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**Datasheet for the decision
of 14 April 2011**

Case Number: T 0697/09 - 3.2.08

Application Number: 98300309.6

Publication Number: 0864658

IPC: C21B 13/14

Language of the proceedings: EN

Title of invention:

Refining iron ore

Patent Proprietor:

Linde, Inc.

Opponent:

Outotec GmbH

Headword:

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Relevant legal provisions:

EPC Art. 56

Relevant legal provisions (EPC 1973):

-

Keyword:

"Inventive step (no)"

Decisions cited:

-

Catchword:

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Case Number: T 0697/09 - 3.2.08

D E C I S I O N
of the Technical Board of Appeal 3.2.08
of 14 April 2011

Appellant: Linde, Inc.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 19 January 2009
revoking European patent No. 0864658 pursuant
to Article 101(3)(b) EPC.

Composition of the Board:

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

Summary of Facts and Submissions

- I. By its decision dated 19 January 2009, the opposition division revoked European patent No. 0 864 658.

The opposition division held that the subject matter of claim 1 of the main, first and second auxiliary requests then on file did not involve an inventive step with respect to the technical disclosure of document

D1: EP-A-0 222 452.

- II. On 26 March 2009, the patent proprietor (appellant) lodged an appeal against the decision, and paid the appeal fee on the same date. The statement setting out the grounds of appeal was received on 27 May 2009.
- III. In a communication annexed to the summons to oral proceedings, the Board gave its provisional view on the case. In particular, the subject matter of claim 1 of the new main request enclosed with the appellant's statement of the grounds of appeal was held to lack an inventive step over the disclosure of document D1.
- IV. Oral proceedings took place on 14 April 2011. Although duly summoned the appellant did not attend the oral proceedings, as announced by letter dated 11 March 2011. In accordance with Rule 115(2) EPC and Article 15(3) RPBA, the proceedings were continued without that party.

The appellant requested in the written proceedings that the decision under appeal be set aside and the patent be maintained on the basis of the claims 1 to 8 according to the main request filed on 27 May 2009.

The respondent (opponent) requested that the appeal be dismissed.

V. Claim 1 of the main request reads:

"A method of producing iron by refining iron ore comprising: feeding an iron ore feed, a carbon-containing substance, and an oxygen containing gas into a secondary reactor to produce products comprising gas and hot solids containing char and partly reduced iron ore; separating and removing at least about 90% of the calorific gas from the products produced within the secondary reactor to form an intermediate feed; introducing the intermediate feed into a primary reactor without substantial cooling of the hot solids; and reducing to liquid metallic iron the partly reduced iron ore within the primary reactor to form at least part of a liquid iron containing product, wherein the secondary reactor is operated at a temperature less than that of the primary reactor and the carbon-containing substance is coal, and wherein the gas produced in the secondary reactor is a calorific gas comprising carbon dioxide and carbon monoxide in a ratio not less than 0.25."

Dependent claims 2 to 8 relate to preferred embodiments of the method set out in claim 1.

VI. The appellant's arguments necessary for the present decision can be summarized as follows:

D1 was concerned with the reduction of higher metal oxides to lower metal oxides having the desired

oxidation state and to minimize the carbon content of the reduced material. Specifically, the nickel oxides were reduced to nickel metal, but the iron oxides were reduced only to FeO, and in the melting process only a small amount of iron was formed. In fact the formation of iron was avoided by the process of document D1.

The term "iron" featuring in claim 1 should be interpreted as to exclude ferroalloys from its scope. Document D1 was, however, concerned with the production of ferronickel and did not disclose a method of refining iron, as did the patent. The underlying principles of the invention, that was feeding of carbon from the secondary to the primary reactor so as to produce heat and reducing gas that facilitate the desired reduction in the primary reactor could not be derived from the teaching of D1 and there is no teaching about energy savings.

The approach to inventive step made by the opposition division in the decision was therefore based on an incorrect understanding of the technical teaching of document D1 and the patent.

The subject matter of claim 1 was therefore novel and involved an inventive step.

VII. The respondent's arguments necessary for the present decision can be summarized as follows:

The subject matter of claim 1 did not involve an inventive step having regard to the technical disclosure of document D1 and the general knowledge of the person skilled in the art.

Reasons for the Decision

1. The appeal is admissible.
2. Contrary to the appellant's position submitted in the grounds of appeal, the term "iron" in claim 1 cannot be interpreted so narrowly as to exclude for instance "ferro-alloys" from its scope. In that respect, the patent specification teaches clearly and unambiguously that the claimed process results at least in part in liquid iron containing products or in a liquid metallic iron-rich phase (the patent specification, paragraph [0001]; column 2, line 17, lines 31 to 35 and 55; column 3, lines 39 to 44; claim 1, lines 14, 15). This implies that the term "iron" featuring in claim 1 can comprise various other alloying elements including for instance Ni or Mn in substantial amounts. Hence, the amendment to claim 1 does not constitute a delimitation of the claimed subject matter from the subject matter of the prior art D1 producing also iron containing products.
3. Like the patent at issue, document D1 is concerned with a method of pre-reducing ore fines containing oxides of Fe, Ni, Mn etc in a "secondary reactor" (24). To this end, oxygen gas (25), coal (26) and calcined ore fines (23) are fed into the fluidised bed reactor (24), (D1, Figure and page 4, lines 41 to 45). The secondary reducing reactor (24) produces a partially reduced iron ore plus carbon (21.4% FeO, 1.9% Ni and 1.37% C) and a calorific gas (18.8% CO, 17.6% CO₂, 6.3% H₂, 50.5% N₂, 7.4% H₂O; ratio CO₂/CO = 0.94) which is removed

completely from the secondary reactor through pipes (27) and (30) (D1, figure; example, page 5, lines 23 to 35). The intermediate pre-reduced feed is then transferred to a primary reactor which is not shown in the Figure. As mentioned in document D1, page 5, lines 54 to 55, an electric arc furnace could be chosen for further reducing the intermediate feed to form a liquid iron containing product, preferably a ferro-nickel-alloy.

Document D1 does not disclose the feature of "introducing the intermediate feed into the primary reactor *without substantial cooling of the hot solids*" set out in claim 1 of the patent at issue, and there is no teaching about energy savings.

The skilled person is, however, well aware of the fact that cooling and reheating the intermediate feed to the reduction temperature in the primary furnace would result in a substantial consumption of energy and time, i.e. in costs which obviously could be saved by feeding the hot intermediate pre-reduced material without substantial temperature loss directly into the primary reactor. Doing so would be close at hand for the person skilled in the art. Contrary to the appellant's position, the reasoning of the opposition division in its approach to inventive step of the subject matter of claim 1 is considered as being correct.

The subject matter of claim 1 therefore does not involve an inventive step.

4. By the Board's preliminary assessment of the case, which was summarized in the official communication annexed to the summons to oral proceedings, the

appellant was informed about the objections and arguments given in the preceding paragraphs. The appellant however dispensed with presenting any counter-arguments or statements in response to the Board's provisional opinion.

Order

For these reasons it is decided that:

1. The appeal is dismissed.

The Registrar:

The Chairman:

V. Commare

T. Kriner