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Datasheet for the decision of 7 December 2010

Case Number: T 1946/08 - 3.2.08

Application Number: 05075421.7

Publication Number: 1559802

IPC: C22C 9/04

Language of the proceedings: EN

Title of invention:
Lead-free, free-cutting copper alloys

Applicant:
Mitsubishi Shindoh Co., Ltd.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 84, 54, 111(1), 123(2)

Relevant legal provisions (EPC 1973):
-

Keyword:
-

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1946/08 **-** 3.2.08

D E C I S I O N
of the Technical Board of Appeal 3.2.08
of 7 December 2010

Appellant: Mitsubishi Shindoh Co., Ltd.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 6 May 2008 refusing European patent application No. 05075421.7 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: T. Kriner
Members: R. Ries
E. Dufrasne

Summary of Facts and Submissions

I. In its decision dated 6 May 2008 to refuse European patent application No. 05075421.7, the examining division held that the subject matter of the claims according to the main, first and second auxiliary requests then on file lacked novelty (Article 54 EPC). The examining division based its objections on the following documents:

D1: CH-A-0 148 824;
D2: GB-A-1 443 090 (corresponding to D7);
D3: GB-A-0 359 570;
D4: US-A-1 954 003;
D5: DE-A-1 558 470
D6: GB-A-0 354 966
D7: US-A-3 900 349.

In addition, the claims of the main and first auxiliary requests were held to contravene the requirements of Article 123(2) EPC.

II. On 26 June 2008, the appellant (applicant) lodged an appeal against this decision and paid the appeal fee on the same date. Enclosed with the statement setting out the grounds of appeal, which was received at the EPO on 6 September 2008, the appellant submitted a revised set of claims as a main request.

III. In the official communication annexed to the summons to oral proceedings, the Board gave its provisional view on the case. Therein, the claimed subject matter was objected to under Articles 84 and 123(2) EPC and regarded as being not allowable for lack of novelty in

particular vis-à-vis the technical disclosure of documents D5 and D7.

IV. In its response dated 5 November 2010 to the Board's communication, the appellant submitted six revised sets of claims according to the main request and first to fifth auxiliary requests. Also enclosed therewith were comparative test results carried out by the appellant and summarized in documents

E1: Report of an experimental comparison between the microstructure of alloys disclosed in DE-A-1 558 470 (D5) and of EP-0507542.7 (the present patent application); and

E2: Report of an experimental investigation into the disclosure of US-A-3 900 349 (D7).

V. Oral proceedings took place before the Board on 7 December 2010.

The appellant requested that the decision under appeal be set aside and a patent be granted

- on the basis of the main request (claims 1 and 2) submitted during the oral proceedings before the Board, or in the alternative,
- on the basis of one of the first to fifth auxiliary requests, all filed with letter dated 5 November 2010.

Independent claim 1 of the main request reads:

"1. A lead-free copper alloy comprising 2.0 to 4.0 wt % silicon, 69 to 79 wt% copper, the remaining wt% being

zinc, having a γ phase or a *K* phase in the alloy, and wherein the alloy optionally includes:

a) at least one element selected from among 0.02 to 0.4 wt% bismuth, 0.02 to 0.4 wt% tellurium, and 0.02 to 0.4 wt% selenium; or

b) at least one element selected from among 0.02 to 0.25 wt% phosphorus, 0.02 to 0.15 wt% antinomy, and 0.02 to 0.15 wt% arsenic; or

c) at least one element selected from among 0.3 to 3.5 wt% tin, 0.02 to 0.25 wt% phosphorus, 0.02 to 0.15 wt% antimony, and 0.02 to 0.15 wt% arsenic; at least one element selected from among 0.02 to 0.4 wt% bismuth, 0.02 to 0.4 wt% tellurium, and 0.02 to 0.4 wt% selenium; or

d) 0.1 to 1.5 wt% aluminium; and 0.02 to 0.25 wt% phosphorus; or

e) 0.1 to 1.5 wt% aluminium; 0.02 to 0.25 wt% phosphorus; at least one element selected from among 0.02 to 0.4 wt% chromium and 0.02 to 0.4 wt% titanium; or

f) 0.1 to 1.5 wt% aluminium; 0.02 to 0.25 wt% phosphorus; at least one element selected from among 0.02 to 0.4 wt% bismuth, 0.02 to 0.4 wt% tellurium and 0.02 to 0.4 wt% selenium; or

g) 0.1 to 1.5 wt% aluminium; 0.02 to 0.25 wt% phosphorus; at least one element selected from among 0.02 to 0.4 wt% chromium, and 0.02 to 0.4 wt% of titanium; at least one element selected from among 0.02 to 0.4% bismuth, 0.02 to 0.4 wt% of titanium; at least one element selected from among 0.02 to 0.4% bismuth, 0.02 to 0.4 wt% tellurium and 0.02 to 0.4 wt% selenium."

There is no need for the present decision to consider the content of the auxiliary requests.

VI. The appellant's arguments are summarized as follows:

Claim 1 of the main request clearly defined the composition of a lead-free copper-silicon-zinc alloy and required a structure having gamma or kappa phase. The visibility of these phases was demonstrated by the micrographs filed as document E1 showing that the gamma phase was readily identifiable under the microscope when present. Hence, the presence (or absence) of gamma or kappa phase in the microstructure could be verified simply by metallographic inspection. Consequently the claimed alloy was clearly distinguishable from the prior art.

The experimental data given in document E1 also demonstrated that the minimum limit of 69% for Cu in the claimed alloy represented a composition threshold which was crucial for the development of gamma phase. Contrary to the position of the examining division given in the impugned decision, it was clear from the experimental data given in E1, Table 2, point 14 that example 10 of document D5 comprising 68.6% Cu, 2.4% Si and 29% Zn had no gamma phase, irrespective of the heat treatment regime, but consisted of alpha and beta phases only.

Document D7 actually disclosed certain alloy compositions which fell within the composition ranges required by claim 1 and which were cast, heat treated and quenched. However, only alpha, mju and chi phases were identified in this document and there was no

disclosure or suggestion of gamma or kappa phase. The experimental investigation described in document E2 and concerning alloy embodiments of D7 within the elemental ranges of the claimed alloy confirmed that water cooling (quenching) the alloy from high temperatures inhibited the development of the equilibrium microstructure so that gamma and/or kappa phase did not form.

Depending on the chemistry, some compositions of the claimed alloy did cause the development of gamma and kappa phase as a direct consequence of the composition, whereas it could occur that others required a specific heat treatment to promote gamma and kappa phase formation. In any case, rapid quenching was critical.

Therefore, the subject matter of claim 1 of the main request was novel and involved an inventive step vis-à-vis the cited prior art, in particular the technical disclosure of documents D5 and D7.

Reasons for the Decision

1. The appeal is admissible.

2. Formal aspects; Articles 123(2) and 84 EPC

The subject matter of claims 1 and 2 of the main request is based on claims 1 to 3 of the application as originally filed.

The lead-free copper alloy is clearly defined by its composition, which comprises all mandatory and optional elements and requires the presence of gamma and/or kappa phase.

Hence, there are no formal objections to the present claims under Article 123(2) and 84 EPC.

3. Situation of the case; novelty and inventive step

3.1 At the oral proceedings the discussion turned on the issue whether the formation of gamma and/or kappa phase was an inherent feature given that these phases were formed as a consequence of the composition of the alloy, or whether gamma and/or kappa phase were formed through a specific heat treatment and cooling regimen. The first finding was supported by the appellant's comparative experimental data submitted in document E1 according to which no gamma phase was formed in an alloy comprising 2.4 wt% Si, but having less than 68.3 wt% Cu balance Zn, irrespective of the heat treatment and the cooling regimen. The experiments in E1 support the appellant's position that the exemplifying alloy 10 given on page 4 of document D5 and comprising 68.6% Cu, 2.4 wt% Si and 29 wt% Zn actually did not develop gamma or kappa phase at all.

Moreover, various passages of the description of the application itself indicate that additions of specific elements including silicon, tin or aluminium within the claimed ranges do produce gamma phase (and in some cases kappa phase) whereas phosphorus has no property of forming gamma phase as Sn and Al. Reference is made, for example, in this context to the description of the

A1-publication of the present application, page 2, line 55 to page 3, line 2; page 3, lines 47 to 48 and 57, 58; page 4, line 5.

3.2 On the other hand, the appellant pointed out at the oral proceedings that based on the experimental data given in document E2, at least some of CuSiZn alloys encompassed by claim 1 required a special heat treatment in order to develop the desired microstructure comprising gamma and/or kappa phase. The experiments in E2 also showed that water quenching after the heat treatment carried out on the alloy in D7 prevented the formation of gamma and kappa phase.

4. Having regard to revised claims 1 and 2 of the main request submitted by the appellant at the oral proceedings and in view of the newly filed technical facts and evidence given in documents E1 and E2 which were not known to the examining division, the situation of the case has changed in substance and even fundamentally and at this very late stage of the appeal proceedings. As a consequence, it could turn out that the objection of lack of novelty raised by the examining division on the basis of the technical disclosure of document D7 or document D5, which was the reason for its refusal of the application, is no longer justified and, therefore, requires reconsideration in the light of E1 and E2.

5. The first instance has not yet considered the changed situation of the file, in particular the question whether or not the present application as amended meets the requirements of novelty and inventive step. The Board therefore considers it appropriate, in accordance

with Article 111(1) EPC, to remit the case to the first instance for further prosecution.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance for further prosecution on the basis of the main request filed during the oral proceedings before the Board.

The Registrar: The Chairman:

V. Commare T. Kriner