

(51) International Patent Classification:  
*C10G 1/10* (2006.01) *C08J 11/00* (2006.01)(21) International Application Number:  
PCT/US2010/046461(22) International Filing Date:  
24 August 2010 (24.08.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
61/236,343 24 August 2009 (24.08.2009) US

(72) Inventors; and

(71) Applicants : KOSTEK, Stanislaw, SR. [US/US]; 10 John Clendon Road, Queensbury, New York 12804 (US).  
KOSTEK, Stanislaw, JR. [US/US]; 61 Barber Road, Queensbury, New York 12804 (US).

(74) Agent: PIETRANGELO, John; Heslin Rothenberg Farley &amp; Mesiti P.C., 5 Columbia Circle, Albany, New York 12203 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,

DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

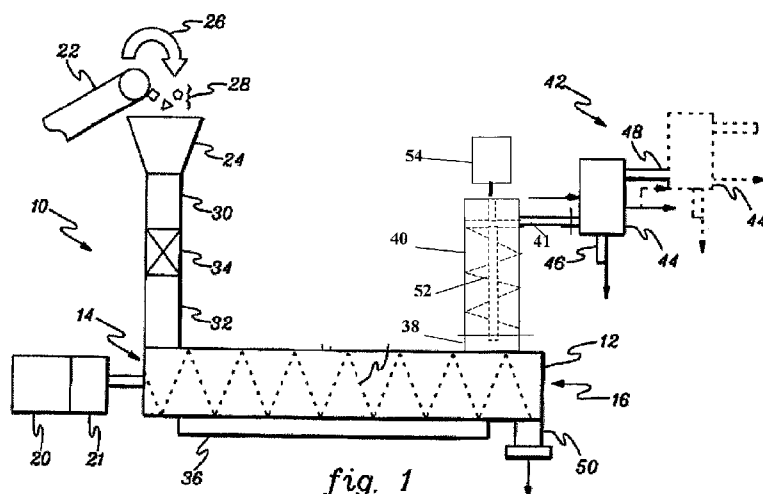
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(88) Date of publication of the international search report:  
23 June 2011

(54) Title: METHODS AND APPARATUS FOR PYROLYZING MATERIAL



(57) Abstract: Methods and systems (10) for substantially continuously treating comminuted material (28) containing carbon and hydrogen, for example, used tires, are provided. The methods include the steps of introducing the tire material to an elongated chamber (12), transferring the tire material through the elongated chamber, heating the tire material to a temperature sufficient to pyrolyze the material to produce a gaseous stream; discharging the gaseous stream from the chamber, and cooling at least some of the gaseous stream to liquefy components of the stream. The transfer may be effected by a flexible, center-less screw conveyor (18) to minimize material buildup in the vessel. The cooling of the gaseous stream may be practiced by reverse condensation. The apparatus may further comprise an agitator (52) positioned in a conduit (40) operatively connected to an outlet (38) from the chamber (12), the agitator adapted to displace any condensate formed in the conduit (40).

**A. CLASSIFICATION OF SUBJECT MATTER***C10G 1/10(2006.01)i, C08J 11/00(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)

C10G, C10B, C10J, B01J

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 practicable, search terms used)

eKOMPASS(KIPO internal) &amp; Keywords: (pyroly\*, crack\*, decomposit\*) &lt;and&gt; (plastic\*, tire\*, rubber\*) &lt;and&gt; (agitat\*, stir\*, mix\*, screw\*, auger\*, plunger\*, scraper\*, rotary\*) &lt;and&gt; (convey\*, screw\*, auger\*)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2008-0128259 A1 (KOSTEK et al.) 05 June 2008 See claims 1-39; figures 1-7	1-10
Y	US 2002-0119089 A1 (MASEMORE et al.) 29 August 2002 See [0032]-[0036]; figures 5,5a; claim 43	1-10
A	US 2007-0286779 A1 (STEINMEYER et al.) 13 December 2007 See [0024]-[0033]; figure 1	1-10
A	US 05693188A A (DONNOHUE et al.) 02 December 1997 See abstract; figures 4,5	1-10
A	US 2008-0063578 A1 (MOLOHON et al.) 13 March 2008 See abstract; claims	1-10



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 application or patent 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 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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

26 APRIL 2011 (26.04.2011)

Date of mailing of the international search report

**27 APRIL 2011 (27.04.2011)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office  
Government Complex-Daejeon, 189 Cheongsa-ro,  
Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

BYUN, Sang Hyun

Telephone No. 82-42-481-5618



**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2010/046461**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0128259 A1	05.06.2008	None	
US 2002-0119089 A1	29.08.2002	US 2004-0182001 A1 US 6736940 B2 US 7329329 B2	23.09.2004 18.05.2004 12.02.2008
US 2007-0286779 A1	13.12.2007	CA 2649693 A1 EP 2007849 A2 MX 2008013410 A US 2010-003170 A1 WO 2007-121166 A2 WO 2007-121166 A3	25.10.2007 31.12.2008 18.02.2009 07.01.2010 25.10.2007 24.07.2008
US 05693188A A	02.12.1997	EP 0767821 A1 JP 10-502109 A KR 10-1997-0704024 A WO 1996-00268 A1	27.10.1999 24.02.1998 09.08.1997 04.01.1996
US 2008-0063578 A1	13.03.2008	None	