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**D E C I S I O N**  
**of 11 April 2005**

**Case Number:** T 1089/01 - 3.3.6

**Application Number:** 93500108.1

**Publication Number:** 0586323

**IPC:** C11D 1/74

**Language of the proceedings:** EN

**Title of invention:**

Detergent composition and method for its preparation

**Patentee:**

KAO CORPORATION, S.A.

**Opponent:**

Cognis Deutschland GmbH & Co. KG

**Headword:**

Non-irritant detergent composition/KAO

**Relevant legal provisions:**

EPC Art. 83, 56

**Keyword:**

"Sufficiency of disclosure (yes) - examples in the patent and their modifications sufficient for carrying out the invention"  
"Inventive step (yes) - simultaneous improvement of several unrelated properties"

**Decisions cited:**

T 0014/97

**Catchword:**

-



Case Number: T 1089/01 - 3.3.6

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.6  
of 11 April 2005

**Appellant:** Cognis Deutschland GmbH & Co. KG  
(Opponent) Postfach 130164  
D-40551 Düsseldorf (DE)

**Representative:** Fiesser, Gerold Michael, Dr.  
Patentanwälte  
Kahlhöfer Neumann  
Herzog Fiesser  
Postfach 26 02 32  
D-80059 München (DE)

**Respondent:** KAO CORPORATION, S.A.  
(Proprietor of the patent) Puig del Tudons, 10  
ES-08210 Barbera del Valles,  
(Barcelona) (ES)

**Representative:** Kindler, Matthias, Dr. Dipl.-Chem.  
Hoffmann Eitle  
Patent- und Rechtsanwälte  
Postfach 81 04 20  
D-81904 München (DE)

**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
7 August 2001 concerning maintenance of  
European patent No. 0586323 in amended form.

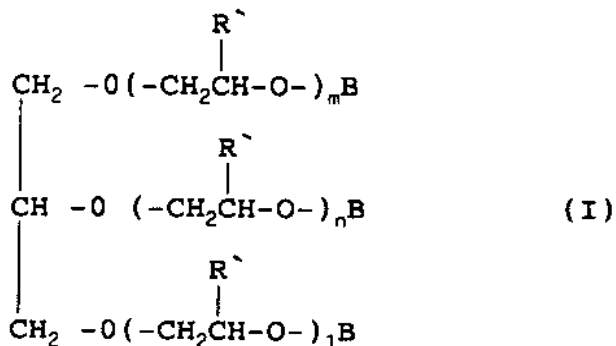
**Composition of the Board:**

**Chairman:** P. Krasa  
**Members:** P. Ammendola  
U. J Tronser

## Summary of Facts and Submissions

- I. This appeal is from the interlocutory decision of the Opposition Division concerning the maintenance in amended form of European Patent No. 0 586 323 according to the Patent Proprietor's main request.
- II. The Opponent had sought revocation of the granted patent on the grounds of lack of novelty and inventive step (Article 100(a) in combination with Articles 52(1), 54 and 56 EPC). The Opposition Division had additionally raised - under the provisions of Article 114(2) EPC - an objection on the grounds of Article 100(b) EPC.
- III. During the opposition proceedings the parties had filed, among others, the following documents and enclosures:
- Document (1) = BE-A-866 868,
- Document (3) = DE-C-2 024 051,
- Enclosure (1): "Bailey's Industrial Oil And Fat Products", Vol. 2, 4th Ed., pages 126 to 159,
- Enclosures (2) to (4): Table and graph representation of the composition of the final ester and ether mixture expected at different reactant molar fractions,
- Enclosures (5) and (10): experimental reports.
- IV. The Proprietor's main request in the opposition proceedings comprised a set of four claims, wherein claim 1 was as granted and read:

"1. Detergent composition comprising the mono-, di- and tri-ester compounds represented by the formula (I) wherein the weight ratio of mono, di and tri-ester is 46-90/9-30/1-15,



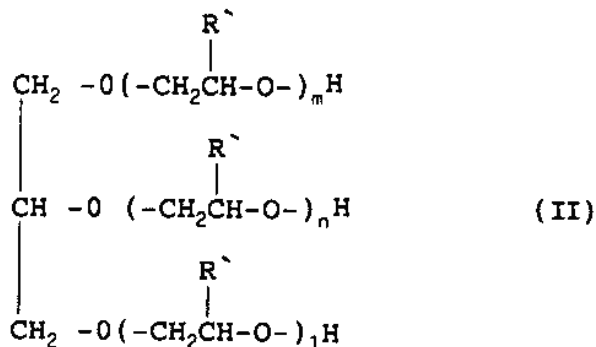
wherein:

- "B" represents "H" or the group represented by



provided that R represents alkyl or alkenyl group having C<sub>6-22</sub> R' represents H or CH<sub>3</sub>, and each of n, m and l independently represents an integer from 0 to 40; being m+n+l=2-100 preferably 9-19

and the compound represented by the formula (II)



wherein:

- "n", "m" and "l" may have a value between 0 and 40, provided that  $(m+n+l) = 2-100$  preferably 9-19
- R' represents H or CH<sub>3</sub> respectively,

*in which the weight ratio (I)/(II) has a value between 3 to 0.33."*

Also claim 2 was as granted and defined a preferred embodiment of the detergent composition of claim 1.

Claims 3 and 4 were different from the corresponding granted claims and defined the following methods:

"3. *Method of preparing a detergent composition as defined in claim 1 by employing the following steps (a) and (b):*

*(a) the mixture of triglyceride, and glycerine is subjected to an inter-esterification reaction,*

*(b) the reaction mixture obtained in the step (a) is subjected to alkoxylation using alkylene oxide having C<sub>2-3</sub> in the presence of alkaline catalyst to produce the compounds represented by the general formula (I) + (II)."*

"4. *Method of preparing a detergent composition as defined in claim 1 by employing the following steps (c) and (d):*

*(c) the mixture of glycerine and alkylene oxide C<sub>2-3</sub>, in presence of alkaline catalysts is prepared,*

(d) *the reaction mixture obtained in the step (c) is reacted with methyl ester of fatty acid or fatty acid."*

V. The Opposition Division found *inter alia* that the methods defined in the above claims 3 and 4 were exemplified in the patent in suit. Moreover, the common general knowledge in the field of glycerolises of fats as disclosed in the Enclosures (1) to (4) would allow the person skilled in the art to synthesize other embodiments of the detergent of above claim 1 by simple modifications of the examples of the patent in suit.

The Opposition Division also found that, starting from the most relevant prior art disclosed in Document (1), the person skilled in the art had to exercise inventive activity in order to arrive at the claimed detergent composition with improved detergency and reduced irritation to skin. It additionally observed that the claimed subject-matter would remain non obvious even when starting from the prior art disclosed in Document (3) because it considered, *inter alia*, that the comparative example based on "CETIOL HE" in Enclosure (10) demonstrated the lower detergency of the prior art described in this citation.

VI. The Opponent (hereinafter Appellant) lodged an appeal against this decision, presenting arguments only in respect of insufficiency of disclosure and lack of inventive step.

VII. In a letter dated 8 April 2004 the Appellant stated that it would not take part in the oral proceedings

scheduled for 11 May 2004 and requested a decision on the contents of the file as it stands.

The Board informed the parties by a fax dated 5 May 2004 that the oral proceedings were cancelled.

VIII. The Appellant argued substantially as follows.

The disclosure in the patent in suit of the methods of the above-cited claims 3 and 4 would be incomplete and the common general knowledge of the person skilled in the art summarised in Enclosure (1) would not be sufficient to predict how to regulate the several process variables of the glycerolysis step so as to reliably obtain the detergent compositions according to the above-cited claim 1. Thus, the invention disclosed in the patent in suit could be carried out only after very extensive experimental investigations.

Theoretical predictions, such as those reported in Enclosures (2) to (4), on the composition of the final mixture present at a hypothetical thermodynamic equilibrium point of the reactions of fat, glycerine and alkylene oxide at different molar ratios would not correspond to the actual product of these reagents under real reaction conditions. In particular, this would appear evident from the fact (also mentioned in Enclosure (1)) that the extent of this reaction would be substantially influenced by the limited miscibility of glycerine with the fat and, therefore, could change to a relevant extent e.g. when changing the temperature profile of the process or by adding cosolvents. Moreover, different reactivity and/or charge density was to be expected among the different kinds of

functional groups taking part in the reaction. In particular, these differences and the limited compatibility among the reactants necessarily would have played a very significant role in the Referential examples 1 and 2 of the patent in suit, because of their surprisingly short reaction times, as compared to those known (e.g. from Enclosure (1)) as necessary for reaching equilibration of the reaction.

Therefore, the chemical structure of the actual products obtained in the only examples (insufficiently) disclosed in the patent in suit might have depended substantially from the reactant compatibility and the different reactivity of the reacting groups, rather than resembling the mixture of esters (I) and ethers (II) predictable at a hypothetical equilibrium state, under the assumption that all starting reagents took part in the reactions and that there was no difference in reactivity among the different kinds of functional groups.

In respect of the assessment of inventive step the Appellant maintained that the cosmetic detergent formulations disclosed in Document (3) would represent the most reasonable starting point for the assessment of inventive step. Considering that none of the examples of the patent in suit and the experimental comparisons reported in Enclosures 5 and 10 were according to the prior art examples in this citation, none of the alleged advantages of the invention had been credibly proven by the Proprietor (hereinafter Respondent) and the claimed subject-matter would only represent an obvious alternative to the very similar detergent compositions disclosed in Document (3).



IX. The Respondent refuted the Appellant's arguments and maintained that the skilled person might not only reproduce the examples given in the patent in suit, but also any other embodiment of the claimed detergent composition. It stressed that the Appellant provided no evidence supporting the alleged lack of reproducibility of the invention and further argued that it had misinterpreted the post-reaction times given in Referential examples 1 and 2.

In respect of the assessment of inventive step, the Respondent maintained that Document (3) referred only to the use of alkoxyated glycerine esters of fatty acids as refatting agents for cosmetic compositions, rather than as non-ionic surfactants for detergent formulations, and did not mention irritation of the skin or of the eyes. Thus, it concluded that the prior art disclosed in this citation was more remote from the claimed invention than that described in Document (1).

X. The Appellant requested that the decision of the first instance be set aside and the patent be revoked.

XI. The Respondent requested that the appeal be dismissed. Alternatively that the patent be maintained in amended form on the basis of the 1<sup>st</sup> or 2<sup>nd</sup> auxiliary requests as filed at the oral proceedings before the opposition division.

## Reasons for the Decision

*Respondent's main request (patent in the amended form found to comply with the requirements of the EPC by the Opposition Division)*

### 1. *Sufficiency of disclosure*

- 1.1 The above-cited claims 3 and 4 (see above item III) define methods for synthesizing the mixture of glycerine esters (I) / ethers (II) described in the above-cited claim 1. Both claimed methods involve reaction of fatty acid or fat with glycerine (i.e. a glycerolysis, compare claims 1, 3 and 4 of the patent in suit with page 134, lines 4 to 10, and page 138, Table 2.6 of Enclosure 1) and an alkoxylation reaction.
- 1.2 The Appellant has argued that the contested patent provided insufficient disclosure of the above methods for the reasons indicated above at item VIII.
- 1.3 The Board observes that no experimental evidence has been filed in support of the Appellant's arguments. In particular, it has not reported failure to obtain a detergent composition according to claim 1 by carrying out processes according to claims 3 or 4.
- 1.4 The Board considers that the disclosure in the description of the patent in suit relevant in respect of the reproducibility of the methods of claims 3 and 4 is represented by the similarly worded generic definitions of the reactant kinds and ratios (see page 3, lines 50 to 57, and page 4, first three lines)

and by the two examples labelled "Referential example 1" and "Referential example 2".

1.5 The Board concurs with the Appellant and with the Opposition Division (see the decision under appeal, page 4, lines 4 to 7, from the bottom) that these Referential examples are described only in part, so that it is impossible to establish with certainty the temperature and reactant concentration profile actually occurring in the experiments carried out by the inventors. For instance, the patent in suit discloses in these examples neither the rate of addition of the reagents, nor the heating or cooling rate.

1.5.1 However, the Board observes that glycerolysis of fats and alkoxylation of glycerol are undisputedly conventional processes. Therefore, the skilled reader of the patent in suit would reasonably assume that the reaction parameters undisclosed in the Referential examples may be set as in any other conventional glycerolysis or alkoxylation process(es).

Hence, the Board has no reason to doubt that a skilled person would be able to carry out synthetic processes (hereinafter "the processes consistent with the patent examples") which represent the reasonable reduction to practice of the incomplete instruction contained in Referential examples 1 and 2, by:

- on one hand, following the explicit disclosure in these examples, e.g. as to the kind and the amount of specified reactants and of the alkaline catalyst, as well as to the addition sequence and the time length and temperature of some of the process steps,

and

- on the other hand, setting as in any other conventional fat glycerolysis or glycerol alkoxylation processes the relevant process parameters undisclosed in these Referential examples (such as the rates of the reactants' addition, heating and cooling).

1.5.2 The Board notes also that the actual glycerolysis reaction times of the Referential examples 1 and 2, although not disclosed, must necessarily have lasted more than the 0.5 and 0.75 hours explicitly mentioned therein as time lengths of the step following the completion of the reactants' addition. Indeed the Board finds it credible that, as observed by the Respondent (see the last full paragraph at page 2 and the paragraph bridging pages 2 and 3 of the Respondent letter of 24 February 2004), in Referential example 1 substantial glycerolysis may have occurred already during the vacuum stripping at 110°C, during the time needed for raising the temperature to 140°C or during the time interval necessary for pressurizing the reactor with ethylene oxide and, finally, may also have lasted for at least some time during the cooling step. Similar conclusions apply to Referential example 2.

Moreover, the Board observes that complex reactions not reaching the equilibrium may be reproduced as well. Therefore, it is irrelevant to the reproducibility of the processes consistent with the patent examples, whether or not the disclosed reaction time was

sufficient to ensure the achievement of the theoretical equilibrium composition of the reaction system.

1.5.3 Accordingly, the Board concludes that, in the absence of any evidence to the contrary, the skilled person finds in the patent in suit information at least sufficient for carrying out processes consistent with the instruction given in the Referential examples 1 and 2 as supplemented by the skilled person's common general knowledge.

1.6 The Opposition Division (see the decision under appeal page 6, lines 7 to 12) considered that, in addition to repeating the processes of the examples of the patent in suit, the skilled person could synthesize further claimed mixtures by **modifying** the processes of these examples.

The Appellant has objected that these modifications would require an undue amount of experimentation, because of the large number of process variables influencing the chemical composition of the final mixture and because the conventional methods for predicting it, such as those exemplified in Enclosures (2) to (4), provide unrealistic results, since they are based on the assumption of complete reaction and equilibration of all the reactants and do not take into account the incompatibility of fatty acids and glycerine and the presence of reacting groups with different reactivity (see above item VIII).

1.6.1 The Board observes instead that the skilled person, willing to implement further embodiments of the invention, does neither need to foresee the precise

effect of the possible process modifications on the final chemical composition, nor necessarily to reach the thermodynamic equilibrium composition. To ensure the reproducibility of further embodiments of the invention it is sufficient that the skilled person knows **which parameters** of the processes consistent with the patent examples might be modified and **in which direction** in order to get closer to the desired composition. In the present case, it is credible that the skilled person is able to carry out the increasingly focused optimization experiments possibly needed to realize further embodiments of the invention, because of the conventional nature of these well known processes and of the related common general knowledge summarised in Enclosure (1) (cf. also the considerations referring thereto at page 3 of the decision under appeal as well as at item 2 of the grounds of appeal).

- 1.6.2 It is stressed that these considerations do not render useless the conventional prediction models (such as that illustrated in Enclosures 2 to 4, or in Enclosure (1), Table 2.6 at page 138 and the comment referring thereto at page 137, lines 19 to 21) which are based on an hypothetical equilibrium point among all introduced reactants and on the assumption of no difference of reactivity among the various kinds of reacting groups. On the contrary, such models may serve as a rough guidance towards the required reactant relative ratios, and therefore significantly reduce the amount of optimization experiments needed to arrive at the desired mixture.

1.6.3 Thus, the Board concurs with the conclusion in the decision under appeal that further embodiments of the detergent composition of the invention may be readily realised by modifying the processes consistent with the patent examples.

1.7 In view of the above findings at items 1.5.3 and 1.6.3 the Board concludes that the subject-matter of the claims of the patent as amended during the opposition proceedings complies with the requirements of Article 83 EPC.

2. *Novelty*

The Board is satisfied that the subject-matter of the claims of the present request is novel (Article 54 EPC). Since the Appellant has raised no objection in this respect no reasons need to be given.

3. *Inventive step for the subject-matter of claim 1*

3.1 The detergent composition of claim 1 (see above item IV) is characterised exclusively by the presence of the ester mixture (I) and the ether (II) in given amounts. The patent description at page 2, lines 7 to 9, confirms that this definition embraces any kind of detergent formulations from heavy duty to light duty detergents (for fabrics), to all purpose cleaners, to shampoos and body shampoos.

3.2 The granted patent identifies at page 2, lines 50 to 54, the technical problem of providing a detergent composition which will exhibit outstanding biodegradable, non-toxic, non-irritant performance,

foam stability and better dye transfer inhibition, while **maintaining** and even improving detergency. It further clarifies at page 4, lines 6 to 12, that the biodegradability, non toxicity, very low skin irritation, foam profile and anti dye transfer property of the patented detergent formulations are improved in respect of detergent compositions based on other nonionics **without deterioration of the detergency**. This is further explicitly confirmed at page 7, lines 5 to 6 of the patent description, stating that at least some of the compositions of the invention have been observed to display the **same level of detergency** of comparative compositions.

Therefore, the Board finds that the patent in suit does not disclose that (all) the claimed compositions display improved detergency as compared with those of the prior art. Thus, in apparent contradiction with the statement at page 8, lines 12 to 14, of the decision under appeal, the achievement of **an improved detergency does not belong to the technical problem** addressed in the patent in suit and the evaluation of the most reasonable starting point for the assessment of inventive step should not take into consideration this alleged technical effect.

Accordingly, the Board concludes that the technical problem addressed in the patent in suit is that of **providing detergent compositions with improved biodegradability, non toxicity, anti dye transfer property, foam profile and skin irritation**.

- 3.3 The parties have disputed as to which of Documents (1) and (3) discloses the more relevant prior art.



The Board finds that also the cosmetic cleaning compositions disclosed in Document (3) address the technical problem of obtaining a good foam profile and avoiding skin irritation, the latter being that caused by the de-fatting occurring upon repeated use of these cosmetic cleaning formulations (see Document (3) claim 1, the examples and page 2, line 1 to page 3, line 11, whereby the cited page numbers are those at the lower right corner of each page).

On the other hand, the Board observes that this technical problem is substantially the same addressed also by the good-foaming non-irritating detergent compositions disclosed in Document (1) (see page 2, line 1 to page 3, line 1, claim 1 and the examples).

Therefore, the Board concludes that both these citations disclose prior art addressing part of the technical problem addressed in the patent in suit (see above item 3.2).

The Board, however, concurs with the Appellant that the chemical composition of the shampoos and bath foams disclosed in Document (3) (see e.g. lines 13 to 11 from the bottom of the page numbered 2 at the right lower corner, in combination with lines 3 to 11 of the page numbered 3 at the right lower corner, the examples and claim 1) is **closer** to the claimed shampoo and body shampoos embraced by the definition of present claim 1, than the detergent formulations, preferably shampoos, disclosed in Document (1) (see claim 1 and the examples). This has been explicitly stated in the

decision under appeal (see page 9, lines 19 to 21) and has not been disputed by the Respondent.

- 3.3.1 The Respondent's argument for disregarding the prior art disclosed in Document (3) (see above item X) is partially based on an alleged substantial difference between the property of the claimed compositions of being "*non-irritant*" and the re-fatting property of the detergent formulations of the prior art disclosed in this citation. The Board finds instead that in the patent in suit the expression "*non-irritant*" expressly indicates the avoidance of any kind of strong interactions with the human skin (see page 2, lines 18 to 19, and examples 4 and 5). This definition inevitably embraces (if not coincides with) the avoidance of the irritation resulting from the de-fatting generally known to be produced by detergent formulations, in particular by those comprising anionic surfactants. Thus, also the compositions of the invention necessarily aim at avoiding the irritation produced by de-fatting. Accordingly, the substantial difference alleged by the Respondent is found not to be proven.

The Respondent's remaining argument, that the mixture of compounds (I) and (II) is disclosed in Document (3) only as re-fatting ingredient, rather than as the non-ionic surfactant ingredients of the claimed detergent compositions, is found irrelevant. In general, the fact that a document discloses formulations with the desired properties is not substantially modified by the additional (correct or incorrect) information as to the function that each ingredient performs therein. Nor has the Respondent derived from the labelling of the

alkoxylated glycerine ester ingredients in Document (3) as re-fatting agents any necessary implication that e.g. the compositions of this prior art must be less "*non-irritant*" than the other detergent compositions known to produce low irritation. Thus, the relevance of the disclosure in Document (3) of shampoos with good foam profile and low irritation is independent of whether the alkoxylated glycerine ester ingredients are labelled therein as re-fatting agents or surfactants.

3.3.2 Therefore, the Board concurs with the Appellant that the most appropriate starting point for the assessment of inventive step is the prior art disclosed in Document (3).

3.4 In respect of the technical problem solved by the detergent compositions of the invention vis-à-vis those of this prior art, the Appellant has argued that there was no credible evidence on file that the claimed detergent compositions would have any improved property.

3.4.1 The Board observes however that, according to the established jurisprudence of the Boards of Appeal, it is the Opponent who bears the burden of proof for its allegations as to the lack of compliance of the patented invention with the requirements of the EPC.

In the present case, therefore, the Appellant should have provided convincing evidence that the technical advantages over the prior art mentioned in the patent in suit were not credible: i.e. the Appellant should have credibly demonstrated that the claimed compositions would not display vis-à-vis the relevant prior art at least one of the improved properties that,

according to the patent in suit, characterize the formulations of the invention (see above item 3.2).

- 3.4.2 The Appellant has, however, provided no evidence in this respect and the Board finds, upon reading the patent in suit, no reason to doubt the teaching contained therein as to the improved properties of the claimed detergent compositions. To the contrary, the Board observes that the patent examples demonstrate that the inventors have assessed the level of skin irritation, anti dye transfer and foam profile of the formulations of the invention.

Hence, the Board concludes that the subject-matter of claim 1 credibly solved the technical problem explicitly mentioned in the patent in suit (see above in point 3.2).

- 3.4.3 Under these circumstances, it is not necessary to establish whether or not the experimental comparisons provided by the Respondent in Enclosures (5) and (10) represents credible proof of the alleged improved detergency of the composition of the invention vis-à-vis those of Document (3), since these comparisons would at most demonstrate a further advantage of the composition of the invention in addition to those already mentioned in the patent in suit.

- 3.5 The Board observes that among the improved properties of the claimed detergent formulations in particular biodegradability, non toxicity, skin irritation and foam profile would be relevant for the shampoos of the invention (the anti dye transfer property being instead of technical significance for detergent compositions

for fabrics). Although a skilled person could speculate that by varying the chemical compositions of the non-irritant and good foaming shampoos of Document (3) each of these two properties *per se* could be optimised, nothing in the available prior art suggests that modifications of the chemical composition of the cosmetic detergent formulations of this citation would result in a **simultaneous** maximization of these unrelated properties also in combination with improved biodegradability and non-toxicity.

For these reasons, the notional skilled person would not have been prompted to modify the chemical composition of the mixture of compounds (I) and (II) present in the cosmetic detergent formulations disclosed in Document (3) so as to arrive at the compositions comprising these ingredients in the amounts defined in present claim 1, in the reasonable expectation of solving the existing technical problem.

The Board finds, therefore, that the subject-matter of claim 1 complies with the requirements of Article 56 EPC.

4. *Assessment of the inventive step of the subject-matter of claims 2 to 4*

Claim 2 defines a preferred embodiment of the detergent composition of claim 1 and derives its patentability from the latter.

Since the methods of claims 3 and 4 are directed only to the preparation of the detergent composition of claim 1, the Board finds that the subject-matter of

these methods claims is based on the same inventive concept discussed above for the claimed detergent composition and, thus, also involves an inventive step within the meaning of Article 56 EPC for substantially the same reasons given above in respect of claim 1.

5. *Cancellation of the oral proceedings*

The present decision could be taken without holding oral proceedings, because the Appellant communicated to the Board that it would not attend the scheduled hearing and asked for a decision on the contents of the file as it stands (see above point VII). Such a statement acts as a withdrawal of the Appellant's earlier request for oral proceedings. As the Appellant waived the right to be heard in oral proceedings and the Respondent requested oral proceedings only if the Board intended not to decide to dismiss the appeal, the oral proceedings were duly cancelled by the Board (see also T 14/97 of 11 February 2000, point 4 of the reasons for the decision, not published in the OJ EPO).

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:

G. Rauh

P. Krasa