

389

AVISO DE NOTIFICACION

0103

CORREO CERTIFICADO

Radicación :00030114 00000011 Fecha: 24/03/2006 8:24:48
Tramite :2 PATENTES DE INVENCION
Evento :1 REGISTRO/DEPOSITO/CONCESION/DEPOSITO
Actuación :432 COMUNICACION ACTO ADMINISTRATIVO
Solicitante :DELGADO VILLEGAS JAIME EDUARDO Folios:1

Bogotá, D.C.

Señor (a) (es)
DELGADO VILLEGAS JAIME EDUARDO
AVENIDA 22 PARK WAY NO. 37-31 OFC. 202
BOGOTA D.C.

REF: RESOLUCION No: 6929
FECHA No. 23/03/2006
EXPEDIENTE No. 0 30114
Tramite :2 PATENTES DE INVENCION
Evento :1 REGISTRO/DEPOSITO/CONCESION/DEPOSITO
Actuación :432 COMUNICACION ACTO ADMINISTRATIVO

Estimado Doctor (a) :

Comendidamente le solicito presentarse a este Despacho ubicado en la Carrera 13 No. 27 - 00 Piso Quinto (5), de la ciudad de Bogotá D.C., dentro del término de cinco (5) días hábiles contados a partir del envío de la presente citación, en horario de 8:30 a.m. a 5:00 p.m. jornada continua, con el fin de notificarle personalmente el contenido de la resolución de la referencia proferida dentro del expediente tramitado con el número de radicación citado en el asunto.

De no hacerse presente en el término indicado anteriormente, la providencia en mención se notificará por edicto, el cual se fijará por el término de diez (10) días en el Centro de Documentación e Información. Para su comodidad el texto completo de la resolución se encontrará disponible en la página web de la Entidad, desde el día hábil siguiente al que se desfije el edicto.

La consulta del listado notificación y del acto administrativo puede ser realizada desde un computador con acceso a Internet, en la página web www.sic.gov.co, con el número de resolución a través de la opción servicios en línea - caracter general - consulta actos administrativos.

Secretaría General
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

Superintendencia de Industria y Comercio

Otorga la Patente de Invención a:

*Falcombridge Limited
Toronto, Ontario, Canada*

A la Creación denominada:

"Reduccion de laterita en un reactor con gases reductores generados in situ"

Inventor(es):

*Bon Phoneyville
Gary Kaiura
Terrence Koehler*

Certificado No:28633

*Clasificación Internacional: C21B 13/0
de Patentes*

*16 Reivindicaciones
Vigente Desde: 26/04/2000
Hasta: 26/04/2020*

Prioridad No: US 09/299,080 26/04/1999

Que la solicitud de Patente de Invención No 030114 cumple con los requisitos previstos en las disposiciones legales vigentes, Resolución No. 6929 de 23/03/2006, en testimonio de ello se estampa la firma del funcionario competente y el sello de esta Entidad.

Superintendente de Industria y Comercio



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Europäisches
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Generaldirektion 2

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des brevets

Direction Générale 2

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Cabinet Beau de Lomélie
158, rue de l'Université
75340 Paris Cedex 07
FRANCE



Application No.
00 922 375.1 - 2122

Ref.
SOB J175080-4

Date
14.03.2005

Applicant:
Falconbridge Limited

Communication under Rule 51(4) EPC

You are informed that the Examining Division intends to grant a European patent on the basis of the above application with the text and drawings as indicated below:

In the text for the Contracting States:
FR

Description, Pages

1-6, 8, 11-14 as published
7, 9, 10 received on 09.02.2005 with letter of 08.02.2005

Claims, Numbers

1-12 received on 09.02.2005 with letter of 08.02.2005

With the following amendments to the above-mentioned documents by the examining division

Description, Pages 6, 14"

Comments

- * adaption to the amended claims (Rule 27(1)c) EPC)
- ** deletion of unclear statement (Art. 84 EPC)

A copy of relevant documents is enclosed

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Date 14.03.2005

Sheet 2

Application No.: 00 922 375.1

The title of the invention in the three official languages of the European Patent Office, the international patent classification, the designated Contracting States, the registered name of the applicant and the bibliographic data are shown on the attached EPO Form 2056.

You are requested **within four months** of this notification

1.	to file 1 set of translations of the claim(s) in the two other EPO official languages;		EUR
2a.	to pay the fee for grant including the fee for printing up to and including 35 pages; Reference 007		715.00
2b.	to pay the printing fee for the 36th and each additional page; number of pages: 0	Reference 008	0.00
3.	to pay the additional claim fee(s) (Rule 51(7) EPC); number of claims fees payable: 0	Reference 016	0.00
	Total amount		715.00

Concerning the possibility of a request for accelerated grant pursuant to Article 97(6) EPC, reference is made to OJ EPO 2001, 459.

If the grant, printing or claims fees are not paid, or the translations not filed, in due time the European patent application will be deemed to be withdrawn (Rule 51(8) EPC).

For all payments you are requested to use EPO Form 1010 or to refer to the relevant reference number.

If additional copies of the patent specification are required, you should request this in writing and quote Fee reference code 058 when making payment.

Translation of the priority document(s)

If the translation of the priority document(s), as required by Article 88(1) EPC, or the declaration according to Rule 38(5) EPC has not yet been filed, Form 2530 will be despatched separately. The translation is to be filed within the above mentioned time limit (Rule 38(5) EPC).

Note on payment of renewal fees

If a renewal fee falls due between notification of the present communication and the proposed date of publication of the mention of the grant of the European patent, publication will be effected only after the renewal fee and any additional fee have been paid (Rule 51(9) EPC).

Under Article 86(4) EPC, renewal fees are payable to the European Patent Office until the year in which the mention of the grant of the European patent is published.

Filing of translations in the Contracting States

Pursuant to Article 65(1) EPC the following Contracting States require a translation of the specification of the European patent in their one of their official language(s) (Rule 51(10) EPC). Insofar this specification will not be published in their one of their official language(s)



Date 14.03.2005

Sheet 3

Application No.: 00 922 375.1

- within **three** months of publication of the mention of such decision:

FR FRANCE

The date on which the European Patent Bulletin publishes the mention of the grant of the European patent will be indicated in the decision on the grant of the European patent (EPO Form 2006).

The translation must be filed with the national Patent Offices of the Contracting or Extension States in accordance with the provisions applying thereto in the State concerned. Further details (e.g. appointment of a national representative or indication of an address for service within the country) are given in the EPO information brochure "National law relating to the EPC", and in the supplementary information published in the Official Journal of the EPO, or available on the EPO website.

Failure to supply such translation to the Contracting and Extension States in time and in accordance with the requirements may result in the patent being deemed to be void ab initio in the State concerned.

Note to users of the automatic debiting procedure

Unless the EPO receives prior instructions to the contrary, the fee(s) will be debited on the last day of the period of payment. For further details see the Arrangements for the automatic debiting procedure (see Supplement to OJ EPO 2, 2002).

Examining Division:

Chairman:	Bjoerk, P
2nd Examiner:	González-Junquera, J
1st Examiner:	Boureau, J-L



Sánchez Gomez, P
For the Examining Division
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Enclosure(s): Form 2056
17 Copies of the relevant documents



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Telephone Numbers:

Primary Examiner -49 89 2399-8454
(substantive examination)

Formalities Officer / Assistant -49 89 2399-2227
(Formalities and other matters)



Application No. 00 922 375.1-2122	Ref. SOB J175080-4	Date 24.06.2003
Applicant Falconbridge Limited		

Communication pursuant to Article 96(2) EPC

The examination of the above-identified application has revealed that it does not meet the requirements of the European Patent Convention for the reasons enclosed herewith. If the deficiencies indicated are not rectified the application may be refused pursuant to Article 97(1) EPC.

You are invited to file your observations and insofar as the deficiencies are such as to be rectifiable, to correct the indicated deficiencies within a period

of **4** months

from the notification of this communication, this period being computed in accordance with Rules 78(2) and 83(2) and (4) EPC.

One set of amendments to the description, claims and drawings is to be filed within the said period on separate sheets (Rule 36(1) EPC).

Failure to comply with this invitation in due time will result in the application being deemed to be withdrawn (Article 96(3) EPC).



BOUREAU J M
Primary Examiner
for the Examining Division

Enclosure(s): 3 page/s reasons (Form 2906)

**Beschied/Protokoll (Anlage)**

Datum
Date 24.06.2003
Date

Communication/Minutes (Annex)

Blatt
Sheet 1
Feuille

Notification/Procès-verbal (Annexe)

Arme de No.:
Application No.: 00 922 375.1
Demande n°:

The examination is being carried out on the **following application documents:**

Text for the Contracting States:
FR

Description, pages:

1-14 as published

Claims, No.:

1-22 as received on 20.01.2003 with letter of 16.01.2003

The observations of the Applicant with letter of 16.01.2003 have been carefully considered.

The present independent claims 1, 15, 21 and 22 are generally deficient in that they define the invention in different ways so that it cannot be determined which features are essential to the invention (Article 84 and Rule 29(1) EPC). Said claims further relate to methods which do not involve an inventive step in the sense of Article 56 EPC, as explained below.

Claim 1

The Applicant submits that the claimed free space velocity (fsv) is much lower than in document D1 (column 3, lines 49-54) where the target extent of reduction and residual carbon content is only achievable by multiple passes through the reactor of calcine and coal feed.

These arguments are not relevant because they are obviously based on the operative conditions of the circulating fluidized bed in the calcining reactor (10). In document D1, the reduction step is carried out in reactor (24) which is a stationary fluidized bed (D1, column 2, lines 46-48; column 5, lines 9-12). The fsv in reactor (24) is certainly much lower than in reactor (10).



Beschuld/Protokoll (Anlage)

Communication/Minutes (Annex)

Notification/Procès-verbal (Annexe)

Datum
Date 24.06.2003

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Sheet 2
Feuille

Anno de-M.:
Application No.: 00 922 375.1
Demande n°:

Like in D1, the method of the present invention is preferably carried out in a pre-reduction vessel fed by calcined laterite ore coming from a fluidized bed calciner (see the present description, page 8, lines 7-9 and page 14, lines 1-6).

Moreover, the claimed fsv is presented in the description as a typical value (page 10, lines 4-8) of only one of parameters controlled for achieving a residual carbon content of about 0.1% (page 8, lines 14-18).

That means that the claimed fsv does not seem to be the essential feature or the only essential feature of the invention, all the more as claim 1 is not restricted to any carbon content of the recovered reduced calcine product.

The process of claim 1 may be regarded as novel because the claimed range of fsv is the only feature which is not explicitly disclosed by document D1. However it does not appear to involve an inventive step because said difference is determined by common routine measures.

Claim 15

The volatile matter content specified in amended claim 15 is not disclosed by document D1 but its selection does not appear to be inventive. The reason is that the teaching of D1, column 2, lines 53-68, achieves the same effects and advantages as the invention, namely in-situ production of reducing gases CO and H₂ by complete gasification of the carbonaceous reducing agent (see the present specification page 7, lines 14-16; page 8, lines 9-12). The teaching of D1 is not restricted to the kind of coal exemplified in column 5, lines 47-53.

Furthermore, D1, column 4, lines 2-9 discloses that the carbonaceous reducing agent is preferably distributed in the stationary fluidized bed. That means that, contrary to one of the Applicant's arguments, it is not immediately entrained by the offgas.

The Applicant's submissions given from page 3, last paragraph to page 4, first paragraph are not understood because they do not concern the particle size of the carbonaceous material and the independent claims do not specify any particle

**Beschold/Protokoll (Anlage)**

Datum
Date 24.06.2003
Date

Communication/Minutes (Annex)

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Sheet 3
Feuille

Notification/Procès-verbal (Annexe)

Anmeldung-Nr.:
Application No.: 00 922 375.1
Demande n°:

size of the oxide material or laterite.

Claims 21 and 22

In addition to the features of claims 1 and 15, present claims 21 and 22 require the two following conditions:

- (i) a reactor offgas CO/CO₂ ratio of between 0.3 and 2.0
- (ii) a reactor discharge having a carbon content less than about 1.5%

These conditions are, however, fulfilled by the method of D1 (see column 5, lines 66, 67 and column 6, line 7).

Since the remaining features of claims 21 and 22 are either known or obvious from D1 (see above and the International preliminary examination report), these claims relate to non-inventive methods.

It is not at present apparent which part of the application could serve as a basis for a new, allowable claim. Should the applicant nevertheless regard some particular matter as patentable, an independent claim should be filed taking account of Rule 29(1) EPC. The applicant should also indicate in the letter of reply the difference of the subject-matter of the new claim vis-à-vis the state of the art and the significance thereof.



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Telephone Numbers:

Primary Examiner -49 89 2399-8454
(substantive examination)

Formalities Officer / Assistant -49 89 2399-2227
(Formalities and other matters)



Application No. 00 922 375.1-2122	Ref. SOB J175080-4	Date 04.04.2002
Applicant Falconbridge Limited		

Communication pursuant to Article 96(2) EPC

The examination of the above-identified application has revealed that it does not meet the requirements of the European Patent Convention for the reasons enclosed herewith. If the deficiencies indicated are not rectified the application may be refused pursuant to Article 97(1) EPC.

You are invited to file your observations and insofar as the deficiencies are such as to be rectifiable, to correct the indicated deficiencies within a period

of 4 months

from the notification of this communication, this period being computed in accordance with Rules 78(2) and 83(2) and (4) EPC.

Amendments to the description, claims and drawings are to be filed where appropriate within the said period in **three copies** on separate sheets (Rule 36(1) EPC).

Failure to comply with this invitation in due time will result in the application being deemed to be withdrawn (Article 96(3) EPC).



BOUREAU J M
Primary Examiner
for the Examining Division

Enclosure(s): 1 page/s reasons (Form 2906)

**Beschaid/Protokoll (Anlage)**

Datum
Date
Date 04.04.2002

Communication/Minutes (Annex)

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Sheet
Fouille 1

Notification/Procès-verbal (Annexe)

Arrêté de N° :
Application No.: 00 922 375.1
Demande n° :

The examination is being carried out on the **following application documents:**

Text for the Contracting States:

AT BE CH LI CY DE DK ES FI FR GB GR IE IT LU
MC NL PT SE

Description, pages: 1-14

as published

Claims, No.: 1-19

as published

An international preliminary examination report has already been drawn up for the present application in accordance with the PCT. The deficiencies mentioned in that report give rise to objections under the corresponding provisions of the EPC.

In order to facilitate the examination of the conformity of the amended application with the requirements of Article 123(2) EPC, the applicant is requested to clearly identify the amendments carried out, irrespective of whether they concern amendments by addition, replacement or deletion, and to indicate the passages of the application as filed on which these amendments are based.

If the applicant regards it as appropriate these indications could be submitted in handwritten form on a copy of the relevant parts of the application as filed.

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 02 JUL 2001

WIPO PCT

Applicant's or agent's file reference F37	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/CA00/00470	International filing date (day/month/year) 25/04/2000	Priority date (day/month/year) 26/04/1999
International Patent Classification (IPC) or national classification and IPC C22B23/02		EPO - DG 1
Applicant FALCONBRIDGE LIMITED		13. 09. 2001

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:
- I ☒ Basis of the report
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☒ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand

24/11/2000

Date of completion of this report

28.06.2001

Name and mailing address of the international preliminary examining authority:

 European Patent Office
D-80286 Munich
Tel. +49 89 2339-0 Telex 523656 eppo d

Authorized officer

Boureau, J-L



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/CA00/00470

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-14 as originally filed

Claims, No.:

1-19 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/CA00/00470

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims 9,13,15,17,19
	No: Claims 1-8,10-12,14,16,18
Inventive step (IS)	Yes: Claims
	No: Claims 1-19
Industrial applicability (IA)	Yes: Claims 1-19
	No: Claims

**2. Citations and explanations
see separate sheet**

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA00/00470

1. Reference is made to the following document:

D1: US-A-4 789 580 (HIRSCH MARTIN ET AL) 6 December 1988 (1988-12-06)

2. Document D1 (claims 1 and 4; column 1, line 64 to column 2, line 58;) discloses a method for reducing higher valencies of a metal oxide, e.g. iron oxide in lateritic ores, to lower valencies. The main purpose is to facilitate the subsequent smelting step in the production of iron-nickel alloys.

Metal oxides are first calcined in a fluidized bed reactor and the calcined product is prereduced at a temperature of 800-1100°C in a fluidized bed which is supplied with a carbonaceous reducing agent and oxygen-containing gases (air) to reduce the higher metal oxides to lower metal oxides.

The oxygen-containing gases are supplied at such a rate that the carbonaceous reducing agent is gasified to such a degree that the discharged matter has a low carbon content (column 2, lines 53-57). The carbonaceous reducing agent is supplied at a rate effective to reduce the metal oxide to a lower valency, to maintain the reduction temperature and to minimize the carbon content in the discharged matter.

The iron oxides contained in calcined lateritic ores are substantially reduced to an FeO state and the prereduced material contains not more than 2 wt% of carbon (column 4, lines 10-17). An example is given from column 5, line 28 to column 6, line 13 (see especially column 5, line 65 to column 6, line 7).

The above known method falls within the terms of claim 1.

Consequently, the subject-matter of claim 1 is not novel (Article 33(2) PCT).

3. Document D1 does not specify the particle size of the carbonaceous material given in present independent claim 15.

Although the subject-matter of claim 15 may, therefore, be regarded as novel, this difference alone comes within the scope of the customary practice followed by

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA00/00470

persons skilled in the art, especially as the advantages thus achieved can readily be foreseen. Consequently, the subject-matter of claim 15 also lacks an inventive step (Article 33(3) PCT). This opinion applies to **claim 9**.

The additional features of dependent **claims 2-8,10-12,14,16,18** are either explicitly or implicitly disclosed by document D1. In addition, the coal analysis and heat value given in column 5, lines 48-53 correspond to high volatile bituminous coal grade being quite close to a sub-bituminous grade, rendering, thus, the feature of **claim 17** obvious.

Claims 13 and 19 concern a reaction parameter which would be determined by routine measures on the basis of the data given in document D1, in order to achieve optimal conditions for a high reduction rate.

Document D1 does not disclose a carbon content of 0.1 wt% in the reduced material. However, the process features given on page 8, lines 14-18 of the description in order to achieve this result are too vague for making a difference with the disclosure of document D1.

4. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

INTERNATIONAL SEARCH REPORT

Internal Application No
PCT/CA 00/00470

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C22B23/02 C22B5/14 C22B5/10 C22B1/10 C21B13/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C22B C21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, EPO-Internal, PAJ, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 789 580 A (HIRSCH MARTIN ET AL) 6 December 1988 (1988-12-06)	1-12, 14-16
A	the whole document	13,17-19
X	FR 1 025 051 A (THE MOND NICKEL) 17 April 1953 (1953-04-17) page 5 -page 6	1-5,7, 10,11

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

10 August 2000

Date of mailing of the international search report

21/08/2000

Name and mailing address of the ISA
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Fax: (+31-70) 340-3019

Authorized officer

Bombeke, M

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Internat. Application No

PCT/CA 00/00470

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4789580 A	06-12-1988	DE 3540541 A	21-05-1987
		AU 588647 B	21-09-1989
		AU 6513486 A	21-05-1987
		BR 8605633 A	18-08-1987
		CA 1266368 A	06-03-1990
		DE 3662700 D	11-05-1989
		EP 0222452 A	20-05-1987
		GR 88300159 T	08-03-1989
		GR 3000079 T	31-10-1990
		IN 166635 A	30-06-1990
		NO 864490 A,B,	18-05-1987
		NZ 217937 A	27-07-1989
FR 1025051 A	17-04-1953	NONE	

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(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11) EP 1 190 106 B1

(12) EUROPEAN PATENT SPECIFICATION

- (45) Date of publication and mention of the grant of the patent:
28.09.2005 Bulletin 2005/39

(51) Int Cl.7: C22B 23/02, C22B 5/14, C22B 5/10, C22B 1/10, C21B 13/00
- (21) Application number: 00922375.1

(86) International application number:
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(54) FLUIDIZED BED REDUCTION OF LATERITE FINES WITH REDUCING GASES GENERATED "IN SITU"

WIRBELBETT-REDUKTION VON LATERIT-FEINERZEN MIT "IN SITU" ERZEUGTEN REDUKTIONSGASEN

REDUCTION DE FINES DE LATERITE DANS UN LIT FLUIDISE AU MOYEN DE GAZ REDUCTEURS FORMES IN SITU

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[0032] In a commercial method, this offgas can be used as fuel in the upstream calcination method. The bed product and cyclone underflow are similar with respect to the degree of reduction of the calcine. However, as outlined above, the bed discharge product contains substantially less carbon. Very little particle decrepitation took place during the reduction, and the product calcine size analysis is similar to the feed size analysis given above.

[0033] While the invention has been described in connection with specific embodiments thereof, it will be understood that it is capable of further modifications and this application is intended to cover any variations, uses or adaptations of the invention following the scope of the appended claims.

Claims

1. A method for reduction of iron oxide-containing materials in a fluidized bed of a reactor to produce a low carbon calcine product, comprising the steps of:
 - a) injecting an oxidizing gas into a chamber of the reactor, feeding the iron oxide-containing material having a particle size of 10 to 1500 μm and feeding a reducing agent having a particle size of 20 to 400 μm ;
 - b) -maintaining a temperature inside the reactor above a gasification temperature of the reducing agent, below a sticking temperature of a resulting reduced calcine product, and sufficiently high to partially combust the reducing agent to provide a reducing atmosphere to convert Fe_2O_3 to FeO , and
 - maintaining a free-space velocity comprised between 0.35 to 0.60 m/s which is sufficient to fluidize the bed and ensure a sufficient residence time for the particles prior to elutriation; and
 - c) combine the reduced calcine product of the reactor discharge with the calcine material removed from the top of the reactor, a carbon content of the reduced calcine product being maintained between 0.1 and 2.0 percent by weight.
2. The method according to claim 1, **characterized in that** the reducing agent comprises a carbonaceous material.
3. The method according to claim 2, **characterized in that** the reducing agent has a volatility content of at least 25% wt.
4. The method according to claim 2, **characterized in that** the reducing agent has a volatility content of 25% to 45%wt.
5. The method according to claim 2, **characterized in that** the reducing agent has a volatility content of 45%wt.
6. The method according to anyone of claims 1 to 5, **characterized in that** the temperature is comprised between 800°C and 1100°C.
7. The method according to any one of claims 1 to 6, **characterized in that** the free space velocity in the reactor chamber is maintained at about 0.5 m/s.
8. The method according to any one of claims 1 to 7, **characterized in that** the reducing agent comprises at least one of coal, lignite, natural gas, fuel oil, coal char and coke.
9. The method according to any one of claims 1 to 8, **characterized in that** the oxidizing gas comprises at least one of air, oxygen-enriched air, oxygen, CO_2 and steam.
10. The method according to any one of claims 1 to 9, **characterized in that** a CO/CO_2 ratio inside the chamber is maintained between 0.3 and 2.0 by adding the reducing agent.
11. The method according to any one of claims 1 to 10, **characterized in that** the iron oxide-containing material comprises at least one of saprolitic nickel laterite, limonitic laterites, roasted sulphide concentrates, iron ore, chrome ore and titanium oxide ore.
12. The method according to any one of claims 1 to 11, **characterized in that** said maintaining the temperature inside the chamber provides a reducing atmosphere to convert Fe_2O_3 to FeO and NiO to metallic Ni.