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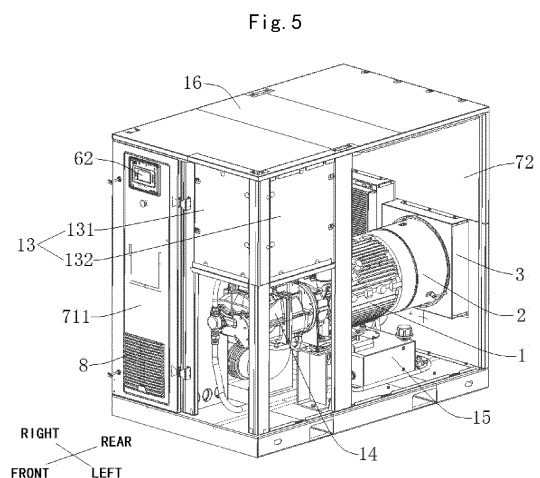
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(54) **BLOWER**

(57) The present invention discloses a blower. The blower includes a case, a motor and a compression unit, wherein a chamber is formed within the case, and the motor, a control unit and the compression unit are set within the chamber. A first air inlet entrance and a second air inlet entrance that separately penetrate through a case side wall are set on the case side walls of the case. The control unit is applicable to communicate with the outside through the first air inlet entrance, the motor is applicable to communicate with outside through the second air inlet entrance, and the compression unit is applicable to compress the air inside the chamber. According to the blower of the invention, the first air inlet entrance and the second air inlet entrance are set on the case side walls of the case, thus the number of openings is small, which facilitates in reducing the noise coming out from the inside of the case.



Description

Cross references to related applications

[0001] This application claims the priority of Chinese patent application with the filing date of May 23, 2022, application number 202210564771.8, and the title of the patent application "blower", and the priority of Chinese patent application with the filing date of May 23, 2022, application number 202221252128.3, and the title of the patent application "blower", the entire disclosures of which are incorporated herein by way of reference.

Field of the invention

[0002] The present invention relates to the field of blower, specifically, relates to a blower.

Background of the Invention

[0003] According to the state of the art, a single-stage screw blower is complicated in structure, is divided strictly in functional areas, and includes a compressed gas inlet and channel, a cooling air inlet for a motor and an electrical cabinet, an air inlet for oil-cooling fan, a fresh air inlet for a whole machine, a hot air outlet for a whole machine and so on. Such structure can ensure energy efficiency to the greatest extent, but it is difficult to use space efficiently with too much open grids for air inlets and air outlets, which causes the noise of the operating machine to easily go out, and amounts of spacers are necessary for reducing noise, however, the effect of reducing noise is still not satisfactory.

[0004] Besides, a conventional blower needs a separate air inlet channel to enter a compressor element, which also generates large noise. The design of a separate air outlet channel also increases the environmental temperature and pollutes the environment.

Summary of the invention

[0005] The invention intends to solve one of the above technical problems in the prior art at least. Thus, the invention sets out to propose a blower that can reduce the number of openings in the case.

[0006] A blower according to the embodiments of the present invention includes: a case, a chamber formed within the case, a first air inlet entrance and a second air inlet entrance that separately penetrate through a case side wall of the case being set on the said case side walls; a control unit being set within the chamber and applicable to communicate with the outside through the first air inlet entrance; a motor being set within the chamber, the control unit being at least applicable to control the motor to work, the motor being applicable to communicate with the outside through the second air inlet entrance; and a compression unit, the motor is applicable to drive the compression unit to work, and the compression unit is

applicable to compress the air inside the chamber.

[0007] According to the blower of the embodiments of the present invention, the first air inlet entrance and the second air inlet entrance are set on the said case side walls of the case, thus the number of openings is rather small, which facilitates in reducing the noise coming out from the inside of the case.

[0008] According to some embodiments of the invention, the said case side walls include a first end plate and a second end plate that are set oppositely to each other, wherein the first air inlet entrance is set on the first end plate and the second air inlet entrance is set on the second end plate.

[0009] According to some embodiments of the invention, a control fan is set on a side of the first air inlet entrance towards the control unit.

[0010] According to some embodiments of the invention, the control unit further has a heat radiating opening being communicating with the chamber, wherein the heat radiating opening is located at a side of the control unit facing away from the first air inlet entrance.

[0011] According to some embodiments of the invention, the blower further includes a motor fan that is applicable to provide air cooling to the motor and set between the motor and the second air inlet entrance, wherein an axis of the motor fan and an axis of the motor are coaxial, and the axis of the motor fan is misaligned with the center of the second air inlet entrance.

[0012] According to some embodiments of the invention, a fan cover is set between the motor fan and the second air inlet entrance, and an air inlet channel is formed within the fan cover.

[0013] According to some embodiments of the invention, the blower further includes an oil tank which is located below the motor and supports the motor.

[0014] According to some embodiments of the invention, the blower further includes a gas filter being connected with the compression unit, wherein the gas filter is applicable to suck the gas within the chamber and send the filtered gas to the compression unit for compression.

[0015] According to some embodiments of the invention, a sound-proofing panel is set between the gas filter and the case side wall.

[0016] According to some embodiments of the invention, a compressed gas exit that penetrates through a case side wall is set on the case side wall of the case, and a compressed gas outlet of the compression unit communicates with the compressed gas exit; the blower further includes a muffler, which is set between the compressed gas outlet of the compression unit and the compressed gas exit.

[0017] According to some embodiments of the invention, the motor is applicable to drive the compression unit to work via a transmission system, and the blower further includes an oil cooler being applicable to cool the lubricant passing through the transmission system and an oil cooling fan being applicable to provide air cooling to the oil cooler, wherein a third air inlet entrance that pene-

trates through a case side wall is set on the case side wall of the case, and the oil cooling fan communicates with the outside through the third air inlet entrance.

[0018] According to some embodiments of the invention, the case includes a ceiling, a bottom plate, a first side plate and a second side plate being set oppositely to each other, a first end plate and a second end plate being set oppositely to each other, wherein the first side plate, the first end plate, the second side plate and the second end plate are disposed in order, the ceiling covers the tops of the first side plate, the first end plate, the second side plate and the second end plate, the bottom plate covers the bottoms of the first side plate, the first end plate, the second side plate and the second end plate, the first air inlet entrance is set on the first end plate, and the second air inlet entrance and the third air inlet entrance are set on the second end plate.

[0019] According to some embodiments of the invention, the control unit includes an electrical cabinet and a control panel electrically connected with the electrical cabinet, and the first end plate includes a first end plate body and a first end door plate, the first end plate body is adjacent to the second side plate and a first end door plate is adjacent to the first side plate, wherein the electrical cabinet is set on a side of the first end door plate towards the chamber, the first air inlet entrance is set on the first end door plate, and a mounting port is also set on the first end door plate, through which the control panel is installed outside.

[0020] According to some embodiments of the invention, both the motor and the compression unit are located on a side of the first end plate body towards the chamber.

[0021] According to some embodiments of the invention, the first side plate includes a first front side door being adjacent to the first end plate and a first rear side door being adjacent to the second end plate, wherein the compression unit is located on a side of the first front side door towards the chamber, and the motor is located on a side of the first rear side door towards the chamber.

[0022] According to some embodiments of the invention, a compressed gas exit is set on the second end plate, and a compressed gas outlet of the compression unit communicates with the compressed gas exit.

[0023] According to some embodiments of the invention, a first air inlet entrance, a second air inlet entrance and a third air inlet entrance are all provided with an air inlet grid for each.

[0024] According to some embodiments of the invention, the blower further includes a motor fan being applicable to provide air cooling to the motor and set between the motor and the second air inlet entrance, and a control fan is set on a side of the first air inlet entrance towards the control unit.

[0025] The additional aspects and advantages of the invention will be partially apparent from the following description, will be partially apparent from the following description, or will be understood through the practice of the invention.

Brief Description of the Drawings

[0026]

Fig.1 a side view of a blower without a first side plate; Fig.2 is a front view of a blower;

Fig.3 is a three-dimensional schematic view of a blower without a first side plate according to one embodiment;

Fig.4 is a three-dimensional schematic view of a blower without a second side plate according to one embodiment from one perspective ;

Fig. 5 is a three-dimensional schematic view of a blower without the second side plate from another perspective;

Fig. 6 is a three-dimensional schematic view of a blower from one perspective;

Fig. 7 is a three-dimensional schematic view of the blower from another perspective.

Fig. 8 is a top view of a blower without a ceiling;

Fig. 9 is a three-dimensional schematic view of a sound-proofing panel;

Fig. 10 is a three-dimensional schematic view of a blower without a first side plate according to another embodiment; and

Fig. 11 is a three-dimensional schematic view of a blower without a second side plate according to another embodiment.

[0027] Reference signs:

motor 1, motor fan 2, oil cooler 3, oil cooling fan 4, muffler 5, control unit 6, electrical cabinet 61, control panel 62, first end plate 71, first end door plate 711, first end plate body 712, second end plate 72, first air inlet entrance 8, second air inlet entrance 9, third air inlet entrance 10, heat radiating opening 11, gas filter 12, sound-proofing panel 13, first baffle 131, second baffle 132, sound-absorbing sponge 133, sheet metal bracket 134, compression unit 14, oil tank 15, ceiling 16, first side plate 17, first front side door 171, first rear side door 172, second side plate 18, second front side door 181, second rear side door 182, compressed gas exit 19.

Detailed Description on the Embodiments

[0028] The embodiments of the invention are described in detail below. The examples of the embodiments are disclosed in the drawings, in which the same or similar reference signs indicate the same or similar elements or elements having the same or similar functions throughout the drawings. The embodiments described with reference to the drawings below are illustrative and to explain the invention, but cannot be interpreted as the limit to the invention.

[0029] In the description of the invention, it is understood that the orientation or position relation indicated by the terms "longitudinal", "lateral", "length", "width", "thickness", "up", "below", "front", "rear", "left", "right", "verti-

cal", "horizontal", "top", "bottom", "inside", "outside" or the like are the ones shown based on the drawings, which facilitates in describing the invention and simplifying the description, rather than indicating or suggesting that the referred devices or elements must have particular orientation, be configured and operated in particular orientation, thus cannot be interpreted as the limit to the invention.

[0030] Further, the terms "first" and "second" are merely used for the purpose of describing, but cannot be interpreted as indicating or suggesting relative importance or impliedly indicating the number of the referred technical features. As such, the features defined with "first" and "second" can definitely or impliedly include one or more these features. In the description of the invention, "plurality of" means at least two, for example, two, three or the like, unless being defined definitely and specifically.

[0031] In the invention, unless being stipulated and defined definitely, the terms "install", "interconnect", "connect", "secure" or the like should be interpreted broadly, for example, it may be fixedly connected or detachably connected or formed as one piece; it may be mechanically connected or electrically connected or intercommunicated; it may be directly interconnected or indirectly interconnected via intermediate medium or the communication inside two elements or the interact between two elements. To those skilled in the art, the specific meanings of the above terms in the invention can be interpreted according to specific cases.

[0032] The blower according to the invention is described in detail in conjunction with Figs. 1-11 below.

[0033] With reference to Figs. 1-2, 4 and 8, the blower according to the invention may include a case, a control unit 6, a motor 1 and a compression unit 14.

[0034] Wherein, an chamber is formed within the case, with reference to Figs. 2-4, a first air inlet entrance 8 and a second air inlet entrance 9 are set on a case side wall of the case; the first air inlet entrance 8 and the second air inlet entrance 9 separately penetrate a case side wall, that is, the inside of the case is communicated with the outside of the case by the first air inlet entrance 8 and the second air inlet entrance 9; and the air outside may enter into the chamber inside the case via the first air inlet entrance 8 and the second air inlet entrance 9.

[0035] In some embodiments of the invention, with reference to Figs. 1-2 and 5-6, the control unit 6 may include an electrical cabinet 61 and a control panel 62, wherein, electric components, such as an inverter or the like, are disposed inside the electrical cabinet 61, the control panel 62 is connected with the electrical cabinet 61, a monitoring system may be integrated inside the control unit 6, for monitoring various working parameters of the blower, for example, the monitoring system may include warning information, maintenance plan and on-line visible display of the state of the machine.

[0036] With reference to Figs. 1-4, the control unit 6 is disposed inside the chamber, the control unit 6 commu-

nicates with the outside (the outside of the case) through the first air inlet entrance 8 on the electrical cabinet 61, and the control unit 6 is at least applicable to control the operation of the motor 1. In some embodiments, a user can set the relevant parameters of the control unit 6 by means of the control panel 62, which can control the motor 1. Further, the control unit 6 can dissipate heat through the first air inlet entrance 8, so as to prevent the control unit 6 from being destroyed due to an excessively high working temperature.

[0037] With reference to Figs. 1 and 3-4, the motor 1 communicates with the outside through the second air inlet entrance 9. A motor fan 2 is used for air cooling the motor 1. When the motor fan 2 is working, the air outside can be guided to the motor 1 through the second air inlet entrance 9, so as to dissipate heat, which prevents the motor 1 from being destroyed due to an excessively high working temperature.

[0038] With reference to Figs. 4-5, the compression unit 14 is set within the chamber, the motor 1 is suitable for driving the compression unit 14 to work, and the compression unit 14 is suitable for compression the gas inside the chamber.

[0039] According to the blower of the embodiments in the invention, the first air inlet entrance 8 and the second air inlet entrance 9 are set on the case side wall of the case, no other air inlet entrances and air outlet exits are provided, for example, no other openings for cooling air sucking and hot air discharging are provided. Fewer openings help to reduce noise transmission from the inside of the case to the outside. Meanwhile, the arrangement is simplified, which facilitates in reducing the cost of installation and future maintenance, and in better ensuring the stable operation of the blower at a low temperature.

[0040] In some embodiments of the invention, in connection with Figs. 1, 6 and 11, the case side walls include a first end plate 71 and a second end plate 72 that are set oppositely. The first air inlet entrance 8 is set on the first end plate 71, and the second air inlet entrance 9 is set on the second end plate 72. In this way, the first air inlet entrance 8 and the second air inlet entrance 9 are set oppositely, which brings less mutual interference, so as not to interfere with the cooling effect of each end. Further, the centers of the first air inlet entrance 8 and the second air inlet entrance 9 are not located in the same line, which helps the heat dissipation of the motor 1 and the control unit 6, and makes the cooling air and the hot air at two ends of the blower flow in different spaces.

[0041] In some embodiments of the invention, the first air inlet entrance 8 and the control unit 6 are directly opposite to each other, and a control fan is set on a side of the first air inlet entrance 8 towards the control unit 6. When the control fan is working, the air outside can be guided to the control unit 6 through the first air inlet entrance 8, so as to dissipate the heat of the control unit 6. By providing the control fan, the air circulation speed at the control unit 6 can be increased, so that more sur-

rounding heat can be taken away, which reduces the working temperature of the control unit 6 (mainly including the electric components such as the inverter or the like).

[0042] In some embodiments, the control fan can further integrate with a filter such as air filter cotton or the like, so as to filter the air entering from the first air inlet entrance 8, which ensures that the air entering and cooling the inverter and other electric components of the control unit 6 does not contain particulate pollutants and help to elongate the service life of the inverter and other electric components.

[0043] In some embodiments of the invention, with reference to Figs. 1 and 3, the control unit 6 further has a heat radiating opening 11 that communicates with the chamber. In this way, the heat generated by the working control unit 6 can enter the chamber through the heat radiating opening 11. The air entering from the first air inlet entrance 8 takes away the heat of the control unit 6 by blowing directly towards the control unit 6, so that the heat enters into the chamber via the heat radiating opening 11. With reference to Figs. 3 and 10, the heat radiating opening 11 is located near the top of the electrical cabinet 61. Because the air with the heat of the control unit 6 is hot and light, providing the heat radiating opening 11 at a location close to the top of the electrical cabinet 61 helps the hot air within the electrical cabinet 61 flow upwards so as to enter the chamber from the heat radiating opening 11.

[0044] The heat radiating opening 11 is located on a side of the control unit 6 facing away from the first air inlet entrance 8. As such, the heat radiating opening 11 does not directly face to the first air inlet entrance 8, which can prevent the heat radiating opening 11 from being directly blown by the air entering from the first air inlet entrance 8, affecting the heat discharging from the inside the control unit 6 to the chamber.

[0045] In some embodiments of the invention, with reference to Figs. 3-5 and 10-11, the blower further includes a motor fan 2 set in the chamber and used for air cooling the motor 1. When the motor fan 2 is working, the air outside can be rapidly guided to the motor 1 through the second air inlet entrance 9, so as to dissipate the heat of the motor 1 faster, which prevents the motor 1 from being destroyed due to an excessively high working temperature. The axis of the motor fan 2 and the axis of the motor 1 are arranged coaxially.

[0046] In some embodiments, with reference to Figs. 10-11, the axis of the motor fan 2 is in misalignment with the center of the second air inlet entrance 9. In this way, the path between the second air inlet entrance 9 and the motor fan 2 meanders, which can reduce the noise of the air intake at the second air inlet entrance 9.

[0047] In further embodiments of the invention, as shown in Figs. 3-5, the second air inlet entrance 9 directly faces to the motor fan 2. When the motor fan 2 is working, the air outside can be guided into the chamber through the second air inlet entrance 9, so as to cool the parts

within the chamber. The speed of air circulation within the chamber can be increased when the motor fan 2 is working, so that more heat within the chamber can be taken away, and the working temperature of the blower reduces.

[0048] In some embodiments of the invention, a motor cover is set between the motor fan 2 and the second air inlet entrance 9, and the motor cover forms a channel for the inlet air. In this way, the work efficiency of the motor fan 2 can be improved, and the vortex generated by the work of the motor fan 2 directly acts on the second air inlet entrance 9, so as to accelerate the air circulation at the second air inlet entrance 9. When the heat dissipating demand increases, the air intake of the motor fan 2 also increases to meet the actual heat dissipating demand.

[0049] In some embodiments of the invention, the motor 1 is suitable for driving the compression unit 14 to work by means of transmission system. In some embodiments, the transmission system may be gear mechanism, which has high drive efficiency. In some embodiments, the transmission mechanism also may be belt drive mechanism.

[0050] In some embodiments of the invention, the axis of the motor 1 and the axis of the transmission system can be set horizontally, which has a simple arrangement, a low cost of maintenance, and a higher drive stability. In other embodiments, the axis of the motor 1 and the axis of the transmission system can also be set non-horizontally, so as to increase the drive ratio and the amount of compressed air.

[0051] The blower may also include an oil cooler 3 and an oil cooling fan 4. The oil cooler 3 is used for cooling the lubricant passing the transmission system, to take away a part of heat of the transmission system, which prevents the transmission system from working at a high temperature for long time. Further, the lubricant lubricates the transmission system and also reduces the wear of the transmission system, so that the service life of the transmission system can be elongated. The oil cooling fan 4 is used for making air cooling to the oil cooler 3, so as to take away the extra heat of the oil cooler 3. When the oil cooling fan 4 is working, the speed of air circulation at the oil cooler 3 can be increased, so as to take away more heat surrounding the oil cooler 3 and reduce the working temperature of the oil cooler 3. A third air inlet entrance 10 is set on a case side wall of the case. The third air inlet entrance 10 penetrates through the case side wall, that is, the inside of the case is communicated with the outside of the case by the third air inlet entrance 10. The oil cooling fan 4 is applicable to communicate with the outside through the third air inlet entrance 10, and the air outside can reach the oil cooling fan 4 via the third air inlet entrance 10 to enter the chamber within the case. Specifically, when the oil cooling fan 4 is working, the air outside can be guided to the oil cooler 3 through the third air inlet entrance 10, so as to dissipate the heat of the oil cooler 3 and prevent the cooling effects on the lubricant from being affected by an excessively high working tem-

perature of the oil cooler 3.

[0052] Alternatively, the third air inlet entrance 10 directly faces to the oil cooling fan 4. In this way, the vortex generated by the work of the oil cooling fan 4 directly acts on the third air inlet entrance 10, so as to accelerate the air circulation at the third air inlet entrance 10. The air outside will also enter the chamber through the fins of the oil cooler 3 later, in order to dissipate the heat of the parts within the chamber.

[0053] In some embodiments of the invention, the blower may also include an oil tank 15 positioned under the motor 1. A shock-absorbing pad (not shown in the drawings) is set between the oil tank 15 and the motor 1, and the motor 1 is mounted on the oil tank 15 by means of fasteners such as bolts or rivets. The oil tank 15 can support the motor 1, without separately providing a motor supporting seat.

[0054] In some embodiments of the invention, the blower may also include an oil pump, the oil pump is integrated on the compression unit 14 and applicable to drive a circulating flow of lubricant fluid from the oil tank 15 to the transmission system.

[0055] In some alternative embodiments, the third air inlet entrance 10 and the second air inlet entrance 9 can be integrated as one air inlet entrance.

[0056] In some embodiments of the invention, with reference to Fig.3, the blower may also include a gas filter 12, which is connected with the compression unit 14. The gas filter 12 is applicable to absorb the hot gas within the chamber and send the filtered hot gas to the compression unit 14 for compression, which ensures a pure gas enters into the compression unit 14 and prevent the compression unit 14 from being destroyed due to the impurities entering into the compression unit 14. The gas inside the chamber can enter into the compression unit 14 after passing through the gas filter 12 for compression, and the compression unit 14 does not need a separate air inlet channel.

[0057] In some embodiments of the invention, a sound-proofing panel 13 is set between the gas filter 12 and the case side wall. The sound-proofing panel 13 as shown in Fig. 9, may include a sound-absorbing sponge 133 and a sheet metal bracket 134. The thickness of the sound-absorbing sponge 133 may be 20mm-40mm, for example, 30mm. The surface of the sound-absorbing sponge 133 is covered with PU film, and the sound-absorbing coefficient of the sound-absorbing sponge 133 can be up to more than 90% at a high-frequency section. The sound-absorbing sponge faces towards the gas filter 12, that is, the sound-absorbing sponge 133 is located on a side of the sheet metal bracket 134 towards the gas filter 12, in order to absorb and buffer the sound wave radiated thereto. The sheet metal bracket 134 is secured beside the gas filter 12, so as to reflect the sound wave passing through the sound-absorbing sponge 133 and prevent the energy of sound wave from being radiated out of the case as far as possible.

[0058] With reference to Figs. 3-5, there may be two

sound-absorbing sponges 13, the two sound-absorbing sponges 13 are a first baffle 131 and a second baffle 132 respectively, wherein the first baffle 131 is located on the front side of the blower and the second baffle 132 is located on the left side of the blower. The sound-absorbing sponge 13 can reduce the amount of noise coming out of the gas filter 12 towards the outside, so as to further reduce the noise of the blower.

[0059] In some embodiments of the invention, with reference to Figs. 3-4, 7 and 10-11, the case side wall of the case is set with a compressed gas exit 19. The compressed gas exit 19 penetrates through the case side wall, and the compressed gas outlet compressed by the compression unit 14 is suitable for communicating with the compressed gas exit 19. In actual application, the compressed gas exit 19 is applicable to connect with the pipelines of other devices, so that the other devices can use the compressed air generated by the blower. That is, the motor 1 supplies the compression unit 14 with power, and the gas compressed by the compression unit 14 goes out of the compressed gas exit 19 in order to be used by other devices.

[0060] In some embodiments of the invention, with reference to Figs. 3-5, the blower may also include a muffler 5 set between the compressed gas outlet of the compression unit 14 and the compressed gas exit 19. The muffler 5 is applicable to eliminate the compressed gas noise coming out from the compressed gas outlet of the compression unit, so as to further reduce the noise of the blower.

[0061] In some embodiments of the invention, with reference to Figs. 6-7, the case may include a ceiling 16, a bottom plate, a first side plate 17 and a second side plate 18 being set opposite to each other, and a first end plate 71 and a second end plate 72 being set opposite to each other. The first side plate 17, the first end plate 71, the second side plate 18 and the second end plate 72 are disposed in order. The ceiling 16 covers the tops of the first side plate 17, the first end plate 71, the second side plate 18 and the second end plate 72. The bottom plate covers the bottoms of the first side plate 17, the first end plate 71, the second side plate 18 and the second end plate 72. The first air inlet entrance 8 is set on the first end plate 71, and the second air inlet entrance 9 and the third air inlet entrance 10 are set on the second end plate 72.

[0062] The second side plate 18 is located on left side of the blower, the first side plate 17 is located on right side of the blower, the first end plate 71 is located at front end of the blower, and the second end plate 72 is located at rear end of the blower. The first side plate 17, the first end plate 71, the second side plate 18 and the second end plate 72 may be plates that are detachable, so as to facilitate in maintaining the parts behind the corresponding side plate by detaching the same.

[0063] The first end plate 71 may include a first end plate body 712 and a first end door plate 711. The first end plate body 712 is adjacent to the second side plate 18, the first end door plate 711 is adjacent to the first side plate

17, and the electrical cabinet 61 is set on a side of the first end door plate 711 towards the chamber. In other words, the electrical cabinet 61 is located on right side of the blower, and the electrical cabinet 61 is located directly behind the first end door plate 711. As such, by opening the first end door plate 711, the repair and maintenance of the electrical cabinet 61 behind the first end door plate 711 can be performed. The first air inlet entrance 8 is set on the first end door plate 711, and the first end door plate 711 is also set with a mounting port, through which the control panel 62 is installed outside, convenient for the user to operate the control panel 62. That is, the user can perform relevant operations to the control panel 62 outside the case.

[0064] In some embodiments of the invention, the motor 1, the motor fan 2 and the compression unit 14 are all located on a side of the first end plate body 712 towards the chamber. That is, the motor 1, the motor fan 2 and the compression unit 14 are all located on left side of the blower.

[0065] In some embodiments of the invention, the first side plate 17 may include a first front side door 171 and a first rear side door 172. The first front side door 171 is located at front side of the first rear side door 172, the first front side door is adjacent to the first end plate 71, the first rear side door 172 is adjacent to the second end plate 72, the compression unit 14 is located on a side of the first front side door 171 towards the chamber, and the motor 1 and the motor fan 2 are located on a side of the first rear side door 172 towards the chamber. That is, the compression unit 14 is located at front side of the blower, and the motor 1 and the motor fan 2 are located at rear side of the blower.

[0066] In some embodiments of the invention, the second side plate 18 may include a second front side door 181 and a second rear side door 182. The second front side door 181 is located at front side of the second rear side door 182, the second front side door 181 is adjacent to the first end plate 71, and the second rear side door 182 is adjacent to the second end plate 72.

[0067] In some embodiments of the invention, the compressed air outlet 19 is set on the second end plate 72, that is, the compressed air outlet 19 is located at the rear side of the blower. As such, the blower has better appearance, the compressed gas exit 19 is connected to other devices from rear side of the blower, and the leaked gas occurring at the compressed gas exit 19 when a pipeline leaks, is prevented from directly blowing the user at a front, left or right side, which facilitates in improving the use safety of the blower.

[0068] In some embodiments of the invention, the first air inlet entrance 8, the second air inlet entrance 9 and the third air inlet entrance 10 are all set with an air inlet grid for each. Providing the air inlet grids can protect the first air inlet entrance 8, the second air inlet entrance 9 and the third air inlet entrance 10 and prevent the user from colliding with the parts inside the case through the first air inlet entrance 8, the second air inlet entrance 9 and the

third air inlet entrance 10, which ensures the use safety of the blower. Meanwhile, because of fewer openings, the amount of the air inlet grids can be lowered, which can reduce the labor-hours for assembling the air inlet grids and the case.

[0069] In some embodiments of the invention, the blower further includes a motor fan 2, which is applicable to provide air cooling to the motor 1, and the motor fan 2 is set between the motor 1 and the second air inlet entrance 9. When the motor fan 2 is working, the air outside can be guided to the motor 1 rapidly through the second air inlet entrance 9, so as to dissipate heat of the motor 1 faster and prevent the motor 1 from being destroyed due to an excessively high working temperature. The axis of the motor fan 2 and the axis of the motor 1 are arranged coaxially. A control fan is set on a side of the first air inlet entrance 8 towards the control unit 6. When the control fan is working, the air outside can be directed to the control unit 6 through the first air inlet entrance 8, so as to dissipate the heat of the control unit 6. By providing the control fan, the speed of air circulation at the control unit 6 can be increased, so that more heat surrounding the control unit 6 can be taken away, which reduces the working temperature of the control unit 6 (mainly the electric components such as the inverter or the like).

[0070] The working situation of the blower according to one embodiment of the invention will be overall described below.

[0071] The motor fan 2 set coaxially with the motor 1 obtains the cool air outside through the second air inlet entrance 9, after the cool air absorbs the heat of motor 1, the cool air becomes hot air and stays within the chamber after cooling the motor 1, because the first side plate 17 and the ceiling 16 is not set with an opening and are designed as being closed.

[0072] The control unit 6 takes in fresh air through the first air inlet entrance 8 on the first end plate 71 to dissipate the heat of the inverter and the electronic elements, and then the hot air is exhausted into the chamber through the heat radiating opening 11, too.

[0073] The oil cooling fan 4 at front end of the oil cooler 3 takes in air through the third air inlet entrance 10, and after taking away the heat of the lubricant being cooled by oil, the hot air also enters into the chamber.

[0074] The hot air is absorbed directly by the gas filter 12. Based on experiments, the temperature of the air entering the gas filter 12 is higher than that of the air outside by 8 °C to 10 °C. After the impurities thereof are filtered, the air enters the compression unit 14 to be compressed. Then, the level of pressure fluctuation is reduced via the muffler 5, and finally, the compressed air is transported to other systems through the compressed gas exit 19. The first baffle 131 and the second baffle 132 are set around the gas filter 12 in a direction close to the first side plate 17, which facilitates in reducing noise at the sound source.

[0075] The arrangement of the blower according to the embodiment of the invention can maintain the expected

level of flow and energy efficiency, and the amplitude of the noise of the machine can be reduced by 8 to 9dB (A). Through the calculation of machine intake amount, the air amount required by the air compression can be satisfied by the air intake of the first air inlet entrance 8 and the second air inlet entrance 9, and the situation of back pressure (which will cause the motor or lubricant not to be cooled enough) would not occur. After adding the third air inlet entrance 10, the air intake amount can be further satisfied, and the back pressure situation is less likely to occur. Except for a little exposure from the air inlet grids, the case is well sealed integrally, which facilitates in reducing the sound radiating outside the case when the blower is running. The blower is compact in structure, and has a higher integrality. When the blower is used under normal conditions, there is no need to equip an additional rain-proof/dust-proof cover.

[0076] According to the embodiment of the invention, the case of the blower only retain three air inlets (that is, the first air inlet entrance 8, the second air inlet entrance 9 and the third air inlet entrance 10), which removes a separate air inlet channel for the compressed air and a hot air outlet of the machine.

[0077] In the description of this specification, the description on the reference terms "one embodiment", "some embodiments", "examples", "specific examples", or "some examples" or the like means specific features, structure, material, or characters described in connection with this embodiment or example are contained in at least one embodiment or example of the invention. In this specification, the schematic expression for the above terms is not necessary to refer to the same embodiments or examples. Also, the described specific features, structure, material, or characters can be combined in any one or a plurality of embodiments or examples as appropriate. Further, those skilled in the art can engage or combine different embodiments or examples described in the description.

[0078] Although the embodiments of the invention have been shown and described, as can be understood, the above embodiments are illustrative and in no way of limiting the present invention. Changes, modifications, alternatives and variants can be made to the above embodiments by those skilled in the art are within the scope of the invention.

Claims

1. A blower including a case, a motor (1), a control unit (6) and a compression unit (14), wherein a chamber is formed within the case, and the motor (1), the control unit (6) and the compression unit (14) are set within the chamber, **characterized in that**, a first air inlet entrance (8) and a second air inlet entrance (9) that separately penetrate through a case side wall are set on the said case side walls of the case, the control unit (6) communicates with outside through

the first air inlet entrance (8), the motor (1) communicates with outside through the second air inlet entrance (9), and the compression unit (14) is applicable to compress the air inside the chamber.

2. The blower according to claim 1, **characterized in that** the said case side walls include a first end plate (71) and a second end plate (72) that are set oppositely to each other, wherein the first air inlet entrance (8) is set on the first end plate (71) and the second air inlet entrance (9) is set on the second end plate (72).
3. The blower according to claim 1 or claim 2, **characterized in that** a control fan is set on a side of the first air inlet entrance (8) towards the control unit (6).
4. The blower according to any one of claims 1- to 3, **characterized in that** the control unit (6) further has a heat radiating opening (11) being communicating with the chamber, wherein the heat radiating opening (11) is located at a side of the control unit (6) facing away from the first air inlet entrance (8).
5. The blower according to any one of claims 1 to 4, **characterized in that** the blower further includes a motor fan (2) that is applicable to provide air cooling to the motor (1) and set between the motor (1) and the second air inlet entrance (9), wherein an axis of the motor fan (2) and an axis of the motor (1) are coaxial, and the axis of the motor fan (2) is misaligned with the center of the second air inlet entrance (9).
6. The blower according to claim 5, **characterized in that** a fan cover is set between the motor fan (2) and the second air inlet entrance (9), and an air inlet channel is formed within the fan cover.
7. The blower according to any one of claims 1 to 6, **characterized in that** the blower further includes an oil tank (15) which is located below the motor (1) and supports the motor (1).
8. The blower according to any one of claims 1- to 7, **characterized in that** the blower further includes a gas filter (12) being connected with the compression unit (14), wherein the gas filter (12) is applicable to suck the gas within the chamber and send the filtered gas to the compression unit (14) to be compressed.
9. The blower according to claim 8, **characterized in that** a sound-proofing panel (13) is set between the gas filter (12) and the case side wall.
10. The blower according to any one of claims 1 to 9, **characterized in that** a compressed gas exit (19) that penetrates through a case side wall is set on the case side wall of the case, and a compressed gas

outlet of the compression unit (14) communicates with the compressed gas exit (19);
the blower further includes a muffler (5), which is set between the compressed gas outlet of the compression unit (14) and the compressed gas exit (19).

11. The blower according to claim 1 or claim 2, **characterized in that** the motor (1) is applicable to drive the compression unit (14) to work via a transmission system, and the blower further includes an oil cooler (3) being applicable to cool the lubricant passing through the transmission system and an oil cooling fan (4) being applicable to perform air cooling to the oil cooler (3), wherein a third air inlet entrance (10) that penetrates through a case side wall is set on the case side wall of the case, and the oil cooling fan (4) communicates with the outside through the third air inlet entrance (10).
12. The blower according to claim 11, **characterized in that** the case includes a ceiling (16), a bottom plate, a first side plate (17) and a second side plate (18) being set opposite to each other, a first end plate (71) and a second end plate (72) being set opposite to each other, wherein the first side plate (17), the first end plate (71), the second side plate (18) and the second end plate (72) are disposed in order, the ceiling (16) covers the tops of the first side plate (17), the first end plate (71), the second side plate (18) and the second end plate (72), the bottom plate covers the bottoms of the first side plate (17), the first end plate (71), the second side plate (18) and the second end plate (72), the first air inlet entrance (8) is set on the first end plate (71), and the second air inlet entrance (9) and the third air inlet entrance (10) are set on the second end plate (72).
13. The blower according to claim 12, **characterized in that** the control unit (6) includes an electrical cabinet (61) and a control panel (62) being electrically connected with the electrical cabinet (61), and the first end plate (71) includes a first end plate body (712) adjacent to the second side plate (18) and a first end door plate (711) adjacent to the first side plate (17), wherein the electrical cabinet (61) is set on a side of the first end door plate (711) towards the chamber, the first air inlet entrance (8) is set on the first end door plate (711), and a mounting port is also set on the first end door plate (711), through which the control panel (62) is installed outside.
14. The blower according to claim 13, **characterized in that** both the motor (1) and the compression unit (14) are located on a side of the first end plate body (712) towards the chamber.
15. The blower according to any one of claims 12 to 14, **characterized in that** the first side plate (17) in-

cludes a first front side door (171) being adjacent to the first end plate (71) and a first rear side door (172) being adjacent to the second end plate (72), wherein the compression unit (14) is located on a side of the first front side door (171) towards the chamber, and the motor (1) is located on a side of the first rear side door (172) towards the chamber.

16. The blower according to any one of claims 12 to 15, **characterized in that** a compressed gas exit (19) is set on the second end plate (72), and a compressed gas outlet of the compression unit (14) communicates with the compressed gas exit (19).
17. The blower according to any one of claims 11 to 16, **characterized in that** the first air inlet entrance (8), the second air inlet entrance (9) and the third air inlet entrance (10) are all provided with an air inlet grid for each.
18. The blower according to any one of claims 11 to 17, **characterized in that** the blower further includes a motor fan (2) being applicable to provide air cooling to the motor (1) and set between the motor (1) and the second air inlet entrance (9), and a control fan is set on a side of the first air inlet entrance (8) towards the control unit (6).

Fig. 1

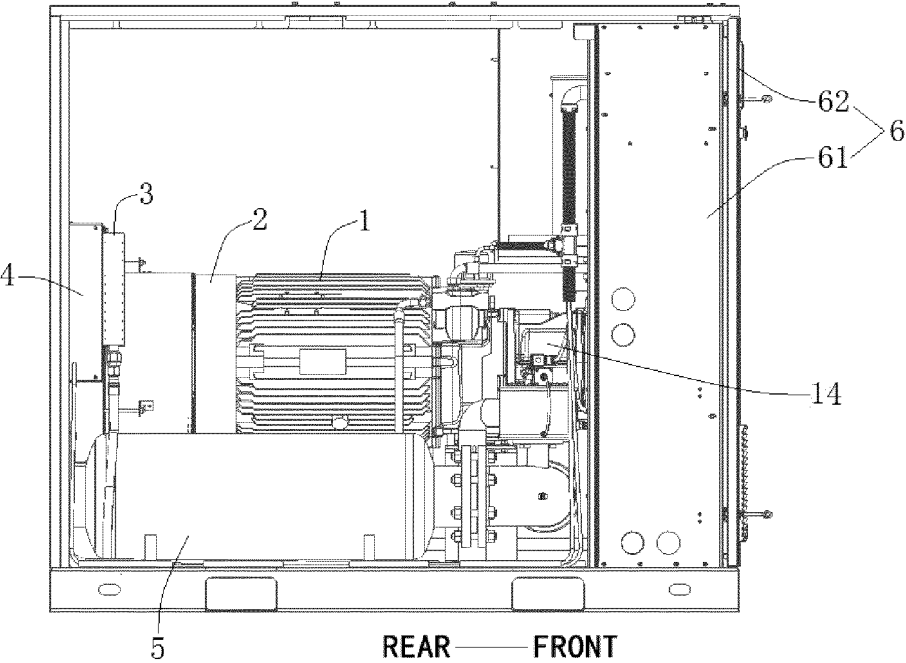


Fig. 2

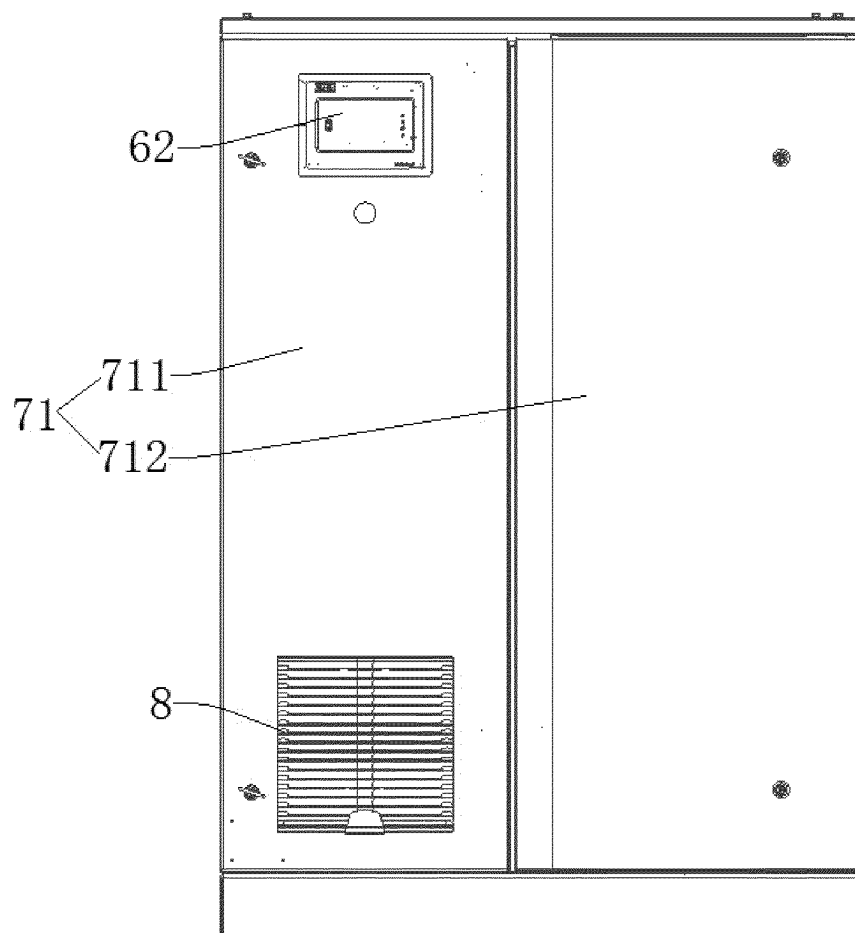


Fig. 3

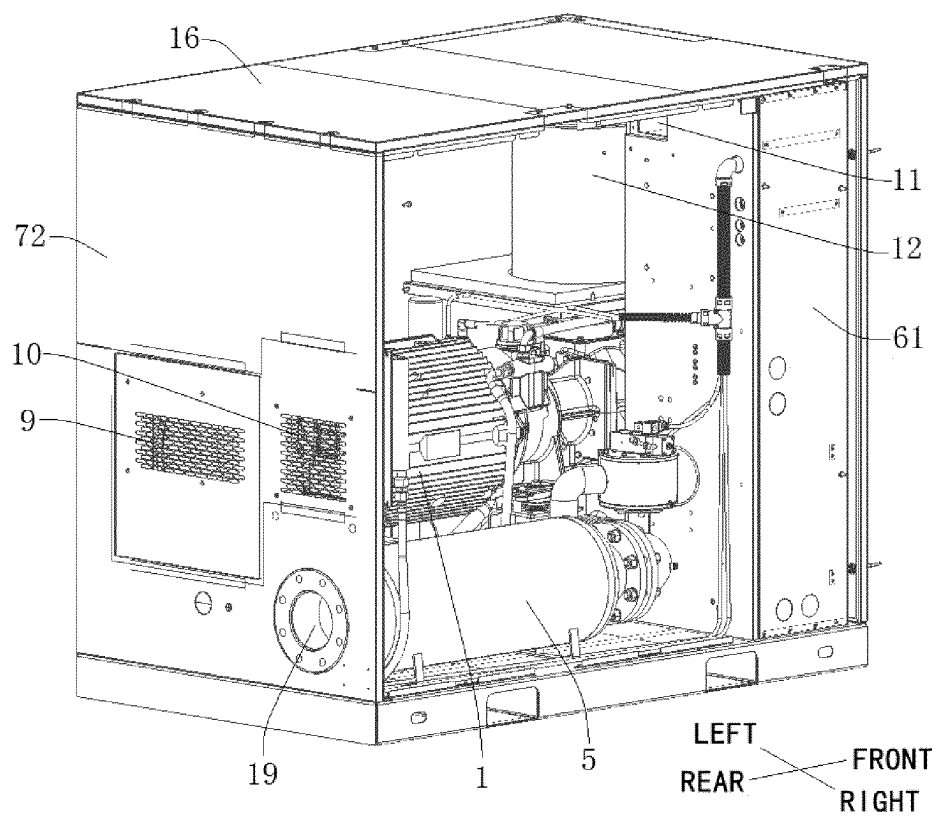


Fig. 4

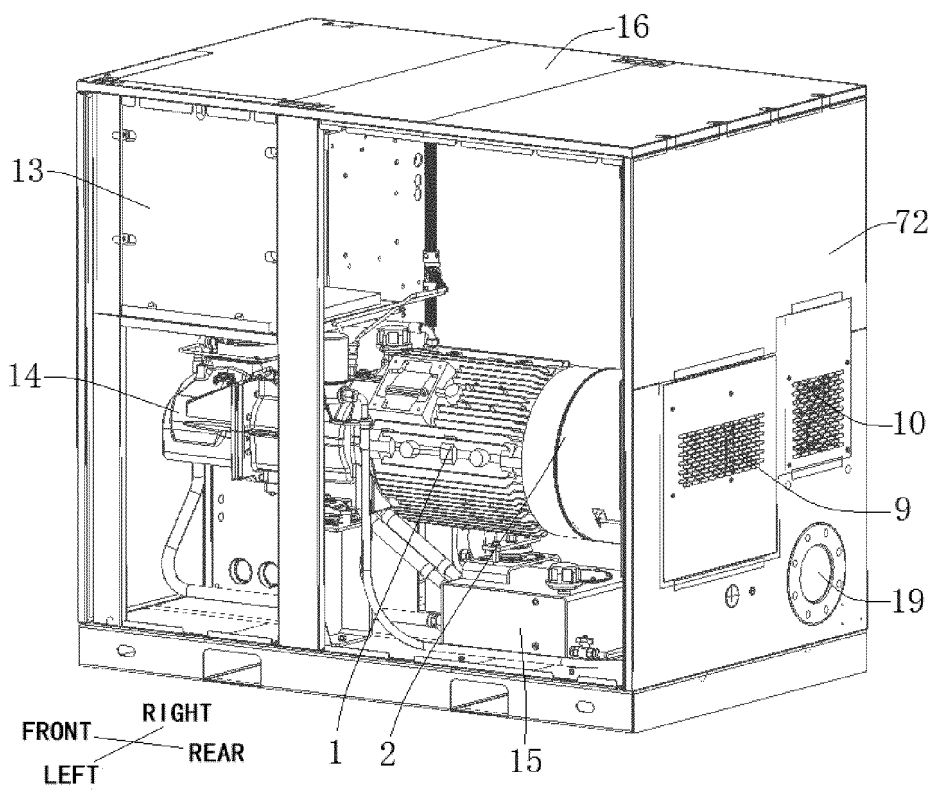


Fig. 5

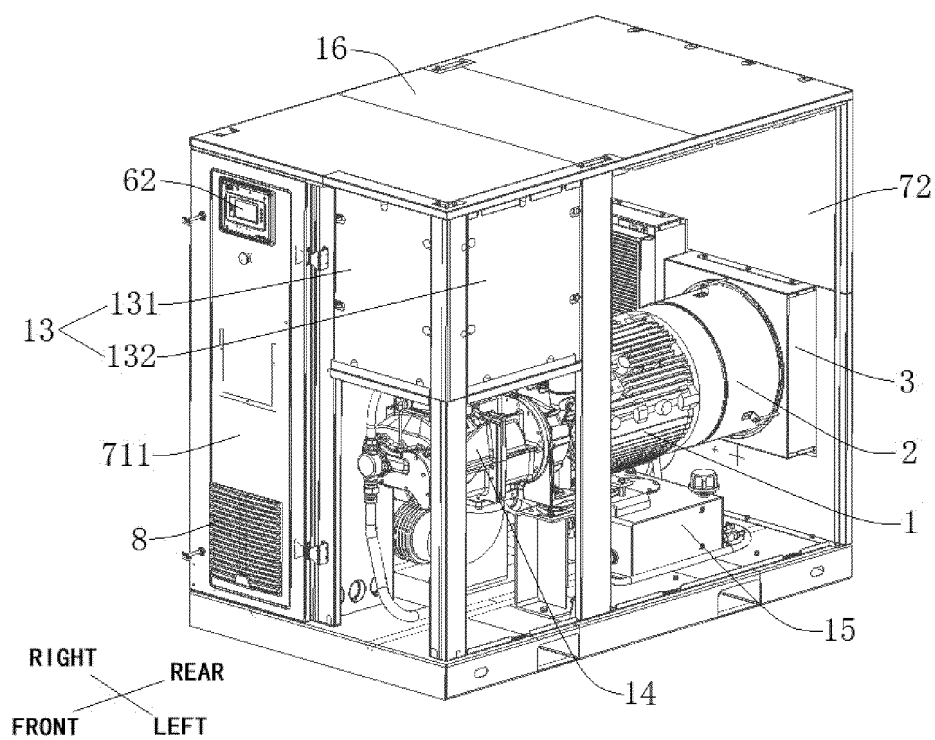


Fig. 6

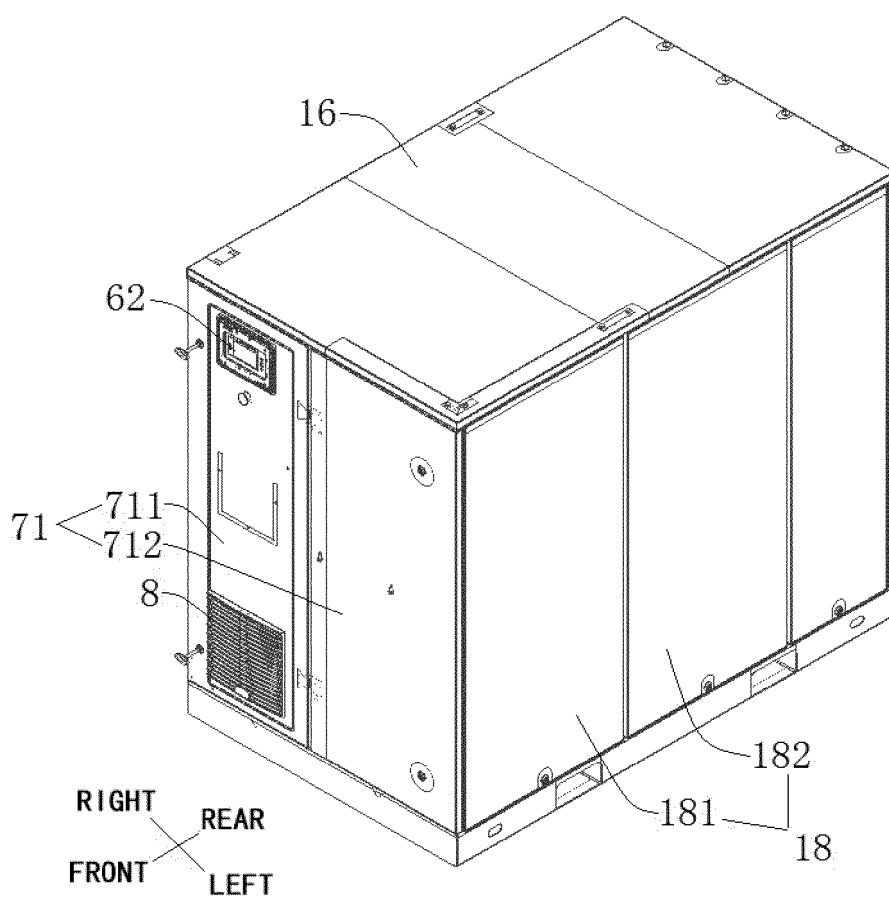


Fig. 7

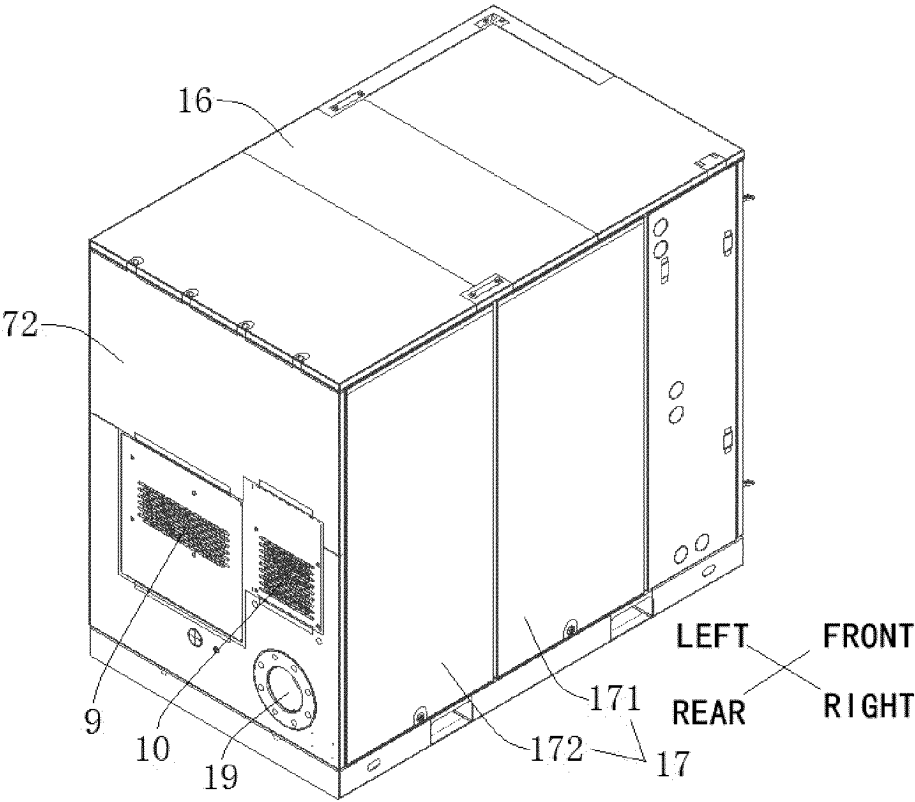


Fig. 8

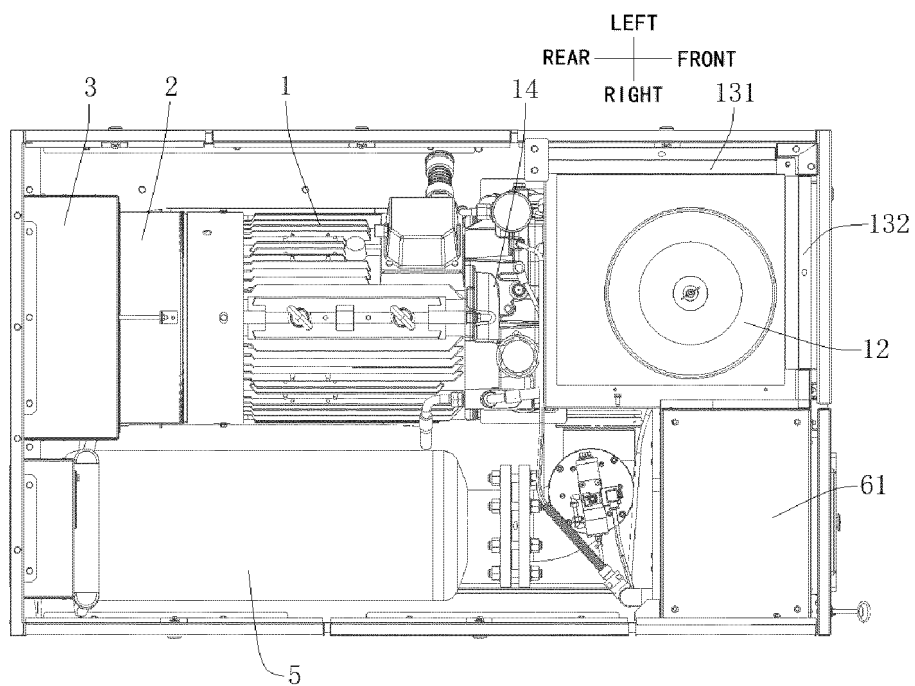


Fig. 9

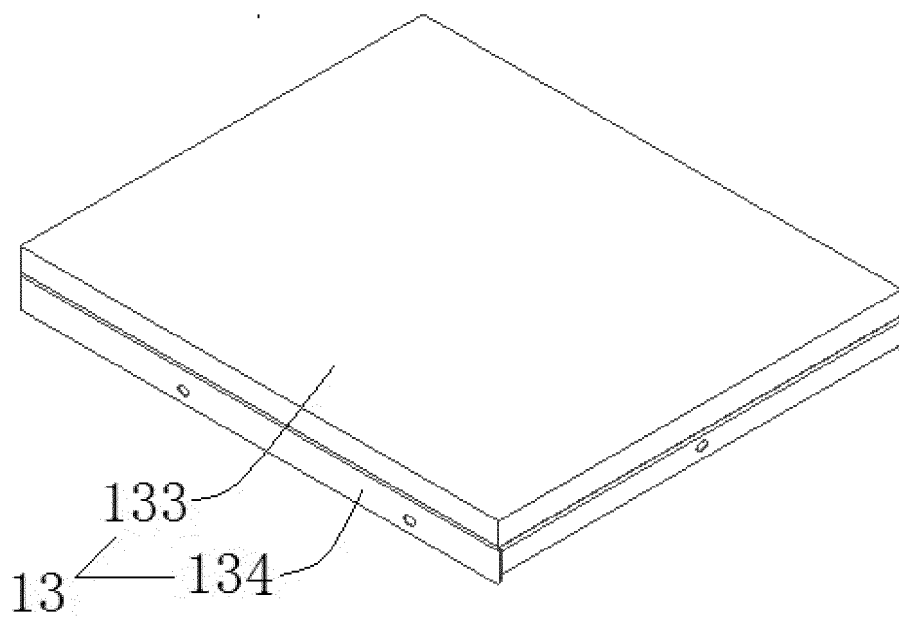


Fig. 10

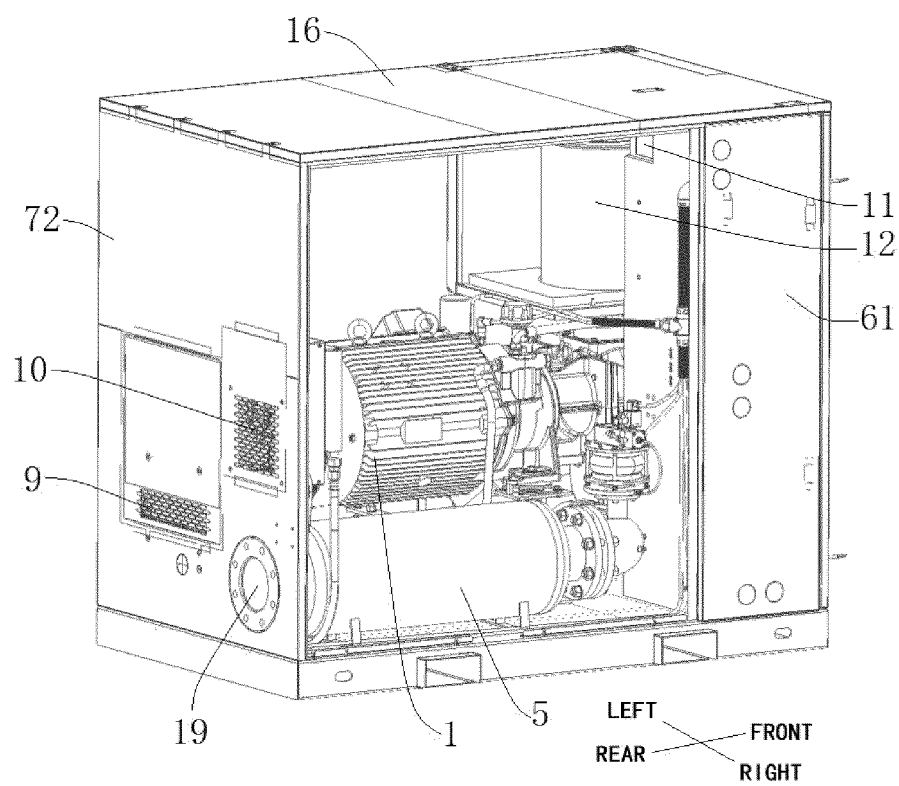
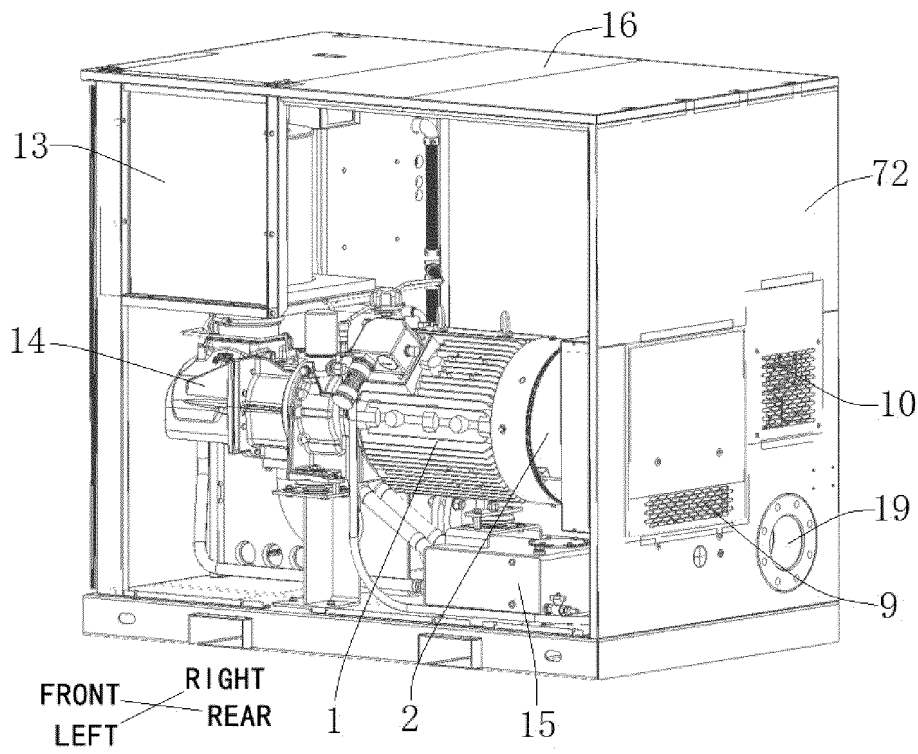


Fig. 11



INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2023/093500

A. CLASSIFICATION OF SUBJECT MATTER

F04C23/02(2006.01)i; F04C29/00(2006.01)i; F04C29/04(2006.01)i; F04C29/06(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: F04C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS; CNTXT; VEN; USTXT; EPTXT; WOTXT; CNKI: 科普柯, 压缩机, 空压机, 鼓风机, 风扇, 箱, 柜, 马达, 电机, 电动机, 控制, 电控, 电气, 逆变器, 变频器, compressor, fan, blower, box, case, tank, motor, control+, monitor, regulator, electric +, inverter, converter

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 217270824 U (ATLAS COPCO WUXI COMPRESSOR CO., LTD.) 23 August 2022 (2022-08-23) claims 1-18, and description, paragraphs [0043]-[0086], and figures 1-11	1-18
X	CN 101379297 A (ATLAS COPCO AIRPOWER NV) 04 March 2009 (2009-03-04) description, pages 3-6, and figures 1-3	1-18
X	CN 208885585 U (YIXIN ENERGY TECH SHANGHAI CO., LTD.) 21 May 2019 (2019-05-21) description, paragraphs [0016]-[0021], and figures 1-3	1-18
X	CN 212389495 U (FUSHENG INDUSTRY (SHANGHAI) CO., LTD.) 22 January 2021 (2021-01-22) description, paragraphs [0047]-[0064], and figures 1-12	1-18
X	JP 2016089665 A (IHI CORP.) 23 May 2016 (2016-05-23) description, paragraphs [0031]-[0067], and figures 1-7	1-18

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

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Date of mailing of the international search report

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Name and mailing address of the ISA/CN

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Beijing 100088

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2023/093500

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Form PCT/ISA/210 (patent family annex) (July 2022)

REFERENCES CITED IN THE DESCRIPTION

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