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File Number: T 777/90 - 3.3.1

Application No.: 83 103 786.6

Publication No.: 0 092 772

Title of invention: Process for producing aromatic hydroxy compound

Classification: C07C 37/04

D E C I S I O N
of 25 March 1992

Proprietor of the patent: Kabushiki Kaisha Ueno Seiyaku Oyo Kenkyujo

Opponent: Bayer AG

Headword: Aromatic hydroxy compounds/Ueno

EPC Article 56

Keyword: "Inventive step (confirmed) - unforeseeable improvement"

Headnote



Case Number : T 777/90 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 25 March 1992

Appellant :
(Opponent)

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Respondent :
(Proprietor of the patent)

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Decision under appeal :

Interlocutory decision of the Opposition Division
of 10 August 1990 concerning maintenance of
European patent No. 0 092 772 in amended form.

Composition of the Board :

Chairman : K.J.A. Jahn
Members : R.W. Andrews
J.-C. Saisset

Summary of Facts and Submissions

- I. European patent No. 0 092 772 in respect of European patent application No. 83 103 786.6, which was filed on 19 April 1983, was granted on 23 July 1986 (cf. Bulletin 86/30).
- II. A notice of opposition, which was filed on 5 December 1986, requested the revocation of the patent on the grounds that its subject-matter lacked novelty and did not involve an inventive step. The opposition was supported, inter alia, by the following documents:
- (3) US-A-2 111 973, and
 - (4) Industrial and Engineering Chemistry, Volume 33, pages 158 to 169, 1941.

After expiry of the time allowed for filing notice of opposition, the Opponent (Appellant) referred to the Encyclopedia of Chemical Technology, Kirk Othmer, 3rd Edition, Volume 3, page 331, 1978 (document 5).

- III. By an interlocutory decision issued on 10 August 1990, the Opposition Division maintained the patent on the basis of Claims 1 to 4 filed on 9 May 1989. The only independent claim of this set of claims reads as follows:

"A process for producing an aromatic hydroxy compound which comprises reacting an alkali metal salt of an aromatic sulfonic acid with an alkali metal hydroxide in a fluid reaction medium at an elevated temperature, characterised in that the aromatic sulfonic acid has a naphthalene or biphenyl ring structure and the reaction medium is a partial hydrogenation product of a triaryl in form of a hydrogenated triphenyl mixture or is dibenzyltoluene."

The Opposition Division held that these claims were adequately supported by the description and met the requirements of Article 123(2) EPC. In view of the surprisingly improved yields achieved with the present process compared with those obtained using the prior art process disclosed in document (3), the Opposition Division also decided that the subject-matter of the claims involved an inventive step.

IV. An appeal was lodged against this decision on 2 October 1990 and the prescribed fee duly paid. In his Statement of Grounds of Appeal filed on 7 November 1990 and during the oral proceedings held on 25 March 1992, the Appellant argued that the present Claim 1 represents an arbitrary selection of the substrates and reaction media which is not supported by the granted patent and that the present Claims 2 to 4 did not possess any independent inventive features.

The Appellant also contended that the terms "partially hydrogenated triphenyl mixture" and dibenzyltoluene were unclear.

The Appellant further alleged that the actual invention was not disclosed in the granted patent insofar as the effects relied on to support the presence of an inventive step were first disclosed in the later-filed Comparative Test Reports A and B.

The Appellant also maintained that the advantages listed in columns 3 and 4 of the published patent were also obtained by the process disclosed in document (3). Moreover, the reference to kerosene or aliphatic hydrocarbon fractions clearly pointed to the difference in character in these solvents. Since it was known from

document (5) that kerosene can contain up to 25% of aromatics and that the reference to a specific gravity of 0.838 for one of the components of the kerosene used in document (4) implies a large portion of aromatics, it was obvious to select partially hydrogenated terphenyl mixtures from the not too many available high boiling point hydrocarbon fractions.

Finally, the Appellant considered that the high yields achieved by the claimed process should be considered as a "bonus" effect.

- V. The Respondent maintained that the proprietor of the patent is entitled to restrict the claims of his patent to any subject-matter provided it was disclosed in the granted patent. With respect to the Comparative Test Reports A and B, the Respondent stressed that these were filed to provide evidence of the advantages of the claimed process over the one disclosed in document (3) which was cited for the first time during the opposition proceedings.

With respect to inventive step the Respondent contended that it was not possible to deduce from the teaching of document (3) that the yields obtained by the present process would be higher than those obtained by the process disclosed therein. Furthermore, the yield obtained by a chemical process cannot be regarded as a side effect since it is of great economic importance. Thus, a small increase in yield in a process used on a large scale is of great value.

- VI. The Appellant requested that the decision under appeal be set aside and that the patent be revoked. The Respondent requested that the patent be maintained on the basis of

Claims 1 to 4 filed on 23 March 1992, the description attached to the decision under appeal as Annex V and the drawing of the granted patent. Claim 1 of this request is identical with Claim 1 filed on 9 May 1989 (cf. paragraph III).

VII. At the conclusion of the oral proceedings the Board's decision to maintain the patent in the form requested by the Respondent was announced.

Reasons for the Decision

1. The appeal is admissible.
2. There are no objections under Article 123 EPC to the present claims. In particular, Claim 1 finds a basis in Claims 1 and 2 as filed and granted in combination with page 2, lines 7 to 20, the paragraph bridging pages 2 and 3 of the published patent application (cf. also column 2, lines 10 to 24 and 37 to 50 of the printed patent specification) and Examples 1, 2, 5, 6, 11 and 12 of the application and granted patent.
 - 2.1 In the Board's opinion, dibenzyltoluene is an example of an alkylbenzene. Thus, this compound (or mixture of compounds) may be considered either to be a substituted toluene wherein the substituents are two benzyl radicals or a substituted trimethylbenzene in which two of the methyl groups each carry a phenyl group.
 - 2.2 The expression "a partial hydrogenation product of a triaryl in form of a hydrogenated triphenyl mixture" is taken to refer to a mixture of hydrogenated terphenyls the nature of which remains aromatic. Such partially hydrogenated terphenyls are used as solvents for

carbonless copy paper, heat-transfer fluids and plasticizers and are available commercially in the United States of America, Europe and Japan (cf. Encyclopedia of Chemical Technology, Kirk Othmer, 3rd Edition, Volume 7, page 790, 1979).

- 2.3 In the Board's judgment, the present Claim 1 is clear and covers a process for the preparation of naphthols and diphenols by reacting the alkali metal salts of the corresponding sulphonic acids with alkali metal hydroxides in a reaction medium which consists of either partially hydrogenated terphenyls or dibenzyltoluene, i.e. mixtures of either of these two solvents with other materials are excluded from the scope of this claim.
- 2.4 Claims 2 to 4 correspond to Claims 3 to 5 as filed and granted.
3. The disputed patent relates to a process for the preparation of an aromatic hydroxy compound by reacting an alkali metal salt of the corresponding sulphonic acid with an alkali metal hydroxide in a liquid medium. Document (3), which is considered to represent the closest state of the art, discloses such a process in which the liquid medium is a high boiling hydrocarbon such as kerosene or aliphatic hydrocarbon fractions boiling between 250° to 400°C (cf. page 1, line 37 of the left-hand column to line 16 of the right-hand column).
- 3.1 However, the yields of naphthols and diphenols achieved by this prior art process were found to be unsatisfactory. Therefore, in the light of this closest prior art, the technical problem underlying the patent in suit is to provide a process of this type for the preparation of naphthols and diphenols in which the yields of these products are improved with respect to those obtained by this known process.

- 3.2 According to this disputed patent, this technical problem is solved by carrying out the process in a partially hydrogenated terphenyl mixture or dibenzyltoluene as the reaction medium.
- 3.3 In the light of the results in the Comparative Test Reports A and B filed on 19 April 1989, the result using dibenzyltoluene submitted during the oral proceedings held on 9 May 1989 and original Examples 1, 2, 5, 6, 11 and 12, the Board is satisfied that the above-defined technical problem is solved. In particular, yields in excess of 92% of 4.4'-diphenol, 2-naphthol, 2.6-dihydroxynaphthalene and 2.3-dihydroxynaphthalene-6-sulphonic acid were obtained by the present process. In contrast, the prior art process gave yields of 75% and 63.5% of 4.4'-diphenol and 2-naphthol respectively.
- 3.4 The Appellant questioned whether the yields of the desired products were as high as stated since there was no indication of the purity of the product. However, this cannot cast doubts as to whether the technical problem has been successfully solved since in the comparative tests the products were isolated in exactly the same manner and, therefore, it must be assumed that the resulting products had about the same degree of purity.
- 3.5 In view of the fact that document (3) was brought to the Patentee's attention for the first time by the filing of the notice of opposition, it was impossible for him to submit comparisons between his process and this known process to demonstrate the effect relied on to support inventive step at an earlier date. Furthermore, it is the established jurisprudence of the Boards of Appeal that, if the technical problem underlying an application or disputed patent has to be regarded as providing, for

example, an alternative process, it can be subsequently demonstrated by means of later-filed evidence that the problem actually lies in providing an improved process (cf. T 01/80, Carbonless copying paper, OJ EPO 1981, 206, particular paragraphs 6 to 8).

- 3.6 In the light of the prior art cited during the opposition proceedings, the Patentee was forced to restrict the scope of the claims in order to render the claimed subject-matter novel. However, the Patentee does not have to limit his claims to a previously acknowledged preferred embodiment. He may amend in any way he chooses provided the requirements of Articles 83, 84 and 123 EPC are met.
4. After examination of the cited prior art, the Board has concluded that the claimed subject-matter is novel. Since novelty is no longer in dispute, it is not necessary to give detailed reasons for this finding.
5. It still remains to be decided whether the subject-matter of the present claims involves an inventive step.
- 5.1 As previously mentioned, document (3) discloses a process for the preparation of aromatic hydroxy compounds by the reaction of alkali metal aromatic sulphonates with alkali metal hydroxides in the presence of kerosene or aliphatic hydrocarbon fractions, boiling between 250° to 400°C (cf. Claims 10 to 12 and 14 to 19).

Table 2 on page 331 of document (5) reports the results of the mass spectrometric analysis of kerosenes boiling in the range 150°C to 288°C. Depending on the source of the kerosene, it contains from 14 to 25% by weight of aromatics. From this disclosure the Appellant concluded that document (3) teaches that the reaction medium may be an aliphatic hydrocarbon or a mixture of acyclics,

alicyclics and aromatics. However, this teaching would not suggest to the skilled person that the yield of the desired naphthols and diphenols would be improved by replacing these known reaction media with the ones referred to in the present Claim 1. Moreover, in view of the large number of high boiling materials available to the skilled person, it would be a matter of luck for him to hit upon either a partially hydrogenated terphenyl mixture or dibenzyltoluene.

5.2 If the Appellant's allegation that the advantages of the present process referred to in column 3, line 30 to column 4, line 8 were achieved by the process of document (3) is accepted, the only proven advantage of the present process over this prior art process lies in the increase in yields of the desired products. Therefore, the Appellant's argument that this represents a so-called "bonus effect" is clearly invalid. In any case, since the yield of a chemical process is one of the key factors in determining its economic viability, it cannot be considered to be a feature of no great importance. Contrary to the Appellant's assertion, an improvement in the yield of the desired products was stated to be one of the advantages of the claimed process (cf. column 3, lines 44 and 45).

5.3 Document (4) is concerned with the effects of several parameters on the preparation of phenol by the reaction of sodium hydroxide and sodium benzenesulphonate in the presence of kerosene (cf. first paragraph under the heading "Fusion" in the right-hand column on page 16 and Tables VIII to XII on the following pages). Under certain conditions yields of phenol in excess of 90% were obtained (cf. above-mentioned Tables). However, this document, which is solely concerned with the preparation of phenol using kerosene as the reaction medium, would not provide

the skilled person with any indication of the steps to be taken to obtain similar yields with the claimed substrates.

5.4 According to the second paragraph under the heading "Fusion" in the right-hand column of page 165, the kerosene used in the experiments was well within the gas oil range since it was a mixture of one volume of Bayol D-1 (boiling range 201° to 275°C, specific gravity 0.789) and two volumes of Markol (boiling range 295° to 425°C, specific gravity 0.838). The Appellant alleged that this latter specific gravity implied a high aromatic content of this fraction of the kerosene and, therefore, a pointer to the solution to the present technical problem. However, the Respondent contested this allegation. In these circumstances where parties make contrary assertion which cannot be substantiated and the Board is unable to establish the facts of its own motion, it is the established jurisprudence of the Boards of Appeal that it is the party whose argument rests on these alleged facts who loses thereby. In any case, in the Board's judgment, even if it is assumed that the Appellant's assertion is correct, the teaching of this document would not lead the skilled person to the proposed solution in the absence of any information regarding the possibility of using other reaction media or other substrates.

5.5 Therefore, in the Board's judgment, the skilled person could not have foreseen that the selection of the reaction media referred to in the present Claim 1 would lead to a considerable increase in yield of the desired naphthols and diphenols. Thus, the subject-matter of Claim 1 involves an inventive step. Claims 2 to 4, which relate to preferred embodiments of the process of Claim 1, are also allowable.

Order

For these reasons, it is decided that:

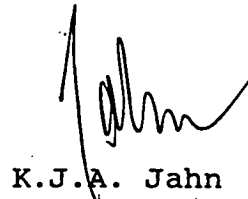
1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of Claims 1 to 4 filed on 23 March 1992, the description attached to the decision under appeal as Annex V and the drawing of the granted patent.

The Registrar:



E. Gorgmaier

The Chairman:



K.J.A. Jahn