CLAIMS

1. An oil-free screw compressor comprising:

a screw rotor including a screw and a shaft;

a bearing supporting the shaft;

a first shaft seal device fitted on the shaft, the first shaft seal device disposed between the screw and the bearing, the first shaft seal device including:

a first seal opposite to the shaft, and

a first communication section configured to communicate the bearing side with respect to between the shaft and the first seal, and an outer peripheral face of the first shaft seal device;

a second shaft seal device fitted on the shaft, the second shaft seal device disposed between the first shaft seal device and the bearing, the second shaft seal device including:

a second seal opposite to the shaft, and

a second communication section configured to communicate the screw side with respect to between the shaft and the second seal, and an outer peripheral face of the second shaft seal device;

a casing including a rotor chamber accommodating the screw, and a shaft accommodation space accommodating the shaft, the bearing, the first shaft seal device, and the second shaft seal device; and

a first seal member fitted on the shaft, the first seal member including an annular seal configured to be opposite to the shaft between the first communication section and the second communication section and separate

the first communication section and the second communication section,

wherein the casing includes an atmosphere communication section connected to both of the first communication section and the second communication section on the inner peripheral face of the shaft accommodation space, the atmosphere communication section configured to communicate the first communication section and the second communication section with an atmosphere,

wherein a flow passage sectional area in the first communication section is larger than a flow passage sectional area between the seal of the first seal member and the shaft,

wherein an angular position of the first communication section with respect to a rotation center of the shaft is different from an angular position of the second communication section, and

wherein the atmosphere communication section includes a connection space formed in a recess shape on an inner peripheral face of the shaft accommodation space so that the connection space is connected to both of the first communication section and the second communication section whose angular positions are different.

2. The oil-free screw compressor according to claim 1, wherein the first communication section is provided in a higher position than the second communication section.

3. The oil-free screw compressor according to claim 1 or 2, wherein the atmosphere communication section includes an external communication section

communicating a lower portion of the connection space with an atmosphere outside the casing, and an oil collection section provided between the external communication section and the connection space.

4. The oil-free screw compressor according to claim 1,

wherein a connection space of the atmosphere communication section is sectioned into a first sectioning region and a second sectioning region with a partitioning wall,

wherein the first communication section communicates with the first sectioning region,

wherein the second communication section communicates with the second sectioning region, and

wherein each of the first sectioning region and the second sectioning region includes an external communication section configured to communicate with an atmosphere outside the casing.

5. The oil-free screw compressor according to claim 4, wherein an external communication section corresponding to the second sectioning region is positioned at lower level than an external communication section corresponding to the first sectioning region.

6. The oil-free screw compressor according to any one of claims 1 to 5,

wherein the second communication section includes a plurality of second communication sections, and

wherein angular positions of the respective plurality of second

communication sections with respect to a rotation center of the shaft are different.

7. The oil-free screw compressor according to any one of claims 1 to 6, wherein the first shaft seal device and the second shaft seal device engage with each other so as to partially overlap with each other when seen in a diameter direction of the screw rotor.

8. The oil-free screw compressor according to any one of claims 1 to 7, wherein the first seal member is a seal ring forming a floating-type seal and is provided displaceably in a diameter direction of the shaft.

9. The oil-free screw compressor according to any one of claims 1 to 8, further comprising a second seal member fitted on the shaft, the second seal member including an annular seal opposed to the shaft between a first seal of the first shaft seal device and the rotor chamber.

10. The oil-free screw compressor according to claim 9, wherein the second seal member is a seal ring forming a floating-type seal and is provided displaceably in a diameter direction of the shaft.

11. The oil-free screw compressor according to any one of claims 1 to 10, wherein the first seal member overlaps at least one of the first shaft seal device and the second shaft seal device at least partially when seen in a diameter direction of the screw rotor.