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(54) **CENTRIFUGAL COMPRESSOR**

ZENTRIFUGALVERDICHTER

COMPRESSEUR CENTRIFUGE

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(73) Proprietor: **Mitsubishi Heavy Industries, Ltd.**
Tokyo 108-8215 (JP)

(72) Inventor: **SUGIMOTO, Koichi**
Tokyo 108-8215 (JP)

(74) Representative: **Hoffmann Eitle**
Patent- und Rechtsanwälte PartmbB
Arabellastraße 30
81925 München (DE)

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Description

Technical Field

[0001] The present invention relates to a centrifugal compressor which increases a pressure of a fluid to generate a compressed fluid, and particularly, relates to a centrifugal compressor which includes a diffuser part provided on a discharge side of the compressor fluid.

Background Art

[0002] A centrifugal compressor is mainly configured of an impeller which includes a rotating hub and a plurality of centrifugal blades attached to the outer peripheral surface of the hub, and a casing which accommodates the impeller and forms a flow path for a fluid.

[0003] In the flow path for the fluid, there are provided a suction flow path through which the fluid is sucked from the outside by rotation of the impeller and the fluid is introduced into the impeller, a diffuser part which is approximately annularly formed on the outer peripheral side of the impeller and recovers a static pressure by decreasing the speed of airflow discharged from the impeller, and a spiral volute part and a discharge pipe which are provided on the outer peripheral side of the diffuser part, are formed so that the cross-sectional areas are enlarged along the peripheral directions, decrease the speed of the airflow, and increase the static pressure of the airflow.

[0004] In this centrifugal compressor, when the impeller is rotated, the impeller compresses the fluid such as gas, air, or the like introduced from the outside. The flow (airflow) of the fluid formed in this way is discharged from the outer peripheral end of the impeller to the outside through the discharge pipe via the diffuser part and the volute part.

[0005] Meanwhile, in the centrifugal compressor, the compressed air is discharged during a specific period, and thus, the pressure and the flow rate are changed, and a phenomenon such as surging which generates self-excitation vibration occurs. The pressure and the flow rate generated by the surging determine an operation limit of a small flow rate side.

[0006] On the other hand, if the flow rate is increased, occlusion of the fluid referred to as choking occurs in the impeller or the diffuser part, and thus, the flow rate range of a large flow rate side is limited.

[0007] Accordingly, in order to realize a stable operation in the centrifugal compressor, it is necessary to operate an operational range so that the surging does not occur in the small flow rate side and the choking does not occur in the large flow rate side.

[0008] Then, in the diffuser part, seperation occurs on the low flow rate condition, a reverse flow from the volute part reaches the impeller when a reverse flow region generated due to the seperation reaches the rear edge of the diffuser part, and thus, surging occurs.

[0009] Accordingly, for example, in the technology disclosed in PTL 1, a circulation passage is provided on a rear side of a wall surface of a diffuser along the flow direction of a fluid, a first opening of the circulation passage is formed on a fluid outlet side of an impeller of the wall surface of the diffuser, and a second opening is formed on a discharge port side of the wall surface of the diffuser.

[0010] In this configuration, the fluid, which flows in the vicinity of the wall surface of the diffuser and in which the reverse flow easily occurs, becomes a circulation flow in which the fluid enters from the second opening to the circulation passage and is discharged from the first opening, and thus, an apparent flow rate of the diffuser is increased. Accordingly, the flow in the vicinity of the wall surface is smooth, occurrence of the reverse flow of the fluid is suppressed, and thus, it is possible to increase a flow rate range up to the surge. As a result, it is possible to suppress occurrence of the surging with certainty, due to the reverse flow of the fluid during a low flow rate without damaging the functionality of the diffuser.

[0011] In addition, a technology disclosed in PTL 2 includes a configuration in which a circulation flow path is provided, through which a part of a fluid flowing in a diffuser flow path is returned as a circulation fluid from a downstream side region to an upstream side region in the diffuser flow path, and the fluid flowing in the circulation flow path is cooled by cooling means.

[0012] Accordingly, the fluid flowing in the circulation flow path is cooled, and is returned to the upstream side region of the diffuser flow path. Therefore, compression performance of the centrifugal compression is improved.

[0013] DE 14 28 102 A1 discloses a centrifugal compressor with a recirculation path from the volute to the downstream part of the diffuser.

Citation List

Patent Literature

[0014]

[PTL 1] Japanese Unexamined Patent Application Publication No. 2005-240680
[PTL 2] Japanese Unexamined Patent Application Publication No. 2010-151034

Summary of Invention

Technical Problem

[0015] However, it is constantly necessary to further expand an operational range of a centrifugal compressor, and thus, there is still needs for improvement.

[0016] In the technologies disclosed in PTL 1 and PTL 2, occurrence of the reverse flows of the fluid is suppressed by circulating a part of the fluid flowing in the diffuser flow path and increasing the flow rate of the appearance, and thus, operational efficiency is substantially decreased.

[0017] The present invention is made in consideration of the above-described circumstances, and an object thereof is to provide a centrifugal compressor capable of increasing the operational efficiency while suppressing occurrence of the surging and further expanding the operational range.

Solution to Problem

[0018] According to the present invention, a centrifugal compressor including: an impeller which includes a hub and a plurality of blades attached to the outer peripheral surface of the hub; and a casing which rotatably accommodates the impeller, in which the casing includes: a suction flow path through which a fluid sucked from the outside by rotation of the impeller is introduced to the impeller; a diffuser part which is annularly formed on an outer peripheral side of the impeller, and decelerates the flow of the fluid discharged to the outer peripheral side by the rotation of the impeller; a spiral volute part which is formed on an outer peripheral side of the diffuser part and in which a cross-sectional area is gradually increased along a circumferential direction; a discharge pipe which extends from a part having the largest cross-section area of the volute part toward the outer peripheral side; and a connecting part which is formed on a side wall surface of a diffuser flow path through which the fluid flows in the diffuser part, and causes the inner portion of the volute part and the inner portion of the diffuser flow path to communicate with each other, in which an opening part of the diffuser flow path side of the connecting part is formed on a downstream side of the diffuser flow path, and is formed in only a region from within 30° of a upstream side of the diffuser part to within 30° of a downstream side thereof based on a tongue which is formed between a minimum area part of the volute part and the discharge pipe.

[0019] In the centrifugal compressor, the fluid sucked from the outside by the rotation of the impeller is discharged to the diffuser part of the outer peripheral side of the impeller via the suction flow path and is decelerated, and thus, the fluid flows into the volute part. In the volute part, the fluid flows from the side in which the cross-sectional area is small to the side in which the cross-sectional area is large, and is discharged from the discharge pipe to the outside as a high-pressure compressed fluid.

[0020] In this case, in the diffuser part, the high-pressure compressed fluid inside the volute part is discharged into the diffuser flow path through the connecting part. Accordingly, a flow rate in which a reverse flow region due to seperation occurring on the diffuser wall surface reaches a rear edge of the diffuser part is further decreased, and thus, it is possible to increase the flow rate range up to the surge. In addition, since the high-pressure compressed fluid passing through the diffuser part is circulated from the volute part, efficiency in the diffuser part is not decreased.

[0021] Preferably, a plurality of the connecting parts are formed at set intervals along the circumferential direction of the diffuser part. The connecting part may be a through hole, and may be a slit which is continuous in the circumferential direction of the diffuser part.

[0022] Then, in many cases, an axially asymmetrical structure such as a volute part in which the cross-sectional area is spirally increased along the circumferential direction, may exist in the downstream side of the diffuser. According to this influence, a non-uniform static pressure distribution in the circumferential direction exists in the downstream side of the diffuser. According to the non-uniform static pressure distribution, lengths in a radial direction of the reverse flow region with respect to the diffuser flow path wall are different from each other in the circumferential direction. In addition, it is considered that the surging is generated from a location at which the reverse flow region reaches the rear edge the earliest.

[0023] Accordingly, preferably, the connecting part is formed at least on an inner peripheral side of the part having the largest cross-section area of the volute part.

[0024] In addition, preferably, in the connecting part, at least an end part of the side wall surface side is formed so as to be inclined from the inner peripheral side of the diffuser part toward the outer peripheral side. Accordingly, the high-pressure compressed fluid discharged into the diffuser flow path from the connecting part can flow along the diffuser wall surface, and thus, it is possible to effectively suppress occurrence of the reverse flow of the fluid.

[0025] Moreover, in the connecting part, at least the end part of the side wall surface side may be formed so as to be parallel with an outer peripheral side end part of a diffuser vane.

Advantageous Effects of Invention

[0026] According to a centrifugal compressor of the present invention, occurrence of the surging is suppressed, and it is possible to increase the operational efficiency while further expanding the operational range.

Brief Description of Drawings

[0027]

Fig. 1 is a view showing a component configuration of a centrifugal compressor according to a first embodiment of the present invention.

Fig. 2 is a half cross-sectional view along an axis of the centrifugal compressor according to the first embodiment.

Fig. 3 is a view showing an aspect of the flow of a fluid in a diffuser part of the centrifugal compressor according to the first embodiment of the present invention.

Fig. 4 is a view showing configurations of main portions of a centrifugal compressor according to a second embodiment of the present invention.

Description of Embodiments

[0028] Hereinafter, embodiments of a centrifugal compressor according to the present invention will be described with reference to the drawings.

[First Embodiment]

[0029] A centrifugal compressor 10 according to a first embodiment of the present invention will be described.

[0030] As shown in Figs. 1 and 2, the centrifugal compressor 10 includes a rotary shaft 11 which is rotationally driven by a driving device such as a motor (not shown) or a turbine (not shown), an impeller 12 which is rotated around the rotary shaft 11, and a casing 20 which accommodates the rotary shaft 11 and the impeller 12 and forms a flow path for the fluid.

[0031] The impeller 12 includes a hub 13 which is integrally provided with the rotary shaft 11 and a plurality of blades 14 which are provided on an outer peripheral surface of the hub 13. In the hub 13, a curved surface 13c in which the outer diameter is gradually increased from an end part 13a of one end side of the rotary shaft 11 toward an end part 13b of the other end side is formed. The plurality of blades 14 are disposed on the curved surface 13c of the hub 13 in the circumferential direction. Here, as shown in Fig. 1, the blades 14 are configured of inner peripheral blades 14A provided on the inner peripheral side of the hub 13 and outer peripheral blades 14B provided on the outer peripheral side of the hub 13, and thus, may be a multiple configuration.

[0032] The casing 20 includes a suction flow path 21 which is continuous along an axial direction of the rotary shaft 11 from a suction port 29 formed on one end 20a side toward the impeller 12, a diffuser part 30 which is annularly formed on the outer peripheral side of the impeller 12, a spiral volute part 22 which is continuously formed in the circumferential direction on the outer peripheral (downstream) side of the diffuser part 30 and in which a cross-sectional area in a cross-section orthogonal to the circumferential direction is gradually increased along the circumferential direction, and a discharge pipe 23 which is connected to a maximum area part 22b of the volute part 22 and extends in a tangential direction.

[0033] Here, a minimum area part 22a and the discharge pipe 23 are adjacent to the maximum area part 22b in the circumferential direction of the volute part 22. In addition, a tongue 28 is formed between the minimum area part 22a of the volute part 22 and the discharge pipe 23.

[0034] The diffuser part 30 is opened to the inner peripheral side (impeller 12 side) and the outer peripheral side (volute part 22 side) over the entire circumference of the outer peripheral part of the impeller 12. The diffuser part 30 includes an annular disk part 31 which is formed on a part of the casing 20, an annular disk 32 which is disposed to oppose the annular disk part 31 at a set interval, and diffuser vanes 33 which are integrally formed with the annular disk 32 and provided at equal intervals in the circumferential direction of the annular disk 32. The diffuser vanes 33 are formed so as to be inclined in the radial direction of the annular disk 32. Accordingly, the interval between the diffuser vanes 33 and 33 adjacent to each other in the circumferential direction of the annular disk 32 is gradually increased from the inner peripheral side toward the outer peripheral side.

[0035] In the diffuser part 30, the diffuser flow path 35 is formed between the annular disk part 31 and the annular disk 32.

[0036] In the present embodiment, a diffuser member 34 which includes the annular disk 32 and the diffuser vanes 33 is separately formed with the casing 20, and the diffuser member is provided to be interposed between the annular disk part 31 which forms a part of the casing 20 and a holding part 24 of the casing 20 which is formed to oppose the annular disk part 31. Moreover, an inner peripheral side end part 32a of the annular disk 32 is formed in a curved surface shape in which the interval between the inner peripheral side end part 32a and the annular disk part 31 is gradually decreased from an outer peripheral part 12a of the impeller 12 toward the outer periphery.

[0037] In addition, an outer peripheral side end part 32b of the annular disk 32 extends the outer peripheral side from the outer peripheral side end part 24a of the holding part 24 and is formed to protrude in the volute part 22. In the annular disk 32, a connecting part 40A through which a side wall surface 32c facing the diffuser flow path 35 and a backface 32d opposite to the side wall surface 32c communicate with each other is formed on the outer peripheral side from the outer peripheral side end part 24a of the holding part 24. A plurality of the connecting parts 40A are formed at set intervals in the circumferential direction of the annular disk 32, and each of the connecting parts 40A is formed of a slit 41 which is continuous in the circumferential direction.

[0038] Contrary to what is shown in fig. 1, the slits of the invention do not extend over the complete circumference. Instead, they are limited to a region from within 30° of an upstream side of the diffuser to within 30° of a downstream side thereof based on a tongue which is formed between a minimum area part of the volute and the discharge pipe.

[0039] Here, preferably, the connecting part 40A configured of the slit 41 or the like is formed so as to be inclined from the inner peripheral side of the diffuser part 30 to the outer peripheral side, from an opening end 40a of the backface 32d side toward an opening end (opening part) 40b of the side wall surface 32c side.

[0040] Moreover, in the connecting part 40A, preferably, the opening end 40b of the diffuser flow path 35 side is formed on the downstream side of the diffuser flow path 35. More preferably, the opening end 40b is formed in the outer peripheral side from a position which is positioned 75% from the center side of the diffuser part 30 with respect to the radius of the outer peripheral part of the diffuser part 30. In the inner peripheral side, since a static pressure difference between the opening end 40a and the opening end 40b is increased, a speed of the flow introduced from the connecting part 40A to the diffuser part 30 is increased, and thus, the flow inside the diffuser deteriorates.

[0041] An operation of the centrifugal compressor 10 configured in this way will be described below.

[0042] The centrifugal compressor 10 rotationally drives the impeller 12 around the rotary shaft 11 by the driving device such as the motor (not shown) or a turbine (not shown). By the rotation of the impeller 12, the fluid taken in the casing 20 through the suction port 29 from the outside flows toward the impeller 12 in the suction flow path 21.

[0043] Centrifugal force is applied to the fluid introduced into the casing 20 by the rotation of the blades 14 integrally rotated with the hub 13, and is compressed. The compressed fluid flows from the outer peripheral end of the impeller 12 into the diffuser part 30 of the outer peripheral side. In the diffuser part 30, airflow discharged from the impeller 12 to the outer peripheral side passes between the diffuser vanes 33 and 33 adjacent to the each other in the circumferential direction, and thus, the airflow is decelerated, and the static pressure is recovered. In addition, the fluid flowing in the volute part 22 of the outer periphery from the diffuser part 30 flows from the minimum area part 22a toward the maximum area part 22b, and is discharged from the discharge pipe 23 as a high-pressure compressed fluid.

[0044] Here, as shown in Fig. 3, the high-pressure compressed fluid flowing in the volute part 22 through the diffuser part 30 is drawn into the diffuser flow path 35 between the annular disk part 31 and the annular disk 32 through the connecting part 40A. In the diffuser part 30, according to the decreased flow rate, seperation occurs from the annular disk 32 in the diffuser flow path 35, and a reverse flow region H due to the seperation extends toward the rear edge (the edge part in the outer peripheral side) of the diffuser part 30. In this case, it is possible to increase the flow rate of the fluid in the part along the annular disk 32 through a flow R of the high-pressure compressed fluid which flows from the volute part 22 into the diffuser flow path 35 through the connecting part 40A. Accordingly, it is possible to prevent the reverse flow region H, due to large-scale detachment generated from the annular disk 32, from extending toward the rear edge of the diffuser part 30.

[0045] Therefore, it is possible to prevent occurrence of surging in the diffuser part 30, and it is possible to increase the operational range of the centrifugal compressor 10.

[0046] In addition, the diffuser member 34 including the annular disk 32 in which the connecting part 40A is formed and the diffuser vanes 33 may be separately formed with the casing 20. Accordingly, it is possible to easily process the connecting part 40A as a single body of the diffuser member 34.

[0047] Then, the plurality of slits 41 configuring the connecting part 40A is formed on only a part of the circumference.

[0048] On the downstream side of the diffuser part 30, it is known that static pressure distribution which is non-uniform in the circumferential direction exists in the vicinity of the tongue 28 in the volute part 22 in which the cross-sectional area is increased along the circumferential direction.

[0049] Accordingly, the slits 41 configuring the connecting part 40A may be formed only within a range from the tongue 28 to within 30° of the upstream side based on the tongue 28.

[0050] According to the invention, the slits 41 configuring the connecting part 40A must be formed only in an area from within 30° of the upstream side to within 30° of the downstream side based on the tongue 28 in which the pressure distribution exists.

[Second Embodiment]

[0051] Next, a second embodiment of the present invention will be described. In the second embodiment described below, in the drawings, the same reference numerals are assigned to the configurations common to the first embodiment, descriptions thereof are omitted, and differences between the first embodiment and the second embodiment are mainly described.

[0052] As shown in Fig. 4, in the present embodiment, the connecting part 40B is formed of through holes 42 instead of slits 41, and the connecting part 40B including the through holes 42 is formed so as to be parallel with the outer peripheral side end part 33b of the diffuser vane 33 and to be inclined approximately at the angle in the radial direction of the annular disk 32, from the opening end 40a of the backface 32d side of the annular disk 32 toward the opening end 40b of the side wall surface 32c side.

[0053] Accordingly, the high-pressure compressed fluid flowing into the diffuser flow path 35 from the opening end 40b through the connecting part 40B can suppress turbulence in the flow between the diffuser vanes 33 and 33 adjacent in the circumferential direction. Therefore, it is possible to more certainly prevent occurrence of the surging in the diffuser part 30, and it is possible to further increase the operational range of the centrifugal compressor 10.

[0054] Also in this case, the connecting part 40B may be formed in only the range up to within 30° of the upstream side with respect to the tongue 28.

[0055] Moreover, the present invention is not limited to the above-described embodiments, and may be appropriately modified within the scope of the appended claims.

[0056] For example, the cross-sectional shapes, sizes, dispositions, or the like of the connecting parts 40A and 40B are not limited.

[0057] In addition, a plurality of rows (a plurality of plies) of the connecting parts 40A and 40B may be disposed on the inner peripheral side and the outer peripheral side.

[0058] Moreover, the diffuser vanes 33 may be removed, and the casing 20 and the holding part 24 may be an integral structure.

Reference Signs List

[0059]

10:	centrifugal compressor
11:	rotary shaft
12:	impeller
12a:	outer peripheral part
13:	hub
13a:	end part
13b:	end part
13c:	curved surface
14:	blade (centrifugal blade)
14A:	inner peripheral blade
14B:	outer peripheral blade
20:	casing
20:	one end
21:	suction flow path
22:	volute part
22a:	minimum area part
22b:	maximum area part
23:	discharge pipe
24:	holding part
24a:	outer peripheral side end part
28:	tongue
29:	suction port
30:	diffuser part
31:	annular disk part
32:	annular disk
32a:	inner peripheral side end part
32b:	outer peripheral side end part
32c:	side wall surface
32d:	backface
33:	diffuser vane
33b:	outer peripheral side end part
34:	diffuser member
35:	diffuser flow path
40A and 40B:	connecting part
40a:	opening end
40b:	opening end (opening part)
41:	slit
42:	through hole

Claims

1. A centrifugal compressor comprising:

an impeller which includes a hub and a plurality of centrifugal blades attached to the outer peripheral surface of the hub; and
a casing which rotatably accommodates the impeller,
wherein the casing includes:

a suction flow path through which a fluid sucked from the outside by rotation of the impeller is introduced to the impeller;
a diffuser part which is annularly formed on an outer peripheral side of the impeller, and decelerates the flow of the fluid discharged to the outer peripheral side by the rotation of the impeller;
a spiral volute part which is formed on an outer peripheral side of the diffuser part and in which a cross-sectional area is gradually increased along a circumferential direction;
a discharge pipe which extends from a part having the largest cross-section area of the volute part toward the outer peripheral side; and
a connecting part which is formed on a side wall surface of a diffuser flow path through which the fluid flows in the diffuser part, and causes the inner portion of the volute part and the inner portion of the diffuser flow path to communicate with each other, and
wherein an opening part of the diffuser flow path side of the connecting part is formed on a downstream side of the diffuser flow path,
the centrifugal compressor being **characterized in that**
said opening part is formed in only a region from within 30° of a upstream side of the diffuser part to within 30° of a downstream side thereof based on a tongue which is formed between a minimum area part of the volute part and the discharge pipe.

2. The centrifugal compressor according to claim 1, wherein a plurality of the connecting parts are formed at set intervals along the circumferential direction of the diffuser part.

3. The centrifugal compressor according to claim 1 or 2, wherein the connecting part is formed at least on an inner peripheral side of the part having the largest cross-section area of the volute part.

4. The centrifugal compressor according to any one of claims 1 to 3,
wherein in the connecting part, at least an end part of the side wall surface side is formed so as to be inclined from the inner peripheral side of the diffuser part toward the outer peripheral side.

5. The centrifugal compressor according to any one of claims 1 to 4,
wherein in the connecting part, at least the end part of the side wall surface side is formed so as to be parallel with an outer peripheral side end part of a diffuser vane.

6. The centrifugal compressor according to any one of claims 1 to 5,
wherein the opening part of the diffuser flow path side of the connecting part is formed in only a region from the tongue to within 30° of the upstream side of the diffuser part based on the tongue.

Patentansprüche

1. Zentrifugalverdichter, aufweisend:

   ein Flügelrad, welches eine Nabe und eine Vielzahl von an der Außenumfangsfläche der Nabe befestigten Zentrifugalschaufeln beinhaltet; und
   ein Gehäuse, welches das Flügelrad drehbar aufnimmt, wobei das Gehäuse beinhaltet:

      einen Ansaug-Strömungspfad, durch den ein durch die Rotation des Flügelrads von außen angesaugtes Fluid an das Flügelrad zugeführt wird;
      ein Diffusorteil, das ringförmig an einer Außenumfangsseite des Flügelrads ausgebildet ist und den Strom des an die Außenumfangsseite abgeleiteten Fluids durch die Rotation des Flügelrads verlangsamt;
      ein spiralförmiges Gehäuseteil, das an einer Außenumfangsseite des Diffusorteils gebildet ist und bei dem eine Querschnittsfläche nach und nach entlang einer Umfangsrichtung zunimmt;
      ein Ableitungsrohr, das sich von einem Teil mit der größten Querschnittsfläche des Gehäuseteils hin zu der Außenumfangsseite erstreckt; und
      ein Verbindungsteil, das an einer Seitenwandoberfläche eines Diffusorströmungspfads, durch den das Fluid in das Diffusorteil strömt, gebildet ist und das den inneren Abschnitt des Gehäuseteils und den inneren Abschnitt des Diffusorteils dazu veranlasst, miteinander zu kommunizieren, und
      wobei ein Öffnungsteil der Diffusorströmungspfadseite an einer stromabwärts liegenden Seite des Diffusorströmungspfads gebildet ist,
      wobei der Zentrifugalverdichter **dadurch gekennzeichnet ist, dass**
      das besagte Öffnungsteil lediglich in einem Bereich von innerhalb 30° einer stromaufwärts liegenden Seite des Diffusorteils bis innerhalb 30° einer stromabwärts liegenden Seite davon gebildet ist, ausgehend von einer Zunge, die zwischen einem Minimalflächenteil des Gehäuseteils und dem Ableitungsrohr gebildet ist.

2. Zentrifugalverdichter gemäß Anspruch 1,
wobei eine Vielzahl der Verbindungteile in festgelegten Abständen entlang der Außenumfangsrichtung des Diffusorteils gebildet ist.

3. Zentrifugalverdichter gemäß Anspruch 1 oder 2,
wobei das Verbindungsteil zumindest an einer Innenumfangsseite des Teils mit der größten Querschnittsfläche des Gehäuseteils gebildet ist.

4. Zentrifugalverdichter gemäß einem der Ansprüche 1 bis 3,
wobei bei dem Verbindungsteil zumindest ein Endteil der Seitenwandoberfläche gebildet ist, um von der Innenumfangsseite des Diffusorteils hin zu der Außenumfangsseite geneigt zu sein.

5. Zentrifugalverdichter gemäß einem der Ansprüche 1 bis 4,
wobei bei dem Verbindungsteil zumindest das Endteil der Seitenwandoberflächenseite gebildet ist, um zu einem Endteil einer Außenumfangsseite einer Diffusorschaufel parallel zu sein.

6. Zentrifugalverdichter gemäß einem der Ansprüche 1 bis 5,
wobei das Öffnungsteil der Diffusorströmungspfadseite des Verbindungsteils lediglich in einem Bereich von der Zunge bis innerhalb 30° der stromaufwärtsliegenden Seite des Diffusorteils, ausgehend von der Zunge, gebildet ist.

Revendications

1. Compresseur centrifuge comprenant :

   une roue qui comporte un moyeu et une pluralité d'ailettes centrifuges attachées à la surface périphérique extérieure du moyeu ; et
   un boîtier qui loge de manière rotative la roue, dans lequel le boîtier comporte :

      une voie de flux d'aspiration, par laquelle un fluide, aspiré du côté extérieur par rotation de la roue, est introduit dans la roue ;
      une partie de diffusion qui est formée en anneau sur un côté périphérique extérieur de la roue et décélère le flux du fluide évacué vers le côté périphérique extérieur par la rotation de la roue ;

une partie formant volute en spirale qui est formée sur un côté périphérique extérieur de la partie de diffusion et dans laquelle une aire en coupe transversale est progressivement augmentée le long d'une direction circonférentielle ;

un tuyau d'évacuation qui s'étend depuis une partie présentant 1'aire en coupe transversale la plus grande de la partie formant volute vers le côté périphérique extérieur ; et

une partie de liaison qui est formée sur une surface de paroi latérale d'une voie de flux de diffuseur, par laquelle le fluide s'écoule dans la partie de diffusion, et amène la partie intérieure de la partie formant volute et la partie intérieure de la voie de flux de diffuseur à communiquer l'une avec l'autre, et dans lequel une partie d'ouverture du côté voie de flux de diffusion de la partie de liaison est formée sur un côté en aval de la voie de flux de diffuseur,

le compresseur centrifuge étant **caractérisé en ce que** ladite partie d'ouverture est formée dans une seule région depuis 30° d'un côté en amont de la partie de diffusion à 30° d'un côté en aval de celle-ci sur la base d'une languette qui est formée entre une partie formant aire minimale de la partie formant volute et le tuyau d'évacuation.

2. Compresseur centrifuge selon la revendication 1, dans lequel une pluralité des parties de liaison sont formées à des intervalles définis le long de la direction circonférentielle de la partie de diffusion.

3. Compresseur centrifuge selon la revendication 1 ou 2, dans lequel la partie de liaison est formée au moins sur un côté périphérique intérieur de la partie présentant l'aire en coupe transversale la plus grande de la partie formant volute.

4. Compresseur centrifuge selon l'une quelconque des revendications 1 à 3, dans lequel dans la partie de liaison, au moins une partie d'extrémité du côté surface de paroi latérale est formée de sorte à être inclinée du côté périphérique intérieur de la partie de diffusion vers le côté périphérique extérieur.

5. Compresseur centrifuge selon l'une quelconque des revendications 1 à 4, dans lequel dans la partie de liaison, au moins la partie d'extrémité du côté surface de paroi latérale est formée de sorte à être parallèle à une partie d'extrémité latérale périphérique extérieure d'une aube de diffusion.

6. Compresseur centrifuge selon l'une quelconque des revendications 1 à 5, dans lequel la partie d'ouverture du côté voie de flux de diffusion de la partie de liaison est formée dans une seule région depuis la languette jusqu'à 30° du côté en amont de la partie de diffusion sur la base de la languette.

FIG. 1

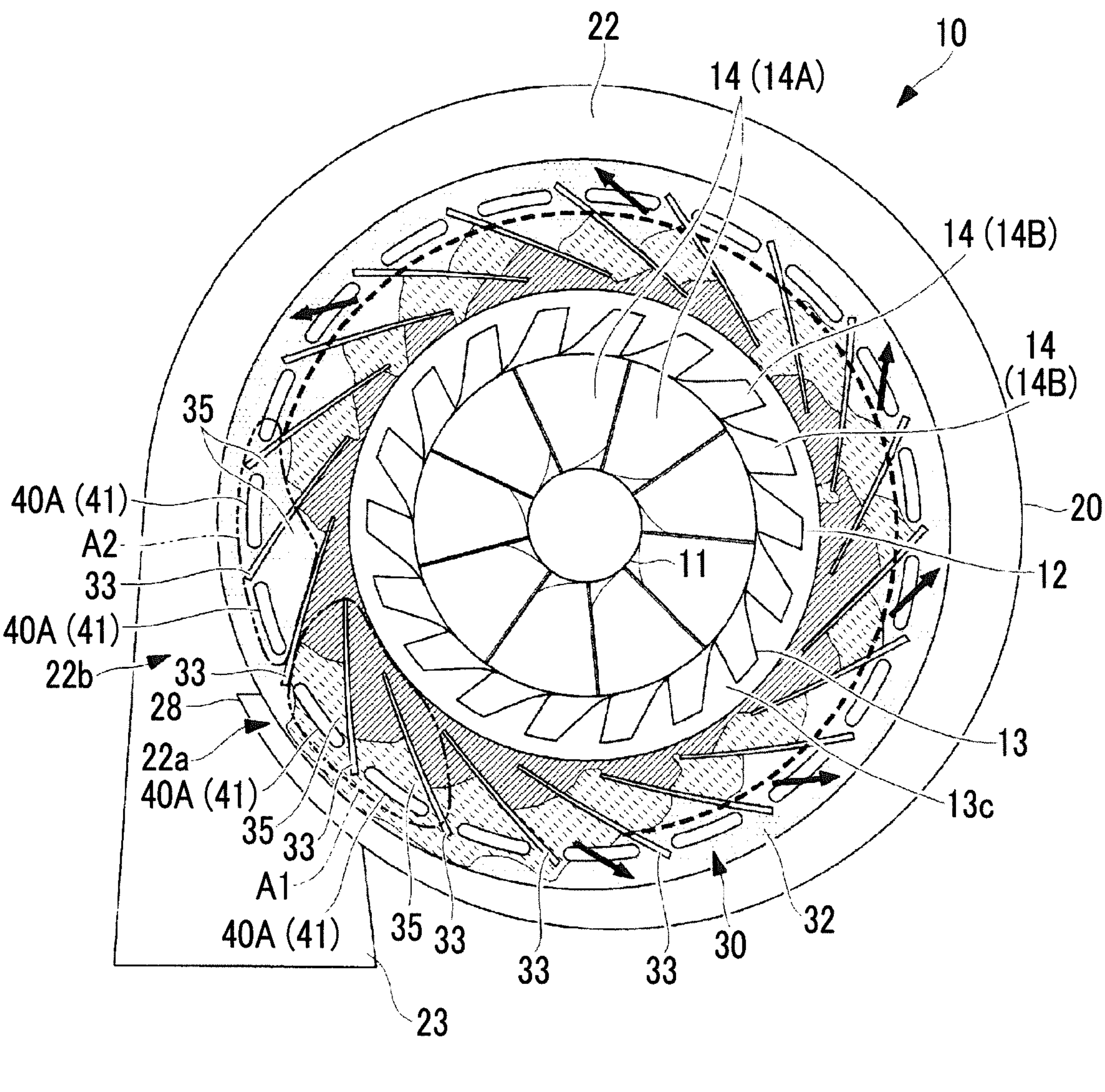
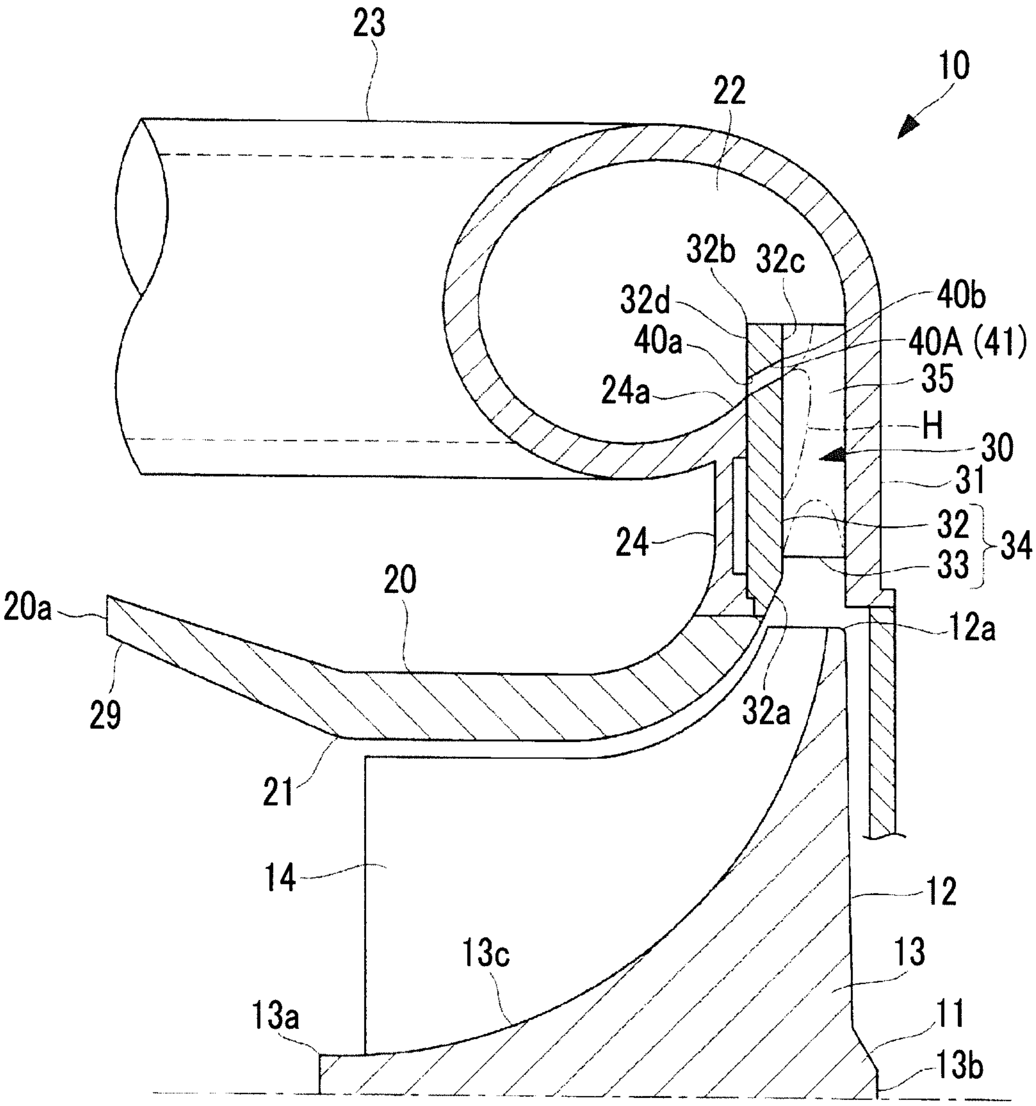

22
10
14 (14A)
14 (14B)
14
(14B)
35
40A (41)
A2
33
40A (41)
22b
33
28
22a
40A (41)
35
33
A1
40A (41)
35
33
33
33
30
32
23
20
11
12
13
13c

FIG. 2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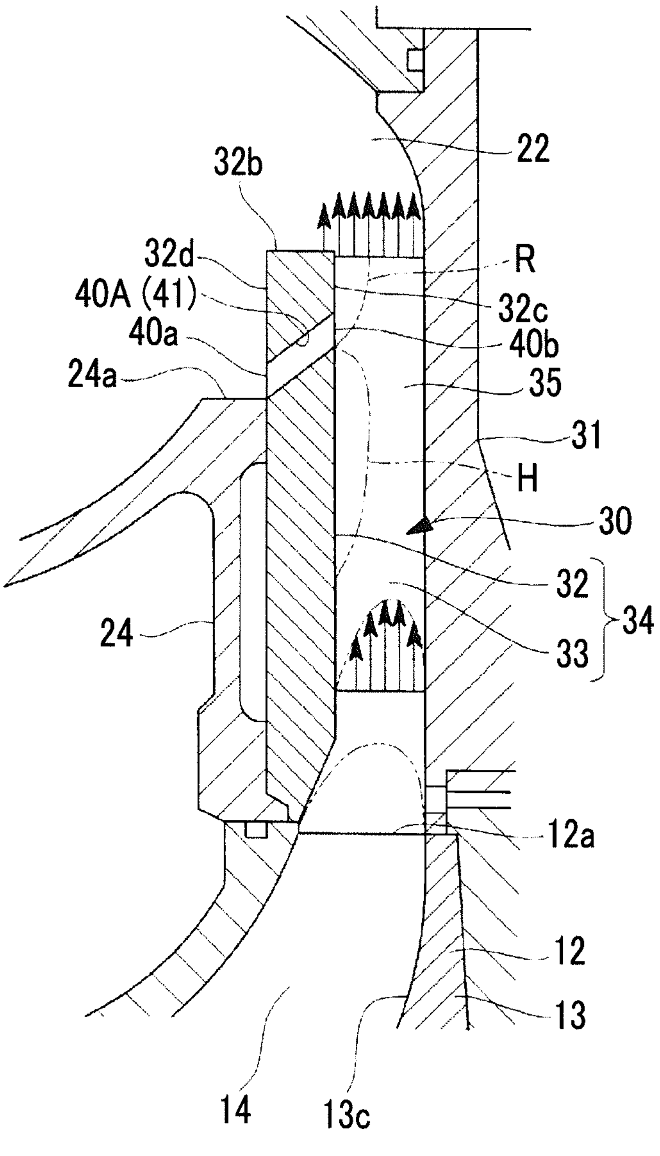
22
10
32b
32c
40b
32d
40a
40A (41)
35
24a
H
30
31
32
34
33
24
20
20a
12a
29
32a
21
14
12
13c
13
13a
11
13b

FIG. 3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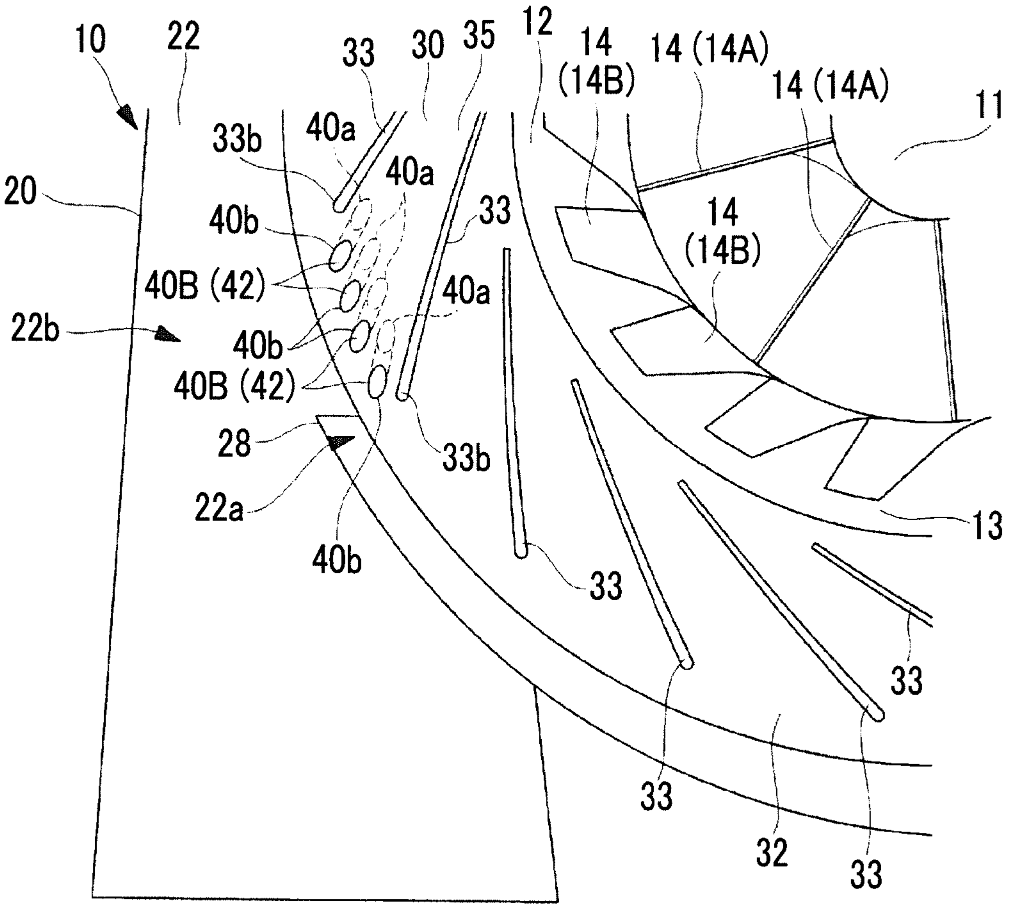
32b
R
32d
40A (41)
32c
40a
40b
24a
35
31
H
30
32
34
24
33
12a
12
13
14
13c

FIG. 4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22
33
30
35
12
14
(14B)
14 (14A)
14 (14A)
11
33b
40a
40a
20
40b
33
14
(14B)
40B (42)
40a
22b
40b
40B (42)
28
33b
22a
40b
33
13
33
33
32
33

REFERENCES CITED IN THE DESCRIPTION

Patent documents cited in the description

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- JP 2005240680 A **[0014]**
- JP 2010151034 A **[0014]**