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D E C I S I O N  
of 19 December 1996

Case Number: T 0298/93 - 3.3.1

Application Number: 87100481.8

Publication Number: 0229671

IPC: C11D 17/00

Language of the proceedings: EN

Title of invention:  
High-density granular detergent composition

Patentee:  
Kao Corporation

Opponent:  
Unilever N.V.

Headword:  
High-density detergent powders/KAO

Relevant legal provisions:  
EPC Art. 56

Keyword:  
"Inventive step (confirmed) - closest state of art in applying  
the problem and solution approach - non-obvious alternative"

Decisions cited:  
-

Catchword:  
-



Case Number: T 0298/93 - 3.3.1

DECISION  
of the Technical Board of Appeal 3.3.1  
of 19 December 1996

Appellant:  
(Opponent)

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Representative:

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Respondent:  
(Proprietor of the patent)

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Decision under appeal:

Decision of the Opposition Division of the  
European Patent Office posted 9 February 1993  
rejecting the opposition filed against European  
patent No. 0 229 671 pursuant to Article 102(2)  
EPC.

Composition of the Board:

Chairman: A. J. Nuss  
Members: J. M. Jonk  
S. C. Perryman

## Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal against the decision of the Opposition Division by which the opposition based on Article 100(a) EPC, which had been filed against the European patent No. 0 229 671 (European patent application No. 87 100 481.8) as a whole, was rejected.

II. The opposition was supported by several documents including:

- (1) JP-A-58/213093 (English translation),
- (2) EP-A-0 168 102, and
- (4) EP-A-0 150 613.

III. The decision was based on the claims as granted, independent Claim 1 reading as follows:

"A granular, detergent composition having a bulk density of at least 0,5 g/cm<sup>3</sup> and comprising a dry blend of

- (I) 75 to 95 wt.%, based on the total weight of the detergent composition, of granules of a detergent stock having a bulk density of at least 0,5 g/cm<sup>3</sup> and comprising a mixture of
  - (a) 20 to 60 wt.% of an organic surfactant,
  - (b) 2 to 15 wt.% of a water-soluble, crystalline, inorganic salt selected from the group consisting of sodium carbonate, sodium sulfate, sodium tripolyphosphate, sodium pyrophosphate and/or sodium orthophosphate, and

(c) 78 to 25 wt.% of another inorganic salt selected from the group consisting of alkali metal silicates having a molar ratio of silica to alkali metal oxide greater than 1,0 and aluminosilicate and/or an organic sequestering agent for a divalent metal, and

(II) 25 to 5 wt.%, based on the total weight of the detergent composition, of granules of a water-soluble crystalline, alkaline, inorganic salt selected from the group consisting of sodium carbonate, sodium tripolyphosphate, sodium pyrophosphate and/or sodium orthophosphate, and having an average particle size of 100 to 1000  $\mu\text{m}$ ."

IV. The Opposition Division held that in view of the closest state of the art, i.e. EP-A-0 168 102 (document (2)), the technical problem to be solved by the claimed invention of the patent in suit was to provide high-density granular detergent compositions having an improved solubility in water at low temperatures down to 5°C. Moreover, they held that the solution of this technical problem by providing a composition in accordance with Claim 1, and in particular of a composition wherein the base granules (I) were present in an amount of at least 75% by weight based on the total composition, and wherein these base granules contained component (b) in an amount of at most 15% by weight and component (c) in an amount of at least 25 to 78% by weight, could not be derived from the cited prior art.

They also considered that the test-report filed by the Appellant on 10 December 1992 in order to show that the problem in question only existed with respect to compositions having base granules prepared by spray-drying and subsequent granulation in accordance with the examples of the patent in suit, or that compositions prepared in accordance with these examples did not always show the desired effect, did not constitute sufficient proof against the presence of an inventive step.

V. Oral proceedings were held on 19 December 1996.

VI. The Appellant argued that the subject-matter of the claims of the patent in suit did not involve an inventive step in the light of the combined teaching of documents (1) and (2). In particular, he pointed out that, having regard to the common general knowledge as supported by

(5) Kirk-Othmer, Vol. 22 (1983), page 420,

in that high bulk densities in excess of  $0.5 \text{ g/cm}^3$  could be obtained by spray-drying, document (1) represented the closest state of the art. Furthermore, he contended that the composition in accordance with Example 4 of this document only differed from those of the patent in suit in the level of the sodium sulphate in the base granules, i.e. in the amount of component (b) of the composition of Claim 1 of the patent in suit. However, in view of the teaching of document (2) indicating that the reduction of the level of sodium sulphate would improve solubility of the detergent compositions, the provision of the compositions as claimed in the opposed patent was obvious to the skilled person.

Moreover, he argued that the compositions as claimed in the disputed patent were obvious in the light of document (4), in particular Example 4, since the skilled person would omit the bleach component as being inactive at low temperatures.

He also noted that in view of the test-report submitted by him on 10 December 1992, and having regard to the comparative tests in the patent in suit which all related to densified spray-dried products, solubility problems as indicated in the patent in suit were related only to high density powders prepared by spray-drying followed by densification/granulation, and that the reduction of the amount of inorganic salts (component (b)) provided compositions which did not differ significantly in their dissolution behaviour from compositions containing higher amounts of such salts.

VII. The Respondent (Patentee) defended the maintenance of the patent in suit as main request on the basis of the claims as granted, and as first and second auxiliary requests on the basis of sets of claims filed during oral proceedings.

Claim 1 of the first auxiliary request differed from Claim 1 of the present main request in that the minimum bulk densities of the final product and of the detergent stock were each amended to read  $0.6 \text{ g/cm}^3$ .

Claim 1 of the second auxiliary request differed from Claim 1 of the present main request in that the stated minimum bulk densities of the final product and of the detergent stock were amended to read  $0.65 \text{ g/cm}^3$  and  $0.6 \text{ g/cm}^3$  respectively.

The Respondent argued that none of the cited documents, alone or in combination, rendered the subject-matter of the patent in suit obvious.

In this respect, he submitted that in accordance with the claimed invention it was surprisingly found that a limitation of the amount of the water-soluble crystalline salts in the high-density base granules, i.e. of component (b), to an amount of at most 15% by weight, together with a dry-blending of alkaline water-soluble crystalline salts with the high-density base granules in the amounts as claimed, lead to superior solubility in cold water.

Moreover, he maintained his point of view that document (1) related to low-density detergent compositions, so that the skilled person faced with the problem to improve the solubility of high density detergent compositions at low temperatures would have disregarded this document. He also denied that document (2) would teach that the solubility of high density detergent powders could be improved by reducing the content of sodium sulphate. Furthermore, he argued that Appellant's submission with respect to Document (4) was wrong, since this document related to compositions, in which the bleaching agent was an essential component.

VIII. The Appellant requested that the decision under appeal be set aside, and that the patent be revoked.

The Respondent requested as main request that the appeal be dismissed and that the patent be maintained as granted, or as first and second auxiliary request

respectively that the decision under appeal be set aside and that the patent be maintained on the basis of the set of claims marked "Auxiliary Request 1" or "Auxiliary Request 2" respectively submitted at the oral proceedings on 19 December 1996.

- IX. At the conclusion of the oral proceedings the Board's decision was pronounced.

### Reasons for the Decision

1. The appeal is admissible.
2. *Main request*
  - 2.1 The only issue arising on this request is whether the subject-matter of the claims as granted involves an inventive step.
  - 2.2 Problem and solution approach
    - 2.2.1 Article 56 EPC sets forth that an invention involves an inventive step if, having regard to the state of the art (in the sense of Article 54(2) EPC), it is not obvious to a person skilled in the art.
    - 2.2.2 For deciding whether or not a claimed invention meets this criterion, the Boards of Appeal consistently apply the "problem and solution approach". This approach involves the identification of the "**closest state of the art**", i.e. a technically realistic starting point from which the claimed invention could most easily have been made by a skilled person at the filing date. In this context, the Boards of Appeal developed certain criteria that should be adhered to. One such criterion



is that the "closest prior art" for assessing inventive step is normally a prior art document disclosing subject-matter **conceived for the same purpose as the claimed invention**. Ideally that purpose or objective should be something already mentioned in the prior art document as a goal worth achieving.

2.3 Selection of closest prior art

2.3.1 In the present case, it was accepted by both parties that the objective to be achieved as indicated in the patent in suit could be stated generally as **the provision of high density granular detergent compositions having densities of at least 0.5 g/cm<sup>3</sup> and having good dispersibility and/or solubility in cold water** (cf. the patent in suit page 2, lines 3 to 5 and 19 to 47, page 3, lines 16 to 36, and page 4, line 14). In relation to this objective, a selection among the documents cited in the proceedings must be made as to which is to be treated as the "closest prior art".

2.3.2 Document (1), having regard to the considerations above (point 2.2.2), disqualifies itself as closest state of the art, since it concerns a totally unrelated problem, namely, **that of improving the anti-caking property of detergent powders, and preventing classification of sodium carbonate therein**, which problem was solved by adding 5 to 40% by weight based on the total weight of the detergent powders of a particular sodium carbonate to spray-dried base powders having in accordance with the examples specific gravities of **0.28 g/cm<sup>3</sup> ± 0.01 g/cm<sup>3</sup>** (cf. page 1, last paragraph; page 2, last line, to page 4, second paragraph; and page 19, last paragraph).

In this context, the Board observes that a skilled person in view of his common general knowledge as represented by document (5), first paragraph under "Spray-Dried Powders", in that conventional spray-dried detergent powders can have bulk densities of 0.25 to 0.65 g/cm<sup>3</sup>, in the Board's judgment, would not have had any reason to understand the teaching of document (1) as being related to solubility problems of high density detergent powders, since document (1) not only relates to a particular method for the preparation of detergent powders in order to achieve - as indicated above - **special improvements which are unrelated to solubility problems**, but also describes merely the use of spray-dried base powders having bulk densities of 0.28 g/cm<sup>3</sup> ± 0.01 g/cm<sup>3</sup>, i.e. spray-dried powders having - in view of said range of 0.25 to 0.65 g/cm<sup>3</sup> - **low bulk densities** and, consequently, normally **good solubilities**.

- 2.3.3 Document (4) relates to a detergent bleaching composition comprising a spray-dried base powder, together with one or more post-dosed ingredients **which include a peroxygen bleach compound**, the base powder containing at least a synthetic detergent active material, an amorphous aluminosilicate builder material, moisture, optionally soap, **optionally** a crystalline aluminosilicate builder material, and **optionally** an alkaline salt selected from alkali metal silicates, alkali metal carbonates, alkali metal phosphates and mixtures thereof, in which **the moisture content of the base powder, i.e. the water content which is lost at heating to 135°C, is maintained at a certain level**, which level is defined by a particular formula, in order to improve the initial and long term ion exchange properties of the amorphous aluminosilicate builder material and also to improve

the storage stability of the bleach materials (see page 2, lines 3 to 53, and page 6, lines 10 to 14). It neither discloses anything about the bulk density of the spray-dried base powder, nor anything with respect to the bulk density of the finished detergent powder.

While it is true, that considered in isolation the **base powder** of Example 4 of document (4) **with respect to its composition** falls under the scope of component (I) in accordance with Claim 1 of the patent in suit, there was no evidence whatsoever before the Board to support the Appellant's contention that this base powder was per se a well known detergent composition. Furthermore, even having regard to the common general knowledge as represented by document (5) in that spray-dried detergent powders can have bulk densities within the range of 0.25 to 0.65 g/cm<sup>3</sup>, there is no indication that this particular base powder has a bulk density of at least 0.5 g/cm<sup>3</sup>.

Therefore, in view of the considerations above (point 2.2.2), and having regard to the fact that document (4) does not have any relation to solubility problems of high density granular detergent compositions, this document (4) also cannot be treated as closest prior art.

- 2.3.4 Document (2) relates to a process for the preparation of a non-ionic surfactant-containing powder detergent composition having a high active detergent content and **a high bulk density** as well as **all the other benefits of spray-dried detergent powders such as solubility, wetting and sinking properties**, wherein (a) a spray-dried base powder being **essentially free of sodium sulphate** and containing a portion of the non-ionic surfactant is obtained, (b) the remaining portion of the non-ionic surfactant is in part sprayed onto the

base powder and (c) in part added subsequently by mixing the obtained powder with a **granulate** obtained by granulation of the non-ionic surfactant with a **carrier chiefly containing a mixture of zeolite and perborate monohydrate**, whereby other components such as sodium tripolyphosphate or sodium sulphate can be added to this granulate, and (d) wherein the other detergent components are added subsequently to the base powder (see page 1, first paragraph; page 1, line 30, to page 2, line 2; page 2, line 21, to page 3, line 12; page 4, lines 13 to 25; and page 5, lines 7 to 25).

In accordance with the two examples, i.e. Examples 1 and 2, finished detergent powders having bulk densities of  $0.68 \text{ g/cm}^3$  and  $0.70 \text{ g/cm}^3$  respectively are obtained using spray-dried base powders containing roughly **50% by weight** based on the weight of the spray-dried powders of sodium tripolyphosphate.

Given the objective as indicated in the patent in suit, document (2) is thus highly relevant prior art in the sense of a suitable starting point to be considered by the skilled person in the art wishing to define the technical problem to be solved.

- 2.3.5 Of the documents suggested as candidates for being treated as the closest prior art, the Board thus concludes that document (2) is the correct choice.
- 2.4 Assessment of technical results over the closest state of the art
  - 2.4.1 The Respondent argued that the claimed detergents were an improvement over the state of the art while the Appellant disputed this.

2.4.2 According to the description of the patent in suit, as well as the Respondent's submissions, high-density granular detergents having high dispersibility, solubility and detergent capacity in cold water, such as water of about 5°C which is usually used domestically for washing in winter in Japan, are obtained according to the claimed invention by **limiting** the amount of the water soluble crystalline salts as defined in component (b) of Claim 1, which salts inhibit the dispersion and dissolution and are contained in the high density granular detergent stock (i.e. component (I)), and by dry-blending certain of these crystalline salts - provided they have the required particle size (i.e. component (II)) - with said granular detergent stock in specific ratios (see page 3, lines 16 to 51; page 4, lines 41 to 57; and page 5, lines 15 to 41).

2.4.3 In this context, the Appellant submitted by referring to his test-report filed on 12 December 1992, and the examples in the patent in suit, that the high density detergent compositions as claimed in Claim 1 of the patent in suit neither show an improved solubility compared with those of document (2), nor compared with any other composition on the basis of non-densified spray-dried detergent powders, including such powders having high bulk densities between 0.5 g/cm<sup>3</sup> and 0.6 g/cm<sup>3</sup>.

2.4.4 The test-report as submitted by the Appellant does not represent, and was actually never intended to be a direct comparison with the compositions of document (2), which the Board considers to be the closest state of the art. This report concerned two comparative experiments comparing Powder 1 with comparative Powder A and Powder 2 with comparative Powder B respectively. The base powders of the Powders

1 and A were prepared by spray-drying, whereas the base powders of the Powders 2 and B were prepared by spray-drying followed by densification. Moreover, the comparative Powders A and B were essentially prepared in the same way as Powders 1 and 2 respectively, except that the spray-dried base powders (detergent stocks) of the comparative Powders A and B contained (in 100 parts of dry base powder) 18% and 25,3% by weight respectively of a mixture of sodium carbonate and sodium sulphate corresponding to component (b) of Claim 1 of the patent in suit. In washing at 7°C no solubility improvements were found for the compositions in accordance with the claimed invention, since in using Powders 1 and A no solubility problems were encountered at all, and in using Powders 2 and B both powders showed about the same slight to medium residue score. These test results were not disputed by the Respondent.

2.4.5 Thus, in view of this test-report, wherein the experiments with the comparative Powders A and B (although not representing the closest prior art) demonstrate that there is no significant difference in the dissolution behaviour when reducing the amount of the inorganic salts to that specified under (b) of present Claim 1, which feature is considered in the patent in suit as the critical one for achieving a high solubility capacity in cold water (see page 3, lines 16 to 36 and page 4, lines 41 to 57 of the patent in suit), and having regard to the fact that the comparative examples in the patent in suit all concern powders wherein the detergent stocks (base powders) were prepared by spray-drying **followed by densification**, in the Board's judgment, it has indeed,

not been made credible that the compositions in accordance with the claims of the patent in suit, which does not exclude powders on the basis of non-densified spray-dried granular detergent stock, show an improved solubility over the whole claimed area.

2.4.6 Notwithstanding the above conclusion, the Board cannot accept Appellant's submission in that no solubility problems would exist at all with respect to any detergent powder on the basis of **non-densified** spray-dried powders having high densities of about 0.5 to 0.6 g/cm<sup>3</sup>, since this submission is solely based on the experiment of the test-report using comparative Powder A, which essentially differs from the compositions in accordance with Claim 1 of the patent in suit only in that it contains a slightly higher amount (i.e. about 3% by weight) of component (b), and, as already pointed out, does not form part of the prior art. Moreover, in view of the numerous examples of the patent in suit, in the Board's judgment, the solubility of spray-dried powders not only depends on their density, but also on the compositions of the corresponding slurries to be spray-dried.

2.5 Problem to be solved

2.5.1 Therefore, in the light of the above identified closest state of the art, the underlying problem can only be seen in the provision of further granular detergent compositions having bulk densities of at least 0.5 g/cm<sup>3</sup> and having high dispersibility or solubility of their components in cold water.

2.5.2 According to present Claim 1 this technical problem is solved by detergent compositions as defined therein containing essentially a dry blend of (I) 75 to 95 wt.%, based on the total weight of the detergent

composition, of granules of a detergent stock having a bulk density of at least  $0.5 \text{ g/cm}^3$  and comprising 2 to 15 wt.%, based on the detergent stock, of at least one of the water-soluble, crystalline, inorganic salts as specified under (b), and 78 to 25% by weight, based on the detergent stock, of at least one other inorganic salt as specified under (c), and (II) 25 to 5 wt.%, based on the total weight of the detergent composition, of granules of one or more of the indicated water-soluble crystalline, alkaline, inorganic salts having an average particle size of 100 to 1000  $\mu\text{m}$ .

2.5.3 Having regard to the large number of examples of the patent in suit, the Board considers it plausible that the technical problem as defined above has been solved. Actually, the Appellant did not contest that the compositions according to the claimed invention show a high dispersibility and solubility performance in cold water.

## 2.6 Assessment of inventive step

2.6.1 In assessing inventive step the question thus is whether a skilled person starting from document (2) would arrive at something falling within Claim 1 by following the suggestions made in the prior art.

2.6.2 Although document (2) relates to high density granular detergent compositions showing the normal benefits of spray-dried detergent powders, such as solubility performance, this document does not give any pointer to the skilled person in the direction of making modifications leading to what is now claimed. Moreover, in accordance with both examples 1 and 2, the amount of inorganic salts corresponding to the salts (b) indicated in Claim 1 of the patent in suit is **more than 15% by weight**, the amount of other inorganic salts



in the spray-dried base powder corresponding to salts (c) required by Claim 1 of the patent in suit is **less than 25% by weight** and not between 78% and 25% as required by this Claim 1. Further the weight ratio of the spray-dried base powder to the granulate obtained by granulation of the non-ionic surfactant with the specific carrier, i.e. of the components corresponding to the constituents (I) and (II) of Claim 1 of the patent in suit, amounts to **about 2 : 1**, and not to greater than 3:1 as in effect required to meet the proportions specified in Claim 1. Thus, modifications leading to the claimed invention would involve reducing and adjusting the amount of inorganic salts corresponding to component (b) of Claim 1 of the patent in suit, raising the amount of the other inorganic salts corresponding to component (c) of said Claim 1, and selecting a specific ratio of the base powder to the dry-mixed granulate in order to meet the ratio in accordance with Claim 1 of the patent in suit for components (I) and (II).

In this context, the Board observes that although document (2) indeed teaches that the spray-dried base powder must be essentially free of sodium sulphate in order to achieve a base powder which has **a high bulk density despite its high active detergent content** (see page 2, lines 21 to 24), this document clearly does not contain the detailed information necessary for preparing a composition as claimed.

- 2.6.3 Document (1) concerns - as indicated under point 2.3.2 above - a method for the preparation of a detergent powder by adding to a spray-dried detergent material 5 to 40% by weight based on the total weight of the detergent powder of a particular sodium carbonate having specific properties **in order to improve the anti-caking property of the detergent composition, and**

to prevent classification of the sodium carbonate. In particular, it discloses that said sodium carbonate has an apparent specific gravity of 0.25 to 0.7 g/cm<sup>3</sup>, an average particle size of 250 to 600 μm, and such a particle size distribution that the content of particles with a size of not larger than 125 μm is not more than 20% by weight (see page 4, second paragraph). Moreover, it describes the use of spray-dried base powders having specific gravities of 0.28 g/cm<sup>3</sup> ± 0.01 g/cm<sup>3</sup> (cf. page 19, last paragraph), i.e. only low density powders having normally good solubility properties (see in this respect also point 2.3, second paragraph).

Thus, the teaching of document (1) as a whole concerns a technical problem which is totally unrelated to that underlying the patent in suit, and the solution to that completely different problem gives no pointer to the skilled person which would lead him to produce a high density detergent powder having bulk densities of at least 0.5 g/cm<sup>3</sup> in accordance with Claim 1 of the patent in suit by using a detergent stock (base powder) having a specific composition as defined under (I) and having a bulk density of at least 0.5 g/cm<sup>3</sup>.

2.6.4 Document (4) has already been discussed above under point 2.3.3 when considering which document to choose as the closest prior art. The Appellant relies in particular on Example 4 describing the addition of **20.0 parts by weight of sodium perborate**, 18.0 parts by weight of sodium tripolyphosphate, and 4.0 parts by weight of water and miscellaneous to 61.3 parts by weight of the base powder. However, in view of the fact that the composition of this example containing a / bleaching agent as an essential constituent (see page 2, lines 13 and 14; page 6, lines 10 to 14; and the examples) is to be used at much higher

temperatures, the Board cannot see any reason why the skilled person should ever consider this document as a possible source of useful hints in solving his problem. Further document (4) would provide no reason or incentive to the skilled person to add the particular component (II) as defined in Claim 1 of the patent in suit to the base powder in an amount of 25 to 5% by weight.

2.6.5 Document (5) has been mentioned by the Appellant only to support common general knowledge in that spray-dried detergent powders can have bulk densities of 0.25 to 0.65 g/cm<sup>3</sup>. However, this common general knowledge does not lead the skilled person to the preparation of the particular finished detergent compositions in accordance with the claimed invention, let alone to the solution of the technical problem underlying the patent in suit.

2.6.6 In conclusion, the Board finds that the detergent compositions according to Claim 1 of the main request involve an inventive step in the sense of Article 56 EPC.

Since Claims 2 to 4 relate to particular embodiments of the compositions claimed in Claim 1, they are also allowable.

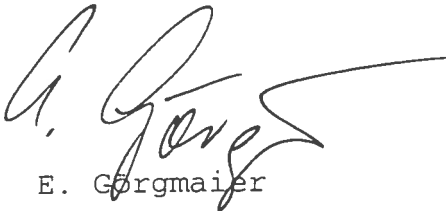
3. In the light of the above findings, it is not necessary to consider the Respondent's auxiliary requests.

Order

For these reasons it is decided that:

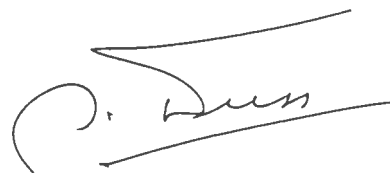
The appeal is dismissed.

The Registrar:



E. Gorgmaier

The Chairman:



A. Nuss