

(19)



(11)

EP 2 722 506 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
23.04.2014 Bulletin 2014/17

(51) Int Cl.:
F02B 39/16 ^(2006.01) **F01D 25/00** ^(2006.01)

(21) Application number: **13185137.0**

(22) Date of filing: **19.09.2013**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

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(30) Priority: **22.10.2012 JP 2012232818**

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(54) **Turbocharger**

(57) The present invention provides a turbocharger (1) including a compressor housing (2) provided therein with an air flow path (10) in which an impeller (13) is disposed and a bearing housing (3). The air flow path (10) includes a suction port (11) and a discharge scroll chamber (12). The compressor housing (2) includes a shroud surface (221) and a diffuser surface (222). The bearing housing (3) includes a facing surface (311) which is facing to the diffuser surface (222). A cleaning agent

supplying units (4, 5) are provided in the diffuser surface (222) and the facing surface (311). The cleaning agent supplying units (4, 5) include porous supplying portions (41, 51) for forming at least a portion of the diffuser surface (222) or the facing surface (311), and a cleaning agent (6) for preventing adhesion of deposits is supplied from the porous supplying portions (41, 51) to the diffuser surface (222) or the facing surface (311).

EP 2 722 506 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a turbocharger including a compressor housing and a bearing housing.

Description of the Related Art

[0002] A turbocharger provided in a car and the like is configured such that air sucked in a compressor is compressed and discharged toward an internal combustion engine (see Patent Document 1).

That is, the turbocharger includes a compressor housing provided at its inner side with an air flow path. An impeller is disposed in the air flow path. The turbocharger also includes a bearing housing which rotatably supports a rotor shaft. The impeller is connected to the rotor shaft. The air flow path includes a suction port through which air is sucked toward the impeller, and a discharge scroll chamber into which compressor air discharged from the impeller flows.

[0003] The compressor housing includes a shroud surface which is facing to the impeller, and a diffuser surface extending from the shroud surface toward the discharge scroll chamber. The bearing housing forms a diffuser passage between the bearing housing and the diffuser surface of the compressor housing.

The turbocharger is configured such that the compressed air discharged from the impeller passes through the diffuser passage and flows into the discharge scroll chamber, and the compressed air is discharged from the discharge scroll chamber toward the internal combustion engine.

Patent Document

[0004]

Patent Document 1: JP 2002-180841 A

SUMMARY OF THE INVENTION

[0005] For example, some internal combustion engines include a positive crankcase ventilation system (PCV, hereinafter) which refluxes, into a suction passage, blow-by gas (mainly unburned gas) generated in a crankcase, and reheats the blow-by gas in a combustion chamber. In this case, oil (oil mist) included in the blow-by gas flows out, in some cases, from the PCV into the suction passage on an upstream side of a compressor in a turbocharger.

[0006] At this time, if an outlet air pressure of the compressor is high, an outlet air temperature also becomes high. Hence, oil which flows out from the PCV is condensed and viscosity of the oil is increased due to vapor-

ization of the oil, the oil becomes deposits, and the deposits accumulate, in some cases, on a diffuser surface of a compressor housing, a surface of a bearing housing facing to the diffuser surface, and the like. The diffuser passage is narrowed by the accumulated deposits, and there may be a risk that performance of the turbocharger is deteriorated and output of the internal combustion engine is lowered.

[0007] Hence, to prevent the accumulation of deposits in the diffuser passage, the outlet air temperature of the compressor is conventionally lowered to some extent. Hence, the performance of the turbocharger can not sufficiently be exerted, and the output of the internal combustion engine can not sufficiently be increased.

[0008] The present invention has been accomplished in view of the background, and the invention provides a turbocharger capable of preventing the accumulation of deposits in the diffuser passage.

[0009] One aspect of the invention resides in a turbocharger including a compressor housing provided therein with an air flow path in which an impeller is disposed; and a bearing housing for rotatably supporting a rotor shaft to which the impeller is connected, wherein:

the air flow path includes a suction port through which air is sucked toward the impeller, and a discharge scroll chamber which is formed on an outer peripheral side of the impeller in its circumferential direction, and which guides, to outside, compressed air discharged from the impeller;

the compressor housing includes a shroud surface facing to the impeller, and a diffuser surface extending from the shroud surface toward the discharge scroll chamber;

the bearing housing includes a facing surface which is facing to the diffuser surface of the compressor housing and which forms a diffuser passage between the facing surface and the diffuser surface;

a cleaning agent supplying unit is provided in at least one of the diffuser surface of the compressor housing and the facing surface of the bearing housing; and the cleaning agent supplying unit includes a porous supplying portion made of porous material for forming at least a portion of the diffuser surface or the facing surface, and is configured such that cleaning agent for preventing adhesion of deposits is supplied from the porous supplying portion to the diffuser surface or the facing surface.

[0010] In the turbocharger, at least one of the diffuser surface of the compressor housing and the facing surface of the bearing housing is provided with the cleaning agent supplying unit having the porous supplying portion. The porous supplying portion is disposed such that it forms at least a portion of the diffuser surface or the facing surface. The cleaning agent supplying unit is configured such that the cleaning agent for preventing the adhesion

of deposits is supplied from the porous supplying portion to the diffuser surface or the facing surface.

[0011] Hence, the cleaning agent supplied from the porous supplying portion of the cleaning agent supplying unit to the diffuser surface or the facing surface can prevent deposits from adhering to the diffuser surface of the compressor housing or the facing surface of the bearing housing. According to this, it is possible to prevent deposits from adhering to (accumulating on) the diffuser surface or the facing surface, i.e., it is possible to prevent the adhesion (accumulation) of deposits in the diffuser passage formed between the diffuser surface and the facing surface.

[0012] The porous supplying portion of the cleaning agent supplying unit is formed from porous material, and the porous supplying portion forms at least a portion of the diffuser surface and the facing surface. Hence, it is possible to easily and directly supply cleaning agent from pores formed in the porous supplying portion to the diffuser surface and the facing surface by making cleaning agent pass through the porous supplying portion, for example. Hence, it is possible to efficiently prevent the adhesion of deposits which will accumulate on the diffuser surface and the facing surface.

[0013] As described above, it is possible to provide a turbocharger capable of preventing the adhesion of deposits in the diffuser passage.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

Fig. 1 is an explanatory sectional view showing a turbocharger in a first embodiment.

Fig. 2 is an explanatory enlarged sectional view showing a cleaning agent supplying unit in the first embodiment.

Fig. 3 is an explanatory enlarged sectional view showing a cleaning agent supplying unit in a second embodiment.

Fig. 4 is an explanatory sectional view showing a turbocharger in a third embodiment.

Fig. 5 is an explanatory enlarged sectional view showing a cleaning agent supplying unit in the third embodiment.

MODE FOR CARRYING OUT THE INVENTION

[0015] In the turbocharger, the cleaning agent supplying unit is provided on at least one of the diffuser surface of the compressor housing and the facing surface of the bearing housing. That is, the cleaning agent supplying unit may be provided on one of or both of the diffuser surface and the facing surface. It is preferable that the cleaning agent supplying units are provided on both of them. In this case, the effect for preventing the adhesion of deposits in a diffuser passage can more sufficiently be obtained.

[0016] It is preferable that the porous supplying portion of the cleaning agent supplying unit is annularly provided on the diffuser surface of the compressor housing or the facing surface of the bearing housing over the entire circumferential direction thereof. In this case, the effect for preventing the adhesion of deposits in the diffuser passage can more sufficiently be obtained.

[0017] It is preferable that the porous supplying portion of the cleaning agent supplying unit is provided on the diffuser surface of the compressor housing or the facing surface of the bearing housing at a position closer to the impeller. In this case, the effect for preventing the adhesion of deposits in the diffuser passage can more sufficiently be obtained.

[0018] As porous material (including thin film and the like) configuring the porous supplying portion of the cleaning agent supplying unit, it is possible to use porous resin, metal, ceramic, glass fiber, carbon graphite, and articles which are in proportion to these examples (e.g., article obtained by rolling up resin film, article obtained by superposing resin paper sheets on one another, and article obtained by knitting resin string).

As the cleaning agent, it is possible to use a lubricant such as KURE CRC5-56 produced by KURE Engineering Ltd., and SUPER-CHECK CLEANING AGENT produced by MARKTEC Corporation.

[0019] The bearing housing includes a bearing body and a back plate which is disposed between the bearing body and the compressor housing and which faces to a portion of the air flow path, the bearing body and the back plate are separated from each other, and the back plate may be provided with the facing surface.

In the case of this configuration also, the effect for preventing the adhesion of deposits in the diffuser passage can sufficiently be obtained.

In the case of this configuration, it is also possible to provide the back plate which is a portion of the bearing housing with the cleaning agent supplying unit.

[0020] The cleaning agent supplying unit may be configured such that the cleaning agent passes through the porous supplying portion and is supplied to the diffuser surface or the facing surface.

In this case, it is possible to easily and directly supply the cleaning agent from the porous supplying portion to the diffuser surface or the facing surface. Further, it is possible to control the supply of the cleaning agent to the diffuser surface or the facing surface as will be described later.

[0021] The porous supplying portion may be configured such that the cleaning agent in a liquid state does not pass through the porous supplying portion and the cleaning agent in a gas state passes through the porous supplying portion, and the cleaning agent supplying unit may be configured such that the cleaning agent in the liquid state is vaporized under a predetermined condition, the cleaning agent passes through the porous supplying portion and is supplied to the diffuser surface or the facing surface.

In this case, it is possible to control the supply of the cleaning agent to the diffuser surface or the facing surface in accordance with a condition such as an atmosphere temperature of the compressor in the turbocharger.

[0022] Specifically, the turbocharger is configured such that a temperature of compressed air becomes high (e.g., temperature of 165°C or higher) in the diffuser passage, and vaporized cleaning agent of a necessary amount is supplied at a temperature slightly lower than a temperature at which oil from a PCV becomes deposits and the deposits adhere (lower than the above temperature by 5 to 10°C). According to this, when it is necessary to prevent deposits from adhering, vaporized cleaning agent of the necessary amount passes through the porous supplying portion and is supplied to the diffuser surface or the facing surface, and it is possible to efficiently prevent deposits from adhering. In this case, it is necessary to adjust a size (diameter) of each of the pores in the porous supplying portion depending upon a size of molecule of the cleaning agent, a boiling point of the cleaning agent, and a supply amount of the cleaning agent.

[0023] The cleaning agent supplying unit may be configured such that the porous supplying portion is impregnated with the cleaning agent in a liquid state, the cleaning agent is vaporized under a predetermined condition and is supplied to the diffuser surface or the facing surface.

In this case, it is possible to easily and directly supply the cleaning agent from the porous supplying portion to the diffuser surface or the facing surface. Further, it is possible to control the supply of the cleaning agent to the diffuser surface or the facing surface in accordance with a condition such as an atmosphere temperature of the compressor.

[0024] Specifically, as described above, the turbocharger is configured such that vaporized cleaning agent of a necessary amount is supplied at a predetermined temperature. According to this, when it is necessary to prevent deposits from adhering, the cleaning agent of a liquid state held in the pores in the porous supplying portion is vaporized, the cleaning agent of a necessary amount is supplied to the diffuser surface or the facing surface, and it is possible to efficiently prevent deposits from adhering.

When the porous supplying portion is to be impregnated with the cleaning agent, it is preferable to carry out this operation under a normal pressure condition when an affinity between the cleaning agent and the porous material configuring the porous supplying portion is great, and under a high pressure condition when the affinity is small.

[0025] The cleaning agent supplying unit further includes a reservoir in which the cleaning agent is stored, and the cleaning agent supplying unit may be configured such that the cleaning agent stored in the reservoir can be supplied to the porous supplying portion.

In this case, the cleaning agent can be stored in the reservoir. Further, it is possible to efficiently supply previously stored cleaning agent to the porous supplying portion.

5 It is possible to employ such a configuration that a passage for bringing the reservoir and outside into communication with each other is provided, and the cleaning agent can be replenished from outside to the reservoir.

10 Description of the Embodiments

(First embodiment)

[0026] A first embodiment of the turbocharger will be described with reference to the drawings.

15 As shown in Figs. 1 and 2, a turbocharger 1 includes a compressor housing 2 provided therein with an air flow path 10 in which an impeller 13 is disposed and a bearing housing 3 for rotatably supporting a rotor shaft 14 to which the impeller 13 is connected.

20 The air flow path 10 includes a suction port 11 through which air is sucked toward the impeller 13, and a discharge scroll chamber 12 which is formed on an outer peripheral side of the impeller 13 in its circumferential direction, and which guides, to outside, compressed air discharged from the impeller 13.

25 **[0027]** As shown in Figs. 1 and 2, the compressor housing 2 includes a shroud surface 221 facing to the impeller 13, and a diffuser surface 222 extending from the shroud surface 221 toward the discharge scroll chamber 12.

30 The bearing housing 3 includes a facing surface 311 which is facing to the diffuser surface 222 of the compressor housing 2 and which forms a diffuser passage 15 between the facing surface 311 and the diffuser surface 222.

35 **[0028]** As shown in Figs. 1 and 2, cleaning agent supplying units 4 and 5 are provided in the diffuser surface 222 of the compressor housing 2 and the facing surface 311 of the bearing housing 3.

40 The cleaning agent supplying units 4 and 5 include porous supplying portions 41 and 51 made of porous material for forming a portion of the diffuser surface 222 or the facing surface 311, and are configured such that cleaning agent 6 for preventing adhesion of deposits is supplied from the porous supplying portions 41 and 51 to the diffuser surface 222 or the facing surface 311.

This will be described below in detail.

45 **[0029]** As shown in Fig. 1, the turbocharger 1 rotates a turbine by exhaust gas discharged from an internal combustion engine of a car or the like, compresses suction air in a compressor utilizing the rotation force, and sends the compressed air into the internal combustion engine. Therefore, the turbocharger 1 includes, in an axial direction, a turbine housing (not shown) on a side opposite to the compressor housing 2 which configures a hull of the compressor.

[0030] An exhaust gas flow path in which a turbine impeller is disposed is formed inside of the turbine housing.

The turbine impeller is fixed to the rotor shaft 14. That is, the impeller 13 of the compressor and the turbine impeller are connected to each other through the rotor shaft 14. According to this, as the turbine impeller rotates, the impeller 13 of the compressor rotates.

[0031] As shown in Fig. 1, the compressor housing 2 includes a cylindrical suction port-forming portion 21 forming the suction port 11, a shroud portion 22 forming the shroud surface 221 and the diffuser surface 222, and a discharge scroll chamber-forming portion 23 forming the discharge scroll chamber 12. The shroud surface 221 is formed into an annular shape so as to face to the facing surface 311 of the bearing housing 3. The shroud surface 221 forms the diffuser passage 15 between the shroud surface 221 and the facing surface 311 of the bearing housing 3.

[0032] The impeller 13 is disposed on an inner peripheral side of the shroud portion 22 of the compressor housing 2. The impeller 13 includes a hub 131 fixed to the rotor shaft 14 through an axial end nut 141, and a plurality of blades 132 projecting from an outer peripheral surface of the hub 131 and arranged in a circumferential direction. The plurality of blades 132 is disposed to face to the shroud surface 221 of the compressor housing 2.

[0033] The bearing housing 3 which rotatably and pivotally supports the rotor shaft 14 is disposed between the compressor housing 2 and the turbine housing. A substantially disk-shaped flange 33 is provided on one end of the bearing housing 3 in its axial direction. The facing surface 311 which is facing to the diffuser surface 222 of the compressor housing 2 is annularly formed on a surface of the flange 33 on the side of the compressor.

[0034] As shown in Figs. 1 and 2, the compressor housing 2 is provided with the cleaning agent supplying unit 4. The cleaning agent supplying unit 4 includes the porous supplying portion 41 made of porous material and a reservoir 42 in which the cleaning agent 6 is stored. The porous supplying portion 41 is formed into an annular pipe shape having an interior space. The porous supplying portion 41 is disposed in an annular recess 24 provided in the diffuser surface 222 of the compressor housing 2. A portion of the porous supplying portion 41 forms a portion of the diffuser surface 222 of the compressor housing 2.

[0035] The reservoir 42 is provided in an interior space formed by the porous supplying portion 41. The liquid cleaning agent 6 is charged into the reservoir 42. The reservoir 42 and outside are in communication with each other through an external communication passage 43 provided in the compressor housing 2. One end of the external communication passage 43 opens toward outside, and this opening is closed with a plug 44. The cleaning agent 6 can be replenished to the reservoir 42 through the external communication passage 43.

[0036] As shown in Figs. 1 and 2, the bearing housing 3 is also provided with a cleaning agent supplying unit 5. The cleaning agent supplying unit 5 includes a porous supplying portion 51 made of porous material and a res-

ervoir 52 in which the cleaning agent 6 is stored. The porous supplying portion 51 is formed into an annular pipe shape having an interior space. The porous supplying portion 51 is disposed in an annular recess 34 provided in the facing surface 311 of the bearing housing 3. A portion of the porous supplying portion 51 forms a portion of the facing surface 311 of the bearing housing 3.

[0037] The reservoir 52 is provided in an interior space formed by the porous supplying portion 51. The liquid cleaning agent 6 is charged into the reservoir 52. The reservoir 52 and outside are in communication with each other through an external communication passage 53 provided in the bearing housing 3. One end of the external communication passage 53 opens toward outside, and this opening is closed with a plug 54. The cleaning agent 6 can be replenished to the reservoir 52 through the external communication passage 53.

[0038] The liquid cleaning agent 6 does not pass through the porous supplying portions 41 and 51 of the cleaning agent supplying units 4 and 5, and the cleaning agent 6 in a state of gas passes through the porous supplying portions 41 and 51.

The cleaning agent supplying units 4 and 5 are configured such that the liquid cleaning agent 6 is vaporized under a predetermined condition, the cleaning agent 6 passes through the porous supplying portions 41 and 51 and the cleaning agent 6 is supplied to the diffuser surface 222 and the facing surface 311.

[0039] In this embodiment, sintered metal made of porous stainless steel is used as porous material configuring the porous supplying portions 41 and 51. Further, SUPER-CHECK CLEANING AGENT produced by MARKTEC Corporation is used as the cleaning agent 6. The cleaning agent supplying units 4 and 5 are configured such that a temperature of compressed air becomes high (e.g., 165°C or higher) in the diffuser passage 15, and vaporized cleaning agent 6 of a necessary amount is supplied at a temperature (lower than the above temperature by 5 to 10°C) slightly lower than a temperature at which oil from a PCV becomes deposits and the deposits adhere to the diffuser surface 222 of the compressor housing 2 or the facing surface 311 of the bearing housing 3.

[0040] According to this, if an atmosphere temperature of the turbocharger 1 (on the side of compressor) becomes equal to a predetermined temperature or higher, the cleaning agent 6 which is stored in the reservoirs 42 and 52 in its liquid state is vaporized, passes through the porous supplying portions 41 and 51, and the cleaning agent 6 is supplied to the diffuser surface 222 of the compressor housing 2 and the facing surface 311 of the bearing housing 3. The cleaning agent 6 prevents deposits from adhering to the diffuser surface 222 and the facing surface 311.

[0041] Next, effects in the turbocharger 1 of this embodiment will be described.

In the turbocharger 1 of this embodiment, the diffuser surface 222 of the compressor housing 2 and the facing

surface 311 of the bearing housing 3 are provided with the cleaning agent supplying units 4 and 5 including the porous supplying portions 41 and 51. The porous supplying portions 41 and 51 are disposed such that they form portions of the diffuser surface 222 and the facing surface 311. The cleaning agent supplying units 4 and 5 are configured such that the cleaning agent 6 for preventing deposits from adhering is supplied from the porous supplying portions 41 and 51 to the diffuser surface 222 and the facing surface 311.

[0042] Hence, the cleaning agent 6 supplied from the porous supplying portions 41 and 51 of the cleaning agent supplying units 4 and 5 to the diffuser surface 222 and the facing surface 311 can prevent deposits from adhering to the diffuser surface 222 of the compressor housing 2 and the facing surface 311 of the bearing housing 3. According to this, it is possible to prevent deposits from adhering to (accumulating on) the diffuser surface 222 and the facing surface 311, i.e., it is possible to prevent the adhesion (accumulation) of deposits in the diffuser passage 15 formed between the diffuser surface 222 and the facing surface 311.

[0043] The porous supplying portions 41 and 51 of the cleaning agent supplying units 4 and 5 are formed of the porous material, and form at least portions of the diffuser surface 222 and the facing surface 311. Hence, the cleaning agent 6 is made to pass through the porous supplying portions 41 and 51, and the cleaning agent 6 can easily and directly be supplied from the pores formed in the porous supplying portions 41 and 51 to the diffuser surface 222 and the facing surface 311 as in this embodiment. According to this, it is possible to efficiently prevent the adhesion of deposits which try to accumulate on the diffuser surface 222 and the facing surface 311.

[0044] In this embodiment, the porous supplying portions 41 and 51 are configured such that the liquid cleaning agent 6 does not pass through the porous supplying portions, and the cleaning agent 6 in a gas state passes through the porous supplying portions. The cleaning agent supplying units 4 and 5 are configured such that the liquid cleaning agent 6 is vaporized under a predetermined condition, the cleaning agent 6 passes through the porous supplying portions 41 and 51 and the cleaning agent 6 is supplied to the diffuser surface 222 or the facing surface 311. Hence, it is possible to control the supply of the cleaning agent 6 to the diffuser surface 222 and the facing surface 311 in accordance with an atmosphere temperature of the turbocharger 1 (on the side of compressor) as in this embodiment. According to this, it is possible to efficiently prevent the adhesion of deposits.

[0045] As described above, according to this embodiment, it is possible to provide the turbocharger 1 capable of preventing the adhesion of deposits in the diffuser passage 15.

[0046] In this embodiment, the porous supplying portions 41 and 51 of the cleaning agent supplying units 4 and 5 are configured such that liquid cleaning agent 6 does not pass through the porous supplying portions 41

and 51 and the gas cleaning agent 6 passes through the porous supplying portions, but the porous supplying portions 41 and 51 may be configured such that they can be impregnated with the liquid cleaning agent 6, that is, the liquid cleaning agent 6 can be held in the pores formed in the porous supplying portions 41 and 51.

The cleaning agent supplying units 4 and 5 may be configured such that if an atmosphere temperature of the turbocharger 1 (on the side of compressor) becomes equal to or higher than a predetermined temperature, the liquid cleaning agent 6 held in the pores in the porous supplying portions 41 and 51 are vaporized and supplied to the diffuser surface 222 of the compressor housing 2 and the facing surface 311 of the bearing housing 3.

[0047] The suction port-forming portion 21, the shroud portion 22 and the discharge scroll chamber-forming portion 23 are integrally formed and this is used as the compressor housing 2 of the turbocharger 1. Alternatively, a scroll piece mainly configuring the suction port-forming portion 21 and the discharge scroll chamber-forming portion 23, and a shroud piece mainly configuring the shroud portion 22 are assembled together and this may be used as the compressor housing 2.

(Second embodiment)

[0048] In a second embodiment, configurations of cleaning agent supplying units 4 and 5 are changed as shown in Fig. 3.

As shown in Fig. 3, the annular disk-shaped porous supplying portion 41 is disposed in the recess 24 of the compressor housing 2 such that the porous supplying portion 41 closes an opening of the recess 24. The reservoir 42 is provided in a space of the recess 24 where the porous supplying portion 41 is not disposed.

The annular disk-shaped porous supplying portion 51 is disposed in the recess 34 of the bearing housing 3 such that the porous supplying portion 51 closes an opening of the recess 34. The reservoir 52 is provided in a space of the recess 34 where the porous supplying portion 51 is not disposed.

Other basic structure and effects are the same as those of the first embodiment.

(Third embodiment)

[0049] In a third embodiment, a configuration of the bearing housing 3 is changed as shown in Figs. 4 and 5. As shown in Fig. 4, the bearing housing 3 is provided with the bearing body 32 and the back plate 31 which is disposed between the bearing body 32 and the compressor housing 2 and which faces to a portion of the air flow path 10. The bearing body 32 and the back plate 31 are separated from each other. The facing surface 311 is formed on a surface of the back plate 31 on the side of the compressor.

[0050] As shown in Figs. 4 and 5, the back plate 31 of the bearing housing 3 is provided with the cleaning agent

supplying unit 5. The porous supplying portion 51 is disposed in the annular recess 34 provided in the facing surface 311 of the back plate 31. The reservoir 52 and outside are in communication with each other through the external communication passage 53 provided in the back plate 31.

Other basic structure is the same as that of the first embodiment.

[0051] In the case of the third embodiment also, it is possible to sufficiently obtain the effect for preventing the adhesion of deposits in the diffuser passage 15.

Other basic effects are the same as those of the first embodiment.

[0052] It is explicitly stated that all features disclosed in the description and/or the claims are intended to be disclosed separately and independently from each other for the purpose of original disclosure as well as for the purpose of restricting the claimed invention independent of the composition of the features in the embodiments and/or the claims. It is explicitly stated that all value ranges or indications of groups of entities disclose every possible intermediate value or intermediate entity for the purpose of original disclosure as well as for the purpose of restricting the claimed invention, in particular as limits of value ranges.

Claims

1. A turbocharger (1) comprising:

a compressor housing (2) provided therein with an air flow path (10) in which an impeller (13) is disposed; and

a bearing housing (3) for rotatably supporting a rotor shaft (14) to which the impeller (13) is connected, wherein:

the air flow path (10) includes a suction port (11) through which air is sucked toward the impeller (13), and a discharge scroll chamber (12) which is formed on an outer peripheral side of the impeller (13) in its circumferential direction, and which guides, to outside, compressed air discharged from the impeller (13);

the compressor housing (2) includes a shroud surface (221) facing to the impeller (13), and a diffuser surface (222) extending from the shroud surface (221) toward the discharge scroll chamber (12);

the bearing housing (3) includes a facing surface (311) which is facing to the diffuser surface (222) of the compressor housing (2) and which forms a diffuser passage (15) between the facing surface (311) and the diffuser surface (222);

a cleaning agent supplying unit (4, 5) is pro-

vided in at least one of the diffuser surface (222) of the compressor housing (2) and the facing surface (311) of the bearing housing (3); and

the cleaning agent supplying unit (4, 5) includes a porous supplying portion (41, 51) made of porous material for forming at least a portion of the diffuser surface (222) or the facing surface (311), and is configured such that cleaning agent (6) for preventing adhesion of deposits is supplied from the porous supplying portion (41, 51) to the diffuser surface (222) or the facing surface (311).

2. The turbocharger (1) according to claim 1, wherein the bearing housing (3) includes a bearing body (32) and a back plate (31) which is disposed between the bearing body (32) and the compressor housing (2) and which faces to a portion of the air flow path (10), the bearing body (32) and the back plate (31) are separated from each other, and the back plate (31) is provided with the facing surface (311).

3. The turbocharger (1) according to claim 1 or 2, wherein the cleaning agent supplying unit (4, 5) is configured such that the cleaning agent (6) passes through the porous supplying portion (41, 51) and is supplied to the diffuser surface (222) or the facing surface (311).

4. The turbocharger (1) according to claim 3, wherein the porous supplying portion (41, 51) is configured such that the cleaning agent (6) in a liquid state does not pass through the porous supplying portion (41, 51) and the cleaning agent (6) in a gas state passes through the porous supplying portion (41, 51), and the cleaning agent supplying unit (4, 5) is configured such that the cleaning agent (6) in the liquid state is vaporized under a predetermined condition, the cleaning agent (6) passes through the porous supplying portion (41, 51) and is supplied to the diffuser surface (222) or the facing surface (311).

5. The turbocharger (1) according to claim 1 or 2, wherein the cleaning agent supplying unit (4, 5) is configured such that the porous supplying portion (41, 51) is impregnated with the cleaning agent (6) in a liquid state, the cleaning agent (6) is vaporized under a predetermined condition and is supplied to the diffuser surface (222) or the facing surface (311).

6. The turbocharger according to any one of claims 1 to 5, wherein the cleaning agent supplying unit (4, 5) further includes a reservoir (42, 52) in which the cleaning agent (6) is stored, and the cleaning agent supplying unit (4, 5) supplies the cleaning agent (6) stored in the reservoir (42, 52) to the porous supplying portion (41, 51).

FIG. 1

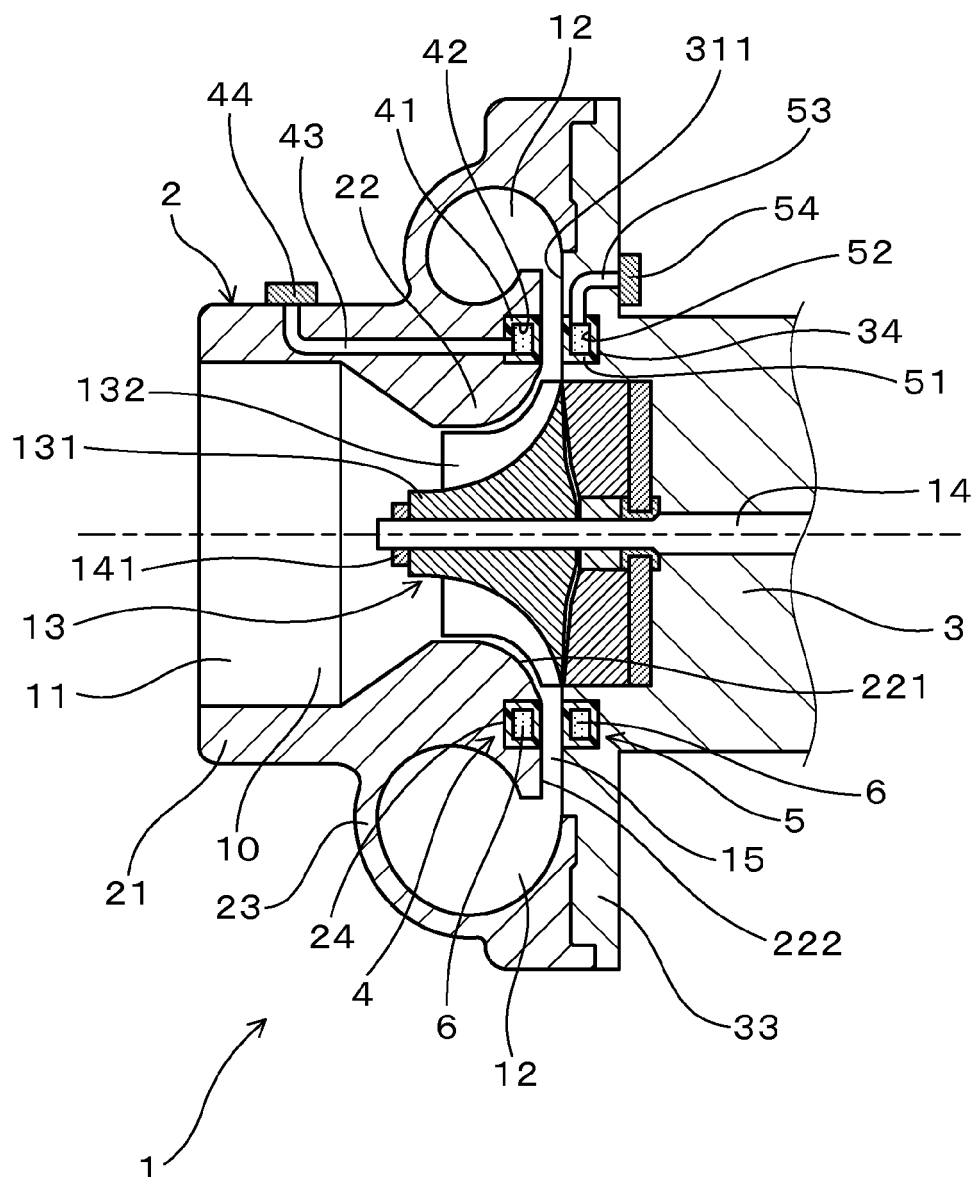


FIG. 2

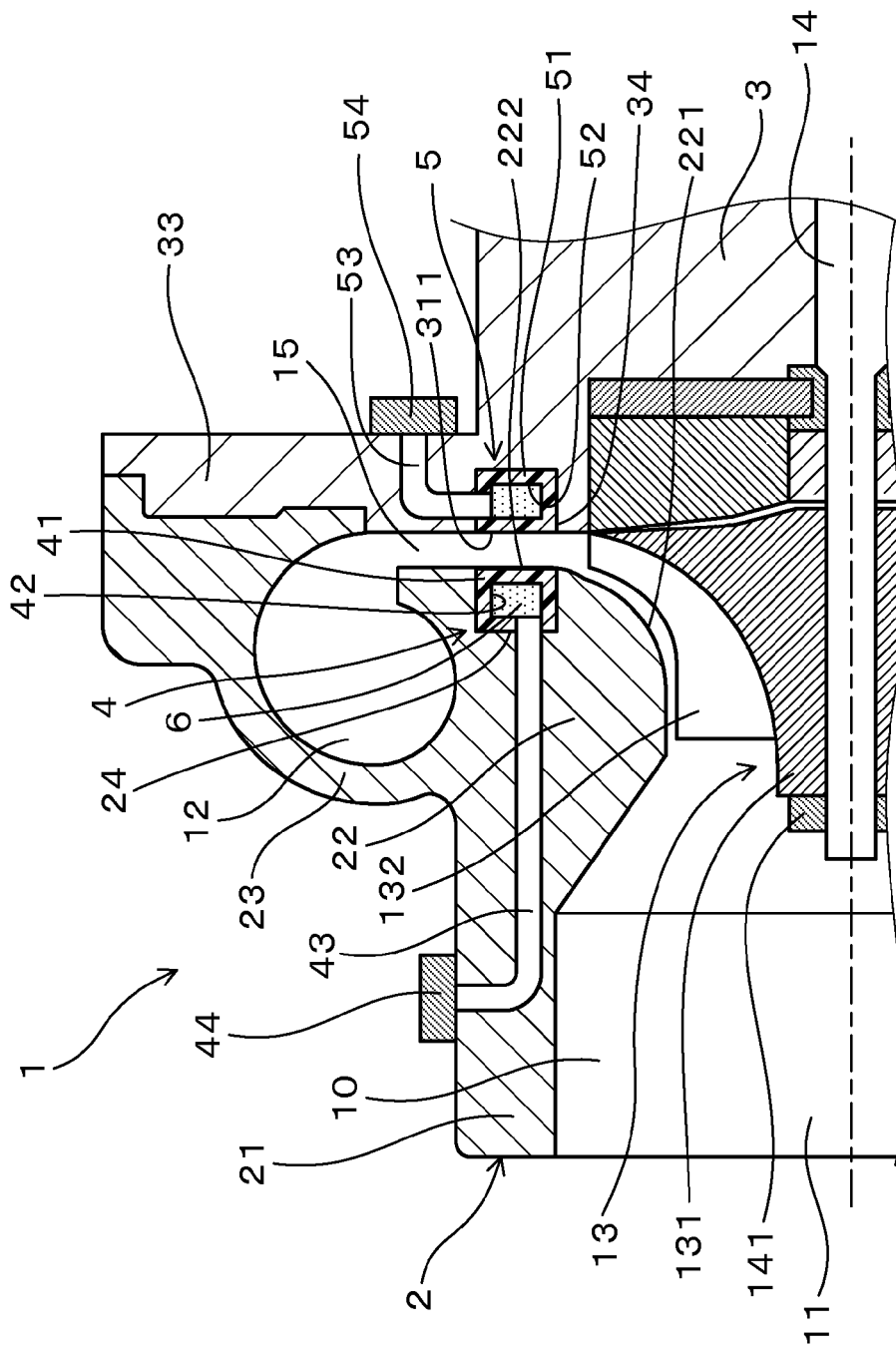


FIG. 3

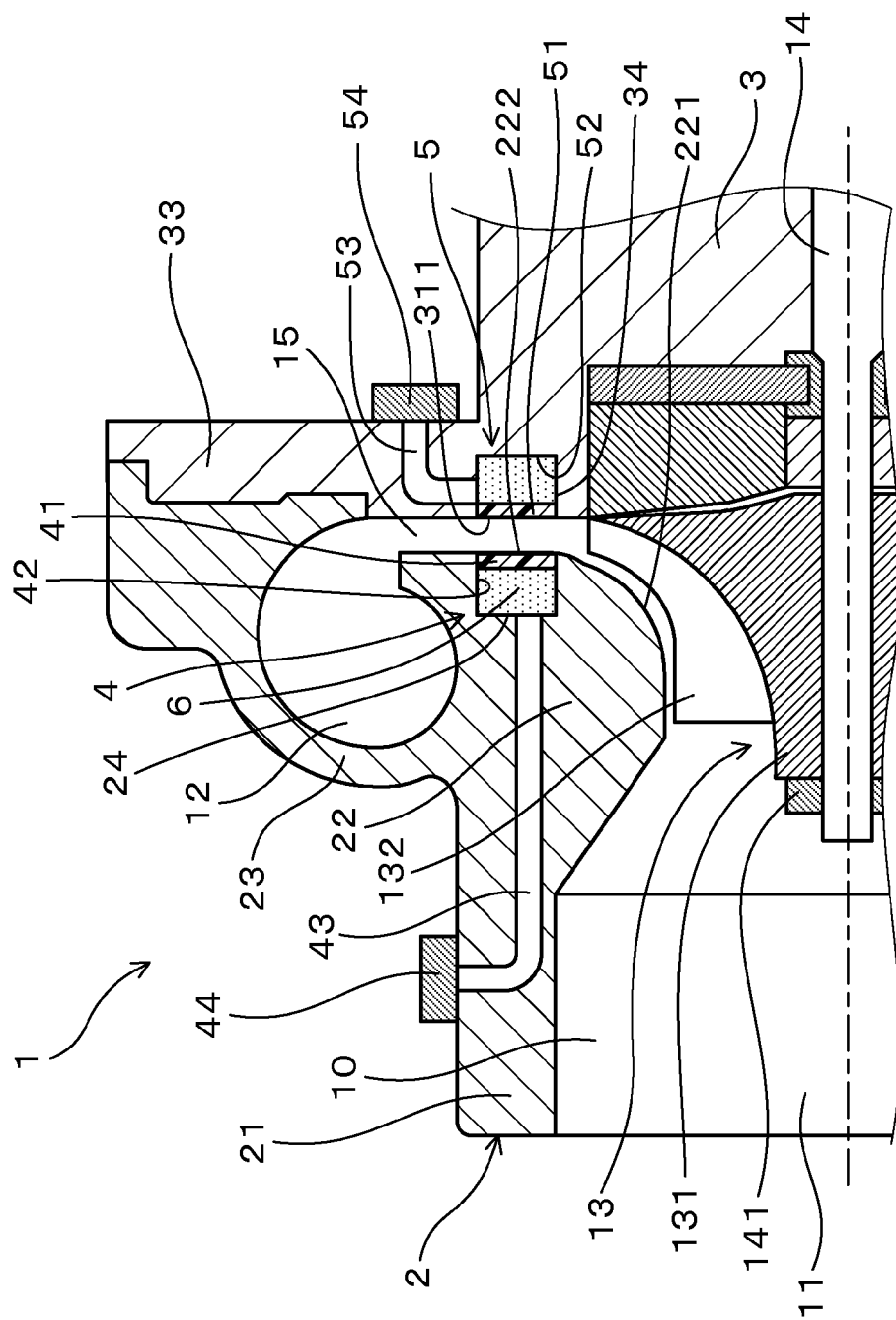


FIG. 4

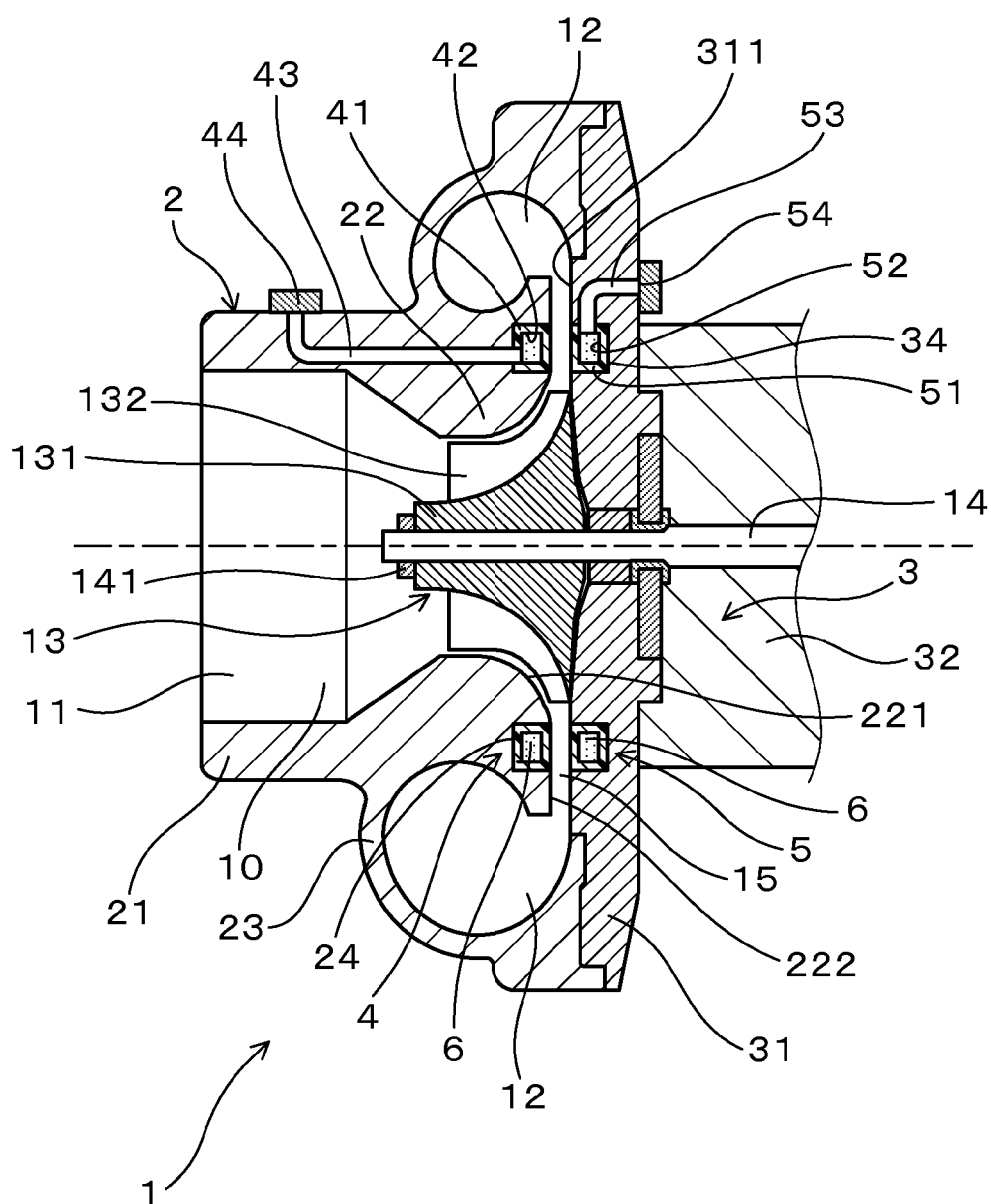
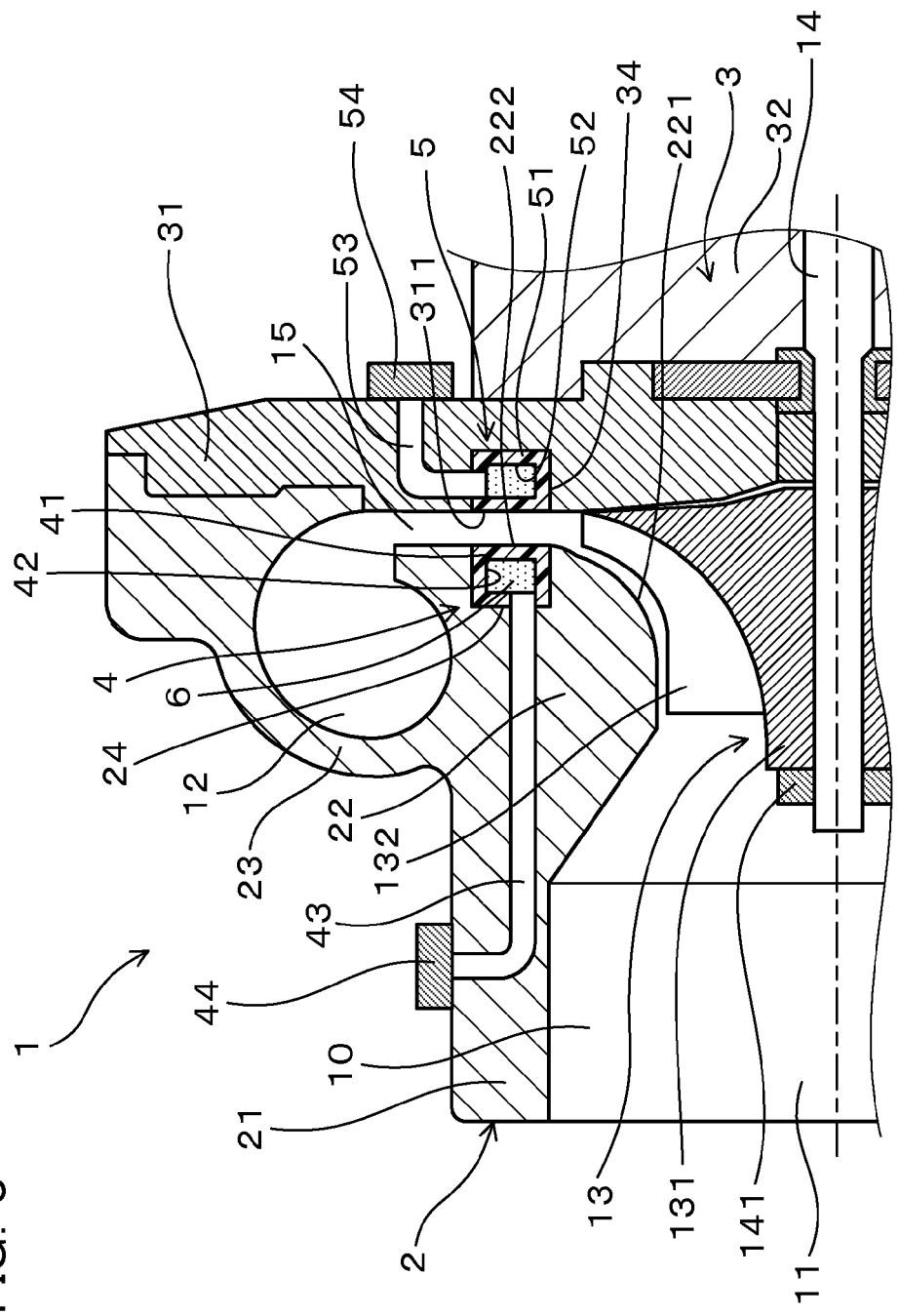


FIG. 5





EUROPEAN SEARCH REPORT

Application Number
EP 13 18 5137

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	AT 507 450 A2 (MAN DIESEL SE [DE]) 15 May 2010 (2010-05-15) * claims 1-4; figures 2,3 *	1-6	INV. F02B39/16 F01D25/00
A	US 2010/034634 A1 (SCARINCI THOMAS [CA] ET AL) 11 February 2010 (2010-02-11) * abstract; figure 2 *	1-6	
A	WO 2005/028876 A1 (ABB RESEARCH LTD [CH]; THIELE MARTIN [CH]; FUHRMANN HENNING [CH]; STRU) 31 March 2005 (2005-03-31) * claims 1-9; figures 2,3 *	1-6	
A	JP 2008 248726 A (OSAKA GAS CO LTD) 16 October 2008 (2008-10-16) * paragraphs [0017], [0046], [0047]; figure 1 *	1-6	
			TECHNICAL FIELDS SEARCHED (IPC)
			F02B F01D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 30 October 2013	Examiner Boye, Michael
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