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D E C I S I O N
of 21 December 1993

Case Number: T 0616/90 - 3.3.3

Application Number: 82900999.2

Publication Number: 0075024

IPC: C08L 1/18

Language of the proceedings: EN

Title of invention:
Process for the preparation of nitrocellulose compositions

Patentee:
Daicel Chemical Industries, Ltd.

Opponent:
Bayer AG, Leverkusen Konzernverwaltung RP Patente Konzern

Headword:
-

Relevant legal norms:
EPC Art. 56

Keyword:
"Inventive step - confirmed"

Decisions cited:
-

Catchword:
-

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Case Number: T 0616/90 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 21 December 1993

Appellant: (Opponent)
Bayer AG, Leverkusen
Konzernverwaltung RP
Patente Konzern
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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 dated 19 February 1990 and issued in writing on 11 May 1990 concerning maintenance of European patent No. 0 075 024 in amended form.**

Composition of the Board:

Chairman: C. Gérardin
Members: H.H.R. Fessel
F. Benussi

Summary of Facts and Submissions

I. The mention of the grant of European patent No. 0 075 024 in respect of European patent application No. 82 900 999.2 filed on 1 April 1982 claiming a JP priority of 2 April 1981 (JP-50200/81) was announced on 12 November 1986 (cf. Bulletin 86/46). The patent was granted on the basis of three claims of which the only independent claim, viz. Claim 1, reads as follows:

"A process for producing a nitrocellulose composition in the form of chips, said process comprising the steps of adding to water-wetted nitrocellulose having a water content of less than 50 wt%, an organic solvent capable of dissolving nitrocellulose and polyurethane resin and inert to isocyanate in an amount of 30 to 300 parts by weight based on 100 parts by weight of dry nitrocellulose, mixing, rolling or extruding, drying at 30 to 55°C so that the content of water becomes less than 1 wt% and the content of nitrocellulose becomes 50 to 80 wt%, and cutting."

The other two claims were directed to preferred embodiments of the process as defined in the main claim.

II. A notice of opposition was filed on 4 August 1987 by Bayer AG alleging lack of novelty and inventive step (Article 100(a) EPC) of the claimed subject-matter.

The opposition was supported *inter alia* by:

(4) DE-B-1 226 014 and
(6) EP-A-0 021 896.

III. By an interlocutory decision within the meaning of Article 106(3) EPC delivered orally on 19 February 1990, with written reasons posted on 11 May 1990, the Opposition Division held that there were no grounds of opposition to the maintenance of the patent in amended form, the amendment consisting of the selection of the solvent from acetic esters, ketones and lactones.

The Opposition Division held the subject-matter of said claim to be novel and considered it to involve an inventive step *vis-à-vis* documents (4) or (6) or a combination of them. Moreover, it held that under these circumstances the subsidiary request based on a claim handed over during oral proceedings need not be discussed.

The problem addressed in the patent in suit was how to produce nitrocellulose (NC) chips which could be safely handled and stored and which were suitable for use with polyurethane to make a binder material for magnetic tapes, whereas document (6) concerned propellants implying different requirements for NC. Thus, there was no hint as to the process claimed in the patent in suit. The Opposition Division also held that document (4) concerned the production of NC suitable for use in protective coatings, adhesives and the like by a process starting from a dilute aqueous suspension of NC and yielding, via two azeotropic distillations, a dense NC powder made wet with hydrocarbon. Therefore, it came to the conclusion that there was no hint in that prior art that a product suitable for use as a magnetic tape binder could be obtained by reducing the water content of methyl ethyl ketone-wetted NC. Moreover, it held that a person skilled in the art would not combine the teachings given in documents (4) and (6) without resorting to *ex post facto* analysis.

IV. On 10 July 1990 an appeal was lodged against that decision together with payment of the prescribed fee. The Statement of Grounds of appeal was received on 7 September 1990. In its written submission and during oral proceedings held on 21 December 1993 the Appellant first argued that the process according to Example 1 of document (6) led to an essentially water-free NC, which left no room for an invention because of the close similarity to the claimed process. Further, it put forward that processes to produce NC with a water content of less than 1% were well known in the art (cf. document (4)) and the reactivity of water with isocyanate groups was also well known. The claimed process would thus have been obvious in the light of the teaching given in document (6), possibly combined with document (4). The fact that these two documents were related to different technological fields would not have prevented the skilled person from considering both teachings and possibly combining them.

V. The Respondent submitted during the oral proceedings two sets of claims as main and auxiliary requests.

The three claims according to the main request read as follows:

"1. A process for producing a nitrocellulose composition in the form of chips, said process comprising the steps of adding to water-wetted nitrocellulose having a water content of less than 50 wt%, an organic solvent capable of dissolving nitrocellulose and polyurethane resin and inert to isocyanate and selected from acetic esters, ketones and lactones in an amount of 30 to 300 parts by weight based on 100 parts by weight of dry nitrocellulose, kneading, thereafter rolling or extruding, and then drying at 30 to 55°C so that

the content of water becomes less than 1 wt% and the content of nitrocellulose becomes 50 to 80 wt%, and cutting.

2. The process of claim 1, wherein the water content in the water-wetted nitrocellulose is 25 to less than 50 wt% and the kneading is accomplished in a closed system.

3. The process of claim 1, wherein a polyurethane resin is added simultaneously to the water-wetted nitrocellulose to prepare a magnetic tape binder."

In favour of the patentability of that subject-matter the Respondent contended that it could not be derived from the teaching of documents (4) and (6), either in isolation or in combination. Furthermore, a combination of these documents was not legitimate and resorted to an *ex post facto* analysis. A person skilled in the art of NC chemistry faced with the problems associated with the use of hydrocarbons in solvent-wetted NC for binder purposes would not seek a solution in the field of NC-propellants.

VI. The Appellant requested that the decision under appeal be set aside and that the patent be revoked entirely.

The Respondent requested that the appeal be dismissed and that the patent be maintained on the basis of Claims 1 to 3 submitted during oral proceedings (main request), or on the basis of the single claim submitted during oral proceedings (auxiliary request) and a description yet to be adapted.

Reasons for the Decision

1. The appeal is admissible.

2. There are no formal objections under Article 123(2) EPC since the subject-matter of Claims 1 to 3 of the main request is supported by the original disclosure.

Claim 1 is supported:

- as to the specific solvents on page 4, lines 14 to 19 (column 2, lines 34 to 39 of the patent specification);

- as to the treatment of NC on page 5, second full paragraph (column 2, line 54 to column 3, line 5 of the patent specification).

The replacement of "mixing" by "kneading" in Claim 2 is supported on page 5, lines 8 to 10 (column 2, lines 55 to 57 of the patent specification). The addition of a polyurethane resin to the water-wetted NC in Claim 3 is mentioned on page 7, lines 13 to 16 (column 3, lines 51 to 64 of the patent specification).

The Board is also satisfied that the provisions of Article 123(3) EPC are met by the claims since the subject-matter of amended Claims 1 and 2 has not been amended in a way so as to extend the protection conferred by the patent as granted (organic solvent now restricted to solvents selected from acetic esters, ketones and lactones and "mixing" now restricted to "kneading"). The other amendment, namely the introduction of "thereafter" between "kneading" and "rolling" and of "and then" between "extruding" and

"drying" serves only clarification purposes and has obviously no impact on the scope of the main claim.

3. The Board is satisfied that the subject-matter claimed in Claims 1 to 3 of the main request is novel over the cited prior art, which has not been disputed in oral proceedings. Further details to support the Board's view are therefore not necessary.

4. According to the present version of the claims, the patent in suit concerns a process for producing a nitrocellulose composition in the form of chips by several steps so that the content of water becomes less than 1 wt% and the content of NC becomes 50 to 80 wt% viz. a solvent content of about 20 to 50% (the solvent being an acetic ester, a ketone or a lactone).

The process disclosed in document (4) is directed to NC particles with a water content of, in general, below 1% (loc. cit. Tables 1 and 2) and a solvent content of 10 to 40% (loc. cit. Claim 1) which may be used for, e.g., coatings or propellants (loc. cit. column 16, lines 38 to 43). The solvent is, however, different from that of the patent in suit. This is regarded as a closer state of the art than document (6) which discloses a process directed to the preparation of an NC product with a water content above 1% and a solvent content of under 1% (loc. cit. Examples 1 to 3).

4.1 The process disclosed in document (4) comprises the steps of mixing water-wetted NC with active solvents, such as ketones or aliphatic esters (column 3, lines 27 to 31), removing that solvent by azeotropic distillation and additionally removing water by mechanical means, then removing water from the thus obtained water-wet NC in the presence of hydrocarbon by distillation (Claims 1 and 2). In spite of a satisfactory low water content of

the resulting NC composition, this process suffers several shortcomings. First, it requires a sequence of operations which is rather cumbersome; secondly, the distribution of the organic solvent in the final product is uneven; thirdly, the low dielectric constant of wetted NC is responsible for an easy charge with electricity.

4.2 In the light of that prior art, the technical problem underlying the patent in suit can be seen in the definition of a simplified process leading to NC particles free of the above drawbacks without impairing the low water content.

4.3 The solution given is the combination of features according to Claim 1, which comprises subjecting the water-wetted NC to only one treatment with a specific solvent and then drying the product obtained by rolling or extruding at 30 to 55°C to a water content of less than 1 wt%.

4.4 In view of the specification and especially the examples of the patent in suit the Board is satisfied that the above problem is effectively solved. This point has not been disputed by the Appellant.

5. It remains to be decided whether the claimed subject-matter involves an inventive step with regard to the teaching of the documents relied upon by the Appellant.

5.1 As indicated above, document (4) teaches a process wherein the water-wet NC is first treated with an active solvent as specified in the patent in suit and then with a hydrocarbon solvent to get a product with a water content of less than 1% and a hydrocarbon content of 10 to 40 wt%. In the absence of any alternative embodiment in this citation, this sequence of operation must be

regarded as essential in order to ensure a water content of less than 1% by weight. This applies particularly to the hydrocarbon treatment described at length as playing a major role during the azeotrope distillation of water, before being eliminated by conventional methods (column 4, lines 6 to 31). Upon reading document (4) the person skilled in the art would thus not be aware that this particular step is in fact superfluous (cf. patent in suit, Examples 1, 2 and 6), provided the water-wetted product is subjected to a specific, different mechanical treatment.

This means that document (4) cannot provide any element for the solution of the above-defined technical problem.

5.2 Document (6) discloses a process for the preparation of NC-based propulsive powders which comprises (a) mixing wet NC with methyl ethyl ketone and/or ethyl acetate and kneading the mixture for two hours, (b) calendering the product to form a sheet, (c) cutting the latter into small pieces, (d) which are then treated with hot water to eliminate the solvent(s), dried and coated with graphite (Claim 1 in conjunction with page 3, line 36 to page 4, line 16). Although the description refers to a "perfect elimination of water" (page 3, line 15), the residual amount of water in the final product is at least 1.20% by weight in practice (cf. Examples 1 to 3), thus higher than the critical limit of 1% by weight considered for the definition of the technical problem underlying the patent in suit.

A further point to consider is the fact that the teaching of document (6) is very specific in that the process can only be carried out with the above-mentioned solvents; this means that any solution based on the teaching of this citation should incorporate that feature. The same applies to the final coating with

graphite in order to avoid static electricity; since this is the only information available to the skilled person in that respect, any process taking the teaching of document (6) into account should comprise that feature.

Apart from the fact that the tolerance of a water content higher than 1% by weight is not in line with the above-defined problem, both the restricting condition regarding the choice of the solvent(s) and the final coating with graphite do not correspond to the features of the claimed process. For these reasons, document (6) in isolation cannot lead the skilled person to the process as defined in the patent in suit.

5.3 It remains to be decided whether a person skilled in the art would combine the teachings given in documents (4) and (6) and whether by such a combination the claimed subject-matter would become obvious.

5.3.1 The Board considers in the present case the person skilled in the art as having ordinary skill in the field of NC and thus as being familiar with common uses of NC, such as for coatings and propellants (cf. document (4), column 16, lines 38 to 44). When seeking to solve the above-specified problem, he would thus look at prior art concerning the use of NC for coatings **and/or** propellants.

5.3.2 As noted above, the water content is at least 20% higher in document (6) than in document (4). Such a difference can only be explained by the different properties and applications of NC aimed at in the two citations, which means that the water content must be regarded as an essential feature of the final product. This means as well that the two processes are tailored to achieve different levels of residual humidity. The Board can,

therefore, see no reason why a person skilled in the art should combine the teachings given in those documents when seeking to solve the above-identified problem (cf. point 4.2).

No arguments were provided that such a combination was possible without having any knowledge of the patent in suit. The Board considers thus that a person skilled in the art would not combine the teachings given in documents (4) and (6) without resorting to *ex post facto* analysis.

5.3.3 But even if doing so there would be no incentive in the light of the teaching of document (6) to amend the process disclosed in document (4) in a way leading to the claimed process, for features regarded as essential in one process are excluded in the other. This applies particularly to the solvent. Whereas methyl isobutyl ketone is mentioned in document (4) as the preferred ketone (column 3, lines 27 to 29) and actually used in most examples (Examples 2 to 30 and 32), this compound is said to be totally unsuitable to carry out the process according to document (6) (page 3, lines 17 to 20). In spite of a *prima facie* similarity between the two processes, this opposite teaching about a specific feature would be regarded by the skilled person as a warning against an arbitrary combination of isolated features of one process with the other process. It follows thus that documents (4) and (6) considered in combination cannot lead to the claimed subject-matter.

5.4 For these reasons, the claimed subject-matter cannot be derived from the teaching of documents (4) and (6) either in isolation or in combination and thus involves an inventive step.

6. The subject-matter of Claim 1 being allowable, the same applies to the subject-matter of dependent Claims 2 and 3 which is directed to preferred embodiments of the process according to the independent Claim 1 and whose patentability is supported by that of the main claim.

7. Since the main request has been found to be allowable, the subsidiary request becomes redundant and need not be discussed.

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 with the order to maintain the patent on the basis of Claims 1 to 3 submitted during oral proceedings, and a description yet to be adapted.

The Registrar: The Chairman:

E. Görgmaier C. Gérardin