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D E C I S I O N
of 30 November 2004

Case Number: T 0426/98 - 3.3.1

Application Number: 93302920.9

Publication Number: 0572113

IPC: C09K 7/02

Language of the proceedings: EN

Title of invention:

Aqueous brines

Patentee:

BP Chemicals Limited

Opponent:

OSCA, INC.

Headword:

Well servicing fluid/BP CHEMICALS

Relevant legal provisions:

EPC Art. 54(2), 56, 123(2)(3)

EPC R. 57a

Keyword:

"Amendments - disclaimer - added subject-matter (no)"

"Novelty (main request, no)"

"Novelty (first auxiliary request, yes)"

"Inventive step (yes) - non-obvious alternative"

Decisions cited:

G 0001/03, T 0398/92

Catchword:

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Case Number: T 0426/98 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 30 November 2004

Appellant:
(Opponent)

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Decision under appeal:

Interlocutory decision of the Opposition
Division of the European Patent Office posted
16 February 1998 concerning maintenance of
European patent No. 0572113 in amended form.

Composition of the Board:

Chairman: A. J. Nuss
Members: J. M. Jonk
R. T. Menapace

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal against the interlocutory decision of the Opposition Division in which it was found that the subject-matter of the patent in suit No. 0 572 113 (European patent application No. 93 302 920.9) as amended meets the requirements of the EPC.

II. The decision was based on Claims 1 to 4 filed during oral proceedings before the Opposition Division on 4 February 1998, Claim 1 reading as follows:

"An aqueous composition for use as a well servicing fluid comprising in solution a mixture of the carboxylic acid salts of cesium and at least one other alkali metal, the carboxylate anions in the salts being derivable from formic acid, acetic acid or propionic acid, said solution having a density of greater than 1.8 g/cm^3 due to the combination of said carboxylic acid salts."

III. The opposition was filed against the patent as a whole, and based on the grounds of lack of novelty and inventive step as indicated in Article 100(a) EPC. It was supported by several documents including:

(1) EP-A-0 137 872,

(9) "High-temperature stabilisation of xanthan in drilling fluids by the use of formate salts" by J.D.Downs, Investigation: 6DRI1331 (Publication 1058, July 1991), and

(12) "Handbook of Electrolyte solutions", Part A, V.M.M.Lobo, Elsevier (1989), pages 329, 330, and 774-779.

IV. Oral proceedings before the Board were held on 30 November 2004. The Appellant, who had been duly summoned, did not attend the oral proceedings.

V. The Appellant argued in writing that the subject-matter of Claim 1 of the set of claims filed on 4 February 1998 forming the basis for the decision of the Opposition Division lacked novelty in view of document (1) and a further document filed together with his grounds of appeal, namely:

(15) Russian Journal of Inorganic Chemistry, 24 (4), 1979, 613-618.

Moreover, he argued that if the claimed subject-matter was considered novel over the documents (1) and (15), it lacked inventive step, in particular, in view of documents (9) and (12), and the fact that there was no unexpected effect as alleged by the patent in suit or as held in the decision under appeal.

VI. The Respondent (Patentee) defended the patentability of the subject-matter of the patent in suit on the basis of a main request and four auxiliary requests all filed on 7 April 2003.

Claims 1 to 4 of the main request corresponded to the claims forming the basis for the decision of the Opposition Division, except that present Claim 1 contained a disclaimer excluding particular mixtures of

lithium formate, cesium formate and water as disclosed in document (15). The additional Claim 5 of this request related to the use of an aqueous composition as defined in present Claim 1, but including the subject-matter disclaimed in view of document (15), as well servicing fluid.

The claims of the first auxiliary request corresponded to those of the present main request, except that in Claim 1 the disclaimer was replaced by another one excluding any mixture of lithium formate, cesium formate and water.

The claims of the second and third auxiliary request comprised further restrictions with respect to the nature of the carboxylate anions and the proportion of the carboxylate salts, respectively, and the claims of the fourth auxiliary request concerned use claims, i.e. did not comprise a product claim anymore.

VII. Concerning novelty the Respondent considered that in Claim 1 of the present main request the solutions consisting of lithium formate, cesium formate and water having a density of more than 1.8 g/cm^3 as specified in document (15) had been excluded. Moreover, he argued that document (1) did not disclose aqueous compositions comprising in solution a mixture of carboxylic acid salts of cesium and at least one other alkali metal as defined in said Claim 1 having a density of more than 1.8 g/cm^3 due to the combination of said carboxylic salts. Consequently, he concluded that the claimed compositions were novel over the cited documents (1) and (15).

Regarding inventive step he argued essentially that, starting from document (9) as the closest prior art, the technical problem underlying the patent in suit was the provision of well servicing compositions having higher densities. The skilled person would not have any reason to consider document (12) for the solution of this problem, since this document only related to electrolytes instead of brines, and because it could not be derived from document (9) that it might be desirable to replace the brines having sufficient well properties by other brines, the well servicing properties of which were not known. Furthermore, there was no indication in the cited document (1) that higher densities of well servicing fluids could be obtained by adding cesium formate. Finally, document (15) gave a mere list of aqueous solutions containing lithium formate and cesium formate without referring to the densities thereof and without having a link to well servicing fluids. In view of these considerations, the claimed subject-matter of the patent in suit involved an inventive step in the light of any of the cited documents.

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

The Respondent requested that the patent be maintained on the basis of the claims according to the main request or to one of the auxiliary requests 1 to 4, all filed on 7 April 2003.

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

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Amendments (Article 123(2)(3) and Rule 57a EPC)*

- 2.1 Present Claim 1 differs from the subject-matter of Claim 1 of the patent in suit by the feature that the aqueous composition comprising in solution a mixture of carboxylic acid salts as defined in Claim 1 as granted has a density of greater than 1.8 g/cm^3 due to the combination of said carboxylic acid salts. This specific feature is supported by Claim 5 and page 5, lines 3 to 8, of the application as filed.

Moreover, present Claim 1 comprises a disclaimer excluding from Claim 1 as granted a list of particular mixtures of cesium formate, lithium formate and water disclosed in document (15) (Table 2, compositions 9 to 24) in order to restore the novelty of the claimed subject-matter over that document. This document (15), a purely theoretical study, deals with investigations concerning $\text{HCOOLi-HCOORb-H}_2\text{O}$ and $\text{HCOOCs-HCOOLi-H}_2\text{O}$ systems with respect to chemical interactions between their components and the solubility of the reaction products without giving any information about the density of such systems (see the summary on page 613). Therefore, its technical information is so unrelated to and remote from the claimed invention that the person skilled in the art would never have taken it into consideration when making the invention. Consequently,

- and having regard to the criteria to be applied for assessing the allowability of a disclaimer set out in the decision G 1/03 of the Enlarged Board of Appeal, the Board has come to the conclusion that the disclaimer in the present Claim 1 does not offend against the requirements of Article 123(2) EPC.
- 2.2 Present Claims 2 to 4 corresponds to Claims 2, 3 and 6 of the patent as granted and of the application as filed, respectively.
- 2.3 The support for the added Claim 5 claiming the use of the aqueous composition defined in present Claim 1, but including the subject-matter disclaimed in view of document (15), as a well servicing fluid corresponds to that for present Claim 1.
- 2.4 Thus, in view of these considerations and the fact that the amendments only represent restrictions to the scope of Claim 1 as granted, the Board finds that the subject-matter of the present claims meets the requirements of Article 123(2) and (3) EPC.
- 2.5 Having regard to the provision of Rule 57a EPC, the Board observes for the sake of completeness that in the present situation the addition of Claim 5 is considered to be allowable, since it partly compensates for the loss of protection due to the disclaimer in present Claim 1 introduced by the Respondent in order to restore novelty with respect to document (15).

3. *Novelty*

3.1 The Respondent accepted that the subject-matter of Claim 1 as granted lacked novelty in view of document (15) and submitted present claims excluding subject-matter disclosed therein in order to meet the novelty objection.

3.2 As indicated above (point 2.1, second paragraph), document (15) relates to investigations of the solubility of the formed reaction products in HCOOLi-HCOORb-H₂O and HCOOCs-HCOOLi-H₂O systems. It discloses with respect to the HCOOCs-HCOOLi-H₂O system in Figure 2 a solubility curve at 25°C resulting from 24 compositions specified in Table 2 and it reports the crystallisation of the lithium and cesium formate monohydrates, anhydrous lithium formate and the incongruently soluble anhydrous compound HCOOLi.HCOOCs, noting that this last compound crystallises in a range of from 16.17 mass% HCOOLi - 62.28 mass% HCOOCs - 21.55 mass% H₂O to 7 mass% HCOOLi - 84 mass% HCOOCs - 9 mass% H₂O (see page 614, right column, last paragraph to page 615, left column, second paragraph; and Table 2, in particular compositions within the range of from No. 11 to No. 17, No. 17 stated as determined graphically). Moreover, it discloses in Figure 4 a comparison of the 25°C solubility isotherm of the HCOOCs-HCOOLi-H₂O system with those of three other systems in which Cs has been replaced by Na, K, and Rb (see page 617, left column, paragraphs 1 and 2; and Figure 4).

3.3 The Respondent submitted that merely the particular compositions No. 9 to No. 24 specified in Table 2 of

document (15) and falling under the scope of Claim 1 as granted had to be disclaimed in order to establish novelty. However, the technical information in document (15) with respect to the solubility of the HCOOCs-HCOOLi-H₂O system is not restricted to the particular compositions specified in Table 2, but comprises the information made available by the document as a whole, thus including the entire information graphically presented by the solubility curves in Figures 2 and 4, which are not purely intellectual graphic constructions but reproduce real experimental values rendering it possible, as actually has been done for the composition No. 17 in Table 2, to find the particular compositions corresponding to certain points of the curves (see also T 398/92).

- 3.4 Therefore, the disclosure of document (15) as a whole directly and unambiguously makes available to the skilled person the HCOOCs-HCOOLi-H₂O system as such including all the HCOOCs-HCOOLi-H₂O compositions disclosed by the solubility curves in Figures 2 and 4, and consequently the technical information disclosed in document (15) goes well beyond the subject-matter excluded from Claim 1 by the disclaimer. Thus, the Respondent's main request fails because of lack of novelty.

First auxiliary request

4. *Amendments*

- 4.1 The claims of this request correspond to those of the present main request, except that in Claim 1 the disclaimer has been replaced by another one excluding

mixtures consisting of lithium formate, cesium formate and water.

- 4.2 Thus, having regard to the considerations concerning the claims of the main request under point 2 above, and in view of the fact that the disclaimer in present Claim 1 excluding mixtures consisting of lithium formate, cesium formate and water is based on the disclosure in document (15) of the HCOOLi-HCOOCs-H₂O system as such, which system is not restricted in its scope to particular examples of compositions, such as those indicated in Table 2, the claims of this request equally meet the requirements of Rule 57a EPC, as well as those of Article 123(2) and (3) EPC.

5. *Novelty*

- 5.1 The next issue to be dealt with is whether the subject-matter of Claim 1 of this request is novel in view of documents (1) and (15).
- 5.2 Document (1) discloses a well drilling and completion fluid composition comprising water, a viscosity increasing agent which also functions as a fluid loss reducer, a fluid loss reducing and rheology stabilising agent and a clay stabilising agent (see page 3, second paragraph). The clay stabilising agent serves to prevent the hydration and swelling of clays and the resulting sloughing of clay containing materials when in contact with the compositions (see page 3, lines 17 to 20, and page 4, lines 15 to 18).

Suitable clay stabilising agents are organic acid salts or mixtures of salts having the general formula:



wherein R is hydrogen or a methyl, ethyl or propyl radical; and

M is potassium, rubidium, cesium or ammonium.

However, although it is true that this document teaches that mixtures of such salts can be applied and that it specifies particular suitable organic acid salts including potassium and cesium salts (see page 6, lines 9 to 14), it does not teach an aqueous composition for use as a well servicing fluid having a density of more than 1.8 g/cm³ due to a mixture in solution of a carboxylic acid salt of cesium and at least one carboxylic acid salt of another alkali metal.

5.3 Document (15) discloses, as set out above under points 3.2 to 3.4, the HCOOCs-HCOOLi-H₂O system as such, the compositions specified in Table 2, and the HCOOCs-HCOOLi-H₂O compositions derivable from the solubility curves in Figures 2 and 4. However, in view of the disclaimer in present Claim 1 excluding mixtures consisting of lithium formate, cesium formate and water, document (15) does not disclose subject-matter falling under its scope anymore.

5.4 Therefore, the Board concludes that neither document (1) nor document (15) directly and unambiguously makes available to the skilled person a composition falling within the scope of present Claim 1, and that consequently the claimed subject-matter is novel.

6. *Inventive step*

6.1 According to the established jurisprudence of the Boards of Appeal it is necessary, in order to assess inventive step on an objective basis, to establish the closest state of the art, to determine in the light thereof the technical problem which the invention addresses and successfully solves, and to examine the obviousness of the claimed solution to this problem in view of the state of the art. In this context, the closest prior art is normally a document disclosing subject-matter aiming at the same objective as the claimed invention and having the most relevant technical features in common.

6.2 The Opposition Division and both parties to the proceedings considered document (9) as the closest prior art, but the Board finds in view of the objective to be achieved as indicated in the patent in suit, namely the provision of a composition for use as a well servicing fluid having an improved density (see page 2, lines 3 to 16), that document (1) is a better starting point for assessing inventive step for the following reasons:

Document (9) is primarily related to the stabilisation of xanthan in drilling fluids. It discloses in particular that xanthan, which is widely used as a viscosifier for water based drilling fluids, can be stabilised against thermal degradation by adding an alkali metal salt of formic acid (see under "Introduction" on pages 1 and 2). Moreover, it notes by referring to Figure 2 that the alkali metal salts of

formic acid have the added advantage of being extremely water-soluble and have potential application as environmentally friendly high density brine bases for a new generation of low-solids drilling and completion fluid systems (see page 2, third paragraph, last sentence). However, this document does not give any pointer to the use of cesium formate and, in fact, it can only be derived from Figure 2 that the densities of solutions of potassium formate and sodium formate are below 1.6 g/cm^3 . Therefore, document (9) does not aim at the same objective as the patent in suit and, moreover, does not contain information on how to achieve fluids having a high density of more than 1.8 g/cm^3 .

Document (1) discloses, as indicated under point 5.2 above, a well drilling and completion fluid composition comprising water, a viscosity increasing agent which also functions as a fluid loss reducer, and a fluid loss reducing and rheology stabilising agent, which composition is characterised by the presence of a water soluble organic acid salt as a clay stabilising agent. Moreover, it discloses that the composition can include one or more weighting agents, such as barite and hematite, in an amount sufficient to increase the density thereof up to about 19 pounds per gallon (2.3 g/cm^3) (see page 3, lines 1 to 3; page 9, lines 21 to 24; and page 11, lines 5 to 22, in particular lines 15 to 18). Therefore, although also this document does not primarily concern the same technical problem as the claimed invention, it discloses that the drilling or completion fluid can be weighted with solid weighting agents to obtain high densities such as aimed at by the invention as claimed in the patent in suit.

- 6.3 In view of the closest state of the art, i.e. document (1), the technical problem underlying the patent in suit consists in providing further high density aqueous compositions for use as a well servicing fluid (see also page 2, lines 15 and 16).
- 6.4 As the solution to this problem, the patent in suit proposes according to present Claim 1 the provision of an aqueous composition having the desired high density due to a mixture in solution of a carboxylic acid salt of cesium and at least one other carboxylic acid alkali metal salt as defined in the claim.
- 6.5 The Board is satisfied that the problem underlying the patent in suit has been successfully solved in view of the specification of the patent in suit demonstrating in the examples that compositions having the desired density are achieved by the compositions as claimed.
- 6.6 Finally, it remains to be decided whether or not the proposed solution to the problem underlying the patent in suit is obvious in the light of the cited state of the art.
- 6.7 The Appellant submitted in this respect that the proposed solution was obvious to the skilled person in view of documents (1), (9) and (12).
- 6.8 Document (1) discloses, as indicated under points 5.2 and 6.3 above, the provision of aqueous compositions for use as drilling or completion fluids having densities of up to 2.3 g/cm^3 by including one or more weighting agents, such as barite and hematite.

It is true that the known compositions contain as a mandatory component a potassium, rubidium, cesium or ammonium salt of formic acid, acetic acid, propionic acid or butyric acid, or a mixture thereof. However, such a carboxylic salt has not been included there to increase the density of the compositions, but has been incorporated for a different purpose, namely as a clay stabilising agent to prevent the hydration and swelling of clays and the resulting sloughing of clay containing materials when in contact with the compositions (see also under point 5.2 above). Moreover, the document clearly teaches in this context that the most preferred salt is potassium acetate (see page 6, lines 15 to 22, and the examples).

Thus, in view of these considerations, document (1) does not render obvious the proposed solution of the technical problem underlying the patent in suit involving the incorporation in the fluid of a solution of a cesium salt in combination with another alkali metal salt in order to achieve the desired high density.

- 6.9 Document (9) discloses, as indicated under point 6.2 above, that xanthan can be stabilised against thermal degradation by adding an alkali metal salt of formic acid (see under "Introduction" on pages 1 and 2), and by referring to Figure 2 that alkali metal salts of formic acid have the additional advantage of having potential application as environment friendly high density brine bases for a new generation of low-solids drilling and completion fluid systems (see page 2, third paragraph, last sentence). However, it does not give any pointer to the possibility of using cesium formate; rather, it can only be derived from said

Figure 2 that the densities of solutions of potassium formate and sodium formate are below 1.6 g/cm^3 .

Therefore, document (9) does not provide any suggestion to the skilled person how to solve the technical problem underlying the patent in suit as defined above.

6.10 In the context of the teaching of document (9), the Appellant submitted that it was known from document (12) that cesium formate solutions have higher densities than potassium formate solutions of the same concentration and that it would therefore be obvious to the skilled person to replace, at least partly, potassium formate by cesium formate in order to achieve compositions having an improved density compared to solutions containing potassium formate alone giving densities below about 1.6 g/cm^3 as follows from Figure 2 of document (15) and also from the specification of the patent in suit (see Table I and page 3, lines 44 and 45).

However, this submission fails since document (9), as indicated above, does not suggest the possibility of using cesium formate and does not give any pointer to the skilled person that it would be possible to obtain aqueous compositions having the desired high densities by using alkali metal salts of formic acid as weighting agents either, and because document (12) does not have any relationship with well servicing fluids and, consequently, does not render it obvious to the skilled person that mixtures of cesium carboxylate with another alkali metal carboxylate, such as claimed in the patent in suit would provide aqueous compositions having the desired high densities, let alone such compositions

having at the same time adequate properties as well servicing fluids.

6.11 Finally the Board notes with respect to the cited document (15) that, as indicated under point 2.1 above, this document does not address the technical problem underlying the patent in suit as it is indeed so remote that the person skilled in the art would never have taken it into consideration when trying to solve the above defined technical problem.

6.12 For these reasons the Board concludes that the subject-matter of Claim 1 involves an inventive step within the meaning of Articles 52(1) and 56 EPC.

Claims 2 to 4 relate to particular embodiments of the subject-matter of Claim 1. They are therefore also allowable.

Independent Claim 5, which relates to the use of an aqueous composition as defined in Claim 1, but including the subject-matter disclaimed in view of document (15), is patentable for the same reasons as indicated with respect to present Claim 1, and because document (15) does not disclose such a use.

7. *Auxiliary requests 2 to 4*

7.1 Since the subject-matter of the claims of the first auxiliary request is allowable for the reasons set out above, there is no need for the Board to decide on these further requests.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent with the Claims 1 to 5, filed as first auxiliary request dated 7 April 2003 and a description to be adapted thereto.

The Registrar:

The Chairman:

N. Maslin

A. Nuss