

Internal distribution code:

- (A) [-] Publication in OJ
- (B) [-] To Chairmen and Members
- (C) [X] To Chairmen
- (D) [-] No distribution

**Datasheet for the decision
of 27 June 2017**

Case Number: T 1440/12 - 3.4.03

Application Number: 99905225.1

Publication Number: 1037258

IPC: H01J61/20

Language of the proceedings: EN

Title of invention:

MERCURY-FREE METAL HALIDE LAMP

Patent Proprietor:

Toshiba Lighting & Technology Corporation

Opponent:

OSRAM GmbH

Headword:

Relevant legal provisions:

EPC 1973 Art. 54, 56, 84, 100(a), 100(c), 113(2)
EPC Art. 52(1), 101(3)(a), 101(3)(b)
EPC 1973 R. 71(2)
RPBA Art. 15

Keyword:

Claims - clarity (no)

Basis of decision - text submitted or agreed by patent proprietor (no)

Decisions cited:

G 0003/14, T 1670/07, T 0560/09

Catchword:

In the case of opposition, the intention behind Article 113(2) EPC 1973 is that the EPO may not maintain a patent according to a particular text unless the proprietor has consented unambiguously to the patent being maintained in that form. The "text submitted" is to be understood to mean a text submitted by the proprietor with the clear intention that the patent be maintained according to that text, at least as an auxiliary measure (Reasons, point 10.2).



Beschwerdekammern
Boards of Appeal
Chambres de recours

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 1440/12 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 27 June 2017

Appellant:

(Opponent)

OSRAM GmbH
Marcel-Breuer-Strasse 6
80807 München (DE)

Representative:

Epping - Hermann - Fischer
Patentanwaltsgesellschaft mbH
Schloßschmidstraße 5
80639 München (DE)

Respondent:

(Patent Proprietor)

Toshiba Lighting & Technology Corporation
1-201-1, Funakoshi-cho
Yokosuka-shi, Kanagawa-ken 237-8510 (JP)

Representative:

Dempster, Benjamin John Naftel
Withers & Rogers LLP
4 More London Riverside
London SE1 2AU (GB)

Decision under appeal:

**Interlocutory decision of the Opposition
Division of the European Patent Office posted on
18 April 2012 concerning maintenance of the
European Patent No. 1037258 in amended form.**

Composition of the Board:

Chairman

G. Eliasson

Members:

S. Ward

W. Van der Eijk

Summary of Facts and Submissions

- I. This is an appeal against the interlocutory decision of the Opposition Division that, account being taken of the amendments made during the opposition proceedings, European patent No. EP 1 037 258 and the invention to which it related met the requirements of the EPC on the basis of the main request.

The patent had been opposed in its entirety on the grounds of lack of novelty, lack of inventive step and unallowable extension of subject-matter (Articles 100(a) and (c), 52(1), 54 and 56 EPC).

- II. Oral proceedings were held in the presence of the appellant-opponent (hereinafter "the opponent") and in the absence of the respondent-proprietor (hereinafter "the proprietor"), the proprietor's intention not to attend having previously been stated in writing.

- III. At the end of the oral proceedings held before the Board the opponent requested that the decision under appeal be set aside and that the patent be revoked.

The proprietor requested in writing that the appeal be dismissed and the patent maintained in the form found allowable in the interlocutory decision of the Opposition Division.

- IV. In the reply to the statement of grounds of appeal dated 30 April 2013, the proprietor also enclosed "six auxiliary requests that the proprietor may subsequently choose to rely upon". Under the heading "Auxiliary positions" the proprietor indicated that the arguments for the allowability of these requests could be found

in a letter dated 22 October 2010 (sent during the opposition procedure).

In a letter dated dated 6 March 2014 the proprietor stated that the "requests in our letter of 30th April 2013 are maintained". No reference was made to these requests in the proprietor's final letter of 31 January 2017.

V. Claim 1 of the main request reads as follows:

"A mercury-free metal halide lamp for use as a light source in motor vehicle headlights, the lamp comprising an arc tube which encloses:

*a rare gas,
 halide of Sc (scandium),
 halide of Na (sodium),*

characterised in that said tube also encloses

halide of In (indium),

wherein said indium halide has a vapor pressure of at least 10^{-5} atm at an operating temperature of said lamp; and

said lamp operates so that in a CIE1931 x,y chromaticity diagram, the chromaticity coordinate of emitted light of said lamp satisfies the following equations:

*$x \geq 0.310$,
 $x \leq 0.500$,
 $y \leq 0.150 + 0.640x$,
 $y \leq 0.440$,
 $y \geq 0.050 + 0.750x$, and
 $y \geq 0.382$ (in the case where $x \geq 0.44$)."*

VI. The opponent's arguments, in so far as they are relevant to the present decision, were essentially as follows:

The feature of claim 1 of the main request that the "indium halide has a vapor pressure of at least 10^{-5} atm at an operating temperature of said lamp" had been added during the opposition procedure and introduced a lack of clarity, contrary to the requirements of Article 84 EPC.

Firstly, the meaning of the term "vapor pressure" was unclear as it was not apparent whether the claim was referring to the saturated vapor pressure of the indium halide or whether the term extended to unsaturated vapor pressures. Secondly the term "operating temperature" was unclear, as the relevant temperature determining the saturated vapor pressure was the cold spot temperature, whereas the temperature used to determine the unsaturated partial vapor pressure via the ideal gas equation was the average discharge temperature.

Moreover, the claimed subject-matter did not meet the requirements of Article 84 EPC as it did not comprise all of the features essential to solving the problem posed in the contested patent. A vapor pressure of 10^{-5} atm would correspond to an amount of indium halide which was so tiny that it could not possibly lead to the increase in the lamp voltage which was the stated aim.

The claimed subject-matter also lacked inventive step in view of the combination of documents D7 (JP 06 111772) and D2 (JP 09 283079), or the combination of documents D22 (US 5 402 037) and D23 ("Microwave Powered Electrodeless HID Lamp Containing Indium Halide", Akira Hochi, Shigeru Horii, and Mamoru Takeda, National Technical Report Vol. 43, No. 2, Apr. 1997).

Lack of inventive step could also be demonstrated on the basis of D7 alone, or D5 (DE 39 04 926 A1) alone.

VII. The proprietor's arguments, in so far as they are relevant to the present decision, were essentially as follows:

The invention was clear as it was easy for the person skilled in the art to determine whether the filling components are completely evaporated or only partially evaporated by knowing the amount of the filling components enclosed in the metal halide lamp and the temperature (temperature distribution) of the metal halide lamp. It was then easy for the person skilled in the art to calculate the vapor pressure by using the results determined by this method. Expressing quantities in terms of pressure was a common practice for the person skilled in the art in the field of discharge lamp technology.

The patent in suit specified the vapor pressure of the indium halide at an operating temperature. The use of vapour pressure described the quantity of the filling components that are in a gas (vapor) state in the arc tube that contribute to the electrical and luminescence characteristics of plasma in both cases: one where the filling components were completely evaporated and one where they were only partially evaporated. Therefore, in order to achieve the effect of the invention, the use of vapour pressure as a parameter was appropriate.

Claim 1 achieved the aim stated in the patent in suit of obtaining a high voltage and long life of the lamp since it corresponded to the solution found in the description by being limited to a minimum amount of

indium halide in combination with the rare gas, scandium halide, and sodium halide.

The claimed subject-matter was inventive over the combinations of documents cited by the opponent.

Reasons for the Decision

1. The appeal is admissible.

As announced in advance, the duly summoned proprietor did not attend the oral proceedings. According to Rule 71(2) EPC 1973, the proceedings could however continue without the proprietor. In accordance with Article 15(3) RPBA, the board relied for its decision only on the proprietor's written submissions. The Board being in a position to decide the case at the conclusion of the oral proceedings (Article 15(5) and (6) RPBA), the voluntary absence of the proprietor was not a reason for delaying a decision (Article 15(3) RPBA).

2. *Article 84 EPC 1973: The alleged lack of clarity*

- 2.1 Claim 1 of the main request comprises the feature:

"said indium halide has a vapor pressure of at least 10^{-5} atm at an operating temperature of said lamp."

Although a corresponding feature was apparent in the combination of claims 1 and 3 as originally filed, no reference to the vapor pressure of indium halide was present in any of the claims of the granted patent. This feature was subsequently reintroduced into claim 1

during the opposition procedure, and it is therefore open to the opponent to challenge compliance with Article 84 EPC 1973 (see G 3/14, Catchword).

2.2 Although the opponent raises a number of clarity objections in relation to the above feature (see point VI, above), the Board sees them as interrelated in the sense that they all appear to hinge on the argument that it is unclear whether the claimed "vapor pressure" refers to the saturated vapor pressure only, or whether it extends to unsaturated vapor pressures. Hence, before looking at the clarity issue directly, the Board briefly reviews the meaning of these terms in general and within the context of the present invention.

3. *The physical background*

3.1 When a liquid is introduced into a sealed vessel, some of the more energetic surface molecules escape from the liquid and form a vapor. This process continues until an equilibrium state is reached in which as many molecules are returning to the liquid as escaping from it (the rate of condensation equals the rate of evaporation). Thereafter the density of vapor molecules in the vessel does not further increase, and the vapor is said to be saturated. The pressure of the vapor in equilibrium with its liquid state is referred to as the saturation (or saturated, or equilibrium) vapor pressure.

The saturation vapor pressure is well-known to be an intrinsic characteristic of a particular material, depending only on the temperature of the liquid (hence the inner wall temperature of the vessel at the location of the liquid). Curves of vapor pressure versus temperature may be found in the literature, so

that a measurement of the temperature of the liquid is sufficient to determine the pressure of vapor in equilibrium with it.

- 3.2 If the quantity of liquid introduced into the vessel is sufficiently small (and/or the temperature is raised sufficiently), complete evaporation may take place, with the liquid entirely disappearing. In this case the vapor is said to be unsaturated, and its unsaturated vapor (partial) pressure is (approximately) determined by the ideal gas equation, $PV = nRT$, in which T is the average temperature in the vessel, V is its volume and n is the amount of material substance (in moles).

In the unsaturated case, an arbitrarily small partial pressure P can be achieved by introducing only very small amounts n of the material, whereas the saturated state implies that sufficient material has been introduced such that a part of it remains in the condensed state at the given temperature.

- 3.3 Although the word "liquid" has been used above, the same analysis applies to the introduction of solid materials.

4. *Saturated versus unsaturated vapor pressure in the context of the present invention*

- 4.1 Taking the example of indium iodide (InI) at a typical wall temperature of a discharge lamp in operation (about 800°C), the saturated vapor pressure is about 2 atm (see paragraph [0058] of the granted patent). The saturated vapor pressure of other indium halides at this temperature is of approximately the same order of magnitude.

If the term "vapor pressure" in claim 1 is taken to mean "saturated vapor pressure, then in operation the indium halide vapor is in a saturated state, and the claimed subject-matter is restricted to lamps comprising sufficiently large amounts of indium halide that a part of it remains in a condensed state at a typical operational wall temperature. In operation, the relatively high saturated vapor pressure of indium halides means that a correspondingly large amount of indium halide vapor will be in the discharge tube.

4.2 However, if the claimed "vapor pressure" is considered to refer also to unsaturated vapor pressures, the claimed subject-matter would not be restricted as mentioned above, but would include lamps comprising much smaller amounts of indium halide which would be completely evaporated at the operating temperature. In fact, the claim would include lamps comprising indium halide in such minute quantities that the partial pressure in operation would be as low as 10^{-5} atm, five orders of magnitude below the saturated vapor pressure.

4.3 In the light of the above, there is no doubt that the meaning of the claim would differ in a very significant manner depending on the interpretation placed on the term "vapor pressure". The Board therefore accepts that the claimed subject-matter could not be considered clear within the meaning of Article 84 EPC 1973 unless it is unambiguously apparent how the term "vapor pressure" is to be understood in claim 1.

5. *The wording of claim 1*

5.1 It must first be asked whether an unambiguous meaning for this term can be inferred from the wording of the claim itself.

5.2 It is well-known, and not disputed by the opponent, that the saturated vapor pressure is often referred to in the literature simply as the vapor pressure. In the Board's view, this is what is most commonly implied by the term. Hence, a first possible (and entirely plausible) understanding of the claimed term "vapor pressure" would be to regard it as synonymous with "saturated vapor pressure".

On the other hand, it is certainly conceivable that the unqualified expression "vapor pressure" might be employed to describe the pressure of a vapor whether it happened to be in a saturated or unsaturated state. This represents a second understanding of "vapor pressure", which is also not considered implausible.

5.3 The opponent argued that the wide discrepancy between the extremely low cited pressure of 10^{-5} atm and the typical saturated vapor pressures for metal halides in a lamp (about 2 atm for InI) would represent a contradiction ("Widerspruch").

5.4 It is, however, a fact that 2 atm is in the range of "at least 10^{-5} atm", and therefore, in the case of saturated vapor pressures, such a lower limit might be superfluous, but it is not a contradiction.

Nevertheless, specifying a lower limit of 10^{-5} atm - five orders of magnitude below realistic saturated vapor pressures of indium halides in discharge lamps - would be so manifestly unnecessary if the claim referred to saturated vapor pressures only that this limit must be considered to provide at least an indication that the claim may be intended to refer to unsaturated vapor pressures also.

5.5 In summary, the Board has the impression that the term "vapor pressure" is most commonly used in the sense of "saturated vapor pressure", but it is not entirely implausible that it could include unsaturated vapor pressures, a reading which would find support in the claimed lower limit of 10^{-5} atm. Hence, the wording used in the contested feature lends itself to two plausible, but very different, interpretations, and claim 1, seen in isolation, cannot be considered to be unambiguously clear.

5.6 In discussing this matter, both parties made reference to the description of the contested patent, and the Board will therefore examine whether the description, and also the prosecution history of the file and the explanations of the terminology offered by the proprietor, can shed any light on the issue of clarity.

6. *The description of the contested patent*

6.1 Embodiment 2 is the only detailed embodiment representing the current claimed invention (combining halides of scandium, sodium and indium). According to this embodiment (see paragraph [0058]):

"The temperature of the internal surface of the arc tube 201 is estimated to be approximately 800 °C according to the same manner as in Embodiment 1, and the vapor pressure of InI at this temperature is approximately 2 atm."

From this, and the corresponding explanation in embodiment 1 of the estimation of the vapor pressure from a determination of the temperature of the internal surface of the arc tube (paragraph [0049]), it may be

derived that the vapor pressure being referred to depends only on the temperature, and that the relevant temperature is that of the internal surface of the arc tube. There can therefore be no doubt that in this embodiment, the vapor pressure referred to is the saturated vapor pressure.

- 6.2 Embodiment 2 employs 0.02 mg of InI in a volume the same as that of embodiment 1 (0.025 cc), and hence InI is present in an amount of 8 mg/cc. In general, the invention is said (paragraphs [0037],[0038]) to be based on providing "a large amount" of metal or metal halide, the quoted range for indium halides being 4 to 12 mg/cc. The opponent has argued that at a wall temperature of 800°C, InI vapor would be in a saturated state over the whole of this range, and the Board finds this plausible, given that the midpoint of 8 mg/cc certainly corresponds to a saturated state.

This further reinforces the view that the vapor pressure of InI referred to in the contested patent is the saturated vapor pressure.

- 6.3 In the light of the above, the Board takes the view that the description of the contested patent supports an interpretation of the term "vapor pressure" as meaning "saturated vapor pressure".

7. *Prosecution history*

- 7.1 The Board accepts that there is a basis in original claims 1 plus 3 for the claimed feature of indium halide "having a vapor pressure of at least 10^{-5} atm at an operating temperature of said lamp".

It should, however, be recalled that according to original claim 1 it was envisaged to use any metal halide (or any metal) provided it had a vapor pressure of 10^{-5} atm at an operating temperature of the lamp. A preferred metal halide (employed in embodiments 1 and 3) was yttrium iodide (YI_3), which has a low vapor pressure of approximately 10^{-5} atm at a wall temperature of $800^{\circ}C$ (paragraph [0048]). From the manner in which this vapor pressure is determined (on the basis of the temperature of the internal surface of the arc tube - paragraph [0048]) it is clear that it is a saturated vapor pressure.

The Board doubts that it is mere coincidence that the value of " 10^{-5} atm" appears in the original application as both the claimed lower limit for the vapor pressure and as the saturated vapor pressure of the preferred material of embodiments 1 and 3, and it must be suspected that this feature appeared in the claim in connection with the saturated vapor pressure of YI_3 quoted in the description.

It is telling, therefore, that during the examination procedure, when the claim was restricted to a halide of indium, the feature "having a vapor pressure of at least 10^{-5} atm at an operating temperature of said lamp" was at the same time deleted (claims submitted with applicant's letter of 2 November 2006). In the Board's opinion, the most plausible reason for this deletion was that "vapor pressure" was understood as "saturated vapor pressure", and it was recognised that specifying a lower limit of 10^{-5} atm for the saturated vapor pressure of indium halides would be entirely superfluous, as explained under point 5.4, above.

7.2 The reappearance of the lower limit for the vapor pressure in opposition was as a result of an objection from the opponent under Article 123(2) EPC.

8. *The proprietor's arguments in appeal*

8.1 In the reply to the statement of grounds of appeal, the proprietor stated the following:

"The patent in suit specifies the vapor pressure of the indium halide at an operating temperature. The use of vapor pressure describes the quantity of the filling components that are in a gas (vapor) state in the arc tube that contribute to the electrical and luminescence characteristics of plasma in both cases: one where the filling components are completely evaporated and one where they are only partially evaporated. Therefore, in order to achieve the effect of the invention, the use of vapor pressure as a parameter is appropriate" (Point 2.2).

"After testing a combination of different ionization voltages of different discharge media and a combination of different vapor pressures, the inventors of the patent in suit have found that an increase in the tube voltage and a prolonged life of the lamp can be achieved by making the vapor pressure of an indium halide at least 10^{-5} atm at an operating temperature in a combination of a rare gas, scandium halide, sodium halide, and indium halide" (Point 3.1(b)).

8.2 Furthermore, in the letter dated 6 March 2014, the proprietor stated the following:

"The patent in suit specifies 'the vapor pressure of indium halide at an operating temperature'. The

indication in the form of a pressure shows the quantity of 'the filling components that are in a gas (vapor) state in the arc tube', which contribute to the electrical and optical properties of plasma both when the filling components are completely evaporated and when the filling components are only partially evaporated. The use of this parameter is appropriate for the purpose of having an increased lamp voltage and increased service-life" (Point 1.5).

8.3 There is therefore no doubt that the proprietor's arguments in appeal in support of the clarity of the claim are based on an understanding of vapor pressure as covering both the saturated and unsaturated cases.

9. *Clarity: conclusion*

9.1 The term "vapor pressure" as used in claim 1 of the main request lends itself to two plausible, but very different, interpretations, and therefore claim 1, seen in isolation, cannot be considered to be unambiguously clear (see point 5.5, above).

9.2 Even assuming *arguendo* that the examination of a claim for clarity may be influenced by considerations other than the wording of the claim itself as it would be understood by a skilled reader, such considerations do not, in the present case, support any single consistent interpretation, but merely sow additional confusion. In particular, the description and arguably the prosecution history point to an interpretation in which "vapor pressure" means "saturated vapor pressure" (hence excluding the unsaturated vapor pressure), while the proprietor's submissions in appeal point in precisely the opposite direction.

9.3 The Board therefore judges that claim 1 of the main request does not meet the clarity requirement of Article 84 EPC 1973, and hence that the patent cannot be maintained on the basis of this request according to Article 101(3) (a) EPC.

10. *The status of the "auxiliary requests"*

10.1 Article 113(2) EPC 1973 states the following:

"The European Patent Office shall examine, and decide upon, the European patent application or the European patent only in the text submitted to it, or agreed, by the applicant or the proprietor of the patent."

10.2 In the case of opposition, the intention behind Article 113(2) EPC 1973 is that the EPO may not maintain a patent according to a particular text unless the proprietor has consented unambiguously to the patent being maintained in that form. The "text submitted" is to be understood to mean a text submitted by the proprietor with the clear intention that the patent be maintained according to that text, at least as an auxiliary measure.

10.3 In T 1670/07 (Reasons, point 20), this idea was expressed as follows (in the case of examination):

"According to the principle of party disposition, it is the applicant who sets the framework of the procedure. He must present his requests and the EPO can only decide upon the European patent application in the text submitted to it, or agreed by him (Article 113(2) EPC). From this principle it follows that it is the applicant's obligation to formulate his requests in such a way that the EPO is put in a position to decide

on them without any further investigations about what the applicant's petitum is. This means that the exact wording of the claims must be clear and, at the same time, it must be immediately clear for which claims grant of a patent is sought."

- 10.4 In the present case, although six new requests were enclosed with the reply to the statement of grounds of appeal (see point IV, above), the proprietor did not actually request maintenance of the patent on the basis of any of them, but merely described them as "six auxiliary requests that the proprietor may subsequently choose to rely upon".

The letter of 6 March 2014 included the statement that the "requests in our letter of 30th April 2013 are maintained", which the Board takes to mean that the proprietor's position remained the same: maintenance of the patent was requested on the basis of the main request, and the proprietor might "subsequently choose" to rely on the other requests. No further reference was made to these requests in writing, and the proprietor was not represented at oral proceedings.

- 10.5 Although the submissions in question were termed "requests", the phrase "that the proprietor may subsequently choose to rely upon" makes it clear that the proprietor was *not*, at that point, requesting maintenance of the patent based on them, but merely leaving open the possibility that it might choose to make such a request subsequently. In practice, it did not.

- 10.6 In the absence of any clear request, and in the light of the provisions of Article 113(2) EPC 1973, the Board

is not empowered to decide whether the patent should be maintained according to the "six auxiliary requests".

11. *Conclusion*

Taking into consideration the amendments made by the proprietor during the opposition proceedings, the Board judges that the patent and the invention to which it relates do not meet the requirements of Article 84 EPC 1973, and consequently the patent must be revoked according to Article 101(3) (b) EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. European patent No. 1 037 258 is revoked.

The Registrar:

The Chairman:



S. Sánchez Chiquero

G. Eliasson

Decision electronically authenticated