CLAIMS

1. A centrifugal compressor comprising:

a main shaft which rotates around an axis line;

a bladed wheel mounted on the main shaft; and

a vane device which adjusts a flow rate of a fluid in an inflow flow path to the bladed wheel, wherein

the vane device comprises:

a plurality of vane main bodies provided at intervals in a circumferential direction with respect to the axis line of the main shaft in the inflow flow path and each of a rotary shaft extending in a radial direction with respect to the axis line of the main shaft, wherein a mounting angle of the plurality of vane main bodies is changed by rotating the rotary shaft;

a plurality of link members which is rotated along with the rotary shaft, wherein a first end of the plurality of link members is connected to each of the rotary shaft;

an annular member which is formed with an annular shape centered on the axis line and is moved in a moving direction along a rotation locus of the link member, wherein the moving direction is both a axial direction and the circumferential direction, the rotation locus is generated by rotating with the vane main body, and the annular member is connected to a second end of the plurality of link members; and

a drive mechanism which is connected to the annular member and transmits a force in a tangential direction to the annular member.

2. The centrifugal compressor according to Claim 1, wherein

the drive mechanism comprises:

an electric motor provided with an output shaft which is rotationally driven; and

a transmission arm transmitting a rotational force of the electric motor to the annular member as a force in the tangential direction, wherein the a first end of the transmission arm is connected to the output shaft, and the second end of the transmission arm is connected to the annular member.

3. The centrifugal compressor according to Claim 2, wherein

the transmission arm comprises:

a driving lever which is fixed to the output shaft, extends in a radial direction of the output shaft, and rotates along with the output shaft; and

a driving link bar, wherein a first end of the driving link bar is connected to the driving lever, and a second end of the driving link bar is connected to the annular member, and

the driving link bar is provided with:

a connecting rod-shaped portion extending along the circumferential direction with respect to the axis line of the main shaft; and

universal joints provided at both ends of the connecting rod-shaped portion, and

a first end of the transmission arm is connected to the driving lever via the universal joint, and a second end of the transmission arm is connected to the annular member via the universal joint.

4. The centrifugal compressor according to Claim 3, wherein

the universal joints comprises:

two spherical bearings which are connected to the driving lever and the annular member; and

rod-shaped portions extending toward the connecting rod-shaped portion from the respective spherical bearings, thereby coming into contact with the connecting rod-shaped portion, and having a first threaded portion provided in a portion which is brought into contact with the connecting rod-shaped portion, and

the connecting rod-shaped portion is provided with a second threaded portion which is screwed with the first threaded portion.

5. The centrifugal compressor according to Claim 2, wherein

the transmission arm comprises:

a driving lever which is fixed to the output shaft, extends in a radial direction of the output shaft, and rotates along with the output shaft; and

a driving link member, wherein a first end of the driving link member is connected to the driving lever, and a second end of the driving link member is connected to the annular member,

the driving link member is provided with:

a connection portion extending in a direction away from the annular member; and

two universal joints provided at the connection portion so as to be spaced apart from each other in at least one of the axial direction and a radial direction with respect to the axis line of the main shaft, and

a first end of the transmission arm is connected to the driving lever via the universal joint on one side, and a second end of the transmission arm is connected to the

annular member via the universal joint on the other side.

6. The centrifugal compressor according to Claim 2, wherein the transmission arm comprises:

a driving lever which is fixed to the output shaft, extends in a radial direction of the output shaft, and rotates along with the output shaft; and

a driving link member, wherein a first end of the driving link member is connected to the driving lever, and a second end of the driving link member is connected to the annular member,

the driving link member is provided with:

a damping member which is damping a force acting on the driving link member, and is provided between the first end of the driving link member and the second end of the driving link member; and

two universal joints provided at the damping member, and

a first end of the transmission arm is connected to the driving lever via the universal joint on one side, and a second end of the transmission arm is connected to the annular member via the universal joint on the other side.

7. The centrifugal compressor according to any one of Claims 2 to 6, further comprising:

a torque detection section which detects a torque of the electric motor; and

a control section which reversely rotates the output shaft of the electric motor in a case where a detected value in the torque detection section exceeds a threshold value set in advance.

8. The centrifugal compressor according to any one of Claims 2 to 7, wherein the vane main body comprises a torque limiter section which allows the rotary shaft to perform relative rotation between the rotary shaft and the link member in a case where torque acting on the vane main body exceeds a threshold value set in advance.

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CLAIMS

1. A centrifugal compressor comprising:

a main shaft which rotates around an axis line;

a bladed wheel mounted on the main shaft; and

a vane device which adjusts a flow rate of a fluid in an inflow flow path to the bladed wheel, wherein

the vane device comprises:

a plurality of vane main bodies provided at intervals in a circumferential direction with respect to the axis line of the main shaft in the inflow flow path and each of a rotary shaft extending in a radial direction with respect to the axis line of the main shaft, wherein a mounting angle of the plurality of vane main bodies is changed by rotating the rotary shaft;

a plurality of link members which is rotated along with the rotary shaft, wherein a first end of the plurality of link members is connected to each of the rotary shaft;

an annular member which is formed with an annular shape centered on the axis line and is moved in a moving direction along a rotation locus of the link member, wherein the moving direction is both a axial direction and the circumferential direction, the rotation locus is generated by rotating with the vane main body, and the annular member is connected to a second end of the plurality of link members; and

a drive mechanism which is connected to the annular member and transmits a force in a tangential direction to the annular member,

the drive mechanism comprises:

an output shaft which is rotationally driven; and

a transmission arm transmitting a rotational force from the output shaft

to the annular member as a force in the tangential direction, wherein the a first end of the transmission arm is connected to the output shaft, and the second end of the transmission arm is connected to the annular member,

the transmission arm comprises:

a driving lever which is fixed to the output shaft, extends in a radial direction of the output shaft, and rotates along with the output shaft; and

a driving link bar, wherein a first end of the driving link bar is connected to the driving lever, and a second end of the driving link bar is connected to the annular member,

the driving link bar is provided with:

a connecting rod-shaped portion extending along the circumferential direction with respect to the axis line of the main shaft; and

universal joints provided at both ends of the connecting rod-shaped portion, and

a first end of the transmission arm is connected to the driving lever via the universal joint, and a second end of the transmission arm is connected to the annular member via the universal joint.

2. The centrifugal compressor according to Claim 1, wherein

the universal joints comprises:

two spherical bearings which are connected to the driving lever and the annular member; and

rod-shaped portions extending toward the connecting rod-shaped portion from the respective spherical bearings, thereby coming into contact with the connecting rod-shaped portion, and having a first threaded portion provided in a portion

which is brought into contact with the connecting rod-shaped portion, and

the connecting rod-shaped portion is provided with a second threaded portion which is screwed with the first threaded portion.

3. The centrifugal compressor according to Claim 1, wherein

the transmission arm comprises:

a driving lever which is fixed to the output shaft, extends in a radial direction of the output shaft, and rotates along with the output shaft; and

a driving link member, wherein a first end of the driving link member is connected to the driving lever, and a second end of the driving link member is connected to the annular member,

the driving link member is provided with:

a connection portion extending in a direction away from the annular member; and

two universal joints provided at the connection portion so as to be spaced apart from each other in at least one of the axial direction and a radial direction with respect to the axis line of the main shaft, and

a first end of the transmission arm is connected to the driving lever via the universal joint on one side, and a second end of the transmission arm is connected to the annular member via the universal joint on the other side.

4. A centrifugal compressor comprising:

a main shaft which rotates around an axis line;

a bladed wheel mounted on the main shaft; and

a vane device which adjusts a flow rate of a fluid in an inflow flow path to the

bladed wheel, wherein

the vane device comprises:

a plurality of vane main bodies provided at intervals in a circumferential direction with respect to the axis line of the main shaft in the inflow flow path and each of a rotary shaft extending in a radial direction with respect to the axis line of the main shaft, wherein a mounting angle of the plurality of vane main bodies is changed by rotating the rotary shaft;

a plurality of link members which is rotated along with the rotary shaft, wherein a first end of the plurality of link members is connected to each of the rotary shaft;

an annular member which is formed with an annular shape centered on the axis line and is moved in a moving direction along a rotation locus of the link member, wherein the moving direction is both a axial direction and the circumferential direction, the rotation locus is generated by rotating with the vane main body, and the annular member is connected to a second end of the plurality of link members; and

a drive mechanism which is connected to the annular member and transmits a force in a tangential direction to the annular member,

the drive mechanism comprises:

an output shaft which is rotationally driven; and

a transmission arm transmitting a rotational force from the output shaft to the annular member as a force in the tangential direction, wherein the a first end of the transmission arm is connected to the output shaft, and the second end of the transmission arm is connected to the annular member,

the transmission arm comprises:

a driving lever which is fixed to the output shaft, extends in a radial

direction of the output shaft, and rotates along with the output shaft; and

a driving link member, wherein a first end of the driving link member is connected to the driving lever, and a second end of the driving link member is connected to the annular member,

the driving link member is provided with:

a damping member which is damping a force acting on the driving link member, and is provided between the first end of the driving link member and the second end of the driving link member; and

two universal joints provided at the damping member, and

a first end of the transmission arm is connected to the driving lever via the universal joint on one side, and a second end of the transmission arm is connected to the annular member via the universal joint on the other side.

5. The centrifugal compressor according to any one of Claims 2 to 4, further comprising:

a torque detection section which detects a torque of an electric motor; and

a control section which reversely rotates the output shaft of the electric motor in a case where a detected value in the torque detection section exceeds a threshold value set in advance.

6. The centrifugal compressor according to any one of Claims 2 to 5, wherein the vane main body comprises a torque limiter section which allows the rotary shaft to perform relative rotation between the rotary shaft and the link member in a case where torque acting on the vane main body exceeds a threshold value set in advance.