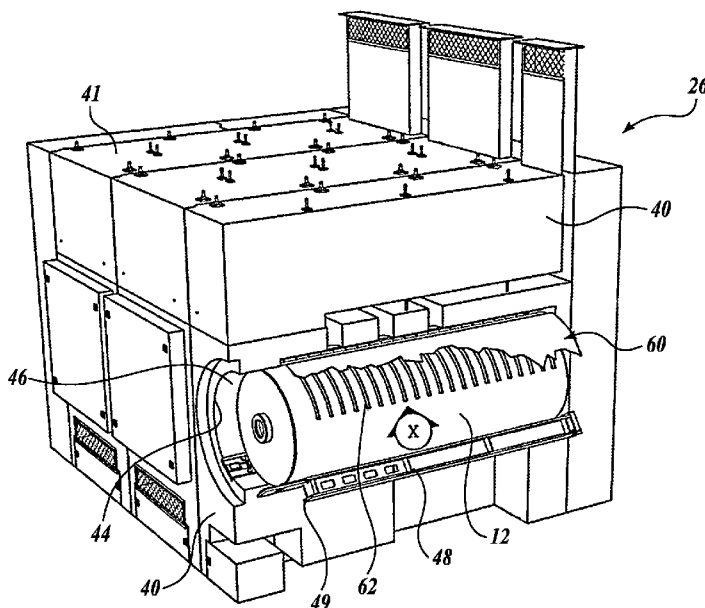




- (51) International Patent Classification:
G21F 5/10 (2006.01)
- (21) International Application Number:
PCT/US2013/022597
- (22) International Filing Date:
22 January 2013 (22.01.2013)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
61/588,550 19 January 2012 (19.01.2012) US
- (71) Applicant: TRANSNUCLEAR, INC. [US/US]; 7135
Minstrel Way, Suite 300, Columbia, MD 21045 (US).
- (72) Inventors: BRACEY, William; 17 Beaumont Terrace,
West Orange, NJ 07052 (US). VAN RIPER, Thomas;
5930 Lemay Road, Rockville, MD 20851 (US). WOLF,
Uwe; 2916 Weisman Road, Silver Spring, MD 20902
(US). BONDRE, Jayant, Rajabhau; 5808 Wild Orange
Gate, Clarksville, MD 21029 (US). TAVASSOLI, Kam-
ran; 12003 Holly Crest Court, Great Falls, VA 22066
(US). HAROON, Raheel; 6230 Black Cherry Circle,
Columbia, MD 21045 (US).
- (74) Agent: NAGAE, Jerald, E.; Christensen O'Connor John-
son Kindness PLLC, 1420 Fifth Avenue, Suite 2800,
Seattle, WA 98101 (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, BN, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU,
RW, 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, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: SYSTEM FOR STORAGE AND TRANSPORTATION OF SPENT NUCLEAR FUEL



(57) Abstract: A concrete storage module (26) is adapted to slideably receive a cylindrical canister assembly (12) therein. Heat dissipation fins (62) and a tubular heat shield (96) are disposed within the module to help dissipate heat emitted from the nuclear fuel assemblies stored in the canister to air flowing through the module. The canister assembly (12) is composed of a basket assembly (70) constructed from multi-layer structural plates disposed in cross-cross or egg carton configuration. A single port tool (106) is provided for draining water from the canister (12) and replacing the drain water with make-up gas. The single port tool is mounted in the cover (100) of the canister and is in fluid flow communication with the interior of the canister.



Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
- *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:
9 January 2014

Published:

- *with international search report (Art. 21(3))*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/022597**A. CLASSIFICATION OF SUBJECT MATTER****G21F 5/10(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)

G21F 5/10; G21F 5/012; G21C 19/18; G21F 7/015; G21C 19/32; G21C 19/06; G21C 19/00; G21C 19/07; G21F 5/00; G21F 9/36

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: canister, plate, heat port, drain

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5898747 A (KRISHNA P. SINGH) 27 April 1999 See abstract, column 6, line 9 - column 9, line 17, and figures 1-2.	1-8, 12
Y		14-16
A		9-11, 13, 17-35
Y	JP 2004-156930 A (MITSUBISHI HEAVY IND., LTD.) 03 June 2004 See paragraphs [0036]-[0037] and figure 2.	14-16
A		1-13, 17-35
X	JP 2002-243888 A (MITSUBISHI HEAVY IND., LTD.) 28 August 2002 See paragraphs [0039]-[0041] and figures 7-9.	28-35
A		1-27
A	US 2008-0123798 A1 (REGIS ANDRE et al.) 29 May 2008 See abstract, paragraphs [0060]-[0090], and figures 1-5b.	1-35
A	KR 10-2010-0081865 A (KOREA HYDRO & NUCLEAR POWER CO., LTD.) 15 July 2010 See abstract, paragraphs [0043]-[0048], claim 1, and figures 1-4.	1-35
A	JP 2007-205931 A (HITACHI LTD.) 16 August 2007 See abstract, paragraphs [0015]-[0033], and figures 1-2.	1-35

 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

"&" document member of the same patent family

Date of the actual completion of the international search

25 November 2013 (25.11.2013)

Date of mailing of the international search report

26 November 2013 (26.11.2013)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
189 Cheongsu-ro, Seo-gu, Daejeon Metropolitan City,
302-701, Republic of Korea

Facsimile No. +82-42-472-7140

Authorized officer

PARK, Hye Lyun

Telephone No. +82-42-481-3463



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2013/022597

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2003-207593 A (MITSUBISHI HEAVY IND., LTD.) 25 July 2003 See paragraphs [0021]-[0026] and figures 1-2,5.	1-35
A	US 2006-0171500 A1 (CHARLES W. PENNINGTON et al.) 03 August 2006 See paragraphs [0019]-[0035] and figures 1-2.	1-35

INTERNATIONAL SEARCH REPORTInternational application No.
PCT/US2013/022597**Box No. 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 No. 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:

- I. Claims 1-16 directed to a canister comprising a basket assembly.
- II. Claims 17-27 directed to a storage module configured for airflow, comprising at least one heat transfer structure and at least one heat shield.
- III. Claims 28-35 directed to a single port tool.

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 and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2013/022597

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5898747 A	27/04/1999	EP 1016091 A2 EP 1016091 A4 EP 1016091 B1 JP 2002-509608 A KR 10-0596588 B1 KR 10-0702806 B1 US 6064710 A WO 98-53460 A2	05/07/2000 06/02/2002 28/03/2007 26/03/2002 06/07/2006 04/04/2007 16/05/2000 26/11/1998
JP 2004-156930 A	03/06/2004	None	
JP 2002-243888 A	28/08/2002	None	
US 2008-0123798 A1	29/05/2008	AT 472805 T DE 602007007423 D1 EP 1926107 A1 EP 1926107 B1 FR 2909216 A1 FR 2909216 B1 JP 2008-134247 A US 7961834 B2	15/07/2010 12/08/2010 28/05/2008 30/06/2010 30/05/2008 20/02/2009 12/06/2008 14/06/2011
KR 10-2010-0081865 A	15/07/2010	None	
JP 2007-205931 A	16/08/2007	None	
JP 2003-207593 A	25/07/2003	JP 4119731 B2	16/07/2008
US 2006-0171500 A1	03/08/2006	US 8437444 B2	07/05/2013