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**D E C I S I O N**  
**of 9 March 2000**

**Case Number:** T 0549/97 - 3.2.3

**Application Number:** 88908393.7

**Publication Number:** 0334968

**IPC:** B22F 1/00, C22C 38/00

**Language of the proceedings:** EN

**Title of invention:**  
Composite alloy steel powder and sintered alloy steel

**Patentee:**  
Kawasaki Steel Corporation

**Opponent:**  
Höganäs AB

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 56

**Keyword:**  
"Inventive step - additional effect"

**Decisions cited:**  
-

**Catchword:**  
-



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Boards of Appeal

Chambres de recours

Case Number: T 0549/97 - 3.2.3

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.3  
of 9 March 2000

**Appellant:** Höganäs AB  
(Opponent) S-26301 Höganäs (SE)

**Representative:** Thylén, Eva Matilda  
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**Respondent:** Kawasaki Steel Corporation  
(Proprietor of the patent) 1-1-28 Kitahonmachi-Dori  
Chuo-ku  
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**Representative:** Grünecker, Kinkeldey,  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office dated 5 March 1997, posted  
on 25 March 1997, rejecting the opposition filed  
against European patent No. 0 334 968 pursuant to  
Article 102(2) EPC.

**Composition of the Board:**

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

## Summary of Facts and Submissions

I. European patent No. 0 334 968 was granted with claims 1 to 3 on 8 February 1995.

II. Claim 1 reads as follows:

"1. A composite alloyed steel powder for powder metallurgy composed of iron powder particles, and powdery alloy components of Ni and Mo and/or W attached by diffusion to part of the surface of the iron powder particles, said alloy powder being composed of 0.50 - 3.50 wt% of Ni, 0.65 - 3.50 wt% of Mo and/or 1/2 W, and the remainder of Fe and inevitable impurities in the following ranges:

C: less than 0.03 wt%, preferably less than 0.01 wt%;

Si: less than 0.1 wt%, preferably less than 0.05 wt%;

Mn: less than 0.4 wt%, preferably less than 0.15 wt%;

Cr: less than 0.3 wt%;

Cu: less than 0.3 wt%;

Al: less than 0.1 wt%;

P: less than 0.02 wt%;

S: less than 0.02 wt%;

O: less than 0.25 wt%, preferably less than 0.15 wt%;

N: less than 0.01 wt%, preferably less than 0.002 wt%.

with the content of Ni and the content of Mo and/or W in the steel powder of particular diameter smaller than 45  $\mu\text{m}$  being in the range of 2.0 - 4.2 times the average content in the entire

steel powder, thereby permitting achieving high tensile strength and high toughness by strain-induced martensite transformation after carburizing, quenching, and tempering after sintering."

III. The opposition of Höganäs AB - appellant in the following - against the above European patent was rejected in the oral proceedings of 5 March 1997; the written decision of the opposition division was posted on 25 March 1997. This decision was inter alia based on

(D3) JP-A-62-146203 (filed as translation in English)  
and

(D5) JP-A-61-130401 (filed as abstract in English).

IV. Against the above decision the appellant lodged an appeal on 21 May 1997 paying the appeal fee on the same day and filing the statement of grounds of appeal on 22 July 1997.

V. Following the board's Communication pursuant to Article 11(2) RPBA dated 9 September 1999 oral proceedings were held on 9 March 2000 in which the appellant and the patentee - respondent in the following - brought forward the following arguments:

(a) appellant

- in (D3) the base-powder is prealloyed with Mo and Mn whereas Ni is diffusion-bonded in a second step to the prealloyed powder;

- DDS - parameters, (degree of diffusion segregation), are not discussed in (D3) and apart from (D5), i.e. a Kawasaki-patent, DDS-values are not to be found in the prior art;
- this is also the case for newly cited JP-A-59-261983 - (D6) in the following - from which document a low-alloy iron powder is known which powder has a tensile strength of over 130 kg/mm<sup>2</sup>, see Table 2;
- claim 1 relates to a powder composition and is not restricted to specific process parameters and specific values for the tensile strength and toughness; the latter values are largely influenced by the process parameters quenching, tempering and optionally carburizing and not by the composition of the powder itself so that claim 1 should be restricted to process steps or should be drafted as a process claim;
- summarizing, claim 1 does not define patentable subject-matter.

(b) respondent

- claim 1 relates to a steel powder for powder metallurgy which powder permits achieving high tensile strength and toughness;
- the crucial features of claim 1 are diffusion-bonding the alloying elements Ni, Mo and W to the iron particles and the range of DDS; the latter parameter is clearly defined in claim 1 and allows

a comparison of the claimed powder with the prior art;

- the claimed range of DDS-values in combination with the claimed powder composition are responsible for a higher degree of compaction of the powder so that the aimed-at higher tensile strength and toughness are achieved;
- the teaching of claim 1 is novel and not rendered obvious by the prior art to be considered; the claimed teaching is moreover clear and can be carried out by a skilled person; this teaching contrary to appellant's arguments is not simply based on parameters to be achieved;
- summarizing, claim 1 defines patentable subject-matter so that this claim 1 is valid.

VI. The appellant requested that the decision under appeal be set aside and that the European patent No. 0 334 968 be revoked.

VII. The respondent requested that the appeal be dismissed.

### **Reasons for the Decision**

1. The appeal is admissible.

2. *General remarks*

2.1 Claim 1 is based on a steel powder with diffusion-bonded particles of Ni, Mo and/or W to iron particles

and on a definition of a remainder of Fe; in claim 1 a DDS-factor is defined, namely by indicating the content of Ni, Mo and/or W in particles smaller than 45 µm and in the entire steel powder, followed by the words "thereby permitting achieving high tensile strength and high toughness by...".

2.2 Since the DDS-factor, even if not too common in the literature, is defined in the claim itself the teaching thereof is clear and it is not necessary to rely on handbooks etc., to understand what is meant by the claim's wording.

2.3 As a general rule the patentee is responsible for defining the subject-matter for which protection is sought, namely in the present case for "a composite alloyed steel powder for powder metallurgy".

2.4 In opposition and appeal proceedings it has to be assessed whether or not claimed subject-matter is patentable. The following is observed in this respect.

### 3. *Novelty*

In the present case the issue of novelty was not contested neither by the appellant, the opposition division nor the board so that the crucial issue to be assessed is inventive step.

### 4. *Inventive step*

4.1 The nearest prior art document is (D3) which document discloses the composition of claim 1 but not features 1a, 1b, 2a and 2b) as follows:

(1a) the base powder is unalloyed iron powder,

(1b) all of Ni, Mo and/or W is added by diffusion alloying

(2a) the content of Ni and the content of Mo and/or W in the steel powder of particle diameter smaller than 45  $\mu\text{m}$  is in the range of 2.0-4.2 times the average content in the entire steel powder (in the following referred to as the DDS-value, cf. page 6, lines 15 to 18), and

(2b) thereby permitting achieving high tensile strength and high toughness by strain-induced martensite transformation after carburizing, quenching, and tempering after sintering.

4.2 (D3) is based on a **two**-step process in that firstly Fe-Mo-Mn are prealloyed and in that thereafter Ni is mixed with the prealloyed powder.

4.3 Starting from this prior art the claimed invention aims at a low alloy composite steel powder permitting products having high tensile strength and high toughness, see page 4, lines 26 to 29 of EP-B1-0 334 968.

4.4 This object of the invention is solved by the features of claim 1 whereby the last sentence thereof "thereby permitting achieving..." is more a result to be achieved than a technical feature. Since the other features of claim 1, however, clearly define an alloyed steel powder which achieves in a sintered alloyed steel

high tensile strength and high toughness claim 1 taken as a whole defines a technical teaching readily to be followed by a skilled person.

4.5 From the wording of claim 1 it is clear that a **composite alloyed steel powder** is protected and nothing else.

4.6 The central feature which distinguishes the teaching of claim 1 from (D3), (D5) and (D6) is the DDS-value, namely the **degree of diffusion segregation**, which has to be kept within the claimed range between 2.0 to 4.2.

The DDS-value can be controlled by

- (1) the particle size of the iron powder
- (2) the alloying components and
- (3) the diffusion heat treatment,

(see page 6, lines 23 to 25 of EP-B1-0 334 968). The patent specification is therefore a source for any skilled person to get additional information about the nature of the DDS-value.

4.7 From the above follows that the crucial parameter of claim 1 is the DDS-value with its three above-set-out controlling influences.

4.8 (D3) is silent about the DDS-value so that even its Example 3 according to Table 1 and the graph on page 8 cannot lead a skilled person to the subject-matter of claim 1.

4.9 Maintaining the DDS-value in the range of claim 1 leads to a higher degree of compaction values, see "Graph A" of the respondent, filed with the letter of 8 February 2000, and achieving densities of up to 7.49 or 7.51 or 7.50 for instance, compared with (D3) and its graph on page 8 wherefrom densities far below 7 and even 6.8 are to be seen.

4.10 The teaching of (D6) is very similar to (D3) since again a **two**-step mixing is set out without considering, however, the importance of the DDS-value. Under these circumstances a skilled person not knowing the claimed invention is not lead by (D3) and (D6) to the subject-matter of claim 1.

4.11 (D5) on the other hand is a useful document for the skilled person since it also deals with the DDS-value, see page 1 under "Purpose". The range of (D5) is, however, outside of claim 1, namely too low, see page 2, line 3, (0.8 - 1.9) so that a skilled person even if considering (D5) in combination with (D3/D6) would not be led to the subject-matter of claim 1. Claim 1 is therefore based on an inventive step.

4.12 Since claim 1 defines a novel and inventive composite alloyed steel powder it is irrelevant that this claim also includes a hint to the further fate of the claimed powder, namely by indicating mechanical properties achievable by using the claimed powder or by mentioning process steps useful when using the claimed powder, namely carburizing, quenching and tempering after sintering.

4.13 It is also irrelevant under the above circumstances

that with specific process steps some properties of the claimed powder can be enhanced since the powder in itself is already patentable and since a powder is protected in claim 1 and not its use in combination with the production of steel or in combination with specific process steps to be followed when using the claimed powder.

4.14 Claims 2 to 3 are claims making use of the powder of claim 1 so that their subject-matter is likewise novel and inventive.

4.15 Summarizing, claims 1 to 3 are valid so that the European patent No. 0 334 968 can be maintained as granted.

## **Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:

N. Maslin

C. T. Wilson