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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 24/35808

<p>A. CLASSIFICATION OF SUBJECT MATTER</p> <p>IPC - INV. G21C 13/02, G21C 15/247 (2024.01) ADD. G21C 1/02, G21C 15/24, G21C 15/243, G21C 15/28 (2024.01)</p> <p>CPC - INV. G21C 13/02, G21C 15/247</p> <p>ADD. G21C 1/02, G21C 15/24, G21C 15/243, G21C 15/28</p> <p>According to International Patent Classification (IPC) or to both national classification and IPC</p>														
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols) See Search History document</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched See Search History document</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) See Search History document</p>														
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>US 2023/0154635 A1 (WESTINGHOUSE ELECTRIC COMPANY LLC) 18 May 2023 (18.05.2023) entire document, especially FIG. 1, FIG. 3, FIG. 5, FIG. 9, para [0003], [0016], [0021], [0023], [0027]</td> <td>1-15</td> </tr> <tr> <td>A</td> <td>US 2020/0373027 A1 (BWXT ADVANCED TECHNOLOGIES LLC) 26 November 2020 (26.11.2020) entire document, especially FIGS. 2-3, FIG. 5, FIG. 6A, para [0030], [0034], [0036], [0038]-[0039]</td> <td>1-15</td> </tr> <tr> <td>A</td> <td>US 4,401,619 A (MCEDWARDS) 30 August 1983 (30.08.1983) entire document, especially FIGS. 3-4, col 5, ln 33-48, col 6, ln 5-7</td> <td>1-15</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	US 2023/0154635 A1 (WESTINGHOUSE ELECTRIC COMPANY LLC) 18 May 2023 (18.05.2023) entire document, especially FIG. 1, FIG. 3, FIG. 5, FIG. 9, para [0003], [0016], [0021], [0023], [0027]	1-15	A	US 2020/0373027 A1 (BWXT ADVANCED TECHNOLOGIES LLC) 26 November 2020 (26.11.2020) entire document, especially FIGS. 2-3, FIG. 5, FIG. 6A, para [0030], [0034], [0036], [0038]-[0039]	1-15	A	US 4,401,619 A (MCEDWARDS) 30 August 1983 (30.08.1983) entire document, especially FIGS. 3-4, col 5, ln 33-48, col 6, ln 5-7	1-15
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<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.														
<p>* Special categories of cited documents:</p> <p>“A” document defining the general state of the art which is not considered to be of particular relevance</p> <p>“D” document cited by the applicant in the international application</p> <p>“E” earlier application or patent but published on or after the international filing date</p> <p>“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)</p> <p>“O” document referring to an oral disclosure, use, exhibition or other means</p> <p>“P” document published prior to the international filing date but later than the priority date claimed</p> <p>“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</p> <p>“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</p> <p>“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</p> <p>“&” document member of the same patent family</p>														
<p>Date of the actual completion of the international search</p> <p>20 October 2024</p>		<p>Date of mailing of the international search report</p> <p>DEC 31 2024</p>												
<p>Name and mailing address of the ISA/US</p> <p>Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300</p>		<p>Authorized officer</p> <p>Kari Rodriguez</p> <p>Telephone No. PCT Helpdesk: 571-272-4300</p>												

Continuation of Box No. III – Observations where unity of invention is lacking

The groups of inventions listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Special Technical Features:

Group I includes the special technical features of a shield, a nuclear reactor comprising a pressure vessel, nuclear fuel, control rods, and a melt seal, not found in the other groups.

Group II includes the special technical features of a coolant composition comprising lead and bismuth, not found in the other groups.

Common Technical Features:

The only technical features shared by Groups I-II is a metallic coolant configured to absorb radiation, nuclear fuel, a nuclear reactor, and occupy a volume adjacent the nuclear reactor. However, these shared technical features do not represent a contribution over prior art, because the shared technical features are disclosed by US 2023/0154635 A1 to Westinghouse Electric Company (hereinafter Westinghouse).

Westinghouse discloses a metallic coolant configured to absorb radiation (para [0023]), nuclear fuel (para [0016]), a nuclear reactor (para [0016]), and occupy a volume adjacent the nuclear reactor (para [0023]).

Accordingly, the inventions listed as Groups above lack unity of invention under PCT Rule 13 because they do not share a same or corresponding special technical feature providing contribution over prior art.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 24/35808

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:

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I: Claims 1-15, directed to a nuclear reactor.

Group II: Claims 16-20, directed to a metallic coolant composition.

--see extra sheet

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 additional fees, this Authority did not invite payment of additional fees.
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.:
1-15

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.