



(51) International Patent Classification:
B01J 19/00 (2006.01) B01J 19/24 (2006.01)

(21) International Application Number:
PCT/GB2009/051634

(22) International Filing Date:
2 December 2009 (02.12.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0822544.3 11 December 2008 (11.12.2008) GB

(71) Applicant (for all designated States except US): **COMPACTGTL PLC** [GB/GB]; Wilton Centre Annexe, Wilton Centre, Redcar Cleveland TS10 4RF (GB).

(72) Inventor; and
(75) Inventor/Applicant (for US only): **WEST, David James** [GB/GB]; 14 Church Street, Ducklington, Oxfordshire OX29 7UG (GB).

(74) Agent: **MANSFIELD, Peter Turquand**; Collier IP Management Limited, Fugro House, Hithercroft Road, Wallingford Oxfordshire OX10 9RB (GB).

(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, 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, 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, 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).

Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

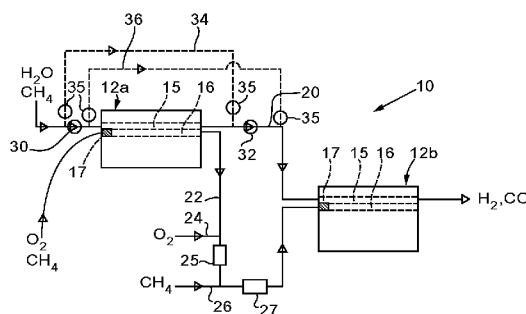
Published:

— 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:
10 September 2010

(54) Title: CHEMICAL REACTOR OPERATION

Fig.1.



(57) Abstract: A method of operation of one or more chemical reactors (12), wherein each chemical reactor defines first flow channels (15) for a chemical reaction process in proximity to second flow channels (16) for heat transfer, and each chemical reactor is provided with fluid connections for bringing about flows of respective fluids through the first flow channels and the second flow channels, involves the steps of shutting down the flows of fluids through at least one of the first flow channels and the second flow channels, and then changing the fluid connections, and then reopening the fluid connections. There is no change in the chemical reaction process performed by the reactors. The change to the fluid connections is preferably such as to achieve a flow reversal. This may involve turning the reactor (12) itself around, or changing the arrangement of ducts connected to the reactor. This changes the thermal stress distribution within the reactor, and can consequently increase the reactor's operational lifetime.

WO 2010/067097 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2009/051634

A. CLASSIFICATION OF SUBJECT MATTER
INV. B01J19/00 B01J19/24
ADD.

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)
B01J C10G C01B

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/175326 A1 (HERSHKOWITZ FRANK [US] ET AL) 9 September 2004 (2004-09-09) paragraphs [0016] - [0023], [0030] - [0041], [0048], [0049], [0063], [0064], [0087], [0088] figures 1,2,4,5	1-13
X	US 2 333 845 A (DANFORTH JOSEPH D) 9 November 1943 (1943-11-09) page 1, left-hand column, lines 42-54 page 2, left-hand column, line 42 - page 3, left-hand column, line 10 page 3, left-hand column, lines 16-43; figure 1	1-12

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.
- *&* document member of the same patent family

Date of the actual completion of the international search

13 July 2010

Date of mailing of the international search report

20/07/2010

Name and mailing address of the ISA/
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Baumlin, Sébastien

INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2009/051634

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 887 286 B1 (TAKI MASAYOSHI [JP] ET AL) 3 May 2005 (2005-05-03) column 32, line 10 - column 34, line 59 column 21, lines 6-51 claims 17,18 pages 1-13; figures 1,4,17-19 -----	1-13
X	US 2005/054737 A1 (LEE-TUFFNELL CLIVE DEREK [GB] ET AL) 10 March 2005 (2005-03-10) paragraphs [0018], [0021], [0022], [0030] - [0036] figures 1,2 -----	14
X	US 2005/234138 A1 (BOWE MICHAEL J [GB] BOWE MICHAEL JOSEPH [GB]) 20 October 2005 (2005-10-20) paragraphs [0026] - [0037] figures 1-3 -----	12-14
X	US 2005/282918 A1 (BOWE MICHAEL J [GB] BOWE MICHAEL JOSEPH [GB]) 22 December 2005 (2005-12-22) paragraphs [0002], [0315] - [0019]; figure 1 -----	12,13
X,P A,P	WO 2009/101434 A2 (COMPACTGTL PLC [GB]; BOWE MICHAEL JOSEPH [GB]; LEE-TUFFNELL CLIVE DERE) 20 August 2009 (2009-08-20) page 5, lines 11-17 page 7, line 31 - page 8, line 10 page 9, line 28 - page 11, line 9 claims 1,8,15; figures 1-4 -----	12-14 1
X	US 2007/258883 A1 (WEST DAVID J [GB] ET AL) 8 November 2007 (2007-11-08) paragraphs [0024] - [0029]; figures 2,3 -----	12,13
A	US 2003/087138 A1 (MARGIOTT PAUL R [US] ET AL) 8 May 2003 (2003-05-08) the whole document -----	1-14
A	US 5 710 356 A (SUBRAMANIAM BALA [US] ET AL) 20 January 1998 (1998-01-20) the whole document -----	1-14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2009/051634

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004175326	A1	09-09-2004	AT 465124 T 15-05-2010
			AU 2004217989 A1 16-09-2004
			CA 2515514 A1 16-09-2004
			EP 1601615 A1 07-12-2005
			JP 2006520527 T 07-09-2006
			KR 20050115886 A 08-12-2005
			MX PA05008564 A 04-11-2005
			WO 2004078646 A1 16-09-2004
US 2333845	A	09-11-1943	NONE
US 6887286	B1	03-05-2005	BR 9911883 A 27-03-2001
			CA 2336545 A1 20-01-2000
			CN 1430301 A 16-07-2003
			CN 1308588 A 15-08-2001
			EP 1103518 A1 30-05-2001
			WO 0002812 A1 20-01-2000
			PL 345402 A1 17-12-2001
			RU 2199382 C2 27-02-2003
US 2005054737	A1	10-03-2005	AU 2002365663 A1 17-06-2003
			BR 0214693 A 03-11-2004
			EP 1451098 A1 01-09-2004
			WO 03048035 A1 12-06-2003
			TW 592832 B 21-06-2004
US 2005234138	A1	20-10-2005	AU 2005234981 A1 03-11-2005
			BR PI0510087 A 16-10-2007
			CA 2563852 A1 03-11-2005
			CN 1997447 A 11-07-2007
			EP 1737568 A1 03-01-2007
			WO 2005102511 A1 03-11-2005
			JP 2007533444 T 22-11-2007
			KR 20070008648 A 17-01-2007
US 2005282918	A1	22-12-2005	AT 384111 T 15-02-2008
			AU 2005254793 A1 29-12-2005
			BR PI0512096 A 06-02-2008
			CA 2568702 A1 29-12-2005
			CN 1977033 A 06-06-2007
			DE 602005004405 T2 02-01-2009
			DK 1756249 T3 19-05-2008
			EP 1756249 A1 28-02-2007
			WO 2005123883 A1 29-12-2005
			JP 2008502766 T 31-01-2008
			RU 2375406 C2 10-12-2009
WO 2009101434	A2	20-08-2009	NONE
US 2007258883	A1	08-11-2007	AU 2007246840 A1 15-11-2007
			CA 2648502 A1 15-11-2007
			EA 200870513 A1 30-06-2009
			EP 2015866 A2 21-01-2009
			WO 2007129109 A2 15-11-2007
US 2003087138	A1	08-05-2003	DE 10297398 T5 17-02-2005
			JP 2005509261 T 07-04-2005
			WO 03041203 A1 15-05-2003

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2009/051634

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5710356	A	20-01-1998 WO 9616007 A1	30-05-1996