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**D E C I S I O N**  
**of 13 October 1999**

**Case Number:** T 0302/97 - 3.2.3  
**Application Number:** 89309741.0  
**Publication Number:** 0361837  
**IPC:** B22D 17/32, B29C 45/77  
**Language of the proceedings:** EN

**Title of invention:**

Casting control method by controlling a movement of a fluid-operated cylinder piston and apparatus for carrying out same.

**Patentee:**

Ube Industries, Ltd.

**Opponent:**

- (I) Bühler AG  
(II) Oskar Frech GmbH + Co.

**Headword:**

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**Relevant legal provisions:**

EPC Art. 108, 54, 56

**Keyword:**

"Form of appeal - missing statement of grounds"  
"Novelty - implicit disclosure (no)"  
"Inventive step - exclusion of hindsight"

**Decisions cited:**

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**Catchword:**

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Boards of Appeal

Chambres de recours

Case Number: T 0302/97 - 3.2.3

**D E C I S I O N**  
**of the Technical Board of Appeal 3.2.3**  
**of 13 October 1999**

**Appellant I:**  
(Opponent I)

Bühler AG  
Patentabteilung  
9240 Uzwil  
SUISSE

**Representative:**

-

**Appellant II:**  
(Opponent II)

Oskar Frech GmbH + Co.  
Schorndorfer Strasse 32  
73614 Schorndorf-Weiler  
ALLEMAGNE

**Representative:**

Wilhelm, Hans-Herbert  
Wilhelm & Dauster  
Patentanwälte  
Hospitalstrasse 8  
70174 Stuttgart  
ALLEMAGNE

**Respondent:**  
(Proprietor of the patent)

Ube Industries, Ltd.  
12-32, Nishihonmachi 1-chome  
Ube-shi  
Yamaguchi-ken 755-0052  
JAPON

**Representative:**

Adams, William Gordon  
Raworth, Moss & Cook  
36 Sydenham Road  
Croydon  
Surrey CR0 2EF  
ROYAUME-UNI

**Decision under appeal:**      **Decision of the Opposition Division of the**

European Patent Office dated 14 January 1997,  
posted on 20 February 1997, rejecting the  
oppositions filed against European patent  
No. 0 361 837 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. In the oral proceedings of 14 January 1997 the opposition division rejected the oppositions against European patent No. 0 361 837; the written decision was posted on 20 February 1997.

II. Granted claims 1 and 16 of EP-B1-0 361 837 read as follows:

"1. A method of controlling a casting process for obtaining a cast product from a substance to be cast, including injecting the substance into a die cavity (44) of casting dies (41,42) by an injecting plunger (48), applying a squeeze pressure to the substance (46) to be molded in the die cavity from a squeezing plunger (45) operated by a fluid-operated pressurizing cylinder (1) characterised by comprising the steps of:

predetermining a desired curve (St versus t) with respect to an amount of stroke movement (St) of said squeezing plunger and versus elapse of time (t) from a start of stroke movement of said plunger into said die cavity; and

controlling an actual stroke movement (Stb) of said squeezing plunger from said start of stroke movement thereof to copy said desired curve when said squeezing pressure is applied to said substance to be cast in said die cavity."

and

"16. An apparatus for controlling a casting operation of a casting machine provided with an assembly of

casting dies (41,42) and a core element (43) cooperable with the casting dies to define a die cavity (44) when the casting dies and the core element are mated together, an injecting plunger (48) operable to inject a substance (46) to be cast into the die cavity, a fluid-operated injecting cylinder operating the injecting plunger, a squeezing plunger (45) slidably disposed in a part (41) of the casting dies and operable to be moved into the die cavity to thereby apply to squeeze pressure to the substance injected in the die cavity, and a fluid-operated pressurizing cylinder (1) operating the squeezing plunger, characterized in that it comprises:

a position detecting means (3) for generating an electric signal (St') indicating a detection of a position of said squeezing plunger moved from a predetermined retracted position thereof;

valve means (4) for adjustably changing a fluid pressure supplied from a fluid pressure source to said fluid-operated pressurizing cylinder in response to an extent of a valve drive signal (Prf) to thereby control an actual stroke movement of said squeezing plunger,

valve drive means (9) for generating the valve drive signal upon receipt of a drive command signal (Pc,p1); and

a first feedback control means (11) including: at least one command signal setting means (12) for presetting therein a desired curve with respect to a desired amount of stroke movement (St) of said squeezing plunger versus an elapse of time (t) from a start of stroke movement of said squeezing plunger into said die cavity, said command signal

setting means being capable of generating an output signal (St) indicating said desired amount of stroke movement of said squeezing plunger derived from said desired curve; and a signal processing means (13) capable of detecting an error (e) between said electric signal of said position detecting means and said output signal of said command signal setting means, and generating said drive command signal as at least one feedback signal (V1) to be supplied to said valve drive means, said drive command signal varying in response to an extent of said error detected by said signal processing means to enable said stroke movement of said squeezing plunger to copy said desired curve."

- III. Against the above decision of the opposition division opponent I - appellant I in the following - lodged an appeal on 15 March 1997 paying the appeal fee on the same day and filing the statement of grounds of appeal on 23 June 1997.
  
- IV. Opponent II - appellant II in the following - filed an appeal on 15 April 1997 and paid the appeal fee on the same day. With a Communication pursuant to Article 108 and Rule 65(1) EPC dated 17 July 1997 the EPO informed appellant II that it appeared from the file that a written statement setting out the grounds of appeal filed with letter of 14 April 1997 against the decision of the opposition division of the EPO of 20 February 1997 had not been filed.
  
- V. Appellant I requested to set aside the impugned decision and to revoke the patent. The proprietor of

the patent - respondent in the following - requested to dismiss the appeal (**main request**) or to maintain the patent on the basis of one of the **auxiliary requests I to IV** filed on 11 October 1999.

VI. In the oral proceedings before the board held on 13 October 1999 appellant II who had been duly summoned was not present so that these were continued without him pursuant to Rule 71(2) EPC.

VII. Appellant I and the respondent essentially argued as follows:

(a) appellant I

- US-A-4 469 164 (E1) is a novelty destroying document with respect to the subject-matter of granted claim 1 since in (E1) a desired curve is predetermined and since the actual stroke movement is controlled (see column 7, lines 30 to 37);
- countermeasures mentioned in (E1) to be taken against production of defective products is a clear teaching for a skilled person even if the movements of the counterplunger are not literally described in (E1);
- even if (E1) is not accepted as a novelty-destroying document the subject-matter of granted claim 1 is not patentable since a combination of (E1) and GB-A-2 056 338 (D3) renders obvious the claimed subject-matter;
- the parameters velocity/pressure/way are closely



related to one another and are to be seen as "countermeasures to be taken" according to (E1);

- choosing the tip movement of the counterplunger is one possibility which comes into the mind of a skilled person confronted with the problem of shrinkage and defective products; (D3) teaches moreover the use of a pressure plunger;
- the comparison of predetermined and actual parameters (values) makes it necessary to carry out specific movements of the plungers be it for reasons of maintenance of quality or for economic reasons; since movements of the plungers out of contact with the molten metal have no real effect, it is clear for a skilled person that their movements are only relevant when in contact with the molten metal.

(b) respondent

- the counterplunger of (E1) does not represent a pressure plunger which compensates for shrinkage of the solidifying metal. Rather, it is a movable support for the molten metal; from (E7), (a sketch derived from (E1)), it is clear that no squeezing effect can be achieved with the counterplunger since a skilled person is readily aware that it is moved away from the casting in a final step of casting and not vice versa;
- the counterplunger of (E1) is not always in contact with the molten metal since an air cushion between its tip and the surface of the molten

metal largely prevents such a contact;

- the voltage curve "b" according to Figure 3 of (E1) does not represent the actual movements of the counterplunger and Figure 1 of (E1) cannot be interpreted as representing the starting point of the counterplunger, rather its end position;
- (E1) is therefore not a novelty - destroying document with respect to the subject-matter of granted claim 1 which is in addition not rendered obvious by (E1) and/or (D3);
- (E1), if its disclosure is considered to be at any relevance at all, discloses the problem of the invention but not its solution.

## **Reasons for the Decision**

### *1. Admissibility of the appeals*

1.1 The appeal of appellant I is admissible.

1.2 The appeal of appellant II is inadmissible for the following reasons:

Contrary to Article 108 EPC appellant II did not file the grounds of his appeal so that this appeal is inadmissible according to Rule 65(1) EPC.

*Main request*

2. *Novelty*

2.1 In (E1) an apparatus is disclosed which comprises two plungers, namely the injection plunger "6" and the counterplunger "7" according to Figure 1 of (E1). The function and operation of the latter plunger is not unambiguously defined in (E1).

2.2 After long discussions in the oral proceedings and consideration of the written statements of the parties and the opposition division the board comes to the conclusion that the known counterplunger "7" constitutes nothing other than a movable bottom of the die-cavity which in the starting phase of a production-cycle acts as a valve preventing molten metal from entering into the die-cavity and thereafter - at a later stage - **being lowered** into a position in which molten metal is allowed to enter into the die-cavity. Following this interpretation the movements of the counterplunger according to Figure 3 of (E1) have nothing to do with the application of a specific pressure compensation for any negative influences of metal-shrinkage on the quality of a cast product.

2.3 Contrary to this teaching claim 1 prescribes an active counterplunger which is controlled by feedback signals derived from a comparison of predetermined and actual stroke positions so that any wished pressure can be applied to the molten/solidifying metal within the die-cavity. These proceedings safeguard high quality of the cast products since the negative influence of too low pressure caused by shrinkage of the molten metal can be compensated for. Detrimental air gaps between the tips of the plungers and the molten metal are moreover

minimized which fact is favourable with respect to cooling. Appellant's arguments relating to the equivalence of the parameters velocity-pressure-stroke of a plunger and the importance of a tip movement are therefore not supported by (E1). Rather, they are the result of an ex post facto analysis.

2.4 The board is convinced that respondent's "sketch A" - (E7) in the proceedings - which is an interpretation of what happens in (E1) correctly reflects the function and operation cycle of the two plungers of the casting machine laid down in (E1). Under these circumstances it is of no relevance whether or not in Figure 3 of (E1), (see curve "b"), the actual stroke of the counterplunger or simply a voltage curve is shown.

2.5 The appellant pointed to column 7, lines 30 to 37, of (E1) in which "countermeasures" against defective products are mentioned. This information has, however, to be seen in the light of the complete teaching of (E1) which is based on "inspecting the quality of a casting" produced by a die-casting machine. Any statements in (E1) that abnormal values are modified into normal conditions (see column 1, lines 58 to 65) do not refer to a cast product at a specific time, but rather **to the next** product to be cast. In the proper sense (E1) has therefore no direct feedback-arrangements since it only allows the judgement that normal casting-values lead to correct cast products in contrast to the existence of abnormal values. It is therefore only possible to modify the casting parameters in that **the next article** to be cast can be cast under normal conditions.

2.6 Under these circumstances (E1) is not a novelty-destroying document with respect to the subject-matter of claim 1. Since independent claim 16 as granted (apparatus claim) is closely related to granted claim 1 its subject-matter is likewise novel.

3. *Inventive step*

3.1 In above remark 2 it is set out that (E1) has no counterplunger within the meaning of granted claims 1 and 16, i.e. a plunger which compensates for shrinkage of molten metal when solidifying in the die-cavity, and that (E1) does not disclose a control mechanism which allows - in combination with only one product to be cast - the modification of casting parameters, namely basically the stroke movement versus time, such that an actual curve between these parameters is brought into agreement with a predetermined curve between these parameters. Considering these fundamental differences in function and operation of the two plungers present in (E1) and in the claimed invention, the disclosure of (E1) is irrelevant for any assessment of the inventive contribution to the prior art even if (E1) is seen in combination with further prior art.

3.2 The appellant turned to (D3) and argued that (D3) in combination with (E1) directly leads to the subject-matter claimed.

3.3 (D3) was already dealt with in respondent's letter of 8 January 1998, (see remarks 4 and 5 on pages 20/21). The board shares respondent's findings that (D3) is irrelevant with respect to the claimed invention since no **actual** stroke movement is controlled such that a

**predetermined** curve between stroke movement of a squeezing plunger and time is controlled. (D3) aims at a solution to the problem of how the squeezing plunger can be protected from being blocked in its axial movement, (see page 1, lines 20 to 27). The solution to this problem is laid down in claims 1, 2 and 5 as well as in Figures 2, 3, 12 and 13 of (D3), namely by creating an annular gap between the squeezing plunger and its sleeve.

3.4 Starting from (E1) and being confronted with the problem of shrinkage of solidifying metal in a die-cavity a skilled person could not derive from the prior art such as (E1) and (D3) useful hints to directly achieve the claimed subject-matter. Appellant's argument that to safeguard quality the person skilled in the art simply needs the comparison of actual and predetermined values is the result of **inadmissible hindsight** since (E1) clearly offers a possibility which is technically different from the claimed subject-matter, namely in that abnormal values are modified with respect **to the next** product to be cast. What is still missing in the prior art is the step that not only the quality is judged from casting parameters observed during a single casting-cycle and modified in a further casting-cycle, but rather this is done in one and the same casting-cycle as in EP-B1-0 361 837.

3.5 Summarizing, the subject-matter of granted claims 1 and 16 is based on an inventive step within the meaning of Articles 56 and 100(a) EPC so that these claims are allowable. This is also true for the dependent claims, namely granted claims 2 to 15 and 17 to 26 which concern further embodiments of the invention. Under

these circumstances EP-B1-0 361 837 has to be maintained as granted.

*Auxiliary requests*

4. The **main request** being allowable, it is not necessary to discuss the merits of the auxiliary requests filed on 11 October 1999.

**Order**

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

1. The appeal of appellant II is rejected as inadmissible.
2. The appeal of appellant I is dismissed.

The Registrar:

The Chairman:

N. Maslin

C. T. Wilson