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Beschwerdekammern **Boards of Appeal** **Chambres de recours**

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Bezeichnung der Erfindung:
Title of invention:
Titre de l'invention : High-molecular-weight novolak substituted phenolic resins and their preparation

Klassifikation / Classification / Classement : C08G 8/28

ENTSCHEIDUNG / DECISION

vom / of / du 27 June 1989

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /
Titulaire du brevet : Mitsui Petrochemical Industries, Ltd.

Einsprechender / Opponent / Opposant : Hoechst AG

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Article 54(2)

Schlagwort / Keyword / Mot clé : "Novelty affirmed after limitation of claim"

Leitsatz / Headnote / Sommaire

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Beschwerdekammern | **Boards of Appeal** | **Chambres de recours**

Case Number : T 186/88 - 3.3.1

DECISION
of the Technical Board of Appeal 3.3.1
of 27 June 1989

Respondent:
(Proprietor of the patent)

MITSUI PETROCHEMICAL INDUSTRIES, LTD.
2-5, Kasumigaseki 3-chome
Chiyoda-ku
Tokyo 100
Japan

Representative :

Myerscough, Philip Boyd
J.A. Kemp & Co.
14, South Square
London, WC1R 5EU
GB

Appellant:
(Opponent)

HOECHST AKTIENGESELLSCHAFT
c/o Kalle Niederlassung der HOECHST AG
Postfach 3540
D-6200 Wiesbaden 1

Decision under appeal :

Decision of the Opposition Division of the European Patent Office of 11 November 1987 posted on 8 March 1988 revoking European patent No. 0 032 062 pursuant to Article 102(1) EPC

Composition of the Board :

Chairman : K. Jahn
Members : M. Eberhard
G.D. Paterson

Summary of Facts and Submissions

I. The mention of the grant of the European patent No. 0 032 062 in respect of patent application No. 80 304 746.3, filed on 29 December 1980 and claiming priorities of 27 December 1979 and 3 June 1980 from five earlier Japanese applications, was announced on 3 April 1985 on the basis of forty eight claims.

II. On 28 December 1985, the Respondent (Opponent) filed a notice of opposition requesting that the patent be revoked in its entirety on the grounds of lack of novelty and inventive step.

From the three documents cited by the Respondent during the opposition proceedings only the following one was relied upon at the oral proceedings before the Board:

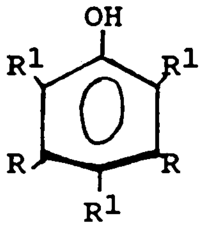
(2) Coatings and Plastics Preprints, Vol. 35, No. 2, pages 306-311, 1975, American Chemical Society.

III. By a decision delivered orally on 11 November 1987, with written reasons posted on 8 March 1988, the Opposition Division revoked the patent. It was held that the subject-matter of the amended product Claim 31 lacked novelty with regard to the teaching of document (2) which discloses a novolac polymer with a polydispersity index and a number average molecular weight lying with the claimed ranges, this novolac resin being prepared from a mixture of bifunctional phenols according to the general formula (I). It was further pointed out that document (2) refers to a published document to indicate the method of preparation of the novolac resins.

IV. An appeal was lodged against this decision on 2 May 1988 together with payment of the prescribed fee. A Statement of Grounds of appeal and an amended Claim 31 were filed on 18 July 1988. This amended claim differs from Claim 31 on which the Opposition Division had based its decision in that the bifunctional phenol is restricted to a para-substituted phenol. Amended Claim 31 reads as follows:

"31. A substantially linear, high-molecular-weight novolak phenolic resin which comprises substantially linear novolak recurring units formed by condensation of a phenol component comprising at least 70 mole % of at least one bifunctional phenol represented by the general formula (I) as defined in Claim 1, wherein the R^1 group which is not a hydrogen atom is in the para position with respect to the hydroxy group, with at least one aldehyde represented by the general formula as defined in Claim 1, said resin having a number average molecular weight of from 1 700 to 15 000 as measured by vapour pressure osmometry in N,N-dimethylacetamide as solvent, a ratio $\overline{M}w/\overline{M}n$ of the weight average molecular weight $\overline{M}w$ to the number average molecular weight $\overline{M}n$ of from 1.7 to 20 and a melting point higher than 160°C."

The general formulae of the bifunctional phenol and the aldehyde referred to in this claim are defined in Claim 1 as follows:



phenol of formula (I)

wherein two of the three R^1's are hydrogen atoms and the remaining R^1 is an alkyl group having 1 to 8 carbon atoms, an aryl group having 6 to 10 carbon atoms, a halogen atom or a hydroxyl group, and the two R's, which may be same or different, represent a hydrogen atom, an alkyl group having 1 to 8 carbon atoms, a halogen atom or a hydroxyl group;

aldehyde of formula (II) $R^2 - CHO$

wherein R^2 represents a hydrogen atom, a methyl group or a halogenated methyl group.

V. At the oral proceedings held on 27 June 1989, the Board raised the question as to whether the amended Claim 31 meets the requirements of Article 123(2), the lower limit of 1.7 for the polydispersity index being disclosed only in two examples of the patent and solely for novolac resins prepared by condensation of a p-tert-butylphenol/formaldehyde resin with either 2,6-dimethylol-p-cresol or p-xylylene glycol.

The Appellant consequently filed a further amended Claim 31 which differs from the preceding one only in that the lower limit of 1.7 is replaced by the value 1.8.

VI. In the grounds of appeal and during the oral proceedings, the Appellant argued that the amended Claim 31, the subject of his request, is clearly novel over the disclosure of document (2) since the novolac resin recorded in Table 2 thereof is not prepared from at least 70% of a para-substituted phenol. Although p-cresol is mentioned in document (2), this document teaches that it is not worthy preparing resists from p-cresol. The Appellant also contended that the disclosure of document (2) is not sufficient to enable one skilled in the art to prepare the resins and that the resins of document (2) do not have molecular weights falling within the range defined in Claim 31.

VII. In his observations in reply filed on 3 December 1988 and during the oral proceedings, the Respondent argued that the subject-matter of the amended Claim 31 still lacks novelty. It was contended that the teaching of document (2) is not restricted to the use of o-cresol to prepare the novolac resin, the use of bifunctional cresols in general and in particular of p-cresol being also disclosed. The Respondent further argued that although only o-cresol is exemplified in document (2), this document however teaches the similarity of o- and p-cresol for the transformation into novolac resins. It was therefore to be expected that the novolac resins which have been prepared from p-cresol exhibit the values given in Tables 1 and 2 for the number average molecular weight $\overline{Mn}$, the polydispersity index and the melting point.

VIII. At the oral proceedings the Appellant requested that the decision under appeal be set aside and the case be remitted to the Opposition Division for further examination on the basis of Claim 31 as amended during the oral proceedings.

The Respondent requested that the appeal be dismissed.

The decision was announced at the conclusion of the oral proceedings that the Decision of the Opposition Division was set aside and case was to be remitted to the Opposition Division on the basis of Claim 31 as amended during the oral proceedings.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.

2. There are no formal objections under Article 123(2) and (3) to Claim 31, as filed in amended form during the oral proceedings. In particular the range of 1.8 to 20 for the ratio $\overline{Mw}/\overline{Mn}$ and the limitation to a bifunctional para-substituted phenol are supported by the application as filed, respectively on page 8, lines 4-8 and page 10, line 27 to page 11, line 3 (cf. page 4, line 15 and page 5, lines 12-17 of the patent as granted). The lower limit of the melting point and the number average molecular weight range are based on the original text page 8, lines 8-10 and on the original Claim 34 (cf. page 4, lines 16-17 and Claim 34 of the patent as granted). The present Claim 31 manifestly does not extend the protection conferred by Claim 32 of the patent as granted.

3. The only issue arising in this appeal is that of novelty in respect of Claim 31. This claim relates to a substantially linear, high-molecular-weight novolac phenolic resin comprising recurring units formed by condensation of a phenol component comprising at least 70 mole % of at least a bifunctional para-substituted phenol of the general formula (I) with at least one aldehyde of the general formula (II), this novolac resin having a number average molecular weight of from 1 700 to 15 000 as measured by vapour pressure osmometry, a polydispersity index of from 1.8 to 20 and a melting point higher than 160°C.

3.1 Document (2) discloses a novolac resin having a polydispersity index ($\overline{Mw}/\overline{Mn}$) of 1.8 and a weight average molecular weight $\overline{Mw}$ of 4 600, as measured by gel permeation chromatography (see page 307, paragraph 3, page 309, third resin of Table 2 and paragraph bridging pages 307 and 308). The number average molecular weight $\overline{Mn}$ of this novolac resin, as calculated from the values of the polydispersity index and $\overline{Mw}$, is 2 556. This novolac resin was prepared from a starting phenol mixture consisting of 82% o-cresol, 15% o-tert-butylphenol and 3% p-nonylphenol.

The second novolac polymer disclosed in Table 2 was prepared from 80% o-cresol and 20% o-tert-butylphenol. It has a polydispersity index lying outside the range stated in the present Claim 31.

Thus the starting phenol mixtures used for the preparation of these two novolac resins include respectively 97% and 100% of bifunctional ortho-substituted phenols whereas, according to the present Claim 31, the starting phenol comprises at least 70% mole % of a bifunctional para-substituted phenol. The starting phenol mixtures consisting essentially of o-substituted phenols disclosed in document (2) indubitably lead to novolac polymers having a structure which differs from that of polymers prepared from a starting phenol comprising at least 70 mole % of para-substituted phenols as claimed in the present Claim 31.

The use of a specific p-substituted phenol, namely p-nonylphenol, is exemplified in document (2) but only in an amount of 3%. Furthermore p-nonylphenol does not represent a bifunctional p-substituted phenol as defined in the general formula (I) of Claim 31 since the alkyl group R^1 of this formula contains at most 8 carbon atoms.

A novolac resin having a polydispersity index of 1.8 and a number average molecular weight $\overline{M}n$ of 2 600 is further recorded in Table 1 of document (2) (see page 309, the second polymer of table 1). According to the fourth paragraph of page 307, which refers to Table 1, this resin was prepared predominantly from o-substituted phenols, however document (2) does not mention any specific data concerning the relative amounts of ortho- or para-substituted phenol in the starting mixture of phenols. In the fourth paragraph of page 307 referred to above, it is emphasised (i) that the fraction of meta-cresol should be limited to 20% to make it easy to control gel formation and (ii) that the polymers were prepared predominantly from o-substituted phenols with some m-substituted for higher molecular weight, since o-cresol makes a less symmetrical and less rigid polymer than p-cresol. Therefore p-cresol is presented in document (2) as a possible starting phenol for the preparation of novolac resins having a structure and a rigidity which differ from those of the novolac resins recorded in Tables 1 and 2 but not as a possible substitute for o-cresol in order to obtain novolac resins exhibiting the characteristics indicated in these tables. In other words, document (2) does not specifically disclose novolac resins formed by the use of p-cresol instead of o-cresol in the starting phenol mixtures exemplified in this document and having a polydispersity index and a number average molecular weight similar to those recorded in Tables 1 and 2 or falling within the ranges stated in the present Claim 31.

Furthermore the Respondent, upon whom the onus of proof rests in opposition proceedings, did not provide any evidence to establish that by using p-cresol instead of o-cresol in the starting mixture of phenols exemplified in document (2) and preparing the novolac resin by the known method referred to in this document, a novolac resin having the number average molecular weight defined in Claim 31 is inevitably obtained.

The Respondent's arguments are mainly based upon the similarity of o- and p-cresol for the transformation into novolac resins and the expectation inferred therefrom. However, when considering novelty, the only issue to deal with is identity and the question of similarity or expectation does not arise, therefore these arguments are not relevant.

Under these circumstances, it is considered that document (2) provides no specific and unambiguous disclosure of a novolac resin containing recurring units formed from at least 70 mole % of a para-substituted phenol and having a polydispersity index and a number average molecular weight which fall within the ranges stated in the present Claim 31.

3.2 For the preceding reasons the Board considers that document (2) does not disclose the novolac resin of Claim 31 as amended in the oral proceedings and therefore that the subject-matter of this claim is novel.

4. According to the impugned decision, the Opposition Division did not examine the formal allowability of Claim 1, or any other questions pertaining to the patentability of its subject-matter. Furthermore, the question as to whether the subject-matter of the present Claim 31 involves an inventive step was also not considered by the first instance.

It is noted that the present Claim 31 does not appear to embrace the novolac resins described in Examples 3 and 25 of the patent as granted since their polydispersity indexes lie outside the claimed range. It does not appear to be necessary for these Examples to be deleted however. The final form of the patent is a matter for the Appellant and the Opposition Division.

In the circumstances the Board remits the case to the Opposition Division for further examination of all aspects of the patent except what is specifically the subject of this Decision.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Opposition Division for further examination on the basis of Claim 31 filed on 18 July 1988 with the amendment submitted at the oral proceedings, namely replacement of the value 1.7 by 1.8 for the ratio $\overline{Mw}/\overline{Mn}$, and claims 1-30 and 32-44 filed on 5 February 1987.

The Registrar The Chairman