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D E C I S I O N
of 16 May 2000

Case Number: T 0023/99 - 3.4.2
Application Number: 9197017.5
Publication Number: 0503089
IPC: G02F 1/1339, G09F 9/35
Language of the proceedings: EN

Title of invention:

A fine sphere, a spherical spacer for a liquid crystal display element and a liquid crystal display element using the same

Patentee:

SEKISUI CHEMICAL CO., LTD.

Opponents:

Nippon Shokubai Company Limited
Kao Corporation
Hayakawa Rubber Co., Ltd. / Natoco Paint Co., Ltd. / Catalysts
& Chemicals Industries Co., Ltd.

Headword:

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Relevant legal provisions:

EPC Art. 54, 83
EPC R. 88

Keyword:

"Novelty (main request and auxiliary request I: no)"
"Sufficiency of the disclosure (auxiliary requests II and III:
no)"
"Correction under Rule 88 EPC: refused"

Decisions cited:

G 0003/89, G 0011/91

Catchword:

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Boards of Appeal

Chambres de recours

Case Number: T 0023/99 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 16 May 2000

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Decision under appeal:

Decision of the Opposition Division of the
European Patent Office posted 16 October 1998
revoking European patent No. 0 503 089 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: E. Turrini
Members: A. G. Klein
B. J. Schachenmann

Summary of Facts and Submissions

I. European patent No. 0 503 089 (application No. 91 917 017.5) was revoked by the Opposition Division on the ground that its subject-matter lacked novelty within the meaning of Article 52(4) EPC in view of the contents of document:

D1: JP-A-1-144 429.

In its decision the Opposition Division held that document D1 disclosed a process for producing coloured fine spheres useful as, among others, spacers for liquid crystal display (LCD) elements. Although the document did not explicitly disclose the values for the K-value and the recovery factor after compression deformation of the fine spheres prepared in accordance with Example 1 of the document, fine spheres so fabricated had mechanical properties clearly and unambiguously falling within the claimed ranges, as was evidenced, *inter alia*, by the test report filed by opponents III with the letter dated 9 May 1996 (hereinafter test report D1a).

The Opposition Division also rejected the patentee's request for correction under Rule 88 EPC of the expression "0.27 grf/sec" in page 6, line 24 of the patent specification to "0.029 grf/sec".

- II. The appellant (proprietor of the patent) lodged an appeal against the decision revoking the patent.
- III. Oral proceedings were held on 16 May 2000, at the end of which the appellant requested that the decision under appeal be set aside and that the patent be

maintained as granted (main request) or, auxiliarily, that it be maintained in amended form with any of the sets of claims filed as his auxiliary requests I to III at the oral proceedings.

Claim 1 of the main request reads as follows:

"1. A fine sphere having a K-value defined as

$$K = (3/\sqrt{2}) \cdot F \cdot S^{-3/2} \cdot R^{-1/2},$$

wherein F and S represent a load value in units of kgf and a compression displacement in units of mm at 10% compression deformation of said fine sphere, respectively, and R represents a radius in units of mm of said fine sphere wherein said K-value is in the range of 250 kgf/mm² to 700kgf/mm² at 20°C, and a recovery factor after the compression deformation is in the range of 30% to 80% at 20°C."

Claim 1 of auxiliary request I reads as follows:

"1. A particulate material consisting of fine spheres for use as spherical spacer in a liquid crystal element, wherein said fine spheres have a K-value defined as

$$K = (3/\sqrt{2}) \cdot F \cdot S^{-3/2} \cdot R^{-1/2}$$

wherein F and S represent a load value in units of kgf and a compression displacement in units of mm at 10% compression deformation of said fine sphere, respectively, and R represents a radius in units of mm of said fine spheres wherein said K-value is in the range of 350 kgf/mm² to 700kgf/mm² at 20°C, and a recovery factor after the compression deformation is in the range of 40% to 70% at 20°C."

Claim 1 of auxiliary requests II and III reads as follows:

"1. A method of obtaining fine spheres for use as a spacer in a liquid crystal display, comprising the following steps:

taking a sample and measuring the K-value of a sphere in accordance with the following formula

$$K = (3/\sqrt{2}) \cdot F \cdot S^{-3/2} \cdot R^{-1/2}$$

wherein F and S represent a load value in units of kgf and a compression displacement in units of mm at 10% compression deformation of said fine sphere, respectively, and R represents a radius in units of mm of said fine sphere;

measuring the recovery factor after compression deformation; and

selecting a sample consisting of spheres which have a K-value in the range of 250 kgf/mm² to 700kgf/mm² at 20°C and a recovery factor after compression deformation in the range of 40% to 70% at 20°C."

Independently of the above requests, the appellant also requested that the description of the patent be corrected under Rule 88 EPC by changing the expression "0.27 grf/sec" in line 24 of page 6 to "0.029 grf/sec".

The respondents (opponents III who after the withdrawal of two other oppositions remain as the only adverse party in the present procedure) requested that the appeal be dismissed.

IV. The arguments put forward by the appellant in relation to the issues addressed in the present decision can be summarised as follows.

The invention aimed at providing spacer materials for LCD elements. In the past such materials were characterised only by macroscopic properties like their density or chemical composition. The invention was however based on the recognition that microscopic individual properties were in fact decisive for determining whether a given material was suitable for use as a spacer in LCD elements. If the material met the parameter ranges set out in the claims for the K-value and the recovery factor, which expressed its elasticity and plasticity, then its suitability for the manufacturing of LCD elements was warranted, independently for instance of its chemical composition.

The prior art on file did not disclose spherical beads of the claimed plasticity and elasticity. The manufacturing process of document D1 only achieved a non-homogenous product, having particle sizes between 6 and 15 micrometers. The document did not specify the source and purity of the starting materials used in the manufacturing process, and it did not disclose any mechanical property of the product obtained. In addition, the manufacturing process disclosed in document D1 involved a final reaction for colouring the product, which necessarily affected its individual microscopic properties in a non-specified manner.

In contrast, the test report D1a submitted by the respondents only concerned the intermediate product of the process of document D1, as obtained before the colouring step, not the inevitable product of the process as a whole. The respondents also purposely selected from the inhomogeneous product those few spheres which accidentally exhibited mechanical properties in the claimed range.

Moreover, the spheres of the respondents' test report were manufactured from commercially available starting materials, in particular low-purity divinylbenzene (DVB), instead of the 95% pure DVB used by the respondent, the 95% pure DVB being obtained for test purposes from a manufacturer, and being neither generally available nor chemically stable. Reproducing the manufacturing conditions of Example 1 of document D1 with high-purity DVB resulted in spherical beads having mechanical properties which did not fall within the claimed ranges, as was evidenced by the experimental data in the appellant's submissions dated 18 March 1997 and 29 June 1998.

Finally, if document D1 actually formed patent application documents as originally filed, the subsequent introduction therein of features specifying the parameter ranges as set out in the present claims would certainly not be admissible under Article 123(2) EPC. This provided clear evidence that the parameter ranges were not actually disclosed in document D1.

In respect of his request for correction of the description under Rule 88 EPC, and of the general issue of the sufficiency of the disclosure, the appellant submitted that the measuring conditions for determining the recovery factor after compression, in particular the loading speed indicated in line 24 of page 6 of the description (0.27 grf/sec) resulted from an obvious typing error. The correct value (0.029 grf/sec) could be deduced immediately from the user manual for the compression test machine PCT-200 referred to also in the description (hereinafter document D10). The correct value could also be easily determined by the skilled person, using the numerous examples given in the description of the results of compression tests performed on various materials.

V. The respondents for their part insisted that the claimed subject-matter lacked novelty, since it inevitably resulted from the manufacturing process disclosed in particular in Example 1 of document D1, as was evidenced by their test report D1a. Since the patent itself did not specify the purity of the required starting materials, there was no ground for the skilled person reproducing Example 1 of document D1 not to use commercially available DVB. Document D1 also explicitly referred to sieving the fine spheres for classification, to obtain materials in a particular diameter range, i.e. a homogenous material. They also pointed at experiment I as relied upon by the appellant in his submission of 29 June 1998 to demonstrate that the use of high purity DVB resulted in a recovery factor outside the claimed range. The value relied upon by the appellant (80.3%) was however so close to the upper range end (80%) that, given the uncertainty resulting both from the measurement and from the graphical determination of the parameter value, experiment I could not be considered to establish any difference between the product obtained by the patentee and the one set out in the claims.

Concerning the question of the erroneous indication of the loading speed in the patent specification, the respondents submitted that, on the one hand, the user manual for a particular compression test machine was not part of the general knowledge on which the skilled person could rely to correct an error under Rule 88 EPC. On the other hand, the manual provided support for many different settings other than the one offered by the appellant as an obvious correction.

The respondents also invoked several prior uses of the claimed material before the priority date of the patent, and raised objections under Articles 123(2) and (3) EPC against the amendments proposed by the appellant in his auxiliary requests.

Reasons for the Decision

1. The appeal is admissible.
2. *The appellant's request for correction of the specification under Rule 88 EPC*

The appellant requests that, in the passage of the description specifying the conditions for measuring the recovery factor of a sphere after compression deformation, the indication of a loading speed of 0.27 grf/sec in line 24 of page 6 be corrected under Rule 88 EPC to 0.029 grf/sec.

This passage also describes further measuring conditions, namely a maximum load value of 1 grf, a standard load value of 0.1 grf and a temperature of 20°C (see lines 22, 23 and 25, respectively), and it refers to a specific machine for performing the compression test: "Then, the spacers and the like are compressed... by using a compression test machine (PCT-200 type Shimadzu Seisakusho Ltd.)" (see page 6, lines 9 to 11).

In accordance with the consistent case law of the Boards of Appeal as enshrined in particular in Opinion G 3/89 and Decision G 11/91 of the Enlarged Board of Appeal (see OJ 1993, 117 and 125, respectively) the parts of a European patent relating to the description, claims and drawings may be corrected under Rule 88 EPC

only within the limits of what a skilled person would derive directly and unambiguously, using common general knowledge, and seen objectively and relatively to the date of filing, from the whole of these documents as filed.

In the present case, the parties agreed that the particular compression test machine PCT-200 referred to in the description would not allow for the combination of settings proposed in the specification.

Even if one admitted that the skilled person could have suspected that it was the indication of the loading speed which was wrong, rather than, for instance the indication of the maximum load value, of the standard low value or even of the test machine itself, the correction offered by the appellant cannot in the Board's opinion be derived directly and unambiguously from the patent documents, supplemented with the user manual of the particular machine referred to there.

As a matter of fact, Table 7.1 of the user manual D10 and the corresponding passage on page 3 of the English translation thereof show that for a maximum load value comprised between 1 gf and 2 gf the loading speed may be set to any of ten different values by selecting an integer in the range of 1 to 10 as a "loading speed constant", of which the proposed correction of 0.029 grf/sec (29 mgrf/sec) is only one example.

Accordingly, even if it was admitted that the user manual D10 could be relied upon for correcting the error, which was denied by the respondents, the proposed correction could not in the Board's view have been unambiguously derived from this manual.

Neither can the Board endorse the appellant's argument - which was not supported by any evidence whatsoever - that the skilled person could have easily determined the proper settings of the test machine by merely measuring spheres actually manufactured in accordance with the numerous examples given in the description of the patent, and by selecting the loading speed which actually achieves the particular parameter values ascribed to them in these examples.

As a matter of fact, the description does not provide any details of the manufacturing conditions of the spheres, like the purity of the starting materials which the appellant himself claims as being decisive for the mechanical properties of the resulting spheres or the temperature and duration of the polymerization reaction. The Board therefore is not convinced that the skilled person could, in the light of the description, manufacture spheres in a sufficiently controlled way to achieve the very parameter values disclosed in the examples, even with a correct setting of the loading speed of the test machine. The method of determining the correct value for the loading speed from a re-working of the described examples, as was proposed by the appellant, would not appear practicable, accordingly.

Since, for the above reasons, the correction offered by the appellant cannot be derived directly and unambiguously from the patent application documents as filed, his request under Rule 88 EPC is not allowable.

3. *Novelty of the subject-matter of claim 1 of the main request*

3.1 Document D1 discloses a process for manufacturing a coloured fine sphere for use, *inter alia*, as a spacer for LCD elements (see the sentence bridging pages 2 and 3 of the English translation).

In accordance with the specific embodiments of Example 1 (see page 8, second paragraph to page 9, second paragraph of the translation), fine spheres are obtained by suspension polymerization from a monomer solution, followed by filtering of the reaction mixture to remove its mother liquor and washing, whereby cross-linked, high-molecular fine spheres of 6 to 15 micrometres are obtained, the mechanical properties of which are not specified in the document.

3.2 The respondents have produced test report D1a showing that fine spheres obtained by the method of Example 1 in document D1 actually exhibit a K-value and a recovery factor after the compression deformation (as measured with the correct value of the loading speed of 0.029 grf/sec) in the ranges set out in claim 1.

3.3 The appellant contested the evidence produced by the respondents on the ground that the tests had been performed on spheres obtained from a mixture comprising commercially available low-purity DVB. With his submissions of 18 March 1997 and 29 June 1998 he filed experimental data showing that the use of pure DVB resulted in spheres exhibiting a K-value within the claimed range, but a recovery factor falling outside.

This line of argument does not however in the Board's opinion cast doubts on the test reports produced by the respondents. The Board in particular sees no reason for a skilled person re-working Example 1 of document D1

not to start from commercially available monomer products, the less so since, as submitted by the appellant, purified DVB was not readily available to him at the effective date of the patent. In addition, the specification of the patent in suit does not suggest that any care whatsoever should be taken at the purity of the starting materials for the manufacturing of the claimed spheres.

Moreover, a series of examples of the patent in suit use as a starting material tetramethylolmethane tetraacrylate (see Example 1), DVB (see Example 5) or tetramethylolmethane triacrylate (Example 6), which are disclosed as well in document D1 as suitable alternatives to the mixture used in Example 1 of this document (see page 5 of the translation, points 1 and 4). In the absence of any particulars in the patent specification, it must be assumed that the skilled person starting from the same materials as proposed both in the patent and in document D1 would necessarily arrive at products exhibiting the same properties.

3.4 Claim 1 being directed to single spheres having specific properties, independently of their intended use ("a fine sphere having a K-value...and a recovery factor..."), such individual spheres being obtained at the outcome of the sieving and drying steps disclosed in Example 1 of document D1, the claimed subject-matter lacks novelty within the meaning of Article 54 EPC.

3.5 The Board cannot agree to the reasoning of the appellant that the subject-matter of claim 1 should be considered new in view of the description of document D1, because the latter - if it constituted the content of a patent application as originally filed - would not be considered as a proper basis under Article 123(2) EPC for the subsequent introduction of a claim corresponding to present claim 1.

As a matter of fact, the question at issue in the present instance is whether the process of Example 1 of document D1 inevitably results in the claimed fine sphere, to which the answer is yes for the above reasons. The appellant's hypothetical case, on the contrary, addresses the question whether the description of Example 1 in document D1 unambiguously discloses the additional information that the spheres obtained after the sieving and the drying steps exhibit specific mechanical properties which fall within the ranges set out in the claim, which is a quite different matter.

- 3.6 For the above reasons, the appellant's main request is not allowable.
4. *Novelty of the subject-matter of claim 1 of appellant's auxiliary request I*
- 4.1 As compared to claim 1 of the appellant's main request, which is directed to "a fine sphere" having specific properties, claim 1 of auxiliary request I is directed to "a particulate material consisting of fine spheres for use as spherical spacer in a liquid crystal element", wherein said fine spheres exhibit the properties set out in claim 1 of the main request, except for the ranges for the K-value and for the recovery factor, which are narrowed to the ranges of 350 kgf/mm² to 700 kgf/mm², and 40% to 70%, respectively.
- 4.2 The appellant denied that such particulate material was actually anticipated by the disclosure of Example 1 in document D1, pointing in particular at the indication in document D1 that the polymerization reaction in

Example 1 resulted in an inhomogeneous mixture of fine spheres having a diameter of between 6 and 15 micrometres, which moreover was only an intermediate product, the final product consisting of dyed spheres which not necessarily exhibited the claimed properties.

Document 1 however explicitly discloses that the fine spheres of a diameter between 6 and 15 micrometres referred to by the appellant are sieved for classification, so as to obtain fine spheres having a desired average particle diameter. Next, 10 grams of these fine spheres having an average particle diameter of 10.08 micrometres and a standard deviation of 0.28 micrometres are dried (see page 8 of the translation, lines 11 to 22). These 10 grams thus in the Board's opinion constitute a particulate material consisting of spheres having a homogeneous diameter. It is noticed in this respect that the examples of the patent in suit refer to substantially identically standard deviations for similar particle diameters (Example 1: 0.27 micrometres for a diameter of 7.03 micrometers; Example 4: 0.28 micrometres for a diameter of 7.03 micrometers or Example 5: 0.29 micrometres for a diameter of 7.05 micrometers).

The Board also has no reason to doubt that the geometrically homogeneous material of Example 1 of document D1 also exhibits homogeneous **mechanical** properties. Neither in document D1 nor in the patent in suit is there any suggestion that this might not be the case. The appellant himself did not apparently encounter any difficulty in this respect, since in the experiments described in his submissions of 18 March 1997 and 29 June 1998 the K-value and the recovery factor were each deduced from the measurement of a single sphere (see the Figures 1 to 3 attached to the respective test reports).

In respect of the question whether the intermediate product as obtained from the process of Example 1 of document D1 after the sieving and drying steps and before the dyeing procedure also disclosed in the document can be relied upon for assessing the novelty of the claimed subject-matter, it should be noticed that in accordance with the constant case law of the Boards of Appeal, the expression "for use as spherical spacer in a liquid crystal element" shall be interpreted as merely meaning that the spheres are actually suitable for such purpose. In the Board's opinion, there is little doubt that the not yet dyed spheres of document D1, having a definite diameter, can actually be used as spacers in liquid crystal elements. The patent in suit itself clearly acknowledges that colouring of the spheres is only an option, defined for instance in dependent claim 2, and none of the materials of Examples 1 to 5 has undergone any dyeing treatment.

Finally, the test report D1a shows that for spheres obtained in accordance with Example 1 of document D1 and selected so as to exhibit a comparable diameter (8.94 and 9.07 micrometres as compared to 10.08 micrometres) the K-value and the recovery factor still fall within the limited ranges set out in claim 1 of auxiliary request I (see Table 4 of the report).

- 4.3 For these reasons, the subject-matter of the appellant's auxiliary request I is not novel either within the meaning of Article 54 EPC.

5. *Sufficiency of the disclosure of the subject-matter of claim 1 of the appellant's auxiliary requests II and III*

Claim 1 of the appellant's auxiliary requests II and III are directed to a method of obtaining fine spheres, which involves the selection, amongst a number of samples of spheres, of the samples of which the spheres have a measured K-value and a measured recovery factor in the ranges specified in the claim.

Thus, the measuring of the properties set out in claim 1, on which the selection is based, is an essential feature of the claimed method. The results provided by the measuring method however undisputedly depend on the measuring conditions, and the conditions erroneously disclosed in the specification cannot be reproduced in practice, as was acknowledged by the appellant. Since furthermore the correct measuring conditions can be deduced by the skilled person neither from his general knowledge, nor from the re-working of the examples given in the patent, nor even from the details of the user manual of the test machine referred to in the present specification, for the reasons set out above in connection with the appellant's request for a correction under Rule 88 EPC (see point 2 above), the patent specification does not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, in contravention of the requirement of Article 83 EPC.

The appellant's auxiliary requests II and III are not allowable accordingly.

6. None of the appellant's requests being allowable, the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

P. Martorana

E. Turrini