

REVISED VERSION

(19) World Intellectual Property
Organization
International Bureau



(10) International Publication Number
WO 2012/147014 A9

(43) International Publication Date
1 November 2012 (01.11.2012)

(51) International Patent Classification:
H01J 61/33 (2006.01) *H01J 61/82* (2006.01)
H01J 61/34 (2006.01)

(21) International Application Number:
PCT/IB2012/051956

(22) International Filing Date:
19 April 2012 (19.04.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
11163797.1 27 April 2011 (27.04.2011) EP

(71) Applicant (for all designated States except DE, US):
KONINKLIJKE PHILIPS ELECTRONICS N.V.
[NL/NL]; High Tech Campus 5, NL-5656 AE Eindhoven
(NL).

(71) Applicant (for DE only): **PHILIPS INTELLECTUAL
PROPERTY & STANDARDS GMBH** [DE/DE];
Lübeckertordamm 5, 20099 Hamburg (DE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HAACKE, Michael**
[DE/DE]; c/o High Tech Campus, Building 44, NL-5656
AE Eindhoven (NL). **PROKESCH, Bernd** [DE/DE]; c/o
High Tech Campus, Building 44, NL-5656 AE Eindhoven
(NL).

(74) Agents: **VAN EEUWIJK, Alexander** et al.; High Tech
Campus 44, NL-5600 AE Eindhoven (NL).

(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.

(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, MD, RU,
TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,
DK, 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).

Published:

— with international search report (Art. 21(3))

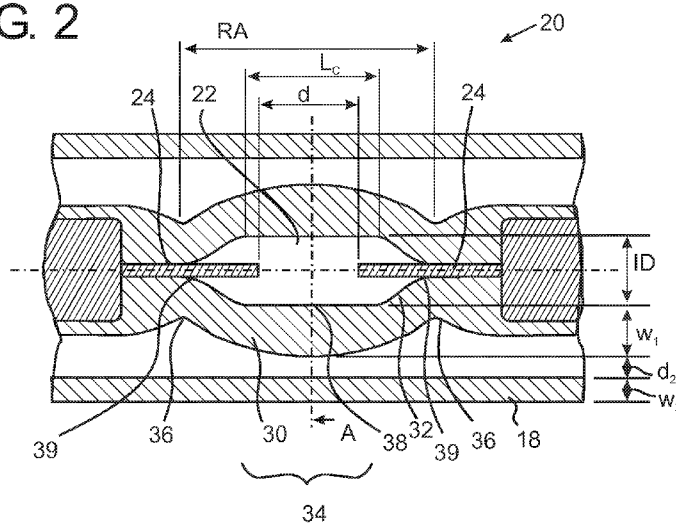
(88) Date of publication of the international search report:

17 January 2013

[Continued on next page]

(54) Title: DISCHARGE LAMP WITH HIGH COLOR TEMPERATURE

FIG. 2



(57) Abstract: A discharge lamp comprises a discharge vessel 20 defining a sealed inner discharge space 22 with two electrodes 24. A filling consists of a rare gas and a metal halide composition and is free of mercury. The discharge vessel 20 comprises outer grooves 36 where the electrodes 24 are embedded, arranged at a groove distance Ra between them. The discharge vessel 20 further comprises an inner diameter ID. In operation of the lamp, an arc discharge is formed between the electrodes and the metal halide composition is partly evaporated. After operation of the lamp, the metal halide composition forms a film on the inner wall of the discharge vessel 20. This film has a surface area A_s measured in mm^2 . The metal halide composition is provided in such an amount within the discharge space 22, that a matching quotient Q, calculated as $Q = Ra \times ID/A_s$, has a value of 2 or more, such that a high colour temperature is achieved.



**Date of publication of the revised international search
report:**

(15) Information about Correction:
see Notice of 7 March 2013

7 March 2013

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2012/051956

A. CLASSIFICATION OF SUBJECT MATTER

INV. H01J61/33 H01J61/34 H01J61/82
ADD.

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)

H01J

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/200944 A1 (TAKATSUKA HIROYUKI [JP] ET AL) 13 August 2009 (2009-08-13)	1,3,6,7, 12,13,15
Y	abstract paragraphs [0026] - [0082]; claims 3,10; figures 1-9; examples 1-1,2-1,3-1 -----	2,4,5,8, 14
Y	US 2010/141138 A1 (HAACKE MICHAEL [DE] ET AL) 10 June 2010 (2010-06-10) abstract paragraphs [0009] - [0017], [0030] - [0066]; claim 11; figures 1-3,7 ----- -/-	2,4,5,8, 14

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

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

1 August 2012

Date of mailing of the international search report

04/12/2012

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Lang, Thomas

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2012/051956

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BROCK L R: "The wettability of sapphire, polycrystalline alumina, and quartz by molten metal halide salts", JOURNAL OF PHYSICS AND CHEMISTRY OF SOLIDS, PERGAMON PRESS, LONDON, GB, vol. 66, no. 2-4, 1 February 2005 (2005-02-01), pages 484-487, XP004752094, ISSN: 0022-3697, DOI: 10.1016/J.JPCS.2004.06.086 abstract pages 484-485; figures 1,2 -----	1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2012/051956

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-8, 12-15

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-8, 12-15

Discharge lamp comprising a discharge vessel defining a sealed inner discharge space with at least two electrodes, where said discharge space comprises a filling of a rare gas and a metal halide composition, said filling being substantially free of mercury, where said discharge vessel comprises outer grooves where said electrodes are embedded, and said grooves are arranged at a groove distance RA between them, said discharge vessel comprising an inner diameter ID, wherein in operation of said lamp an arc discharge is formed between said electrodes and said metal halide composition is at least partly evaporated, such that after operation of the lamp the metal halide composition forms a film on an inner wall of said discharge vessel, which film has a surface area As measured in mm², and wherein said metal halide composition is provided in such an amount within said discharge space, that a matching quotient Q calculated as $Q = RA \times ID / As$ has a value of 2 or more (claim 1); where said lamp is disposed to yield during operation at an electrical power of 25W a luminous flux of at least 1800 lm (claim 2).

2. claims: 9-11

Discharge lamp according to claim 1, where said metal halide composition comprises Thulium halide (claims 9, 11); or where said metal halide composition comprises 0.05 - 0.7 wt-% of Indium halide (claim 10).

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2012/051956

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009200944 A1	13-08-2009	EP 2091069 A2	19-08-2009
		JP 2009218203 A	24-09-2009
		US 2009200944 A1	13-08-2009

US 2010141138 A1	10-06-2010	CN 101636816 A	27-01-2010
		EP 2122662 A1	25-11-2009
		JP 2010521771 A	24-06-2010
		US 2010141138 A1	10-06-2010
		WO 2008110967 A1	18-09-2008
