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D E C I S I O N
of 15 September 1998

Case Number: T 0183/94 - 3.2.5

Application Number: 84115554.2

Publication Number: 0147759

IPC: D04H 1/64, A61L 2/06, A61L 2/08

Language of the proceedings: EN

Title of invention:
Latex containing odor inhibitors

Patentee:
The B.F. Goodrich Company

Opponent:
BASF Aktiengesellschaft, Ludwigshafen

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (yes)"

Decisions cited:
G 0007/95

Catchword:
-

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Case Number: T 0183/94 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 15 September 1998

Appellant: (Opponent)
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Representative:
-

Respondent: (Proprietor of the patent)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 5 January 1994 concerning maintenance of European patent No. 0 147 759 in amended form.**

Composition of the Board:

Chairman: H. Ostertag
Members: S. Crane
J. van Moer

Summary of Facts and Submissions

I. European patent No. 0 147 759 was granted on 24 July 1991 on the basis of European patent application No. 84 115 554.2.

II. The granted patent was opposed by the present appellants on the grounds that its subject-matter lacked inventive step with respect to the state of the art (Articles 100(a) and 56 EPC).

Of the pre-published documents relied upon in the opposition proceedings only the following have played any significant role on appeal:

(D6) DE-A-2 357 068

(D7) US-A-3 539 434

III. With its decision posted on 5 January 1994 the Opposition Division held that the patent could be maintained in amended form on the basis of a set of claims 1 to 16 filed with letter dated 24 November 1992.

The independent claims 1, 7 and 11 of this set of claims read as follows:

"1. Sterilized nonwoven fabric comprising nonwoven fibers bonded with a saturated latex prepared by free radical initiation comprising a preponderance of a soft hydrophobic monomer having Tg in the range of -80°C to -20°C, a lesser amount of a hard hydrophobic monomer having Tg in the range of +40°C to +120°C, a small amount of an unsaturated carboxylic acid a sufficient amount of an emulsifier and a small amount of N-alkylol

acrylamide or methacrylamide, characterized in that said latex having admixed therein 0.01 to 5 weight parts per 100 weight parts of latex solids of an odor inhibition agent selected from amine-type antioxidants and hindered phenols that have the function of reducing the odor that is generated on sterilization of the nonwoven fabric."

"7. Method of making sterilized nonwoven fabric comprising bonding nonwoven fibers with a saturated latex, forming a nonwoven fabric from the bonded fibers, and sterilizing said nonwoven fabric; said nonwoven fibers are bonded with a saturated latex prepared by free radical initiation comprising a preponderance of a soft hydrophobic monomer having Tg in the range of -80°C to -20°C, a lesser amount of a hard hydrophobic monomer having Tg in the range of +40°C to +120°C, a sufficient amount of an unsaturated carboxylic acid, a small amount of an emulsifier and a small amount of N-alkylol acrylamide or methacrylamide characterized in that said latex having admixed therein 0.01 to 5 weight parts per 100 weight parts of latex solids of an odor inhibition agent selected from hindered phenols and amine-type antioxidants that have the function of reducing the odor that is generated on sterilization of the nonwoven fabric."

"11. A saturated latex prepared by free radical initiation comprising a preponderance of a soft hydrophobic monomer having Tg in the range of -80°C to -20°C, a lesser amount of a hard hydrophobic monomer, having Tg in the range of +40°C to +120°C, a small amount of an unsaturated carboxylic acid, a sufficient amount of an emulsified and a small amount of N-alkylol

acrylamide or methacrylamide characterized in that said latex having admixed therein 0.01 to 5 weight parts per 100 weight parts of latex solids of an odor inhibition agent selected from amine-type antioxidants and hindered phenols that have the function of reducing the odor that is generated on sterilization of the nonwoven fabric bonded therewith."

Dependent claims 2 to 6, 8 to 10 and 12 to 16 relate to preferred embodiments of the fabric of claim 1, the method of claim 7 and the latex of claim 11 respectively.

IV. An appeal against this decision was filed on 1 March 1994 and the fee for appeal paid at the same time. The notice of appeal was also accompanied by the statement of grounds.

In the statement of grounds of appeal the following further documents and pieces of evidence were referred to:

(D9) Römpp Chemie Lexikon, A-Cl, Thieme Verlag, Stuttgart (1989), pages 2, 129, 130 and 220;

(D10) Expert opinion of Prof. Dr. Schönleben;

(D11) Fieser and Fieser, Organische Chemie, Verlag Chemie, Weinheim (1968), page 311;

(D12) "Norsocryl® EA", a technical bulletin of the company Atochem concerning ethyl acrylate;

(D13) "Norsocryl® MMA", a technical bulletin of the company Atochem concerning methyl methacrylate;

(D14) Ullmanns Encylopädie der technischen Chemie, vol. 16, Verlag Chemie, Weinheim (1978), page 63.

The appellants (opponents) developed arguments that the subject-matter of claim 11 lacked novelty with respect to document D7 or at least inventive step with respect to documents D7 and D6 and the common general knowledge of the person skilled in the art as evidenced in particular by document D9. The latter was also true of the subject-matter of claims 1 and 7.

V. In a communication of the Board dated 20 February 1998 pursuant to Article 11(2) RPBA the provisional view was expressed that, having regard to the decision G 7/95 of the Enlarged Board of Appeal (OJ EPO 1996, 626), it was not open to the appellants to attack the novelty of the subject-matter of the claims at this stage since no such objection had been raised in the course of the opposition proceedings. For completeness the Board also explained the reasons for its opinion that the subject-matter of claim 11 was novel with respect to document D7.

VI. With a letter received on 14 July 1998 the appellants filed a further document, viz.,

(D15) Römpps Chemie-Lexikon, Band 1; A-Cl, Franckh'sche Verlagshandlung, Stuttgart (1979), pages 18, 145 and 242

to replace the non-pre-published document D9.

In this letter the appellants also referred to a comparative test performed by them with the intent of establishing whether the use of a phosphite type antioxidant would have the same odour inhibiting effect as one of hindered phenolic antioxidants proposed by the claimed invention.

VII. With a letter dated 14 August 1998 the respondents (proprietors of the patent) submitted amended sets of claims according to a first and second auxiliary request. Claim 1 (the only independent claim) of the claims according to the first auxiliary request corresponded to independent claim 7 set out in Section II above. Claim 1 (also the only independent claim) of the claims according to the second auxiliary request was directed to the use of the specified antioxidant agents in a latex as defined in claim 11 as set out in Section II above for inhibiting odour generation on sterilization of a non-woven fabric bonded with the latex.

VIII. Oral proceedings before the Board were held on 15 September 1998.

The appellants requested that the decision under appeal be set aside and the patent revoked in its entirety.

The respondents requested that the appeal be dismissed and the patent maintained in the form agreed by the Opposition Division (main request) or in the alternative on the basis of the sets of claims according to the first and second auxiliary requests.

IX. The arguments put forward by the appellants can be summarised as follows:

In view of the comments of the Board in its communication of 20 February 1988 the objection to lack of novelty of the subject-matter of claim 11 would not be pursued. As for the evaluation of the inventive step of this subject-matter the proper starting point was document D6. This disclosed a saturated latex for bonding non-woven fibres and it was not in dispute that two specific embodiments of that latex, copolymers A and B, corresponded in all respects to the latex defined in the preamble of the claim. In essence, the claimed invention was supposed to reside in the addition of an amine-type antioxidant or a hindered phenol to this known latex in order to solve the problem of odour generation when a non-woven fabric bonded by the latex was sterilized, in particular by exposure to heat or gamma radiation.

However, the formulation of the technical problem in this way disguised the fact that the role played by the proposed additives was in fact the same as that for which these well-known additives were traditionally used, namely the prevention of degradation of polymeric material on exposure to heat and radiation, commonly known as ageing. In the light of this the person skilled in the art would immediately recognise that the mechanism causing the unwanted odour would be inhibited by the incorporation of additives known to slow the ageing process. In this respect the assertion of the respondents that such additives were not used to inhibit ageing in saturated latexes was clearly contradicted by the teachings of document D7.

Document D7 proposed the use of one of amine-type antioxidants, hindered phenols or phosphite ester type antioxidants for reducing the degradation on exposure to heat or light and increasing the dry cleaning solvent resistance of a saturated latex used for bonding non-woven fabrics. The respondents had argued that there was some sort of selection involved in using only amine-type antioxidants or hindered phenols. This had been disproved by the comparative test results filed on 14 July 1998 which showed that the phosphite ester type antioxidants led to an equally effective reduction in odour generation.

V. In reply the respondents argued substantially as follows:

The appellants had constructed an abstract theory as to the cause of the unwanted odour generated when the manufactured non-woven fabric products were sterilized and as to how the person skilled in the art would react when set the problem of reducing this odour. This theory was however divorced from the technical realities and based solely on hindsight knowledge of the invention.

The fact of the matter was that the short term process of sterilization could not be assimilated to ageing. With the experimental report submitted with their letter of 14 August 1998 they had demonstrated that the physical properties of the non-woven fabric products had in no way been changed by sterilization, in other words that the degradation in these properties normally associated with the phenomenon of ageing was not observable. The actual mechanisms causing the generation of the unwanted odour were still not wholly clear and the respondents had explored several avenues of research before hitting on the surprising solution claimed.

The respondents stood by their assertion that the generally held opinion in the art was that the addition of antioxidants to a saturated latex would not be useful in preventing ageing. Document D7 was no different in this respect since it required the combination of such an antioxidant with a specific type of chelating agent to achieve the required improvement. A close study of the results reported in Table I showed indeed that the use of an antioxidant alone led to poorer solvent resistance than when the latex combined neither antioxidant nor chelating agent.

Reasons for the Decision

1. The appeal complies with the formal requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC. It is therefore admissible.

2. In comparison with the granted claims each of the independent claims 1, 7 and 11 have been restricted by the incorporation of the requirement that the latex is "saturated". This restriction, which has not been objected to by the appellants, is amply supported by the original disclosure. In addition the two-part form of each of these claims has been adjusted by the transfer of the reference to a "sufficient" or "small" amount of an emulsifier to the preamble of the claim, in order to take proper account of the disclosure of document D6.

   There are no objections of these amendments under Articles 123(2) or (3) EPC.

3. In their statement of grounds the appellants, in particular with reference to the documents D11 to D14, called into question the meaning of the term "hydrophobic monomer" as used in the claims. In particular, they pointed to the fact that ethyl acrylate was specifically excluded from the class of "hydrophobic monomers" discussed at page 2, lines 49 to 54, whereas it was apparent from documents D12 and D13 that ethyl acrylate was more hydrophobic than methyl acrylate, one of the exemplified members of the class.

Viewed in strict isolation the criticised term could indeed give cause for concern. However, when seen in the context of the claims and the patent specification as a whole, it is apparent that the terms "soft hydrophobic monomer" and "hard hydrophobic monomer" are being used as shorthand for monomers which respectively form soft hydrophobic and hard hydrophobic homopolymers, see for example page 2, lines 55 to 58.

The objection of the appellants in this respect was commented on in similar terms to the above in the Board's communication of 20 February 1998 and was not pursued by the appellants at the oral proceedings.

4. Of the three independent claims the ambit of claim 11, directed to a latex per se, is clearly the broadest. For the evaluation of inventive step it is therefore convenient to start with the subject-matter of this claim since a positive finding with respect to it would also extend automatically to the subject-matter of both claims 1 and 7, each of these requiring the presence or use respectively of a latex as defined in claim 11.

Of all the prior art relied upon in the opposition and appeal proceedings only document D6 discloses a saturated latex as defined in the preamble of claim 11. In particular, "copolymer B", discussed on page 10, is a saturated latex comprising 55 wt% of butyl acrylate, i.e. a preponderance of soft hydrophobic monomer within the terms of the claim, cf page 2, line 52 of the patent specification; 40 wt% of styrene, i.e. a lesser amount of hard hydrophobic monomer within the terms of the claim, cf page 2, line 57 of the patent specification, 1% of itaconic acid, i.e. a small amount of an unsaturated carboxylic acid; 2% of methylacrylamide and a sufficient amount of an emulsifier. This latex was used to bind a non-woven polyester fibre mat to form a fabric which withstood five dry cleaning cycles using tetrachloroethylene solvent.

The subject-matter of claim 11 is distinguished from the state of the art according to document D7 in that the latex contains 0.01 to 5 weight parts per 100 weight parts of latex of an amine-type antioxidant or a hindered phenol. The purpose of these additives is to reduce the odour generated on sterilization of a non-woven fabric bonded with the latex.

The central plank on which the appellants have chosen to construct their case on inventive step is the set of premises that the mechanism which causes the generation of an odour on sterilization is the same as that which leads to long term degradation (ageing) of the polymer latex on exposure to heat and/or light, that the person skilled in the art would readily recognise the identity of the mechanisms involved in the two situations and that accordingly it would be obvious for him to reduce odour generation by the addition of additives known to slow down the ageing of polymer latexes, such as in particular the stated amine-type antioxidants and

hindered phenols. In this context the appellants have relied, in particular, in addition to general knowledge concerning the functioning of the olfactory system, on documents D10 and D15. The latter comprises various extracts from a well-known reference work which deal with the degradation of macromolecular materials, for example by heat and light with the consequential formation of smaller molecules, whereby in the case of polymers this can be taken to the point where monomers are formed; the ageing of materials, such as polymers, and additives for preventing this; and antioxidants, for example amines and hindered phenols, and the mechanism by which they function. Document D10 comprises the expert opinion of the director of a surgical clinic that surgical wraps must necessarily be ageing resistant since they are subjected after every use to cleaning and sterilization treatment which should only effect their quality to the smallest extent possible.

The Board is not convinced that what has been advanced by the appellants is the way the person skilled in the art faced with the task of reducing the unwanted odour generation would in practice have viewed the underlying technical problem and tackled its solution. In particular, it has to be noted, according to the uncontradicted experimental report of the respondents, that the sterilization procedure, although giving rise to an unpleasant odour, did not lead to any changes in the physical properties of the non-woven fabrics normally associated with conventional ageing. Furthermore, there is no suggestion in any of the state of the art documents relied upon by the appellants that the ageing of a polymeric material can lead to the generation of an unwanted odour through the release of the substances of low molecular weight. In the opinion of the Board it is therefore wholly plausible, as argued by the respondents, that the notional person

skilled in the art would not form an association between the odour being generated in a short term sterilization process, which lasts a matter of minutes and the long term ageing of equivalent materials and would not therefore have been led in an obvious manner to incorporate additives known in principle for their ability to slow down ageing. The Board is reinforced in this opinion by the fact that a study of Table I of document D7 shows that the effect of an antioxidant alone on the ageing process is very limited.

The Board is also satisfied that, apart from the question of reducing odour generation there is also nothing else, in particular improving resistance to solvents, which would have encouraged the person skilled in the art to incorporate an amine-type antioxidant or hindered phenol, as proposed in document D7, into a latex disclosed in document D6, since the latter (of later date than document D7) is already taught as a complete solution to the problem of providing a hydrophobic latex which is highly resistant to dry cleaning solvent.

The Board therefore comes to the conclusion that the subject-matter of claim 11 involves an inventive step (Article 56 EPC). The same applies by analogy to the subject-matter of claims 1 and 7, see above.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

A. Townend H. Ostertag