



(51) International Patent Classification:

F02B 39/00 (2006.01) F01D 25/24 (2006.01)  
F01D 25/16 (2006.01) F16C 35/00 (2006.01)

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(71) International Application Number:

PCT/US2012/035433

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(22) International Filing Date:

27 April 2012 (27.04.2012)

(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,  
AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,  
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,  
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,  
HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,  
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,  
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,  
OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD,  
SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR,  
TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

10 2011 101 057.6 10 May 2011 (10.05.2011) DE

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(84) Designated States (unless otherwise indicated, for every  
kind of regional protection available): ARIPO (BW, GH,  
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,  
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,  
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,

[Continued on next page]

(54) Title: EXHAUST-GAS TURBOCHARGER

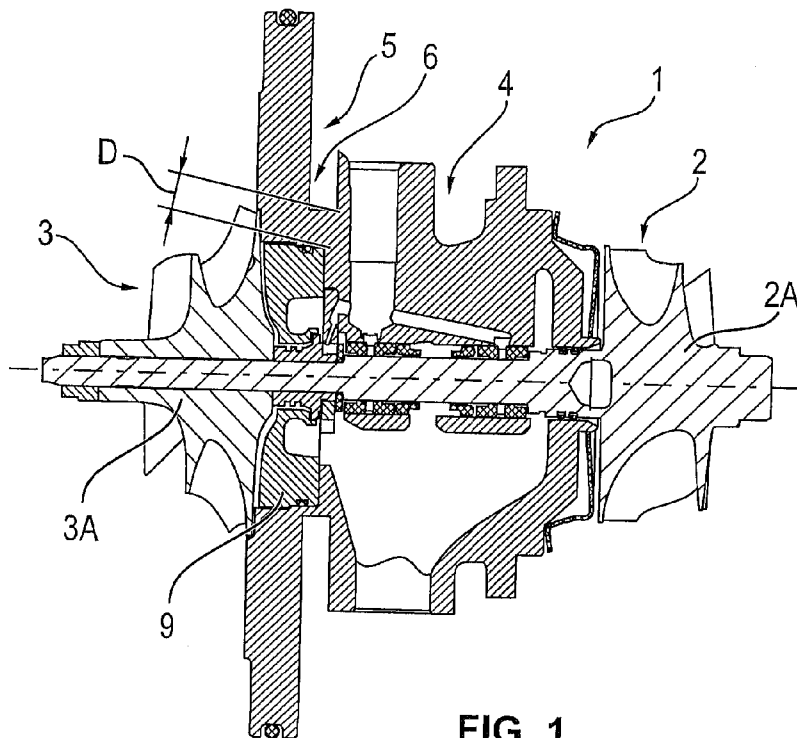


FIG. 1

[Continued on next page]



EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,  
LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,  
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,  
GW, ML, MR, NE, SN, TD, TG).

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- *of inventorship (Rule 4.17(iv))*

**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

**Published:**

- *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

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**(57) Abstract:** The present invention relates to an exhaust-gas turbocharger (1) having a turbine (2); having a compressor (3); and having a bearing housing (4) which is arranged between the turbine (2) and the compressor (3) and a compressor-side flange (5) of which adjoins the compressor (3), wherein a heat throttle (6, 6') is arranged in the compressor-side flange (5) of the bearing housing (4).

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## EXHAUST-GAS TURBOCHARGER

## DESCRIPTION

5           The invention relates to an exhaust-gas turbocharger as per the preamble of claim 1.

          If the bearing housing of an exhaust-gas turbocharger of said type has a compressor-side flange or an integrated rear wall which directly adjoins the housing of the compressor, a flow of heat from the turbine side to the compressor side occurs,  
10           which leads to additional heating of the compressor, in particular at low rotational speeds/loads.

          It is therefore an object of the present invention to provide an exhaust-gas turbocharger of the type specified in the preamble of claim 1 which permits a reduction in the transfer of heat from the turbine side to the compressor side.

15           Said object is achieved by means of the features of claim 1.

          Through the provision of a heat throttle in the compressor-side flange, it is possible to thermally decouple the bearing housing from the compressor or from the compressor housing, and thereby reduce the heat conduction from the turbine side in the direction of the compressor.

20           In this way, the additional heating of the compressor as explained above is eliminated, resulting in a considerable improvement in compressor efficiency.

          The subclaims relate to advantageous refinements of the invention.

          Claims 11 and 12 define a bearing housing of an exhaust-gas turbocharger as an independently marketable object.

25           Further details, features and advantages of the invention will emerge from the following description of exemplary embodiments on the basis of the drawings, in which:

          Figure 1 shows a schematically simplified illustration of a first embodiment of the exhaust-gas turbocharger according to the invention,

30           Figure 2 shows an illustration, corresponding to Figure 1, of a second embodiment,

          Figure 3 shows a schematically slightly simplified illustration of a bearing housing according to the invention,

35           Figure 4 shows an illustration, corresponding to Figures 1 and 2, of a third embodiment of the exhaust-gas turbocharger according to the invention, and

          Figure 5 shows an illustration, corresponding to Figures 1, 2 and 4, of a fourth embodiment of the exhaust-gas turbocharger according to the invention.

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Figures 1, 2, 4 and 5 show four embodiments of an exhaust-gas turbocharger 1 according to the invention, wherein these each have a turbine 2 and a compressor 3. Here, the turbine 2 is represented by the turbine wheel 2A, while the compressor is represented by the compressor wheel 3A. To simplify the illustration, however, the turbine housing and the compressor housing are not shown in Figures 1, 2, 4 and 5, though these are self-evidently provided in a practical embodiment of an exhaust-gas turbocharger. This also applies to all other components of such exhaust-gas turbochargers, which are however not described in detail below because they are not necessary for explaining the principles of the present invention.

The exhaust-gas turbochargers 1 according to the embodiments of Figures 1, 2, 4 and 5 each have a bearing housing 4 which, in each of the illustrated embodiments, is provided with a compressor-side integrated flange or an integrated rear wall 5 which, in the fully assembled state of the exhaust-gas turbocharger 1, adjoins in each case the compressor housing (not illustrated in the figures) of the compressor 3.

To permit thermal decoupling between the turbine side and the compressor side, in the abovementioned embodiments, the compressor-side flange 5 is provided in each case with a heat throttle 6 or 6'.

In the embodiment according to Figure 1, said heat throttle 6 is formed as an external groove in the flange 5, that is to say as a groove 6 which opens into the outer region, as can be seen in detail from Figure 1. Here, the groove 6 is preferably formed as a groove which encircles 360° around the flange 5. Said groove 6 yields the desired thermal decoupling, wherein the narrowest cross section which constitutes the throttling point is denoted by the reference symbol D.

The external groove or the undercut 6 may be produced by casting or mechanical machining of the flange 5.

In the embodiments according to Figures 2, 4 and 5, a heat throttle 6' in the form of an internal groove is provided, said internal groove again preferably being formed as a 360° encircling groove, which, however, as is shown by the illustration of the alternative embodiments of the bearing housing 4 in Figure 3, is not imperatively necessary but is preferable.

The internal groove 6' also yields the desired thermal decoupling which leads to the advantages, explained in the introduction, of the exhaust-gas turbocharger 1 according to the invention.

In the embodiment according to Figure 4, a heat insulation element 7 is arranged in the internal groove 6', which heat insulation element does not completely fill the groove 6'.

In the embodiment according to Figure 5, there is likewise a heat insulation element 8 arranged in the groove 6', but in this case the heat insulation element 8 completely fills the groove, that is to say extends as far as a housing cover 9 of the bearing housing 4, as can be seen in detail from Figure 5.

5 The heat insulation element 7 or 8 may be produced as a disk composed of heat-insulating material, for example as a ceramic disk.

The internal grooves 6' may also be produced either mechanically or during the course of the casting of the bearing housing 4.

10 It is also possible for the heat insulation element 7, 8 to be placed or cast into the groove 6'.

As explained above, Figure 3 illustrates a groove 6' which is an only partially encircling groove. The reference symbol D again denotes the narrowest cross section. Also labeled in Figure 3 are the height H and the width B of the groove 6', which are preferably in a ratio  $H/B > 2.5$ . The narrowest cross section D lies in a range from  
15 approximately 2 to 3 mm.

Said ratio H/B is self-evidently also possible if the groove 6' is formed as a 360° encircling groove.

In addition to the above written disclosure of the invention, reference is hereby explicitly made to the diagrammatic illustration thereof in Figures 1 to 5.

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## LIST OF REFERENCE SYMBOLS

	1	Exhaust-gas turbocharger
	2	Turbine
5	3	Compressor
	4	Bearing housing
	5	Compressor-side flange / integrated rear wall
	6, 6'	Heat throttle (external or internal groove)
	7, 8	Heat insulation element
10	9	Bearing housing cover
	D	Narrowest cross section / throttle point
	H	Height of the groove
	B	Width of the groove

## CLAIMS

1. An exhaust-gas turbocharger (1)
  - having a turbine (2);
  - 5 - having a compressor (3); and
  - having a bearing housing (4) which is arranged between the turbine (2) and the compressor (3) and a compressor-side flange (5) of which adjoins the compressor (3), wherein
    - a heat throttle (6, 6') is arranged in the compressor-side flange (5) of the
    - 10 bearing housing (4).
2. The exhaust-gas turbocharger as claimed in claim 1, wherein the heat throttle is formed as an external groove (6).
- 15 3. The exhaust-gas turbocharger as claimed in claim 2, wherein the groove (6) is formed as a 360° encircling groove.
4. The exhaust-gas turbocharger as claimed in claim 1, wherein the heat throttle is formed as an internal groove (6').
- 20 5. The exhaust-gas turbocharger as claimed in claim 4, wherein the internal groove (6') is formed as a 360° encircling groove.
6. The exhaust-gas turbocharger as claimed in claim 4 or 5, wherein a heat
- 25 insulation element (7, 8) is arranged in the internal groove (6').
7. The exhaust-gas turbocharger as claimed in claim 6, wherein the heat insulation element (8) completely fills the groove (6').
- 30 8. The exhaust-gas turbocharger as claimed in claim 6 or 7, wherein the heat insulation element (7; 8) is formed as a disk composed of heat-insulating material.
9. The exhaust-gas turbocharger as claimed in claim 8, wherein the disk is formed as a ceramic disk.
- 35 10. The exhaust-gas turbocharger as claimed in one of claims 2 to 9, wherein the ratio of height (H) to width (B) of the groove (6') is  $> 2.5$ .

11. A bearing housing (4) of an exhaust-gas turbocharger (1),  
- having a compressor-side flange (5), wherein a heat throttle (6, 6') is arranged in the compressor-side flange (5).
- 5 12. The bearing housing as claimed in claim 11, characterized by one of claims 2 to 10.

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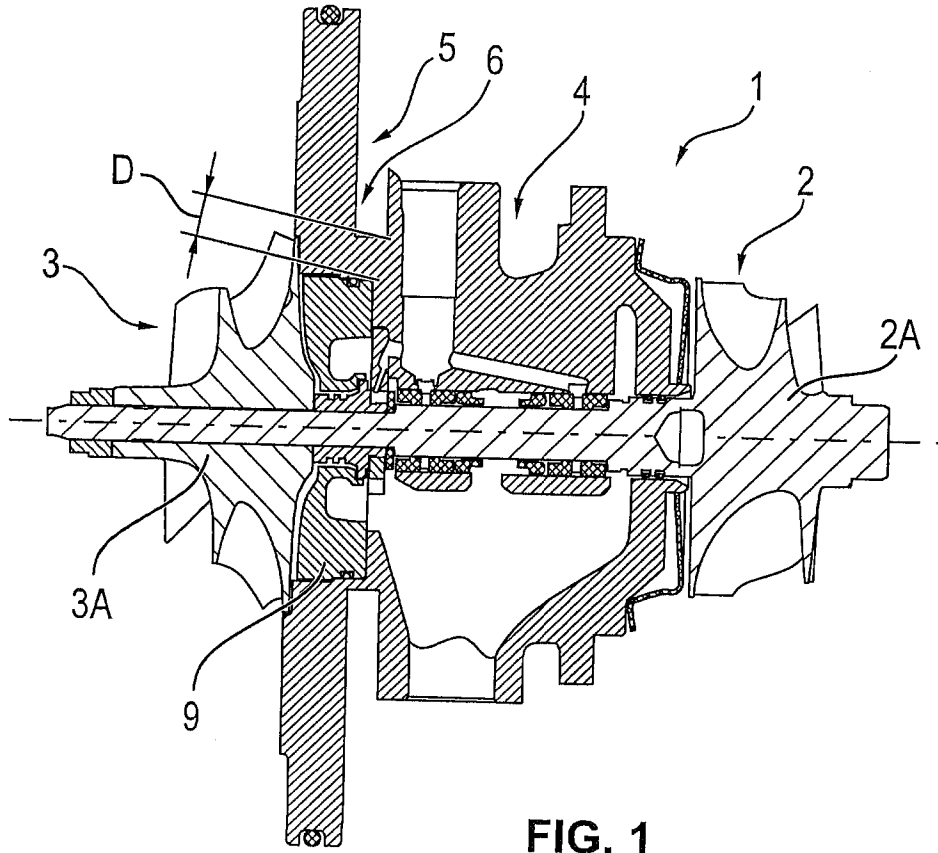


FIG. 1

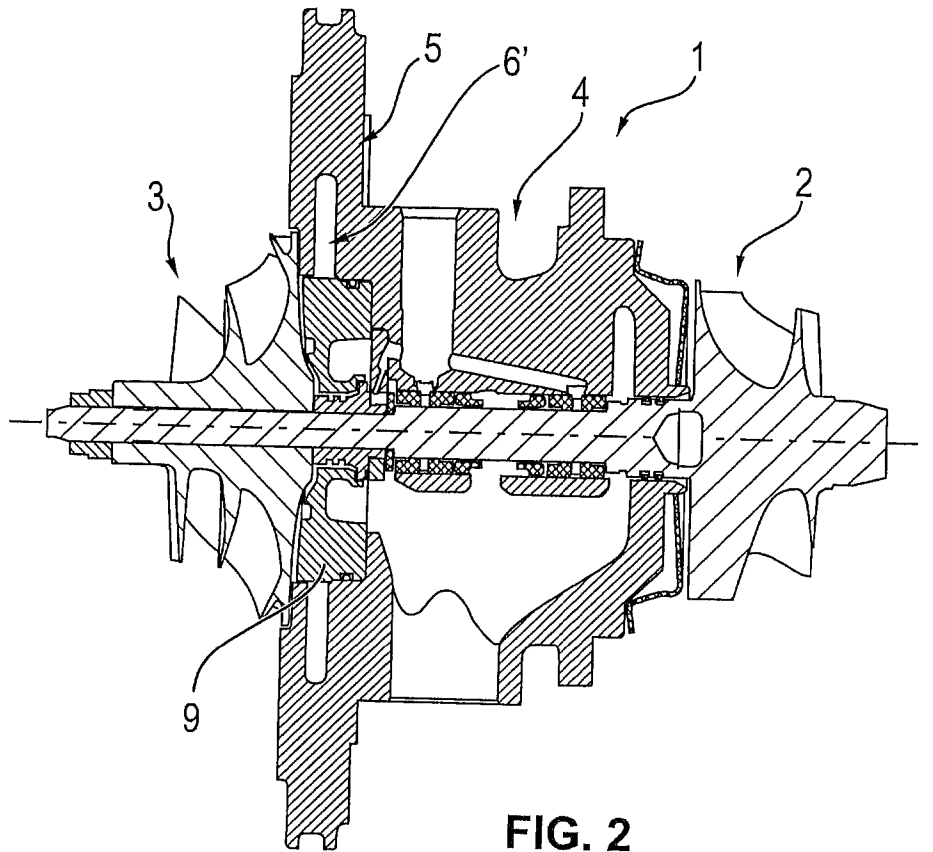


FIG. 2

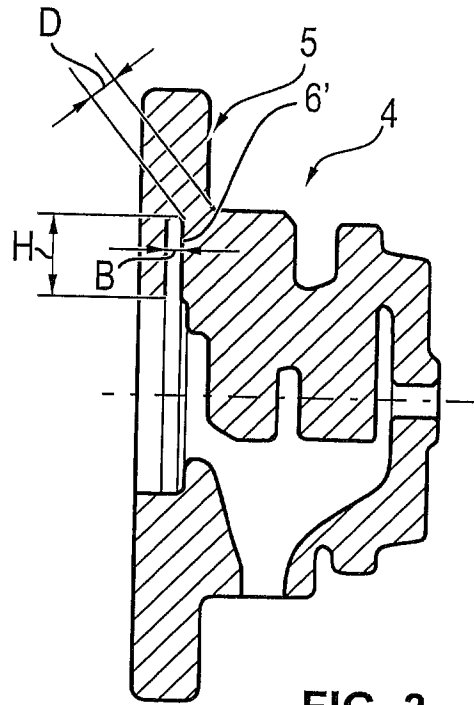


FIG. 3

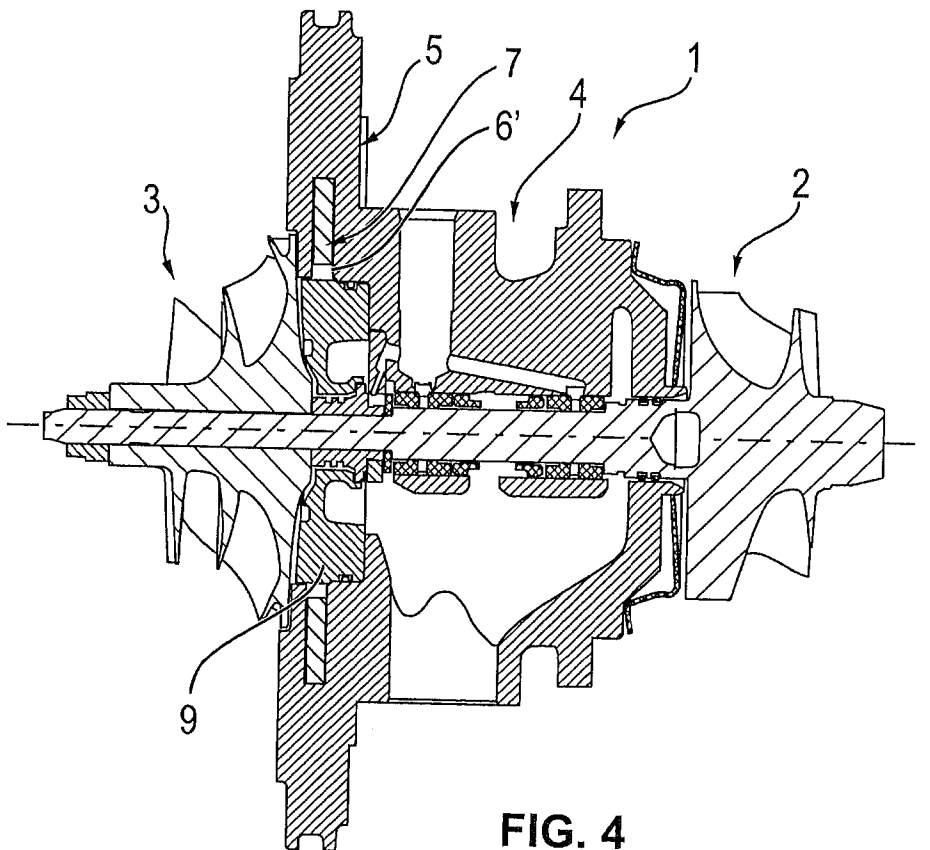


FIG. 4

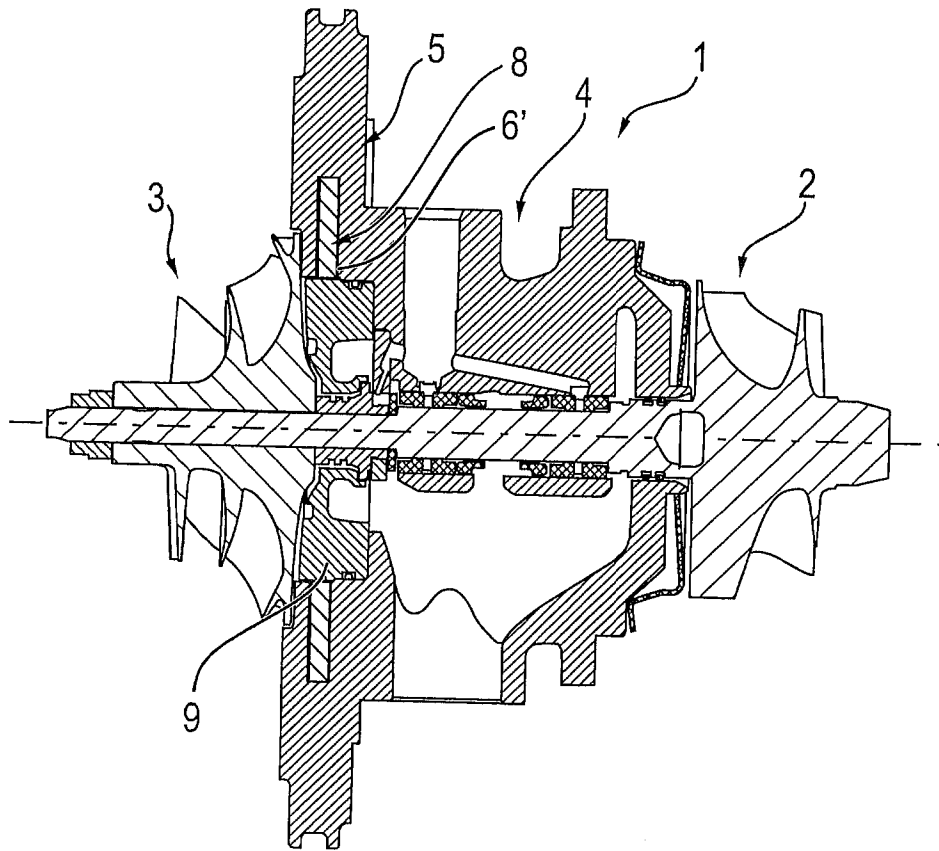


FIG. 5