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D E C I S I O N
of 31 May 1994

Case Number: T 0720/92 - 3.3.3

Application Number: 88306175.6

Publication Number: 0301719

IPC: C08K 5/00

Language of the proceedings: EN

Title of invention:

Improvements in and relating to packaging

Applicant:

Carnaud Metalbox plc

Opponent:

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Headword:

-

Relevant legal norms:

EPC Art. 84

Keyword:

"Clarity of functional features - undue burden for reduction to practice"

Decisions cited:

T 0068/85, T 0752/90, T 0292/85, T 0435/91

Catchword:

I. The term "clarity" in Article 84 EPC refers to the **practical** meaning of the language of the patent claims. Claims with functional features which do not enable the skilled person to carry out the invention in the light of the disclosure and on the basis of common general knowledge do not meet the requirement of clarity according to Article 84 EPC (point 3.1.3 (v) and 3.2.3).

II. A claim combining functional definitions limited to features, which a skilled person would have no difficulty in determining on the basis of common general knowledge, and a structural definition of the essential contribution of the Applicant is not objectionable under Article 84 EPC (point 3.3.2).

Case Number: T 0720/92 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 31 May 1994

Appellant: Carnaud Metalbox plc
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Decision under appeal: Decision of the Examining Division of the European Patent Office dated 16 December 1991 refusing European patent application No. 88 306 175.6 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: C. Gérardin
Members: P. Kitzmantel
W. M. Schar

Summary of Facts and Submissions

I. The Appellant lodged an appeal, received on 13 February 1992 (with letter dated 7 February 1992), against the decision of the Examining Division dated 16 December 1991 refusing European patent application No. 88 306 175.6, filed on 6 July 1988 and published under No. 0 301 719. The prescribed appeal fee was paid on 13 February 1992. A Statement of Grounds of Appeal was filed on 16 April 1992 (with letter dated 10 April 1992).

II. The decision under appeal was based on a set of 36 claims, filed on 28 May 1991 (with letter dated 24 May 1991), of which Claim 1 read as follows:

"A wall for a package, which wall comprises, or includes a layer comprising, a composition which comprises a polymer, and which is capable of scavenging oxygen, characterized in that the composition is capable of scavenging oxygen through the metal promoted oxidation of an oxidizable organic polymer component, the metal oxidation promoter comprising a transition metal in a positive oxidation state, such that the permeance of the wall for oxygen is not more than $10 \text{ cm}^3\text{mm}/(\text{m}^2 \text{ atm day})$."

The appealed decision held that Claim 1 was not clear within the meaning of Article 84 EPC because it used the obscure terms "metal promoted oxidation" and "oxidizable organic polymer"; the indication of a maximum oxygen permeance was considered a definition by result to be achieved which could not represent a technical feature; the only feature in Claim 1 regarded

to be clear was the one referring to the use of a metal oxidation promoter comprising a transition metal in a positive oxidation state; this feature, however, was not considered to be distinguishing from the state of the art in

D6: DE-A-2 643 204.

III. In its written submissions the Appellant filed numerous alternative sets of claims. In substance, it contested the objections raised in the appealed decision under Article 84 and argued that the features "metal promoted oxidation", "oxidizable organic polymer" and the definition of a maximum oxygen permeance all related to readily measurable properties and were thus technical features capable of characterizing the invention. These features reflected a phenomenon known from several documents, namely that transition metals at low concentrations **promoted polymer oxidation** whilst at higher concentration they might behave as **antioxidants**:

D11: H.G. Jellinek "Aspects of Degradation and Stabilization of Polymers" (1978),

D12: H.S.Laver "Developments in Polymer Stabilization, Vol. I, Chapter 5 (1979);

D13: G. Scott "Developments in Polymer Stabilization, Vol. VII, Chapter 2).

This fact was also confirmed by written Declarations of J. Nicholas and Prof. G. Scott.

With respect to the allowability of definitions by a result to be achieved and functional features, the Appellant referred to the Guidelines C-III, 2.1, 4.4

and 4.7, and to decisions T 68/85, T 292/85, T 94/82 and T 752/90.

IV. In the oral proceedings held on 19 May 1994 the Appellant abandoned its previous requests and submitted three new sets of claims to be considered as Main and Auxiliary Requests.

Main Request (comprising 34 claims):

Claim 1:

"A composition for packaging use, which comprises:

- (a) a base polymer incorporating an oxidisable organic polymer component, and which has, in the absence of oxygen-scavenging, a permeability for oxygen of not more than $17 \text{ cm}^3\text{mm}/(\text{m}^2 \text{ atm day})$; and
- (b) a transition metal in a positive oxidation state and having a concentration within the range 10 to less than 300 ppm of the composition;

wherein the oxidisable organic polymer component, the transition metal and ... [follows the identical wording of Claim 1 of the Second Auxiliary Request]."

First Auxiliary Request (comprising 32 claims):

differs from the Main Request by replacement in Claim 1 of the term "oxidisable organic polymer component" by "polyamide component".

Second Auxiliary Request (comprising 32 claims):

Claim 1:

"A composition for packaging use, which comprises:

- (a) a base polymer incorporating a polyamide component of the formula $-\text{arylene}-\text{CH}_2-\text{NH}-\text{CO}-$, and which has, in the absence of oxygen-scavenging, a

permeability for oxygen of not more than
17 cm³mm/(m² atm day); and

- (b) a transition metal in a positive oxidation state
and having a concentration within the range 10 to
less than 300 ppm of the composition;

wherein the polyamide component, the transition metal
and the respective amounts thereof are selected so that
the composition scavenges oxygen to such an extent that
the steady state permeability of the composition for
oxygen is not more than 3 cm³mm/(m² atm day) when
measured in the form of a wall of thickness 0,3 mm, in
the dark, at a temperature of 23°C, at an oxygen partial
pressure of 0,21 atm and at a relative humidity of 50%
on the oxygen-rich side of the wall."

All three sets of claims comprise an independent claim
directed to "a wall for a package, which comprises a
composition according to any one of the preceding
claims" and independent claims directed to "a method of
making a wall", "a method of making a composition", "a
use of a composition", "a package comprising a wall",
"a beverage bottle comprising a wall" and "a food
container comprising a wall".

With regard to the reasons of the contested decision
and in the light of these requests, especially the Main
Request, the Appellant contended that, for a person
skilled in the art of packaging, the wording "a
composition **for packaging use**", would restrict the
choice of "base polymers" to only few bulk polymers,
like polyethylene, polypropylene, polystyrene,
acrylonitrile butadiene styrene resins, polyethylene
terephthalate and polyvinylchloride. Similarly it was
quite obvious to a polymer chemist that, beside the

polyamides used in the application in suit, such polymers which contained tertiary C-atoms or C-C unsaturation would also be very promising candidates for the "oxidisable organic polymer component". The fact that this term was within common general knowledge was also demonstrated by various prepublished documents referring to the phenomenon of oxidation of polymers occurring under the normal conditions of use of a packaging material; moreover, some other documents published after the date of publication of the application in suit referred to oxygen barrier packaging materials which comprised various "oxidisable organic polymer components" in conjunction with transition metals.

There was thus no undue burden on the skilled person to sort out those "base polymers" and "oxidisable organic polymer components" which met the oxygen permeance conditions of the claimed invention.

- V. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the requests filed during the oral proceedings.

Reasons for the Decision

- 1. The appeal is admissible.
- 2. *Article 123 (2) EPC*

All requests are duly based on the original application, especially on page 7, l. 23-25 (oxidisable polymer component), page 15, l.17-19 (polyamide,

especially of the formula -arylene-CH₂-NH-CO-), page 10, 11 bridging paragraphs (permeability data), page 14, l. 15-19 (transition metal catalyst), original Claim 16 (amount of catalyst), page 6, l. 20 (steady state permeability) and page 7, l. 1-16 (permeability measurement conditions).

3. *Article 84 EPC*

3.1 Main Request

3.1.1 The polymeric components of the composition of Claim 1 are defined by the functional terms "base polymer" and "oxidisable organic polymer component". The kind and amount of the latter component are defined by way of the maximum oxygen permeability of the whole composition.

3.1.2 As regards the "base polymer" this has to be interpreted, in view of the indicated use of the claimed composition "for packaging", to be a material conventional for packaging applications, for example, one of the bulk polymers mentioned by the Appellant (see section IV above) and is thus clear in the present context.

3.1.3 The meaning of the term "oxidisable organic polymer" depends on the interpretation of the word "oxidisable".

(i) Oxidation of organic polymers by the oxygen of the air is a very common phenomenon which is normally considered undesirable, because it causes the mechanical properties to deteriorate, and is generally counter-acted by addition of antioxidants, among others

transition metal compounds. However, as convincingly demonstrated by the Appellant, the same transition metals, when used in sufficiently low amounts, may also promote the (aut)oxidation of organic polymers, a fact which is described in D11 (pages 110-111, section 5.3; page 113, second paragraph), D12 (pages 172-173, section 2.3) and D13 (pages 80-81, section 4.2).

(ii) According to the written Declaration of Mr Nicholas (see point III above), in the system

"base polymer" = PET (polyethylene terephthalate)/"oxidisable polymer" = MXD6 (polyamide from m-xylylidenediamine and adipic acid)/transition metal = cobalt,

the changeover from the metal acting as an oxidation promoter to acting as an antioxidant, depending on the MXD6 concentration (2 or 4%), occurs at cobalt concentrations of 150 to 400 ppm. With copper in PET compositions containing 4% MXD6 the changeover occurs between 10 and 25 ppm (see Exhibits A, B, C). Pursuant to section 11 of the same Declaration a PET composition containing 10% MXD6 scavenges oxygen to zero oxygen transmission at a nickel concentration of 200 ppm.

(iii) From these results it must be inferred that - even within the 10 to 300 ppm range of Claim 1 - the amount of transition metal up to which it acts as an oxidation promoter is very much dependent on the kind of transition metal used and on the concentration of the "oxidisable polymer" in the "base polymer".

It is self-evident that the chemical nature of the "oxidisable organic polymer component" must also play a

very important role in determining its susceptibility to oxidation.

(iv) In Claim 1 the oxygen scavenging capacity of the system "oxidisable polymer"/transition metal is not a limiting feature of the alleged invention, but this capacity is reflected to an unknown extent only (the contribution of said system to the measured effect is not indicated) by the claimed maximum oxygen permeability of the **whole** composition which, apart from the "base polymer", the "oxidisable polymer" and the transition metal catalyst, may even contain further components which might or might not have an impact on the oxygen permeability (note the wording of Claim 1: "A composition ..., which **comprises**"). Thus no direct conclusion can be drawn from the value of oxygen permeability of the composition as to the susceptibility to oxidation of the "oxidisable polymer".

(v) Article 84 EPC requires the claims to be clear. It is a necessary but not sufficient condition of clarity that the claims be drafted in comprehensible language. Patent claims are directed to concrete subject-matter. In consequence, it is the **practical** meaning of the language of the claims which is of importance. The person skilled in the art should thus understand what is meant by the language of a claim without ambiguity and without complicated, time-consuming investigations, i.e. without undue burden. This applies also to functional features, i.e. features which become manifest only on exposure to qualifying conditions (here: testing of "oxidisability" of the "oxidisable polymer component" by the oxygen permeability

measurement of the composition); the acknowledgement of their clarity depends on the amount of verifying input necessary to conclude whether or not a functional parameter is met. In areas where experimentation is required, clarity can for these reasons be recognized only if with usual methods or methods disclosed in the application, possibly together with common general knowledge, the skilled person is in a position to purposefully design embodiments of the invention by routine experimentation. That is, clarity cannot be recognized if verification of a functional feature involves the working out of experimental activities or even strategies which are not disclosed in the application and are not within common general knowledge, thus imposing on the expert an undue burden. (see also T 68/85, OJ EPO 1987, 228, section 8.4.3 and T 752/90 dated 8 December 1992, section 2.1, not published in the OJ EPO; both commented in section 3.2.4 of this decision).

This means that the issue of Article 83 EPC (sufficiency of disclosure) stands in relation with the requirements of Article 84 EPC, namely with the requirement of clarity insofar as the practical meaning of the claims has to be assessed in the light of the whole disclosure (description).

(vi) In the present case not even the specification does comprise any information which would put the skilled person in a position to **purposefully** select "oxidisable" polymers which could guarantee the achievement of the desired oxygen permeability of the composition. No rules are given, nor can any be derived from the experimental evidence in the description

according to which an unsatisfactory permeability performance of the composition could be corrected, e.g. by trial and error experimentation, within reasonable time.

The fact that (aut)oxidisable polymers and also the catalytic influence of transition metal containing compounds were known, as argued by the Appellant, does not provide any guidance for the expert either, since this random information, which can be accepted to have been known to the expert, does not lend itself to a systematic approach and is therefore not helpful in sorting out from the big range of polymers which are **generally** oxidisable those which meet the **special** oxygen-scavenging properties required in the present application.

3.1.4 It follows from the above that the term "oxidisable organic polymer component" causes Claim 1 to lack the clarity required by Article 84 EPC, so that the Main Request has to be rejected.

3.2 First Auxiliary Request

3.2.1 In Claim 1 the term "oxidisable organic polymer component" of the Main Request has been replaced by "polyamide component".

3.2.2 The question which arises, thus, is whether the limitation to polyamides in general provides sufficient information for a skilled person to prepare a composition for packaging use having the required properties.

The history of the technical developments which gave birth to the application in suit, as explained by the Appellant during oral proceedings, does not give any reason for supposing that polymers other than polyamides have been tested or that polyamides other than the very special aromatic/aliphatic polyamides exemplified in the application in suit give satisfactory results. This is quite evident in view of the results reported for aliphatic polyamides, which are said in general terms to be promising (page 6, lines 45 to 47), but without any substantiation in the experimental section. Neither the additional information provided by the Appellant during oral proceedings, nor the content of the related application EP 89 302 381.2 (appeal case T 952/93) which is based on the same technical developments, but incorporates the results of later experimental work, suggests that fully aliphatic or aromatic polyamides could represent suitable oxidisable polymers in the framework of the application in suit.

3.2.3 Thus, as with the term "oxidisable organic polymer component" of the Main Request, the necessary information for reducing to practice the teaching of Claim 1, i.e. the selection of those polyamides, other than the ones exemplified (MXD6-type), which satisfy the purpose to be achieved (= maximum oxygen permeability of the composition) is lacking. Since there are no usual procedures disclosed in the specification or within the general common knowledge of the expert to sort out those non-MXD6-type polyamides which meet the desired oxygen permeability criteria, there would be an undue burden on the skilled person to establish the **special** meaning of the term "polyamide

component" in the present context; this term is therefore to be considered unclear within the meaning of Article 84 EPC.

- 3.2.4 This assessment of functional features and definitions by a purpose to be achieved is fully in line with the conclusions drawn in the decisions of the Boards of Appeal referred to by the Appellant.

T 68/85, OJ EPO 1987, 228, sets out in section 8.4.3: "On the other hand, the effort to define a feature in functional terms must stop short where it jeopardises the clarity of a claim as required by Article 84 EPC. That clarity demands not only that a skilled person be able to understand the teaching of the claim, but also that he be able to implement it. In other words, the feature must provide instructions which are sufficiently clear for the expert to reduce them to practice without undue burden, if necessary with reasonable experiments." This reasoning is fully applicable to the present case, with the consequence that the criteria establishing clarity are not met for Claim 1 of the First Auxiliary Request.

T 752/90 of 8 December 1992 (unpublished in the OJ EPO) confirms the findings in T 68/85 by stating that claims which define the invention, or a feature thereof, by a result to be achieved should only be allowed if the "result is one which can be directly and positively verified by tests or procedures adequately specified in the description and involving nothing more than trial and error." (see Reasons 2.1). As explained above, these conditions are not met for Claim 1 of the First Auxiliary Request.

In T 292/85, OJ EPO 275, Reasons 3.1.5, it was held:
"The disclosure need not include specific instructions as to how all possible component variants within the functional definition should be obtained." This problem is not at issue here; what is at issue is whether the information at the disposal of the expert enables him to reduce the functional definition to practice, when he is confronted with a broad range of options from which to select the ones meeting the requirements of the functional feature.

Reference is made also to the recent decision T 435/91, to be published in the OJ EPO, where it was held that the functional definition of an additive to a detergent composition, in the absence of a self-sufficient concept as to how the desired result is to be achieved, caused the disclosure to be insufficient under the provisions of Article 83 EPC (Reasons 2.2.1, paragraph 5). This criterion is also applicable to the aspect of clarity of a functional definition and is indeed analogous to the aspect of "practical meaning" explained in section 3.1.3 (v) above and answers furthermore which features are essential for carrying out the invention..

- 3.2.5 The finding of the Board with regard to the clarity of Claim 1 of the Main and the First Auxiliary Requests is also in agreement with the Guidelines C-III, 2.1, 4.4. and 4.7, because the same conditions as mentioned above for the allowability of functional features and definitions by a result to be achieved are set out therein.

The argument that the present invention should be regarded as a pioneer invention justifying a broader formulation of the claims cannot be accepted. As stated above, there is no evidence from the description of the application in suit that polymers other than polyamides have been tested, nor that polyamides other than those with the recurrent unit - arylene-CH₂-NH-CO- would be suitable. The steady state permeability for oxygen of not more than 3 cm³mm/(m² atm day) must thus be regarded as closely related to the choice of polyamides based on that specific recurrent unit. Without reference of this structural feature in Claim 1, the above limit is isolated from its technical context resulting in considerable discrepancy between the scope of the claimed subject-matter and the actual contribution made by the Appellant, as illustrated in the application and explained during oral proceedings. The value of steady state permeability for oxygen, desirable as it may be, cannot be generalized to any kind of polyamide, which demonstrates that the claimed composition cannot be equated with a pioneer invention.

3.2.6 For these reasons, the First Auxiliary Request must be rejected.

3.3 Second Auxiliary Request

3.3.1 In Claim 1 of this request the scope of the term "polyamide component" has been narrowed down to polyamides of the formula -arylene-CH₂-NH-CO-.

Since the suitability of MXD6 for scavenging oxygen in amounts meeting the desired oxygen permeability is proved by the experimental evidence in the

specification, the skilled person would be aware of the important structural criteria and would be able, at most with some (routine) experimentation carried out on the basis of trial and error, to identify further homologous polyamides which come under the oxygen permeability requirements of Claim 1. There is thus no undue burden on the skilled person with regard to the practical understanding of Claim 1 and, consequently, Claim 1 of the Second Auxiliary Request is clear within the meaning of Article 84 EPC.

3.3.2 In the present version, Claim 1 combines essentially three features, namely (i) the steady state permeability of the composition for oxygen, which represents the property to be achieved, (ii) the polyamide component, which corresponds to a relatively narrow class of polyamides, and (iii) further compositional features, such as transition metal and the relative amount thereof to the polyamide, which are not further specified and are thus defined in terms of a functional definition. As argued by the Appellant, a person skilled in the art would have no difficulty in first selecting the most suitable polyamide as well as an appropriate catalyst, and then determining the optimal relative amounts thereof. For this reason, the wording of Claim 1, while still amounting to a functional definition, is not objectionable under Article 84 EPC in that it offers a clear guidance to the skilled person as to how, on the basis of the information in the application and common general knowledge, the desired purpose (i) can be achieved by adapting the general compositional features (iii) to the particular class of polyamides (ii), the latter

being the actual contribution of the Appellant to the art.

- 3.3.3 The further independent claims of the Second Auxiliary Request (Claims 19, 27-32) all refer directly or indirectly to the use of a composition according to Claim 1; these claims are therefore clear with respect to this definition and also otherwise meet the requirements of Article 84 EPC. The same applies to the dependent claims.

4. The refusal of the application was based solely on lack of clarity and no comprehensive examination of further substantive issues was carried out by the Examining Division. For these purposes, the case must therefore be remitted to the Examining Division.

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 for further prosecution on the basis of the Second Auxiliary Request (Claims 1 to 32) as filed during the oral proceedings on 31 May 1994.

The Registrar:

The Chairman:

E. Görgmaier

C. Gérardin