

AIR INTAKE SYSTEM AND AIR COMPRESSION APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to Chinese Patent Application No. 202322307085.5, entitled “AIR INTAKE SYSTEM AND AIR COMPRESSION APPARATUS”, and filed on August 25, 2023 by Atlas Copco (Wuxi) Compressor Co., Ltd., the entire contents of which are incorporated herein by reference.

FIELD

[0002] The present disclosure relates to the field of air compression apparatus manufacturing technologies, and more particularly, to an air intake system and an air compression apparatus including the same.

BACKGROUND

[0003] At present, the existing air compression apparatus has become increasingly mature, but the air intake system usually adopts a relatively simple structure. That is, the atmosphere is connected to an air filter via a hose, or the atmosphere is connected to a hose through an air intake channel and then connected to the air filter. The air filter is further connected to a compression element or an unloading valve via a hose. This structure is often a source of high noise in the machine, leading to problems such as high noise levels of the entire machine. In addition, the structural design of the air intake system can also affect intake pressure drop. The air filter serves as a consumable part in the air intake system. The mounting, disassembly, and shape of the air filter in the air intake system can also influence the maintenance and structural compactness of the system. Therefore, the existing intake system still has substantial potential for improvements.

SUMMARY

[0004] The present disclosure aims to solve at least one of the technical problems mentioned in the background part. To this end, the present disclosure provides a new air intake system and an air compression apparatus including the same.

5 [0005] The air intake system according to embodiments of the present disclosure includes a muffling channel having an air inlet; a muffling box having a first chamber and a second chamber that are spaced apart from each other, the first chamber being in communication with the muffling channel and an air filter structure being disposed in the first chamber, the air filter structure having an inlet in communication with the first chamber and an outlet in
10 communication with the second chamber, and wherein at least one of the first chamber and the second chamber is constructed as a muffling chamber; and a connection pipe assembly in communication with the second chamber and configured to be in communication with an air consumption component.

[0006] With the air intake system according to the embodiments of the present disclosure,
15 the muffling channel and the muffling box that are connected to each other are configured to perform multiple sound muffling processes on the gas, reducing noise volume generated by the air intake system. Therefore, problems such as noise pollution caused by excessive noise generated during operation of the air intake system can be avoided, resulting in better service performance and a wider application range.

20 [0007] With the air intake system according to some embodiments of the present disclosure, a partition plate is disposed in the muffling box and configured to separate the first chamber from the second chamber. The partition plate has a mounting hole. An end, where the outlet is formed, of the air filter structure passes through the mounting hole and is mounted at the mounting hole.

25 [0008] With the air intake system according to some embodiments of the present disclosure, a plurality of mounting holes are provided and configured to be mounted in one-to-one correspondence with a plurality of air filter structures.

[0009] With the air intake system according to some embodiments of the present disclosure, the mounting hole is constructed as an elliptical hole, and an end portion of the air

filter structure is of elliptical shape to be adapted to an inner peripheral wall of the mounting hole.

[0010] With the air intake system according to some embodiments of the present disclosure, a mounting support is disposed in the first chamber. The mounting support has an end fixed relative to an inner wall of the first chamber and the other end that is a free end suspended in the first chamber. The air filter structure is sleeved over an outside of the mounting support.

[0011] With the air intake system according to some embodiments of the present disclosure, the mounting support includes two main plates and an end plate. Each of the two main plates has an end connected to the inner wall of the first chamber. The two main plates are spaced apart from and opposite to each other. The end plate has two ends, each of which is connected to the other end of a corresponding one of the two main plates. The main plates penetrate the air filter structure. A movable fastener is disposed at the end plate and configured to selectively fix the air filter structure.

[0012] With the air intake system according to some embodiments of the present disclosure, a mounting support is disposed in the first chamber. The mounting support defines a mounting groove, and a fastener is movable and disposed at the mounting support. The fastener at least partially extends into the mounting groove and is configured to selectively fix the air filter structure.

[0013] With the air intake system according to some embodiments of the present disclosure, the mounting groove is configured to receive the air filter structure.

[0014] With the air intake system according to some embodiments of the present disclosure, the muffling channel includes an air intake channel and a connection channel, the air inlet being formed in the air intake channel, the connection channel and the air intake channel being connected to each other in a bent manner, and the connection channel being in communication with the first chamber; and/or a flow baffle is disposed in at least part of the muffling channel, the flow baffle being arranged to protrude in the muffling channel.

[0015] With the air intake system according to some embodiments of the present disclosure, a plurality of flow baffles are provided and distributed in the muffling channel in a staggered manner, allowing the muffling channel to extend in a multi-segment bent form.

[0016] With the air intake system according to some embodiments of the present disclosure, the air inlet is formed at a top of the muffling channel, and a slope is formed at a bottom wall of the muffling channel. The slope is constructed to extend obliquely toward the first chamber from top to bottom.

5 **[0017]** With the air intake system according to some embodiments of the present disclosure, the muffling channel has a width configured to gradually decrease from an end of the muffling channel away from the first chamber to an end of the muffling channel adjacent to the first chamber; and/or the muffling channel has a height configured to gradually increase from an end of the muffling channel away from the first chamber to an end of the muffling
10 channel adjacent to the first chamber.

[0018] With the air intake system according to some embodiments of the present disclosure, a sound absorption member is disposed in the muffling box and/or the muffling channel; and/or the muffling box further has an access opening in communication with the first chamber. An access door is disposed at the access opening and configured to open and
15 close the access opening.

[0019] With the air intake system according to some embodiments of the present disclosure, the connection pipe assembly includes a connection hose and an air intake unloading valve. One end of the connection hose is in communication with the second chamber, and the air intake unloading valve is mounted at the other end of the connection
20 hose.

[0020] The present disclosure further provides an air compression apparatus.

[0021] The air compression apparatus according to the embodiments of the present disclosure includes the air intake system according to any one of the above-described embodiments.

25 **[0022]** Compared with the prior art, the air compression apparatus and the above-described air intake system have the same advantages, and details are omitted herein.

[0023] Additional aspects and advantages of the present disclosure will be provided at least in part in the following description, or will become apparent at least in part from the following description, or can be learned from practicing of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The above and/or additional aspects and advantages of the present disclosure will become more apparent and more understandable from the following description of embodiments taken in conjunction with the accompanying drawings.

5 **[0025]** FIG. 1 is a first schematic structural diagram of an air intake system according to an embodiment of the present disclosure.

[0026] FIG. 2 is a first schematic structural diagram of a muffling channel according to an embodiment of the present disclosure.

10 **[0027]** FIG. 3 is a second schematic structural diagram of a muffling box according to an embodiment of the present disclosure.

[0028] FIG. 4 is a third schematic structural diagram of a muffling box according to an embodiment of the present disclosure.

[0029] FIG. 5 is a fourth schematic structural diagram of a muffling box according to an embodiment of the present disclosure.

15 **[0030]** FIG. 6 is a second schematic structural diagram of an air intake system according to an embodiment of the present disclosure.

[0031] FIG. 7 is a schematic structural diagram of an air compression apparatus according to an embodiment of the present disclosure.

20 **[0032]** FIG. 8 is a third schematic structural diagram of an air intake system according to an embodiment of the present disclosure.

[0033] FIG. 9 is a fourth schematic structural diagram of an air intake system according to an embodiment of the present disclosure.

[0034] FIG. 10 is a fifth schematic structural diagram of an air intake system according to an embodiment of the present disclosure.

25 **[0035]** FIG. 11 is a fifth schematic structural diagram of a muffling box according to an embodiment of the present disclosure.

[0036] FIG. 12 is a sixth schematic structural diagram of an air intake system according to an embodiment of the present disclosure.

[0037] Reference numerals of the accompanying drawings:

[0038] air intake system 100,

[0039] muffling channel 1, air inlet 11, air intake channel 12, connection channel 13, flow baffle 14, bottom wall 15,

[0040] muffling box 2, first chamber 21, mounting support 211, mounting groove 2111,
5 fastener 2112, second chamber 22, partition plate 23, mounting hole 231, access opening 24, access door 25, hinge 26, upright column 27,

[0041] connection pipe assembly 3, connection hose 31, air intake unloading valve 32, air filter structure 4.

DETAILED DESCRIPTION OF THE EMBODIMENTS

10 [0042] Embodiments of the present disclosure will be described in detail below with reference to examples thereof as illustrated in the accompanying drawings, throughout which same or similar elements, or elements having same or similar functions, are denoted by same or similar reference numerals. The embodiments described below with reference to the drawings are illustrative only and are intended to explain the present disclosure, and shall not
15 be construed as limiting the present disclosure.

[0043] In the description of the present disclosure, it should be understood that the orientation or the position indicated by terms such as “center”, “longitudinal”, “transverse”, “length”, “width”, “thickness”, “over”, “below”, “front”, “rear”, “left”, “right”, “vertical”, “horizontal”, “top”, “bottom”, “inner”, “outer”, “clockwise”, “anti-clockwise”, “axial”,
20 “radial”, and “circumferential” should be construed to refer to the orientation or the position as shown in the drawings, and is only for the convenience of describing the present disclosure and simplifying the description, rather than indicating or implying that the pointed device or element must have a specific orientation, or be constructed and operated in a specific orientation, and therefore cannot be understood as a limitation to the present disclosure. In
25 addition, the features associated with “first” and “second” may explicitly or implicitly that there are one or more features. In the description of the present disclosure, “plurality” means two or more unless otherwise specified.

[0044] In the description of the present disclosure, it should be noted that, unless

otherwise clearly specified and limited, terms such as “install”, “connect”, “connect to”, and the like should be understood in a broad sense. For example, it may be a fixed connection or a detachable connection or connection as one piece; mechanical connection or electrical connection; direct connection or indirect connection through an intermediate; internal communication of two components. For those of ordinary skill in the art, the specific meaning of the above-mentioned terms in the present disclosure can be understood according to specific circumstances.

[0045] An air intake system 100 according to an embodiment of the present disclosure is described in detail below with reference to FIG. 1 to FIG. 12. This system can reduce noise of an entire unit and avoid problems such as noise pollution.

[0046] As illustrated in FIG. 1 to FIG. 12, the air intake system 100 according to an embodiment of the present disclosure includes a muffling channel 1, a muffling box 2, and a connection pipe assembly 3.

[0047] The muffling channel 1 has an air inlet 11. The muffling box 2 has a first chamber 21 and a second chamber 22 that are spaced apart from each other. The first chamber 21 is in communication with the muffling channel 1 and an air filter structure 4 is disposed in the first chamber 21. The air filter structure 4 has an inlet in communication with first chamber 21 and an outlet in communication with the second chamber 22. The connection pipe assembly 3 is in communication with second chamber 22 and configured to be in communication with an air consumption component.

[0048] Specifically, the air intake system 100 is provided with the muffling channel 1 and the muffling box 2. The muffling channel 1 has an end in communication with the muffling box 2 and the other end having the air inlet 11. The air inlet 11 can be formed above an end portion of the muffling channel 1. External gas can enter the muffling channel 1 through the air inlet 11 and then enter the muffling box 2 through the muffling channel 1. The muffling channel 1 can perform a muffling treatment on the gas, and the muffling box 2 can also perform a muffling treatment on the gas, reducing noise volume generated during a gas compression process.

[0049] Furthermore, the muffling box 2 has the first chamber 21 and the second chamber 22 that are spaced apart from each other to form two independent chambers. The first

chamber 21 can be connected to the second chamber 22 by means of riveting, welding, or other methods. The muffling channel 1 is in communication with the first chamber 21, that is, the gas may enter the first chamber 21 through the muffling channel 1. The air filter structure 4 is disposed inside the first chamber 21. The air filter structure 4 has the inlet in communication with the first chamber 21 and the outlet in communication with the second chamber 22. The gas entering the first chamber 21 enters the air filter structure 4 through the inlet of the air filter structure 4, and then flows into the second chamber 22 through the outlet of the air filter structure 4. The second chamber 22 is in communication with a connection pipe assembly 3, and the connection pipe assembly 3 is in communication with an air consumption component. The air filter structure 4 can filter out dust, sand particles, etc. in the gas. After being filtered by the air filter structure 4, the gas undergoes muffling again in the second chamber 22 and then flows into the air consumption component through the connection pipe assembly 3.

[0050] It should be noted that at least one of the first chamber 21 and the second chamber 22 is constructed as a muffling chamber. That is, either the first chamber 21 or the second chamber 22 can be configured as the muffling chamber, to achieve secondary muffling after the gas passes through the muffling channel 1, the first chamber 21, and the second chamber 22, effectively eliminating noise in the gas. Alternatively, both the first chamber 21 and the second chamber 22 can be configured as the muffling chambers, to achieve tertiary muffling after the gas passes through the muffling channel 1, the first chamber 21, and the second chamber 22, effectively eliminating the noise in the gas and enhancing muffling performance.

[0051] According to the air intake system 100 according to the embodiments of the present disclosure, the muffling channel 1 and the muffling box 2 that are connected to each other are configured to perform multiple sound muffling processes on gas, reducing the noise volume generated by the air intake system 100. Therefore, problems such as noise pollution caused by excessive noise generated by the air intake system 100 during operation are avoided, resulting in better service performance and a wider application range.

[0052] In some embodiments, a partition plate 23 is disposed in the muffling box 2 and configured to separate the first chamber 21 from the second chamber 22. The partition plate 23 has a mounting hole 231. An end, where the outlet is formed, of the air filter structure 4

passes through and is mounted at the mounting hole 231.

[0053] Specifically, as illustrated in FIG. 4 and FIG. 5, the muffling box 2 has the first chamber 21 and the second chamber 22, and the partition plate 23 is disposed in the muffling box 2. The first chamber 21 is separated from the second chamber 22 by the partition plate 23 to form the two independent chambers, facilitating after-sales cleaning and maintenance. The partition plate 23 has the mounting hole 231, and the end, where the outlet is formed, of the air filter structure 4 passes through and is mounted at the mounting hole 231. The mounting hole 231 has a shape that matches that of the air filter structure 4, ensuring a tight connection between the air filter structure 4 and the mounting hole 231. After being filtered in the air filter structure 4, the gas can enter the second chamber 22 through the mounting hole 231, which prevents filtered gas from entering the first chamber 21 and can also prevent unfiltered gas in the first chamber 21 from entering the second chamber 22. In this way, a filtration effect of the filter structure on the gas can be ensured.

[0054] In some embodiments, a plurality of mounting holes 231 are formed and configured to be mounted in one-to-one correspondence with a plurality of air filter structures 4.

[0055] Specifically, both the plurality of mounting holes 231 and the plurality of air filter structures 4 are provided, and they are mounted and fixed in a one-to-one correspondence. For example, two mounting holes 231 may be provided to mount two air filter structures 4, realizing mounting and fixation of each of the two air filter structures 4. In addition, the number of the air filter structures 4 can be flexibly set.

[0056] In some embodiments, the mounting hole 231 is configured as an elliptical hole, and an end portion of the air filter structure 4 is of elliptical shape to be adapted to an inner peripheral wall of the mounting hole 231. That is, a shape of the inner peripheral wall of the mounting hole 231 is the same as a shape of the end portion of the air filter structure 4. In this way, during vertical mounting, mounting space is more compact compared with an air filter having a circular end portion. The elliptical hole 231 of the partition plate 23 is fitted with the elliptical end portion of the air filter structure 4, which can prevent the unfiltered gas in the first chamber 21 from entering the second chamber 22, ensuring the filtration effect of the filter structure on the gas.

[0057] Specifically, the partition plate 23 is disposed between the first chamber 21 and the second chamber 22, and the end, where the outlet is formed, of the air filter structure 4 passes through and is mounted at the mounting hole 231. The plurality of mounting holes 231 may be provided. For example, as illustrated in FIG. 5, two mounting holes 231 are provided, and
5 as illustrated in FIG. 11, three mounting holes 231 are provided. In this embodiment, each of the mounting holes 231 is configured as an elliptical hole, and the end portion of the air filter structure 4 is also of elliptical shape. Such arrangement can prevent a user from mounting an air filter structure 4 of other specifications. Mounting an air filter structure 4 of other specifications would lead to mismatching of the air filter structure 4 and affect the service
10 performance of the air intake system 100. The plurality of mounting holes 231 are formed in one-to-one correspondence with the plurality of air filter structures 4. Therefore, after entering the first chamber 21, the gas can flow into the plurality of air filter structures 4 simultaneously for filtration, improving the filtration performance and enhancing operating efficiency.

[0058] In some embodiments, a mounting support 211 is disposed in the first chamber 21.
15 The mounting support 211 has an end that is fixed relative to an inner wall of the first chamber 21 and the other end that is a free end suspended in the first chamber 21. The air filter structure 4 is sleeved over an outside of the mounting support 211.

[0059] Specifically, as illustrated in FIG. 4 and FIG. 11, the mounting support 211 is disposed in the first chamber 21. One end of the mounting support 211 is connected to the
20 inner wall of the first chamber 21 by means of welding or other methods, and the other end of the mounting support 211 is the free end suspended in the first chamber 21. The mounting support 211 is configured as a rectangular frame structure. The plurality of air filter structures 4 are provided and formed in one-to-one correspondence with the plurality of mounting supports 211. For example, as illustrated in FIG. 4, two mounting supports 211 are provided,
25 and as illustrated in FIG. 11, three mounting supports 211 are provided. Each of the mounting supports 211 is disposed corresponding to one of the air filter structures 4, in such a manner that each of the mounting supports 211 has higher support reliability for a corresponding one of the air filter structures 4 and better service performance, avoiding problems such as deformation of the mounting supports 211 caused by excessive weight of the air filter
30 structure 4, etc.

[0060] In some embodiments, the mounting support 211 includes two main plates and an end plate. Each of the two main plates has an end connected to the inner wall of the first chamber 21. The two main plates are spaced apart from and opposite to each other. The end plate has two ends, each of which is connected to the other end of a corresponding one of the two main plates. The main plates penetrate the air filter structure 4, and a movable fastener 2112 is disposed at the end plate and configured to selectively fix the air filter structure 4.

[0061] Specifically, as illustrated in FIG. 4 and FIG. 11, the mounting support 211 is disposed in the first chamber 21. The mounting support 211 includes the two main plates and the end plate. Each of the two main plates has one end connected to the inner wall of the first chamber 21 by means of welding or other methods. The two main plates are spaced apart from and opposite to each other. The end plate has two ends, each of which is connected to the other end of a corresponding one of the two main plates. That is, the mounting support 211 can be configured as a rectangular frame structure. The air filter structure 4 is sleeved over the outside of the mounting support 211, allowing the main plates to penetrate the air filter structure 4. In addition, the movable fastener 2112 is disposed at the end plate and may be configured to selectively fix the air filter structure 4.

[0062] In addition, after the air filter structure 4 is sleeved on the mounting support 211, the fastener 2112 can be tightened by screwing in a direction towards the mounting support 211, in such a manner that the fastener 2112 abuts against the mounting support 211, allowing the air filter structure 4 to be fixed relative to the mounting support 211. When the air filter structure 4 needs to be disassembled relative to the mounting support 211, the fastener 2112 can be unscrewed in a direction away from the mounting support 211, in such a manner that the air filter structure 4 can be moveable relative to the mounting support 211, facilitating subsequent maintenance, replacement, and the like of the air filter structure 4.

[0063] In some embodiments, a mounting support 211 is disposed in the first chamber 21. The mounting support 211 defines a mounting groove 2111, and a fastener 2112 is movable and disposed at the mounting support 211. The fastener 2112 at least partially extends into the mounting groove 2111 and is configured to selectively fix the air filter structure 4.

[0064] Specifically, the mounting support 211 is disposed in the first chamber 21. The mounting support 211 is connected to the partition plate 23 by means of welding or other

methods. The mounting support 211 is configured as a rectangular frame structure and the mounting groove 2111 is defined in the interior of the mounting support 211. The mounting support 211 has an end connected to the partition plate 23 by means of welding or other methods and the other end that is the free end. The fastener 2112 is movable and disposed at the free end. The fastener 2112 can be configured as a nut or the like. The fastener 2112 has an end disposed outside the mounting groove 2111 and the other end disposed in the mounting groove 2111. That is, the fastener 2112 at least partially extends into mounting groove 2111.

[0065] Furthermore, the fastener 2112 can be configured to selectively fix the air filter structure 4. When the air filter structure 4 is placed in the mounting groove 2111, the fastener 2112 can be tightened by screwing in a direction towards the mounting groove 2111, in such a manner that the fastener 2112 abuts against or penetrates the air filter structure 4, allowing the air filter structure 4 to be fixed relative to the mounting support 211. When the air filter structure 4 needs to be disassembled relative to the mounting support 211, the fastener 2112 can be unscrewed in a direction away from the mounting groove 2111, in such a manner that the air filter structure 4 can be moved relative to the mounting support 211, facilitating subsequent maintenance, replacement, and the like of the air filter structure 4.

[0066] In some embodiments, the mounting groove 2111 is configured to receive the air filter structure 4. The plurality of air filter structures 4 are provided and disposed in one-to-one correspondence with the plurality of mounting supports 211. For example, as illustrated in FIG. 4, two mounting supports 211 are provided. As illustrated in FIG. 11, three mounting supports 211 are provided. Each of the mounting supports 211 is disposed corresponding to one of the air filter structures 4, in such a manner that each of the mounting supports 211 has higher support reliability for a respective one of the air filter structures 4 and better service performance, avoiding problems such as deformation of the mounting supports 211 caused by excessive weight of the air filter structures 4, etc.

[0067] In some embodiments, the mounting support 211 is disposed in the first chamber 21 and a mounting groove 2111 is defined by the mounting support 211. The mounting groove 2111 is received in the air filter structure 4.

[0068] Specifically, the mounting support 211 is disposed in the first chamber 21, and the mounting support 211 is connected to the partition plate 23 by means of welding or other

methods. The mounting support 211 is configured as the rectangular frame structure and defines the mounting groove 2111 therein. The mounting groove 2111 can be received in the air filter structure 4 to support the air filter structure 4. The plurality of air filter structures 4 are provided and disposed in one-to-one correspondence with the plurality of mounting supports 211. For example, as illustrated in FIG. 4, two mounting supports 211 are provided. As illustrated in FIG. 11, three mounting supports 211 are provided. Each of the mounting supports 211 is disposed corresponding to a respective one of the air filter structures 4, in such a manner that each of the mounting supports 211 has higher support reliability for a respective one of the air filter structures 4 and better service performance, avoiding problems such as deformation of the mounting support 211 caused by excessive weight of the air filter structure 4, etc.

[0069] In some embodiments, the fastener 2112 is movable and disposed at the mounting support 211. The fastener 2112 at least partially extends into the mounting groove 2111 and is configured to selectively fix the air filter structure 4.

[0070] Specifically, the mounting support 211 has an end connected to the partition plate 23 by means of welding or other methods and the other end that is the free end. The fastener 2112 is movable and disposed at the free end. The fastener 2112 can be configured as a nut or the like. One end of the fastener 2112 is disposed outside the mounting groove 2111 and the other end of the fastener 2112 is disposed in the mounting groove 2111. That is, the fastener 2112 at least partially extends into the mounting groove 2111. The fastener 2112 can be configured to selectively fix the air filter structure 4. When the air filter structure 4 is placed in the mounting groove 2111, the fastener 2112 can be tightened by screwing in a direction towards the mounting groove 2111, in such a manner that the fastener 2112 abuts against or penetrates the air filter structure 4, allowing the air filter structure 4 to be fixed relative to the mounting support 211. When the air filter structure 4 needs to be disassembled relative to the mounting support 211, the fastener 2112 can be unscrewed in the direction away from the mounting groove 2111, in such a manner that the air filter structure 4 can be moved relative to mounting support 211, facilitating subsequent maintenance, replacement, and the like of the air filter structure 4.

[0071] In some embodiments, the mounting groove 2111 is defined by the end plate

together with the two main plates. The fastener 2112 penetrates the air filter structure 4 and the end plate and at least partially extends into the mounting groove 2111. One end of the fastener 2112 is disposed outside the mounting groove 2111 and the other end of the fastener 2112 is disposed in the mounting groove 2111. That is, the fastener 2112 at least partially extends into the mounting groove 2111. The fastener 2112 can be configured to selectively fix the air filter structure 4. When the air filter structure 4 is placed in the mounting groove 2111, the fastener 2112 can be tightened by screwing in a direction towards the mounting groove 2111, in such a manner that the fastener 2112 abuts against the air filter structure 4, allowing the air filter structure 4 to be fixed relative to the mounting support 211. When the air filter structure 4 needs to be disassembled relative to the mounting support 211, the fastener 2112 can be unscrewed in the direction away from the mounting groove 2111, in such a manner that the air filter structure 4 can be moved relative to the mounting support 211, facilitating subsequent maintenance, replacement, and the like of the air filter structure 4.

[0072] In some embodiments, the muffling channel 1 includes an air intake channel 12 and a connection channel 13. The air inlet 11 is formed at the air intake channel 12. The connection channel 13 and the air intake channel 12 are connected to each other in a bent manner, and the connection channel 13 is in communication with the first chamber 21. Additionally or alternatively, a flow baffle 14 is disposed in at least part of the muffling channel 1, and the flow baffle 14 is arranged to protrude in the muffling channel 1.

[0073] Specifically, as illustrated in FIG. 2, the muffling channel 1 can be configured in an L-shape and include the air intake channel 12 and the connection channel 13. The air inlet 11 is disposed at the air intake channel 12 and above the air intake channel 12. The connection channel 13 has an end that can be connected to the air intake channel 12 via a bolt or the like and the other end that is in communication with the first chamber 21. A top end of the connection channel 13 can be connected to the entire unit by means of suspension or other methods. After entering the air intake channel 12 through the air inlet 11, the gas can be conveyed from the air intake channel 12 to the connection channel 13. The connection channel 13 and the air intake channel 12 are connected to each other in the bent manner. That is, a connection between the air intake channel 12 and the connection channel 13 is angled. Therefore, a flowing direction of the gas changes during conveyance of gas, which can

achieve muffling.

[0074] In addition, as illustrated in FIG. 2, the flow baffle 14 may be disposed in the muffling channel 1 and is arranged to protrude in the muffling channel 1. In this embodiment, three flow baffles 14 are provided and arranged in a staggered manner in the muffling channel 1. By changing a flowing direction of the airflow multiple times, the airflow is subjected to sound muffling.

[0075] In some embodiments, a plurality of flow baffles 14 are provided and distributed in a staggered manner in the muffling channel 1, allowing the muffling channel 1 to extend in a multi-segment bent form. As illustrated in FIG. 2, the flow baffle 14 may be disposed in the muffling channel 1 and is arranged to protrude in the muffling channel 1. In addition, the plurality of flow baffles 14 are provided. In this embodiment, three flow baffles 14 are provided and are distributed in the staggered manner in the muffling channel 1. In this way, the muffling channel 1 can be divided into a plurality of segments, with adjacent segments bent relative to each other, to allow the flowing direction of the airflow to change multiple times when flowing in the muffling channel 1, muffling the airflow and enhancing the muffling performance.

[0076] In some embodiments, the air inlet 11 is formed at a top of the muffling channel 1, and the muffling channel 1 is formed with a slope at a bottom wall 15 of the muffling channel 1. The slope is configured to extend obliquely toward the first chamber 21 from top to bottom.

[0077] Specifically, as illustrated in FIG. 8 to FIG. 10, the air inlet 11 is formed at the top of the muffling channel 1, in such a manner that the airflow can enter the muffling channel 1 from the top of the muffling channel 1, facilitating gas conveyance. In addition, the muffling channel 1 is formed with the slope at the bottom wall 15 of the muffling channel 1, and the slope is configured to extend obliquely toward the first chamber 21 from top to bottom. This slope can be configured to guide the airflow into the muffling box 2. The muffling channel 1 has a structure that is wider on the outside and narrower on the inside, as well as shallower on the outside and deeper on the inside, which can ensure that an air intake cross-sectional area of the muffling channel 1 remains unchanged and reduce pressure loss. The muffling channel 1 can be connected to the entire unit via an upright column 27. The flow baffles 14 are disposed to be transversely staggered in the muffling channel 1, thereby performing sound

muffling on the airflow by changing the flowing direction of the airflow multiple times.

[0078] In some embodiments, the muffling channel 1 has a width configured to gradually decrease from an end of the muffling channel 1, away from the first chamber 21, to an end of the muffling channel 1, adjacent to the first chamber 21. Additionally or alternatively, the muffling channel 1 has a height configured to gradually increase from the end of the muffling channel 1, away from the first chamber 21, to the end of the muffling channel 1, adjacent to the first chamber 21.

[0079] Specifically, as illustrated in FIG. 9 and FIG. 12, the muffling channel 1 is configured such that its width gradually decreases from the end away from the first chamber 21 to the end adjacent to the first chamber 21. The muffling channel 1 is configured such that its height gradually increases from the end away from the first chamber 21 to the end adjacent to the first chamber 21, ensuring that the air intake cross-sectional area of the muffling channel 1 remains unchanged and reduces the pressure loss. In actual configuration, only the width of the muffling channel 1 may be configured to gradually decrease from the end away from the first chamber 21 to the end adjacent to the first chamber 21; or only the height of the muffling channel 1 may be configured to gradually increase from the end away from the first chamber 21 to the end adjacent to the first chamber 21.

[0080] In some embodiments, a sound absorption member is disposed in the muffling box 2 and/or the muffling channel 1. That is, the sound absorption member may be disposed only in the muffling box 2, or only in the muffling channel 1, or in both the muffling box 2 and the muffling channel 1. Furthermore, the sound absorption member is disposed in the first chamber 21 and/or the second chamber 22 in the muffling box 2. That is, the sound absorption member can be disposed in at least one of the first chamber 21 and the second chamber 22, achieving flexible arrangement of the sound absorption member and selecting a sound muffling and noise reduction effect.

[0081] Specifically, in this embodiment, the sound absorption member can be disposed in both the muffling box 2 and the muffling channel 1. The sound absorption member can be configured as a sound-absorbing foam, which can absorb and reduce noise generated by gas vibration in the muffling box 2 and the muffling channel 1, achieving a noise reduction effect. After entering the muffling channel 1, the gas can achieve noise reduction effect by changing

the airflow direction and through the sound absorption member. In addition, after entering the muffling box 2, the noise reduction can be achieved through the sound absorption member, resulting in a better noise reduction effect.

[0082] In addition, as illustrated in FIG. 3, FIG. 4, FIG. 7, and FIG. 9, the muffling box 2 further includes an access opening 24 in communication with the first chamber 21. An access door 25 is disposed at the access opening 24 and connected to the access opening 24 via a hinge 26. The access door 25 is configured to open and close the access opening 24. The access door 25 can be opened during after-sales maintenance, which facilitates subsequent maintenance, replacement, or the like of a filter core, saving time.

[0083] In some embodiments, the connection pipe assembly 3 includes a connection hose 31 and an air intake unloading valve 32. One end of the connection hose 31 is in communication with the second chamber 22, and the air intake unloading valve 32 is mounted at the other end of the connection hose 31.

[0084] Specifically, as illustrated in FIG. 1 and FIG. 8, the connection pipe assembly 3 includes the connection hose 31 and the air intake unloading valve 32. The connection hose 31 can be made of a material such as rubber, which has excellent elasticity, adjustable shape, and high flexibility. One end of the connection hose 31 is in communication with the second chamber 22. The gas is conveyed to the first chamber 21 of the muffling box 2 through the muffling channel 1. After entering the first chamber 21, the gas enters interiors of the plurality of air filter structures 4 for filtration. After filtration, the gas enters the second chamber 22, and then flows into the connection hose 31 through the second chamber 22. The air intake unloading valve 32 is disposed at the other end of the connection hose 31. When the gas reaches a certain pressure value, the air intake unloading valve 32 opens, allowing the connection hose 31 to be in communication with the air consumption component. When the gas pressure value does not meet a predetermined value of the air intake unloading valve 32, the air intake unloading valve 32 is closed to stop the gas supply, realizing automation of the gas supply.

[0085] The present disclosure further provides an air compression apparatus.

[0086] The air compression apparatus according to an embodiment of the present disclosure includes the air intake system 100 according to any of the above-described

embodiments.

[0087] The air compression apparatus according to an embodiment of the present disclosure includes the air intake system 100. By disposing the muffling channel 1 and the muffling box 2 that are connected to each other, the air intake system 100 performs multiple
5 sound muffling processes on the gas, reducing the noise volume generated by the air intake system 100. Therefore, problems such as noise pollution caused by excessive noise during operation of the air intake system 100 are avoided, resulting in better service performance and a wider application range.

[0088] Reference throughout this specification to “an embodiment”, “some embodiments”,
10 “schematic embodiments”, “an example”, “a specific example”, or “some examples” means that a particular feature, structure, material, or characteristic described in connection with the embodiment or example is included in at least one embodiment or example of the present disclosure. In this specification, exemplary descriptions of aforesaid terms are not necessarily referring to the same embodiment or example. Further, the particular features, structures,
15 materials, or characteristics may be combined in any suitable manner in one or more embodiments or examples.

[0089] Although embodiments of the present disclosure have been illustrated and described, it is conceivable for those of ordinary skill in the art that various changes, modifications, replacements, and variations can be made to these embodiments without
20 departing from the principles and spirit of the present disclosure. The scope of the present disclosure shall be defined by the claims as appended and their equivalents.

CLAIMS

1. An air intake system (100), comprising:

a muffling channel (1) having an air inlet (11);

5 a muffling box (2) having a first chamber (21) and a second chamber (22) that are spaced apart from each other, wherein the first chamber (21) is in communication with the muffling channel (1) and an air filter structure (4) is disposed in the first chamber (21), the air filter structure (4) having an inlet in communication with the first chamber (21) and an outlet in communication with the second chamber (22), and wherein at least one of the first chamber
10 (21) and the second chamber (22) is constructed as a muffling chamber; and

a connection pipe assembly (3) in communication with the second chamber (22) and configured to be in communication with an air consumption component.

2. The air intake system (100) according to claim 1, wherein a partition plate (23) is disposed in the muffling box (2) and configured to separate the first chamber (21) from the
15 second chamber (22), the partition plate (23) having a mounting hole (231), and

wherein an end, where the outlet is formed, of the air filter structure (4) passes through the mounting hole (231) and is mounted at the mounting hole (231).

3. The air intake system (100) according to claim 2, wherein a plurality of mounting holes (231) are provided and configured to be mounted in one-to-one correspondence with a
20 plurality of air filter structures (4).

4. The air intake system (100) according to claim 2 or 3, wherein:

the mounting hole (231) is constructed as an elliptical hole, and an end portion of the air filter structure (4) is of elliptical shape to be adapted to an inner peripheral wall of the mounting hole (231).

25 5. The air intake system (100) according to any one of claims 1 to 4, wherein a mounting support (211) is disposed in the first chamber (21), the air filter structure (4) being sleeved over the mounting support (211), wherein the mounting support (211) has an end fixed relative to an inner wall of the first chamber (21) and the other end that is a free end

suspended in the first chamber (21).

6. The air intake system (100) according to claim 5, wherein the mounting support (211) comprises two main plates and one end plate, wherein:

each of the two main plates has an end connected to the inner wall of the first chamber (21), the two main plates being spaced apart from and opposite to each other;

the end plate has two ends, each of which is connected to the other end of a corresponding one of the two main plates;

the main plates penetrate the air filter structure (4); and

a movable fastener (2112) is disposed at the end plate and configured to selectively fix the air filter structure (4).

7. The air intake system (100) according to any one of claims 1 to 4, wherein:

a mounting support (211) is disposed in the first chamber (21);

the mounting support (211) defines a mounting groove (2111); and

a fastener (2112) is movable and disposed at the mounting support (211), the fastener (2112) at least partially extending into the mounting groove (2111) and being configured to selectively fix the air filter structure (4).

8. The air intake system (100) according to claim 7, wherein the mounting groove (2111) is configured to receive the air filter structure (4).

9. The air intake system (100) according to any one of claims 1 to 8, wherein:

the muffling channel (1) comprises an air intake channel (12) and a connection channel (13), the air inlet (11) being formed in the air intake channel (12), wherein the connection channel (13) and the air intake channel (12) are connected to each other in a bent manner and the connection channel (13) is in communication with the first chamber (21); and/or

a flow baffle (14) is disposed in at least part of the muffling channel (1), the flow baffle (14) being arranged to protrude in the muffling channel (1).

10. The air intake system (100) according to claim 7, wherein a plurality of flow baffles (14) are provided, the plurality of flow baffles (14) being distributed in the muffling channel (1) in a staggered manner to cause the muffling channel (1) to extend in a multi-segment bent form.

11. The air intake system (100) according to any one of claims 1 to 10, wherein:

the air inlet (11) is formed at a top of the muffling channel (1), and

a slope is formed at a bottom wall of the muffling channel (1), the slope being constructed to extend obliquely toward the first chamber (21) from top to bottom.

12. The air intake system (100) according to claim 11, wherein:

5 a width of the muffling channel (1) is set to gradually decrease from an end of the muffling channel (1) away from the first chamber (21) to an end of the muffling channel (1) adjacent to the first chamber (21); and/or

a height of the muffling channel (1) is set to gradually increase from an end of the muffling channel (1) away from the first chamber (21) to an end of the muffling channel (1)
10 adjacent to the first chamber (21).

13. The air intake system (100) according to any one of claims 1 to 12, wherein:

a sound absorption member is disposed in the muffling box (2) and/or the muffling channel (1); and/or

the muffling box (2) further has an access opening (24) in communication with the first
15 chamber (21), an access door (25) being disposed at the access opening (24) and configured to open and close the access opening (24).

14. The air intake system (100) according to any one of claims 1 to 13, wherein the connection pipe assembly (3) comprises a connection hose (31) and an air intake unloading valve (32), wherein the connection hose (31) has an end in communication with the second
20 chamber (22) and the other end to which the air intake unloading valve (32) is mounted.

15. An air compression apparatus, comprising the air intake system (100) according to any one of claims 1 to 14.