

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
8 June 2006 (08.06.2006)

PCT

(10) International Publication Number
WO 2006/058542 A3

(51) International Patent Classification:

F23C 5/32 (2006.01) *F24H 1/28* (2006.01)
F23L 15/04 (2006.01) *F01K 23/10* (2006.01)
F22B 7/12 (2006.01)

[FI/FI]; Hepotie 4, FIN-16500 Herrala (FI). **PEKKOLA,**
Eero [FI/FI]; Eeronkatu 5 B, FIN-15900 Lahti (FI).

(21) International Application Number:

PCT/DK2005/000769

(22) International Filing Date:

2 December 2005 (02.12.2005)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

PA 2004 01891 3 December 2004 (03.12.2004) DK

(71) Applicants (for all designated States except US): **AAL-**
BORG INDUSTRIES A/S [DK/DK]; Gasvaerksvej 24,
P.O. Box 661, DK-9100 Aalborg (DK). **OY, Oilon** [FI/FI];
Metsä-Pietiläntä 1, P.O. Box 5, FIN-15801 Lahti (FI).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **PEDERSEN,**
Thomas, Paarup [DK/DK]; Dalgasgade 23B, 1.tv.,
DK-9000 Aalborg (DK). **STRØEH, Claus, Stegmann**
[DK/DK]; Jens Baggesens Vej 17, DK-9000 Aalborg
(DK). **NIELSEN, Bodil, Irene, Mosekær** [DK/DK]; Re-
bildparken 21, DK-9220 Aalborg Øst (DK). **SALO, Esko**

(74) Agent: **BUDDE, SCHOU, &, OSTENFELD, A/S**; Vester
Søgade 10, DK-1601 Copenhagen V (DK).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV,
LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI,
NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG,
SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US,
UZ, VC, VN, YU, ZA, ZM, ZW.

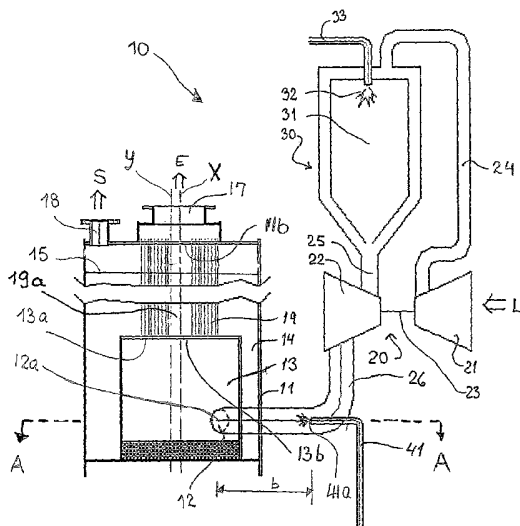
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT,
RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA,
GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

[Continued on next page]

(54) Title: A METHOD OF HEATING A BOILER AND A HEATING SYSTEM



(57) Abstract: A heating system and a method for heating a boiler comprising a combustion chamber (13) having an axis of symmetry (X), one or more chamber inlets (12, 12') for introducing combustion air and fuel into the combustion chamber, heat exchanger means, pressurizing means (22) for pressurizing the combustion air, first fuel inlet means (33) and first burning means (31) for burning a first portion of the fuel in the combustion air for heating the combustion air and arranged at a first location upstream of the chamber inlets, second fuel inlet means (41) for introducing a second portion of the fuel in the flow and arranged at a second location downstream of the first location and upstream of the chamber inlets, the chamber inlets being arranged such that the flow of combustion air with the second portion of fuel flows along a generally helical path around the axis (X).

WO 2006/058542 A3



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(88) Date of publication of the international search report:

10 August 2006

INTERNATIONAL SEARCH REPORT

International application No
PC1/DK2005/000769

A. CLASSIFICATION OF SUBJECT MATTER

INV. F23C5/32 F23L15/04 F22B7/12 F24H1/28 F01K23/10

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)

F23C F23L F22B F24H F01K

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)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 91/10096 A (KELLER, LEONARD, J; STANTON, AUSTIN, N) 11 July 1991 (1991-07-11) page 16, line 20 - line 30 page 17, line 3 - line 14 page 18, line 15 - page 19, line 14; figures 2-4	1,2,4, 14,15, 19,24, 25,27, 29-31,41
Y	GB 276 898 A (WILFRED ROTHERY WOOD) 8 September 1927 (1927-09-08) the whole document	1,2,5, 11,14, 15,19, 24,25, 28-31,41



Further documents are listed in the continuation of Box C.



See patent family 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.

G document member of the same patent family

Date of the actual completion of the international search

20 June 2006

Date of mailing of the international search report

28/06/2006

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Coli, E

INTERNATIONAL SEARCH REPORT

inal application No

PCT/DK2005/000769

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 30 30 043 A1 (NOACK, ROLF, DR.-ING) 11 March 1982 (1982-03-11) page 8, line 20 - page 10, line 1; figures 1,2 -----	1,2,5, 11,14, 15,19, 24,25, 28-31,41
X	GB 102 194 A (WILLIAM ANDERSON; JAMES MEIKLE) 23 November 1916 (1916-11-23) the whole document -----	47,48
X	GB 226 714 A (LEONARD ALBERT HINDLEY; HAROLD DOUGLAS HINDLEY) 1 January 1925 (1925-01-01) the whole document -----	47,48
X	DE 809 438 C (NEUBURG HERMANN) 30 July 1951 (1951-07-30) the whole document -----	47
X	GB 181 495 A (GEORGE WATSON; FRANK HETHERINGTON) 16 June 1922 (1922-06-16) the whole document -----	47
A	FR 2 178 409 A (BOUELLAT PAUL, FR) 9 November 1973 (1973-11-09) the whole document -----	3-5,16, 24, 26-28, 35,47

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK2005/000769

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-46

Method for heating a boiler and heating system for carrying out the method

2. claims: 47-49

Boiler for heating water

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/DK2005/000769

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9110096	A	11-07-1991	AT 133488 T	15-02-1996
			AU 639936 B2	12-08-1993
			AU 6039490 A	24-07-1991
			CA 2033063 A1	22-06-1991
			DE 69025057 D1	07-03-1996
			EP 0460121 A1	11-12-1991
			JP 4504892 T	27-08-1992
			MX 173783 B	25-03-1994
GB 276898	A	08-09-1927	NONE	
DE 3030043	A1	11-03-1982	NONE	
GB 102194	A	23-11-1916	NONE	
GB 226714	A	01-01-1925	NONE	
DE 809438	C	30-07-1951	NONE	
GB 181495	A	16-06-1922	NONE	
FR 2178409	A	09-11-1973	NONE	