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**D E C I S I O N**  
of 12 December 2005

**Case Number:** T 0553/03 - 3.2.03

**Application Number:** 97108886.9

**Publication Number:** 0811447

**IPC:** B22D 18/04

**Language of the proceedings:** EN

**Title of invention:**

Low-pressure die casting plant and method for operating the same

**Patentee:**

IMR S.p.A.

**Opponent:**

KWC AG

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Non-obvious solution"

**Decisions cited:**

-

**Catchword:**

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Case Number: T 0553/03 - 3.2.03

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.03  
of 12 December 2005

**Appellant:** IMR S.p.A.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 26 March 2003  
revoking European patent No. 0811447 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** U. Krause  
**Members:** Y. Jest  
J. Seitz

## Summary of Facts and Submissions

I. The appeal is directed against the decision posted on 26 March 2003 of an opposition division which revoked the European patent No. 0811447. In the decision under appeal, the opposition division held that the claimed subject-matter of the patent as granted (main request) or as amended according to four subsidiary requests lacked inventive step.

The patentee, hereinafter the appellant, lodged the appeal on 15 May 2003 and paid the appeal fee on the same day. In the statement of grounds, received on 11 July 2003, the appellant requested:

- (a) to set aside the decision of the opposition division because:
  - (i) the decision was void since it did not comply with Rule 68(2) EPC,
  - (ii) the apparatus of claim 1 according to the patent as granted (main request) and as amended according to four subsidiary requests involved an inventive step,
- (b) to reimburse the appeal fee (violation of Article 113(1) EPC) since the second independent claim of each request, i.e. the method claims, had not been dealt with in detail in the proceedings,
- (c) to remit the case to the first instance and to change the composition of the opposition division,

(d) auxiliary for oral proceedings to be held.

II. The independent claims 1 and 11 as granted read as follows:

"1. A low-pressure die-casting plant with improved production capacity, comprising a first furnace (1) and a second furnace (2), and handling units (5, 6) said furnaces (1, 2) being selectively connectable to respective dies which are associated with said handling units (5, 6), characterized in that it further comprises a station (3), arranged between the furnaces (1, 2) for unloading the cast parts and for performing graphitization of the dies, in that said furnaces (1, 2) have mutually independent operating pressures and metal levels, and in that said handling units (5, 6) are mutually detachably coupled for moving synchronously by translatory motion between the casting position and the unloading position and/or viceversa."

"11. A method for operating a low-pressure die-casting plant comprising a first (1) and a second (2) furnaces with mutually independent operating pressures and metal levels, an unloading station (3), arranged between said furnaces, and handling units (5, 6), the method comprising the steps of:

- detachably coupling with each other and synchronously moving by translatory motion said handling units (5, 6) to locate one of said handling units (5, 6) at one of said furnaces (1, 2) in a casting position while locating the other handling unit at the unloading station (3) and/or viceversa;

- selectively connecting said furnaces (1, 2) to respective dies which are associated with said handling units (5, 6) located in said casting position;
- unloading the cast parts at said unloading station (3); and
- performing graphitization of the dies."

III. The following documents were of relevance in the proceedings:

- B2-10\*: "Das Giessen von Kupferlegierungen", J.+R. Gunzenhauser AG Sissach, Sonderdruck aus technica 11/1979, Seiten 833-837;
- B2-11: enlarged copy of Figure 11 at page 835 of B2-10;
- D1: US-A- 3 804 152;
- D2: US-A- 3 512 576;
- D7: US-A- 5 205 341;
- D14: "Metal handbook", ninth edition, Vol. 15, Casting, ASM International, Metals Park, Ohio, September 1988, pages 275 to 285.

\* Remark: although document B2-10 has been cited in the opposition procedure in connection with an alleged prior use B2, it is itself a pre-published piece of literature and therefore comprised within the state in the art as defined in Article 54(2) EPC.

IV. With a communication dated 12 September 2005, the board gave its provisional view on the various issues addressed by the parties.

In the letter of 10 November 2005, the appellant withdrew his requests dealing with the formal issues (a) (i), (b) and (c) listed in paragraph I. above related to Rule 68(2) and Article 113(1) EPC.

Accordingly, the debate during the oral proceedings held on 12 December 2005 was limited to the patentability, in particular with respect to inventive step, of the claimed invention.

V. The appellant requested that the decision be set aside and the patent maintained as granted or auxiliary as amended according to one of the four amended sets of claims of the opposition procedure.

The appellant's arguments on inventive step of the apparatus and the method as granted can be summarised as follows:

Considering the rotary plate-structure of the handling unit of Figure 5 of D1 and the vertical operating movement of its dies, the skilled person would recognise that D1 concerns very big and heavy machines (in the magnitude of 3.000 to 5.000 kg), particularly used for casting aluminium products. In contrast, the claimed apparatus as illustrated in the patent is directed to small units in which the dies move horizontally and which are used for casting pieces of bronze or other alloys. The apparatus of D1 cannot thus be taken as the closest prior art.

But even if D1 was considered as relevant prior art, only the features disclosed in combination in Figure 5 of D1 should be considered. In this respect, the opposition division was wrong in considering a "mixture" of the embodiments of Figures 5 and 6 of D1 as closest state of the art, because these two embodiments concern two separate entities.

The apparatus defined in claim 1 as granted differs from this state of the art by the characterising features of claim 1, which enable the achievement of high production capacity and increased versatility of operation. None of these distinguishing features is clearly disclosed in D1. The indication at the end of the description of D1, defining an alternative embodiment with linearly moving handling units is rather theoretical and does not appear to be applicable in practice, especially because of the heavy structure of the handling units of D1. Both handling units according to Figure 5 of D1 are rigidly coupled together, there is no indication whatsoever of rendering the coupling detachable, which would allow each unit to be operated independently when needed, as for instance when two different alloys (with different solidification times) are to be treated in the furnaces. The feature "selectively connectable" of the preamble of claim 1, if read in connection with the feature defining the detachable coupling, is also not disclosed in D1.

Further, D1 fails to indicate that there is graphitisation of the dies, and remains silent as to whether the pressure and metal levels of the furnaces are mutually independent.

Documents D2, D7 or B2-10/B2-11 refer to units which are operated in a coupled manner. However, they fail to disclose any type of detachable coupling as claimed.

Therefore, the claimed apparatus and, as a matter of consequence, the independently claimed method involve an inventive step.

VI. The opponent, hereinafter the respondent, requested that the appeal be dismissed.

The respondent presented his arguments as follows:

The respondent argued that solely the wording of the claims should be considered and that no distinction between the invention and the prior art D1 can be made on the basis of features which are not specified in the claims. In this respect, the assumptions that the basic construction of the handling units is considerably different in size and weight, or that there is the possibility of treating two different alloys in the furnaces, are not supported by any specific features of the claim and should therefore be disregarded when assessing novelty or inventive step.

The preamble of claim 1 is known from D1, including the feature "selectively connectable", since the handling units of Figure 5 of D1 are alternately connectable to



their respective furnace, the concept of "alternately" being comprised in the meaning of "selectively".

Since the furnaces of D1 are operated alternately, it is inherent that the pressurisation and the metal level are controlled or maintained in the furnaces in an independent manner.

D1 further discloses an unloading station at the side of the furnaces. This implies for the altered embodiment of Figure 5, in which, in accordance with the indication contained in the last paragraph of the description, the handling units are operated in translation, that the unloading station is located linearly between the furnaces.

Graphitisation of the dies is a normal operating mode in casting processes and would then have to take place in the area of the unloading station.

As far as concerns the feature defining the mutually detachable coupling of the handling units, the respondent argued that this definition is not limited to mechanical couplings, but applies also to separate handling units which can be operated synchronously by a regulation control, as in D2, D7 or B2-10.

Therefore, the features of the die-casting plant of claim 1 and, by analogy, the steps of the method of claim 11, were obviously derivable from the cited prior art for the skilled person.

## Reasons for the Decision

1. The appeal is admissible.

2. *Main request - Novelty*

Novelty has not been disputed in the proceedings and since the board is also of the opinion that none of the cited documents discloses all features of claim 1 or claim 11, - see communication pursuant to Article 11(1) RPBA and dated 12 September 2005 - ,no detailed discussion of novelty is necessary and the crucial issue to be decided is inventive step.

3. *Claim 1 of the Main request - Inventive step*

3.1 Closest state of the art

The closest prior art is disclosed by D1 which is cited as such in the description of the patent, paragraph [0006].

The appellant has questioned whether D1 forms the closest prior art not only because of the large dimensions and weight of the handling units of D1 in comparison to those of the invention, but also because of the different types of metals treated (aluminium for D1 and heavier metal alloys for the invention). The board does not share this view mainly because the subject-matter as defined in claim 1 is silent in this respect.

The device disclosed by the embodiment of Figure 5 of D1 comprises the features of the preamble of claim 1, defining basically a low-pressure die-casting plant (see the title), comprising two furnaces 2',2'' and two handling units 7',7''.

The furnaces can be alternately, thus selectively, connected to respective dies which are associated with the handling units (see column 4, lines 25 to 31). The appellant argued that the term "selectively" also applied to the characterising feature defining the mutually detachable coupling of the units, which would mean that the option of independently operating the handling units with respect to their associated furnaces is also covered by the term "selectively"; this situation may occur for instance when two alloys with different solidification times are treated (see column 2 of the patent, lines 25 to 26) or when one furnace is undergoing maintenance (see column 3, lines 54 to 58). This reasoning is not followed by the board. The extent of application of the term "selectively" within the claim must first be established. In the opinion of the board, in the absence of any indication in the patent of an independent operation of both handling units, the term "selectively connecting" will be understood by the skilled reader of the patent as defining the alternating connection of the handling units with the furnaces, as described in the description of the patent, see column 3, paragraph [0022]. Such an alternating mode of connection further fully corresponds to the operation disclosed in prior art D1.

Furthermore, since the furnaces cooperate alternately with the handling units and the dies they support, the furnaces have consequently mutually independent operating pressures and metal levels.

The known plant disclosed in Figure 5 of D1 further comprises an unloading station for unloading the cast parts; this is implicit from the fact that the handling units may be moved laterally clear of the furnaces and that this intermediate position corresponds to the removal of the cast from the die, see description at column 4, lines 12 to 15, which relates to the embodiment of Figure 3 but applies also to the embodiment of Figure 5 (see column 4, line 25). In addition, the handling units 7', 7'' are rigidly coupled and thus move synchronously and alternately between the casting position and the unloading position.

In the final paragraph of the detailed description of D1 (column 5, lines 37 to 43), alternative embodiments to those detailed in D1 are defined which employ a linear, as opposed to a pivoting, movement of the handling units. When applied to the embodiment of Figure 5 of D1, in which the unloading station is located "between" the furnaces with respect to the rotational movement of the handling units, the skilled person would immediately and implicitly arrive at a structure which is characterised by a linear arrangement of the furnaces with the unloading station there between and by two linearly moveable handling units coupled together, connecting selectively one furnace with one die and the other die with the unloading station. Technically there is nothing to prevent or hinder this adaptation from a rotational

movement to a linear movement. The appellant's argument that such a change could not be realised in practice for heavy handling units, such as those of D1, cannot convince the board since the concept of linearly moveable "heavy" handling units already existed in the state of the art, see for instance D2 or D7, which disclose casting plants similar to those of D1.

### 3.2 Difference - Technical problem

The claimed apparatus thus differs from the closest prior art defined above by the following features:

- the unloading station is further arranged for performing **graphitisation** of the dies,
- the handling units are mutually **detachably coupled** for moving synchronously between the casting position and the unloading position.

These two features provide two separate technical effects and are to be considered as a mere juxtaposition.

The graphitisation of the dies usually serves as lubricant to provide a barrier between the molten metal and the die surfaces; it may also be used for cooling down the dies after removal of the cast. The first technical problem (P1), which is derivable from this feature, thus concerns the lubricating and insulating treatment of the dies.

The second distinguishing feature allows the plant to be run with an increased flexibility (second technical problem (P2)), for instance in the sense that either both handling units are operated synchronously or only a single handling unit is connecting its die to the respective furnace and to the unloading station, while the operation of the remaining unit is blocked (see paragraph [0031] at column 3).

### 3.3 Solution to the first technical problem (P1)

The graphitisation of mould cavities is generally known in the field for protecting the die surfaces when molten metal is introduced into the mould, for facilitating removal of the castings from the mould and for accelerated cooling. This general knowledge is illustrated by D14, page 281, right column: "Mold Coatings".

The person skilled in the art would apply this well-known coating technique to D1 at the most suitable location of the casting apparatus, which is clearly the unloading station. The first distinguishing feature of claim 1 is therefore obviously derivable for the skilled person and cannot in itself involve an inventive step.

### 3.4 Solution to the second technical problem (P2)

Although the technical solution provided by the invention for increasing the flexibility of the casting plant might appear to be very simple, there is no concrete and substantive hint which would have prompted the skilled person, before the filing date of the

invention, to alter the casting plant shown in Figure 5 of D1 in the way claimed in the patent.

The respondent has cited in this respect documents D2 and D7 as well as an alleged prior use corresponding, as far as the operation of the handling units is concerned, to the disclosure of the die casting plants in prior art document B2-10. The respondent argued that the feature "mutually detachably coupled" covers both a mechanical coupling of the handling units as well as a coupling of their operation by a controlled regulation system.

In all three documents D2, D7 and B2-10, the handling units are not mechanically coupled, but operated in a mutually controlled mode taking into account the respective position of each unit. This is illustrated in the following passages of the documents:

- column 2, lines 47 to 61 of D2;
- column 1, lines 56 to 64 of D7;
- Figure 11 and its description in B2-10/B2-11, referring to a one-man operating mode of the plant.

The plant of both D2 and D7 comprises two rotary handling units cooperating with a **single** furnace, so that the skilled person would not have considered these documents as potential source of information for providing a solution to the problem (P2) of increasing flexibility in a plant according to Figure 5 of D1 which comprises two furnaces connectable to respective handling units.

In document B2-10 and its enlargement B2-11, two manipulators A and B are described, each manipulator being connectable to a respective furnace. The explanatory text indicates that the two sets of furnace/manipulator assemblies normally work independently from each other. In the case of a single technician running the plant, the manipulators may be coupled together to avoid collision. Obviously, none of the situations described in B2-10 corresponds to the technical problem addressed by the invention starting from the prior art known from D1. If B2-10 gave any indication of how to increase flexibility of operation of the plant, this would rather concern the "normal" operating mode, which is controlling the movement of the manipulator of each assembly by a corresponding technician in charge of it. This solution teaches away from the proposal suggested by the invention.

Further it should be emphasized that D1, as well as disclosing in Figure 5 the closest state of the art, also comprises several alternative embodiments. In particular Figure 4 shows an arrangement with a single furnace, selectively connectable to two handling units. In column 4, lines 21 to 24, this is presented as being particularly advantageous, since it allows one furnace to undergo service or maintenance whilst keeping running the plant. This embodiment would thus provide the desired technical effects, i.e. an increase in flexibility as compared to the closest state of the art according to Figure 5 of D1, in which the whole plant must be stopped if a furnace needs to be accessed.



It is therefore even questionable why and to what extent the skilled person would have looked for any other solution in the remaining prior art like D2, D7 or B2-10, which refer to casting plants which are technically closer to the embodiment of Figure 3 (one furnace with two handling units) or Figure 4 (two furnaces with one handling unit) of D1 than to the one of Figure 5.

3.5 For these reasons, the device of claim 1 as granted could not be obviously derived from the state of the art before the filing date of the invention without hindsight; therefore it involves an inventive step in the meaning of Article 56 EPC.

4. *Claim 11 of the Main request - Inventive step*

The method of independent claim 11 comprises the same technical distinction over the closest prior art as disclosed by the embodiment of Figure 5 of D1, namely in form of the method step consisting of "detachably coupling the handling units with each other".

For the same reasons as explained above, the method of claim 11 also involves an inventive step.

5. *Auxiliary requests*

Since the claimed subject-matter of the patent as granted meets the requirements of patentability, it is not necessary to deal with the auxiliary requests on file.

**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 the first instance with the order to maintain the patent as granted.

The Registrar:

The Chairman:

A. Counillon

U. Krause