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**D E C I S I O N**  
of 29 January 1998

**Case Number:** T 0060/95 - 3.3.5

**Application Number:** 88901945.1

**Publication Number:** 0399999

**IPC:** D21C 11/04

**Language of the proceedings:** EN

**Title of invention:**

Method for green liquor cleaning in sulphate pulp mills

**Patentee:**

Caustec Aktiebolag

**Opponent:**

A. Ahlströhm Corporation

**Headword:**

Green Liquor Cleaning/CAUSTEC

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step (yes, after amendment) - determination of the closest state of the art and the relevant technical problem"

**Decisions cited:**

T 0606/89, T 0439/92, T 0495/91, T 0478/91, T 0390/88,  
T 0002/83

**Catchword:**

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Case Number: T 0060/95 - 3.3.5

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.5  
of 29 January 1998

**Appellant:** Caustec Aktiebolag  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 8 November 1994  
revoking European patent No. 0 399 999 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** R. K. Spangenberg  
**Members:** G. Dischinger-Höppler  
W. Moser

## Summary of Facts and Submissions

I. The appeal is from the Opposition Division's decision revoking European patent No. 0 399 999. The decision under appeal was based on 2 claims presented as main request and one single claim presented as auxiliary request on 25 October 1995. The Opposition Division, after having considered 21 documents, held that the subject-matter of Claim 1 of the main request lacked novelty in respect of

D1: US-A-1 587 679,

and that the subject-matter of Claim 1 of the auxiliary request lacked inventive step.

II. On 26 November 1997 the Appellant (patent Proprietor) filed new claims according to main request, first, second and third auxiliary request (only one claim each).

The single claim according to main request read as follows:

"A method for filtering green liquor, which comprises adding a filter aid to the unclarified green liquor under agitation and removing the solid particles from the green liquor using a pressure filter, characterized in that as filter aid caustic lime is used in an amount of 1 to 3% of the quantity required for complete causticization (corresponding to 2.5 to 7.5 kg of caustic lime per metric ton pulp)."

III. Oral proceedings were held on 29 January 1998.

IV. During the oral proceedings, the following documents were taken into consideration in addition to D1:

D18: Lumikko, Application of Pressurized Filtration in Recausticizing, 1981 Int'l Conf. on Recovery of Pulping Chemicals, pages 99 to 105,

D19: US-A-4 388 197 (corresponding to SE 8103333-4, cited in the patent), and

D20: EP-B-0 125 163.

V. The Appellant's written and oral submissions can be summarized as follows:

- The patent concerned the clarification of green liquor by removing the fine particles contained therein by filtering in advance to a causticization step. In the prior art the clarification was usually done by merely settling the particles. Only in very recent times filtration of green liquor was considered to be a practically useful method. This was evident from D18 and D19 which both used CaCO<sub>3</sub> in the form of mud or sludge as filtration aid in pressurized filtration. This method was, however, not satisfactory with respect to filterability. The problem underlying the patent in suit was, therefore, to provide a method for filtering green liquor having a better filterability.

D18 and D19 were silent about the amount of filter aid to be added and contained no hints as to a possible use of caustic lime. As could be seen from Example 1 of the patent in suit, the claimed method surprisingly resulted in an improved filterability.

- D1 was not concerned with the clarification of green liquor but only with the removal of colouring matter to produce white CaCO<sub>3</sub>. An improvement of filterability was not considered in D1, nor was there any mentioning of pressure filtration. Moreover, D1 was an old document and published at a time (in 1926) where green liquor was usually not clarified.
- Substantially the same object was addressed in D20. The process disclosed therein included a step of filtering green liquor after adding 5-10% of the slaked lime required for its causticization. Thus, there was no incentive to use less lime, let alone caustic lime in an amount of only 1-3% as presently claimed.

VI. The Respondent (Opponent) contested the Appellant's arguments as set out below:

- While it was true that D1 concerned a process for the recovery of pure CaCO<sub>3</sub> from caustic liquors, it nevertheless included a method for clarifying green liquor as an essential precondition for obtaining the pure CaCO<sub>3</sub> by precipitating and subsequent filtering the impurities from the green liquor.

In addition, it was known from D20 that filtration of green liquor was rendered more effective by partial causticization prior to the filtration step. D20 further demonstrated that the use of lime in the filtering of green liquor was not only mentioned at the time of D1 but also very recently

in 1983, the priority date of D20. Hence, the Appellant's assertion that the only filtration methods known before the priority date of the opposed patent used lime sludge as a filter aid was incorrect.

- In accordance with T 606/89, the closest prior art was generally that document which corresponded to a similar use requiring a minimum of structural and functional modifications. Since D1 and D20 as well as D18 and D19 all referred to methods for filtering green liquor, they all dealt with the same use as the patent in suit. In D18/19 these modifications consisted in the type and amount of filtering aid, in D1 in the amount of filter aid and the use of pressure during filtration. D20 left in addition the choice between CaO and Ca(OH)<sub>2</sub> for use in the preacidification step. Therefore, either D1 or D20 represented the closest prior art. Nevertheless, D20 was considered to represent the 'best' prior art because it already hinted at the objective problem underlying the patent in suit.
  
- Starting from D20 as the closest prior art and looking for a solution to the objective problem of improving filterability, the skilled person was only confronted with the choice to select from CaO and Ca(OH)<sub>2</sub> as filter aid. Since the Appellant did not show whether CaO improved filterability over Ca(OH)<sub>2</sub>, the choice of CaO did not require an inventive step. Likewise one skilled in the art would have attained the subject-matter of Claim 1 if he had started from D1, because he would have taken into consideration that the use of a pressure filter belonged to the common general knowledge of the expert as reflected by D18/19.

Even if one started from D19, one would have been led to the solution of the above problem of improving filterability, because in the light of D20 it was obvious to try the replacement of CaCO<sub>3</sub> by CaO.

Eventually, the adaptation of the amounts of lime was no more than routine work, in particular since the lower amounts did not show any surprising advantage and were not covered by the examples given in the patent in suit.

VII. The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of

- (a) single claim filed on 26 November 1997 as main request or
- (b) single claim filed on 26 November 1997 as first auxiliary request or
- (c) single claim filed on 26 November 1997 as second auxiliary request or
- (d) single claim filed on 26 November 1997 as third auxiliary request.

The Respondent requested that the appeal be dismissed.

## Reasons for the Decision

1. The appeal is admissible.
2. After examination of the new claim of the main request, the Board has reached the conclusion that the subject-matter as defined in that claim complies with the requirements of Article 123 EPC. Since no objections were raised in this respect, it is not necessary to give reasons for this finding.
3. None of the cited prior art documents discloses a method having the combination of features as set out in the claim of the main request. The subject-matter of this claim is, therefore, novel. Since this is not contested, there is no need to give further details.
4. The only relevant question that remains to be answered in the present appeal is therefore that of inventive step.
  - 4.1 Closest prior art and problem to be solved
    - 4.1.1 The problem stated in the patent in suit is to provide a method for filtering green liquor having improved filterability (see specification, page 2, lines 49/50). In formulating this problem, the patent in suit starts from the pressurized filtration method taught in SE-A-8103333-4 which is a family member of D19 (see specification, page 2, lines 43 to 48) and is in the name of the author of D18.
    - 4.1.2 By contrast, the Respondent relied upon D1 and D20 as the closest prior art. In his opinion the objective problem of the patent in suit was to improve the effectiveness of green liquor filtering with respect to a recovery of pulp chemicals in general, which problem



was the same as in D1/20 and D18/19. However, D1 and D20 do not mention pressurized filtration, so that any mentioning of filtration therein must be interpreted as relating to conventional, ie unpressurized filtration.

In the Boards judgement, when determining the closest prior art document, the problem mentioned in the patent in suit should normally not be changed. Since pressure filtration is not mentioned in D1/20 it follows that by using D1/20 as the closest prior art a redefinition of the problem would be necessary. With respect to the avoidance of the risk of a judgement on an ex post facto analysis, such a redefinition should only be considered if the prior art used as a starting point in the patent is inapplicable or if the problem mentioned in the patent is not solved (see e.g. decision T 495/91 of 20 July 1993, reasons no. 4.2).

Moreover, contrary to the Respondent's submission (see point VII above), the condition mentioned in decision T 606/89 of 18 September 1990, namely that the closest prior art must be concerned with a similar use which requires a minimum of structural and functional modifications (see reasons no. 2) is not met by D1 and D20 either. Neither D1 nor D20 refer to the improvement of filterability of green liquor, but to the recovery of white CaCO<sub>3</sub> - which is suitable as a pigment - from residual liquors from the cooking of wood (see in D1, page 1, lines 22 to 26; in D20, column 1, lines 3 to 9) and, hence, to a different use as compared to the patent in suit and to D18/19. In any case, D1 and D20 do not contain anything from which it could be concluded that the methods disclosed therein could be rendered suitable for pressure filtration, no matter by

what modification. In the Board's judgement, there is thus no link between the problem set out in the patent in suit and the "closest" prior art chosen by the Respondent (see e.g. decision T 439/92 of 16 May 1994, reasons no. 6.2.2).

Hence, in accordance with the Appellant's opinion, the method described in D18 and D19 represents the closest prior art.

- 4.1.3 Example 1 of the patent in suit shows that in a pressure filtering process the filtering properties can be considerably improved by using caustic lime (CaO) as claimed instead of lime sludge (CaCO<sub>3</sub>) as taught in D19. However, as pointed out by the Respondent, example 1 c, the only one which epitomizes the invention, is outside the claimed amount of caustic lime of 1-3% of the quantity required for complete causticization, because 2.5 kg/m<sup>3</sup> liquor corresponds to 8.75 kg/metric ton pulp (as can be inferred from the specification of the patent in suit, page 2, line 36) and hence to 3.5% of the quantity required for complete causticization. It is further true that 2.5kg/m<sup>3</sup> CaO result in about 4.5kg/m<sup>3</sup> CaCO<sub>3</sub> after partial causticization. This is to be seen in comparison with example 1 b using 3.5kg/m<sup>3</sup> CaCO<sub>3</sub> in the form of lime sludge. In addition, the same cleaning effect was obtained, no matter whether CaCO<sub>3</sub> (example 1b), CaO (invention, example 1c) or nothing at all (example 1a) was added (see page 4 of the specification of the patent in suit, lines 23/24). In the Respondent's opinion it is, therefore, questionable whether the claimed method solved the above problem.

Under these circumstances, and in accordance with the established jurisprudence of the Boards of Appeal, it has to be established whether the alleged improvement is effectively obtained on the overall balance of probabilities, with the implication that it has to be

considered which set of facts is more likely to be true. In this context, it has to be born in mind that the burden of proof regarding any allegation of fact lies with the party which alleges it. It is, therefore, not enough for the Respondent to merely dispute that an effect has been shown by the Appellant, if the presence of this effect is not prima facie incredible or implausible. In the present case, the Respondent did not provide sufficient evidence to show that the method of Claim 1 did not solve the problem posed.

On this basis, the Board is convinced that the object of improving filterability has actually been attained by the claimed method, because the improvements shown in example 1, which consist in a threefold running time and in a production raised by one and a half, are such that it is not credible that by lowering the amount of CaO from 3.5% to 3% or below, this effect would completely disappear. It is, for example, not plausible that by using CaO in an amount of 1.95 kg/m<sup>3</sup> (ie 6.8 kg/metric ton or 2.7%) which corresponds to 3.5 kg/m<sup>3</sup> CaCO<sub>3</sub> as in comparative example 1b and to a lowering of only 30 % of the amount of CaO used in representative example 1c, no increase in the running time and production would occur. On the contrary, the Board infers from Example 1 that there must be a positive effect for practically the whole claimed range.

The problem mentioned in the specification in view of the method disclosed in D18 or D19, namely to improve filterability of green liquor in a pressurized filtration device, has therefore been effectively solved by the claimed method and must thus be taken into account when assessing whether that method involves an inventive step.

4.2 Inventive step

4.2.1 The patent in suit proposes to solve the problem set out above, i.e. the improvement of filterability, by using specified amounts of caustic lime as a filtering aid.

4.2.2 The method taught in D18 and D19 differs from the subject-matter of Claim 1 in that  $\text{CaCO}_3$  (lime sludge or lime mud) is used instead of  $\text{CaO}$  (see in D18, page 101, part 3; in D19, Claim 1 and column 3, lines 1 to 24) and in that no amounts are given for the  $\text{CaCO}_3$  to be added. The question to be answered is, therefore, whether in the light of the available prior art, i.e. D1 and/or D20, it was obvious for one skilled in the art to modify the known process with a view of improving the filterability through a pressure filter of green liquor in the way proposed by the patent in suit.

In accordance with the Respondent's line of argument, the Board is of the opinion that the process disclosed in D1 and D20 indeed includes the clarification of green liquor by means of filtering with lime as a filtration aid (see in D1, page 1, lines 1 to 91; in D20, column 2, line 56 to column 3, line 37, Examples 1 and 3) as a precondition for obtaining  $\text{CaCO}_3$  in purified form. D20 even mentions that the effectiveness of the filtering can be improved by a partial causticization in advance to the filtering step which consists in adding 5-10% of the lime necessary for complete causticization (see column 4, lines 29 to 38 and example 3). In D1 it is said that, after adding 5-10% of lime, the entire insoluble matter can be filtered out (see page 1, lines 71 to 89). Whereas in the Board's judgement the term "lime" in D20 clearly relates to slaked lime ( $\text{Ca(OH)}_2$ ) (see column 3, lines 1 to 5 and Examples 1 and 3), the Board can agree with

the Respondent's submission that "lime" in D1 means caustic lime (CaO). However, in the first place both of these documents are concerned with the removal of colouring matter by filtration and, hence, with the possibility of capturing the dregs contained in the green liquor by adding lime in order to obtain a white CaCO<sub>3</sub> product. They do not suggest or hint at any possible improvement of filterability, which includes properties like filter capacity (ie production and throughput) and service life (ie clogging time or running time). Moreover, in both cases said improvements or advantages have to be compared with the addition of nothing, ie with the addition of no filter aid at all.

4.2.3 Concerning D1, the Appellant emphasized the period of over 60 years which had elapsed between publication of said document (1926) and the filing date of the patent in suit. While in accordance with several decisions of the Boards of Appeal, in certain circumstances, the age of a document might be an additional indication of inventive step, the period of time to be considered is not necessarily the period between the publication of the old document and the filing of the European patent application but, in the present case, rather that between the time the problem became apparent and the date of filing of the European patent application providing a solution thereto (see in T 478/91 of 2 June 1993, reasons no. 3.6). In the present case, the problem of filterability of green liquor in a pressure filter became apparent not before the International Conference on Recovery of Pulping Chemicals in 1981, which is the origin of D18. Moreover, D20 shows that the method of D1 is not an old technique but was further considered up to the time of the patent in suit. The Board cannot, therefore, see that the age of D1 could be relevant to the question of inventiveness of the now claimed subject-matter.

The Board, nevertheless, does not consider that D1 can suggest the claimed solution of the problem posed because D1 does not mention the problem of filterability. Moreover, D1 proposes to use  $\text{CaCO}_3$  as an alternative for lime (see page 2, lines 37 to 46 and Claim 7). The person skilled in the art would therefore not expect that using lime in a process as disclosed in D18 or D19 instead of lime sludge ( $\text{CaCO}_3$ ) would result in any improvement at all, let alone in the improvement of filterability to be considered here.

- 4.2.4 D20 unequivocally uses slaked lime, not caustic lime, for partial causticization (see column 3, lines 1 to 5 and Examples 1 and 3). From the chemical point of view, it is certainly true that the effect of an addition of lime, whether slaked or caustic, to the green liquor must be the same with respect to the product obtained, since  $\text{CaCO}_3$  is formed by the reaction of both starting materials with the  $\text{Na}_2\text{CO}_3$  contained in the liquor. It is, nevertheless, credible that in accordance with the respective findings in the specification of the patent in suit (page 3, lines 5 to 9), the  $\text{CaCO}_3$  produced according to the now claimed method might have particular physical properties which make filtration easy and prevent the filter from clogging. It is further credible that, as pointed out by the Appellant, in the case of caustic lime these properties might be due to the fact that slaking with water and chemical reaction with  $\text{Na}_2\text{CO}_3$  occur, rather simultaneously, on the surface of the  $\text{CaO}$  particles. Consequently, in respect of the improvement of filterability it is not merely a matter of choice, as submitted by the Respondent, to substitute in D20 the slaked lime by caustic lime. The Board is, therefore, satisfied that even if a skilled person had at all considered to combine the technical teachings of D18/19 with D20,

which, like D1, does not mention the problem of filterability, such a combination would have resulted in the suggestion to use slaked lime ( $\text{Ca}(\text{OH})_2$ ) as filter aid in the method of D18/19 and would, therefore, not have led to the claimed method.

- 4.2.5 Even if, in the Respondent's favour, the Board had considered D1 or D20 to represent the closest state of the art, the combination of the methods described in these documents with the process of D18/19 would not have led to the claimed method in an obvious way:

In the Board's judgement, the problem to be solved in relation to D1 and D20 consists in providing a (further) method suitable for filtering green liquor on an industrial scale. In view of the examples in the patent in suit (see point 4.1.3 above), the Board considers that this problem is effectively solved by the claimed method.

Starting from D1, the question is not whether the skilled person could have used  $\text{CaO}$  in the method taught in D18/19 (see decision T 2/83, OJ EPO 1984, 265). Rather, the relevant question is whether he would have done so in the reasonable expectation to solve the respective technical problem. This is, however, not the case here, because, as pointed out under point 4.2.3 above, there was no reason to expect that, for use in a pressure filter,  $\text{CaO}$  could be a better filter aid than  $\text{CaCO}_3$ .

Likewise, the skilled person looking for suitable means for adapting the process of D20 to industrial standards would at best have used  $\text{Ca}(\text{OH})_2$  as a filter aid in a pressure filtration method as taught in D18/19 (see point 4.2.4 above).

- 4.2.6 Consequently, starting from D20 the invention as set out in the single claim of the main request has not been rendered obvious, even though there was no surprising improvement of filterability in comparison with the use of slaked lime. Contrary to the Respondent's opinion, it was, therefore, not necessary to present comparative examples with respect to that use of slaked lime in the method according to D18/19, as might have been suggested by D20, in order to establish inventiveness (see also decision T 390/88 of 20 February 1990, reasons no. 8).
- 4.2.7 Finally, the Board observes that, in any case, regardless of the document selected as a starting point, there remains the fact that according to the claimed subject-matter the amount of lime to be added is only 1-3% of the amount required for complete causticization. As explained under point 4.1 above, it is credible that a positive effect occurs within this range, even if the amount given in the example of the specification is just outside. No amounts are mentioned in D18/19. The amount recommended in the prior art (D1/20) for partial causticization and using conventional filtering is 5-10%. The Board is, therefore, not convinced that it was a mere matter of routine for one skilled in the art to use an amount of CaO within the above range with the expectation that benefits in pressurized filtration could be obtained.
- 4.3 The patent in suit can thus be maintained with the sole claim according to the main request. Concerning the necessary adaptation of the description, the Board makes use of its power under Article 111(1) EPC, second sentence, and remits the case to the Opposition Division, in accordance with the Appellant's request. The Board observes, however, that the Opposition Division should carefully consider whether this adaptation requires, in the present case, the deletion



of the Examples, in particular Example 1c, since they still may contribute to the intelligibility of the invention as claimed, or may even be necessary therefor.

- 4.4 Since the Appellant's main request is found allowable, there is no need to consider the auxiliary requests.

### Order

#### For these reasons it is decided that:

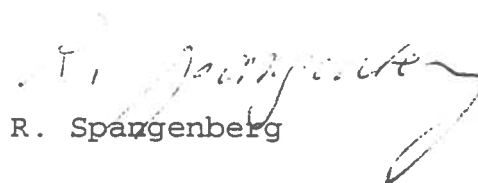
1. The decision under appeal is set aside.
2. The case is remitted to the Opposition Division with the order to maintain the patent with the single claim, filed on 26 November 1997 as main request, and the description to be adapted thereto.

The Registrar:



A. Townend

The Chairman:



R. Spangenberg

