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Datasheet for the decision of 25 November 2019

Case Number: T 0774/15 - 3.4.03

Application Number: 07705734.7

Publication Number: 1984935

IPC: H01J61/28, H01J61/70, H01J61/52

Language of the proceedings: EN

Title of invention:
LOW-PRESSURE MERCURY VAPOR DISCHARGE LAMP WITH AMALGAM

Patent Proprietor:
Koninklijke Philips N.V.

Opponent:
Heraeus Noblelight GmbH

Headword:

Relevant legal provisions:
EPC Art. 52(1), 123(2)
EPC 1973 Art. 54, 84, 100(a)
RPBA Art. 12(4), 13(1)

Keyword:
Claims - clarity - main request (no)
Novelty - "main request b" (no)
Late-filed auxiliary requests - admitted (no)

Decisions cited:
G 0003/14, T 0728/98, T 1399/11

Catchword:

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Case Number: T 0774/15 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 25 November 2019

Appellant: (Patent Proprietor)	Koninklijke Philips N.V. High Tech Campus 52 5656 AG, Eindhoven (NL)
Respondent: (Opponent)	Heraeus Noblelight GmbH Heraeusstr. 12-14 D-63450 Hanau (DE)
Representative:	Staudt, Armin Walter Sandeldamm 24a 63450 Hanau (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 20 February 2015 revoking European patent No. 1984935 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	G. Eliasson
Members:	T. M. Häusser
	G. Decker

Summary of Facts and Submissions

I. The appeal of the patent proprietor concerns the decision of the opposition division to revoke the European patent No. EP-B-1 984 935 (Article 101(2) and (3)(b) EPC).

II. The opposition had been filed against the patent as a whole. Grounds of opposition were lack of novelty and lack of inventive step (Articles 100(a), 54(1) and (2), and 56 EPC 1973).

III. Reference is made to the following documents:

D1: JP 01253198 A,
D1a: German translation of D1,
D1d: English translation of D1,
D1e/D1f: English translation of D1 with corresponding translation certificate,
D1g/D1h: English translation of D1 with corresponding translation certificate,
D12: *Discharge lamps*, C. Meyer, H. Nienhuis, 1988, Kluwer Technische Boeken B.V., Deventer, Netherlands, pages 70-72.

IV. At the oral proceedings before the board the appellant (patent proprietor) requested that the decision under appeal be set aside and a patent be granted based on the main request, main request a, main request b, auxiliary request I, auxiliary request I a or auxiliary request I b, the main request and auxiliary request I filed with the grounds of appeal and the other requests filed during the oral proceedings before the board.

The respondent (opponent) requested that the appeal be dismissed.

V. The wording of independent claim 1 of the various requests is as follows (board's labelling "1.5", "1.5'", "1.5''", "1.6", ... , "1.11"):

Main request b (granted version):

"1. A lamp system comprising a low-pressure mercury vapor discharge lamp, the lamp comprising:

- at least one discharge vessel (6) enclosing, in a gastight manner, a discharge space (8) provided with a filling of mercury and a rare gas, the discharge vessel having a first 5 [sic] end section (28) and a second end section,

- a first electrode (10, 30) arranged at the first end section and a second electrode arranged at the second end section for maintaining a discharge along a discharge path between the first electrode and the second electrode,

1.5 - an amalgam (18) for regulating the mercury vapor pressure in the discharge vessel and having an optimal temperature range,

1.6 - a heating element (22) arranged at the first end section for heating the amalgam to a temperature within its optimal temperature range,

- an electronic circuit (38) arranged to generate an electrical discharge current for maintaining the discharge, and an electrical heating current for heating the heating element (22), independently of the electrical discharge current,

- characterized in that

1.8 the amalgam (18) is arranged at the first end section outside the discharge path,

- in that the lamp system further comprises:

1.9 a control circuit (40) for generating at least one control signal to activate the electronic circuit to generate the electrical heating current in dependence on at least the dimming level of the lamp."

Main request:

Claim 1 of the main request differs from claim 1 of main request b (claim 1 as granted) in that the expression "characterized in that" is deleted, the expression "and in that" is replaced by "and wherein" in the expression before feature 1.9, and features 1.5 and 1.8 are replaced by the following respective features 1.5' and 1.8' (board's marking of the changes):

1.5' "- an amalgam (18) for regulating the mercury vapor pressure in the discharge vessel and having an optimal temperature range where the mercury vapor pressure is such that the radiation output of the lamp is at least 90% of the maximal radiation output under operating conditions where the mercury vapor pressure is optimal,",

1.8' "- wherein the amalgam (18) is ~~arranged~~ positioned at the first end section outside the discharge path, such that in case the discharge lamp operates at maximal input power, the temperature of the amalgam will not exceed the maximum value of its optimal temperature range,".

Main request a:

Claim 1 of main request a differs from claim 1 of the main request in that features 1.5' and 1.8' are re-

placed by the following respective features 1.5'' and 1.8'' (board's marking of the changes):

1.5'' "- an amalgam (18) for regulating the mercury vapor pressure in the discharge vessel and having an optimal temperature range where the mercury vapor pressure is such that the UV radiation output of the lamp is at least 90% of the maximal UV radiation output, wherein the maximal UV radiation output of the lamp is the UV radiation output in Watts under operating conditions where the mercury vapor pressure is optimal and when the lamp is operated at nominal power,",

1.8'' "- wherein the amalgam (18) is positioned at the first end section outside the discharge path, such that in case the discharge lamp operates at maximal input power, the temperature of the amalgam will not exceed the maximum value of its optimal temperature range, wherein the maximal input power is the nominal input power of the lamp,".

Auxiliary request I:

Claim 1 of auxiliary request I differs from claim 1 of the main request in that "and" is deleted in the expression before feature 1.9 and in comprising the following additional features:

1.10 "- wherein the first electrode (10) is further arranged to operate as the heating element (22) or wherein the heating element (22) is arranged to heat the amalgam (18) independently of the first electrode (10), and",

1.11 "- wherein the first end section comprises a pressed end (14) for sealing the first end section in a gas tight manner, and that the amalgam (18) is positioned in a recess (20) of the pressed end on the side facing the discharge vessel (6)".

Auxiliary request I a:

Claim 1 of auxiliary request I a differs from claim 1 of main request a in comprising the additional features 1.10 and 1.11.

Auxiliary request I b:

Claim 1 of auxiliary request I b differs from claim 1 of main request b in comprising the additional features 1.10 and 1.11.

VI. The parties argued essentially as follows:

(a) Admission of the requests

The *appellant* was of the opinion that main request a, main request b, auxiliary request I, auxiliary request I a and auxiliary request I b should be admitted into the proceedings.

The *respondent* argued that these requests should not be admitted into the proceedings.

(b) Main request - clarity

The *appellant* argued that the amendments effected in relation to claim 1 of the main request, i. e. the amendments in features 1.5' and 1.8' were clear.

The *respondent* was of the opinion that these amendments were unclear.

(c) Main request b - novelty

According to the *appellant*'s view the subject-matter of claim 1 of main request b was new over document D1, which in particular did not disclose the subject-matter of features 1.5, 1.6, and 1.8.

The *respondent* argued that the subject-matter of claim 1 of main request b was not new over document D1.

Reasons for the Decision

1. Admission of requests

1.1 Main request a, main request b, auxiliary request I a, and auxiliary request I b were filed during oral proceedings before the board. These requests constitute therefore an amendment to the appellant's case after it has filed its grounds of appeal and may be admitted into the proceedings and considered at the board's discretion (Article 13(1) RPBA).

Auxiliary request I was filed with the statement setting out the grounds of appeal and may be held inadmissible by the board in accordance with Article 12(4) RPBA.

1.2 In accordance with established case law, late-filed auxiliary requests are inadmissible if - *prima facie* - they do not overcome the outstanding objections under the EPC or give rise to new objections (see *Case Law of*

the Boards of Appeal of the EPO, 9th edition 2019, sections V.A.4.4.2 a) and 4.5.1).

1.2.1 Claim 1 of main request a differs from claim 1 of the main request in that features 1.5' and 1.8' are replaced by features 1.5'' and 1.8'', respectively. Claim 1 of auxiliary request I a also comprises features 1.5'' and 1.8''.

The appellant was of the opinion that the amendments in the features 1.5'' and 1.8'' in relation to the "UV radiation output" and the "nominal input power" were based on the application as filed (page 2, line 19; page 3, line 13; page 7, last line; page 8, third from last line).

1.2.2 The board notes that the sentence on page 2, lines 18 and 19 of the description of the application relates to the ratio of the radiation output and the lamp input power (i. e. the "lamp efficiency") rather than the ratio of the radiation output and the maximal radiation output as claimed in feature 1.5''. Furthermore, the sentence does not refer to the UV spectral band as claimed but to the UV-C spectral band.

Moreover, "nominal input power" is not explicitly mentioned anywhere in the application as filed, as admitted by the appellant. There is also no indication in the application that the various occurrences of the expression "maximal input power" cited by the appellant are intended to refer to the nominal input power, since the expression may well be understood in different ways (see point 2.4.2 below).

Hence, there are doubts whether the subject-matter of features 1.5'' and 1.8'' is directly and unambiguously derivable from the application as filed.

Consequently, *prima facie*, main request a and auxiliary request I a give rise to a new objection under Article 123(2) EPC concerning added subject-matter. These requests are therefore not admitted into the proceedings (Article 13(1) RPBA).

1.3 Main request b constitutes a reversion to the patent as granted. Even though the request is submitted at a late stage of the proceedings the board accepts that it poses no additional work and that the respondent and the board are in a position to deal with the request at the oral proceedings.

Auxiliary request b is therefore admitted into the proceedings (Article 13(1) RPBA).

1.4 Claim 1 of auxiliary request I differs from claim 1 of the main request essentially in comprising the additional features 1.10 and 1.11. Claim 1 of auxiliary request I b also contains these features.

The appellant argued that it had filed auxiliary request I only at the appeal stage as it had relied on the technical understanding that the claimed subject-matter was new over document D1. This had been confirmed by the preliminary opinion of the opposition division.

1.4.1 However, the board is of the opinion that a party cannot rely on the fact that its technical understanding of matters in dispute will prevail during opposition proceedings. Moreover, a patent proprietor should for-

mulate fallback positions at the earliest possible stage in order to allow the procedure to proceed in an efficient manner.

In the present case, document D1 had been filed with the notice of opposition. The fallback position of auxiliary request I could therefore have been filed already with the patent proprietor's reply to the notice of opposition. At the latest such a request should have been submitted during the oral proceedings before the opposition division, especially since the patent proprietor was explicitly asked during these proceedings whether it wished to do so (see point 4 of the minutes of the oral proceedings).

Admitting auxiliary request I into the appeal proceedings might well compel the board either to give a first ruling on critical issues such as whether the subject-matter of the additional features is new and involves an inventive step, which runs counter to the purpose of appeal proceedings to review first instance decisions, or to remit the case to the opposition division, which is contrary to procedural economy. In order to forestall these unsatisfactory options, Article 12(4) RPBA provides the board with the discretionary power to hold inadmissible requests which could have been presented in the first-instance proceedings.

Auxiliary request I is therefore not admitted into the proceedings (Article 12(4) RPBA).

1.4.2 Auxiliary request I b with independent claim 1 which also comprises features 1.10 and 1.11 constitutes an alternative fallback position that is similar to the fallback position of auxiliary request I. Since auxiliary request I b was only filed at the oral proceedings

before the board, the considerations mentioned under point 1.4.1 above in relation to auxiliary request I apply all the more to auxiliary request I b.

Consequently, auxiliary request I b is not admitted into the proceedings, either (Article 13(1) RPBA).

2. Main request - clarity

2.1 The respondent argued that the amendments in features 1.5' and 1.8' of claim 1 of the main request were not clear, contrary to the requirements of Article 84 EPC 1973.

2.2 The board notes first that the respondent's objections under Article 84 EPC 1973 exclusively concern the amendments effected in relation to granted claim 1, namely those contained in features 1.5' and 1.8', and may therefore be examined in the present opposition appeal proceedings in accordance with the principles set out in the decision G 3/14 of the Enlarged Board of Appeal. This was not contested by the appellant.

2.3 Article 84 EPC 1973 stipulates that the claims define the matter for which protection is sought and that they must, *inter alia*, be clear.

This requirement serves the purpose of ensuring that the public is not left in any doubt as to which subject-matter is covered by a particular claim and which is not. A claim which does not unambiguously allow this distinction to be made cannot be considered clear within the meaning of this Article (see decisions T 728/98, point 3.1 of the Reasons; T 1399/11, point 1.6 of the Reasons). An ambiguity of the claimed subject-matter may in particular arise when a claim contains terms or

expressions which can be understood in various different ways.

2.4 In the present case the contentious expressions in this respect are "radiation output" (feature 1.5') and "maximal input power" (feature 1.8') of claim 1 of the main request.

2.4.1 The appellant was of the opinion that the expression "radiation output" specified in feature 1.5' defined the emitted radiant flux and that it was not necessary to specify in the claim the wavelength of the radiation output.

The board notes that this expression is not further defined in claim 1 of the main request and that, in particular, there is no indication concerning the spectral characteristics of the radiation.

The claim does not specify that the lamp system is adapted for a particular application, either. Concerning the possible use of the claimed low-pressure mercury vapour discharge lamp as a fluorescent lamp the patent specification contains the following statement (see paragraph [0002]):

> *"In low-pressure mercury vapor discharge lamps, mercury constitutes the primary component for the generation of ultraviolet (UV) radiation. A luminescent layer comprising a luminescent material, for example a fluorescent powder, may be present on an inner wall of the discharge vessel to convert UV radiation to radiation of other wavelengths, for example, to UV-B and UV-A radiation for tanning purposes or to visible radiation for general*

illumination purposes. Such discharge lamps are therefore also referred to as fluorescent lamps."

Mercury is described as constituting merely the "primary component" for the generation of UV radiation in view of the fact that other components generating UV radiation may be present in the lamp. In fact, according to claim 1 of the main request the filling of the discharge vessel does not only contain mercury but also a rare gas, which may also contribute to the radiation emission of the discharge lamp.

On the other hand, according to claim 13 of the main request the lamp system of claim 1 of the main request is used for disinfection of water, waste water or air. In relation to this use as a germicidal lamp the patent specification contains the following remarks (see paragraph [0003]):

"Low-pressure mercury vapor discharge germicidal lamps predominantly generate UV-C radiation, and these types of lamps are used for disinfection of water and air, disinfection of foods, curing of inks and coatings, and destroying of pollutants in water and air. The principal radiation that is generated in such lamps has a wavelength of 254 nm, which prevents the growth of, for example, moulds and bacteria."

The reference to the "principal radiation" generated in such lamps having a wavelength of 254 nm implies that other spectral lines are also present. Indeed, low pressure mercury vapor discharge lamps are known to have a further emission line in the UV-C spectral band at a wavelength of 185 nm.

In view of the above, the skilled person is left in doubt as to what is meant by the claimed "radiation output", in particular whether it refers to the emission at a particular wavelength, namely at a wavelength of 254 nm and/or 185 nm, in a particular band of wavelengths, namely the UV-C or UV band, or indeed in the entire radiation spectrum.

Feature 1.5' of claim 1 of the main request is therefore not clear.

2.4.2 Concerning feature 1.8' the appellant argued that the expression "maximal input power" denoted the nominal input power of the lamp and this feature defined the amalgam to be positioned in a relatively cool region of the lamp.

It is first to be noted that there is no indication in claim 1 of the main request that the "maximal input power" defined in feature 1.8' of that claim denotes indeed the nominal input power.

The board agrees with the appellant insofar as the expression "maximal input power" *may well* refer to the nominal input power. However, the expression may also be understood as denoting the maximum power at which the discharge lamp can be operated without being destroyed. Furthermore, the expression may be understood in the context of feature 1.8' as referring to the maximal input power at which the discharge lamp can be operated without the amalgam exceeding the maximum value of its optimal temperature range. The skilled person is thus left in doubt as to the meaning of this expression.

Feature 1.8' of claim 1 of the main request is therefore also not clear.

2.5 In view of the above claim 1 of the main request does not fulfill the requirements of Article 84 EPC 1973.

3. Main request b - novelty

3.1 The opposition division held in the contested decision that claim 1 of main request b (i. e. granted claim 1) lacked novelty over document D1 (see point 1.2 of the Reasons).

3.2 Document D1 discloses (see D1, Figure 1; page 3 of the translation D1d of document D1) a lighting apparatus comprising a lighting power supply 8 and a fluorescent discharge lamp 1 with a first electrode 2 and a second electrode 4. An amalgam 3 is provided adjacent to the first electrode 2 and is heated when the electrode 2 is preheated. Winding N2 of a transformer 5 is connected to the first electrode 2 and functions as a preheating winding for preheating this electrode 2. A primary winding N1 of the transformer 5 is connected to a triac 6 and forms a circuit that energizes the preheating winding N2 when the triac 6 is turned on. A lamp voltage detection circuit 7 is connected to the discharge lamp 1 in parallel, a Zener diode ZD of the circuit 7 being connected to a connection point a between resistors R1 and R2, and a gate G of the triac 6 being connected to the Zener diode ZD. When the lamp voltage is detected by the lamp voltage detection circuit 7 to have a high lamp voltage in dimming (e. g. 60% dimming relative to the fully-on state) this is detected by the resistors R1 and R2 of the lamp voltage detection circuit 7 and the gate G of the triac 6 is triggered. Consequently, the triac 6 is turned on, the primary wind-

ing N1 of the preheating transformer 5 energizes the preheating winding N2 and the first electrode 2 is preheated.

3.3 The contested features of claim 1 of main request b are features 1.5, 1.6, and 1.8. It is common ground between the parties that the other features of the claim are disclosed in document D1.

Indeed, using the wording of claim 1 of main request b document D1 discloses a lamp system (lighting apparatus) comprising a low-pressure mercury vapor discharge lamp (fluorescent discharge lamp 1), the lamp comprising:

- at least one discharge vessel enclosing, in a gas-tight manner, a discharge space provided with a filling of mercury and a rare gas, the discharge vessel having a first end section and a second end section,
- a first electrode (2) arranged at the first end section and a second electrode (4) arranged at the second end section for maintaining a discharge along a discharge path between the first electrode and the second electrode,
- an electronic circuit (power supply 8, transformer 5) arranged to generate an electrical discharge current for maintaining the discharge, and an electrical heating current for heating the heating element (first electrode 2), independently of the electrical discharge current,
- wherein the lamp system further comprises
- a control circuit (voltage detection circuit 7, triac 6) for generating at least one control signal to activate the electronic circuit to generate the electrical heating current in

dependence on at least the dimming level of the lamp.

3.4 In relation to features 1.5 and 1.6 the appellant was of the opinion that document D1 merely disclosed that the mercury vapour pressure was kept at an appropriate value to prevent the lamp from going out in dimming, but not that the amalgam was kept within its optimal temperature range.

3.4.1 The board notes first that in claim 1 of main request b there is no indication about what is meant by the claimed "optimal temperature range".

The patent specification contains the following statement in this regard (see paragraph [0004]):

"In the description and claims of the current invention, the designation 'optimal temperature range' for an amalgam is used to refer to the temperature range where the mercury vapor pressure is such that the radiation output of the lamp is at least 90 % of the maximal radiation output, i.e. under operating conditions where the mercury vapor pressure is optimal."

Even though there is uncertainty concerning the spectral characteristics of the "radiation output" as indicated under point 2.4.1 above, it is evident from this statement that a temperature in the "optimal temperature range" will lead to a mercury vapour pressure in the discharge vessel that is "close to the optimal vapour pressure" leading to the maximal radiation output.

Indeed, the skilled person understands that it is the mercury vapour pressure that is the relevant quantity

in this respect, its optimal value representing a balance between the number of excitable mercury atoms and the absorption of the resonance radiation by these atoms. Since there is no further indication in claim 1 of main request b concerning the "optimal temperature range", e. g. by providing numerical values of related quantities as in the above citation, it does not follow from the claim how close the mercury vapour pressure has to be to the optimal value implying that the expression "optimal temperature range" has to be understood in rather broad terms. This is especially the case since the mercury vapour pressure in the discharge vessel does not only depend on the temperature of the amalgam, but - when the discharge vessel contains excess mercury - crucially on the temperature of the coldest spot on the wall of the vessel which determines the mercury vapour pressure to be equal to the saturation pressure for that temperature (see page 71 of document D12, which represents the skilled person's common general knowledge).

3.4.2 Document D1 contains the following statement (see the translation D1d, page 3, last line - page 4, line 3):

> *"Since this preheating of the amalgam-side electrode 2 causes the amalgam 3 provided adjacent to the electrode 2 to also be heated, a temperature of the amalgam is increased to an appropriate temperature without insufficiently heating, and a mercury vapor pressure is maintained at an optimal value."*

This passage is translated in essentially the same way in the other submitted translations D1a (see page 2, paragraph 2), D1g (see page 5, lines 27-32), and D1e (see page 3, last line - page 4, line 3) of document D1. The passage, in particular the reference to the

optimal value of the mercury vapour pressure but also the reference to the appropriate temperature of the amalgam, is considered a direct and unambiguous disclosure of features 1.5 and 1.6 of main request b when they are understood as indicated under point 3.4.1 above.

3.5 Concerning feature 1.8 the appellant argued that it was merely disclosed in document D1 that the amalgam 3 was provided in the vicinity of the electrode 2. However, there was no disclosure in D1 where the amalgam 3 was precisely located. In particular, this could not be deduced from the schematic Figure 1, either.

The board agrees with the opposition division that in view of technical considerations it is implicitly disclosed in document D1 that the amalgam 3 is located outside the discharge path (see last paragraph of point 1.2.3 of the Reasons). As pointed out by the opposition division, the amalgam 3 would otherwise be heated up in an uncontrolled manner. However, this would be contrary to the teaching of D1 according to which the amalgam 3 is heated in a controlled fashion by means of the lamp voltage detection circuit 7, triac 6, transformer 5, and first electrode 2 in order to keep the amalgam at an appropriate temperature as discussed above. Furthermore, if the amalgam were located in the discharge path the electric discharge between the electrodes through the ionized gas and hence the light emission would be disturbed or disrupted.

This understanding is confirmed by the schematic representation in Figure 1 of document D1, which shows the second electrode 4 at a distance above the first electrode 2, whereas the amalgam 3 is shown to be located

below the first electrode 2, i. e. outside the direct path connecting the two electrodes 2 and 4.

Feature 1.8 is therefore considered to be disclosed in document D1.

3.6 Consequently, the subject-matter of claim 1 of main request b (i. e. granted claim 1) is not new over document D1 (Article 100(a) EPC 1973 in combination with Article 52(1) EPC and Article 54(1) and (2) EPC 1973).

4. Conclusion

Since the main request does not meet the requirements of the EPC (lack of clarity), a ground of opposition (lack of novelty) prejudices the maintenance of the patent with claims as granted according to main request b and main request a, auxiliary request I, auxiliary request I a, and auxiliary request I b are not admitted into the proceedings, the opposition division's decision revoking the patent is to be confirmed. Consequently the appeal has to be dismissed (Article 101(2) and (3)(b) EPC and Article 111(1) EPC 1973).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

S. Sánchez Chiquero G. Eliasson

Decision electronically authenticated