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D E C I S I O N
of 26 August 1997

Case Number: T 1053/93 - 3.3.1

Application Number: 85306056.4

Publication Number: 0177165

IPC: C11D 3/386

Language of the proceedings: EN

Title of invention:
Detergent composition

Patentee:
UNILEVER PLC, et al

Opponent:
Henkel Kommanditgesellschaft auf Aktien
The Procter & Gamble Company

Headword:
Detergent composition/Unilever

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no) - obvius solution of the technical problem underlying the disputed patent - obvious to try"

Decisions cited:
T 0249/88, T 0386/94

Catchword:
-

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Case Number: T 1053/93 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 26 August 1997

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Decision under appeal: Decision of the Opposition Division of the European Patent Office posted 8 October 1993 revoking European patent No. 0 177 165 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: R. K. Spangenberg
Members: J. M. Jonk
S. C. Perryman

Summary of Facts and Submissions

I. The Appellants (proprietors of the patent) lodged an appeal against the decision of the Opposition Division by which European patent No. 0 177 165 was revoked in response to an opposition, based on Article 100(a) EPC, which had been filed against the patent as a whole. Claim 1 of the patent in suit read as follows:

"A detergent composition for cleaning and softening fabrics comprising:

(i) a detergent active material;

(ii) a fabric softening clay material; and

(iii) cellulase."

II. The opposition was supported by several documents including:

(1) EP-A-0 139 329 (Article 54(3) EPC),

(2) EP-A-0 099 197,

(4) US-A-4 435 307,

(5) Journal of Plant Nutrition and Soil Science, Vol. 145, No. 1 (Feb. 1982), pages 493 to 502,

(7) DE-A-2 334 899 (corresponds to US-A-4 062 647),

(8) EP-A-0 026 528, and

(12) Schott, The Journal of the American Oil Chemists Society, Vol. 45 (1968), pages 414 to 422.

III. The decision was based on the claims as granted and on ten sets of claims filed on 12 August 1993 as auxiliary requests.

The Opposition Division held that the compositions of the patent in suit were novel in the light of document (2), but lacked novelty in view of document (1). They also held that the subject-matter of the use claims in accordance with the corresponding auxiliary requests lacked inventive step. In this context, they considered that it was known that certain clays as well as cellulase had fabric softening properties and could be incorporated in detergent compositions for washing and softening fabrics in one operation. Concerning softening clays they referred inter alia to document (7) and concerning cellulase as softening agent inter alia to document (4). Furthermore, they considered that the cited prior art documents did not provide any indication that the softening properties of clay and cellulase would be mutually inhibited when used together in said detergent compositions. They concluded that a skilled person looking for improving the softening effect achieved by clay or by cellulase would expect an additive effect by combining both softening agents.

IV. Oral proceedings were held on 26 August 1997.

V. During these oral proceedings the Appellants filed five new sets of claims as a new main request and new auxiliary requests 1 to 4.

Claim 1 of the **new main request** read as follows:

"A detergent composition for cleaning and softening fabrics comprising:

(i) from 5 to 50% by weight of a detergent active material at least part of which is anionic detergent;

(ii) from 1.5 to 35% by weight of a fabric softening clay material;

(iii) cellulase; and

(iv) from 20 to 70% by weight of detergency builder."

Claim 1 of the **first auxiliary request** corresponded to that of the present main request except that the composition comprises as component (iii) cellulase selected from bacterial and fungal cellulases having an optimum activity at alkaline pH values up to 11.5.

Claim 1 of the **second auxiliary request** read as follows:

"Use, for cleaning and softening fabrics, of a detergent composition comprising:

(i) a detergent active material;

(ii) a fabric softening clay material; and

(iii) cellulase."

Claim 1 of the **third auxiliary request** differed from that of the second one in that the use of a composition was claimed which comprised (i) from 2 to 50% by weight of a detergent and components (ii) and (iii) as defined in accordance with the present main request.

Claim 1 of the **fourth auxiliary request** differed from that of the third one in that the use of the composition was claimed in which component (iii) was defined in accordance with the present first auxiliary request.

VI. The Appellants argued with respect to the novelty of the subject-matter of the present claims that documents (1) and (2) did not disclose compositions comprising a particular detergent in an amount of at least 5% by weight, a fabric softening clay, a detergency builder and a cellulase as defined in the claims, because said features represented separate selections within the possibilities described in said documents.

They also argued that the claimed subject-matter involved an inventive step. In this context, they contended that in the light of the closest state of the art, i.e. document (7) concerning main wash detergent compositions containing softening clay, the technical problem underlying the patent in suit was to provide detergent compositions for cleaning and washing fabrics having an improved softening effect, and that the claimed solution of this technical problem by adding cellulase as an additional softening agent would not have been obvious to a person skilled in the art.

With respect to the improved softening effect the Appellants relied on the examples of the patent in suit and a test report filed together with the statement of grounds of appeal.

Concerning obviousness, they argued that a skilled person would have expected that clay inhibited the softening activity of the cellulase in such a way that the combined softening effect of clay and cellulase would rather be less than the effect of clay when used alone in a corresponding higher amount. They argued in particular that it followed from the teaching of document

(9) Schott, Textile Research Journal (1965), pages 612 to 620,

that the softening clay would hinder the access of the cellulase to the fabric, and that it followed from documents

(16) R.G. Burns, "Soil Enzymes" (1978), pages 58 to 60, 300 to 304,

(17) Hamzehi et al., Z. Pflanzenernähr. Bodenk. **144** (1981), 505-513,

(18) McLaren et al., Soil Sci. Soc. Proc., **22** (1958), 239 to 244, and

(19) Lynch et al., Soil Sci. Soc. Proc., **20** (1956), 367 to 370,

that sorption of the cellulase by the softening clay would reduce mobility and activity of the cellulase. In addition, they contended that in view of the different softening mechanisms of clay and cellulase in that the softening effect of clay was based on lubricating and that of cellulase on cutting fibrils from the cellulose fibers reducing their harshness, a skilled person would

expect that the addition of cellulase was redundant. Furthermore, they disputed that documents (5), (8) and (12), relied on by the Respondents, would teach otherwise.

VII. The Respondents maintained their point of view that the subject-matter of the present claims lacked novelty in view of document (1) or document (2).

Moreover, they agreed with the reasoning of the Opposition Division regarding lack of inventive step of the claimed subject-matter. They argued in particular that in view of the non-linear relationship between the amount of clay and its softening effect, as well as in view of the fact that the softening effect of clay and that of cellulase were based on different mechanisms, i.e. on lubricating and on cutting fibrils from the cellulose fibers respectively, a skilled person would expect a softening effect better than that obtained by increasing the amount of clay. Furthermore, they also argued that the cited documents did not provide any evidence leading a skilled person away from combining a fabric softening clay and cellulase in the same detergent composition. With respect to documents (16) to (19) they considered that these documents were not relevant since none of them related to the problem of fabric softening, and that - if these documents would be considered as relevant - the later published document (5) clearly taught that cellulase bound by clay remained active. Moreover, documents (8) and (12) rather showed that under realistic washing conditions the fibers and fibrils of the fabric were not completely coated, so that a sufficient access for the cellulase was to be expected.

Concerning the test results presented by the Appellants the Respondents argued that as far as different types of softening agents were used an additive effect was to be expected, and that the high margin of error of the measurements did not lead to any distinction between the expected and the measured values proving that the claimed combination of the two softening agents did not lead to any synergistic effect.

VIII. The Appellants requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request or one of the auxiliary requests 1 to 4, all submitted at the oral proceedings on 26 August 1997.

The Respondents requested that the appeal be dismissed.

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

Reasons for the Decision

1. The appeal is admissible.

2. After examination of the new sets of claims, the Board has reached the conclusion that the subject-matter as defined in all the claims complies with the requirements of Article 123 EPC. Since the Respondents did not raise objections in this respect, it is not necessary to give reasons for this finding.

3. Furthermore, in view of the fact that the Board has reached the conclusion that - as set out below - the claimed subject-matter in accordance with all the requests lacks inventive step, and having regard to the fact that the presence of an inventive step is an

essential prerequisite for patentability, it is in the Board's judgment also not necessary to decide on the question of novelty. There is thus no need to consider documents (1) and (2) any further (see point VI above).

4. Concerning the issue of whether the subject-matter of the present claims according to the main request or one of the auxiliary requests involves an inventive step, the Board's considerations are as follows:

5. *Main request*

5.1 For deciding whether or not the claimed subject-matter having regard to the state of the art (as defined in Article 54(2) EPC) is obvious to a person skilled in the art, the Board applies the "problem-solution-approach", which consists essentially in (a) identifying the "closest prior art", (b) assessing the technical results (or effects) achieved by the claimed invention when compared with the "closest state of the art" established, (c) defining the technical problem to be solved as the object of the invention to achieve these results, and (d) examining whether or not the state of the art in the sense of Article 54(2) EPC, having regard to, would have suggested that the claimed technical features were suitable for obtaining the results achieved.

5.2 In the present case, and in accordance with the Appellants' point of view, the Board considers that document (7) and the corresponding US-A-4 062 647 (which will further on be referred to) represents the closest state of the art.

This document relates - like the claimed subject-matter of the patent in suit - to granular built laundry detergent compositions showing simultaneously a satisfactory laundering and softening performance

comprising as essential components a synthetic non-soap detergent, a builder salt and a particular fabric softening clay (see Claim 1; column 1, lines 14 to 21; and column 2, lines 42 to 44). In particular, it discloses that said compositions comprise (a) from 2 to 30% by weight, preferably 5 to 20% by weight, of a detergent active material selected from the group consisting of anionics, nonionics, ampholytics and zwitterionics, whereby the nonionics should provide a minor portion, (b) from 10 to 60% by weight, preferably 20 to 50% by weight, of a detergent builder, and (c) from 3 to 50% by weight, preferably 5 to 20% by weight, of a softening smectite clay (see column 2, lines 17 to 32 and lines 48 to 58; column 15, lines 51 to 54; column 19, lines 54 to 60). Moreover, the compositions 1, 4 and 5 disclosed in Table I comprise anionic detergents in amounts of 16.8, 15.3 and 8.4% by weight respectively. In addition, this document also teaches that the compositions may contain optional components such as enzymes (see column 20, lines 10 to 20).

5.3 Regarding this closest prior art the Appellants argued essentially that the compositions in accordance with the patent in suit showed an improved softening effect.

5.4 Therefore, in the light of this closest state of the art, the problem underlying the patent in suit can be seen in the provision of softening clay containing detergent compositions for cleaning and softening fabrics having a further improved softening effect.

According to present Claim 1 this technical problem is essentially solved by detergent compositions containing cellulase as an additional softening agent.

5.5 Having regard to the examples of the patent in suit and the test-report submitted by the Appellants together with the statement of grounds, the Board considers it plausible that the technical problem as defined above has been solved.

In this context, Respondent 2 argued that there was no statistically significant difference between the softness effect measured and that expected and calculated on the basis of an additive effect of the cellulase and the clay. It is true, that the Figures 1 and 2 as well as Figure 2A filed by said Respondent in support of this contention on 31 August 1994 and 18 August 1997 respectively showed that the measured softness values and the expected softness values were the same within the margin of error of the experiments carried out. However, having regard to the fact that according to these figures all the measured values were actually higher than the expected values, the Board concludes on the balance of probabilities that by using cellulase containing compositions as claimed some further improvement of the softness effect is achieved.

5.6 The question now is whether the cited prior art would have suggested to a person skilled in the art solving the above-indicated technical problem in the proposed way.

5.7 Document (7) - as indicated above under point 5.2 - relates to compositions for cleaning and softening fabrics comprising a detergent active material such as an anionic detergent, a softening clay and a builder in essentially the same amount as claimed in accordance with the patent in suit. However, although it describes

the optional presence of enzymes (see column 20, lines 10 to 20), in the Board's judgment, document (7) does not give any pointer to the skilled person that the technical problem underlying the patent in suit could be solved by providing a detergent composition as now claimed.

5.8 Document (4) discloses the provision of a commercially interesting fungal cellulase, since said cellulase can be produced in high yields by using a strain of *Humicola insolens* and also shows a high cellulase activity at pH-values normally prevailing in main wash solutions (see column 1, line 26, to column 2, line 36). In particular, it discloses the use of said cellulase as a harshness reducing component for main wash compositions comprising usual detergent ingredients and giving washing solutions having pH-values between 7 and 10 whereby the cellulase is able to produce its full activity (see column 5, lines 30 to 54; and column 7, lines 15 to 18).

Having further regard to the Appellants' own undisputed submissions that it was, on the one hand, known at the priority date of the patent in suit that cellulase gives a harshness reducing effect by cutting fibrils from fibers whereas clay provides its softening effect by lubricating, and, on the other hand, that the softening benefit of clay was known to be non-linear in that it gives less benefit at higher amounts of clay, in the board's judgment, the disclosure of document (4) gives a clear incentive to try to solve the above defined technical problem by adding the cellulase disclosed in document (4) to the detergent composition disclosed in document (7), since in view of the softening mechanism of cellulase and said non-linearity of the softening effect of clay a skilled person would have expected an additional softening effect of the cellulase.

.../...

5.9 In this context, the Appellants contended that a skilled person on the basis of his common general knowledge would not have contemplated to use cellulase in addition to clay, since in view of the known inhibiting effect of clay on the cellulase activity he would have expected that the total softening effect of clay and cellulase would be less than the effect of clay when used alone in a corresponding higher amount (see the patent in suit, page 2, lines 24 to 36).

In particular, they contended by referring to document (9) and some relevant passages of document (12) that the softening clay would block the access of the cellulase to the fabric by forming a continuous coating on the fibers and the fibrils, and by referring to documents (16) to (19) that sorption of the cellulase by the softening clay would reduce mobility and activity of the cellulase.

5.10 However, although documents (9) and (12) disclose that sodium montmorillonite provides a thin uniform coating on cellulose fibres and fibrils and that the amount of said clay remaining after washing with detergent solutions is sufficient to retain a complete coverage (see document (9), Abstract, and page 619, right column, second paragraph; and document (12), Abstract, and the paragraph bridging pages 420 and 421), these documents do not expressly say that the fibers and fibrils of cellulose fabrics under realistic washing conditions would be covered by softening clay in such a way that the access of the cellulase to the fibrils is blocked so that no fabric softening effect of the cellulase could be expected. In the Board's judgment, such a possibility is not even suggested by the disclosure of these documents, since on the one hand the coating of the fibers and fibrils by clay in accordance with the experimental provisions indicated in documents (9) and (12) was carried out in the

absence of detergents, and on the other hand document (12) clearly suggests an interfering effect of detergents on the coating of the fabric by clay by indicating that when the clay was brought into contact with the cellulose fabric in the presence of nonionic surfactants, the fabric did not retain the clay at all (see Abstract, last sentence, and page 422, left column, paragraphs 1 and 2).

5.11 In this context, the Board observes that document (8) relating to detergent compositions for cleaning and softening of textiles comprising a cationic compound as softening agent and a smectic clay serving as an additional softening agent (see page 3, last paragraph, to page 5, line 26), actually confirms a possible interfering effect of detergents on the coating of fabrics by softening clay, since this document discloses that if a softening clay is used on its own, it must be applied in a high level of incorporation for effective softening performance possibly because the deposition of the clay on fabrics is not very efficient in the presence of anionic surfactants (see page 2, line 30 to page 3, line 6).

5.12 Furthermore, all the documents (16) to (19) relied on by the Appellants with respect to the contended deactivating and demobilising effect of clay on cellulase also do not relate to experiments carried out in the presence of detergents and, therefore, cannot be accepted by the Board as evidence for the expectation of a relevant inhibiting effect of clay on the cellulase activity in a laundry composition. Moreover, the Board observes, that insofar as the teaching of these documents would be taken into account, document (5) having a later publication date than said documents (16) to (19) clearly states that if cellulase

was allowed to be sorbed by clays such as montmorillonite, a clay-enzyme complex is formed, which remains active in contrast to the behaviour of starch cleaving enzymes (see page 493, Summary).

5.13 The Board is furthermore unable to agree with the Appellants' unsupported argument that a skilled person in view of the lubricating softening effect of clay on the fibers and the fibrils of the fabrics would expect that the addition of cellulase would be redundant. Rather, in view of the softening mechanism of cellulase which - as indicated above - is based on reducing harshness by cutting fibrils from the cellulose fibers, thereby reducing the extent to which fibers are connected and latched together, in the Board's view, a skilled person would expect the contrary, i.e. an additional softening effect.

5.14 In view of these considerations, the Board holds that the Appellant indeed has brought forward evidence to the effect that a theoretical possibility of failure might have existed. However, the Board can nevertheless not agree with the Appellants' argument that in these circumstances a skilled person would not have considered to add the cellulase disclosed in document (4) to the compositions disclosed in document (7). In the Board's judgment, in the assessment of inventive step it is not necessary to establish that the success of an envisaged solution of a technical problem was predictable with certainty. On the contrary, in order to demonstrate that a skilled person would have combined the technical teaching of two documents, it is sufficient to establish that he would have done so with a reasonable expectation of success (see e.g. T 249/88 of 14 February 1989, not published in the OJ EPO, reasons points 7 and 8, and T 386/94, OJ EPO 1996, 658, reasons points 25 to 47, particularly points 39 to 42). The Board further

considers that in the technical field of detergent compositions it is a matter of routine experimentation to achieve certainty. Therefore, a skilled person would not have been prevented from performing such a routine test by such a theoretical possibility of failure, but would have performed it, since he would have reasonably expected that the application of the technical teaching provided by document (4) would improve the softening properties of a detergent composition according to document (7). Thereby, he would have arrived at the solution of the above defined technical problem underlying the patent in suit.

5.15 In conclusion, the Board finds that the compositions according to Claim 1 of the main request do not involve an inventive step in the sense of Article 56 EPC, since it would have been obvious to the skilled person to try the use of cellulase as an additional softening agent.

6. *Auxiliary requests*

6.1 The subject-matter of the main (first) claims of the present auxiliary requests 1 to 4 differ from that of Claim 1 of the present main request - as set out under point V above - essentially in that the first auxiliary request concerns a composition comprising a cellulase selected from bacterial and fungal cellulases having an optimum activity at alkaline pH values up to 11.5, and in that the other auxiliary requests relate to the use of a composition comprising a detergent active material, softening clay and cellulase, or a composition according to the present main request, or a composition according to the first auxiliary request for cleaning and softening fabrics (auxiliary requests 2 to 4 respectively).

6.2 However, in view of the fact that - as indicated above under point 5.8 - document (4) teaches the use of detergent compositions comprising a fungal cellulase having a high cellulase activity at pH-values between 7 and 10 as softening agent for cleaning and softening fabrics, in the Board's judgment, the same considerations regarding inventive step as set out above concerning the main request apply for these requests.

6.3 Thus, the Board concludes that the subject-matter of the main claims of the present auxiliary requests 1 to 4 also does not involve an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

E. Görgmaier R. Spangenberg