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D E C I S I O N
of 23 June 2005

Case Number: T 1181/03 - 3.3.6

Application Number: 01203810.5

Publication Number: 1203841

IPC: D21C 3/24

Language of the proceedings: EN

Title of invention:
Process for continuous cooking of pulp

Applicant:
Kvaerner Pulping AB

Opponent:
-

Headword:
Pulp cooking/KVAERNER

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - no"

Decisions cited:
-

Catchword:
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Case Number: T 1181/03 - 3.3.6

D E C I S I O N
of the Technical Board of Appeal 3.3.6
of 23 June 2005

Appellant: Kvaerner Pulping AB
Box 1033
SE-651 15 Karlstad (SE)

Representative: -

Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 1 October 2005 refusing European application No. 01203810.5 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: P. Krasa
Members: G. Dischinger-Höppler
A. Pignatelli

Summary of Facts and Submissions

I. This appeal is from the decision of the Examining Division to refuse the European patent application No. 01 203 810.5 entitled "Process for continuous cooking of pulp". The decision under appeal was based on an amended set of 10 claims filed under cover of a letter dated 10 February 2003, with independent Claim 1 reading:

"1. Process for continuous cooking of wood chips at elevated pressure and temperature in a vertical digester (1) for production of chemically dissolved pulp, where the digester is provided with a top and a bottom, comprising the following steps:

(a) introducing wood chips and cooking liquor at the top of the digester,

(b) establishing at least one cooking zone in the digester which is maintained at a cooking temperature,

(c) maintaining a mean cooking temperature in the cooking zone at substantially the same temperature level, in the range of 135-180°C, preferably between 140 and 155°C for hard wood and between 150-165°C for soft wood, which mean cooking temperature is maintained for a wood chip dwell time of at least 45 minutes, preferably at least 120 minutes,

(d) extracting cooking liquor from the digester or the wood chip pretreatment system (40) and away from

the cooking process via at least one extraction arrangement (44; 1A, 1B, 1C) arranged between the pretreatment system and the bottom of the digester and conveying it onwards for recovery (1st REC) where this quantity represents a first quantity of used cooking liquor ($Q1_{REC}$),

(e) discharging pulp from the bottom of the digester, the pulp being fed from the digester (1) via a line (20), in which line the pulp is maintained at a pressure level which does not induce cooking in the pulp, and onwards to a pressurized expeller arrangement for expelling liquid in the pulp (7),

(f) expelling the liquid present in the pulp in order to obtain a filtrate,

(g) the expulsion takes place in such a way that the filtrate acquires a high temperature not below the mean cooking temperature by more than 20°C, preferably by not more than 15°C,

characterized in that

(h) a first portion of the filtrate is extracted from the cooking process and conveyed onwards to recovery (2nd REC) where this quantity represents a second quantity of used cooking liquor ($Q2_{REC}$) and which together with the first quantity of used cooking liquor represents the total quantity which is extracted from the system with digester and pressurized wash,

(i) a second portion of the filtrate is conveyed back to the bottom of the digester as dilution liquid,

(j) the ratio of the first quantity of used cooking liquor ($Q1_{REC}$) to the second quantity of used cooking liquor ($Q2_{REC}$) being regulated such that

$Q1_{REC} > 0.1 \cdot (Q1_{REC} + Q2_{REC})$
$Q2_{REC} < 0.9 \cdot (Q1_{REC} + Q2_{REC})$, and
$Q2_{REC} > Q1_{REC}$ ".

Dependent Claims 2 to 10 refer to preferred embodiments of the process of Claim 1.

II. The decision was based on the ground that the claimed subject-matter lacked an inventive step in view of the disclosure of

D1 US-A-5 066 362 in combination with that of

D3 WO-A-00/11263.

The Examining Division held that the method disclosed in D1 differed from the claimed one in that it did not disclose any return of filtrate to recovery "2nd REC" (feature h) nor any ratio of liquors extracted from the digester and the expeller (feature j). However, it was found to be obvious from D1 to regulate the ratio of the withdrawn liquors and from D3 to send flashed effluent to recovery.

III. The Applicant (hereinafter Appellant) filed an appeal against this decision. In its statement of grounds of appeal, the Appellant provided arguments in support of

its opinion that the contested decision was incorrect. In particular, it provided calculations based on the content of 14.5% of dissolved solids in the pulp discharged from the digester in D1 as support of its contention that according to D1 the major part of effluent must have been withdrawn from the digester as was conventional in the art.

IV. In a communication annexed to the summons for oral proceedings held on 23 June 2005, the Board inter alia drew attention to the fact that according to the application in suit the pulp withdrawn from the digester had a solids content of 8 to 12% and that therefore the Appellant's calculations also applied to the application in suit.

V. The Appellant, during the oral proceedings and in writing, submitted in essence the following arguments:

- The process of D1 corresponded to the conventional prior art where the major part of spent liquor was withdrawn from the digester. This was evident from the fact that the pulp discharged from the digester contained only 14.5% of dissolved solids.

- In contrast, Claim 1 disclosed a process wherein the main point of extraction was shifted from the digester to the expeller while maintaining all other parameters of the process.

- The solids content of 8 to 12% mentioned in the application in suit related to the consistency of the pulp and was, therefore, irrelevant for

calculating the amount of organic material dissolved in the pulp suspension.

- Also D3 did not disclose the respective volumes to be extracted from the digester and the expeller.

Therefore, the claimed subject-matter did not lack an inventive step.

VI. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of Claims 1 to 10 submitted under cover of the letter dated 10 February 2003.

Reasons for the Decision

1. The Board is satisfied that the claims as amended in accordance with the only request on file comply with the requirements of Article 123(2) EPC since their wording is supported by the application as originally filed. Since the appeal fails for other reasons, there is no need to give further details.

2. As will be apparent from the assessment of inventive step below, the claimed process is novel in view of the available prior art.

3. *Inventive step*

3.1 The application in suit relates to a process for continuous cooking of wood chips which makes it possible to increase the production capacity of an existing or new digester and to extend the cooking zone

(page 3, lines 35 to 39). So does D1 (column 1, lines 7 to 18) which is mentioned in the application in suit as a relevant prior art document (page 2, paragraphs [0010] to [0012]).

3.2 The state of the art disclosed in D1 qualifies, therefore, as a starting point for the assessment of inventive step. This was not disputed by the Appellant.

3.3 According to D1, the improved production capacity is obtained by using a pressure diffuser for washing the pulp discharged from the digester instead of washing the pulp in the bottom part of the digester. If any, only very little washing should be done in the digester, so that the entire digester can be used for cooking (column 1, lines 19 to 29).

3.4 The Appellant did not dispute the Examining Division's finding concerning the differences between the claimed process and that disclosed in D1 (see II above).

However, the Appellant argued that D1 implicitly disclosed extracting the main part of spent liquor from the digester whereas according to the application in suit more than 50% and up to 90% of the total amount of spent cooking liquor plus washing water from the digester and the expeller is extracted from the expeller (feature (j) of Claim 1). According to the Appellant, it was this difference which solved the technical problem of increasing the yield of cellulose obtained in the digester.

The Appellant, in particular, argued that the yield from chemical cooking was normally around 50% (meaning

that 50% of the amount of the original wood chips were recovered as air dry pulp whereas the other 50% consisted essentially of lignin and hemicellulose and were discharged with the black liquor as dissolved organic solids). Since according to the process of D1, the content of dissolved solids in the pulp withdrawn from the digester was only 14.5%, the major part of the dissolved organic material, i.e. the difference with respect to the 50% contained in the original wood, must have been withdrawn by extracting spent cooking liquor mainly from the digester as was conventional in the art.

Nevertheless, the Appellant at the oral proceedings conceded that it was usual in the art to charge the digester (see feature (a) of Claim 1) with a considerable surplus of cooking liquor as compared to the amount of wood chips and that the ratio was normally around 3.5 (i.e. 3.5 tons of liquor per ton of wood chips). However, since in pulp and paper technology everything was counted on wood, the content of 14.5% of dissolved solids mentioned in D1 did not relate to the pulp withdrawn from the bottom of the digester but to the wood chips introduced at the top.

3.4.1 The Board agrees with the Appellant insofar as the amount of 14.5% in D1 obviously relates to the total of dissolved solids in the pulp withdrawn from the digester but disagrees as concerns the basis of the percentage. Apart from the fact that the Appellant did not provide any evidence in support of its allegation, D1 literally indicates that "the content of solids (dissolved lignin) in the pulp discharged from the digester was about 14.5%, while the solids concentration of the delignifying liquor was about

2-4%" (column 4, lines 56 to 59). There is no doubt from this wording that the percentage of 14.5 indicates the concentration in dissolved solids of the pulp withdrawn from the digester and not the remainder percentage of undesired components which in the Appellant's opinion are left from the 50% contained in the original wood after replacing black liquor during digestion with fresh cooking liquor.

3.4.2 Moreover, it is apparent that the Appellant's interpretation is necessarily incorrect as regards the fibre content of a pulp, i.e. its consistency, since it is generally accepted in the art that this term indicates the percentage by weight of dry solid matter (consisting mainly of cellulose fibres) of the pulp. This fact can also easily be deduced from D1 or the application in suit, where the consistency of the pulp discharged from the digester is given as 8 to 13% or, respectively 8 to 12% (see in D1, column 4, lines 46 to 49; in the application in suit, page 5, lines 7 to 9). If, as alleged by the Appellant, this amount related to the original wood, about 37 to 42% of the originally contained amount of about 50% of cellulose fibres would be lost during the cooking process. This is in complete contradiction to what is actually the purpose and principle of a digester, namely to separate the cellulose fibres from the wood by dissolving essentially all the other components of the wood in the alkaline cooking liquor whilst retaining the fibres almost completely.

3.4.3 In the Board's judgment D1 discloses therefore a process wherein the pulp withdrawn from the digester contains fibres in an amount of 8 to 13% and dissolved

solids in an amount of 14.5%. Since, as indicated above, the fibres are essentially retained during digesting, the above consistency value of 8 to 13% in D1 can only be due to the ratio of cooking liquor added to the wood chips at the top of the digester and some washing water, if any, added at the bottom of the digester (see 3.3 above). The same principle applies to the amount in dissolved solids with the exception that this concentration could be decreased by replacing black liquor during digestion with fresh cooking liquor. If large amounts of black liquor were withdrawn during digestion, anyone skilled in the art would expect that the concentration of the pulp discharged from the bottom of the digester is considerably lower in dissolved solids than in fibres if the yield in final air dry pulp was around 50% counted on the original wood.

However, in D1, the amount of dissolved solids in the pulp (14.5%) is higher than the amount of fibres contained therein (8 to 13%). The Board concludes, therefore, that a person skilled in the art realises from those values that the wood used in D1 must have been rich in lignin and/or hemicellulose and that hardly any spent cooking liquor has been withdrawn from the digester, except for some spent wash liquor, if any, discharged via conduit 42 (column 3, line 48 to column 4, lines 6).

This was eventually conceded by the Appellant.

3.5 Thus, the process of Claim 1 differs from the method disclosed in D1 only in that

- the first portion of the filtrate as defined in feature (d) is conveyed to recovery and

- no more than 90% of the total amount of spent cooking liquor plus washing water from the digester and the expeller is extracted from the expeller.

3.6 The Appellant has not submitted any arguments or evidence as to the technical problem actually solved by these distinguishing features in view of D1. Nor is the Board aware of any other technical result or effect achieved by the claimed process in comparison with the disclosure of D1 than the provision of a further method of continuous cooking of wood chips using a digester and an expeller. Therefore, the technical problem actually solved in view of D1 has to be seen in providing an alternative process. It is credible that, in accordance with Claim 1, this problem can be solved by conveying the first portion of the filtrate also to recovery and by limiting the amount of liquor to be extracted from the expeller.

3.7 It remains to be decided whether or not the claimed solution is based on an inventive step in view of the cited prior art.

3.8 The first distinguishing feature, i.e. sending filtrate from pulp washing to recovery, is usual in the art. This is evident from D3 (e.g. page 7, lines 23 to 26 and page 11, lines 1 to 6) and has never been contested by the Appellant. Therefore, it is obvious for the skilled person to proceed in this manner with the filtrate passed in D1 from the expeller to the flash

tanks, either separately or together with any spent wash liquor discharged via line 42 from the bottom of the digester.

The second distinguishing feature, i.e. limiting the amount of spent cooking liquor withdrawn from the expeller to 90% is a design option which one skilled in the art would consider in accordance with circumstances, in particular, in order to carry out the process of D1 with the optional modest washing at the bottom of the digester.

3.9 The Board concludes, therefore, that a person skilled in the art looking for an alternative to the method disclosed in D1, would consider conveying the first portion of the filtrate also to recovery as is suggested in D3. He would also limit the amount of liquor to be extracted from the expeller to carry out the optional washing at the bottom of the digester as suggested in D1. The selection of withdrawing from the expeller no more than 90% of the total quantity of the spent cooking liquors is arbitrary and one of the options which are obvious to select for a skilled person in order to provide an alternative to the method of D1.

3.10 For these reasons, the Board concludes that the subject-matter of Claim 1 is not based on an inventive step as required by Article 52(1) EPC in combination with Article 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

G. Rauh P. Krasa