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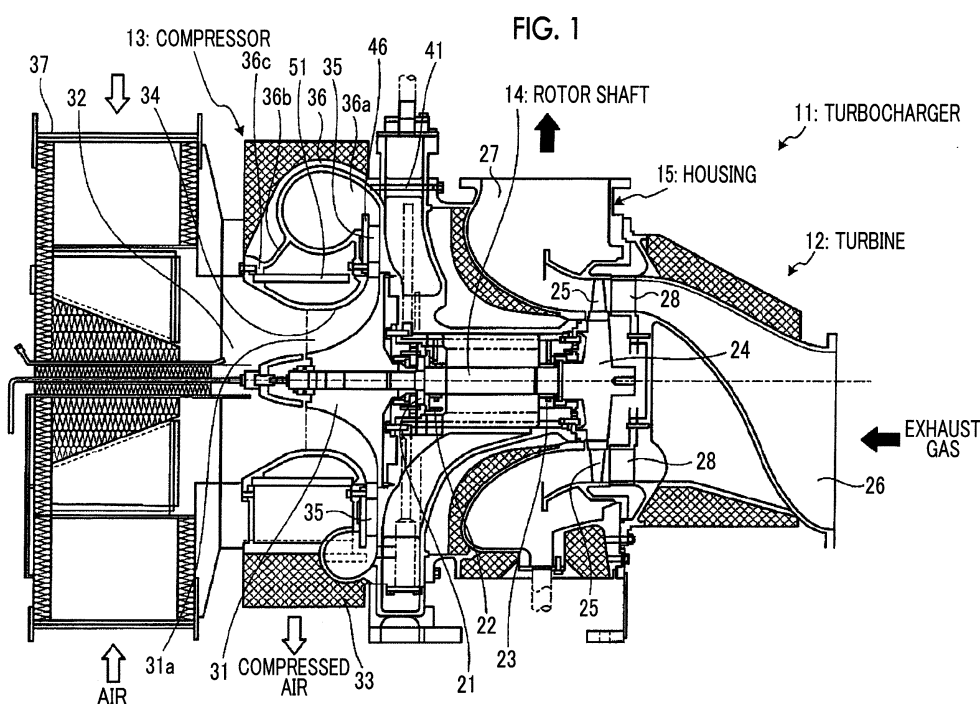
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(54) **COMPRESSOR AND SUPERCHARGER**

(57) Provided is a compressor (13) having: a compressor impeller (31) secured to a rotor shaft (14); an air-guiding cylinder (34) arranged on the outer peripheral side of the compressor impeller (31), the air-guiding cylinder (34) guiding air taken in from an air intake port (32) to the compressor impeller (31); a scroll (36) arranged

on the outer peripheral side of the air-guiding cylinder (34), the scroll (36) guiding compressed air pressurized by the compressor impeller (31); and a containment ring (51) arranged between the air-guiding cylinder (34) and the scroll (36).



Description

Citation List

Technical Field

Patent Literature

[0001] The present invention relates to a compressor and a turbocharger that performs supercharging by using exhaust gas discharged from an exhaust gas turbine.

5 **[0006]**

[PTL 1] Japanese Unexamined Patent Application Publication No. 2011-117417

[PTL 2] Japanese Unexamined Patent Application Publication No. 2001-132465

Background Art

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[0002] A turbocharger has a structure in which a turbine and a compressor are integrally connected to each other by a rotor shaft and are rotatably accommodated in a housing. When exhaust gas is supplied into the housing and rotates the turbine, a rotor is rotationally driven and the compressor is driven. The compressor takes in air from the outside and pressurizes the air by an impeller to generate compressed air. The compressed air is supplied to a diesel engine or the like. Meanwhile, there is a turbocharger, which is disclosed in, for example, PTL 1, as this turbocharger.

Summary of Invention

Technical Problem

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[0007] In the above-mentioned exhaust gas turbine turbocharger of PTL 2, the turbine-side partition wall is provided closer to the compressor than the turbine blade, the compressor-side partition wall is positioned close to the turbine, and the impact absorbing partition wall is positioned toward the compressor from compressor-side partition wall with an interval therebetween. In this case, when the impeller is busted, the breakage of the scroll cannot be prevented.

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[0008] The invention has been made to solve the above-mentioned problem, and an object of the invention is to provide a compressor and a turbocharger that can prevent the breakage of a scroll when an impeller is busted.

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Solution to Problem

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[0009] In order to achieve the above-mentioned object, a compressor according to an aspect of the invention includes an impeller that is fixed to a rotor shaft, a guiding cylinder that is disposed on an outer peripheral side of the impeller and guides fluid taken in from an intake port to the impeller, a scroll that is disposed on an outer peripheral side of the guiding cylinder and guides compressed air pressurized by the impeller, and a ring member that is disposed between the guiding cylinder and the scroll.

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[0010] Accordingly, when the impeller is busted, the impeller or a part thereof scattered outward in the radial direction collides with the guiding cylinder first of all and the guiding cylinder absorbs the impact force of the impeller or a part thereof while being broken. After that, the impeller or a part thereof collides with the ring member but does not break the ring member since the impact force of the impeller or a part thereof has been previously reduced. For this reason, since the scattering of the impeller or a part thereof in the axial direction is suppressed, the occurrence of opening is prevented. As a result, it is possible to prevent the breakage of the scroll that may occur when the impeller is busted.

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[0011] In the compressor according to the aspect of the invention, the scroll is fastened to a housing by bolts, the guiding cylinder is fastened to the scroll by bolts, and

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[0003] Incidentally, this turbocharger requires that the busted impeller is not scattered outward in a radial direction and opening caused by the breakage of a silencer provided on a side in which exhaust gas is taken in does not occur when the impeller is busted.

[0004] In the turbocharger in the related art, an air-guiding cylinder is disposed outside the impeller. However, since the air-guiding cylinder is manufactured by casting, the air-guiding cylinder does not have sufficient strength against an impact force. For this reason, there is a concern that a scroll (scroll chamber) provided outside the air-guiding cylinder may be broken. A method of improving the strength of the air-guiding cylinder by increasing the wall thickness of the air-guiding cylinder may be considered as a countermeasure. In this case, the air-guiding cylinder is not broken, but the impeller is scattered to the side in which exhaust gas is taken in and breaks the silencer after colliding with the air-guiding cylinder. For this reason, there is a concern that opening may occur.

[0005] There is an exhaust gas turbine turbocharger disclosed in, for example, PTL 2 as a turbocharger that solves this problem. The exhaust gas turbine turbocharger disclosed in PTL 2 includes a turbine housing, a compressor housing, and a bearing housing. The bearing housing is provided with a lubricant head tank; the lubricant head tank is provided with a turbine-side partition wall that is positioned closer to the compressor than a turbine blade, and a compressor-side partition wall that is positioned closer to the turbine than a compressor impeller; and an impact absorbing partition wall is positioned toward the compressor from the compressor-side partition wall with an interval therebetween.

the ring member is fastened to the guiding cylinder by bolts.

[0012] Accordingly, in a state in which the ring member is fastened to the guiding cylinder, the ring member and the guiding cylinder may be inserted into the housing and the guiding cylinder may be fastened to the scroll. Therefore, assemblability can be improved.

[0013] In the compressor according to the aspect of the invention, one end portion of the ring member in an axial direction is interposed between the scroll and the guiding cylinder, and fastening bolts pass through the guiding cylinder and are screwed to one end portion of the ring member in the axial direction.

[0014] Accordingly, the ring member can be rigidly supported.

[0015] In the compressor according to the aspect of the invention, only one end portion of the ring member in the axial direction is fixed to the guiding cylinder.

[0016] Accordingly, assemblability can be improved, and the ring member can secure an elastic force.

[0017] In the compressor according to the aspect of the invention, the guiding cylinder includes a guiding cylinder body that includes a recirculation passage on an inner peripheral portion thereof and a guide ring that is disposed on an upstream side of the recirculation passage in a flow direction of the fluid; the guide ring is fastened to the scroll by bolts; the guiding cylinder body is fastened to the guide ring by bolts; and the ring member is fastened to the guide ring by bolts.

[0018] Accordingly, in a state in which the ring member is fastened to the guide ring and the guiding cylinder body is fastened to the guide ring, the ring member and the guide ring may be inserted into the housing and the guide ring may be fastened to the scroll. Therefore, assemblability can be improved.

[0019] In the compressor according to the aspect of the invention, the guiding cylinder and the scroll are manufactured by casting and the ring member is made of rolled steel for general structure.

[0020] Accordingly, while the guiding cylinder is broken at the time of collision between the scattered impeller and the guiding cylinder when the guiding cylinder is formed to have a crushable structure, an impact force can be absorbed. Further, when the ring member secures ductility, an impact force can be appropriately absorbed by an elastic force at the time of collision between the scattered impeller and the ring member.

[0021] In a turbocharger according to an aspect of the invention, the any one of the above-mentioned compressors and a turbine are integrally connected to each other by a rotor shaft and are rotatably accommodated in a housing. Advantageous Effects of Invention

[0022] According to the compressor and the turbocharger of the invention, since the ring member is disposed between the guiding cylinder and the scroll, it is possible to prevent breakage of the scroll that may occur when the impeller is busted.

Brief Description of Drawings

[0023]

- 5 Fig. 1 is a schematic sectional view showing a turbocharger of a first embodiment.
Fig. 2 is a sectional view showing main parts of the turbocharger.
10 Fig. 3 is a sectional view showing main parts of a turbocharger of a second embodiment.

Description of Embodiments

- 15 **[0024]** A preferred embodiment of a compressor and a turbocharger according to the invention will be described below in detail with reference to accompanying drawings. Meanwhile, the invention is not limited by this embodiment. In a case in which there are a plurality of embodiments, the invention also includes combinations of the respective embodiments.

[First embodiment]

- 25 **[0025]** Fig. 1 is a schematic sectional view showing a turbocharger of a first embodiment, and Fig. 2 is a sectional view showing main parts of the turbocharger.

- 30 **[0026]** In the first embodiment, as shown in Fig. 1, a turbocharger 11 is an exhaust gas turbine turbocharger that is to supply compressed air to an air supply manifold communicating with the inside of cylinder liners of a marine diesel engine by being mounted on, for example, the marine diesel engine (not shown).

- 35 **[0027]** The turbocharger 11 has a structure in which a turbine 12 and a compressor 13 are integrally connected to each other by a rotor shaft 14 and are rotatably accommodated in a housing 15.

- 40 **[0028]** The housing 15 has a hollow shape, and the rotor shaft 14 is disposed in the housing 15 and is rotatably supported by a thrust bearing 21 and radial bearings 22 and 23. A turbine disc 24 is fixed to one end portion of the rotor shaft 14 in an axial direction, and a plurality of axial flow type turbine blades 25 are provided on the outer peripheral portion of the turbine disc 24 at predetermined intervals in a circumferential direction. The turbine 12 includes the turbine disc 24 and the plurality of turbine blades 25.

- 45 **[0029]** Further, the housing 15 is provided with an exhaust gas inlet passage 26 and an exhaust gas outlet passage 27 for the turbine blades 25. Furthermore, the housing 15 is provided with turbine nozzles 28 between the inlet passage 26 and the turbine blades 25. Accordingly, an axial exhaust gas flow, which is expanded under static pressure by the turbine nozzles 28, is led to the plurality of turbine blades 25, so that the turbine 12 can be rotationally driven.

- 50 **[0030]** A compressor impeller 31, which is provided with a plurality of blades 31a at predetermined intervals in the circumferential direction, is fixed to the other end

portion of the rotor shaft 14 in the axial direction. The compressor 13 includes the compressor impeller 31. Further, the housing 15 is provided with an air intake port 32 and a compressed air outlet 33 for the compressor impeller 31. Furthermore, the housing 15 is provided with an air-guiding cylinder 34 between the compressor impeller 31 and the air intake port 32, and is provided with a diffuser 35 and a scroll 36, which includes a scroll chamber 36a, between the compressor impeller 31 and the compressed air outlet 33. Air, which is compressed by the compressor impeller 31, is discharged through the diffuser 35 and the scroll 36 (the scroll chamber 36a). Further, a silencer 37 is mounted on the air intake port 32 of the housing 15.

[0031] Accordingly, exhaust gas, which is discharged from the marine diesel engine, passes through the exhaust gas inlet passage 26 and is expanded under static pressure by the turbine nozzles 28. Therefore, an axial exhaust gas flow is led to the plurality of turbine blades 25, so that the turbine 12 is rotationally driven by the turbine disc 24 to which the plurality of turbine blades 25 are fixed. Then, exhaust gas, which has driven the plurality of turbine blades 25, is discharged to the outside from the outlet passage 27. Meanwhile, when the rotor shaft 14 is rotated, the integrated compressor impeller 31 is rotated and air is taken through the air intake port 32. The taken air is pressurized by the compressor impeller 31 and becomes compressed air, and the compressed air passes through the diffuser 35 and the scroll 36 and is supplied to the marine diesel engine from the compressed air outlet 33.

[0032] In the compressor 13 having the above-mentioned structure, as shown in Figs. 1 and 2, the rotor shaft 14 is rotatably supported by the housing 15 and the compressor impeller 31 is integrally fixed to the other end portion of the rotor shaft 14. Further, the scroll 36 is disposed outside the compressor impeller 31 in a radial direction, and the outer peripheral portion of the scroll 36 is fixed to the housing 15 by bolts 41. The scroll 36 includes the scroll chamber 36a, and the silencer 37 is fixed to a mounting portion 36b, which extends toward the air intake port 32, of the scroll 36 by bolts 42. Furthermore, a mounting flange 36c, which extends from the mounting portion 36b toward the inner peripheral side, is formed at the scroll 36. A mounting flange 34a, which extends outward, is formed at one end portion, which is close to the air intake port 32, of the air-guiding cylinder 34. Further, the mounting flange 34a of the air-guiding cylinder 34 overlaps a portion, which is close to the air intake port 32, of the mounting flange 36c of the scroll 36 and is connected to the portion of the mounting flange 36c by bolts 43. Meanwhile, the air-guiding cylinder 34 is divided into the mounting flange 34a and a body 34b, and the mounting flange 34a and a body 34b are connected to each other by bolts 45 with a liner 44 interposed therebetween.

[0033] Furthermore, a guide plate 46, which has the shape of a ring, is fixed to the inner peripheral portion of

the scroll 36 by bolts 47, and the turbine nozzles 28 are mounted on the guide plate 46. A middle portion of the air-guiding cylinder 34 in the axial direction protrudes toward the inner peripheral side so as to have a curved shape along the outer peripheral surface of the compressor impeller 31, and an end portion of the air-guiding cylinder 34 comes into close contact with the inner peripheral portion of the scroll 36 with an O-ring 48 interposed therebetween.

[0034] In the compressor 13 of this embodiment, a containment ring 51 is disposed between the air-guiding cylinder 34 and the scroll 36. The containment ring 51 is fastened to the air-guiding cylinder 34 by bolts. That is, the containment ring 51 has the shape of a ring of which the inner diameter and the outer diameter are constant in the axial direction, and one end portion of the containment ring 51 in the axial direction is interposed between the inner peripheral surface of the mounting flange 36c of the scroll 36 and the outer peripheral surface of the mounting flange 34a of the air-guiding cylinder 34. Further, one end face of the containment ring 51 in the axial direction comes into close contact with the mounting flange 34a, and fastening bolts 52 pass through the mounting flange 34a and are screwed to one end portion of the containment ring 51. For this reason, only one end portion of the containment ring 51 in the axial direction is fixed to the end portion, which is close to the air intake port 32, of the air-guiding cylinder 34.

[0035] Further, the air-guiding cylinder 34 and the scroll 36 are castings that are manufactured by casting, and the containment ring 51 is a ring member that is made of rolled steel for general structure (for example, SS400). That is, the air-guiding cylinder 34 and the scroll 36 are manufactured with high accuracy by casting so as to have a complicated shape, but do not have sufficient strength against an impact. Meanwhile, the containment ring 51 is made of rolled steel for general structure so as to have a simple shape, and particularly, has ductility higher than the ductility of the air-guiding cylinder 34 and has sufficient strength against an impact.

[0036] Accordingly, when the compressor impeller 31 of the turbocharger 11 is busted due to a certain factor, a part of the busted compressor impeller 31 is scattered outward in the radial direction. First of all, a part of the compressor impeller 31 collides with the air-guiding cylinder 34. Since the air-guiding cylinder 34 is manufactured by casting, the air-guiding cylinder 34 does not have sufficient strength against an impact and has a crushable structure. Accordingly, the air-guiding cylinder 34 absorbs an impact force of the compressor impeller 31 while being broken. Then, the compressor impeller 31 collides with the containment ring 51. Since the containment ring 51 is made of rolled steel for general structure, the containment ring 51 has high ductility and has sufficient strength against an impact. Accordingly, the containment ring 51 receives and absorbs the impact force of the compressor impeller 31 without being broken. For this reason, the scroll 36 is not broken, and the breakage of the si-

lencer 37 is prevented since the compressor impeller 31 is not scattered in the axial direction. Therefore, opening is prevented.

[0037] As described above, in the turbocharger of the first embodiment, the turbine 12 and the compressor 13 are integrally connected to each other by the rotor shaft 14 and are rotatably accommodated in the housing 15; and the compressor 13 includes the compressor impeller 31 that is fixed to the rotor shaft 14, the air-guiding cylinder 34 that is disposed on the outer peripheral side of the compressor impeller 31 and guides air taken in from the air intake port 32 to the compressor impeller 31, the scroll 36 that is disposed on the outer peripheral side of the air-guiding cylinder 34 and guides compressed air pressurized by the compressor impeller 31, and the containment ring 51 that is disposed between the air-guiding cylinder 34 and the scroll 36.

[0038] Accordingly, when the compressor impeller 31 is busted, the compressor impeller 31 or a part thereof scattered outward in the radial direction collides with the air-guiding cylinder 34 first of all and the air-guiding cylinder 34 absorbs the impact force of the compressor impeller 31 or a part thereof while being broken. After that, the compressor impeller 31 or a part thereof collides with the containment ring 51 but does not break the containment ring 51 since the impact force of the compressor impeller 31 or a part thereof is previously reduced. For this reason, since the scattering of the compressor impeller 31 or a part thereof in the axial direction is suppressed, the occurrence of opening is prevented. As a result, it is possible to prevent the breakage of the scroll 36 that may occur when the compressor impeller 31 is busted.

[0039] In the turbocharger of the first embodiment, the scroll 36 is fastened to the housing 15 by bolts, the air-guiding cylinder 34 is fastened to the scroll 36 by bolts, and the containment ring 51 is fastened to the air-guiding cylinder 34 by bolts. Accordingly, in a state in which the containment ring 51 is fastened to the air-guiding cylinder 34, the containment ring 51 and the air-guiding cylinder 34 may be inserted into the housing 15 and the air-guiding cylinder 34 may be fastened to the scroll 36. Therefore, assemblability can be improved. In this case, it is possible to easily fix the containment ring 51 without changing the scroll 36 and the like by merely changing only the air-guiding cylinder 34.

[0040] In the turbocharger of the first embodiment, one end portion of the containment ring 51 in the axial direction is interposed between the scroll 36 and the air-guiding cylinder 34 and the fastening bolts 52 pass through the air-guiding cylinder 34 and are screwed to one end portion of the containment ring 51 in the axial direction. Accordingly, since the containment ring 51 is fastened by the bolts and also is interposed between the scroll 36 and the air-guiding cylinder 34, the containment ring 51 can be rigidly supported in the housing 15.

[0041] In the turbocharger of the first embodiment, only one end portion of the containment ring 51 in the axial

direction is fixed to the air-guiding cylinder 34. Accordingly, the containment ring 51 is supported in the form of a cantilever. Therefore, assemblability can be improved since the number of portions to be fastened by bolts is reduced, and an impact force, which is generated when the compressor impeller 31 collides with the containment ring 51, can be absorbed since the containment ring 51 secures an elastic force.

[0042] In the turbocharger of the first embodiment, the air-guiding cylinder 34 and the scroll 36 are castings that are manufactured by casting and the containment ring 51 is a ring member that is made of rolled steel for general structure. Accordingly, since the air-guiding cylinder 34 is appropriately broken at the time of collision between the scattered compressor impeller 31 and the air-guiding cylinder 34 when the air-guiding cylinder 34 is formed to have a crushable structure, an impact force generated at this time can be effectively absorbed. Further, when the containment ring 51 secures ductility, an impact force can be appropriately absorbed by an elastic force at the time of collision between the scattered compressor impeller 31 and the containment ring 51.

[Second embodiment]

[0043] Fig. 3 is a sectional view showing main parts of a turbocharger of a second embodiment. Meanwhile, members having the same functions as those of the above-mentioned embodiment are denoted by the same reference numerals, and the detailed description thereof will be omitted.

[0044] In a compressor 61 of the second embodiment, as shown in Fig. 3, a rotor shaft 14 is rotatably supported by a housing 15 and a compressor impeller 31 is integrally fixed to the other end portion of the rotor shaft 14. Further, a scroll 36 is disposed outside the compressor impeller 31 in a radial direction, and the outer peripheral portion of the scroll 36 is fixed to the housing 15 by bolts 41. The scroll 36 includes a scroll chamber 36a, and a silencer 37 is fixed to a mounting portion 36b, which extends toward an air intake port 32, of the scroll 36 by bolts 42. Furthermore, a mounting flange 36c, which extends from the mounting portion 36b toward the inner peripheral side, is formed at the scroll 36.

[0045] An air-guiding cylinder 62 is provided with a recirculation passage (air recirculation passage) 63 that prevents surging likely to occur when the amount of intake air is small. That is, the air-guiding cylinder 62 includes an air-guiding cylinder body 64 that includes the recirculation passage 63 on the inner peripheral portion thereof and a guide ring 65 that is disposed on the upstream side of the recirculation passage 63 in the flow direction of air. A middle portion of the air-guiding cylinder body 64 in the axial direction protrudes toward the inner peripheral side so as to have a curved shape along the outer peripheral surface of the compressor impeller 31, and a part of the air-guiding cylinder body 64 has a shape recessed toward the outer peripheral side so that the

recirculation passage 63 is formed. The recirculation passage 63 includes an inlet portion 63a and a discharge portion 63b that are provided on an air passage continued from the air intake port 32.

[0046] Further, a mounting flange 65a, which extends outward, is formed at one end portion, which is close to the air intake port 32, of the guide ring 65. Furthermore, the mounting flange 65a of the guide ring 65 overlaps a portion, which is close to the air intake port 32, of the mounting flange 36c of the scroll 36, and is connected to the portion, which is close to the air intake port 32, of the mounting flange 36c by the bolts 43. A base end portion of the air-guiding cylinder body 64 comes into close contact with the guide ring 65, and is connected to the guide ring 65 by bolts 66. Further, a guide plate 46, which has the shape of a ring, is fixed to the inner peripheral portion of the scroll 36 by bolts 47, and turbine nozzles 28 are mounted on the guide plate 46. An end portion of the air-guiding cylinder 62 comes into close contact with the inner peripheral portion of the scroll 36 with an O-ring 48 interposed therebetween.

[0047] In the compressor 61 of this embodiment, a containment ring 71 is disposed between the air-guiding cylinder 62 and the scroll 36. The containment ring 71 is fastened to the air-guiding cylinder 62 by bolts. That is, the containment ring 71 has the shape of a ring of which the inner diameter and the outer diameter are constant in the axial direction, and one end portion of the containment ring 71 in the axial direction is interposed between the inner peripheral surface of the mounting flange 36c of the scroll 36 and the outer peripheral surfaces of the air-guiding cylinder body 64 and the guide ring 65 of the air-guiding cylinder 62. Furthermore, one end portion of the containment ring 71 in the axial direction comes into close contact with the mounting flange 65a, and fastening bolts 52 pass through the mounting flange 65a and are screwed to one end portion of the containment ring 71. For this reason, only one end portion of the containment ring 71 in the axial direction is fixed to the end portion, which is close to the air intake port 32, of the air-guiding cylinder 62.

[0048] Accordingly, when the compressor impeller 31 of the turbocharger 11 is busted due to a certain factor, a part of the busted compressor impeller 31 is scattered outward in the radial direction. First of all, a part of the compressor impeller 31 collides with the air-guiding cylinder 62. Since the air-guiding cylinder 62 is manufactured by casting, the air-guiding cylinder 62 does not have sufficient strength against an impact and has a crushable structure. Accordingly, the air-guiding cylinder 62 absorbs an impact force of the compressor impeller 31 while being broken. Then, the compressor impeller 31 collides with the containment ring 71. Since the containment ring 71 is made of rolled steel for general structure, the containment ring 71 has high ductility and has sufficient strength against an impact. Accordingly, the containment ring 71 receives and absorbs the impact force of the compressor impeller 31 without being broken. For this reason,

the scroll 36 is not broken, and the breakage of the silencer 37 is prevented since the compressor impeller 31 is not scattered in the axial direction. Therefore, opening is prevented.

[0049] As described above, in the turbocharger of the second embodiment, the compressor 61 includes the compressor impeller 31 that is fixed to the rotor shaft 14, the air-guiding cylinder 62 that is disposed on the outer peripheral side of the compressor impeller 31 and guides air taken in from the air intake port 32 to the compressor impeller 31, the scroll 36 that is disposed on the outer peripheral side of the air-guiding cylinder 62 and guides compressed air pressurized by the compressor impeller 31, and the containment ring 71 that is disposed between the air-guiding cylinder 62 and the scroll 36.

[0050] Accordingly, when the compressor impeller 31 is busted, the compressor impeller 31 or a part thereof scattered outward in the radial direction collides with the air-guiding cylinder 62 first of all and the air-guiding cylinder 62 absorbs the impact force of the compressor impeller 31 or a part thereof while being broken. After that, the compressor impeller 31 or a part thereof collides with the containment ring 71 but does not break the containment ring 71 since the impact force of the compressor impeller 31 or a part thereof is previously reduced. For this reason, since the scattering of the compressor impeller 31 or a part thereof in the axial direction is suppressed, the occurrence of opening is prevented. As a result, it is possible to prevent the breakage of the scroll 36 that may occur when the compressor impeller 31 is busted.

[0051] In the turbocharger of the second embodiment, the air-guiding cylinder 62 includes the air-guiding cylinder body 64 that includes the recirculation passage 63 on the inner peripheral portion thereof and the guide ring 65 that is disposed on the upstream side of the recirculation passage 63 in the flow direction of air; the guide ring 65 is fastened to the scroll 36 by bolts; the air-guiding cylinder body 64 is fastened to the guide ring 65 by bolts; and the containment ring 71 is fastened to the guide ring 65 by bolts. Accordingly, in a state in which the containment ring 71 is fastened to the guide ring 65 and the air-guiding cylinder body 64 is fastened to the guide ring 65, the containment ring 71 and the guide ring 65 may be inserted into the housing 15 and the guide ring 65 may be fastened to the scroll 36. Therefore, assemblability can be improved.

[0052] In this case, it is possible to easily fix the containment ring 71 without changing the scroll 36 and the like by changing only the air-guiding cylinder 62. Further, even though the air-guiding cylinder 62 includes the recirculation passage 63, the containment ring 71 can be appropriately fixed.

[0053] Meanwhile, in the above-mentioned embodiments, the containment rings 51 and 71 have the shape of a cylinder of which the diameter is not changed in the axial direction. However, the shapes of the containment rings 51 and 71 may be appropriately set according to

the shapes of the air-guiding cylinders 34 and 62, the scroll 36, and the like, and may be, for example, the shape of a truncated cone, the shape of a combination of a cylinder and a truncated cone, or a shape including ribs and the like.

[0054] Further, the turbocharger of the invention has been applied to a marine exhaust gas turbine turbocharger in the above-mentioned embodiments, but is not limited to this field.

Reference Signs List

[0055]

11: turbocharger
 12: turbine
 13, 61: compressor
 14: rotor shaft
 15: housing
 24: turbine disc
 25: turbine blade
 31: compressor impeller
 32: air intake port
 33: compressed air outlet
 34, 62: air-guiding cylinder
 36: scroll
 37: silencer
 51, 71: containment ring
 63: recirculation passage
 64: air-guiding cylinder body
 65: guide ring

Claims

1. A compressor comprising:

an impeller that is fixed to a rotor shaft;
 a guiding cylinder that is disposed on an outer peripheral side of the impeller and guides fluid taken in from an intake port to the impeller;
 a scroll that is disposed on an outer peripheral side of the guiding cylinder and guides compressed air pressurized by the impeller; and
 a ring member that is disposed between the guiding cylinder and the scroll.

2. The compressor according to claim 1,
 wherein the scroll is fastened to a housing by bolts,
 the guiding cylinder is fastened to the scroll by bolts,
 and
 the ring member is fastened to the guiding cylinder by bolts.

3. The compressor according to claim 2,
 wherein one end portion of the ring member in an axial direction is interposed between the scroll and the guiding cylinder, and fastening bolts pass

through the guiding cylinder and are screwed to one end portion of the ring member in the axial direction.

4. The compressor according to claim 2 or 3,
 wherein only one end portion of the ring member in the axial direction is fixed to the guiding cylinder.

5. The compressor according to any one of claims 2 to 4,
 wherein the guiding cylinder includes a guiding cylinder body that includes a recirculation passage on an inner peripheral portion thereof and a guide ring that is disposed on an upstream side of the recirculation passage in a flow direction of the fluid,
 the guide ring is fastened to the scroll by bolts,
 the guiding cylinder body is fastened to the guide ring by bolts, and
 the ring member is fastened to the guide ring by bolts.

6. The compressor according to any one of claims 1 to 5,
 wherein the guiding cylinder and the scroll are manufactured by casting, and
 the ring member is made of rolled steel for general structure.

7. A turbocharger in which the compressor according to any one of claims 1 to 6 and a turbine are integrally connected to each other by a rotor shaft and are rotatably accommodated in a housing.

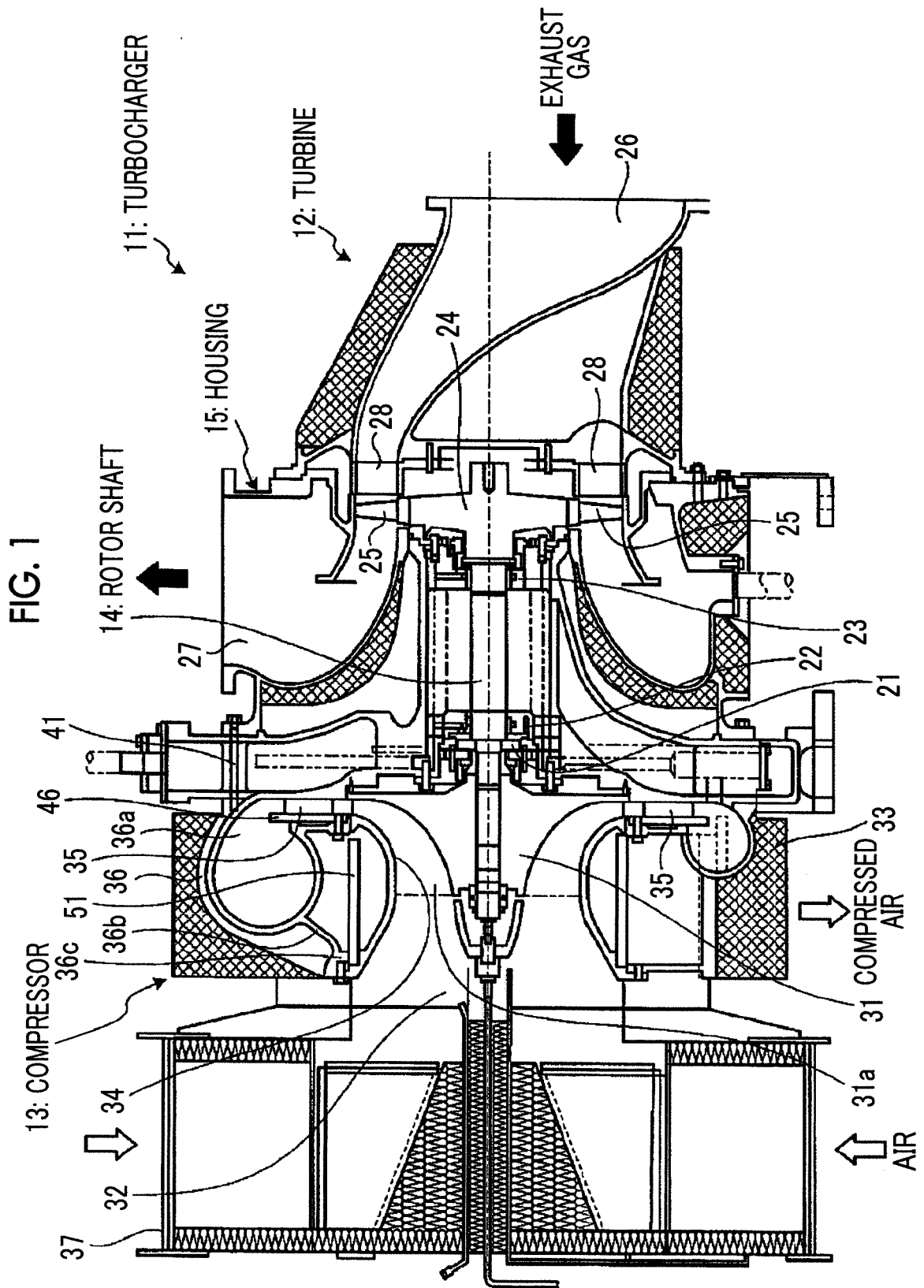


FIG. 2

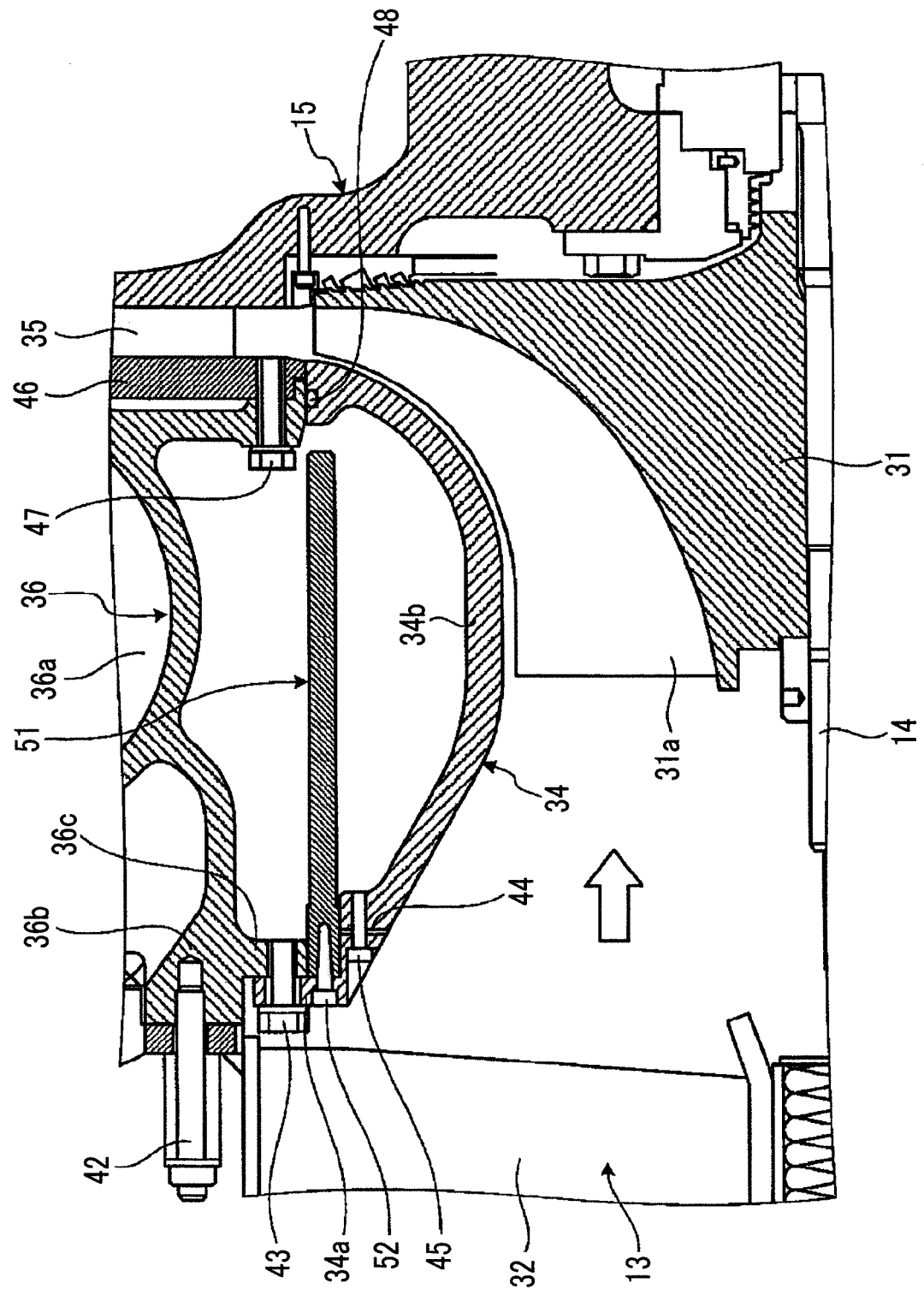
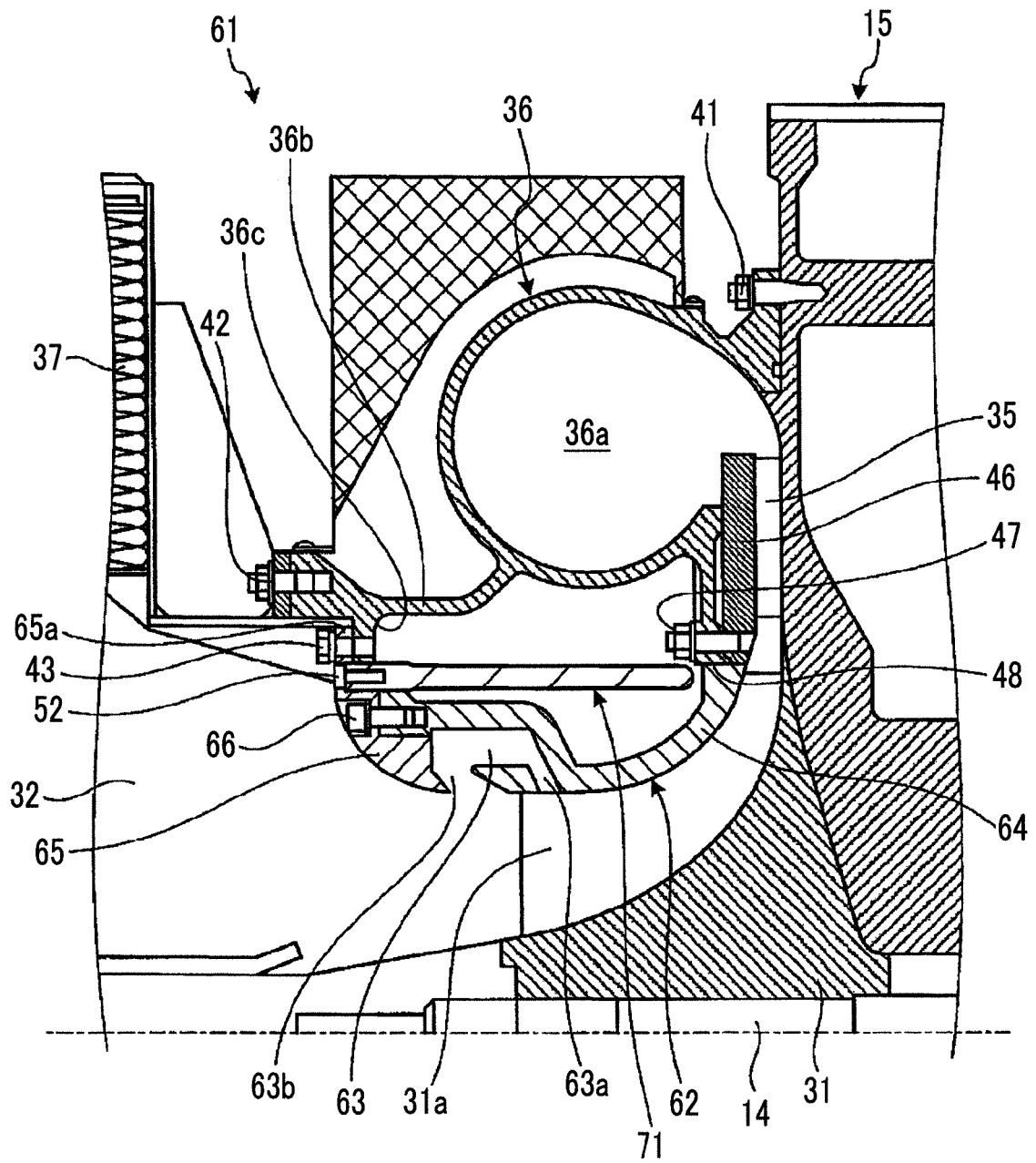


FIG. 3



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2014/083891

A. CLASSIFICATION OF SUBJECT MATTER

F04D29/44(2006.01)i, F02B39/00(2006.01)i, F04D29/42(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F04D29/44, F02B39/00, F04D29/42

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2015
 Kokai Jitsuyo Shinan Koho 1971-2015 Toroku Jitsuyo Shinan Koho 1994-2015

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	JP 2010-180882 A (ABB Turbo Systems AG.), 19 August 2010 (19.08.2010), paragraphs [0025] to [0040]; fig. 1 to 4 & US 2010/0192570 A1 & EP 2216516 A1 & EP 2216517 A1 & CN 101793266 A & KR 10-2010-0089776 A	1, 7 2-6
X	JP 2004-525297 A (ABB Turbo Systems AG.), 19 August 2004 (19.08.2004), paragraphs [0021] to [0024]; fig. 2, 3 & WO 2002/090722 A1 & CN 1537193 A & KR 10-0865650 B1	1, 7

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

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Japan Patent Office
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 53-93406 A (K B Southern, Inc.), 16 August 1978 (16.08.1978), entire text; all drawings & US 4137006 A & GB 1577756 A & DE 2711607 A1 & FR 2378963 A1 & CH 613267 A5	1-7
A	JP 2007-56870 A (MAN Diesel SE), 08 March 2007 (08.03.2007), entire text; all drawings & DE 102005039820 A1 & CH 698497 B & CN 1920312 A & KR 10-2007-0022593 A	1-7

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REFERENCES CITED IN THE DESCRIPTION

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- JP 2001132465 A [0006]