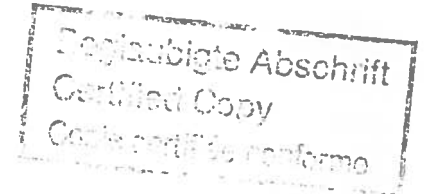


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DECISION
of 22 April 2004



Case Number: T 1115/02 - 3.2.3
Application Number: 98310453.0
Publication Number: 0925861
IPC: B22F 9/28, B22F 1/00, H01M 4/80
Language of the proceedings: EN

Title of invention:
Nickel ultrafine powder

Applicant:
Kawetetsu Mining Co., Ltd.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - (yes) after amendment"

Decisions cited:
-

Catchword:
-



Case Number: T 1115/02 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 22 April 2004

Appellant:

Kawetetsu Mining Co., Ltd.
17-4, Kuramae 2-chome
Taito-ku,
Tokyo 111-0051 (JP)

Representative:

Atkinson, Jonathan David Mark
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Decision under appeal:

Decision of the Examining Division of the
European Patent Office dated 23 April 2002,
posted on 27 June 2002, refusing European
application No. 98310453.0 pursuant to
Article 97(1) EPC.

Composition of the Board:

Chairman: C. T. Wilson
Members: F. Brösamle
M. K. S. Aúz Castro

Summary of Facts and Submissions

I. In the oral proceedings of 23 April 2002 the examining division refused European patent application No. 98 310 453.0 in the light of the following documents:

(D1) EP-A-0 461 866

(D2) JP-A-8246001 and its abstract from the "Patent Abstracts of Japan"

(D3) Hedge et al. "Synthesis and chemical reactivity of polyol prepared monodisperse nickel powders" in Solid State Ionics 93 (1997), pages 33 to 50

(D4) Viau et al. "Nucleation and growth of bimetallic CoNi and FeNi monodisperse particles prepared in polyols" in Solid State Ionics 84 (1996), page 259 and

(D5) Metals Handbook Ninth Edition, Vol. 7 Powder Metallurgy, American Society for Metals 1984, page 151.

The written decision was issued on 27 June 2002.

II. Against the above decision the applicant - appellant in the following - lodged an appeal on 12 August 2002 paying the fee on 19 August 2002 and filing the statement of grounds of appeal on 25 October 2002.

III. Following the board's communication pursuant to Article 11(2) RPBO in which the board issued its provisional assessment of the case with respect to novelty and inventive step oral proceedings before the board were held on 22 April 2004 in which the appellant submitted new claims 1 and 2 as his main request.

IV. These claims read as follows:

"1. A method of producing a nickel ultra-fine powder for the manufacture of thin internal electrodes for laminated ceramic capacitors by reducing nickel chloride vapour with hydrogen in the gas phase, characterised in that the reaction is carried out under conditions such that the powder has an average particle diameter (d50) of 0.2 to 0.6 μm , expressed in terms of the 50% particle diameter of the number-size distribution obtained by analysing electron micrographs, and contains not more than 0.1% of coarse particles having a particle diameter larger than 2.5 times the average particle diameter (d50) of the number-size distribution."

"2. Use of a nickel ultra-fine powder as produced by the method of claim 1 for the manufacture of thin internal electrodes for laminated ceramic capacitors."

V. In the oral proceedings the appellant essentially argued as follows:

- (D1) and (D2) had to be seen as the closest prior art documents relevant for the assessment of inventive step since (D3) and (D4) related to wet

processes for the production of powders and (D5) was relevant only by exercising hindsight;

- considering the teachings of (D1) and (D2) both disclosing ultra-fine nickel powders there could not be seen a reason why the known powders led to too many defective laminated ceramic capacitors;
- before this background the inventors had to systematically investigate the reasons for the above defective capacitors resulting in the teaching of claim 1, namely to carry out the reduction of nickel chloride such that the amount of coarse particles was limited;
- the means to define the particles' diameters in form of analysing electron micrographs was **unusual**, see (D1) and its approach via the surface areas in this context;
- secondly in (D1) contrary to what was claimed a rise of temperature was allowed favouring the creation of coarse particles being the reason for defective capacitors;
- summarizing, the subject-matter of claims 1 and 2 could not be rendered obvious by (D1) and (D2).

VI. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the following documents:

- claims 1 and 2, filed in oral proceedings

- description pages 2 to 4, also filed in oral proceedings,
- Figures 1 and 2 as originally filed.

Reasons for the Decision

1. The appeal is admissible.
2. *Amendments*
 - 2.1 Claim 1 is a combination of features originally disclosed, see in this context EP-A2-0 925 861:
 - page 4, line 33, manufacture of thin internal electrodes for laminated ceramic capacitors;
 - page 2, line 53, reducing nickel chloride vapour with hydrogen in the gas phase;
 - claim 1, reaction being carried out by observing an average particle diameter (d50) and the restriction of coarse particles;
 - page 3, lines 2 to 4, number-size distribution being analysed on the basis of electron micrographs and
 - page 3, lines 26 to 39, method for producing a nickel ultra-fine powder.

2.2 Claim 2 is based on originally filed claims 3/4 and on page 4, line 32, of EP-A2-0 925 861.

2.3 Summarizing, claims 1 and 2 are not open to an objection under Article 123(2) EPC.

3. *Novelty*

The subject-matter of claim 1 is novel particularly with respect to (D2), Article 54 EPC. The finding of a lack of novelty by the first instance appears to have been based on a misunderstanding of the disclosure of (D2), which actually discloses that the geometrical standard deviation of the particle size distribution is 2.0 or less, rather than that the distribution is ≤ 2.0 times the average particle diameter.

4. *Inventive step*

4.1 The nearest prior art is in agreement with the appellant (D2) disclosing an ultra-fine nickel powder used for thin internal electrodes for laminated ceramic capacitors by reducing nickel chloride vapour with hydrogen in the gas phase.

4.2 In the statement of grounds of appeal, see remark 3.2 thereof, even a comparatively small average particle diameter of 0.4 microns contained up to about 8% coarse particles larger than 1 micron in terms of the number size distribution - being by far outside the feature of present claim 1 limiting the amount of coarse particles to 0.1%. The too high amount of coarse particles

obviously is the reason for too many defective capacitors according to (D2).

4.3 (D1) aims at the creation of spherical particles, which are not essential for the method according to present claim 1, and (D1) is not based on the assessment of coarse particles by analysing electron micrographs but rather on measuring the specific surface area, see its column 7, first paragraph. Based on its Figures 2 and 3 it is clear that coarse particles larger than 2.5 times the average particle diameter (d50) exist in amounts well above the claimed limit of 0.1%.

4.4 Against the above background, namely that the powders according to (D1) and (D2), respectively, when used for the manufacture of thin internal electrodes for laminated ceramic capacitors, resulted in too many defective capacitors the problem to be solved by the claimed invention, see amended EP-A2-0 925 861 page 2, remark [0009], is to provide a method for producing a nickel ultra-fine powder improved in particle size distribution more particularly, to provide a nickel ultra-fine powder which, when used as an electrode material, permits laminated ceramic capacitors for electronic machines and equipment to exhibit electrical stability (without electrical short circuits).

4.5 This problem is solved with the features laid down in claim 1, namely to carry out the reduction of nickel chloride such that the average particle diameter (d50) is between 0.2 to 0.6 micron expressed in the terms laid down in detail in the characterising clause of claim 1 and such that not more than 0.1% of particles

beyond a particle diameter larger than 2.5 times (d_{50}) is admitted.

- 4.6 In this respect reference to EP-A2-0 925 862, page 3, lines 29 and 30, has to be made, teaching that the reaction is carried out at a prescribed temperature, namely by not allowing a rise of the temperature as in (D1), see for instance its "Example 1" disclosing a starting temperature of 1050°C and a final temperature of 1090°C, which is the reason for too many coarse particles in the powder.
- 4.7 Table 1 of EP-A2-0 925 861 is based on examples according to the claimed invention and on comparative examples being based on too many coarse particles in the powder, namely between 0.3 and 0.4% compared with 0.1%. While the ratio of short circuits is between 0.0 and 0.1 with respect to the claimed invention this range is between 1.2 and 1.7 with respect to examples based on too many coarse particles (Comparative Examples 1 to 5).
- 4.8 The board considers that the decrease achieved by the claimed teaching in the number of defective capacitors constitutes tremendous progress in the technical field addressed by the claimed invention.
- 4.9 The reason why powders according to (D1) and (D2) lead to too many defective capacitors not being known from the prior art the inventors of the present invention firstly could not rely on prior art teachings to solve this problem but rather had to study their own ways for instance in combination with the definition of the particles' diameters "under the microscope" instead of

following the teaching of (D1) i.e. to consider the surface areas of the particles.

4.10 Thirdly (D1) and (D2) did not recognize the importance of **limiting the reaction temperature** when reducing nickel chloride with hydrogen in the gas phase leading to a reduction of coarse particles and fourthly, (D1) and (D2) alone or in combination did not lead the skilled person trying to solve the above problem to the **claimed restriction of coarse particles defined in claim 1.**

4.11 Under these circumstances (D1) and (D2), neither singly nor in combination could render obvious the subject-matter of claim 1 or of claim 2 (use claim being based on the powder produced by the method of claim 1), Article 56 EPC, so that these claims are allowable and form the basis for grant of a patent in combination with the description as submitted in the oral proceedings and the originally filed Figures 1 and 2.

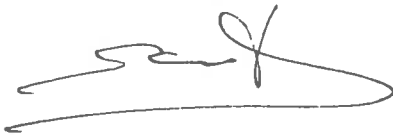
5. Since (D3) and (D4) relate to **wet** processes (different technical field) and (D5) is based on **palladium** - not addressed in the present invention - these documents are relevant for the assessment of inventive step only by **hindsight** as convincingly brought forward by the appellant in the oral proceedings.

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 grant a patent on the basis of the following documents:
 - claims 1 and 2, filed in oral proceedings,
 - description pages 2 to 4, also filed in oral proceedings,
 - Figures 1 and 2 as originally filed.

The Registrar:



R. Schumacher

The Chairman:



C. T. Wilson



THE UNITED STATES OF AMERICA

DEPARTMENT OF JUSTICE

INVESTIGATION OF THE ACTS OF VIOLENCE
COMMITTED BY THE ORGANIZATION OF
BLACK PEOPLE

REPORT OF THE ATTORNEY GENERAL

AND THE ATTORNEY GENERAL

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