BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Publication in the Official Journal ~~Yes~~ / No

File Number: T 190/91 - 3.3.1

Application No.: 88 905 477.1

Publication No.: 0 316 431

Title of invention: METHOD FOR SUPPRESSING THE POISONING EFFECTS OF CONTAMINANT METALS ON CRACKING CATALYSTS IN FLUID CATALYTIC CRACKING

Classification: C10G 11/00

D E C I S I O N
of 13 August 1992

Applicant: CHEVRON RESEARCH AND TECHNOLOGY COMPANY

Headword:

EPC Article 54

Keyword: "Novelty (confirmed)" - "Remitted for further prosecution"

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Case Number : T 190/91 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 13 August 1992

Appellant : CHEVRON RESEARCH AND TECHNOLOGY COMPANY
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Decision under appeal : Decision of Examining Division of the European Patent Office dated 26 October 1990 refusing European patent application No. 89 905 477.1 pursuant to Article 97(1) EPC.

Composition of the Board :

Chairman : K.J.A. Jahn
Members : R.W. Andrews
J.A. Stephens-Ofner

Summary of Facts and Submissions

I. European patent application No. 88 905 477.1, which was filed under the Patent Cooperation Treaty on 22 April 1988, was refused by a decision of the Examining Division 2.1.04.029 of the European Patent Office dated 26 October 1990.

II. The ground for the refusal was that the subject-matter of Claims 1 to 4 filed on 20 July 1990 lacked novelty in the light of disclosure in US-A-4 178 267 (1) or UA-A-3 977 963 (3).

III. An appeal was lodged against this decision on 10 December 1990 and the appeal fee was duly paid. In his Statement of Grounds of Appeal filed on 23 February 1991, the Appellant argued that, in light of the finding of the decision of G 2/88 of the Enlarged Board of Appeal with respect to novelty, the subject-matter of the claims rejected by the Examining Division was novel since the cited documents did not make available to the public the Applicant's finding of the criticality of maintaining the appropriate ratio of bismuth-containing passivating agent to metal contaminants.

At the commencement of the oral proceedings, which were held on 13 August 1992, the Appellant submitted an amended statement of claim containing seven claims and argued that neither document (1) nor document (3) disclosed the analysis of the feed oil on a frequent basis or the periodical analysis of the equilibrium catalyst or that the rate of addition of bismuth-containing passivating agent should be adjusted in response to the results of these analyses.

IV. The Appellant requested that the decision under appeal be set aside and the case be remitted to the Examining Division for further prosecution on the basis of the claims submitted in the course of oral proceedings. The only independent claim of this set of claims reads as follows:

"A continuous method for the conversation of hydrocarbon oil feed which comprises contacting in a fluid catalytic cracking system a hydrocarbon feed containing metal contaminants including nickel, vanadium and iron with a cracking catalyst associated with a bismuth-containing metal passivating agent, characterised by the steps of:

(a) analyzing on a frequent basis the hydrocarbon feed for nickel equivalents (defined as [nickel + 0.2 vanadium + 0.1 iron] and determining the quantity of nickel equivalents in said hydrocarbon feed;

(b) on the basis of the analysis in step (a) introducing the bismuth-containing passivating agent into said catalytic cracking system at a rate which provides a weight ratio of introduced bismuth to nickel equivalents in the range from 0.01:1 to 1:1 in said feed;

(c) periodically analyzing the equilibrium cracking catalyst for the ratio of bismuth to nickel equivalents on said catalysts; and

(d) on the basis of the analysis in step (c) adjusting the rate of introducing said passivating agent in step (b) within said range to achieve a level of bismuth on said catalyst of at least 0.01 and not more than 1 part by weight of bismuth per part by weight of nickel equivalents."

V. At the conclusion of the oral proceedings the Board's decision to allow the appeal was announced.

Reasons for the Decision

1. The appeal is admissible.

2. There are no objections under Article 123(2) EPC to the present claims since they do not contain subject-matter which extends beyond the content of the application as filed.

In particular, Claim 1 is supported by Claim 1 as originally filed in combination with page 8, line 40 to page 9, line 23 of the published application. Claims 2 to 6 are supported by page 6, lines 16 to 20, lines 27 to 30, lines 30 to 32, line 40 and page 13, lines 21 to 25 respectively. Claim 7 corresponds to Claim 2 as originally filed.

3. After examination of the cited prior art, the Board has reached the conclusion that the claimed subject-matter is novel.

3.1 Document (1) discloses a process for passivating nickel, vanadium and iron on a clay based cracking catalyst by contacting it with a passivating compound selected from antimony selenide, antimony sulphide, antimony sulphate, bismuth selenide, bismuth sulphide and bismuth phosphate under elevated temperature conditions (cf. Claim 1). According to Claim 2 the amount of passivating compound deposited on the catalyst should be in the range of about 0.05 to about 5% of antimony or bismuth based on the weight of the clay based catalyst.

Example III illustrates the cracking of Borger topped crude oil in a fluid bed reactor by means of a used catalyst obtained by blending a cracking catalyst

containing 3800 ppm of nickel, 6200 ppm vanadium and 9400 ppm iron (i.e. 5980 ppm nickel equivalents) and 940 ppm, 8000 ppm and 1000 ppm of bismuth is the form of bismuth sulphide, selenide or phosphate trihydrate. Discounting any nickel vanadium or iron introduced in the feed oil, weight ratio of the bismuth to nickel equivalents are 0.16:1, 1.34:1 and 0.17:1 respectively.

Example II of this document indicates how this prior art process could be operated on a plant scale. According to this example in order to maintain the antimony level of 0.5 wt%, 11 ppm of antimony has to be added continuously if 8 tons of catalyst per day are withdrawn from the reactor and replaced by untreated catalyst.

However, the content of this document does not make available in the form of a technical teaching the analysis of the feedstock on a frequent basis for nickel equivalents or the periodical analysis of samples of the equilibrium catalyst to determine the ratio of bismuth to nickel equivalents on the catalyst or that the rate of addition of the bismuth-containing passivating agent should be varied in response to the results of these analyses. Therefore, the subject-matter of the present Claim 1 is novel with respect to this document.

3.2 Document (3) discloses a process for converting a hydrocarbon feed boiling above 600°F into a gasoline fraction by contacting the feed, into which bismuth or manganese, or oxides of bismuth or manganese or compounds convertible to bismuth or manganese oxides has been incorporated, with a catalyst containing metal contaminants and thereafter heating said catalyst to a temperature in the range of about 800° to about 1600°F. The concentration of bismuth or manganese deposited on the catalyst is in the range from about 0.2 to about 1.5 mole

per mole of contaminating metals present on the catalyst (cf. Claim 4). According to Claims 10 and 11 the bismuth and manganese are incorporated into the hydrocarbon feed in an amount ranging from 3 ppm to 3000 ppm and the catalyst contains from 1700 to 3700 ppm nickel equivalent metal contaminants. In the Board's opinion, it is not possible to calculate a weight ratio of bismuth to nickel equivalents on the basis of the information provided by Claim 4 or Claims 10 and 11.

Run No. 2 of the example describes the cracking of an oil containing 1.28 ppm nickel equivalents using a catalyst which had a weight ratio of bismuth to nickel equivalents of 1.97:1 at the start of the run.

Although this document discloses the analysis of the hydrocarbon feed for nickel equivalents and the analysis of the starting cracking catalyst for the ratio of bismuth to nickel equivalents, there is no disclosure that the analysis of the feed should be carried out on a frequent basis or that the ratio of bismuth to nickel equivalent of the equilibrium catalyst should be periodically determined or that the adjustments to the rate of addition of bismuth-containing passivating agent should be made on the basis of the results of these analyses. Therefore the subject-matter of the present Claim 1 is also novel with respect to the disclosure of document (3).

Therefore, in the Board's judgment the subject-matter of Claim 1 and dependent Claims 2 to 7 is novel. Hence the only ground for the refusal of the application has been overcome. However, the patent sought cannot be granted since the question of whether the claimed subject-matter involves an inventive step has still to be considered by the Examining Division. In these circumstances, the Board makes use of its powers under Article 111(1) EPC to remit

the case to the Examining Division for further prosecution.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Examining Division for further prosecution on the basis of the claims submitted in the course of oral proceedings.

The Registrar:

P. Martorana

The Chairman:

K.J.A. Jahn