Description

Title of Invention

AIR COMPRESSION DEVICE

Technical Field

[0001] The present invention relates to an air compression device.

Background Art

[0002] An air compression device has been conventionally known which is mounted on a vehicle or the like to generate compressed air for use in the vehicle. As such an air compression device, Patent Literature 1 describes an air compression device provided with a housing case, and a compressor unit and a compression drive portion housed in the housing case. In the air compression device of Patent Literature 1, the compression drive portion is coupled to a compressor. By driving the compressor unit by the compression drive portion, compressed air for use in a vehicle is generated.

[0003] The air compression device of Patent Literature 1 is further provided with a cooling fan for cooling the compressor unit. The cooling fan generates an air flow heading from the cooling fan to the compressor unit. Here, among surfaces of the housing case, on a surface located on the side opposite to the compressor unit with the cooling fan provided therebetween, a filter portion is provided which allows air to flow from the outside to the inside of the housing case. In the air compression device of Patent Literature 1, air flowing into the housing case through the filter portion is guided to the compressor unit by the cooling fan. As a result, the compressor unit is cooled.

[0004] In the air compression device of Patent Literature 1, in the housing case, the cooling fan is provided behind a surface on which the filter portion is provided and further behind the cooling fan, the compressor unit is provided. Therefore, when, for example, maintenance of the inside of the housing case is conducted from a side of a surface facing the cooling fan in the housing case, the cooling fan becomes a hindrance. This makes maintenance of the compressor unit difficult.

Citation List

Patent Literature

[0005] Patent Literature 1: Japanese Patent Unexamined Publication No. 2011-226285

Summary of Invention

[0006] An object of the present invention is to provide an air compression device enabling maintenance of a compressor unit to be conducted with ease.

[0007] An air compression device according to one aspect of the present invention includes a housing which has a front portion with an opening formed and in which a compressor unit is housed; a fan device unit which generates an air flow that cools the

compressor unit; and a panel member to which the fan device unit is attached, the panel member being attached to the housing so as to be able to open or close the opening of the housing.

Brief Description of Drawings

[0008] FIG. 1 is a schematic view of a railroad vehicle on which an air compression device according to a present embodiment is mounted, the view seen from the side.

FIG. 2 is a schematic view of the railroad vehicle shown in FIG. 1 when seen from above, in which view, rails, cross ties, and the air compression device are illustrated with chain double-dashed lines.

FIG. 3 is a perspective view showing a schematic configuration of the air compression device according to the present embodiment.

FIG. 4 is a perspective view showing a schematic configuration of the air compression device according to the present embodiment, which is a view of the housing seen through a side portion thereof in a state where a panel unit and a cooling air filter portion are detached from the housing.

FIG. 5 is a view of the inside of the housing in the air compression device according to the present embodiment seen from the side.

FIG. 6 is a view of the inside of the housing in the air compression device according to the present embodiment seen from above, which is a view seen through insides of a first recessed space, a second recessed space, and a guide path.

FIG. 7 is a front view of the air compression device according to the present embodiment seen from a front portion side of the housing.

FIG. 8 is a front view of the air compression device according to the present embodiment seen from the front portion side of the housing, which is a view of a state where the panel unit and the cooling air filter are detached from the housing.

FIG. 9 is a perspective view of the panel unit of the air compression device according to the present embodiment seen from the back.

FIG. 10 is a perspective view of a compressible air filter portion of the air compression device according to the present embodiment seen from the side.

FIG. 11 is a sectional view of a main part showing an attachment portion between the compressible air filter portion and a panel member in the air compression device according to the present embodiment.

FIG. 12 is a front view of the air compression device according to the present embodiment seen from the front portion side of the housing, which view is seen through the panel member and shows a state where the cooling air filter portion is detached from the housing.

Description of Embodiment

[0009] In the following, one embodiment of the present invention will be described with reference to the drawings. The respective figures to be referred to in the following are simplification of only main members among constituent members of an air compression device X1 according to a present embodiment for the purpose of illustration. Accordingly, the air compression device X1 according to the present embodiment can include an arbitrary constituent member not shown in each figure referred to in the present specification.

[0010] FIG. 1 and FIG. 2 show a railroad vehicle 100 on which the air compression device X1 according to the present embodiment is mounted. Compressed air generated by the air compression device X1 is used for activating various kinds of pneumatic apparatuses such as a brake device, a door open-and-close device, and the like which are mounted on the railroad vehicle 100. The air compression device X1 may not be mounted on the railroad vehicle 100 but be mounted on an apparatus of other vehicle mounted with a pneumatic apparatus, or the like.

[0011] The railroad vehicle 100 has a floor portion 100a, an upper wall portion 100b located above the floor portion 100b, and a pair of side wall portions 100c and 100d extending vertically so as to link the floor portion 100a and the upper wall portion 100b. Additionally, the railroad vehicle 100 has wheels attached to the floor portion 100a, and door portions attached to the side wall portions 100c and 100d. A user of the railroad vehicle 100 gets on the railroad vehicle 100 from a platform in a station through the door portion attached to the side wall portion 100c or the side wall portion 100d. Then, as shown in FIG. 2, the railroad vehicle 100 travels on a track formed with cross ties 102 and rails 101 extending in a direction orthogonal to the cross ties 102, along the rails 101.

[0012] The air compression device X1 is attached to the floor portion 100a of the railroad vehicle 100 as shown in FIG. 1. Specifically, the air compression device X1 is hung on a lower side of the floor portion 100a via a hanging member 200.

[0013] Next, in addition to FIG. 1 and FIG. 2, the air compression device X1 will be specifically described with reference to FIG. 3 to FIG. 6. FIG. 3 is a perspective view showing a schematic configuration of the air compression device X1. FIG. 4 is a view showing a state where a panel unit 11 and a cooling air filter portion 16 to be described later are detached from the air compression device X1 shown in FIG. 3. FIG. 5 is a view of the air compression device X1 seen from a second direction B1, which view is seen through a side portion of a housing 10 to be described later. FIG. 6 is a view of an inside of the housing 10 in the air compression device X1 seen from above, which is a

view seen through insides of a first recessed space S3, a second recessed space S4, and a guide path 20 to be described later.

[0014] As shown in FIG. 3 to FIG. 6, the air compression device X1 mainly includes the housing 10, a motor unit 17 and a compressor unit 19 housed in the housing 10, and a controller unit 18 arranged outside the housing 10. In the air compression device X1, in conjunction with the motor unit 17 driven by the controller unit 18, the compressor unit 19 is driven. As a result, air flowing into the compressor from the outside of the housing 10 is compressed.

[0015] The housing 10 houses various kinds of members such as the motor unit 17, the compressor unit 19, and the like provided in the air compression device X1. The housing 10 has a generally hexahedral shape having an upper portion 10A and a lower portion 10B facing to each other, a front portion 10D and a rear portion 10E facing to each other, and one side portion and the other side portion facing to each other. Then, a space surrounded by the upper portion 10A, the lower portion 10B, the front portion 10D, the rear portion 10E, the one side portion, and the other side portion serves as a housing space which houses various kinds of members provided in the air compression device X1.

[0016] In the present embodiment, as shown in FIG. 3, a direction in which the upper portion 10A and the lower portion 10B face to each other is referred to as a vertical direction C1. Additionally, a direction in which the front portion 10D and the rear portion 10E face to each other is referred to as a first direction A1. Additionally, a direction orthogonal to the vertical direction C1 and the first direction A1 is referred to as the second direction B1.

[0017] In the present embodiment, the air compression device X1 is mounted to the railroad vehicle 100 in a posture of having the first direction A1 extending along a direction in which the cross ties 102 extend and having the second direction B1 extending along a direction in which the rails 101 extend as shown in FIG. 2. The air compression device X1 is disposed on a lower surface of the floor portion 100a of the railroad vehicle 100 in a posture of having the upper portion 10A facing to the floor portion 100a, the front portion 10D located on the side of the side wall portion 100c in the first direction A1, and the rear portion 10E located at a position near the center in a car width direction.

[0018] As shown in FIG. 4, the housing 10 has an intermediate portion 10C provided between the upper portion 10A and the lower portion 10B so as to divide an internal housing space of the housing 10 into two. In the present embodiment, as shown in FIG. 4 and FIG. 5, in the internal housing space of the housing 10, a space formed between

the upper portion 10A and the intermediate portion 10C serves as a first housing space S1 which houses the compressor unit 19, and a space formed between the intermediate portion 10C and the lower portion 10B serves as a second housing space S2 which houses the compressor unit 19. In other words, in the present embodiment, the motor unit 17 and the compressor unit 19 are arranged so as to be deviated from each other in the vertical direction C1. This enables a reduction in a horizontally occupied area in the air compression device X1.

[0019] Although in the present embodiment, the housing 10 has a generally hexahedral shape, the shape is not limited thereto. The shape of the housing 10 is arbitrary and can be appropriately changed according to sizes, arrangement and the like of the various kinds of members housed in the housing 10.

[0020] Additionally, the intermediate portion 10C may not be provided. For example, by fixing the compressor unit 19 to the upper portion 10A and also fixing the motor unit 17 to the lower portion 10B, the compressor unit 19 and the motor unit 17 may be arranged so as to be deviated from each other in the vertical direction C1.

[0021] As shown in FIG. 4, the motor unit 17 is housed in the first housing space S1 inside the housing 10. The motor unit 17 has a first motor 17A and a second motor 17A. The first motor 17A and the second motor 17A are arranged in line with each other in the second direction B1. The first motor 17A and the second motor 17A have the same structure and arranged to be in a posture symmetrical to each other in the second direction B1. In the following, the first motor 17A will be described.

[0022] The first motor 17A has an output shaft 171, a motor main body 172, and a drive pulley 173.

[0023] The output shaft 171 extends along the second direction B1 and projects from the motor main body 172 to the one side portion of the housing 10. The drive pulley 173 is attached to the projecting output shaft 171. This makes the motor main body 172 and the drive pulley 173 be arranged in the second direction B1.

[0024] The controller unit 18 is attached to the rear portion 10E of the housing 10 in the outside of the housing 10. The controller unit 18 has a box-shaped member, and a controller which is housed in the box-shaped member and controls drive of the motor unit 17. Each motor main body 172 of the respective motors 17A and 17B is to be driven by the controller unit 18. In the controller unit 18, various kinds of electronic parts may be housed other than the controller for controlling drive of the motor unit 17.

[0025] The compressor unit 19 is housed in the second housing space S2 in the housing 10 as shown in FIG. 4. Specifically, the compressor unit 19 is mounted on the intermediate portion 10C of the housing 10. The compressor unit 19 has a first

compressor 19A and a second compressor 19B. The first compressor 19A and the second compressor 19B are arranged in line in the second direction B1. The first compressor 19A is arranged above the first motor 17A, and the second compressor 19B is arranged above the second motor 17A.

[0026] The first compressor 19A and the second compressor 19B have the same structure. The first compressor 19A and the second compressor 19B are arranged symmetrically to each other in spaced relation so as to have suction ports thereof facing to each other in the second direction B1. In the following, the first compressor 19A will be described.

[0027] The first compressor 19A has a compressor main body 19a, a drive pulley 19b, and an input shaft 19c.

[0028] The input shaft 19c extends in the second direction B1 to project from the compressor main body 19a to the one side portion of the housing 10. The drive pulley 19b is attached to the projected input shaft 19c. This makes the compressor main body 19a and the drive pulley 19b be arranged in line in the second direction B1. The drive pulley 19b of the first compressor 19A is arranged so as to overlap the drive pulley 173 of the first motor 17A in the vertical direction C1.

[0029] As shown in FIG. 4, an endless belt B is wound around the drive pulley 19b of the first compressor 19A and the drive pulley 173 of the first motor 17A. Specifically, the intermediate portion 10C of the housing 10 has a through hole formed on the side portion side of the housing 10, which through hole communicates the first housing space S1 to the second housing space S2. The communication through hole overlaps the drive pulleys 19b and 174 in the vertical direction C1. Then, the belt B is arranged to extend from the first housing space S1 to the second housing space S2 through the through hole, and is attached to the drive pulleys 19b and 174 in the housing spaces S1 and S2, respectively. To the compressor main body 19a of the first compressor 19A, driving force is transmitted via the input shaft 19c by circulation of the belt B around the drive pulleys 19b and 174 along with drive of the motor main body 172 of the first motor 17A. As a result, the compressor main body 19a of the first compressor 19A is to generate compressed air.

[0030] As shown in FIG. 5 and FIG. 7, the air compression device X1 further includes a guide path 20 which guides air having flowed in from the outside of the housing 10 to the compressor main body 19a, an outflow pipe portion 21 through which compressed air generated in the compressor main body 19a flows out from the compressor main body 19a, and an aftercooler 22 which cools compressed air flowing through the outflow pipe portion 21.

[0031] The guide path 20 is housed in the first housing space S1 in the housing 10. Specifically, the guide path 20, as shown in FIG. 6, is arranged between the first compressor 19A and the second compressor 19B to extend along the first direction A1. The guide path 20 has an inflow opening 20a allowing air to flow in, and a first outflow opening 20b and a second outflow opening 20c allowing the air to flow into the compressor main body 19a of the first and second compressors 19A and 19B, respectively.

[0032] The inflow opening 20a is formed, in the guide path 20, on a surface facing to the front portion 10D of the housing 10. Air flowing in from the outside of the housing 10 through a compressible air inflow port 121a formed in a panel member 12 of the panel unit 11 to be described later is to flow into the guide path 20 through the inflow opening 20a.

[0033] The first outflow opening 20b is formed, in the guide path 20, on a surface facing to the first compressor 19A. The first outflow opening 20b leads to the suction port in the first compressor 19A through a linkage pipe (not shown by a reference numeral). This causes air flowing into the guide path 20 to flow out from the guide path 20 through the first outflow opening 20b and flow into the first compressor 19A.

[0034] The second outflow opening 20c is formed, in the guide path 20, on a surface facing to the second compressor 19B. The second outflow opening 20c leads to the suction port in the second compressor 19B through the linkage pipe (not shown by a reference numeral). This causes air flowing into the guide path 20 to flow out from the guide path 20 through the first outflow opening 20b and flow into the second compressor 19B.

[0035] The outflow pipe portion 21 has a first outflow pipe 21a leading to the compressor main body 19a of the first compressor 19A, a second outflow pipe 21b leading to the compressor main body 19a of the second compressor 19B, a manifold portion 21c which links the first outflow pipe 21a and the second outflow pipe 21b, and a confluence pipe 21d through which compressed air joined in the manifold portion 21c flows.

[0036] As shown in FIG. 4, the first outflow pipe 21a is connected to a surface of the first compressor 19A facing to the second compressor 19B, extends along the first direction A1 toward the front portion 10D side, and bends upward in the vicinity of the front portion 10D to extend to the upper portion 10A side along the vertical direction C1. Air flowing into a suction port of the compressor main body 19a in the first compressor 19A through the guide path 20 is compressed in the compressor main body 19a to flow out through the first outflow pipe 21a.

[0037] As shown in FIG. 4, the second outflow pipe 21b is connected to a surface of the second compressor 19B facing to the first compressor 19A, extends along the first direction A1 toward the front portion 10D side, and bends upward in the vicinity of the front portion 10D to extend to the upper portion 10A side along the vertical direction C1. Air flowing into the suction port of the compressor main body 19a in the second compressor 19B through the guide path 20 is compressed in the compressor main body 19a to flow out through the second outflow pipe 21b.

[0038] The manifold portion 21c is attached to the upper portion 10A of the housing 10 as shown in FIG. 4 and FIG. 5. Specifically, the manifold portion 21c is housed in the first housing space S1 in the housing 10 and is attached to the front portion 10D side, in the upper portion 10A, between the first compressor 19A and the second compressor 19B. The first and second outflow pipes 21a and 21b are connected to the manifold portion 21c, so that in the manifold portion 21c, compressed air flowing through the first outflow pipe 21a and compressed air flowing through the second outflow pipe 21b join.

[0039] As shown in FIG. 5, the confluence pipe 21d is connected to the manifold portion 21c to extend from the front portion 10D side of the housing 10 to the rear portion 10E side along the upper portion 10A of the housing 10. Compressed air having joined in the manifold portion 21c is to flow into the confluence pipe 21d to flow from the front portion 10D side of the housing 10 to the rear portion 10E side.

[0040] As shown in FIG. 5, in a part of the rear portion 10E surrounding the first housing space S1 in the housing 10, an outflow port 10c is formed which communicates the first housing space S1 with the outside of the housing 10. Specifically, the outflow port 10c is formed in a part of the rear portion 10E on the upper portion 10A side. The confluence pipe 21d extends from the front portion 10D side to the rear portion 10E side and also extends to the outside of the housing 10 through the outflow port 10c formed in the rear portion 10E.

[0041] The aftercooler 22 is attached to the rear portion 10E of the housing 10 in the outside of the housing 10. The aftercooler 22 is arranged above the controller unit 18. The aftercooler 22 has a meandering pipe 22a, a protection cover 22b which houses the meandering pipe 22a, and a cooler fan 22c which sends air outside the housing 10 to the inside of the protection cover 22b.

[0042] The protection cover 22b is arranged outside the housing 10 and back and above the rear portion 10E. A part of the protection cover 22b located back of the rear portion 10E is separated from the rear portion 10E. The meandering pipe 22a extends in the protection cover 22b while meandering in the second direction B1. The

confluence pipe 21d externally extending from the inside of the housing 10 leads to the meandering pipe 22a. Compressed air flowing through the confluence pipe flows into the meandering pipe 22a. The cooler fan 22c is arranged between the rear portion 10E and the protection cover 22b below the outflow port 10c. The cooler fan 22c sucks air outside the housing 10 and sends the same toward the meandering pipe 22a in the protection cover 22b.

[0043] As shown in FIG. 4 and FIG. 5, in the front portion 10D of the housing 10, there are formed a cooling air inflow port 10b through which cooling air flows into the housing 10, and an opening 10a for the maintenance of the inside of the housing 10. Then, as shown in FIG. 3 and FIG. 5, the air compression device X1 further includes the cooling air filter portion 16 attached to the housing 10 so as to be able to open or close the cooling air inflow port 10b, and the panel unit 11 attached to the housing 10 so as to be able to open or close the opening 10a.

[0044] In the following, in addition to FIG. 1 to FIG. 6, the cooling air filter portion 16 and the panel unit 11 will be described in detail with reference to FIG. 7 to FIG. 9. FIG. 7 is a front view of the air compression device X1 seen from the front portion 10D side of the housing 10. Additionally, FIG. 8 is a front view showing a state where in the air compression device X1 in FIG. 7, the cooling air filter portion 16 and the panel unit 11 are detached from the housing 10. Additionally, FIG. 9 is a perspective view of the panel unit 11 seen from the back, which view shows a state where a compressible air filter portion 26 to be described later is detached.

[0045] The cooling air inflow port 10b is formed for cooling various kinds of members inside the housing 10 by causing cooling air to flow into the housing 10. The cooling air inflow port 10b is formed in the front portion 10D of the housing 10. Specifically, the front portion 10D of the housing 10 has a beam portion 10d to which the intermediate portion 10C is fixed as shown in FIG. 4. The beam portion 10d extends along the second direction B1. The cooling air inflow port 10b is formed between the beam portion 10d and the lower portion 10B and has a generally rectangular shape. This allows the cooling air inflow port 10b to communicate the outside of the housing 10 to the second housing space S2 in the housing 10.

[0046] The cooling air filter portion 16 is attached to the front portion 10D of the housing 10 so as to cover the cooling air inflow port 10b. The cooling air filter portion 16 has a louver 161 including a plurality of elongated plate-shaped members assembled to be spaced apart from each other and in parallel to each other, and a filter portion 162 attached to a back surface of the louver 161 as shown in FIG. 3. The louver 161 is attached to the front portion 10D of the housing 10 such that the filter portion 162 is

fitted in the cooling air inflow port 10b.

[0047] To the louver 161, a hinge 161a and a lever lock 161b are attached as shown in FIG. 3 and FIG. 7. The hinge 161a fixes an upper end portion of the louver 161 in the vertical direction C1 to the beam portion 10d in the front portion 10D of the housing 10. The lever lock 161b detachably fixes a lower end portion of the louver 161 in the vertical direction C1 and the front portion 10D of the housing 10.

[0048] In the air compression device X1, with the lever lock 161b being fastened, the cooling air filter portion 16 closes, ahead of the front portion 10D of the housing 10, the cooling air inflow port 10b as shown in FIG. 7. On the other hand, by opening the lever lock 161b and causing the cooling air filter portion 16 to turn with the hinge 161a as a turning center, the cooling air inflow port 10b formed in the front portion 10D is opened as shown in FIG. 8. Then, from the cooling air inflow port 10b, the motor unit 17 housed in the second housing space S2 is exposed.

[0049] Although in the present embodiment, the cooling air filter portion 16 is fixed to the front portion 10D of the housing 10 by the hinge 161a and the lever lock 161b, this is not always the case. For example, the cooling air filter portion 16 may be attached to the housing 10 via a fastening member such as a bolt or the like. Also in this case, the cooling air filter portion 16 is detachable from the housing 10, so that attachment or detachment of the fastening member such as a bolt or the like enables the cooling air inflow port 10b to be opened or closed.

[0050] As shown in FIG. 7, with the cooling air inflow port 10b being closed by the cooling air filter portion 16, air passing through the louver 161 has dusts removed in the filter portion 162. Then, the air from which dusts have been removed flows into the second housing space S2 of the housing 10 through the cooling air inflow port 10b.

[0051] Here, as shown in FIG. 4 and FIG. 5, on the front portion 10D side of the intermediate portion 10C, a through hole 10e is formed which passes through the intermediate portion 10C in the vertical direction C1. The through hole 10e is formed closer to the front portion 10D side than the compressor unit 19 and the motor unit 17. In the present embodiment, the through hole 10e has a rectangular shape extending from ahead of the first motor 17A to ahead of the second motor 17B. The through hole 10e communicates the first housing space S1 to the second housing space S2. Therefore, air flowing into the second housing space S2 in the housing 10 through the cooling air inflow port 10b can be moved to the first housing space S1 through the through hole 10e before reaching the motor unit 17.

[0052] Since in the present embodiment, in the intermediate portion 10C, a part on the side portion side of the housing 10 has the through hole formed through which the belt

B passes, air flowing into the second housing space S2 is also allowed to move to the first housing space S1 through the through hole.

[0053] The opening 10a is formed for the maintenance of the compressor unit 19 and the like housed in the housing 10. The opening 10a is formed in the front portion 10D of the housing 10. Specifically, the opening 10a is formed between the beam portion 10d and the upper portion 10A and has a generally rectangular shape. This enables the opening 10a to communicate the outside of the housing 10 to the first housing space S1 in the housing 10. In the present embodiment, the opening 10a is located above the cooling air inflow port 10b.

[0054] The panel unit 11 is attached to the front portion 10D of the housing 10 so as to cover the opening 10a. The panel unit 11 has the panel member 12, a sound-absorbing member 13, a fan device unit 14, an adaptor unit 15, and the compressible air filter portion 26 as shown in FIG. 3, FIG. 5, FIG. 7, and FIG. 9.

[0055] The panel member 12 is attached to the housing 10 so as to be able to open or close the opening 10a. The panel member 12 has a main body portion 121, a swelling portion 122 which swells ahead of the main body portion 121 in a direction orthogonal to the main body portion 121, and a fixing plate 123 extending behind the main body portion 121 in the direction orthogonal to the main body portion 121.

[0056] The main body portion 121 is a flat plate along the front portion 10D of the housing 10 and has a generally rectangular shape. The main body portion 121 is attached to the front portion 10D of the housing 10 so as to cover the opening 10a with the entire panel member 12. Specifically, a plurality of insertion holes 121b is formed in an outer circumference portion of the main body portion 121 as shown in FIG. 7. Each insertion hole 121b overlaps a fastening hole formed in the front portion 10D of the housing 10. Then, a bolt-shaped attachment member 23 is inserted into each insertion hole 121b and each fastening hole of the front portion 10D, and the attachment member 23 fixes the main body portion 121 and the front portion 10D of the housing 10. In other words, the panel member 12 is detachably attached to the housing 10 by the attachment member 23.

[0057] In the air compression device X1, as shown in FIG. 7, in a state where the main body portion 121 of the panel member 12 is attached to the front portion 10D of the housing 10 by the attachment member 23, the panel unit 11 closes, ahead of the front portion 10D of the housing 10, the opening 10a. On the other hand, as shown in FIG. 8, in a state where the panel unit 11 is detached from the front portion 10D of the housing 10 by detaching the attachment member 23, the opening 10a formed in the front portion 10D is opened . Then, from the opening 10a, the compressor unit 19 housed in the

second housing space S2 is exposed.

[0058] Although in the present embodiment, the main body portion 121 of the panel member 12 is fixed to the front portion 10D by the bolt-shaped attachment member 23, this is not always the case. The main body portion 121 of the panel member 12 may be fixed to, for example, the front portion 10D of the housing 10 by the hinge portion and the lever lock similarly to the cooling air filter portion 16. In this case, the panel unit 11 is allowed to open or close the opening 10a by releasing or fastening the lever lock.

[0059] The main body portion 121 has the compressible air inflow port 121a formed for allowing air to be compressed in the compressor unit 19 to flow from the outside of the housing 10 to the inside thereof. The compressible air inflow port 121a is formed in a middle portion of the main body portion 121 in the second direction B1 as shown in FIG. 7. In the present embodiment, the compressible air inflow port 121a has a generally circular shape. The compressible air inflow port 121a is located between a first fan device 14A and a second fan device 14B to be described later so as to face to the inflow opening 20a of the guide path 20.

[0060] The swelling portion 122 is formed as a part of an inner surface of the panel member 12 recessed toward an outer surface side of the panel member 12. In other words, the swelling portion 122 is integrally configured with the main body portion 121 in the panel member 12. In the present embodiment, the swelling portion 122 is located so as to be surrounded by the main body portion 121 as shown in FIG. 7.

[0061] The swelling portion 122 has a facing portion 122b, and a side portion 122a linked with the facing portion 122b as shown in FIG. 3, FIG. 5, and FIG. 9.

[0062] The facing portion 122b is a part which extends in a plane direction similarly to the main body portion 121, and is located ahead of the main body portion 121. Specifically, with the panel member 12 closing the opening 10a, the facing portion 122b is located on the side opposite to the compressor unit 19 with the main body portion 121 provided therebetween in the second direction B1.

[0063] The side portion 122a is a part extending in the direction orthogonal to the main body portion 121 so as to link the facing portion 122b and the main body portion 121. In the present embodiment, the side portion 122a is located to extend from the outside to the inside of the main body portion 121 in the direction orthogonal to the main body portion 121.

[0064] The side portion 122a has an upper extension portion 122c, side extension portions 122d and 122e, and a lower extension portion 122f as shown in FIG. 3 and FIG. 7.

[0065] The upper extension portion 122c leads to an upper end of the facing portion 122b, as well as extending horizontally. Both of the side extension portions 122d and 122e lead to both side ends of the facing portion 122b, as well as extending generally vertically. The lower extension portion 122f leads to a lower end of the facing portion 122b, as well as extending from a lower end of the side extension portion 122d to a lower end of the side extension portion 122e. Specifically, the lower extension portion 122f has a first part 122g extending inwardly from the lower end of the side extension portion 122d in the horizontal direction, a second part 122h extending inwardly from the lower end of the side extension portion 122e in the horizontal direction, and a third part 122i linking the first part 122g and the second part 122h while bending upward so as to avoid the compressible air inflow port 121a of the main body portion 121. Then, these upper extension portion 122c, side extension portions 122d and 122e, and lower extension portion 122f continue to form a closed loop.

[0066] Thus, the swelling portion 122 is provided such that a part of the inner surface of the panel member 12 is recessed toward the outer surface side, thereby forming one recessed space S5 surrounded by the facing portion 122b and the side portion 122a of the swelling portion 122. This recessed space S5 communicates with the first housing space S1 in the housing 10, with the panel unit 11 being at a position to close the opening 10a.

[0067] The fixing plate 123 is a plate-shaped member for fixing the compressible air filter portion 26 to the panel member 12. The fixing plate 123 is located below the compressible air inflow port 121a to extend from an inner surface of the main body portion 121 toward the rear of the main body portion 121 as shown in FIG. 9. In the present embodiment, the fixing plate 123 falls within a range of a width of the compressible air inflow port 121a in the horizontal direction. Additionally, the fixing plate 123 has two insertion holes 123a formed which pass through the fixing plate 123. The two insertion holes 123a are located to be horizontally spaced apart from each other.

[0068] Here, FIG. 10 is a perspective view of a schematic configuration of the compressible air filter portion 26. As shown in FIG. 10, the compressible air filter portion 26 has a filter main body 26a, an insertion portion 26b provided at an rear end of the filter main body 26a, and a fixing portion 26c projecting in a radial direction from a middle portion of the filter main body 26a in a direction in which the guide path 20 extends.

[0069] The filter main body 26a is a filter which removes dusts and the like from air to be compressed which flows into the housing 10 through the compressible air inflow port

121a. In the present embodiment, the filter main body 26a has a cylindrical exterior.

[0070] The insertion portion 26b is a part of the compressible air filter portion 26, the part which is inserted into the inflow opening 20a of the guide path 20. The insertion portion 26b extends further backward from the rear end of the filter main body 26a in an axis direction and has an outer diameter smaller than that of the filter main body 26a.

[0071] The fixing portion 26c is a part for fixing the compressible air filter portion 26 to the main body portion 121 of the panel member 12. The fixing portion 26c projects from an outer surface of the filter main body 26a to the outside of the filter main body 26a in the radial direction. In the present embodiment, an outermost surface of the fixing portion 26c in the radial direction of the filter main body 26a has a flat rectangular shape.

[0072] To the outermost surface of the fixing portion 26c, two fitting-in bolts 26d are attached. The two fitting-in bolts 26d are separated with a space provided therebetween in a longitudinal direction (a direction orthogonal to an axis direction of the compressible air filter portion 26) of the outermost surface of the fixing portion 26c.

[0073] The compressible air filter portion 26 is detachably attached to the panel member 12.

[0074] Specifically, in a state where the compressible air filter portion 26 is attached to the panel member 12, the filter main body 26a of the compressible air filter portion 26 is fitted in the compressible air inflow port 121a so as to have the fixing portion 26c facing down as shown in FIG. 11. Specifically, the filter main body 26a is inserted into the compressible air inflow port 121a from the front portion 10D side to the rear portion 10E side so as to have a part thereof in the axis direction located ahead of the main body portion 121 and have a reminder thereof in the axis direction located behind the main body portion 121. In this state, the fixing portion 26c falls within a range of a width of the filter main body 26a in a horizontal direction. In this state, in the first direction A1, the fixing portion 26c is arranged in a posture of overlapping the inner surface of the main body portion 121. Then, the fitting-in bolts 26d and 26e attached to the fixing portion 26c are inserted into the insertion hole 123a of the fixing plate 123. As a result, the fixing portion 26c is fixed to the fixing plate 123, and the compressible air filter portion 26 is attached to the panel member 12.

[0075] In this state, the insertion portion 26b inserted into the inflow opening 20a is attached to the guide path 20 via a trim seal 27 arranged inside an edge portion of the guide path 20 forming the inflow opening 20a. In other words, the trim seal 27 links the insertion portion 26b of the compressible air filter portion 26 and the guide path 20. This results in causing air flowing into the filter main body 26a from the outside of the

housing 10 to flow into the guide path 20 through the insertion portion 26b. The trim seal 27 has such an extent of elasticity which enables an error in attachment of the insertion portion 26b to the guide path 20 to be absorbed.

[0076] On the other hand, at the time of detaching the compressible air filter portion 26 from the panel member 12, by upwardly pushing a lower end of the filter main body 26a exposed ahead of the main body portion 121, the fixing portion 26c is moved upward in the state shown in FIG. 11. By this operation, the fitting-in bolt 26d is detached from the insertion hole 123a to pull out the entire compressible air filter portion 26 from the compressible air inflow port 121a. Thus, the compressible air filter portion 26 is detached from the panel member 12.

[0077] The fan device unit 14 generates an air flow which cools the compressor unit 19. Specifically, the fan device unit 14 sends the air flowing into the housing 10 from the cooling air inflow port 10b toward the compressor unit 19.

[0078] The fan device unit 14 has the first fan device 14A which generates an air flow that cools the first compressor 19A, and the second fan device 14B which generates an air flow that cools the second compressor 19B. As shown in FIG. 9, in the recessed space S5, a part of the first fan device 14A is arranged in the first recessed space S3 surrounded mainly by the upper extension portion 122c, the side extension portion 122d, and the first part 122g. Additionally, in the recessed space S5, a part of the second fan device 14B is arranged in the second recessed space S4 surrounded mainly by the upper extension portion 122c, the side extension portion 122e, and the second part 122h. In the present embodiment, the recessed space S5 is a continuous space in which the first recessed space S3 and the second recessed space S4 continue to each other so as to avoid the compressible air inflow port 121a above the compressible air inflow port 121a. The first recessed space S3 and the second recessed space S4 may be divided.

[0079] The first fan device 14A and the second fan device 14B have the same structure. In the following, the first fan device 14A will be described.

[0080] The first fan device 14A is configured with two axial fans which are arranged to overlap with each other in a direction orthogonal to the facing portion 122b. The number of axial fans configuring the first fan device 14A may be one, or three or more.

[0081] The first fan device 14A has an inlet port 14a which sucks air flowing into the housing 10 from the cooling air inflow port 10b, an outlet port 14b located on the side opposite to the inlet port 14a to send out air sucked from the inlet port 14a, and an attachment portion 14d for attaching the first fan device 14A to the panel member 12. The first fan device 14A is configured to have an impeller arranged inside the tubularly-formed side surface 14c. Then, the inlet port 14a is formed with an opening

at one end side on the tubularly-formed side surface 14c, and the outlet port 14b is formed with an opening at the other end on the side surface 14c.

[0082] As shown in FIG. 5, the first fan device 14A is arranged in a posture of having the inlet port 14a facing to the facing portion 122b forming the first recessed space S3 so as to be spaced therefrom, and having the outlet port 14b facing to the first compressor 19A side. Specifically, the first fan device 14A is arranged to extend from the first recessed space S3 to the first housing space S1 such that the inlet port 14a is located in the first recessed space S3. More specifically, an end portion of the side surface 14c on a side where the inlet port 14a is provided in the first fan device 14A is arranged on a side closer to the facing portion 122b than an end portion of the side portion 122a on the first compressor 19A side. As a result, a part of the side surface 14c of the first fan device 14A faces to the side portion 122a forming the first recessed space S3 so as to be spaced therefrom.

[0083] The attachment portion 14d of the first fan device 14A extends from the side surface 14c of the first fan device 14A in a radial direction of the first fan device 14A. Then, the attachment portion 14d of the first fan device 14A is fixed to the panel member 12 via a bolt. In other words, the fan device unit 14 is attached to the panel member 12. The first fan device 14A may be located as a whole in the first recessed space S3.

[0084] Although detailed description of the second fan device 14B will be omitted, similarly to the first fan device 14A, the inlet port 14a is arranged in the second recessed space S4, while a part of the side surface 14c is arranged to face to the side portion 122a with a space provided therebetween, the side portion forming the second recessed space S4.

[0085] The adaptor unit 15 guides air sent from the outlet port 14b in the fan device unit 14 to the compressor unit 19. The adaptor unit 15 has a first adaptor 15A fixed to the outlet port 14b side of the first fan device 14A, and a second adaptor 15B fixed to the outlet port 14b of the second fan device 14B. The first adaptor 15A is arranged between the outlet port 14b of the first fan device 14A and the first compressor 19A. The second adaptor 15B is arranged between the outlet port of the second fan device 14B and the second compressor 19B. The first adaptor 15A and the second adaptor 15B have the same structure. In the following, the first adaptor 15A will be described.

[0086] The first adaptor 15A has a plate-formed member with a rectangular shape. The first adaptor 15A is formed with a through hole passing through the first adaptor 15A in the first direction A1. On the first fan device 14A side, the through hole has a shape corresponding to a shape of the outlet port 14b and on the first compressor 19A

side, has a shape corresponding to an outer shape of the first compressor 19A.

[0087] The adaptor unit 15 is dispensable, and air may be sent out directly from the outlet port 14b of the fan device unit 14 to the compressor main body 19a of the compressor unit 19.

[0088] The sound-absorbing member 13 is arranged in the recessed space S5 to reduce noise of the air compression device X1 caused by air passing through the recessed space S5. As shown in FIG. 9, the sound-absorbing member 13 is attached to the swelling portion 122. The sound-absorbing member 13 has a peripheral edge portion 13a and a dividing portion 13b. The peripheral edge portion 13a is provided along an inner surface of the side portion 122a and along an inner surface of the facing portion 122b of the swelling portion 122. The dividing portion 13b is provided to extend from an upper end of the third part 122i to the upper extension portion 122c so as to divide the first recessed space S3 and the second recessed space S4. The peripheral edge portion 13a and the dividing portion 13b are arranged to be spaced from the fan device unit 14.

[0089] In the air compression device X1, air flowing into the second housing space S2 through the cooling air inflow port 10b rises to the first housing space S1 through the through hole 10e of the intermediate portion 10C according to suction of the inlet port 14a in the fan device unit 14. Then, the air rising to the first housing space S1 flows into a passage F1 formed between the side surface 14c in the fan device unit 14 and the sound-absorbing member 13 attached to the side portion 122a to flow toward the facing portion 122b side of the swelling portion 122. Then, the air goes around to the inlet port 14a while being bent in the sound-absorbing member 13 provided in the facing portion 122b and is sucked into the inlet port 14a. Thereafter, the air sent from the outlet port 14b in the fan device unit 14 is guided to the compressor unit 19 through the adaptor unit 15 to cool the compressor unit 19. Then, after cooling the compressor unit 19, the air is to flow to the outside of the housing 10 through the outflow port 10c formed in the rear portion 10E to flow into the protection cover 22b of the aftercooler 22.

[0090] FIG. 12 is a front view of the air compression device X1 seen from the front portion 10D side of the housing 10, which view is seen through the panel member 12 of the panel unit 11 and shows a state where the cooling air filter portion 16 is detached from the housing 10.

[0091] As shown in FIG. 12, the first and second fan devices 14A and 14B further have wires 14e. Each wire 14e has an upper end leading to the upper end of each side surface 14c of the first and second fan devices 14A and 14B to extend downward from the side surface 14c. Specifically, the wire 14e has the upper end leading to the side

surface 14c to extend from the first housing space S1 to the second housing space S2 through the through hole 10e of the intermediate portion 10C as shown in FIG. 5.

[0092] Further, as shown in FIG. 12, the air compression device X1 further includes a wiring board unit 25 for supplying electric power to drive the fan device unit 14, and a connector unit 24 leading to a lower end of each wire 14e.

[0093] The wiring board unit 25 is arranged closer to the front portion 10D than the motor unit 17 in the first housing space S1 as shown in FIG. 5. In the present embodiment, the wiring board unit 25 has a rectangular shape extending in the vertical direction C1. As shown in FIG. 12, the wiring board unit 25 includes a first wiring board 25A leading to the wires 14e in the first fan device 14A, and a second wiring board 25B leading to the wires 14e in the second fan device 14B. The first wiring board 25A and the second wiring board 25B are arranged in line in the second direction B1 and fixed to the intermediate portion 10C so as to hang from a lower surface of the intermediate portion 10C. The first wiring board 25A and the second wiring board 25B are exposed through the cooling air inflow port 10b, with the cooling air filter portion 16 being moved so as to open the cooling air inflow port 10b as shown in FIG. 8.

[0094] As shown in FIG. 12, the connector unit 24 links each wire portion 14e and the first and second wiring boards 25A and 25B. The connector unit 24 has a first connector 24A attached to the lower end of the wire 14e in the first fan device 14A, and a second connector 24B attached to the lower end of the wire 14e in the second fan device 14B.

[0095] The first connector 24A is located between the first wiring board 25A and the front portion 10D and is also connected to the first wiring board 25A. This results in electrically connecting the first fan device 14A and the first wiring board 25A. Additionally, the second connector 24B is located between the second wiring board 25B and the front portion 10D and is also connected to the second wiring board 25B. This results in electrically connecting the second fan device 14B and the second wiring board 25B.

[0096] When moving the cooling air filter portion 16 so as to open the cooling air inflow port 10b, the first connector 24A and the second connector 24B are exposed through the cooling air inflow port 10b as shown in FIG. 12. In other words, with the cooling air filter portion 16 being moved so as to open the cooling air inflow port 10b, the connector unit 24 can be detached from the wiring board unit 25 through the cooling air inflow port 10b.

[0097] In the air compression device X1, when opening the opening 10a in order to

conduct maintenance of the compressor unit 19, first, by operating the lever lock 161b to open, as well as upwardly turning the cooling air filter portion 16 around the hinge 161a, the cooling air inflow port 10b is opened. Next, as shown in FIG. 12, the connector unit 24 exposed through the cooling air inflow port 10b is detached from the wiring board unit 25 through the cooling air inflow port 10b. In this state, the attachment member 23 is detached which fixes the main body portion 121 of the panel member 12 in the panel unit 11 and the front portion 10D of the housing 10 to detach the panel member 12 from the housing 10. On this occasion, the sound-absorbing member 13, the fan device unit 14, and the adaptor unit 15 attached to the panel member 12, and the connector unit 24 attached to the wire 14e in the fan device unit 14 are to be both detached together with the panel member 12. As a result, as shown in FIG. 8, the opening 10a is opened to enable maintenance of the compressor unit 19 exposed through the opening 10a.

[0098] In the above-described air compression device X1, the fan device unit 14 for cooling the compressor unit 19 is attached to the panel member 12 which closes the opening 10a of the housing 10. Therefore, at the time of moving the panel member 12 so as to open the opening 10a, the fan device unit 14 is to move together with the panel member 12. Therefore, when conducting maintenance of the compressor unit 19 in the housing 10 through the opening 10a of the housing 10, the fan device unit 14 does not become a hindrance, so that the maintenance can be conducted with ease.

[0099] Further, in the air compression device X1, since the adaptor unit 15 is attached to the fan device unit 14, the adaptor unit 15 does not become a hindrance either when conducting maintenance of the compressor unit 19 in the housing 10 through the opening 10a of the housing 10.

[0100] Further, in the air compression device X1, since the panel member 12 of the panel unit 11 is detachably attached to the housing 10, at the time of conducting maintenance of the compressor unit 19, detaching the panel member 12 from the housing 10 more facilitates the maintenance.

[0101] Further, in the air compression device X1, with the recessed space S5 formed in the panel member 12, the fan device unit 14 is arranged such that the inlet port 14a is located in the recessed space S5. Therefore, at the time of sucking air in the housing 10 by the inlet port 14a, an inner surface of the swelling portion 122 of the panel member 12 forming the recessed space S5 is to guide the air to go around toward the inlet port 14a. As a result, upstream of the inlet port 14a in an air flow direction, the flow direction is to bend. Accordingly, noise of the air compression device X1 can be reduced.

[0102] Further, in the air compression device X1, it is not necessary to individually form the first recessed space S3 in which at least a part of the first fan device 14A is arranged and the second recessed space S4 in which at least a part of the second fan device 14B is arranged. Therefore, the entire recessed space S5 can be formed in a series of steps. As a result, process of the panel member 12 can be facilitated.

[0103] Further, in the air compression device X1, the compressible air inflow port 121a is provided between the first fan device 14A and the second fan device 14B, while the first recessed space S3 and the second recessed space S4 continue with each other. Therefore, an increase in size of the air compression device X1 can be suppressed.

[0104] Further, in the air compression device X1, the compressible air filter portion 26 prevents foreign matters from entering the inside of the housing 10 through the compressible air inflow port 121a. Besides, by detaching the compressible air filter portion 26 from the panel member 12, maintenance of the compressible air filter portion 26 can be conducted with ease.

[0105] Further, in the air compression device X1, the fixing portion 26c for fixing the filter main body 26a to the panel member 12 falls within the range of the width of the filter main body 26a in the horizontal direction. Therefore, an interval between the first recessed space S3 and the second recessed space S4 in the horizontal direction can be set to be short. This realizes reduction in size of the air compression device X1 as a whole.

[0106] Further, in the air compression device X1, since the filter main body 26a and the guide path 20 are linked via the trim seal 27, the compressible air filter portion 26 can be detached from the panel member 12 and the guide path 20 with ease.

[0107] Further, in the air compression device X1, the front portion 10D of the housing 10 is formed with the opening 10a covered with the panel member 12 and the cooling air inflow port 10b covered with the cooling air filter portion 16, and the cooling air filter portion 16 is attached to the housing 10 so as to be able to open or close the cooling air inflow port 10b. Therefore, moving the panel member 12 so as to open the opening 10a on the front portion 10D side of the housing 10 enables maintenance of the compressor unit 19. Additionally, moving the cooling air filter portion 16 so as to open the cooling air inflow port 10b also enables maintenance of the cooling air filter portion 16 on the front portion 10D side of the housing 10.

[0108] Further, in the air compression device X1, when the cooling air filter portion 16 is moved so as to open the cooling air inflow port 10b, the connector unit 24 is exposed through the cooling air inflow port 10b. Therefore, connection work and connection releasing work of the connector unit 24 can be conducted through the cooling air inflow

port 10b with ease. Specifically, when conducting maintenance of the compressor unit 19 in the air compression device X1, the panel member 12 can be detached from the housing 10 with ease by conducting the connection releasing work of the connector unit 24 through the cooling air inflow port 10b. This enables maintenance of the compressor unit 19 to be conducted through the opening 10a with ease.

[0109] Although in the present embodiment, the panel member 12 has the main body portion 121, and the swelling portion 122 swelling from the main body portion 121, this is not always the case. For example, by forming the panel member 12 to have a flat-plate-shape as a whole and forming the outer surface of the panel member 12 to be flat, while forming a part of the inner surface thereof to be recessed to the outer surface side, the recessed space S5 may be formed. In other words, the panel member 12 may not necessarily have the swelling portion 122 and it is only necessary to have such a recessed space S5 which allows air to go around toward the inlet port 14a in the fan device unit 14. Additionally, the recessed space S5 is dispensable, but the fan device unit 14 may be attached to the flat-plate-shaped panel member 12 so as to be spaced therefrom.

[0110] Additionally, although in the present embodiment, the compressor unit 19 has the two compressors, the first compressor 19A and the second compressor 19B, this is not always the case. The number of compressors provided in the compressor unit 19 may be one, or three or more. In this case, according to the number of compressors provided in the compressor unit 19, the number of motors provided in the motor unit 17 and the number of fan devices provided in the fan device unit 14 are to be appropriately changed.

[0111] Additionally, although in the present embodiment, providing the housing 10 with the intermediate portion 10C and forming the first housing space S1 and the second housing space S2 with the intermediate portion 10C provided therebetween result in arranging the motor unit 17 and the compressor unit 19 to be deviated from each other in the vertical direction C1, this is not always the case. For example, the motor unit 17 and the compressor unit 19 may be arranged in line in the horizontal direction orthogonal to the vertical direction C1. In this case, the output shaft 171 in the motor unit 17 and the input shaft 19c in the compressor unit 19 are arranged on the same axis, so that the motor unit 17 and the compressor unit 19 are directly linked.

[0112] Additionally, although in the present embodiment, the connector unit 24 and the wiring board unit 25 are housed in the second housing space S2 so as to be exposed through the cooling air inflow port 10b when the cooling air filter portion 16 is moved to open the cooling air inflow port 10b, this is not always the case. For example, the

connector unit 24 and the wiring board unit 25 may be housed in the first housing space S1 and also arranged closer to the front portion 10D than the compressor unit 19 in the first direction A1. In this case, by detaching the panel member 12 from the front portion 10D to open the opening 10a and detaching the connector unit 24 from the wiring board unit 25 through the opening 10a, the panel unit 11 and the connector unit 24 can be detached as a whole from the housing 10. In other words, arrangement of the connector unit 24 and the wiring board unit 25 is not particularly limited and can be appropriately changed according to a mode of use of the air compression device X1.

[0113] Additionally, although in the present embodiment, the lower extension portion 122f in the swelling portion 122 has the third part 122i upwardly bending so as to avoid the compressible air inflow port 121a, so that the first recessed space S3 and the second recessed space S4 continue to each other so as to avoid the compressible air inflow port 121a, this is not always the case. For example, the recessed space S5 configured with the first recessed space S3 and the second recessed space S4 may have a generally rectangular shape when viewed from the first direction A1, and the compressible air inflow port 121a may be formed outside the recessed space S5 having a generally rectangular shape. In other words, a positional relationship among the first recessed space S3, the second recessed space S4, and the compressible air inflow port 121a is not particularly limited, but can be appropriately changed according to a mode of use of the air compression device X1.

[0114] Additionally, although in the present embodiment, the compressible air filter portion 26 and the guide path 20 are indirectly linked by the trim seal 27, the compressible air filter portion 26 and the guide path 20 may, not limited thereto, be directly linked.

[0115] The above-described present embodiment and a second embodiment are for illustrative purpose only and are not to be construed as limiting in any manner. The scope of the present invention is represented not by the description of the above-described present embodiment and the second embodiment but by the scope of claims for patent and further includes meanings equivalent to the scope of claims for patent and all changes within the range.

[0116] Here, the above embodiment will be outlined.

[0117] (1) In the above air compression device, the fan device unit for cooling the compressor unit is attached to the panel member which closes the opening of the housing. Therefore, when moving the panel member so as to open the opening, the fan device unit is to move together with the panel member. Therefore, at the time of conducting maintenance of the compressor unit in the housing through the opening of

the housing, the fan device unit does not become a hindrance, so that the maintenance can be conducted with ease.

[0118] (2) It is preferable that the panel member is detachably attached to the housing.

[0119] In the above air compression device, by detaching the panel member from the housing at the time of maintenance of the compressor unit, the maintenance can be conducted more easily.

[0120] (3) The fan device unit may be configured to have an inlet port which sucks air in the housing and send the air sucked through the inlet port toward the compressor unit. In this case, the panel member may be formed with a recessed space, the recessed space being a part of the inner surface of the panel member recessed from the inside of the housing toward the outside. In this case, at least a part of the fan device unit is preferably arranged in the recessed space such that the inlet port is located in the recessed space.

[0121] In the above air compression device, the panel member has the recessed space, and the fan device unit is arranged such that the inlet port is located in the recessed space. Therefore, when the inlet port sucks air in the housing, the inner surface of the panel member which forms the recessed space is to guide the air to go around toward the inlet port. As a result, on the upstream side of the inlet port in the air flow direction, the flow direction is to bend. Accordingly, noise of the air compression device can be reduced.

[0122] (4) The compressor unit may have the first compressor and the second compressor. Additionally, the fan device unit may have the first fan device which generates an air flow that cools the first compressor, and the second fan device which generates an air flow that cools the second compressor. Additionally, the recessed space may have the first recessed space in which at least a part of the first fan device is arranged, and the second recessed space in which at least a part of the second fan device is arranged. In this case, the first recessed space and the second recessed space preferably continue with each other.

[0123] In the above air compression device, it is not necessary to individually form the first recessed space in which at least a part of the first fan device is arranged and the second recessed space in which at least a part of the second fan device is arranged. Therefore, process of the panel member can be facilitated.

[0124] (5) The panel member may have the compressible air inflow port which is located between the first fan device and the second fan device and which allows air to flow into the housing. In this case, the first recessed space and the second recessed space preferably continue to each other between the first fan device and the second fan

device so as to avoid the compressible air inflow port.

[0125] In the above air compression device, the compressible air inflow port is provided between the first fan device and the second fan device, while the first recessed space and the second recessed space continue with each other. Therefore, an increase in size of the air compression device can be suppressed.

[0126] (6) The above air compression device preferably further includes the compressible air filter portion detachably attached to the panel member so as to be fitted in the compressible air inflow port.

[0127] In the above air compression device, the compressible air filter portion prevents foreign matters from entering the inside of the housing through the compressible air inflow port, as well as enabling maintenance of the compressible air filter portion to be facilitated by detaching the compressible air filter portion from the panel member.

[0128] (7) The compressible air filter portion may have the filter main body, and the fixing portion which fixes the filter main body to the panel member. In this case, the fixing portion is preferably arranged within the range of the width of the filter main body in the horizontal direction.

[0129] In the above air compression device, the fixing portion for fixing the filter main body to the panel member falls within the range of the width of the filter main body in the horizontal direction. Therefore, an interval between the first recessed space and the second recessed space in the horizontal direction can be set to be short. This realizes reduction in size of the air compression device as a whole.

[0130] (8) The above air compression device preferably further includes the guide path which guides air flowing into the housing from the compressible air inflow port to the compressor unit, and the trim seal which links the filter main body of the compressible air filter portion and the guide path.

[0131] In the above air compression device, since the filter main body and the guide path are linked via the trim seal, the compressible air filter portion can be detached from the panel member and the guide path with ease.

[0132] (9) The front portion of the housing may be formed with the cooling air inflow port which allows air to flow into the housing. In this case, the air compression device preferably further includes the cooling air filter portion attached to the housing so as to be able to open or close the cooling air inflow port.

[0133] In the above air compression device, the front portion of the housing is formed with the opening covered with the panel member and the cooling air inflow port covered with the cooling air filter portion, and the cooling air filter portion is attached to the housing so as to be able to open or close the cooling air inflow port. Therefore,

moving the panel member so as to open the opening on the front portion side of the housing enables maintenance of the compressor unit. Additionally, moving the cooling air filter portion so as to open the cooling air inflow port also enables maintenance of the cooling air filter portion on the front portion side of the housing.

[0134] (10) The above air compression device may further include the connector unit for the wire leading to the fan device unit. In this case, the connector unit is preferably arranged to be exposed through the cooling air inflow port when the cooling air filter portion is moved so as to open the cooling air inflow port.

[0135] In the above air compression device, since when the cooling air filter portion is moved so as to open the cooling air inflow port, the connector unit is exposed through the cooling air inflow port, connection work and connection releasing work of the connector unit can be conducted through the cooling air inflow port with ease. Specifically, when conducting maintenance of the compressor unit in the air compression device, first, the connection releasing work of the connector unit is conducted through the cooling air inflow port while moving the suction panel so as to open the cooling air inflow port. Thereafter, by moving the panel member so as to open the opening, the fan device unit, the wire leading to the fan device unit, and the connector unit are moved integrally. This enables maintenance of the compressor unit to be conducted through the opening with ease.

[0136] As described in the foregoing, the embodiment provides an air compression device in which maintenance of a compressor unit can be conducted with ease.

Claims

1. An air compression device comprising:

a housing which has a front portion with an opening formed, and in which a compressor unit is housed;

a fan device unit which generates an air flow that cools the compressor unit; and

a panel member to which the fan device unit is attached,

wherein the panel member is attached to the housing so as to be able to open or close the opening of the housing.

2. The air compression device according to claim 1, wherein the panel member is detachably attached to the housing.

3. The air compression device according to claim 1 or 2, wherein

the fan device unit is configured to have an inlet port which sucks air in the housing and send the air sucked through the inlet port toward the compressor unit,

the panel member is formed with a recessed space, the recessed space being a part of an inner surface of the panel member recessed from the inside of the housing toward the outside, and

at least a part of the fan device unit is arranged in the recessed space such that the inlet port is located in the recessed space.

4. The air compression device according to claim 3, wherein

the compressor unit has a first compressor and a second compressor,

the fan device unit has a first fan device which generates an air flow that cools the first compressor and a second fan device which generates an air flow that cools the second compressor, and

the recessed space has a first recessed space in which at least a part of the first fan device is arranged and a second recessed space in which at least a part of the second fan device is arranged, the first recessed space and the second recessed space continuing with each other.

5. The air compression device according to claim 4, wherein

the panel member has a compressible air inflow port which is located between the first fan device and the second fan device and which allows air to flow into the housing, and

the first recessed space and the second recessed space continue to each other between the first fan device and the second fan device so as to avoid the compressible air inflow port.

6. The air compression device according to claim 5, further comprising:

a compressible air filter portion detachably attached to the panel member so as to be fitted in the compressible air inflow port.

7. The air compression device according to claim 6, wherein

the compressible air filter portion has a filter main body, and a fixing portion which fixes the filter main body to the panel member, and

the fixing portion is arranged within a range of a width of the filter main body in a horizontal direction.

8. The air compression device according to any one of claims 1 to 7, further comprising:

a guide path which guides air flowing into the housing from the compressible air inflow port to the compressor unit; and

a trim seal which links the compressible air filter portion and the guide path.

9. The air compression device according to any one of claims 1 to 8,

wherein the front portion of the housing is formed with a cooling air inflow port which allows air to flow into the housing, the air compression device further comprising:

a cooling air filter portion attached to the housing so as to be able to open or close the cooling air inflow port.

10. The air compression device according to claim 9, further comprising:

a connector unit for a wire leading to the fan device unit,

wherein the connector unit is arranged to be exposed through the cooling air inflow port when the cooling air filter portion is moved so as to open the cooling air inflow port.