



- (51) International Patent Classification:
F28F 7/02 (2006.01) *B28B 11/12* (2006.01)
B01J 19/24 (2006.01)
- (21) International Application Number:
PCT/US2010/036631
- (22) International Filing Date:
28 May 2010 (28.05.2010)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
61/182,759 31 May 2009 (31.05.2009) US
- (71) Applicant (for all designated States except US): **CORNING INCORPORATED** [US/US]; 1 Riverfront Plaza, Corning, New York 14831 (US).
- (72) Inventor; and
(75) Inventor/Applicant (for US only): **SUTHERLAND, James, S** [US/US]; 248 E 4th Street, Corning, New York 14830 (US).
- (74) Agent: **BEAN, Gregory, V.**; Corning Incorporated, Intellectual Property Department, SP-TI-3-1, Corning, New York 14831 (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.

[Continued on next page]

(54) Title: PRESSURE RESISTANT HONEYCOMB REACTOR

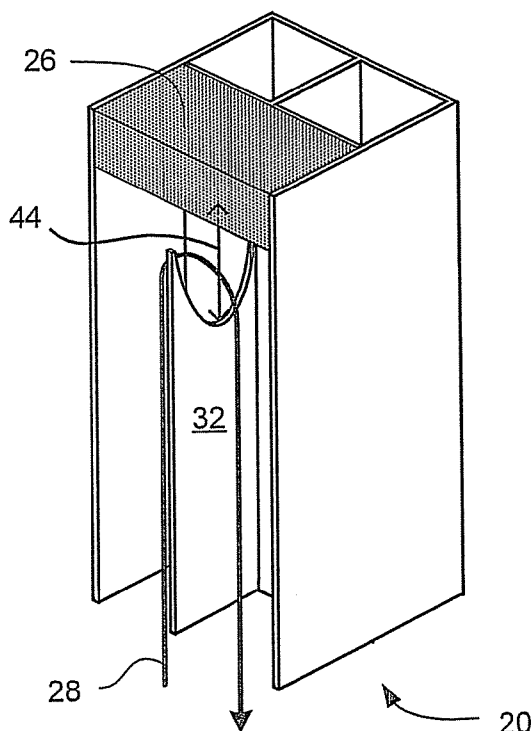


Fig. 3

(57) Abstract: Methods and devices for providing a honeycomb monolith reactors 12 or heat exchangers 12 having improved pressure resistance are disclosed, including the method of (1) providing a honeycomb monolith 20 having a plurality of cells 22, 24 extending in parallel along a common direction, with the cells divided by walls 23, (2) plunge-machining at least a plurality of walls 32 dividing selected adjacent cells 24 of the honeycomb monolith 20 by inserting a plunge machining tool 70 into the honeycomb monolith 20 along a direction 54 lying at an angle to the common direction, such that the machined walls 32 each are breached by an aperture 48 having an edge 50, the edge 50 having a shape, in the direction around the aperture 48, of a smooth curve, and (3) plugging the selected adjacent cells 24 such that at least a portion of the aperture 48 remains open.



(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:

3 June 2011

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2010/036631

A. CLASSIFICATION OF SUBJECT MATTER INV. F28F27/02 B01J19/24 B28B11/12 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) F28F B01J B28B F01N		
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) EP0-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2008/121390 A1 (CORNING INC [US]; CAZE PHILIPPE [FR]; DANNOUX THIERRY L [FR]; EFREMOV) 9 October 2008 (2008-10-09) cited in the application abstract; figures	1-15
A	----- EP 1 696 109 A2 (NGK INSULATORS LTD [JP]) 30 August 2006 (2006-08-30) paragraph [0050] - paragraph [0051]; figure 5	1-15
A	----- EP 1 470 861 A2 (NGK INSULATORS LTD [JP]) 27 October 2004 (2004-10-27) paragraph [0034] - paragraph [0035]; figure 9 ----- -/--	1-15
☒ 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 6 April 2011		Date of mailing of the international search report 13/04/2011
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 Mootz, Frank

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/036631

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 371 826 A2 (TOYOTA MOTOR CO LTD [JP]; DENSO CORP [JP]) 17 December 2003 (2003-12-17) paragraph [0064] - paragraph [0066]; figures 5-7 -----	1-15

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2010/036631

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2008121390 A1	09-10-2008	CN 101678312 A EP 2134462 A1 JP 2010532244 T KR 20100016153 A US 2010143215 A1	24-03-2010 23-12-2009 07-10-2010 12-02-2010 10-06-2010
EP 1696109 A2	30-08-2006	CN 1824628 A JP 4528153 B2 JP 2006231162 A US 2006185335 A1	30-08-2006 18-08-2010 07-09-2006 24-08-2006
EP 1470861 A2	27-10-2004	JP 4322542 B2 JP 2004321851 A US 2004206061 A1 US 2008000829 A1	02-09-2009 18-11-2004 21-10-2004 03-01-2008
EP 1371826 A2	17-12-2003	CN 1474043 A DE 60304250 T2 JP 3872384 B2 JP 2004019498 A US 2004018123 A1	11-02-2004 28-12-2006 24-01-2007 22-01-2004 29-01-2004