

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/JP2019/049519

**A. CLASSIFICATION OF SUBJECT MATTER**

Int.Cl. B22D11/18 (2006.01) i, B22D41/18 (2006.01) i  
 FI: B22D11/18K, B22D41/18

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)  
 Int.Cl. B22D11/18, B22D41/18

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2020
Registered utility model specifications of Japan	1996-2020
Published registered utility model applications of Japan	1994-2020

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4706944 A (THOR CERAMICS LIMITED) 17 November 1987, claims 1-10, column 1, line 5 to column 4, line 19, fig. 1-6	1-5
Y	US 2011/0260092 A1 (NITZI, G.) 27 October 2011, paragraphs [0001]-[0009], [0066]-[0070], fig. 3, 4	1-5
Y	US 2012/0001372 A1 (REFRACTORY INTELLECTUAL PROPERTY GMBH & CO. KG) 05 January 2012, paragraphs [0001], [0035]-[0051], fig. 3, 5	1-5
Y A	JP 2002-530200 A (VESUVIUS CRUCIBLE COMPANY) 17 September 2002, claims 1-12, paragraphs [0001]-[0012]	3-5 1, 2

Further documents are listed in the continuation of Box C.       See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search 10.01.2020	Date of mailing of the international search report 28.01.2020
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Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer  Telephone No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 02-006040 A (VESUVIUS INTERNATIONAL CORPORATION) 10 January 1990, claim 1, page 8, upper left column, line 19 to lower left column, line 14, fig. 1	3-5 1, 2
Y A	JP 03-081061 A (VESUVIUS FR SA) 05 April 1991, page 3, upper left column, line 20 to lower left column, line 6	3-5 1, 2

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

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US 4706944 A	17 November 1987	WO 1985/005056 A1 GB 8411596 A
US 2011/0260092 A1	27 October 2011	WO 2010/082015 A1 EP 2209056 A1
US 2012/0001372 A1	05 January 2012	EP 2233227 A1 WO 2010/108572 A1 CN 102413962 A
JP 2002-530200 A	17 September 2002	US 6367671 B1 claims 1-10, column 1, lines 56-63, column 2, line 31 to column 3, line 28 WO 2000/030785 A1 CN 1326389 A
JP 02-006040 A	10 January 1990	US 4791978 A claim 1, column 7, line 43 to column 8, line 8, fig. 1 EP 320481 A1
JP 03-081061 A	05 April 1991	US 5071043 A column 3, lines 24-53 EP 411999 A1