



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
17.12.2014 Bulletin 2014/51

(51) Int Cl.:
F24F 1/38 (2011.01) **F04D 29/32** (2006.01)
F04D 29/38 (2006.01) **F04D 29/66** (2006.01)
F24F 13/24 (2006.01)

(43) Date of publication A2:
26.11.2014 Bulletin 2014/48

(21) Application number: **14168751.7**

(22) Date of filing: **16.05.2014**

(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

- **Jang, Keun Jeong**
Seoul (KR)
- **Kim, Young Jae**
Gyeonggi-do (KR)
- **Kim, Jong Moon**
Gyeonggi-do (KR)
- **Kim, Hyun Dal**
Gyeonggi-do (KR)
- **Seo, Hyeong Joon**
Gyeonggi-do (KR)

(30) Priority: **20.05.2013 KR 20130056357**

(71) Applicant: **Samsung Electronics Co., Ltd**
Gyeonggi-do 443-742 (KR)

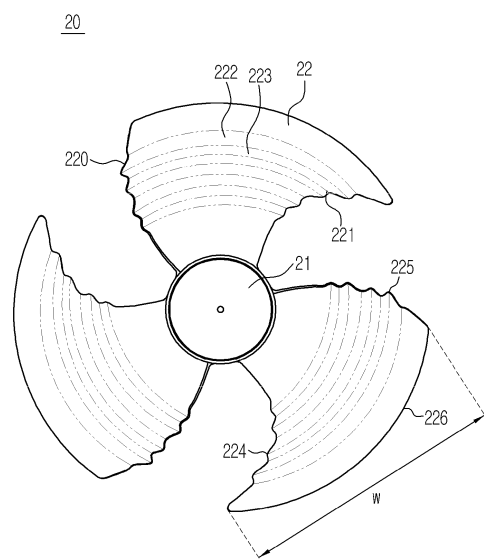
(72) Inventors:
• **Kim, Byung Ghun**
Gyeonggi-do (KR)

(74) Representative: **Hewett, Jonathan Michael**
Richard et al
Venner Shipley LLP
200 Aldersgate
London EC1A 4HD (GB)

(54) **Propeller fan and air conditioner having the same**

(57) An air conditioner includes an outdoor unit that includes a compressor configured to compress a refrigerant, a condenser configured to condense the compressed refrigerant, and a blowing fan configured to blow outdoor air into a room, an indoor unit that discharges air heat-exchanged with the refrigerant flowing in from the outdoor unit to the room, and a connection piping that connects the outdoor unit and the indoor unit. Here, a plurality of protrusions may be formed at least one side of the blowing fan, and a convex portion and a concave portion may be formed on a surface of the blowing fan so that the surface of the blowing fan is indented.

FIG. 2





EUROPEAN SEARCH REPORT

Application Number
EP 14 16 8751

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 2 581 607 A1 (LG ELECTRONICS INC [KR]) 17 April 2013 (2013-04-17) * paragraph [0040] - paragraph [0050] * * paragraph [0056] - paragraph [0064] * * figures 1-6 *	1-11	INV. F24F1/38 F04D29/32 F04D29/38 F04D29/66 F24F13/24
Y	DE 90 13 099 U1 (MOSER, JOSEF) 7 November 1991 (1991-11-07) * page 8, paragraph 2 * * figures 11a,11b *	1-11	
A	JP 2000 110785 A (CALSONIC CORP) 18 April 2000 (2000-04-18) * abstract; figures *	1	
A	WO 2009/054815 A1 (HIDRIA ROTOMATIKA D O O [SI]; SCHWEIGER VLADO [SI]) 30 April 2009 (2009-04-30) * page 2, line 9 - page 3, line 31 * * figures *	1	
A	EP 2 230 407 A1 (DAIKIN IND LTD [JP]) 22 September 2010 (2010-09-22) * paragraph [0042] - paragraph [0060] * * figures *	1	TECHNICAL FIELDS SEARCHED (IPC) F24F F04D
A	EP 1 750 015 A2 (MITSUBISHI HEAVY IND LTD [JP]) 7 February 2007 (2007-02-07) * abstract; figures *	1	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 November 2014	Examiner Mattias Grenbäck
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 16 8751

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-11-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2581607 A1	17-04-2013	CN 103047180 A	17-04-2013
		EP 2581607 A1	17-04-2013
		KR 20130039481 A	22-04-2013
		US 2013091888 A1	18-04-2013
DE 9013099 U1	07-11-1991	CA 2068539 A1	15-03-1992
		DE 9013099 U1	07-11-1991
		EP 0500875 A1	02-09-1992
		JP H05501902 A	08-04-1993
		WO 9205341 A1	02-04-1992
JP 2000110785 A	18-04-2000	NONE	
WO 2009054815 A1	30-04-2009	SI 22636 A	30-04-2009
		WO 2009054815 A1	30-04-2009
EP 2230407 A1	22-09-2010	AU 2009203471 A1	16-07-2009
		CN 101910645 A	08-12-2010
		EP 2230407 A1	22-09-2010
		JP 4400686 B2	20-01-2010
		JP 2009185803 A	20-08-2009
		KR 20100096219 A	01-09-2010
		US 2010266428 A1	21-10-2010
EP 1750015 A2	07-02-2007	EP 1750015 A2	07-02-2007
		US 2007031250 A1	08-02-2007
		US 2011008170 A1	13-01-2011