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D E C I S I O N
of 29 June 2006

Case Number: T 0430/04 - 3.2.03

Application Number: 00919899.5

Publication Number: 1259347

IPC: B22F 3/115, B22D 23/10, C22B 9/18, C23C 4/12

Language of the proceedings: EN

Title of invention:
Hollows casting systems and methods

Applicant:
GENERAL ELECTRIC COMPANY

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 123(2)

Keyword:
"Novelty (no)"
"Inventive step - obvious combination of known features"
"Amendments - added subject matter (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0430/04 - 3.2.03

D E C I S I O N
of the Technical Board of Appeal 3.2.03
of 29 June 2006

Appellant: GENERAL ELECTRIC COMPANY
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Representative: Szary, Anne Catherine
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 27 October 2003 refusing European application No. 00919899.5 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: U. Krause
Members: G. Ashley
K. Garnett

Summary of Facts and Submissions

I. European patent application 00 919 899.5 (International publication number WO 01/62418) concerns the casting of hollow metal objects. This appeal lies from the decision of the examining division, dispatched 27 October 2003, to refuse the application for lack of novelty in light of US-A-3752215 (D1), or lack of inventive step starting from US-A-5160532 (D2) and combining it with D1.

Notice of appeal was filed on 6 January 2004, with the appeal fee being paid on 7 January 2004; a statement containing the grounds of appeal was filed on 4 March 2004.

II. During the examination procedure, the Appellant filed on 21 August 2003 an amended set of claims of which claim 1 reads as follows:

"1. A casting system for forming a hollows metal casting, the hollows metal casting comprising a fine-grain, homogeneous microstructure that is essentially oxide- and sulfide-free, segregation defect free, and essentially free of voids caused by air entrapped during solidification of the metal from a liquidus state to a solid state, the casting system for forming hollows castings comprising:

an electroslag refining system;

a nucleated casting system in which a casting is solidified; and

a cooled mandrel assembly disposed at least in a liquidus portion of the casting of the nucleated casting system, wherein the mandrel has at least one surface and the at least one surface is cooled by applying coolant means on the at least one surface, and wherein the liquidus portion of the metal casting is solidified around the cooled mandrel assembly in a manner sufficient to form a hollows casting with microstructure that comprises a fine-grain, homogeneous microstructure that is essentially oxide- and sulfide-free, segregation defect free, and essentially free of voids caused by air entrapped during solidification from a liquidus state to a solid state."

Dependent claims 2 to 6 concern preferred embodiments of the system defined in claim 1. Independent claim 7, dependent claim 8 and independent claim 9 relate to casting methods.

As an auxiliary request, a further set of claims was filed with the grounds of appeal in which independent claims 1, 7 and 9 are amended to include the feature that the coolant means is located upstream and outside of the mold.

III. The Appellant had requested oral proceedings and these were duly appointed for the 29 June 2006. In a communication, together with the summons to attend oral proceedings, dated 21 February 2006, the Board set out its preliminary opinion concerning the patentability of the above claims.

IV. Oral proceedings were held on 29 June 2006. However, neither the Appellant nor its representative attended.

In accordance with Rule 71(2) EPC, the oral proceedings continued in their absence and the Board reached its decision.

V. The representative of the Appellant had sent a letter, dated 28 June 2006, informing the Board that no representative would be attending the oral proceedings. A further set of claims was submitted with the letter as the second auxiliary request for consideration by the Board. The letter had been sent by facsimile and was received by the fax machine at the EPO on 28 June 2006 at 17.25 hrs. However, the Board was not in possession of the letter until the following day, after the oral proceedings had been concluded and the decision had been taken. Consequently, the claims of the second auxiliary request were received by the Board after the proceedings had been closed and hence were not taken into consideration.

VI. Submissions of the Appellant

The arguments of the Appellant can be summarised as follows:

(a) Main Request

D1 does not disclose the application of a coolant to a mandrel surface, but rather to an external slag layer along a solidified casting. D1 does not teach a mandrel assembly disposed in at least a liquidus portion of the casting of the nucleated casting system. The cooling systems disclosed in D1 could not be applied to the casting system of claim 1.

D2 does not disclose a cooled mandrel assembly.

Consequently, the claim system is both novel and inventive with respect to D1 and D2.

(b) Auxiliary Request

The feature that the coolant means is located upstream and outside of the mould is based in the application as originally filed on the embodiments of the invention disclosed in Figure 1 in combination with page 9, line 26, to page 11, line 10 of the description. This feature is neither shown nor described in D1 or D2.

VII. Requests of the Appellant

The Appellant requested that the decision be set aside and that a patent be granted on the basis of the claims filed with the letter of 21 August 2003, alternatively on the basis of the claims filed with the grounds of appeal on 4 March 2004.

Reasons for the Decision

1. The appeal is admissible.

Main Request - Claim 1

2. Novelty (Article 54 EPC)

2.1 For the following reasons, the subject-matter of claim 1 lacks novelty with respect to D1, which

discloses a casting apparatus for forming hollow metal castings (see column 1, lines 5 to 6).

2.2 Claim 1 is directed to a casting system. The EPC does not recognise "system" as being a separate category of claim as such, and in the present case claim 1 is equated to an apparatus claim.

2.3 Claim 1 refers to an "electroslag refining system". In an electroslag refining process, molten metal passes through a slag and impurities pass from the metal into the slag. Usually the metal is in the form of a consumable ingot and an electric current is passed through the slag, melting the metal at the interface between the slag and ingot. However, the application makes it clear that the invention of claim 1 comprises any refined metal source (see Figure 1; page 6, last paragraph and page 7 and page 8, second paragraph), and an electroslag refining system in which the source of metal is a consumable electrode melted by an electrical current is merely defined as a preferred embodiment in dependent claim 2. Consequently an electroslag refining system within the meaning of claim 1 is considered to be disclosed in D1, which shows the metal being supplied to the mould though a slag bath 8 (see Figure 1 and column 5, lines 12 to 18) of the type used in ordinary electroslag melting (see column 3, lines 66 to 67).

2.4 The Board agrees with the view of the Examining Division expressed on page 4 of the decision that the expression "nucleated casting system", as defined in claim 1, has no standard meaning in the art, and is not limited to a casting method in which liquid metal is

fed into the mould as atomised droplets, as described in the application (see pages 18 and 19, and Figures 1 and 2). The term "casting" means transformation from liquid to solid state in order to obtain a desired shape of solid product, and the process of solidification of metals occurs by nucleation and growth; hence D1 discloses a "nucleated casting system in which a casting is solidified".

2.5 D1 also discloses a cooled mandrel assembly disposed at least in a liquidus portion of the casting, and having at least one surface on which coolant is applied.

According to D1, the metal is cast around an inner casting mould or core 2 (see column 3, lines 2 to 3). A mandrel is simply an object around which metal can be cast or shaped in order to form a hollow product. Although the term "mandrel" is not expressly used in D1, the inner casting core 2 fulfils this function, and hence can be considered to be a mandrel.

Liquid metal is indicated by reference numeral 9 in Figure 1 of D1, and it can be seen that core 2 is disposed within the liquidus portion. Although there is a slag layer 10 between the casting and core 2, this is not excluded by the wording of claim 1. Cooling water is supplied to the interior of core 2 through inlet 2a (see column 4, lines 15 to 20). The core thus has at least one surface, this being an inner surface, which is cooled by applying coolant means, as is defined in claim 1. The liquid portion of the casting of D1 is solidified around the cooled core to form a hollow casting 11 (see column 4, lines 24 to 28, and Figure 1).

The Board therefore does not agree with the Appellant's argument that D1 does not disclose the application of a coolant on one or more of the mandrel surfaces and the disposing of the mandrel assembly at least in a liquidus portion of the casting of the nucleated casting system. D1 discloses coolant (water) flowing along inner surfaces of a core, which is in the liquid portion of the casting apparatus.

The Appellant also argues that the cooling systems shown in D1 could not be applied to the casting system of claim 1. In particular, the Appellant refers to the secondary cooling means 13, which is applied below the casting mould (see column 4, lines 46 to 47), and to an embodiment which includes a cooling means 14 in the lower portions of the casting moulds (see column 6, lines 27 to 32). The argument of the Appellant is not convincing, since there is no requirement in claim 1 that cooling means of the type designated 13 or 14 in D1 be incorporated into the apparatus of claim 1. In addition, in assessing novelty it is merely necessary to establish whether or not the features as defined in claim 1 are, in combination, disclosed in D1.

2.6 Claim 1 defines the hollow metal casting as having a microstructure that is fine-grained, homogenous, essentially oxide- and sulphide-free, segregation defect free, and essentially free of voids caused by air entrapped during solidification of the metal from a liquidus state to a solid state. All of these features are features of the product made by the casting apparatus of claim 1, rather than of the apparatus itself (see paragraph 2.2 above), and as such do not further limit the subject-matter of claim 1.

In addition, the claim requires that cooling and solidification is carried out in a manner sufficient to achieve the desired properties; this feature therefore concerns the method by which the apparatus is operated, and similarly is not a feature of the apparatus itself.

2.7 Since all of the features of the apparatus defined in claim 1 are disclosed in D1, the subject-matter of this claim lacks novelty.

3. Inventive Step (Article 56 EPC)

3.1 The present application addresses the problem of casting hollow objects having homogenous, fine-grained microstructures free of defects, whilst reducing the amount of processing required to achieve such microstructures (see the introduction to the application "Background to the Invention", especially page 1, paragraphs 2 and 3, and page 4, paragraph 3).

Document D2 is also concerned with the problem of casting ingots of uniform composition, without the need for extensive multistep processing (see column 3, lines 36 to 54), and thus provides an appropriate starting point for the assessment of the invention. D2 discloses a casting apparatus comprising an electroslag refining system and a "nucleated casting system" in the form of an atomiser (see Figure 1 and column 9, lines 11 to 31).

3.2 The subject-matter of claim 1 differs from D2 in that it is directed to making hollow castings, and defines a cooled mandrel assembly, which is not present in D2; it is thus novel with respect to D2.

3.3 Starting from D2, the objective technical problem is therefore seen as how to adapt the apparatus of D2 to make hollow castings.

3.4 It is generally known that, to form a hollow casting, metal must be cast around a core or a mandrel. D1 provides an example of forming hollow-shaped metal castings (see column 1, lines 5 to 12), in which the metal is poured into a mould surrounding a central core or mandrel. Given the high temperatures involved and the need both to solidify the metal and to protect the mandrel, it is clear that the mandrel must be cooled, and indeed this is what happens in D1. The skilled person wishing to produce a hollow ingot would merely have to replace the spray collection station 60 of D2 with the mould / cooled mandrel assembly of D1 and in doing so would derive the claimed subject-matter. Thus, the Board concurs with the reasoning set out in the contested decision and with the conclusion that the subject-matter of claim 1 lacks an inventive step.

Auxiliary Request

4. Article 123(2) EPC

4.1 Claim 1 according to the first auxiliary request contains the additional feature that the coolant means is located upstream and outside of the mould.

4.2 The Applicant submits that a basis for the amendment can be found in the application as originally filed in the embodiments of the invention disclosed in Figure 1

in combination with page 9, line 26, to page 11, line 10, of the description.

4.3 However, the references supplied by the Appellant provide no basis for this amendment. According to the description (page 10, second paragraph) the cooling system 300 comprises a coolant supply 305 and a coolant conduit 310, supplying both the inside and the outside of the mandrel 205 with coolant. Fig. 1 is a schematic diagram, which shows a coolant supply 305 that could be located anywhere, and a mandrel 205 that is partly inside and partly outside of the mould; it cannot be said that it is directly and unambiguously derivable that the cooling means is upstream and outside of the mould.

4.4 The amended feature therefore does not meet the requirements of Article 123(2) EPC.

Second Auxiliary Request

5. The following observations on the second auxiliary request are for information only, and do not form part of the decision.

6. Late-Filed Requests

6.1 The Appellant filed an amended set of claims as a second auxiliary request, together with a letter informing the Board that the representative would not be attending the oral proceedings. The letter was sent by facsimile and was received by the facsimile machine at the EPO on 28 June 2006 at 17.25 hrs. Oral proceedings were opened the following morning at

09.00 hrs, but the Board was not in possession of the letter until after the oral proceedings had been concluded and the decision had been taken. Since the claims of the second auxiliary request were received by the Board after the debate had been closed, they were disregarded as having been filed too late.

6.2 Generally speaking, if a party files documents after the working hours of the EPO on the evening prior to oral proceedings, then it must run the risk that the Board may not be in possession of the documents at the oral proceedings. Clearly, this situation is not alleviated by a decision not to attend the oral proceedings.

6.3 It should be noted that in the present case, even if the Board had been in possession of the Appellant's letter, the late-filed claims of the second auxiliary request would not have been admitted into the proceedings.

The purpose of filing amended claims prior to oral proceedings should be to address objections raised thus far in the proceedings; they should then form the basis of the discussion at the oral proceedings, so that if any further minor amendments are necessary in order for the application to meet all the requirements of the EPC, they can be carried out with the approval of the Appellant or his attorney.

Should the second auxiliary request have been found to be allowable in substance, then it might have been necessary either to continue the proceedings in writing or to remit the application to the examining division

for formal amendments to the description. The Board would therefore not have been in a position at the end of the oral proceedings to take a final decision, contrary to Article 11(6) of the Rules of Procedure of the Boards of Appeal.

In addition, Article 11(3) of the Rules of Procedure of the Boards of Appeal states that the Board shall not be obliged to delay any step of the proceedings, including its decision, by reason only of the absence at the oral proceedings of any party duly summoned who may then be treated as relying only on its written case. If the application does not meet all the requirements of the EPC, then there is a real risk of it being refused at the end of the oral proceedings.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

A. Counillon U. Krause