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D E C I S I O N
of 15 July 2003

Case Number: T 0805/00 - 3.3.1

Application Number: 92303196.7

Publication Number: 0515027

IPC: C07C 19/045

Language of the proceedings: EN

Title of invention:
Process for preventing fouling in the production of ethylene dichloride

Patentee:
ONDEO NALCO ENERGY SERVICES, L.P.

Opponent:
BetzDearborn, Inc.

Headword:
Ethylene dichloride/NALCO

Relevant legal provisions:
EPC Art. 54, 56, 114(2), 123(2), (3)

Keyword:
"Late filed evidence (not admitted) - lack of relevance"
"Prior use (no) - no pertinent evidence about the chemical structure of the product used"
"Main request: inventive step (no) - obvious solution - no deterrent teaching"
"Auxiliary request: concurring requests of Appellant and Respondent for maintenance on that basis"

Decisions cited:
T 0800/91, T 0472/92, T 0702/92, T 0097/94, T 0068/95, T 0116/02

Catchword:
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Case Number: T 0805/00 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 15 July 2003

Appellant: (Opponent)
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Respondent: (Proprietor of the patent)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 8 June 2000 rejecting the opposition filed against European patent No. 0515027 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: A. J. Nuss
Members: R. Freimuth
S. U. Hoffmann

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal on 31 July 2000 against the decision of the Opposition Division posted on 8 June 2000 rejecting the opposition against European patent No. 515 027 which was granted on the basis of seventeen claims, the only independent claim 1 reading as follows:

"1. A process for recovering ethylene dichloride (EDC) wherein crude ethylene dichloride feed stream from a chlorination or oxychlorination unit is distillation separated into an overhead stream of purified ethylene dichloride and a bottoms stream of crude EDC containing fouling amounts of chlorinated and/or oxygenated polymeric materials, characterised in that fouling in the bottoms stream is inhibited by introducing into the crude ethylene dichloride feed stream an antifoulant which is:

(A) the reaction product of (i) an olefin polymer of C2 to C10 mono-olefin having a molecular weight of 300 to 5000 reacted with a C4 to C10 mono-unsaturated dicarboxylic acid, ester or anhydride material; and (ii) a basic reactant selected from the group consisting of an amine, amino alcohol and mixtures thereof;
or
(C) a blend of 10 to 90 wt% (A) and 90 to 10 wt% of an oil-soluble magnesium alkyl aromatic sulfonate (B)."

II. Notice of Opposition had been filed by the Appellant requesting revocation of the patent as granted to the extent of claims 1 to 6 and 15 on the grounds of lack of novelty and of inventive step. *Inter alia* the following documents were submitted in opposition proceedings:

(1) "Sicherheitsdatenblatt" of Petromeen AF-114, september 1981,

(2) Product Facts sheet of Petromeen AF-114, 1983,

(3) US-A-3 271 295 and

(4) US-A-3 271 296.

III. The Opposition Division held that the alleged public prior use did not destroy the novelty of the subject-matter claimed. It had not been shown beyond all reasonable doubt that the commercial product Petromeen AF-114 contained an antifoulant denoted (A) according to claim 1 and that the composition of Petromeen AF-114 was available to the public before the priority date of the patent in suit.

The affidavit of Goliaszewski designed to demonstrate that the skilled person was able to determine the chemical composition of that commercial product, was to be disregarded since he had private information which was not available to the public. Thus, Goliaszewski did not analyse the commercial product AF-114 as such, but the commercial product Lubrizol 8065 which he knew was the active ingredient thereof. The Opposition Division was not convinced that the conclusions which

Goliaszewski reached in his affidavit were those which would have been drawn by the skilled person not in possession of the additional private information which he had. As the commercial product AF-114 comprised the solvent heavy aromatic naphtha which was a complex organic mixture, it would have been very difficult for the ordinary skilled person to determine the chemical structure of the active ingredient of that commercial product. Therefore the Opponent-Appellant had not proven beyond all reasonable doubt that the chemical composition of AF-114 was available to the public.

Furthermore, the use of the product AF-114 as an antifoulant in a process as defined in claim 1 was not made available to the public before the priority date since that information was passed on to a large, but only limited circle of persons who were usually bound by secrecy.

The documents on file did not anticipate the claimed invention either as none disclosed specifically an EDC distillation process.

With respect to inventive step, documents (3) and (4) taught to use compounds as defined under (A) in claim 1 as antifoulants in a hydrocarbon refinery process. In view of the different chemical/physical properties of hydrocarbons and ethylene dichloride and the nature of the foulants, the skilled person would not have expected such an antifoulant to be suitable for use in an EDC plant. Thus, the claimed process was found to be non-obvious.

IV. The Respondent (Proprietor of the patent) defended the maintenance of the patent in suit on the basis of the claims as granted and subsidiarily on the basis of the set of claims submitted as auxiliary request on 17 June 2003. The claims according to the auxiliary request differed from those as granted exclusively in that claim 1 was restricted to one of the granted alternatives for the composition of the antifoulant, namely to the blend of 10 to 90 wt% (A) and 90 to 10 wt% (B).

V. The Appellant submitted that the commercial product AF-114 destroyed the novelty of the claimed invention since it was made available to the public as an antifoulant in a process as defined in claim 1 of the patent in suit without any secrecy agreement. The skilled person was also able to identify the chemical structure of that commercial product AF-114 which contained the antifoulant (A) as specified in the characterising portion of granted claim 1. In support of his allegation the Appellant relied on a fresh analytical report of the external laboratory "Jordi" filed on 14 April 2001 in appeal proceedings which was to be taken at its face value. That laboratory made a search in the patent literature before starting the chemical analysis of the structure of the product AF-114 which was the way a skilled person would tackle that objective. At the oral proceedings before the Board he conceded that the affidavit of Goliaszewski was incorrect since it started from Lubrizol 8065, not from the product AF-114 and since Goliaszewski used private information to identify the chemical structure thereof. Therefore that evidence should be disregarded in the proceedings.

Moreover documents (3) and (4) anticipated the process claimed since they disclosed the use of an antifoulant as defined in embodiment (A) of claim 1 in a refinery process of hydrocarbons which covered ethylene dichloride.

In the assessment of inventive step the Appellant started from a conventional purification process of crude ethylene dichloride as acknowledged on page 2, paragraph 2 of the patent specification. The problem underlying the invention was the reduction of fouling. Documents (3) and (4) gave an incentive to use compounds as defined in embodiment (A) of claim 1 in order to reduce fouling. Though those documents were directed to a refinery process of hydrocarbons, document (2) indicated to the skilled person that those antifouling compounds could also be used in the distillation of chlorinated hydrocarbons which included ethylene dichloride. Therefore the claimed process was obvious in the light of the state of the art.

In respect of the Respondent's auxiliary request the Appellant submitted that he never opposed that embodiment and that he had no objections to maintain the patent in suit in this restricted form.

VI. The Respondent submitted that the alleged public prior use of the commercial compound AF-114 in an ethylene dichloride distillation process had to be proven by the Appellant beyond all reasonable doubt. He argued that the Appellant nevertheless failed to present pertinent evidence which showed the chemical structure of that product. The affidavit of Goliaszewski was to be

disregarded since he did not analyse the product AF-114 as such and since he used private and inside information when analysing its structure. The Appellant's fresh analytical report of the laboratory "Jordi" lacked any relevance because that laboratory was not certain about the chemical structure of the active ingredient in AF-114 indicating only "one possible structure" and because it did determine this "possible structure" by chemical analysis in combination with structural information gathered from patent literature. Furthermore, the Respondent submitted that the commercial product AF-114 comprised heavy aromatic naphtha as solvent. The skilled person was not able to detect without undue burden the chemical structure of the active ingredient comprised therein since it was difficult to remove that solvent thereby hindering the structural analysis of the active ingredient. Therefore the alleged prior use did not destroy the novelty of the claimed subject-matter.

Documents (3) and (4) did not anticipate the claimed invention either as none disclosed specifically an ethylene dichloride distillation process.

The Respondent objected to the late filing of the analytical report of the laboratory "Jordi" during the appeal proceedings by the Appellant which amounted to a "drip feed" of evidence. As that report lacked relevance on the grounds given above he requested this late filed evidence to be disregarded.

With respect to inventive step, the Respondent started also from a conventional purification process of crude ethylene dichloride as acknowledged in the

precharacterising portion of claim 1 and considered the reduction of fouling as the problem underlying the invention. Though dealing with the reduction of fouling the skilled persons would not take documents (3) and (4) into account since they were limited to the distillation of petroleum hydrocarbons. That process was, however, substantively different from the distillation of crude ethylene dichloride thereby preventing consideration of antifoulants taught in those documents as being suitable in the latter. Nor would the skilled person combine their teaching with that of document (2) which gave numerous suitable applications for the antifoulant product AF-114 without specifically addressing the distillation of ethylene dichloride. Therefore it was not obvious to try using the antifoulant known from documents (3) and (4) in the distillation of crude ethylene dichloride.

VII. The Appellant requested that the decision under appeal be set aside and the patent be revoked in the form as granted, or maintained in the form as amended according to the auxiliary request submitted on 17 June 2003 by the Respondent.

The Respondent requested that the appeal be dismissed and the patent be maintained as granted or subsidiarily that the patent be maintained as amended on the basis of the auxiliary request submitted on 17 June 2003.

VIII. The decision of the Board was given orally at the end of the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

2. *Late filed evidence (Article 114(2) EPC)*

The Appellant's fresh analytical report made by the laboratory "Jordi" is new evidence submitted for the first time on 14 April 2001 during appeal proceedings. No reason has been given for this late filing by the Appellant, nor can the Board see any such reason. This analytical report is supposed to prove that the commercial product AF-114 which is purported to have been publicly used in an ethylene dichloride distillation process before the priority date of the patent in suit, contains an active ingredient having a structure covered by the antifoulant (A) according to claim 1 thereby destroying the novelty of the claimed invention. However, the report does not establish the structure of that active ingredient with certainty. Thus, the analytical report specifies in its "Conclusions" that it merely indicates "one possible structure" of the active ingredient contained in the product AF-114 and that it merely "believe[s]" a particular structural portion to be present therein. The analytical report, hence, determines for the active ingredient only a tentative structure which is not certain. Moreover, the Appellant explained that this report has to be taken as it stands, further information not being available to clarify any issue.

Due to these uncertainties, the analytical report "Jordi" does not properly and accurately establish the structure of the active ingredient contained in the

product AF-114. The Appellant cannot discharge the burden of proof which is upon him to establish beyond all reasonable doubt that this ingredient has a structure in accordance with the antifoulant (A) of claim 1 by relying on that fresh analytical report. As a consequence, it is not to be taken into account when assessing novelty. Lacking, thus, relevance for the decision to be taken the late filed analytical report, as requested by the Respondent, is not admitted into the proceedings (Article 114(2) EPC).

Main request

3. *Novelty*

3.1 The Appellant objected to the novelty of the claimed process based on a public prior use alleging that the commercial product AF-114 was used before the priority date of the patent in suit in a distillation process of crude ethylene dichloride, wherein that product AF-114 contained an active ingredient which satisfied all the structural features of the antifoulant (A) indicated in the characterising portion of claim 1.

According to the jurisprudence of the Boards of Appeal, it is with the Appellant-Opponent invoking the invalidity of a patent on the ground of a public prior use that the burden of proof rests for the facts he alleges while the level of proof should be a degree of certainty which is beyond all reasonable doubt (see decisions T 472/92, OJ EPO 1998, 161, point 3.1; T 782/92, point 2.2, not published in OJ EPO; T 97/94, OJ EPO 1998, 467, point 5.1; T 116/02, point 2, not published in OJ EPO). If the Appellant, whose arguments

rest on these alleged facts, is unable to discharge its onus of proof, it loses thereby.

In the present case, therefore, the burden of proof for the fact that the active ingredient contained in the product AF-114 satisfies all the structural features of the antifoulant (A) of claim 1 rests upon the Appellant. In support thereof, he submitted the affidavit of Goliaszewski before the Opposition Division who disqualified this affidavit for lack of pertinence. The Appellant conceded at the oral proceedings before the Board that this affidavit was to be ignored in the proceedings since it was unfair in that Goliaszewski did not analyse the commercial product AF-114 as such, but Lubrizol 8065 which he knew from inside information was an ingredient thereof and since he used in his analysis additional private information. For these reasons, the affidavit of Goliaszewski is not to be taken into account by the Board. The further fresh analytical report "Jordi" was not admitted into the proceedings on the ground of its late filing and lack of relevance for the decision to be taken. The Appellant did not rely on any further evidence in order to support his submission; nor is the Board aware of any such evidence.

Thus, the Appellant's allegation that the commercial product AF-114 is covered by claim 1 is an unverifiable statement devoid of any corroborating evidence. In the absence of evidence, however, the Appellant has not discharged the burden of proof which is upon him, with the consequence that his unsubstantiated objection to the novelty of the claimed invention based on the

alleged public prior use is to be disregarded by the Board.

3.2 Documents (3) and (4) are directed to a refinery process of petroleum hydrocarbons using an antifoulant denoted (A) in claim 1. As examples for petroleum hydrocarbons the documents list naphthalene, gas oil, crude oil, residuum distillate, gasoline or mixtures thereof. The Appellant and the Respondent had divergent views as to whether or not the term "petroleum hydrocarbons" covered ethylene dichloride.

However, irrespective of that divergency in views between the Parties, those documents do not specifically disclose ethylene dichloride on which fact both, the Appellant and the Respondent concurred. Due to that silence in documents (3) and (4) the generic disclosure of "petroleum hydrocarbons" does not reveal to the skilled person any individual compound and, thus, also not the particular compound ethylene dichloride. It appears that the Appellant interprets the disclosure of these documents with the knowledge of the present invention, which the Board cannot accept.

Thus, in the Board's judgement, documents (3) and (4) do not anticipate the subject-matter of the claimed invention.

3.3 For the above reasons, the Board concludes that the subject-matter of the patent in suit is novel and meets the requirements of Articles 52(1) and 54 EPC.

4. *Inventive step*

4.1 The patent in suit is directed to a distillation process of a crude ethylene dichloride feed stream resulting from a chlorination or oxychlorination unit (precharacterising portion of claim 1). That process already belongs to the state of the art as indicated on page 2, lines 10 to 13 of the patent specification and as acknowledged by the Respondent and the Appellant before the Board. Where the patent in suit and the Respondent-Patentee acknowledge a particular state of the art as being closest to the claimed invention and the starting point for determining the problem underlying the patent in suit, then the Board should adopt this as the starting point for the purpose of a problem-solution analysis unless it turns out that there is closer state of the art of greater technical relevance (see e.g. decisions T 800/91, point 6 of the reasons; T 68/95, point 5.1 of the reasons).

Thus, the Board considers, in agreement with the Appellant and the Respondent, that in the present case the distillation process of a crude ethylene dichloride feed stream resulting from a chlorination or oxychlorination unit represents the closest state of the art and, hence, takes it as the starting point when assessing inventive step.

4.2 The drawbacks of that conventional distillation process of a crude ethylene dichloride lie in the serious fouling occurring in the various units handling liquid ethylene dichloride. Thus, the technical problem underlying the claimed invention as indicated in the specification of the patent in suit on page 2, lines 5,

6 and 13 to 20 and as submitted by both, the Appellant and the Respondent, consists in inhibiting the fouling in that distillation process of crude ethylene dichloride.

4.3 As the solution to this problem, the patent in suit proposes *inter alia* to introduce into the crude ethylene dichloride feed stream an antifoulant (A) as defined in the characterising portion of claim 1 (see point I above).

4.4 The Appellant never disputed that the claimed process successfully achieves the inhibition of fouling in the distillation process of a crude ethylene dichloride; and the Board is not aware of any reason for challenging this finding. The specification of the patent in suit demonstrates in the experiments on pages 6 and 7, Tables I and II the successful inhibition of fouling in the presence of the antifouling (A). For these reasons, the Board is satisfied that the problem underlying the patent in suit has been solved.

4.5 Finally, it remains to be decided whether or not the proposed solution to the problem underlying the patent in suit is obvious in view of the cited state of the art.

4.5.1 When aiming at inhibiting the fouling in a distillation process of hydrocarbonaceous feedstocks, it is a matter of course that the person skilled in the art would turn his attention to that prior art in the field of distillation technology just addressing that technical problem. As a skilled person he would be struck by

documents (3) and (4) which aim at overcoming the phenomenon of fouling ((3), column 1, line 69; (4), column 2, line 1). Both documents are directed to a distillation process wherein the fouling is successfully inhibited by the use of an antifoulant as indicated with the parameter "Percent fouling inhibition" in document (3), column 6, Table 2 and document (4), column 6, Table I. The antifoulants are alkyl substituted succinimides ((3, column 2, line 19; (4), column 2, line 23) and result from reacting a mono-unsaturated dicarboxylic acid material, namely an alkyl substituted succinic acid anhydride, with an amine (claims 1). The succinic acid anhydride has been reacted beforehand in particular with the mono-olefin polymer polyisobutylene having a molecular weight between 600 and 1000 ((3), column 3, lines 6 to 8; (4), column 3, lines 7 to 9) in order to incorporate the alkyl substitution. The antifoulants are introduced into the crude feed stream ((3), column 5, lines 19 to 23; (4), column 4, lines 46 to 50). Thus, the antifoulants taught in documents (3) and (4) comply with the antifoulant (A) as defined in claim 1, which finding has never been disputed.

The Board concludes from the above that the state of the art, in particular documents (3) and (4), give the person skilled in the art a concrete indication of how to solve the problem underlying the patent in suit as defined in point 4.2 above, namely by introducing an antifoulant such as claimed into the crude feed stream of the conventional ethylene dichloride distillation process, thereby arriving at the claimed process, i.e. the solution proposed by the patent in suit. In the Board's judgement, it was obvious to try to follow the

avenue indicated in the state of the art with a reasonable expectation of success without involving any inventive ingenuity.

4.5.2 The Respondent argued in support of inventive step that the refinery processes addressed in documents (3) and (4) referred to the distillation of petroleum hydrocarbons which were different to ethylene dichloride and the fouling encountered therewith. Therefore the skilled person was deterred from applying the teaching of those documents to an ethylene dichloride distillation process.

However, documents (3) and (4) address precisely the problem underlying the patent in suit with the consequence that a skilled person takes those documents necessarily into consideration when looking for a solution to that problem. Furthermore, document (2) teaches to apply the product AF-114 which is a mixture of alkyl substituted succinimides (cf. document (1), page 2), as antifoulant in different types of distillation processes. Document (2) addresses specifically the use in crude oil exchangers and gas oil plant reboilers (page 1, left column, "Application") as well as in chlorinated hydrocarbon purification systems (page 1, left column, "Case History #2"). Thus, the skilled person learns from the teaching of document (2) that antifoulants of the class of alkyl substituted succinimides to which belong those used in documents (3) and (4), are not confined to a use in the distillation of petroleum hydrocarbons, such as crude oils or gas oils, but can also be used successfully in preventing fouling in the distillation

of chlorinated hydrocarbon, which include ethylene dichloride.

For those reasons, the person skilled in the art is not deterred from applying the teaching of documents (3) and (4), i.e. adding to the crude hydrocarbonaceous feed stream the alkyl substituted succinimide antifoulants taught therein, in order to solve the problem underlying the patent in suit, namely that of inhibiting fouling in the conventional ethylene dichloride distillation process.

4.6 Therefore, in the Board's judgement, the subject-matter of claim 1 represents an obvious solution to the problem underlying the patent in suit.

5. As a result, the Respondent's main request is not allowable as the subject-matter of claim 1 lacks inventive step pursuant to Article 56 EPC.

Auxiliary request

6. *Amendments (Article 123(2) and (3) EPC)*

In claim 1 according to the auxiliary request the subject-matter has been limited to one of the alternatives for the composition of the antifoulant in granted claim 1, i.e. to the blend of 10 to 90 wt% (A) and 90 to 10 wt% (B). Thus, that amendment complies necessarily with the requirements of Article 123(2) EPC and since it brings about a restriction of the scope of the granted claim, and therefore of the protection conferred thereby, it is also in keeping with the requirements of Article 123(3) EPC.

7. *Novelty, Inventive step*

The patent in suit has been objected to by the Appellant on the grounds of lack of novelty and inventive step exclusively with respect to the antifoulant (A) in granted claim 1. That embodiment (A) is no longer encompassed by claim 1 according to the auxiliary request. The Appellant explicitly submitted at the oral proceedings before the Board that he never opposed the embodiment of the present auxiliary request and that he had no objections to maintain the patent in suit in this restricted form.

Therefore, novelty and inventive step of the subject-matter of the auxiliary request was not in dispute in this appeal and the Board is satisfied that the claimed invention is novel and inventive vis-à-vis the state of the art since there are no facts, documents or other evidence in the proceedings which may challenge the auxiliary request. Since the Appellant and the Respondent concurred on that issue, detailed reasons need not to be given.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of the auxiliary request submitted on 17 June 2003 and a description yet to be adapted.

The Registrar: The Chairman:

P. Cremona A. Nuss