BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [X] To Chairmen

D E C I S I O N
of 9 July 1997

Case Number: T 0730/95 - 3.4.2

Application Number: 88116681.3

Publication Number: 0362435

IPC: G01N 21/64, G01N 33/18

Language of the proceedings: EN

Title of invention:
Fluorescent tracers - chemical treatment monitors

Patentee:
NALCO CHEMICAL COMPANY

Opponent:
W.R. Grace & Co.-Conn.

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Main and first to fourth auxiliary requests: inventive step (no)"

Decisions cited:
-

Catchword:
-

Case Number: T 0730/95 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 9 July 1997

Appellant: (Proprietor of the patent)
NALCO CHEMICAL COMPANY
One Nalco Center
Naperville
Illinois 60563-1198 (US)

Representative:
Wibbelmann, Jobst, Dr., Dipl.-Chem.
Wuesthoff & Wuesthoff
Patent- und Rechtsanwälte
Schweigerstrasse 2
81541 München (DE)

Respondent: (Opponent)
W.R. Grace & Co.-Conn.
Grace Plaza, 1114 Avenue of the Americas
New York, N.Y. 10036 (US)

Representative:
UEXKÜLL & STOLBERG
Patentanwälte
Beselerstrasse 4
D-22607 Hamburg (DE)

Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 19 June 1995 revoking European patent No. 0 362 435 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: E. Turrini
Members: M. Chomentowski
M. Lewenton

Summary of Facts and Submissions

I. The European patent No. 0362435 (application No. 88 116 681.3) was opposed by the respondent in particular on the grounds that the subject-matter of claim 1 lacked an inventive step having regard to i.a. **D9**: US-A-4 762 167 and **D11**: P. L. Smart and I. M. S. Laidlaw, "An Evaluation of Some Fluorescent Dyes for Water Tracing", Water Resources Research, 1977, Vol. 13, No. 1, pages 15 to 33.

II. The patent was revoked. The Opposition Division took the following view:

The submitted amended claim 1 related to a method of continuously monitoring a water system, which may be industrial or municipal, by adding to the water an inert fluorescent tracer in an amount proportioned to a treatment component introduced in the system for avoiding scale or corrosion deposits in said system. **D9** concerned a water management system for industrial use such as in internal combustion engines and open recirculating cooling systems, e.g. those associated with large air conditioning systems. **D9** did not comprise the features of the submitted claim 1 that

(i) the fluorescence of the fluorescent tracer is inert to water, to the equipment and to the treating component, and

(ii) there is a step of identifying an unknown loss or gain of water volume in the water system and

correspondingly increasing or decreasing the volume of water in the system, or the rate at which water is added or withdrawn from the system.

Concerning (i), the problem addressed was that of ensuring that the tracer substance which was used to provide information about the system was not influenced adversely by any undesired parameters in the system, and this rendered obvious the selections of inertness to water, the equipment and the treatment component. Concerning (ii), the wording of the claim was sufficiently broad as to be interpreted as meaning that the step (C) of identifying an unknown loss or gain of water in the system was separate from and subsequent to method step (B) of comparing the concentration of tracer to a standard, and said identification of the unknown loss or gain of water could be made according to any of standard "inaccurate measurements of measuring large volumes of water" referred to in the patent in suit.

The situation in which the fluorescent tracer concentration is out of range because it is too low was addressed by **D9** and corrected therein by adding dye units to the water.

That a "out of range " situation in which the treatment level is too high is a problem, was known in the art, for instance from **D9,** whereby, in an obvious way and as indicated in **D9**, water is added to the system.

Therefore, the subject-matter of the submitted claim 1 lacked an inventive step having regard to **D9** and the

general knowledge of the skilled person.

III. The proprietor (appellant) lodged an appeal against this decision.

IV. During the oral proceedings of 9 July 1997 which had been requested by both parties, the appellant (proprietor) filed five new sets of claims representing a main request and four auxiliary requests. The only independent claim of the main request reads as follows:

"1. A method of continuously monitoring and controlling an industrial or municipal water system of the type involving equipment through which is moving a body of water containing impurities and containing a quantified dosage of a water treating component having the role of being consumed or absorbed within the system as a whole while removing or neutralizing impurities in the body of water, to determine if the level of treating component suscribes to an acceptable parts-components: liquid volume proportion under operating conditions comprising the steps of:

(A) adding to the body of water a water soluble inert fluorescent tracer in an amount proportioned to the amount of treating component in the system the fluorescence of the tracer being inert to water, inert to the equipment and inert to the treating component;

(B) withdrawing from the system a sample of the body of water containing both the component and tracer and subjecting the withdrawn sample to an analysis

which consists essentially of the step of comparing the tracer concentration thereof to a standard based on fluorescent emission to determine directly from a calibration curve of tracer concentration versus emission the concentration of tracer in the sample; and, if the operating concentration determined by said analysis is outside an acceptable operating range,

(C) identifying the need to correct a water loss or a water gain in the system and including the step of undertaking such correction by changing the volume of water or the rate at which water is added or withdrawn, and

(D) the dosage of treating component is changed until an acceptable operating range of concentration for the treating component is attained."

Claim 1 of the **first auxiliary request** comprises, as compared to the main request, the additional features in the first paragraph of the claim that the water system is " open-recirculating" and "subject to evaporative losses", but is no more mentioned as being "of the type involving equipment".

Claim 1 of the **second auxiliary request** comprises, as compared to the first auxiliary request, in step (B), after "from a calibration curve of tracer concentration versus emission the concentration of tracer in the sample", the additional feature "and thus to provide quantitative measurement/control of treatment feed rate and performance".

Claim 1 of the **third auxiliary request** comprises, as compared to the second auxiliary request, the feature that the open-recirculating water system is an open-recirculating "cooling" water system.

Claim 1 of the **fourth auxiliary request** comprises, as compared to the third auxiliary request, the precising feature in step (B) that the concentration of tracer in the sample is determined "within the linear response range" from the calibration curve.

V. The appellant requested that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of the main request or of any of the four auxiliary requests filed during the oral proceedings, and submitted the following arguments in support of his requests:

In the invention in dispute, the need to correct a water loss or water gain in a municipal or industrial water system and undertake the corresponding correction is identified. In **D9**, on the contrary, no need to correct a water gain in a water system, when the water content of the system gets out of range, is identified. The method of controlling a system known from **D9** is not for a water system in the sense of the patent in suit, which relates to cooling towers or such large open water-recirculating systems, wherein additional water can be gained by the system for instance because of the rain and water can be lost because of evaporation to the atmosphere; **D9** concerns primarily a cooling system of a diesel locomotive, i.e. a closed system of limited

size. The method of **D9** uses visual observation for comparing the effect of the fluorescent dye in water to the chips of the comparator, this comparison being obviously performed in a discontinuous manner by the operator. Therefore, **D9** is not a realistic starting point for the invention in dispute. In any case, the skilled person of **D9** intending to improve its method would not be aware of the content of **D11** because this document concerns water tracing, hydrology, and not the monitoring of a water system wherein it is determined if the level of a treating component suscribes to an acceptable parts-component : liquid volume proportion under operating conditions. It is only by hindsight that it can be considered that the person skilled in the art of **D9** would consider the teaching of **D11**, which belongs to another technical field, and would select and transpose in the method of **D9** particular features of the method of **D11**, especially particular instruments, which do not correspond to the visual, discontinuous comparison method of **D9**. Therefore, the subject-matter of claim 1 of the main and auxiliary requests involves an inventive step.

VI. The respondent requested that the appeal be dismissed and argued substantially as follows in support of his request:

The method in dispute does not specify the means for identifying a need to correct a water gain in a water system, when the content of the water system gets out of range, in particular because of a gain of water due to the rain; step (C) of the method is separate and subsequent, additional to step (B) of subjecting the

sample to an analysis and is related to the conventional identification of loss or gain of water, and not to new method measures.

A method of monitoring and controlling a system having the same purpose as the method in dispute is known from **D9** ,which is also for determining if the level of treating component suscribes to an acceptable parts-components: liquid volume proportion under operating conditions and which also uses fluorescent dyes. The method of **D9** can use a comparator located along a sight glass tube wherein the liquid is circulating so that withdrawing a sample of liquid is avoided and the method can be considered as being for continuously monitoring and controlling the system; the method of **D9** is not restricted to a diesel locomotive but is specified as being used in large open recirculating cooling systems. Indeed, the method known from **D9** relies on visual comparison of a sample of coolant liquid with i.a. a fluorescent dye therein and a comparator comprising a series of color chips which vary in color intensity from dark to light hues of the dye that is used in the system, and it does not comprise either a step for determining the concentration of the fluorescent tracer in the water sample by in particular comparing the tracer concentration in the sample to a standard directly from a calibration curve of tracer concentration versus emission. An object of the present invention can be seen in providing a method which is more reliable and precise than the method of visual comparison of the intensity of a fluorescent dye of **D9**. The person skilled in the art of **D9** is a chemical engineer

specialized in water analysis who, when trying to solve his problem of accuracy related with visual comparison, would definitely take the teaching of **D11** into consideration because it also concerns measurements based on fluorescent dyes and uses instruments; he would find in **D11** all the indications needed for the method and would arrive in an obvious way to methods with all the features of the methods of the main claims of the requests, which thus lack an inventive step.

Reasons for the Decision

1. The appeal is admissible.

2. *Main request*

2.1 Inventive step

2.1.1 It is first to be noted that according to the patent in suit (see page 2, lines 35 to 36) the object of the invention in dispute is to identify the need to correct a water loss or water gain in a water system and undertake such a correction.
As convincingly argued in the decision under appeal (see the first two paragraphs of point 4.2.2) with respect of the interaction of steps (B) and (C), the wording of claim 1 having formed the basis of said decision was sufficiently broadly worded as to be interpreted as meaning that the fluorescent tracer concentration measurement of step (B) was performed and if the operating concentration was outside an

acceptable range, identifying step (C) was performed; step (C) was **separate** and subsequent to step (B); the identification of the unknown loss or gain of water was initiated by the out of range determination of the tracer concentration (in dependence of the "if" at the end of step (B)) and was subsequent and **additional** thereto; the identification of the unknown loss or gain of water could be made according to any of standard "inaccurate measurements of measuring large volumes of water" referred to in the patent in suit (see page 4, lines 30 to 33).

In the same respect, in the observations of the respondent in his letter dated 6 May 1996 (see in particular page 6, last line to page 8, fourth line), it was also stressed that the step related to identifying a loss or gain of water in the submitted main claims consisted in **conventional identification** of loss or gain of water, the volume of water being increased or decreased if necessary.

During the oral proceedings of 9 July 1997, there were also objections from the Board, which expressed doubts about the technical possibility of unambiguously identifying with the means in the claim a need to correct a water loss or gain in the system in step (C), i.e. detecting a value of the volume of water outside of the acceptable operating range for said water volume, only on the basis of the assessment that the operating concentration of tracer determined by the fluorescence analysis was outside an acceptable operating range, i.e. of a relative parameter of the content of tracer in the sample of water. There were

also objections from the respondent and from the Board concerning the same feature of the identification of a loss or gain of water in step (C) of the claimed method, in that conventional identification was not excluded by the wording of the claim, said conventional identification being subsequent, but additional and unrelated to the measures in step (B) of the method; in any case, said identification of loss or gain of water was not specified by relevant technical indications.

Since this deficiency has not been met in claim 1 of the main request, said claim concerns a method wherein the step of identification of the loss or gain of water in the system is not specified so that the claimed method is not considered as solving the problem stated in the patent in suit. Therefore, this aspect cannot be taken into account for assessing an inventive step of the claimed method.

2.1.2 It is to be noted that, taking into account the teaching of **D9**, which was filed first in the notice of opposition, a shift in the object of the invention in suit could be considered when selecting **D9** as the starting point. However, for the following reasons, this does not change the findings in the case at issue (see paragraphs 2.1.2.1 to 2.1.2.8 here under).

2.1.2.1 A method of monitoring and controlling a system is known from **D9** (see the whole document); this method is of the type involving equipment through which is moving a body of water containing impurities, for instance minerals causing corrosion and scale

formation within the system; the system contains a quantified dosage of a water treating component having the role of being consumed or absorbed within the system as a whole while removing or neutralizing impurities in the body of water; the method is intended for determining if the level of treating component suscribes to an acceptable parts-components: liquid volume proportion under operating conditions. As convincingly argued by the respondent, the method of **D9** can use a comparator (1) located along a sight glass tube (12) wherein the liquid is circulating so that withdrawing a sample of liquid is avoided and the method can be considered as being a method of continuously monitoring and controlling the system.

The appellant has objected that the system of **D9** is mainly for a cooling system of a diesel locomotive and thus not for an industrial or municipal water system in the sense of the patent in suit (see for instance Example 2) such as a cooling tower or such large system. However, this argument is already not convincing in that no indication about a large system is derivable from the claim. The further arguments of the appellant that the system of D9 is not an open-recirculating system, in particular an open-recirculating cooling system, subject to evaporation losses, is also not convincing in view of the statement in **D9** (see column 2, lines 9 to 16) that for brevity and clarity of description the invention is described therein with particular reference to cooling systems for diesel locomotives but that it is not intended that the invention be so limited for it will also find utility in other closed cooling systems,

such as in internal combustion engines, and **open recirculating cooling systems such as those associated with large air conditioning systems**.

2.1.2.2 The method of **D9** comprises the step of:

(A) adding to the body of water a water soluble inert fluorescent tracer in an amount proportioned to the amount of treating component in the system; since **D9** (see column 2, line 60 to column 3, line 2) specifies that the fluorescent dye should be non-staining, non-toxic, non-polluting, color stable in the coolant liquid and compatible with anti-freeze compounds or other additives, it is derivable that the fluorescence of the tracer is to be considered as being inert to water, inert to the equipment and inert to the treating component. In any case, it has not been disputed that, as argued by the respondent, the xanthene dye exemplified in **D9** (see column 3, lines 3 to 11) is inert under the conditions considered.

The method of **D9** further comprises the steps

(B) of withdrawing from the system a sample of the body of water containing both the component and tracer and subjecting the withdrawn sample to an analysis which consists essentially of the step of comparing in a comparator (1) the fluorescent tracer concentration thereof to a standard, i.e. a series of chips (7) which vary in color intensity from dark to light hues of the dye

that is used in the system, to determine directly the concentration of tracer in the sample; and, if the operating concentration determined by said analysis is outside an acceptable operating range,

(D) changing the dosage of treating component by adding such treating component, until an acceptable operating range of concentration for the treating component is attained.

2.1.2.3 It is to be noted that it is derivable from **D9** (see column 1, lines 27 to 32) that there is in relation with the taught method a step of identifying the need to correct a water loss in the system and including the step of undertaking such correction by changing the volume of water, i.e. by adding make-up water.

Concerning the feature of identifying a gain of water, which is not mentioned in **D9,** it is to be noted that the argument of the respondent can be accepted that this lack of information is related to **D9** disclosing only as a detailed example a diesel locomotive, i.e. a closed system, whereby the skilled person intending to perform the known method for the open systems also mentioned in **D9** would generally know that, because in particular of the occurrence of rain, gain of water is also to be taken into consideration and, if necessary, water is to be withdrawn. In any case, as mentioned here above in paragraph 2.1.1, a direct relation of step (B) with the identification of a loss or a gain of water cannot be found in the claim, so that this cannot be considered as a feature for assessing an

inventive step of the method.

2.1.2.4 Indeed, the method known from **D9** (see column 3, lines 30 to 36) relies on visual comparison of a sample of coolant liquid with i.a. a fluorescent dye therein and a comparator comprising a series of color chips (7) which vary in color intensity from dark to light hues of the dye that is used in the system. Thus, contrary to the method of the main request, the method of **D9** does not comprise, in its step (B), for determining the concentration of the fluorescent tracer in the water sample, a step of comparing the tracer concentration in the sample to a standard directly from a calibration curve of tracer concentration versus emission.

2.1.2.5 The respondent has convincingly argued as follows: in **D9**, the visual comparison includes a comparison of the fluorescent emission of the dye in the water sample with the fluorescent emission of the dye on the coloured chips; this comparison is influenced by the light absorption; an object of the present invention can be seen in providing a method which is more reliable and precise than the method of visual comparison of the intensity of a fluorescent dye of **D9**.

2.1.2.6 A method comprising steps of determining the concentration of fluorescent dyes in solution is known from **D11** (see the abstract; page 15, left-hand column, first paragraph; page 15, right-hand column, last paragraph to page 16, left-hand column, first paragraph; page 18, left-hand column, second paragraph to page 19, left-hand column, first paragraph; table 3 on page 18; Figures 1a and 1b); the method comprises measuring the concentration of fluorescent dyes using an instrument, i.e. a fluorometer, based on fluorescence emission. Different types of fluorometers are described in this document, including spectro fluormeters, filter fluorometers and fluoro/colorimeters; it is mentioned that some of these instruments are only moderately expensive, simple to use and sufficiently robust for operation in the field with a portable generator; minimum detectability by said instruments and calibration curves thereof are stressed; it is specified that the sensitivity of the instruments, i.e. the gradient of the calibration curve for the most sensitive scale, varies slightly from one fluorometer to the other.

2.1.2.7 The appellant has argued that **D11** concerns water tracing, i.e. hydrology, and thus belongs to another technical field, so that the person skilled in the field of **D9**, i.e. of methods of controlling a system of the type involving equipment through which is moving a body of water containing impurities, e.g. minerals causing corrosion and scale formation within the system, the method being intended for determining if the level of treating component suscribes to an acceptable parts-components: liquid volume proportion

under operating conditions, would not be aware of the content of **D11** and would in any case not be incited to use it.

However, as convincingly argued by the respondent, these arguments cannot be accepted for the following reasons: the person skilled in the art of **D9** is a chemical engineer specialized in water analysis who, when trying to solve his problem of accuracy related with visual comparison, would definitely take the teaching of **D11** into consideration because it also concerns providing numerical values matched to the fluorescent dyes concentrations; taking in particular into account the technical information in **D11** concerning the sensitivity of fluorescence measurements performed with the described instruments, the skilled person would understand that the use of an instrument, a fluorometer, is more advantageous because it renders the concentration measurements more precise. As convincingly argued by the respondent, the further features of the claim, such as the selected types of dyes are also derivable from the content of **D11.**

2.1.2.8 Therefore, the subject-matter of claim 1 of the main request lacks an inventive step in the sense of Article 56 EPC.

3. *First to fourth auxiliary requests*

Claim 1 of the **first auxiliary request** is distinguished from claim 1 of the main request substantially only in that it comprises the additional

features in the first paragraph of the claim that the water system is " open-recirculating" and "subject to evaporative losses". Since as mentioned here above the method of **D9** is also mentioned as being intended for open-recirculating systems and it is generally known that in such systems there are evaporative losses, the subject-matter of claim 1 of the first auxiliary request lacks an inventive step for the same reasons as those mentioned in relation with claim 1 of the main request.

Claim 1 of the **second auxiliary request** comprises, as compared to the first auxiliary request the feature that the step of comparing the tracer concentration thereof to a standard based on fluorescent emission is to determine directly from a calibration curve of tracer concentration versus emission the concentration of tracer in the sample "and thus to provide quantitative measurement/control of treatment feed rate and performance". Since it is known from **D11** that the fluorometers allow the operator to perform quantitative measurements, this feature does not change the situation so that the subject-matter of claim 1 of the second auxiliary request lacks an inventive step for the same reasons as those mentioned in relation with claim 1 of the first auxiliary request.

Claim 1 of the **third auxiliary request** comprises, as compared to the second auxiliary request, the feature that the industrial or municipal open-recirculating water system is an open-recirculating "cooling" water system. Since as mentioned here above the method of **D9**

is also mentioned as being intended for open-recirculating cooling systems, the subject-matter of claim 1 of the third auxiliary request lacks an inventive step for the same reasons as those mentioned in relation with claim 1 of the second auxiliary request.

Claim 1 of the **fourth auxiliary request** comprises, as compared to the third auxiliary request, the precising feature in step (B) that the concentration of tracer in the sample is determined "within the linear response range" of the calibration curve. However, since it is generally known to people skilled in the art that correct results are obtained in the linear response range of a calibration curve for an instrument, there can be seen no surprising effect based on the selection of this part of the curve. Therefore, the subject-matter of claim 1 of the fourth auxiliary request also lacks an inventive step in the sense of Article 56 EPC.

Incidentally, it is to be noted that the amendments of the main request resulting in the first to fourth auxiliary request are not directly related to the step (C) of identifying the need to correct a water loss or gain in the system. Therefore, these amendments do not change the situation with respect to an inventive step for solving the problem stated in the patent in suit because, as mentioned here above, the technique for said "identification step" is not disclosed in the claims and thus said problem is not solved by the method of any of said claims.

4. Therefore, since the ground of lack of inventive step prejudices the maintenance of the European patent, it is revoked (Article 102(1) EPC).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

P. Martorana E. Turrini