divided intake flow paths f1-2 and f1-3 partially share one U-shaped member 52. In other words, the two divided intake flow paths f1-2 and f1-3 are partially partitioned by one U-

shaped member 52.

[0060]

The divided intake flow path f1-1 at the upper stage having the smallest flow path cross section among the divided intake flow paths is configured by the U-shaped members 51 and 52, the lid plates 53 and 54, and the inner face of the package 10. With this configuration, in the divided intake flow path f1-1, the cooling air taken in in the horizontal direction (X direction) from the divided intake port 11a1 hits the lid plate 53 to be diverted to the left and right in the horizontal direction (left and right in the Y direction), then hits the inner face or the like of the package 10, changes its direction vertically downward (downward in the Z direction), flows downward along the inner face of the package 10, hits the floor face 16, changes its direction in the horizontal direction (X direction), and reaches the outer fan 26 (see Fig. 3).

[0061]

Here, the U-shaped member 51 constituting the upper face of the divided intake flow path f1-2 at the middle stage also constitutes the lower face of the divided intake flow path f1-1 at the upper stage. Therefore, two adjacent divided intake flow paths f1-1 and f1-2 partially share one U-shaped member 51. In other words, the two divided intake flow paths f1-1 and f1-2 are partially partitioned by one U-

shaped member 51.

[0062]

As described above, in the present embodiment, the divided intake flow paths f1-1 to f1-3 are not linearly formed, and the divided intake flow paths f1-1 to f1-3 are formed to be bent by the intake duct member 50. Therefore, when the inside of the package 10 is viewed from the outside through the divided intake ports 11a1 to 11a3 and the divided intake flow paths f1-1 to f1-3, a noise source (compressor main body 20, turbo fan 42, outer fan 26, oil collector 30, and various pipes 5a to 5d) is blocked by the intake duct member 50 and can not be substantially directly viewed. Specifically, when the inside of the package 10 is viewed from the outside through the divided intake ports 11a1 and 11a2 at the upper and middle stages, the noise source is blocked by the intake duct member 50, and cannot be directly viewed. However, when the inside of the package 10 is viewed from the outside through the divided intake port 11a3 at the lower stage, the outer fan 26 as the noise source and the motor 25 that can be another noise source can be directly viewed.

[0063]

A sound absorbing material 55 is attached to the inner faces of the U-shaped member 52 and the lid plate 53 constituting the divided intake flow path f1-3 at the lower

stage having the largest flow path cross section.

[0064]

The sound absorbing material 55 is attached to the inner face of the U-shaped member 51 constituting the divided intake flow path f1-2 at the middle stage having the second largest flow path cross section. In the present embodiment, the sound absorbing material 55 is not stuck to the lid plate 54, but may be attached thereto. Therefore, the sound wave traveling along the divided intake flow path f1-2 having the second largest flow path cross section among the divided intake flow paths is attenuated by the sound absorbing material 55.

[0065]

The sound absorbing material 55 is not attached to the outer face of the U-shaped member 51 constituting the divided intake flow path f1-1 at the upper stage having the smallest flow path cross section. However, the sound absorbing material 55 is attached to part of the inner face of the package 10 constituting the divided intake flow path f1-1 at the upper stage.

[0066]

Comparing the areas of the attached sound absorbing materials 55, the lower divided intake flow path, among the divided intake flow paths, the intake duct member 50 constitutes, the larger a sound absorbing material 55

attached to the intake duct member. As a result, the lower a divided intake flow path, the higher the sound absorbing effect of the sound absorbing material 55 is set. That is, the divided intake flow path having a larger flow rate of cooling air is set to have a higher sound absorbing effect.

[0067]

The package-type compressor 1 of the present embodiment has the following operational effects.

[0068]

According to the package-type compressor 1 of the present embodiment, since the intake port 11a is provided over the generally entire length of the side face 11 of the package 10 in the height direction (Z direction), a sufficient amount of intake air can be secured. Therefore, intake performance can be improved, and a significant rise in temperature in the package 10 can be suppressed by sufficient intake air, so that cooling performance can be improved.

[0069]

Preferably, the generally entire length of the intake port 11a in the height direction (Z direction) is set to 50% or more of the entire length of the side face 11 of the package 10 in the height direction (Z direction), so that intake performance and cooling performance suitable for the package-type compressor 1 can be achieved.

[0070]

In the configuration of the present embodiment, the intake duct member 50 is disposed such that the noise source cannot be directly viewed even when the inside of the package 10 is viewed from the outside via at least one of the divided intake ports and at least one of the divided intake flow paths. In other words, since the intake duct member 50 is disposed between the divided intake ports and the noise source, noise from the noise source will go around the intake duct member 50 to leak out of the package 10. Therefore, the noise from the noise source can be prevented from directly leaking from the divided intake ports, so that the quietness of the package-type compressor 1 can be improved. Specifically, when the large intake port 11a extending over the entire length of the side face 11 of the package 10 in the height direction (Z direction) is provided as described above, noise leaking through the intake port 11a may also increase. Therefore, this configuration is effective for the package-type compressor 1 having such a large intake port 11a.

[0071]

Since the divided intake flow path f1-1 is not composed of only the intake duct member 50, the installation amount of the intake duct member 50 can be reduced. In addition, since the inner face of the package 10 is effectively used

as a member constituting the divided intake flow path f1-1, the package-type compressor 1 can be downsized without requiring an additional member.

[0072]

The two adjacent divided intake flow paths f1-1 and f1-2 partially share the U-shaped member 51 (intake duct member 50), and the two adjacent divided intake flow paths f1-2 and f1-3 partially share the U-shaped member 52 (intake duct member 50). Therefore, it is not necessary to provide the intake duct member 50 for each of the divided intake flow paths, and the installation amount of the intake duct member 50 can be reduced.

[0073]

Since the divided intake flow paths f1-1 to f1-3 are curved, noise leaking out of the package 10 through the divided intake flow paths f1-1 to f1-3 can be prevented from linearly leaking out of the package 10. Therefore, the quietness of the package-type compressor 1 can be improved.

[0074]

Since the outer fan is provided and the cooling air reaches the outer fan 26 through the intake flow path f1, the flow of the cooling air in the intake flow path f1 can be promoted by the outer fan 26. Therefore, the intake performance and the cooling performance can be further improved.

[0075]

Since the lower a divided intake port among the divided intake ports is disposed, the larger opening the divided intake port has, the closer a divided intake port among the divided intake ports is to the outer fan 26 (the end of the intake duct member 50) disposed at a lower position of the package 10, the larger the opening. Therefore, since the shorter length a divided intake flow path among the divided intake flow paths has, the more the flow rate of the cooling air can be increased. Accordingly, the pressure loss can be reduced and the intake efficiency can be improved.

[0076]

As described above, when the lower a divided intake port among the divided intake ports, the larger opening the divided intake port has, noise is more likely to leak from the lower divided intake port, so that the lower the divided intake flow path among the divided intake flow paths, where noise is more likely to leak from the lower divided intake port, the larger the sound absorbing material 55 attached, whereby noise leakage is efficiently suppressed.

[0077]

Since the flow of the cooling air in the package 10 can be defined by the exhaust duct 41, the cooling performance can be further improved.

[0078]

Although specific embodiments of the present invention have been described above, the present invention is not limited to the above embodiments, and various modifications can be made within the scope of the present invention.

DESCRIPTION OF SYMBOLS

[0079]

- 1 Package-type compressor
- 5a to 5d Pipe
- 10 Package
- 11 to 14 Side face (side wall)
- 11a Intake port
- 11a1 to 11a3 Divided intake port
- 11b Ejection port
- 12a Suction port
- 12b Intake port
- 15 Upper face
- 15a Exhaust port
- 16 Floor face
- 17 Soundproof wall
- 20 Compressor main body
- 21 Suction portion
- 22 Ejection portion
- 23 Bellows flow path unit
- 24 Suction filter
- 25 Motor

26	Outer fan
30	Oil collector
40	Gas-cooling type heat exchanger
41	Exhaust duct
42	Turbo fan (cooling fan)
50	Intake duct member
51, 52	U-shaped member
53, 54	Lid plate
55	Sound absorbing material

CLAIMS

1. A package-type compressor comprising:
 - a box-shaped package having an intake port and an exhaust port;
 - a compressor main body that compresses gas in the package;
 - a motor that drives the compressor main body in the package;
 - a gas-cooling type heat exchanger that exchanges heat between cooling gas taken in from the intake port and exhausted from the exhaust port and compressed gas compressed by the compressor main body to cool the compressed gas in the package;
 - a cooling fan that blows air toward the gas-cooling type heat exchanger in the package; and
 - an intake duct member constituting at least part of an intake flow path that is a flow path of the cooling gas and extends from the intake port into the package, wherein
 - the intake port is provided over a length that is 50% or more of an entire length of a side face of the package in a height direction,
 - the intake port and the intake flow path are partitioned into a plurality of divided intake ports and a plurality of divided intake flow paths by the intake duct member,
 - the intake duct member is disposed such that the compressor main body and the cooling fan cannot be directly viewed even when an inside of the package is viewed from an outside through at least one of the divided intake ports and at least one of the divided intake flow paths, and
 - the plurality of divided intake ports is disposed side by side in a vertical direction, and a most lower divided intake port is the largest of the divided intake ports.
2. The package-type compressor according to claim 1, wherein
 - at least one of the divided intake flow paths includes the intake duct member and an inner face of the package.
3. The package-type compressor according to claim 1 or 2, wherein
 - two adjacent paths of the divided intake flow paths partially share the intake duct member.
4. The package-type compressor according to any one of claims 1 to 3, wherein
 - at least one of the divided intake flow paths is curved.
5. The package-type compressor according to any one of claims 1 to 4, further comprising an outer fan attached to the motor, wherein
 - the intake flow path extends from the intake port to the outer fan.
6. The package-type compressor according to any one of claims 1 to 5, wherein

the lower divided intake flow path, among the divided intake flow paths, the intake duct member constitutes, the larger a sound absorbing material attached to the intake duct member.

7. The package-type compressor according to any one of claims 1 to 6, further comprising an exhaust duct that accommodates the cooling fan and extends from the motor to the gas-cooling type heat exchanger.