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**Datasheet for the decision  
of 30 November 2006**

**Case Number:** W 0011/06 - 3.3.10

**Application Number:** PCT/US 2005/020034

**Publication Number:** WO 2005/123866

**IPC:** C09K 5/00

**Language of the proceedings:** EN

**Title of invention:**

Fluid composition having enhanced heat transfer efficiency

**Applicant:**

HONEY WELL INTERNATIONAL INC.

**Opponent:**

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**Headword:**

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**Relevant legal provisions:**

PCT Art. 17(3)a

PCT R. 13, 40

PCT International Search and Preliminary Examination  
Guidelines, Chap. 10.17

PCT Administrative Instructions, Annex B, Part 1(f)

**Keyword:**

"Lack of unity "a posteriori" - not sufficiently reasoned"

**Decisions cited:**

G 0001/89, W 0003/94, W 0004/93, W 0011/93

**Catchword:**

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**Case Number:** W 0011/06 - 3.3.10

**International Application No.** PCT/US 2005/020034

**D E C I S I O N**  
**of the Technical Board of Appeal 3.3.10**  
**of 30 November 2006**

**Applicant:** HONEY-WELL INTERNATIONAL INC.  
101 Columbia Road  
P.O. Box 2245  
Morristown, NJ 07960 (US)

**Representative:** -

**Decision under appeal:** Protest according to Rule 40.2(c) of the Patent Cooperation Treaty made by the applicants against the invitation (payment of additional fees) of the European Patent Office (International Searching Authority) dated 31 October 2005.

**Composition of the Board:**

**Chairman:** R. Freimuth  
**Members:** P. Gryczka  
T. Bokor

## Summary of Facts and Submissions

I. Following the filing of international application No. PCT/US 2005/020034 the EPO, acting as ISA, on 31 October 2005 issued an invitation to pay 2 additional search fees (Article 17(3)(a) and Rule 40.1 PCT).

II. The said international application contained 25 claims.

Independent claim 1 read as follows:

"1. A fluid composition, comprising:  
a coolant; and  
a plurality of nanoparticles dispersed throughout the coolant, the plurality of nanoparticles comprising at least one of metal compounds adapted to react to form insoluble metal compound particles *in situ*, glass, silica, pumices, and mixtures thereof;  
wherein the plurality of nanoparticles increases heat capacity of the coolant and enhances heat transfer efficiency of the fluid composition."

Claims 2 to 9 were dependent on claim 1 and referred to preferred embodiments within the ambit of that claim.

Independent claim 11 read as follows:

"11. A fluid composition, comprising:  
a coolant having chloride therein;  
a plurality of nanoparticles dispersed throughout the coolant and adapted to enhance heat transfer of the fluid composition, the plurality of nanoparticles

comprising at least one of glass, silica, pumice and mixtures thereof; and  
a plurality of metal compounds adapted to react with the chloride in the coolant to form insoluble metal chloride particles *in situ*."

Claims 12 to 17 were dependent on claim 11 and referred to preferred embodiments within the ambit of that claim.

Independent claim 18 read as follows:

"18. A method of making a heat transferable fluid, comprising the step of:  
mixing a plurality of nanoparticles with a coolant including chloride, the plurality of nanoparticles comprising at least one of glass, silica, pumice, metal compounds adapted to react with chloride in the coolant to form insoluble metal chloride particles *in situ*, and mixtures thereof;  
wherein the plurality of nanoparticles is adapted to enhance heat capacity of the coolant and increase heat transfer efficiency of the fluid."

Claims 19 to 21 were dependent on claim 18 and referred to preferred embodiments within the ambit of that claim.

Claims 22 to 25 concerned a method of determining effective heat transfer capability of a fluid coolant composition.

III. The ISA stated in the invitation to pay additional fees (IPAF) that the international application related to three groups of inventions. The first and the second group concerned the subject-matter of claims 1 to 21

and both groups were defined as referring to a fluid composition and a process for making a heat transferable fluid, the fluid comprising a coolant and a plurality of nanoparticles, the plurality of nanoparticles comprising, in the first group of inventions, metal compounds forming insoluble metal compound particles in situ and, in the second group of inventions, glass, silica or pumices. The third group of inventions which concerned the subject-matter of claims 22 to 25 was defined as relating to a method for determining effective heat transfer capability of a fluid coolant composition.

The ISA held that the common concept linking the subject-matter of claims 1 to 21 was a fluid composition comprising a coolant and a plurality of nanoparticles dispersed throughout the coolant. This common concept was not novel in view of the disclosure of document

- (1) Lee et al: "Measuring Thermal Conductivity of Fluids containing Oxide Nanoparticles", Journal of Heat Transfer, 121 (2), 1999, pages 280 to 289.

Claim 22 was directed to a method which had neither the same nor corresponding special technical features of claims 1 and 18 and solved a completely different technical problem. Thus, the application lacked unity of invention (Rule 13(2) PCT).

- IV. On 30 November 2005 the Applicant paid 2 additional search fees under protest (Rule 40.2(c) PCT). In support of the protest the Applicant submitted that the first and the second group of inventions defined by the

ISA complied with the requirement of unity and that the application should be considered as relating to two inventions rather than three. The subject-matter of independent claims 1, 11 and 18 was novel over the disclosure of document (1) which disclosed the use of CuO and Al<sub>2</sub>O<sub>3</sub> nanoparticles in ethylene glycol to increase thermal conductivity but did not indicate that these oxides will react to form *in situ* insoluble metal compound particles. In addition document (1) was silent as to the use of glass, silica or pumice nanoparticles. Consequently, the subject-matter of claims 1, 11 and 18 shared the same special technical features and should be considered as a single invention in the sense of Rule 13 PCT.

- V. On 9 March 2006 the ISA's review body informed the Applicant that it found the IPAF completely justified and invited the Applicant to pay the protest fee within one month. It confirmed the reasoning given in the IPAF and stated additionally that the question of whether the claimed subject-matter was novel over document (1) was not relevant for the assessment of unity. The combination of features common to all claimed solutions had to be novel. Whilst glass, silica and pumice seemed to be linked by the fact that they were all based on silica, this link was missing for the metal compounds.
- VI. The Applicant paid the protest fee within the time limit set.

## Reasons for the Decision

1. The protest is admissible.
2. The Applicant only protested against the findings of lack of unity between the first and the second group of inventions, said groups concerning the subject-matter of claims 1 to 21. Since the Applicant did not contest the objection of lack of unity in relation with the third group of inventions concerning the subject-matter of claims 22 to 25, the sole issue arising from the present protest concerns the objection of lack of unity between the first and the second group of inventions.
3. According to Rule 13.1 PCT, the international application shall relate to one invention only or to a group of inventions so linked as to form a single general inventive concept. If the ISA considers that the claims lack this unity, it is empowered to invite the Applicant to pay additional fees pursuant to Article 17(3)(a) PCT. Lack of unity of invention may be directly evident a priori, i.e. before the examination of the merits of the claims in comparison with the state of the art revealed by the search. Alternatively, the ISA is also empowered to raise that objection a posteriori, i.e. after having taken into account the state of the art revealed by the search (see decision G 1/89, OJ EPO 1991, 155). In the present case, the ISA raised the objection of non-unity a posteriori, taking into account the prior art document (1).
4. Rule 40.1(i) PCT stipulates that the invitation under Article 17(3)(a) PCT to pay additional fees must specify the reasons for which the international

application is not considered as complying with the requirement of unity. Thus, the invitation needs to comprise a conclusive reasoning substantiating why the invention's single general inventive concept is not new or inventive, but also why, once the invention's single general inventive concept is dropped, unity no longer exists between the newly defined alternative groups of inventions (see decision W 3/94, OJ EPO 1995, 775, point 6 of the reasons).

5. In the invitation to pay the additional fees, the reason given for the ISA's non-unity objection in relation with the subject-matter matter of claims 1 to 21 was that the common general inventive concept linking these claims lacked novelty in view of the disclosure of document (1). Thus, the issue arises whether or not the ISA thereby satisfied its obligation to substantiate its findings.
  
6. Pursuant to Article 2 of the Amended Agreement between the EPO and the International Bureau of WIPO (OJ EPO 2001, 601) the international search shall be carried out in accordance with the Treaty, its Regulations and the Administrative Instructions; when carrying out the international search under the PCT, the International Search and Preliminary Examination Guidelines shall guide it. Chapter 10.17 of said Guidelines as well as Annex B, Part 1(f) of the Administrative Instructions under the PCT specify certain criteria for deciding on unity in situations involving the so-called "Markush practice". This practice addresses claims relating to several chemical or non chemical alternatives. Thus, this part of the Annex B relates to a claim which covers several alternative chemical compounds, as it is



the case in the present claims 1, 11 and 18, having regard to the list of alternative nanoparticles. In respect of the alternatives comprised in such claims, the requirement of a technical interrelationship and the same or corresponding special technical features as defined in Rule 13.2 PCT is considered to be met when the alternatives are of a similar nature. According to Part 1(f)(i) of Annex B of the Administrative Instructions alternatives are to be regarded as "of a similar nature" where

(A) all alternatives have a common property or activity, and

(B)(2) in cases where the common structure cannot be the unifying criterion, all alternatives belong to a recognized class of chemical compounds in the art to which the invention pertains.

7. Present claims 1 to 21 cover several alternatives with regard to the nature of the plurality of nanoparticles since the latter can comprise at least one of metal compounds forming insoluble metal compound particles in situ, glass, silica, pumices and mixtures thereof. The ISA divided the subject-matter of claims 1 to 21 into 2 separate groups of inventions. The first group defined by the ISA related to a fluid composition in which the plurality of nanoparticles comprised metal compounds forming insoluble metal compound particles in situ, whereas in the second group of inventions the plurality of nanoparticles comprised glass, silica or pumices. However, the ISA divided the alternatives into two separate groups of invention without examining the question of whether or not the requirement of a technical interrelationship involving the same or corresponding special technical features as defined in

Rule 13.2 PCT were met, and thus without considering whether the alternatives were of similar nature as foreseen by Part 1(f)(i) of Annex B of the Administrative Instructions. In addition, the ISA did not give any reason in the IPAF for the specific dispatching of the alternatives according to which only the metal compounds forming insoluble metal compound particles in situ belongs the first group of inventions, whereas glass, silica and pumices belong to the second group.

8. Thus, the IPAF falls short of substantiating the finding of lack of unity between the newly defined alternative groups of inventions in respect of the relevant PCT Administrative Instructions. However, an invitation which is based on such a deficient justification does not "specify the reasons" in the sense of Rule 40.1 PCT. For that reason, the IPAF does not meet the requirements of that Rule and, therefore, does not provide a proper legal basis for requiring additional search fees. Therefore, the additional fee which has been paid under protest must be refunded.
  
9. The Board notes that fresh reasons for the lack of unity objection were given by ISA's Review Panel in the in the Notification regarding the Review of Justification for the IPAF. However, even if it could be considered that this Notification substantiates the deficient justification given in the IPAF, the Notification cannot overcome the deficiencies in the justification of the IPAF since fresh reasons given by the Review Panel are to be disqualified anyway (see e.g. W 4/93, OJ EPO 1994, 993, point 2.2 of the reasons;

W 11/93, point 3.3 of the reasons, not published in OJ EPO).

10. The Applicant did not contest the findings of lack of unity raised by the ISA with regard to the subject-matter of claims 22 to 25. Thus, the protest of the Applicant aims at the reimbursement of only one additional search fee.

## **Order**

### **For these reasons it is decided that:**

The reimbursement of one additional search fee and of the paid protest fee is ordered.

The Registrar:

The Chairman:

C. Moser

R. Freimuth