

Internal distribution code:

- (A) [-] Publication in OJ
(B) [-] To Chairmen and Members
(C) [-] To Chairmen
(D) [X] No distribution

**Datasheet for the decision
of 27 February 2015**

Case Number: T 2221/11 - 3.2.03

Application Number: 01128758.8

Publication Number: 1213534

IPC: F23C6/04, F23C10/00

Language of the proceedings: EN

Title of invention:

Combustion method in which generation of NOx, CO and dioxine are suppressed and fluidized bed incinerator therefor

Patent Proprietor:

MITSUBISHI HEAVY INDUSTRIES, LTD.

Opponent:

Metso Power Oy

Headword:

Inventive step (yes)

Admissibility of new main request filed during oral proceedings (yes)

Relevant legal provisions:

EPC Art. 56, 113, 123(2)

RPBA Art. 13(1), 13(3)

Keyword:

Decisions cited:

Catchword:



**Beschwerdekammern
Boards of Appeal
Chambres de recours**

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 2221/11 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 27 February 2015

Appellant: Metso Power Oy
(Opponent) P.O. Box 109
33101 Tampere (FI)

Representative: Rönkkö, Taina Mirjam
Tampereen Patenttitoimisto Oy
Hermiankatu 1 B
33720 Tampere (FI)

Respondent: MITSUBISHI HEAVY INDUSTRIES, LTD.
(Patent Proprietor) 5-1, Marunouchi 2-chome,
Chiyoda-ku
Tokyo (JP)

Representative: Henkel, Breuer & Partner
Patentanwälte
Maximiliansplatz 21
80333 München (DE)

Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 4 August 2011
rejecting the opposition filed against European
patent No. 1213534 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairman G. Ashley
Members: C. Donnelly
M. Blasi

Summary of Facts and Submissions

- I. The appeal lies from the decision of the opposition division dated 4 August 2011 rejecting the opposition against European Patent EP B 1 213 534.

- II. The opponent (hereinafter: the "appellant") filed a notice of appeal against this decision in due form and time. In support of its case for revocation of the patent presented in the grounds of appeal the appellant referred to the following documents:

S1: EP 1 013 994;
S2: US 4 962 711;
S3: WO 91/05205.

- III. The patent proprietor (hereinafter "the respondent") replied to the appellant's case by letter of 30 April 2012.

- IV. In a communication pursuant to Article 15(1) RPBA, annexed to the summons to oral proceedings posted on 1 December 2014 the Board informed the parties of its provisional opinion. By letter of 6 February 2015 the appellant stated that it would not be attending the oral proceedings scheduled for 27 February 2015.

- V. Since the respondent had also made an auxiliary request for oral proceedings to be held, these duly took place in the absence of the duly summoned appellant on the appointed date. At the conclusion of the debate the respondent requested that the decision under appeal be set aside and the patent be maintained in amended form on the basis of the new main request filed during oral proceedings, and the adapted description.

In the written proceedings, the appellant requested that the decision under appeal be set aside and that the patent be revoked in its entirety.

VI. Claim 1 according to the new main request reads:

"A combustion method in a fluidized bed incinerator having first to fourth combustion sections (6,A7,B8,C9) comprising the steps of:

supplying a fuel to a first combustion section (6) and exhausting an (*sic*) combustion exhaust gas after a fourth combustion section (C9); and supplying first to fourth airs to the first to fourth combustion sections (6,A7,B8,C9) in first to fourth air surplus rates, respectively;

wherein a second air surplus rate is equal to or more than a first air surplus rate, a third air surplus rate is equal to or more than said second air surplus rate, and a fourth air surplus rate is equal to or more than said third air surplus rate, and wherein a residence time of combustion gas in the first combustion section (6) is in a range of 1.5 to 2.5 seconds, a residence time of a combustion gas in the second combustion section (A7) is in a range of 0.5 to 1.5 seconds, a residence time of a combustion gas in the third combustion section (B8) is in a range of 0.1 to 1.0 second, and a residence time of a combustion gas in the fourth combustion section (C9) is in a range of 1.5 to 2.5 seconds."

Claim 11 according to the new main request reads:

"A fluidized bed incinerator adapted to carry out the combustion method of any one of claims 1 to 10, said fluidized bed incinerator comprising:

a combustion furnace (A13) having first to fourth combustion sections (6,A7,B8,C9), air supply ports (1,2,3,4) through which the first to fourth airs can be supplied to the first to fourth combustion sections (6,A7,B8,C9), respectively, a fuel input port (10) through which the fuel can be supplied to the first combustion section (6), and a furnace output port (5) through which an (*sic*) combustion exhaust gas can be exhausted after the fourth combustion section (C9); and a control unit controlling the supply of the fuel and the supply of the first to fourth airs such that the second air surplus rate is equal to or more than the first air surplus rate, the third air surplus rate is equal to or more than the second air surplus rate, and the fourth air surplus rate is equal to or more than the third air surplus rate, and such that a residence time of combustion gas in the first combustion section (6) is in a range of 1.5 to 2.5 seconds, a residence time of a combustion gas in the second combustion section (A7) is in a range of 0.5 to 1.5 seconds, a residence time of a combustion gas in the third combustion section (B8) is in a range of 0.1 to 1.0 second, and a residence time of a combustion gas in the fourth combustion section (C9) is in a range of 1.5 to 2.5 seconds."

VII. Arguments of the parties insofar as relevant for the present decision

Appellant

The appellant has not submitted any arguments specifically concerning the new main request. In its written submissions, it argued that the subject-matter of claim 1 as granted lacked an inventive step in view of S2 in combination with S1, S3 or the skilled person's general knowledge.

In the appellant's opinion the combustion method of claim 1 as granted merely differed from that disclosed in S2 by the provision of a fourth combustion section supplied with a fourth air, which has an air surplus rate that is equal to or more than said third air surplus rate. Bearing in mind that S2 is already a development of a furnace which used two air supplies, this is an obvious development.

The appellant also argued that, since S1 (see in particular figure 3) and S3 both disclose fluidized bed incinerators comprising four air supply points, it would be obvious for the skilled person to apply this teaching to the apparatus of S2.

Respondent

Fluidised bed incinerators can be divided into two fundamentally different types: (i) those using fluidised beds of air bubbles, also known as BFB incinerators, and (ii) those known as circulating fluidised bed or CFB incinerators. In BFB incinerators air bubbles form on the floor of the fluidised bed when the velocity of air exceeds the speed at which the

particles comprising the medium of flow behave as a fluid.. These bubbles agitate the medium of flow, causing the interior of the bed to achieve an ebullient state, in which the fuel is combusted. In CFB incinerators, the velocity of the air exceeds the terminal velocity of the particles comprising the medium of flow. As the air and particles are vigorously mixed the particles are entrained in the gas and dispersed and combusted above the fluidised bed. Those particles escaping the incinerator are collected by a separating device such as a cyclone and recirculated back into the incinerator.

In BFB incinerators, inlet air-speeds are typically in the range of 1 to 3 m/s, whereas in CFB devices inlet air-speeds are much higher and range from 5 to 8 m/s. This means that in BFB systems particles are not entrained in the free-board zone above the fluidised bed, and the residence times of the combustion gases in the various combustion zones are relatively long in comparison with CFB plants.

Documents S1 and S3 relate to CFB systems, whereas S2 and the present invention relate to incinerators of the BFB type. For this reason S2 (see in particular column 3, lines 26 to 61) is the most relevant art.

Starting from S2, the invention addresses the problem of improving combustion reaction of CO and the dissolution of dioxin.

S2 does not mention the removal of dioxines and is silent on the residence times of the combustion gases, hence the solution to the problem cannot be derived from S2 itself. As explained above, S1 and S3 relate to a different class of incinerators and would not be

taken into consideration by the skilled person seeking to solve the above problem starting out from S2.

The subject-matter of claim 11 is directed to a fluidized bed incinerator adapted to carry out the combustion method of claim 1. The method features relating to the definition of the combustion gas residence times would be structurally reflected in the length of the combustion sections. Examples of typical section lengths are specified in dependent claim 13.

Thus, the subject-matter of claims 1 and 11 according to the new main request involves an inventive step.

Reasons for the Decision

1. Non-attendance of the appellant at oral proceedings

The duly summoned appellant did not attend the oral proceedings as announced in its letter of 6 February 2015. In accordance with Rule 115(2) EPC and Article 15(3) RPBA, the Board decided to continue the proceedings, taking into account the principles of fairness and procedural economy and the fact that neither reasons for the non-attendance nor a request for postponement had been submitted by the appellant. The appellant could reasonably have expected that during the oral proceedings the board would address the issues mentioned in the annex to the summons and the respondent would try to overcome objections by filing or amending its requests. In deciding not to attend the oral proceedings, the appellant effectively chose not to avail itself of the opportunity to present observations and counter-arguments orally, but instead to solely rely on the written case which consisted, in the absence of any further submissions during the

appeal proceedings, exclusively in the statement of grounds of appeal. The right to be heard under Article 113(1) EPC has thus been satisfied despite the non-attendance of the appellant at the oral proceedings as it only affords the opportunity to be heard and, by absenting itself, the appellant has given up that opportunity.

2. *Admissibility of the respondent's new main request
Articles 13(1), (3) RPBA and Article 123(2) EPC*

2.1 The new main request was filed during the oral proceedings before the board in response to the discussion on the main request. The subject-matter of claim 1 is based on granted claims 1 and 10 (claims 1 and 11 as originally filed) and was included in auxiliary request 4 filed with letter of 30 April 2012 in reply to the grounds of appeal.

2.2 Thus, the requirements of Articles 123(2) EPC are met and the board admitted the request in accordance with Article 13(1), (3) RPBA since it did not raise issues which the board could not deal with without adjournment of the oral proceedings or which the non-attending appellant could not reasonably have expected.

3. *Inventive step, Article 56 EPC*

3.1 Novelty has not been disputed by the appellant in the appeal proceedings, thus the only matter to be addressed is that of inventive step

3.2 Documents S1 and S3 relate to circulating fluidised bed (CFB) systems, in which the inlet air speeds are much greater than those used in the bubbling fluidised bed (BFB) class of apparatus, to which the invention belongs. Accordingly, S2 (see in particular column 3,

lines 26 to 61) is the most relevant prior art, since this is the only document referred to by the appellant which relates to a BFB type fluidised bed.

3.3 S2 discloses:

a combustion method in a fluidised bed incinerator having first to third combustion sections (1,5a,5b) comprising the steps of:

supplying a fuel to a first combustion section (1) and exhausting a combustion exhaust gas after a third combustion section (5b); supplying first to third airs (2,7,14) to the first to third combustion sections (1,5a,5b) in first to third air surplus rates, respectively;

wherein a second air surplus rate is equal to or more than a first air surplus rate, a third air surplus rate is equal to or more than a second air surplus rate,

The subject-matter of claim 1 as granted differs in that

- a fourth combustion section is supplied with a fourth air, which has an air surplus rate equal to or more than said third air surplus rate; and in that claim 1 defines

- that the residence time of combustion gas in the first combustion section (6) is in a range of 1.5 to 2.5 seconds, the residence time of combustion gas in the second combustion section (A7) is in a range of 0.5 to 1.5 seconds, the residence time of combustion gas in the third combustion section (B8) is in a range of 0.1 to 1.0 second, and the residence time of a combustion

- gas in the fourth combustion section (C9) is in a range of 1.5 to 2.5 seconds.
- 3.4 The technical effect of these features is explained in the contested patent in paragraphs [0036] to [0040]. Here it is stated that the reason why air is separately supplied as third and fourth airs, is that the region (C9), which has a temperature equal to or more than 800°C, is made long to promote the combustion reaction of CO and the dissolution of dioxine. In particular, it is said that "the fourth air supply port 4 is provided to extend the combustion region in an upper direction so that the dissolution process becomes sufficiently long to promote the dissolution process of dioxine even if the fuel contains a large amount of chlorine." (see col. 8, lines 45 to 49 of the patent).
- 3.5 Therefore, by employing such a combustion method the problem of improving combustion reaction of CO and the dissolution of dioxin is solved.
- 3.6 As argued by the respondent, S2 does not mention the removal of dioxins and is silent on the residence times of the combustion gases. The board agrees with the respondent that S1 and S3 would not be taken into consideration by the skilled person seeking to solve the above problem starting from S2, since they relate to a different class of incinerators in which the residence times of the gases are not comparable owing to the greatly different inlet airspeeds.
- 3.7 The appellant has not submitted any relevant arguments which counter this opinion, since it chose not to attend the oral proceedings and did not avail itself of the opportunity during the written proceedings to

comment on the auxiliary requests filed by the respondent.

3.8 The subject-matter of claim 11 is directed to a fluidised bed incinerator adapted to carry out the combustion method of claim 1. The method features relating to the definition of the combustion gas residence times would find structural reflection in the length of the combustion sections (e. g. see description col. 12, lines 14 to 20). Explicit examples of typical section lengths are also specified in dependent claim 13.

3.9 Hence, the subject-matter of claims 1 and 11 according to the new main request involves an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division with the order to maintain the patent as amended in the following version:
 - claims:
claims 1 to 14 filed as main request during the oral proceedings before the board,

 - description:
page 3 of the specification as filed during the oral proceedings before the board,
pages 2, 4 to 8 of the patent specification as granted,

 - drawings:
figures 1 to 6 of the patent specification as granted.

The Registrar:

The Chairman:



C. Spira

G. Ashley

Decision electronically authenticated