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Datasheet for the decision of 24 September 2009

Case Number: T 1684/06 - 3.3.05

Application Number: 93924842.3

Publication Number: 0666831

IPC: C01B 15/01

Language of the proceedings: EN

Title of invention:
Process associated with the gasification of cellulose spent liquors

Patentee:
Chemrec Aktiebolag

Opponent:
Eka Chemicals AB

Headword:
Cellulose pulp bleaching /CHEMREC

Relevant legal provisions:
EPC Art. 56

Relevant legal provisions (EPC 1973):
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Keyword:
"Inventive step (no) - starting point: prior use (corroborated by a further document); obviousness: common general knowledge and incentive in prior art".

Decisions cited:
T 0891/98, T 0167/93

Catchword:
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Case Number: T 1684/06 - 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 24 September 2009

Appellant: (Patent Proprietor)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 11 September 2006 revoking European patent No. 0666831 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: G. Raths
Members: J.-M. Schwaller
C. Vallet

Summary of Facts and Submissions

I. This appeal was lodged by the patent proprietor (hereinafter "the appellant") against the decision of the opposition division revoking European patent No. 0 666 831.

II. The patent had been granted by the examining division pursuant to the order of the present board given in decision T 891/98 of 22 January 2002 with a claim 1 worded as follows:

"*Process for bleaching cellulose with hydrogen peroxide in a mill comprising a spent liquor combustion/ gasification plant, a water gas reforming plant, a plant for production of hydrogen peroxide, and a bleaching plant, the process comprising:*
- diverting spent liquor from pulp produced in the mill;
- feeding said liquor to said combustion/gasification plant; partially oxidising or gasifying said liquor at a temperature exceeding 500°C, thereby forming a gas containing hydrogen and carbon monoxide;
- feeding said gas to said reforming plant;
- reforming said gas to increase its hydrogen content;
- feeding hydrogen in said reformed gas to said plant for producing hydrogen peroxide;
- forming hydrogen peroxide from said hydrogen;
- feeding said hydrogen peroxide to said bleaching plant;
- bleaching said pulp with said hydrogen peroxide."

III. Decision T 891/98 can be summarized as follows:

The only document relied upon in the refusal of the examining division was

EP 0 459 963,

which disclosed a process for the partial combustion of cellulose spent liquor.

The application relating to the bleaching of pulp by hydrogen peroxide, the technical problem underlying the invention could not be easily defined starting from a state of the art which was completely silent about the bleaching of pulp and the production of hydrogen peroxide.

In the absence of any prior art citation disclosing the bleaching of pulp by hydrogen peroxide, the undisputable prior use of hydrogen peroxide for bleaching pulp in existing pulp mills represented the closest state of the art.

The problem underlying the invention could be seen in reducing costs and environmental charge of the bleaching of pulp by hydrogen peroxide.

A skilled person trying to economise the bleaching process would normally not consider documents relating to the recovery of cellulose spent liquor, such as EP 0 459 963, and even if he would have had knowledge of this document, he could not find therein any suggestion for producing hydrogen peroxide on site.

"Only with a clear incentive to use the combustion gas for the production of hydrogen would it be obvious to react it with water to increase the amount of hydrogen. Without such an incentive, … the skilled person would not consider optimizing the hydrogen content".

EP 0 459 963 disclosed that the partial combustion of black liquor generates a combustible gas comprising hydrogen, carbon monoxide and carbon dioxide. The skilled person in pulp bleaching technology - who was not an expert in the production of hydrogen peroxide - would not realise, without exercising inventive skill, that the information in EP 0 459 963 could be linked with the production of hydrogen peroxide. Thus the claimed combination of process steps, which were in themselves known in different areas of technology, required more than average skill and was not obvious to a person skilled in the art of pulp bleaching. It was true that the claimed process made use of conventional processes but it was not obvious to combine these processes in the manner claimed to solve the above mentioned problem.

IV. In the contested decision, the opposition division revoked the patent on the ground that above claim 1 did not involve an inventive step in view of the combination of either document

D1: K.T. Liu et al, "*Hydrogen Production form Black Liquor Wastes*", Am. Chem. Soc., Div. Fuel. Chem., Preprints 1976, 21(1), pages 53 to 60,

D2: K.T. Liu et al, *"Pyrolytic Gasification of Kraft Black Liquors"*, Fuels from Waste, 1977, pages 161 to 169, or

D3: US 4 601 786

with the general knowledge represented by documents

D4: US 4 808 264,

D5: Ullmann's Encyclopedia of Industrial Chemistry, 5th Ed., 1989, Vol. A 13, pages 317 to 385,

D6: Ullmann's Encyclopedia of Industrial Chemistry, 5th Ed., 1989, Vol. A 13, pages 443 to 447,

D7: Chemical Economics Handbook, June 1992 pages 741.5000 R to V, or

D8: Ullmann's Encyclopedia of Industrial Chemistry, 5th Ed., 1989, Vol. A 13, page 463

The opposition division concluded that the process according to claim 1 was a juxtaposition or association of conventional reaction steps functioning in their normal way and not producing any non-obvious inter-relationship.

V. In the grounds of appeal filed under cover of the letter dated 9 January 2007, the appellant essentially argued as follows:

– The teaching of documents Dl, D2 and D3 was substantially equivalent to that of document

EP 0 459 963, which had not been considered as the closest state of the art in T 891/98. The reliance on any of these documents would run counter to T 891/98, which was res judicata, and so did the revision of the object of the invention by the opposition division.

– The processes disclosed in documents Dl, D2, D3 and EP 0 459 963 all produce a gas containing substantial amounts of hydrogen, but there was no indication therein of a possible use on site of the hydrogen gas produced.

– By the skilful and unobvious combination of the claimed features, a desirable result from an economic and environmental standpoint was obtained.

VI. Under cover of a letter dated 30 April 2007, the respondent (also opponent) filed observations, in which it held the subject-matter of claim 1 under dispute to be lacking in inventive step.

VII. Oral proceedings took place on 24 September 2009 in the absence of both parties, the absence having been announced in letters dated 2 July 2009 and 18 August 2009, respectively.

VIII. According to the written submissions on file, the board establishes the parties' requests as follows:

– The appellant requests that the decision under appeal be set aside and that the patent be maintained as granted.

– The respondent requests that the appeal be dismissed.

Reasons for the Decision

1. *Binding effect of the decision T 891/98*

Although the subject-matter of claim 1 of the contested patent is identical with the one that the board held as involving an inventive step in T 891/98, the documents and arguments on which the parties relied upon in opposition are different from those on which T 891/98 was based. The factual situation in opposition proceedings was thus different from that of the ex parte proceedings, and so the *res judicata* principle does not apply in the present appeal case.

In any case, a former decision of a board on an appeal from an examining division has no binding effect in subsequent opposition proceedings or an appeal therefrom (T 167/93, points 2.5 to 2.7 and 2.11.3), because the parties are not the same.

2. *Inventive step of claim 1 as granted*

2.1 The contested patent concerns the pulp and paper industry, and the subject-matter of claim 1 relates to a process for bleaching cellulose with hydrogen peroxide.

2.2 In T 891/98, the board held the prior use of hydrogen peroxide for bleaching pulp in existing pulp mills as undisputable and considered this prior use as a suitable starting point for assessing inventive step.

The board does not see any reason in the present case to depart from this starting point, the said prior use being in particular strengthened by the disclosure of document D8, which sets out that at the relevant date hydrogen peroxide was mainly used in bleaching, in particular in bleaching of sulfate and sulfite cellulose, wood pulp and wastepaper (page 463, right-hand column, lines 1 to 7).

2.3 By starting from this state of the art for assessing inventive step, the board also does not see any reason in the present case to depart from the definition of the problem to be solved as set out in T 891/98. It is recalled that the problem to be solved was to be seen in reducing costs and environmental charge of the bleaching of pulp by hydrogen peroxide.

2.4 As a solution to this problem, the patent in suit proposes the process according to claim 1, characterized in that:

- the spent liquor from the pulp produced in the mill is fed to a combustion/gasification plant wherein it is partially oxidised or gasified at a temperature exceeding 500°C, thereby forming a gas containing hydrogen and carbon monoxide;

- said gas being fed to a reforming plant to increase its hydrogen content;

- the hydrogen in the reformed gas being then fed to a plant for producing hydrogen peroxide to form hydrogen peroxide from said hydrogen;

2.5 Examples 1 and 2 in the contested patent show that this technical problem is effectively solved by the process as defined in claim 1 as granted. In both cases, hydrogen peroxide was manufactured from readily available raw material (component stream of a black liquor flow in a sulphate pulp works): so, the aim of reduction of costs was achieved. Black liquor is considered to be a biomass fuel and thus there is also no environmental charge, whereas carbon dioxide originating e.g. from oil (for producing hydrogen) would be a non-biomass source and an environmental charge.

2.6 As regards the question whether the above proposed solution is obvious or not in view of the state of the art, the board came to the following conclusions:

2.6.1 The skilled person, being presumed to be an ordinary practitioner aware of what was common general knowledge in the art at the relevant date, was in particular aware of the information disclosed in the general technical literature illustrated by the excerpts D5 and D6 from Ullmann's Encyclopedia of Industrial Chemistry which can be summed up as follows:

(a) hydrogen is produced, inter alia, through the water-gas shift reaction: $CO + H_2O \rightarrow H_2 + CO_2$ by steam-reforming a synthesis gas obtained from the gasification/partial oxidation of hydrocarbons (D5, in particular page 317 (4.1.2.2. Gasification of Liquid and Gaseous Hydrocarbons) and page 376 (5.3.1. Carbon Monoxide Removal);

(b) hydrogen is used, inter alia, for the production of hydrogen peroxide, e.g. by the anthraquinone process (D6, page 447, paragraph 4.1. Anthraquinone Process (AO Process)).

2.6.2 As to the question who in the present case is the skilled person, the latter must have specific competence in the technical field of processing cellulose bleaching with hydrogen peroxide.

The bleaching operation taking place - as indicated in claim 1 - directly on the pulp mill site, the skilled person inevitably also must be aware of the further cellulose processing steps supposed to take place on the mill's site, and in particular that the residual product from the delignification of wood - the so-called black liquor - can be upgraded by gasification. In this respect, it is to be observed that the patent in suit itself acknowledges the black liquor gasification operation as having already been practised on a commercial scale at the relevant date (see paragraph [0020]), and the board has thus no doubt that black liquor gasification is also part of the basic knowledge of the skilled person.

2.6.3 Under these circumstances, the skilled person faced with the problem identified in item 2.3 has no reason not to take into consideration the teaching of the particular black liquor gasification process disclosed in document D2. According to said teaching the addition of caustic soda to a black liquor increases the hydrogen concentration in the product gas from pyrolytic gasification of black liquor (D2, page 168, item IV, first paragraph) and the production of

hydrogen for ammonia synthesis is a potential application of said black liquor gasification process (D2, page 168, item IV, second paragraph).

2.6.4 The board recognizes - as emphasized by the appellant - that D2 does not explicitly describe the use of the above hydrogen-rich gas for the hydrogen peroxide synthesis. However owing to the strong teaching of document D2 that said hydrogen-rich gas is suitable for ammonia synthesis, there is no doubt that the skilled person - who knows that hydrogen is supposed to be used in the production of hydrogen peroxide (see in this respect item 2.6.1(b))- immediately would recognize the suitability of said hydrogen-rich gas as well as of the process of D2 for the synthesis of hydrogen peroxide. He thus would arrive at a process from which the process according to claim 1 as granted differs in that the synthesis gas from the spent liquor gasification plant is fed to a reforming plant.

2.6.5 The question now is whether this feature - i.e. the feeding of said synthesis gas to a reforming plant, which has the effect of increasing the hydrogen content of said synthesis gas - can be derived from the state of the art.

According to the jurisprudence, the substitution of a technical feature by a feature known as having the same function with regard to the same kind and quality of result is considered as being an obvious technical alternative.

In the present case, the feature whereby a synthesis gas containing carbon monoxide is fed to a reformer is

commonly known as providing the effect of increasing the hydrogen content of the synthesis gas (see item 2.6.1(a) supra), so that its substitution for the feature providing the same technical effect in the process according to D2 - namely the addition of caustic soda to the gasification process - is to be seen as an obvious technical alternative, for which an inventive step is to be denied.

2.6.6 The board observes that this conclusion is corroborated by the statement in the decision T 891/98 that "only with a clear incentive to use the combustion gas for the production of hydrogen would it be obvious to react it with water to increase the amount of hydrogen". As there is no doubt that - as indicated in item 2.6.4 above - this incentive is clearly given by document D2, the board concludes that the skilled person charged with the problem of reducing costs and environmental charge of the bleaching of pulp by hydrogen peroxide would arrive in an obvious way at the combination of process steps of claim 1 by associating the teaching of document D2 with the common general knowledge, as illustrated in documents D5, D6 and D8.

It follows that the subject-matter of claim 1 as granted does not meet the requirements of Article 56 EPC; as this claim belongs to the sole request on file, the request is thus also not allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Vodz G. Raths