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D E C I S I O N
of 9 December 2004

Case Number: T 0893/01 - 3.3.6

Application Number: 97660115.3

Publication Number: 0839949

IPC: D21C 11/10

Language of the proceedings: EN

Title of invention:
Method and arrangement for increasing evaporation capacity of a multi-stage evaporator of spent liquor in a pulp mill

Applicant:
Kvaerner Power Oy

Opponent:
-

Headword:
Evaporation plant/KVAERNER

Relevant legal provisions:
EPC Art. 84, 56

Keyword:
"Feasibility - yes; disclosure supplemented by common general knowledge"
"Inventive step - no; obvious alternative"
"Support of claims - no; description not adapted"

Decisions cited:
-

Catchword:
-

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Case Number: T 0893/01 - 3.3.6

D E C I S I O N
of the Technical Board of Appeal 3.3.6
of 9 December 2004

Appellant: Kvaerner Power Oy
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 22 March 2001 refusing European application No. 97660115.3 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: P. Krasa
Members: G. Dischinger-Höppler
M. B. Günzel

Summary of Facts and Submissions

I. This appeal is from the decision of the Examining Division to refuse the European patent application No. 97 660 115.3 concerning a method and arrangement for increasing evaporation capacity of a multi-stage evaporator of spent liquor in a pulp mill.

II. During the examining procedure, the following documents were cited, *inter alia*:

D1: EP-A-0 068 996,

D2: WO-A-96/12848 and

D4: EP-A-0 036 235.

The Examining Division refused the application in suit for lack of clarity under Article 84 EPC of the then pending Claim 8 for an arrangement of a multi-stage evaporation plant.

The decision under appeal also contained additional remarks indicating that, notwithstanding the reasons for the refusal of the application in suit under Article 84 EPC, the claimed subject-matter, if interpreted so as to give it a clear meaning, would lack novelty and inventive step over the prior art.

The Applicant (hereinafter Appellant) filed an appeal against this decision.

III. In a communication and in an annex attached to the summons to oral proceedings, the Board *inter alia* raised objections under Articles 54 and 56 EPC in view of the disclosure of D4. In the annex reference was also made to document

D5: Ullmanns Enzyklopädie der technischen Chemie, 4th edition, 1972, pages 661 to 662.

In response to these communications, the Appellant filed amended sets of 14 claims in a new request, the last one under cover of its letter dated 16 November 2004, comprising two independent claims, Claim 1 for a method for increasing evaporation capacity in a multi-stage evaporation plant of spent liquor in a pulp mill, and Claim 8 for a multi-stage evaporation plant. Claim 8 reads as follows:

"8. A multi-stage evaporation plant of spent liquor in a pulp mill, said evaporation plant comprising a plurality of evaporation stages (I - V) operating by means of indirect heating, each evaporation stage comprising one evaporation unit or a plurality of evaporation units connected in parallel, conduit (1) for supplying the spent liquor to the last evaporation stage (V) and conduits (4-7) for supplying the spent liquor from the last evaporation stage (V) in series to others (IV - I), conduit (12) for supplying fresh vapour to the first evaporation stage (I) and correspondingly conduits (14, 16, 18, 20) for supplying vapour separated from the spent liquor in an evaporation stage (I - IV) during heating to the following evaporation stage (II - V), characterized in that it comprises booster means (A-D) mounted in at

least one conduit (14, 16, 18, 20) for supplying the vapour from one evaporation stage (I - IV) onwards to a following stage for increasing the pressure of the vapour supplied to the following stage."

Dependent Claims 2 to 7 and 9 to 14 refer to preferred embodiments of the subject-matter of independent Claims 1 and 8.

IV. With its letter dated 16 November 2004, the Appellant filed further arguments supplemented by drawings with the intention to illustrate the merits of the claimed subject-matter in view of the prior art and indicated that it would not attend the oral proceedings.

V. The Appellant submitted in essence the following arguments:

In the prior art disclosed in D4 the vapour released from an evaporation stage was circulated back to the stage from which it was taken or to a previous one. It was therefore, necessary to increase the pressure of the vapour above the pressure in the stage from which it was released since the pressure in that stage was higher than that of the released vapour. Further, it was necessary to provide additional evaporation area. This was due to the fact that an evaporation plant, its equipment and evaporation surface were generally designed for a specific capacity. Therefore, the capacity of an existing evaporation plant operated in a recycling mode could be increased only by the installation of a compressor and if additional evaporation area was provided simultaneously.

Neither of these measurements was necessary according to the patent in suit where the vapour was not circulated back but led to the next evaporation stage. In contrast to the prior art, a slight increase in pressure and temperature of the steam introduced into the next evaporation stage would considerably increase the efficiency and capacity of the evaporation plant without requiring any additional evaporation area. In particular, it was argued that the additional heat would automatically distribute itself over all the evaporation stages in the evaporator train forward from the stage from which the vapour was taken.

VI. In a communication dated 23 November 2004, the Board drew attention to the fact that the oral proceedings had been scheduled in order to reach a decision about patentability of the claimed subject-matter. The Board, further, indicated its provisional opinion that no patent could be granted since, *inter alia*, the subject-matter of Claim 8 was held not to be inventive over the prior art disclosed in D4 in combination with either of D1, D2 or D5 for the reasons given in its communications and since no text was on file fulfilling the requirements of Article 84 EPC.

VII. Oral proceedings were held before the Board of Appeal on 9 December 2004 in the absence of the Appellant as previously announced (point III above).

VIII. The Appellant requested in writing that the decision under appeal be set aside and that a patent be granted on the basis of Claims 1 to 14 filed with letter dated 16 November 2004.

Reasons for the Decision

1. The Board is satisfied that the claims as amended comply with the requirements of Article 123(2) EPC. Since the appeal fails for other reasons, no further comments on these matters are necessary.

2. The application in suit relates to a method and an arrangement for increasing the evaporation capacity in a multi-stage evaporation plant of spent liquor in a pulp mill (page 1, lines 4 to 5 and 18 to 20). In particular, it relates according to the preamble of Claim 8 to a multi-stage evaporation plant comprising a plurality of evaporation stages operating by means of indirect heating and means for supplying the spent liquor to the last evaporation stage and from there to the other stages and for supplying fresh vapour to the first evaporation stage and for supplying vapour separated from the spent liquor in an evaporation stage to the following stage.

According to the description of the application, the capacity of an evaporation plant was restricted and could be increased only by increasing the size of the evaporation unit, adding new evaporation units or changing the operating principle of the units. All these methods are said to require more space which was normally not available without construction work (page 2, lines 22 to 30).

The only relevant prior art referred to in the application in suit is the evaporation plant based on the thermo-compressor principle disclosed in D4. It is

said in the application in suit that in this embodiment the heating effect of an evaporation unit is increased by compressing vapour separated from the liquor by means of a compressor to a higher pressure and by recirculating this vapour to the evaporation stage from which it was separated. This solution is said to have the drawback of requiring separate expensive evaporation units (page 2, line 31 to page 3, line 6).

According to the application in suit, the technical problem to be solved consists in the provision of a method and arrangement by which the capacity of a multi-stage evaporation plant can be increased in a simple manner at low costs (page 3, lines 7 to 9) and the solution to this problem consists in that at least one conduit for supplying the vapour from one evaporation stage onwards is provided with a booster means for increasing the pressure of the vapour before it is supplied to the following stage (page 3, lines 15 to 18 and characterising portion of Claim 8).

According to the application, the booster means are a fan or a compressor (page 3, line 21).

The advantage of the claimed subject-matter is said to consist in that even a small increase in pressure and corresponding increase in temperature difference produced a significant evaporation effect, thereby increasing the evaporation capacity of an evaporation plant. Further, the claimed subject-matter was easy to apply to existing evaporation plants without any expensive construction work since a compressor could be simply provided in a vapour conduit (page 4, lines 3 to 11).

2.1 The arguments provided by the Appellant correspond in essence to the above statements in the application in suit (see V above).

2.2 The Board agrees with the Appellant insofar as an evaporation plant is designed for a specific capacity. This is due to the principle that a given evaporation space contains a particular volume of gas. Nevertheless, the Appellant's line of argument is not convincing for the following reasons:

It is common general knowledge that by compression the temperature and pressure of a vapour or gas is increased but its volume is decreased. Therefore, if in an existing evaporation plant which is designed for a specific gas volume and for operation without any boosters, the volume of the vapour taken from an evaporator stage is decreased by compression, it is necessary either to adapt, i.e. reduce, the volume of the vapour side in the evaporator into which the compressed vapour is introduced or to add - by suitable means - additional vapour of the same pressure and temperature in order to maintain the temperature gain for evaporation in that evaporator. Otherwise the compressed vapour will expand again to fill the given space, thereby losing both the pressure and temperature gain achieved during compression.

Neither of these feasible ways is explicitly disclosed in the application as filed but it is assumed that the skilled reader would understand the application in suit implicitly to disclose the missing features necessary for the method to be feasible, since otherwise the

claimed method and evaporation plant would be useless, i.e. simply require compressors without any advantage. However, the possibility of adapting the volume of the vapour side in the evaporator cannot be accepted as implicitly disclosed since it is intended in the application in suit to apply the claimed subject-matter to existing evaporation plants without any expensive construction work (page 4, lines 9 to 11).

In contrast, the alternative option of providing means for adding vapour, either fresh or from the plant into the evaporator into which the compressed vapour is fed, does not require costly construction work but simply the provision of further conduits.

This embodiment, i.e. means for the addition of vapour from the plant, is however illustrated in Figure 5 of document (4). This figure shows a three-stage evaporation plant and conduits 41' and 57 for supplying heating vapour and the liquor to be treated to the first evaporator 37. Further conduits are provided to feed the vapour (conduit 61) and the evaporated liquor (conduit 60) produced in evaporator 37 as heating vapour and liquor to be treated into the next evaporator 38. The liquor produced in evaporator 38 is fed via conduit 64 into the next evaporator 39 for further evaporation. The vapour produced in evaporators 38 and 39 are both fed via conduits 65' and 65" to conduit 40 which leads into compressor 42. Conduit 41" is provided to feed the thus compressed vapour as heating vapour into the evaporator 39 and the surplus of this vapour is recycled via conduit 41 to the first evaporator 37 (see Figure 5, Claim 5 and description, page 8, line 19 to page 9, line 22).

The state of the art disclosed in D4 was mentioned in the application in suit and used by the Appellant as a starting point for the evaluation of inventive step. Also the Board is of the opinion that D4 qualifies for this purpose, the more so as it deals with the same or a similar technical problem as the application in suit, namely to increase in a simple manner or at low cost the capacity or efficiency of a multi-stage evaporation plant (page 1, line 1 to page 2, line 8).

In Figure 5 of D4 liquor and vapour flow in co-current direction as the only apparent difference over the evaporation plant according the evaporation plant of Claim 8 of the application in suit which is designed for counter-current flow of vapour and liquor.

The Appellant never argued or provided evidence showing that the purpose of evaporating spent liquor in a pulp mill required particular operational or design conditions. Nor did the Appellant provide any evidence showing that - in comparison with the evaporation plant disclosed in D4 - the subject-matter as claimed resulted in a particular effect, let alone in an improvement of the evaporation capacity.

Therefore, the technical problem actually solved in view of D4 is seen to consist in providing an alternative evaporation plant and the solution of this problem consists in the distinguishing feature, i.e. in that the method and the plant is designed for counter-current flow instead of co-current flow.

However, this solution is not based on an inventive step since it is well-known in the art of multi-stage evaporation that the flows of liquor and vapour may be passed in counter-current direction to each other too, not only from D1 (page 2, lines 5 to 11) and D2 (page 2, lines 6 to 8) but also from D5 where counter-current flow is recommended for liquors giving highly viscous concentrates (page 662, left-hand column, lines 7 to 12). Designing the known plant for counter-current flow instead of co-current flow is, therefore, one of those options which a person skilled in the art would have adopted in the expectation of providing a further low cost and highly efficient evaporation.

The Board concludes, therefore, that the subject-matter of Claim 8 is not based on an inventive step as required by Article 52(1) EPC in combination with Article 56 EPC.

3. In the present case, the Appellant's response to a first communication by the Board, including the amended set of claims on which it was based, was held to be insufficient to overcome the Board's objections raised therein. This was communicated to the Appellant in the Board's second communication annexed to the summons for oral proceedings.

With its letter dated 16 November 2004 and received on 19 November 2004, i.e. about three weeks before the date for oral proceedings on 9 December 2004, the Appellant again filed amended claims in a new request and argued why in its opinion these claims were patentable under the EPC. Simultaneously, the Appellant

announced its intention not to attend the oral proceedings.

In the communication dated 23 November 2004, the Board informed the Appellant of the fact that the oral proceedings had been scheduled to facilitate the discussion of the facts of the present case necessary to arrive at a decision about patentability of the application in suit. Further, the Board also drew attention to the fact that the description was not adapted to the claims held patentable by Appellant. Therefore, the claims were not supported by the description as required by Article 84 EPC.

The Appellant did not attend the oral proceedings or submit any reply to this last communication, or indeed a description adapted to the claims it held patentable.

Therefore, the appeal must also be rejected on the ground that there exists no text fulfilling the requirements of Article 84 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

G. Rauh P. Krasa