receiving member that protrudes from the inner surface of the casing so as to come into contact with the air leakage preventing member.

CITATION LIST

PATENT DOCUMENT

[0005]

Patent Document 1: Japanese Unexamined Patent Publication No. 2006-052922

SUMMARY OF THE INVENTION

TECHNICAL PROBLEM

[0006]

An air treatment device using a rotor is configured to have a plurality of air passages where flows of air passing through the rotor in the axial direction are opposite to each other to achieve high performance. In this configuration, the pressure distribution in the casing changes depending on the rotational angle of the rotor. Thus, air leakage occurs from the center toward the outer circumference of the rotor and from the outer circumference toward the center of the rotor.

[0007]

However, in the known sealing structure disclosed in Patent Document 1, the sealing performance deteriorates when the leakage air flows in a direction separating the air leakage preventing member and the receiving member from each other. In addition, if the shaft is displaced in installation of the rotor, great fluctuations in the axial direction occur at the outer circumferential portion of the rotor, resulting in a strong collision between the air leakage preventing member and the receiving member, which may cause damage of the members and

loss of sealing performance.

[0008]

Embodiments of the present disclosure reduce air leakage at an outer circumferential portion of a rotor which serves as an air conditioning rotating body.

SOLUTION TO THE PROBLEM

[0009]

According to a first aspect of the present disclosure, there is provided an air conditioning rotating body having a rotor in a cylindrical shape, the rotor being housed in a casing so as to be freely rotatable, the air conditioning rotating body being configured to treat air passing through the rotor in an axial direction, wherein a labyrinth seal structure is provided between an outer circumferential portion of the rotor and the casing, the labyrinth seal structure includes a first protrusion protruding in the axial direction from the rotor toward the casing, and a second protrusion protruding in the axial direction from the casing toward the rotor, and the first protrusion is provided at a side surface on an outer circumference of the rotor.

[0010]

According to the first aspect, the labyrinth seal structure provided at the outer circumferential portion of the rotor can reduce both of the air leakage from the center toward the outer circumference of the rotor and the air leakage from the outer circumference toward the center of the rotor. Further, the labyrinth seal structure is configured by the engagement between the protrusions and protruding in the rotor axial direction. This configuration makes it easier to maintain sealing performance even if the outer circumferential portion of the rotor fluctuates in the axial direction due to displacement of the shaft, for example.

[0011]

In an embodiment of the first aspect, at least one of the first protrusion or the second protrusion is an elastic element.

[0012]

According to the above embodiment, the wind pressure of leaking air causes the protrusion made of an elastic element to deform to become closer to the other protrusion. The sealing performance can thus be improved.

[0013]

In an embodiment of the first aspect, the labyrinth seal structure includes a plurality of engagement structures, and the plurality of engagement structures includes a plurality of the elastic elements inclined at different angles to the axial direction.

[0014]

According to the above embodiment, the labyrinth seal structure can be optimized by adjusting the inclination angle of each elastic element according to the condition of leaking air.

[0015]

In an embodiment of the first aspect, the plurality of engagement structures includes a plurality of the elastic elements further apart from each other toward ends of the elastic elements.

[0016]

According to the above embodiment, the end of the protrusion made of any one of the elastic elements becomes much closer to another protrusion even when the air leakage flows from the center toward the outer circumference of the rotor or from the outer circumference to the center of the rotor. The sealing performance can thus be further improved.

[0017]

In an embodiment of the first aspect, the first protrusion is an inelastic element, and the second protrusion is an elastic element.

[0018]

The second protrusion protruding from the casing is more likely to be affected by the wind pressure of leaking air than the first protrusion protruding from the rotor. Therefore, in an embodiment of the first aspect, the second protrusion is made of an elastic element, which makes the second protrusions become much closer to the first protrusions. The sealing performance can thus be further improved.

[0019]

According to a second aspect of the present disclosure, there is provided an air treatment device having the air conditioning rotating body of the first aspect.

[0020]

The air treatment device of the second aspect has the air conditioning rotating body that can reduce the air leakage at the outer circumferential portion of the rotor. This can improve the performance of the air treatment device, such as dehumidification and humidification performance and heat exchange performance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

FIG. 1 is a schematic view illustrating a general configuration of an air treatment device according to an embodiment.

FIG. 2 is a schematic view illustrating a cross-sectional configuration of an air conditioning rotating body according to the embodiment.

FIG. 3 is a perspective view of a rotor constituting the air conditioning rotating body according to the embodiment.

CLAIMS

1. An air conditioning rotating body having a rotor in a cylindrical shape, the rotor being housed in a casing so as to be freely rotatable, the air conditioning rotating body being configured to treat air passing through the rotor in an axial direction, wherein

a labyrinth seal structure is provided between an outer circumferential portion of the rotor and the casing-,

the labyrinth seal structure includes a first protrusion protruding in the axial direction from the rotor toward the casing, and a second protrusion protruding in the axial direction from the casing toward the rotor, and

the first protrusion is provided at a side surface on an outer circumference of the rotor.

2. The air conditioning rotating body of claim 1, wherein

at least one of the first protrusion or the second protrusion is an elastic element.

3. The air conditioning rotating body of claim 2, wherein

the labyrinth seal structure includes a plurality of engagement structures, and

the plurality of engagement structures includes a plurality of the elastic elements inclined at different angles to the axial direction.

4. The air conditioning rotating body of claim 3, wherein

the plurality of engagement structures includes a plurality of the elastic elements further apart from each other toward ends of the elastic elements.

5. The air conditioning rotating body of any one of claims 2 to 4, wherein

the first protrusion is an inelastic element, and

the second protrusion is an elastic element.

6. An air treatment device comprising the air conditioning rotating body of any one of claims 1 to 5.