



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
**25.02.2004 Bulletin 2004/09**

(51) Int Cl.7: **G21F 9/36**, G21C 19/375,  
G21F 9/30

(43) Date of publication A2:  
**29.08.2001 Bulletin 2001/35**

(21) Application number: **00308471.2**

(22) Date of filing: **27.09.2000**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU**  
**MC NL PT SE**  
Designated Extension States:  
**AL LT LV MK RO SI**

- **Kondo, Yoshikazu**  
Hitachi-shi, Ibaraki 316-0021 (JP)
- **Kaneko, Shigezi**  
Hitachi-shi, Ibaraki 316-0021 (JP)
- **Narita, Kenjiro**  
Hitachinaka-shi, Ibaraki 316-0002 (JP)

(30) Priority: **21.02.2000 JP 2000042192**

(71) Applicant: **Hitachi, Ltd.**  
**Chiyoda-ku, Tokyo 101-8010 (JP)**

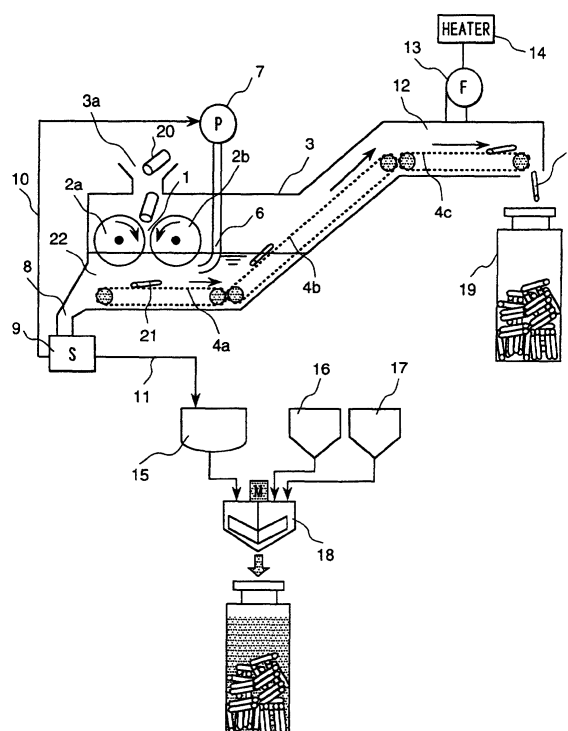
(72) Inventors:  
• **Yoshida, Takuma**  
**Shinjuku-ku, Tokyo 160-0022 (JP)**

(74) Representative: **Paget, Hugh Charles Edward et al**  
**MEWBURN ELLIS**  
**York House**  
**23 Kingsway**  
**London WC2B 6HP (GB)**

(54) **Hulls waste volume-reduction treatment equipment**

(57) Apparatus for volume-reduction of hulls waste (20), i.e. zircaloy and fuel cladding tube residues (hulls) generated during chemical reprocessing of a light-wafer reactor spent fuel, has at least two rotary cylindrical bodies (2a, 2b) having a clearance between them and rotating in mutually opposite directions are provided and compressive reduction in the volume of the hulls waste is accomplished by loading it into the clearance between said rotary cylindrical bodies. The rotary cylindrical bodies may be arranged in order for at least the clearance to be positioned in water or means may be provided for feeding or spraying water downward into the clearance and thus dust due to the occurrence of zircaloy powder during compressive volume-reduction treatment is prevented from exploding.

**FIG. 1**





European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number  
EP 00 30 8471

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 0 163 868 A (TRANSNUKLEAR GMBH) 11 December 1985 (1985-12-11) * page 2, line 8 - line 17 * * page 5, line 12 - line 18; claims 1,3,4; figures I-VI *	1,2,4	G21F9/36 G21C19/375 G21F9/30
A	---	3	
A	US 4 424 016 A (MATSUDA MASAMI ET AL) 3 January 1984 (1984-01-03) * column 2, line 48 - column 3, line 12; figure 2 *	1	
A	---	1,2,4	
A	EP 0 566 960 A (SIEMENS AG) 27 October 1993 (1993-10-27) * column 3, line 28 - column 4, line 11; figures 1,2 *	1,2,4	
A	---	1,2,7,8	
	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 04, 30 April 1999 (1999-04-30) & JP 11 014797 A (ISHIKAWAJIMA HARIMA HEAVY IND CO LTD), 22 January 1999 (1999-01-22) * abstract *		TECHNICAL FIELDS SEARCHED (Int.Cl.7) G21C G21F
D,A	---	1	
	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 08, 30 June 1999 (1999-06-30) & JP 11 064588 A (KOBE STEEL LTD), 5 March 1999 (1999-03-05) * abstract *		
	-----		
<del>The present search report has been drawn up for all claims</del>			
Place of search		Date of completion of the search	Examiner
MUNICH		16 September 2003	Deroubaix, P
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons  & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04001)



European Patent  
Office

Application Number

EP 00 30 8471

### CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

### LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-4, 7-8



European Patent  
Office

**LACK OF UNITY OF INVENTION**  
**SHEET B**

Application Number  
EP 00 30 8471

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-4,7-8

A waste volume reduction treatment equipment for zircaloy fuel cladding tube residues comprising at least two rotary cylindrical bodies having a clearance between each other, rotating in mutually opposite directions and suitable for carrying out a compressive reduction of said residues.

2. Claims: 5,9

An equipment comprising a means for preparing mortar by mixing water and sludge with cement and a container suitable for receiving said mortar and containing the resulting cement body.

3. Claim : 6

An equipment comprising a metallic filter suitable for separating processing water into treated water and zircaloy powder and a means suitable for sintering said zircaloy powder and said metallic filter together into solid form.

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 30 8471

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

16-09-2003

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0163868	A	11-12-1985	DE 3416620 A1	07-11-1985
			DE 3561368 D1	11-02-1988
			EP 0163868 A1	11-12-1985
			ES 8700785 A1	16-01-1987
			JP 1903794 C	08-02-1995
			JP 6031862 B	27-04-1994
			JP 61034500 A	18-02-1986
-----				
US 4424016	A	03-01-1984	JP 1472966 C	27-12-1988
			JP 57105233 A	30-06-1982
			JP 63021528 B	07-05-1988
-----				
EP 0566960	A	27-10-1993	EP 0566960 A2	27-10-1993
			US 5347555 A	13-09-1994
-----				
JP 11014797	A	22-01-1999	NONE	
-----				
JP 11064588	A	05-03-1999	NONE	
-----				