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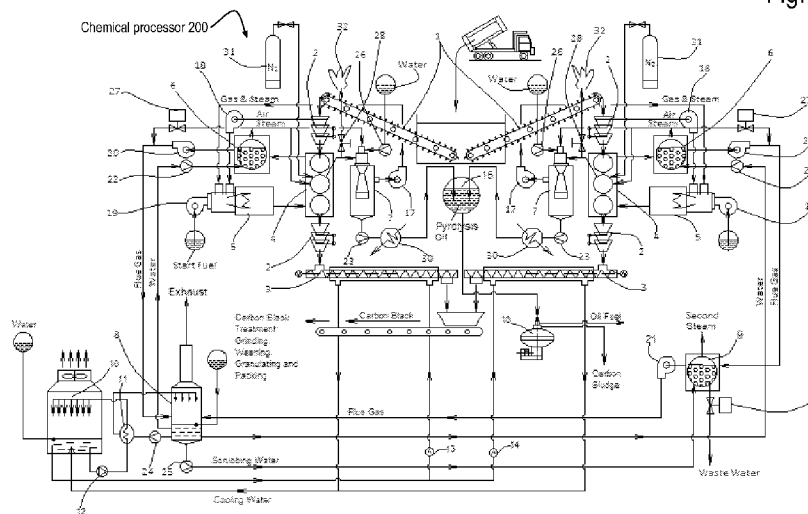
- with international search report (Art. 21(3))
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28 March 2013

(54) Title: PYROLYSIS-BASED APPARATUS AND METHODS

Fig. 1A



(57) **Abstract**: Apparatus and methods of operating hopper valves, reaction chambers, condensers, orifices, furnaces and chemical processors are disclosed and claimed. Several of the embodiments are specific to pyrolysis manufacturing processes. Some of the embodiments are applicable in situations where heat is used to decompose organic material, such as in the burning of wastes. The various embodiments contribute to improved quality for outputs such as carbon black and/or improved reliability by removing the potential for tar buildup and/or removing the possibility of dioxin contamination as a form of pollution.

A. CLASSIFICATION OF SUBJECT MATTER***B09B 3/00(2006.01)i, F23G 5/027(2006.01)i, C01B 31/02(2006.01)i, C10L 1/00(2006.01)i***

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)

B09B 3/00; C10B 23/00; B29B 17/00; C10B 7/10; F23G 5/00; C10B 35/00; C10B 9/00; C08J 11/10; C10G 1/00

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: pyrolysis, hopper, valve, reaction chamber, condenser, orifice, furnace, off-gas

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2009-0250332 A1 (WU, C. Y. et al.) 8 October 2009 See claims 1,7, paragraphs [0040]-[0043], [0049] and figure 4.	1-13
A	US 5636580 A (KANIS, D. R.) 10 June 1997 See claim 1, column 2, lines 51-67, column 4, lines 5-45 and figure 1.	1-13
A	US 5057189 A (APFFEL, F.) 15 October 1991 See claim 1 and figure 1.	1-13
A	US 4994174 A (KUNSTLE, K. et al.) 19 February 1991 See claims 1,10, column 5, line 35 - column 6, line 10 and figure 1.	1-13
A	US 6605209 B2 (LEI, C. E. et al.) 12 August 2003 See claim 1, column 2, lines 45-65, column 3, lines 19-21 and figure 1.	1-13



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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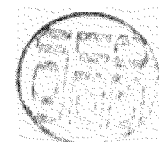
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009-0250332 A1	08.10.2009	TW 200942605 A	16.10.2009
US 5636580 A	10.06.1997	None	
US 5057189 A	15.10.1991	US 4647443 A	03.03.1987
		US 4839151 A	13.06.1989
US 4994174 A	19.02.1991	None	
US 6605209 B2	12.08.2003	US 2003-089646 A1	15.05.2003