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**Datasheet for the decision
of 22 December 2015**

Case Number: T 0348/11 - 3.3.05

Application Number: 02710558.4

Publication Number: 1357999

IPC: B01D53/64, B01D53/02,
B01J20/04, B01J20/16, B01J20/12

Language of the proceedings: EN

Title of invention:
A METHOD FOR THE REMOVAL OF MERCURY FROM A GAS STREAM

Patent Proprietor:
CDEM Holland B.V.

Opponent:
NOx II International, Ltd.

Headword:
Mercury removal/CDEM HOLLAND B.V.

Relevant legal provisions:
EPC Art. 83, 111(1), 84
EPC R. 42(1)(e)

Keyword:
Sufficiency of disclosure - (yes)

Decisions cited:
T 0276/99, T 0171/84, T 0019/90, T 0409/91, T 0182/89

Catchword:



**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 0348/11 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 22 December 2015

Appellant:
(Patent Proprietor)

CDEM Holland B.V.
Coldenhovenseweg 12
6961 ED Eerbeek (NL)

Representative:

Van Breda, Jacobus
Octrooibureau Los & Stigter B.V.,
Weteringschans 96
1017 XS Amsterdam (NL)

Respondent:
(Opponent)

NOx II International, Ltd.
3745 E. Overlook Drive
Port Clinton OH 43452 (US)

Representative:

Sperling, Rüdiger
Staeger & Sperling
Partnerschaftsgesellschaft mbB
Sonnenstrasse 19
80331 München (DE)

Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office posted on 22 December
2010 revoking European patent No. 1357999
pursuant to Article 101(3) (b) EPC.**

Composition of the Board:

Chairman J.-M. Schwaller
Members: H. Engl
P. Guntz

Summary of Facts and Submissions

I. European patent EP-B-1 357 999 was granted with 13 claims. The patent is concerned with a method for the removal of mercury from a gas stream.

II. Claim 1 of the granted patent reads:

"1. A method for the removal of mercury from a gas stream, characterized in that at a temperature above 230°C the gas stream is contacted with a sorbent that as the active component is comprised of a mixture of substantially silica-alumina compounds and/or calcium compounds, wherein said calcium compounds comprise calcium carbonate and/or calcium oxide."

III. The opposition division revoked the European patent on the ground that it did not disclose the invention in a manner sufficiently clear and complete to be carried out by a person skilled in the art (Article 83 EPC).

The reasons were essentially as follows:

- (i) the patent did not provide sufficient information as to how the sorbent could be obtained or what it was composed of; and
- (ii) the patent did not exemplify the removal of mercury by the sorbent.

Although it was acknowledged that certain details of the sorbent were disclosed in paragraph [0013] and the claims of the patent specification, there was no indication of the overall amount of the active components present in the sorbent. The example and Tables 1 and 2 showed experimental results obtained by using 60 g of a sorbent at various temperatures. The

sorbent, however, was not specified and the results could thus not be reproduced.

The opposition division also found that the cross-reference in the description to NL 1009087 (corresponding to D5: WO 00/09256 A1) could not remedy this lack of disclosure because no specific conditions of making the sorbent were contained therein and because the sorbent was not necessarily the same as in the patent. It was not permissible to incorporate subject-matter critical for the understanding of the invention by way of reference. Furthermore, the patentee itself argued that NL 1009870 was *de facto* inessential for a complete understanding of the invention.

IV. The patentee (appellant) filed an appeal against this decision. The appeal brief also included 11 pages of a document entitled "Background knowledge" and the paper

D13: R.V. de la Villa et al., *"Mineralogical and morphological changes of calcined paper sludge at different temperatures and retention in furnace"*, Applied Clay Science 36 (2007), pages 279 to 289.

V. The observations of the respondent (opponent) were received with letters of 1 September 2011 and 17 November 2015.

VI. The board issued a communication under Article 15(1) RPBA. According to the provisional opinion of the board there was no gap in information which would prevent the skilled person from carrying out the claimed invention.

VII. Oral proceedings took place on 22 December 2015. The appellant, who had announced with letter dated 26 August 2015 that it would not attend, was not present.

VIII. The appellant argued in writing essentially as follows:

The claimed invention was disclosed in such terms that the technical problem and the solution thereto could be understood. Advantageous effects of the invention were indicated and at least one way of carrying out the invention was described in detail by way of example.

The object of the invention, as set out in the description, was to provide an improved method for the removal of mercury, in particular metallic mercury, from gas streams.

As a solution, the patent disclosed various ways of carrying out the invention. Specific embodiments were disclosed, wherein the sorbent comprised one or more of kaolin, meta-kaolin, calcium carbonate, calcium oxide, calcium hydroxide, thermally converted paper waste or residue from paper production.

The person skilled in the art would therefore understand that a sorbent may be made according to the invention, by providing a mixture of active components as indicated in the description. In an alternative, a specific sorbent was obtained from paper waste or paper residue. The correct amount of the sorbent to be used in the process could be determined easily.

Paragraphs [0025] to [0038] of the description disclosed the advantageous effects of the invention, in particular a better removal of mercury at elevated temperatures (Table 1), further potential improvements

from adding calcium hypochlorite, and the possibility of using the sorbent in a fixed bed or dispersed in a gas stream.

In the example, a specific sorbent obtained in accordance with D5 was used. To prepare said sorbent, a calcium and kaolin (i.e. silica-alumina)-containing raw material, such as paper or residues obtainable from paper production and recycling waste paper, was thermally treated in a fluid bed at an elevated temperature of 720°C to 850°C. The raw material was thus converted to a sorbent comprising at least meta-kaolin. The chemistry involved in the process was clear for a person skilled in the art. The sorbent of D5 clearly fell under the scope of present claim 1.

In summary, the patent in suit contained sufficient information as to how the sorbent could be obtained and which active ingredients it was composed of.

IX. The respondent essentially argued as follows:

The skilled person was left in doubt as to how a sorbent could be obtained which fulfilled the main claim's broad language over its complete scope. There was no indication in the opposed patent what a sorbent was that comprised *"a mixture of substantially silica-alumina compounds and/or calcium compounds, wherein said calcium compounds comprise calcium carbonate and/or calcium oxide"*. The skilled person would have to choose arbitrarily to create a sorbent consisting "substantially" of silica-alumina compounds, "substantially" of calcium compounds or "substantially" of silica-alumina compounds and calcium compounds. The patent in suit did also not disclose what was meant by the qualifying attribute "substantially". The method of

producing the sorbent was not disclosed.

The opposed patent disclosed only one example (Table 1, paragraph [0024]) for a small amount (60g) of sorbent only. However, the example could not be reproduced because the nature of the sorbent was not revealed.

The reference in the description to NL 1009870 (equivalent to D5) could not remedy the lack of disclosure, firstly because it placed an undue burden on the skilled person and secondly because it was ambiguous with respect to the sorbent material. Document D5 did not teach that the sorbent could be used for removing mercury. According to the case law, common technical knowledge was normally text book knowledge only (see T 276/99), and did not include patent documents such as D5.

Moreover, it was implausible that any sorbent encompassed by claim 1 of the opposed patent would be able to absorb mercury at the tested temperatures. Therefore, the claimed invention could not be carried out over the full scope of the claims.

X. Requests

The appellant requested that the decision under appeal be set aside and the case be remitted to the opposition division for further prosecution.

The respondent requested that the appeal be dismissed or, as a subsidiary request, that the case be remitted to the opposition division for further prosecution.

Reasons for the Decision

1. Sufficiency of disclosure

1.1 *General remarks*

In order to establish insufficiency of disclosure, it is normally necessary to identify gaps in information, either from limitations in teaching or from a lack of guidance in general, or a lack in guidance in case of failures. Any defects may be remedied taking into account the skilled person's common general knowledge. The disclosure must also be reproducible without undue burden, in the whole range claimed (see T 409/91, OJ 1994, 653).

It is established case law that the objection of lack of sufficient disclosure presupposes that there are serious doubts, substantiated by verifiable facts (see T 19/90, OJ EPO 1990, 476). In opposition proceedings the opponent bears the burden of proof that the invention cannot be carried out within the whole range claimed (see T 182/89, OJ 1991, 391).

1.2 *The patent under appeal*

The patent under appeal is concerned with a method for removing mercury from a gas stream. In particular, the object of the patent is to provide a method for removing mercury of metallic and ionogenic type from a gas stream at temperatures of above 230°C.

For this purpose, the patent proposes a method wherein the mercury removal step comprises contacting the hot gas stream with a sorbent. According to claim 1 as granted, the sorbent comprises as the active component

a mixture of substantially silica/alumina compounds and/or calcium compounds, wherein said calcium compounds comprise calcium carbonate and/or calcium oxide.

1.3 *Effects of the claimed method*

For the board, it is plausible from the example and from the data presented in Table 1 and in Figures 1 and 2 of the patent that mercury in both its metallic and ionogenic forms may be removed from a hot gas stream in appreciable percentages (see Table 1), in particular at higher temperatures. In fact, neither the respondent nor the opposition division disputed that the disclosed method was effective in removing mercury.

1.4 *The sorbent*

As to the sorbent to be used in the claimed method, the patent discloses the following:

- According to paragraph [0012] and claim 1, the active component of the sorbent is comprised of a mixture of mainly silica-alumina compounds and/or calcium compounds.

- According to a first preferred embodiment, the sorbent comprises kaolin, that may or may not be in the dehydrated form of meta-kaolin (see paragraph [0013] and claim 2).

- According to a another preferred embodiment, the sorbent comprises calcium carbonate and/or calcium oxide. The calcium fraction of the sorbent typically consists of 60 to 70% of calcium carbonate and 40% to 30% of calcium oxide. The sorbent may also contain

calcium hydroxide, typically in an amount of less than 10% by weight (see paragraph [0013]).

- Another optional additive is an oxidizer (such as peroxides or hypochlorite) (see paragraphs [0018] to [0020] and claims 6, 7 and 12).

- According to another preferred embodiment, the sorbent is obtained by the thermal conversion of a material chosen from (i) paper waste and (ii) residue from the paper production (as described in D5) (see claim 4 and paragraphs [0014] and [0025]).

1.5 *The board's opinion*

1.5.1 The board concurs with the view of the opposition division that a clear and complete disclosure of the sorbent is essential for putting the claimed invention into practice, all other claim features being trivial.

In view of point 1.4 above, the board considers that the patent under appeal clearly discloses several classes of chemical substances for use as sorbents. In selecting a suitable sorbent, it should also be borne in mind that the sorption mechanism at higher temperatures is disclosed to be predominantly of the chemical sorption type, as opposed to physisorption at lower temperatures. Thus, by perusing the patent's information and by relying, where necessary, on common technical knowledge, the board has no reason to doubt that the skilled person is able to obtain substantially all embodiments of sorbents falling within the ambit of the claims.

1.5.2 The respondent argued that *"it was hard to believe and herewith denied that any sorbent encompassed by claim 1*

of the opposed patent will be able to absorb mercury at the tested temperatures" (see surrejoinder of 17 November 2015, page 3).

- 1.5.3 In general, a granted patent carries a presumption of validity, in particular, that it relates to an invention which is disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. In order to rebut this presumption, substantial arguments and evidence are required from the respondent's side.

In the present case, in view of the broad groups of sorbent compounds and compositions which fall under its scope of the claimed invention, relatively simple experiments should have been sufficient for identifying any possible sorbents or sorbent composition that would not solve the problem of removing mercury from a gas stream at a temperature of above 230°C. However, No such evidence was been brought forward. Rather, the respondent's arguments did not go beyond the mere assertion that *"the skilled person was left in doubt as to how a sorbent could be obtained which fulfilled the main claim's broad language over its complete scope"* (see the respondent's rejoinder of 1 September 2011, page 2). In the board's opinion, however, there can be no doubt that obtaining a sorbent whose active component comprises a mixture of substantially silica-alumina compounds and/or calcium compounds, wherein said calcium compounds comprise calcium carbonate and/or calcium oxide is in itself a trivial task, as the recited substances are all well known and easily available.

The respondent thus failed to provide any tangible evidence that specific sorbents or sorbent compositions

falling within the (rather) broad scope of claim 1 were not suitable for the purpose of removing mercury.

- 1.5.4 The respondent furthermore referred to Figure 2 of the opposed patent as a demonstration *"of the fact that sorbents with different chemical composition [had] differing mercury sorption attitude at different temperatures"*. It concluded that even at constant temperatures, different sorbents would exhibit different sorption attitude for mercury in a gas stream. The great number of possible variants of sorbent and temperature would constitute an undue burden for the skilled person (see surrejoinder of 17 November 2015, page 3).

The board cannot recognize how such an argument, which essentially concedes that the claimed invention can be worked with a variety of sorbents, albeit with a varying degree of efficiency, could in itself give rise to an objection of insufficiency.

- 1.5.5 The respondent argued that the disclosed example was meaningless and did not contribute to a sufficient disclosure of the sorbent used for the allegedly inventive method.

However, Rule 42(1)(e) EPC only requires the presence of examples "where appropriate", that is to complete an otherwise incomplete teaching. In the present case, there can be no doubt that the sorbent used in the example was one in accordance with the invention, as it is clearly stated in the specification that it was obtained by thermal conversion of residues from paper production (see paragraphs [0014] and [0025]). Therefore, the respondent's objection is unfounded.

1.6 *Reference to other documents as a supplementary source of information*

1.6.1 Contrary to the opinions of the respondent and the opposition division, the board considers it allowable to refer to patent literature for a disclosure of obtaining a sorbent from paper making residues. The sorbent produced by the method of the NL patent (or D5) is a substance comprising meta-kaolin obtained in a thermal fluidized bed process which is in detail described in D5. The circumstance that in the process the so-called "freeboard temperature" is stated to be "850°C or lower" (emphasis added) does not, in the board's view, mean that the process could not be carried out. The skilled person would not, in a first attempt, start from extremely low freeboard temperatures, for instance close to room temperature, when a temperature as high as 850°C is specifically mentioned in the prior art document.

1.6.2 The sorbent produced in accordance with D5 is, as correctly observed by the respondent, a meta-kaolin-comprising substance (the kaolin being present from the paper-making process). This is not in contradiction with the claims of the patent under appeal, according to which the sorbent may comprise kaolin (a silica-alumina compound) or meta-kaolin (the latter being the dehydrated form of kaolin).

1.6.3 The respondent argued that D5 did not teach that the sorbent derived from paper making residues could be used for the removal of mercury from a gas stream, but only for the removal of Pb, Cd and Pb/Cd.

For the board, this argument is besides the point, because the teaching that (inter alia) the sorbents of

D5 may be used in a process for removing Hg from a gas stream is precisely what the opposed patent proposes in the claimed method and inter alia distinguishes the patent in suit from D5.

- 1.6.4 Referring to T 171/84 (OJ EPO 1986, 95), the respondent questioned whether a patent document in the Dutch language, such as NL 1009870, could be qualified as a disclosure which was directly available and unambiguously understandable for the skilled person. The board considers however that the expression "directly available" in the cited decision refers to (physical) availability, not to the potential ease with which a document may be appraised. Although referring to T 171/84, the respondent did not argue that the NL document had not been available. In any event, the argument is pointless as the family document D5 in English language exists.
- 1.6.5 The board can also not share the respondent's view that it was an undue burden for a skilled person to have to refer to other patent literature. It is true that in decision T 276/99 the board advises that *"[s]omething which is critical for the understanding of the invention should appear in the patent specification, and not be incorporated by a reference. Where a reference in the description is to published prior art, a mere reference may be sufficient as such prior publication will not normally relate to the essence of the invention. Even in such a situation it may be necessary that for ease of consultation some prior published information should appear explicitly in the patent specification rather than by a mere reference (see decision T 211/83 of 18 May 1984, not published in OJ EPO). [...]. Substituting an admittedly essential part of the description by a reference to the*

A-publication would simply impose an added burden on all who had to look at the patent specification and might introduce considerable uncertainty."

The present situation is however different; there is no question of reference to the A-publication. Furthermore, a considerable amount of information regarding the method for obtaining a product as described in D5 is already found in the specification (paragraph [0025]) of the opposed patent. As however the sorbent obtained by thermal conversion of paper production residues is only one embodiment of the sorbents which can be used in accordance with the patent in suit, the board finds it acceptable to refer to other document(s) for still further details.

1.6.6 In summary, the respondent did not demonstrate that a useful sorbent could not be obtained by the process disclosed in D5 and, by reference and implication, in accordance with the patent under appeal.

1.7 *Conclusion*

The board thus considers that the patent in suit, as far as the claimed method is concerned, does not suffer from gaps in information or lack of guidance. It discloses the claimed invention in a manner sufficiently clear and complete for it to be carried out by the skilled person.

The requirements of Article 83 EPC are thus met.

2. Further arguments of the respondent concern the interpretation of certain claim features, such as the qualifier "substantially", the scope of the claimed subject-matter and the question of support of the

claims by the description (see letter dated 1 September 2011, page 5, last paragraph). These objections are in substance objections under Article 84 EPC which is not a ground of opposition (Article 100 EPC). They are therefore not to be considered in opposition appeal proceedings.

- 2.1 According to another argument of the respondent, the skilled person was left in doubt as to how a sorbent could be obtained which fulfilled the main claim's broad language over its complete scope (see letter dated 1 September 2011, page 2, last paragraph). However, it has been emphasised in numerous decisions of the Boards of Appeal that the mere fact that a claim may be broad is not in itself a ground for considering that the application does not comply with the requirement that it be sufficiently disclosed under Article 83 EPC (see Case Law of the Boards of Appeal, 7th Ed. 2013, page 318, section 6.1.4 and the decisions cited there). In the present case, the respondent did not put forward plausible arguments as to why the claims should be considered unduly broad and why such an objection (which *prima facie* appears to touch on questions of Articles 84 and 56 EPC) should be at all considered under Article 83 EPC.

3. Remittal

It follows from points 1.5 to 1.7 above that the contested decision revoking the patent must be set aside and examination of the opposition must be resumed.

Both parties requested that if the board should allow the appeal, the case be remitted to the opposition division for further prosecution. Regarding the fact

that the opposition division did not yet give its opinion on central issues of patentability, such as novelty and inventive step, in view of the prior art, these requests seem to be well-founded. Therefore, the board exercises the discretion conferred to it by virtue of Article 111(1) EPC and decides to remit the case.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance for further prosecution.

The Registrar:

The Chairman:



C. Vodz

J.-M. Schwaller

Decision electronically authenticated