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**D E C I S I O N**  
of 6 December 1994

**Case Number:** T 0036/91 - 3.4.2  
**Application Number:** 86300711.8  
**Publication Number:** 0191585  
**IPC:** H01B 1/20, C09K 3/00, H01B 1/12  
**Language of the proceedings:** EN

**Title of invention:**  
Electrorheological fluids

**Applicant:**  
BRITISH TECHNOLOGY GROUP LIMITED

**Opponent:**  
-

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 84

**Keyword:**  
"Auxiliary request, Claims - clarity (after amendments - yes)"  
"Decision re-appeal - remittal (yes)"

**Decisions cited:**  
T 0433/86, T 0002/81

**Catchword:**  
-



Case Number: T 0000001 - 3.4.2

**D E C I S I O N**  
of the Technical Board of Appeal 3.4.2  
of 6 December 1994

**Appellant:** BRITISH TECHNOLOGY GROUP LIMITED  
101 Newington Causeway  
London SE1 6BU (GB)

**Representative:** Davis, Norman Horbridge  
BRITISH TECHNOLOGY GROUP LTD  
101 Newington Causeway  
London SE1 6BU (GB)

**Decision under appeal:** Decision of the Examining Division of the European Patent Office dated 11 July 1990 refusing European patent application No. 86 300 711.8 pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** E. Turrini  
**Members:** R. Zottmann  
L. C. Mancini

## Summary of Facts and Submissions

I. The Appellant lodged an appeal against the decision of the Examining Division on the refusal of the application No. 86 300 711.8 (publication No. 0 191 595).

The Examining Division held that Claim 1 was unclear and not reworkable, since it expressed only results to be achieved. Therefore, the application did not meet the requirements of Article 84 EPC.

II. The Appellant requested at oral proceedings that the decision under appeal be set aside and the case be remitted to the first instance for further prosecution on the basis of the following documents:

**main request:**

**Claims:**

- No. 1 to 13 received during oral proceedings on 6 December 1994,

**Description:**

- pages 1, 3, 4, 7 to 10 as originally filed,
- page 2 received with letter of 16 February 1994,
- pages 5, 6 received with letter of 03 November 1993,

**Drawings:**

- sheets 1/8 to 8/8 as originally filed.

**auxiliary request:**

**Claims:**

- No. 1 to 13 received during oral proceedings on 6 December 1994,

**Description:**

- pages 1, 3, 4, 7 to 10 as originally filed,
- page 2 received with letter of 16 February 1994,
- pages 5, 6 received with letter of 03 November 1993,

**Drawings:**

- sheets 1/3 to 3/3 as originally filed.

III. The wording of **Claim 1** according to the **main request** reads as follows:

"An electrorheological fluid comprising a liquid continuous phase and a dispersed phase characterised in that the dispersed phase is a semiconductor having an electrical conductivity at ambient temperature of from  $10^{-2}$  to  $10^{-11}$  mho  $\text{cm}^{-1}$  and a positive temperature conductivity coefficient, the electrorheological properties of the fluid not being photo-induced, the fluid being capable of functioning when anhydrous or containing a minor amount of water up to 5% v/v of the fluid."

Claims 2 to 13 according to the main request depend on Claim 1.

The wording of **Claim 1** according to the **auxiliary request** reads as follows:

"An electrorheological fluid comprising a liquid continuous phase and a dispersed phase characterised in that the dispersed phase is a semiconductor having an electrical conductivity at ambient temperature of from  $10^{-2}$  to  $10^{-11}$  mho  $\text{cm}^{-1}$  and a positive temperature conductivity coefficient, the electrorheological properties of the fluid not being photo-induced, the fluid being anhydrous or containing water up to 5% v/v of the fluid."

Claims 2 to 13 according to the auxiliary request depend on Claim 1.

IV. The Appellant argued as follows:

The characteristic feature of the present invention is the use, as dispersed phase of an electrorheological (ER) fluid, of semiconductors having a given conductivity and being electrorheologically active in the absence of water or photostimulation. The range of the electrical conductivity of Claim 1 is restrictive, since most of the organic compounds are insulators and inorganic semiconductors usually have a higher conductivity than defined by the upper limit of said range.

As to the question of water content and the degree of drying, the mention in Claim 1 of the particular drying conditions specified in the description would unduly restrict the claim. These conditions are not essential to the invention and are given by way of example only.

As to the question of photosensitivity, US-A-3 553 708 is concerned entirely with materials producing an ER effect only under the influence of applied light (photoelectrorheological materials, in particular copper phthalocynaine). On the contrary, it is essential to the present invention that the semiconductor materials produce an ER effect of a significant magnitude solely as a result of application of an electric field. In US-A-3 553 708, the experimental details given are rather scanty, the ER effect is not quantified and it is unclear as to whether water was specifically excluded from the materials. In these circumstances, it is better to avoid US-A-3 553 708 by functional exclusion rather than by specific disclaimer of the use of copper phthalocynaine.

## Reasons for the Decision

1. The appeal is admissible.
2. *Main request*

Claim 1 contains the feature that the fluid is **capable of functioning** when anhydrous or containing a minor amount of water up to 5% v/v of the fluid. This feature should not be understood as meaning that the fluid **is** anhydrous or **contains** the said amount of water. On the contrary, it does not exclude that water amounting to more than 5% v/v of the fluid may be present.

As the Appellant points out in his letter of 8 January 1993, prior to the present invention it was believed that small quantities of water in the dispersed phase were essential for a fluid to demonstrate ER behaviour. With known ER fluids, rigorous drying such as that taught in the original application at page 2, lines 13 to 18, would prevent the fluids from demonstrating ER behaviour. On the contrary, according to the present invention, a class of fluids has been found, in which the ER effect does not depend on the presence of water. This means that both an anhydrous fluid (anhydrous having the meaning given in the preceding paragraph) and a fluid comprising small amounts of water within the limits mentioned at page 6, lines 4 to 9 of the original application, will have ER character. It thus appears that the features that the fluid is anhydrous or contains water in the amount mentioned above, are essential to the performance of the invention.

Claim 1 according to the main request is, therefore, unclear, because Article 84 EPC when read in conjunction with Rule 29(1), (3) EPC has to be interpreted as meaning

not only that an independent claim must be comprehensible from a technical point of view but also that it must indicate all the essential features of the invention.

Accordingly, the main request is not allowable.

3. *Auxiliary request*

3.1 Amendments

Claim 1 refers to an ER fluid with the following features which are disclosed in the application as originally filed (see passages cited between brackets):

- the fluid comprises a liquid continuous phase and a dispersed phase (see original Claim 1),
- the dispersed phase is a semiconductor having an electrical conductivity at ambient temperature of from  $10^{-2}$  to  $10^{-11}$  mho/cm and a positive temperature conductivity coefficient (see page 2, lines 19 to 29),
- the ER properties of the fluid are not photo-induced (for this disclaimer, which excludes the specific prior art as known from US-A-3 553 708, a support in the original documents is not needed in accordance with the unpublished decision T 0433/86. Moreover, the choice of a functional exclusion rather than a specific disclaimer of the use of copper phthalocynaine as disclosed in US-A-3 553 708 is justified by the fact that, in this prior art, the experimental details given are rather scanty, the ER effect is not quantified and it is unclear as to whether water was specifically excluded from the materials),

- the fluid is anhydrous or contains water up to 5% v/v of the fluid (see page 2, lines 5 to 18, and page 6, lines 4 to 9).

As to the dependent Claims 2 to 13, they find support in the original documents as follows:

- Claim 2: see page 6, lines 4 to 9,
- Claim 3: see page 2, lines 13 to 18,
- Claims 4, 5, 6: see page 2, lines 24 to 29.  
Moreover, Claim 5 is allowable in view of the decision T 0002/81 (OJ EPO 1982, 394) concerning new combination of limits of ranges,
- Claim 7: see page 2, lines 23 and 24,
- Claim 8: see page 2, lines 30 to 32,
- Claim 9: see page 2, lines 33 to 35,
- Claim 10: see page 3, lines 12 to 14,
- Claim 11: see page 3, lines 19 to 22,
- Claim 12: see page 3, lines 22 to 33,
- Claim 13: see original Claim 13.

The amendments of the description, in particular pages 2, 5 and 6, do not introduce subject-matter which is not supported by the original documents.

Therefore, the application has not been amended in such a way that it contains subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC).

### 3.2 Clarity

Claim 1 refers to an ER fluid comprising a liquid continuous phase and a dispersed phase. This corresponds to the typical composition of an ER material comprising a dispersion of fine hygroscopic particles in a



hydrophobic dispersion fluid. According to the invention, if the dispersed phase is a semiconductor having an electrical conductivity at ambient temperature of from  $10^{-2}$  to  $10^{-11}$  mho/cm and a positive temperature conductivity coefficient (which conditions seem to restrict the number of materials suitable for the dispersed phase considerably), an ER effect of a significant magnitude is produced solely as a result of application of an electric field, the presence of water not being necessary. Therefore, the claimed fluid is anhydrous, which means that the dispersed and the continuous phases are dried according to the steps mentioned in the description, page 2, lines 21 to 24 (pursuant to Article 69 EPC, the description shall be used to interpret the claims). Alternatively, according to Claim 1 the fluid may contain, without losing its ER property, water up to 5% v/v of the fluid, this taking into account the fact that small amounts of water might incidentally be present, for instance due to the use of additives. Moreover, the electrorheological properties of the claimed fluid are not photo-induced.

Thus, Claim 1 according to the auxiliary request is clear (Article 84 EPC).

- 3.3 The appealed decision to refuse the application was only based on the ground of lack of clarity. In the exercise of the Board's discretion under Article 111(1) EPC, the case is referred back to the department of first instance so as to allow the case to be further examined at two levels of jurisdiction and not to deprive the patent Proprietor of one such level of jurisdiction.

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 for further prosecution on the basis of the following application documents according to the Appellant's **auxiliary request**:

**Claims:**

- No. 1 to 13 received during oral proceedings of 6 December 1994,

**Description:**

- pages 1, 3, 4, 7 to 10 as originally filed,
- page 2 received with letter of 16 February 1994,
- pages 5, 6 received with letter of 03 November 1993,

**Drawings:**

- sheets 1/8 to 8/8 as originally filed.

The Registrar:

The Chairman:

P. Martorana

E. Turrini