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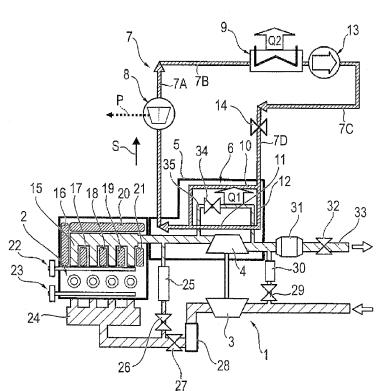
- (71) Applicant (for all designated States except US):

 BORGWARNER INC. [US/US]; Patent Department,
 3850 Hamlin Road, Auburn Hills, Michigan 48326 (US).
- (72) Inventor: and
- (75) Inventor/Applicant (for US only): JOERGL, Volker [AT/AT]; Primelweg 6, A-2384 Breitenfurt (AT).

- (74) Agents: BROOKS, Cary, W. et al.; BrooksGroup, 48685 Hayes, Shelby Township, Michigan 48315 (US).
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[Continued on next page]

(54) Title: EXHAUST TURBOCHARGER OF AN INTERNAL COMBUSTION ENGINE



(57) Abstract: The invention relates to an exhaust turbocharger (1) of an internal combustion engine (2) having a compressor (3), and having a turbine (4), which comprises a turbine housing (5), wherein the turbine housing (5) comprises an evaporator (6), to which heat deriving from the exhaust gases of the internal combustion engine (2) can be admitted for the evaporation of a working fluid, and wherein the evaporator (6) is flow-connected to a line arrangement (7), in which a steam turbine (8) and downstream of that a condenser (9) are arranged, viewed in the direction of flow (S) of the working fluid.



Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

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A. CLASSIFICATION OF SUBJECT MATTER

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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)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) eKOMPASS(KIPO internal) & Keywords: turbocharger, exhaust, internal, combustion, engine, compressor, turbine, evaporator, fluid, working, steam, flow, fluid, connection, condenser

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
US 2010-0199631 A1 (VILIMEC LADISLAV et al.) 12 August 2010 See the abstract, paragraphs 0043, 0068-0069, and figure 1	1-10
US 2008-0116691 A1 (LIN YAO-CHANG) 22 May 2008 See the abstract, pargraphs 0014-0020, and figure 2	1-10
US 2010-0146967 A1 (SIMPSON ALEXANDER et al.) 17 June 2010 See the abstract, paragraphs 0019-0022, and figure 1	1-10
US 7475541 B2 (IBARAKI SHIGERU et al.) 13 January 2009 See the abstract, column 4 lines 5 - 56, and figures 1,2	1-10
	US 2010-0199631 A1 (VILIMEC LADISLAV et al.) 12 August 2010 See the abstract, paragraphs 0043, 0068-0069, and figure 1 US 2008-0116691 A1 (LIN YAO-CHANG) 22 May 2008 See the abstract, pargraphs 0014-0020, and figure 2 US 2010-0146967 A1 (SIMPSON ALEXANDER et al.) 17 June 2010 See the abstract, paragraphs 0019-0022, and figure 1 US 7475541 B2 (IBARAKI SHIGERU et al.) 13 January 2009

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Authorized officer

LEE, TAEK SANG

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010-0199631 A1	12.08.2010	CN 101929386 A EP 2253807 A1 KR 10-2010-0047813 A RU 2009139900 A	29. 12. 2010 24. 11. 2010 10. 05. 2010 10. 05. 2011
US 2008-0116691 A1	22.05.2008	None	
US 2010-0146967 A1	17.06.2010	None	
US 7475541 B2	13.01.2009	EP 1443183 A1 EP 1443183 A4 JP 2003-120281 A US 2004-0231330 A1 WO 03-031775 A1 WO 03-033881 A1	04.08.2004 18.10.2006 23.04.2003 25.11.2004 17.04.2003 24.04.2003