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# D E C I S I O N
## of 27 January 2004

**Case Number:** T 1041/00 - 3.4.1

**Application Number:** 94302536.1

**Publication Number:** 0620558

**IPC:** G21C 3/32

**Language of the proceedings:** EN

**Title of invention:**
Debris catching arrangement for boiling water reactors

**Patentee:**
GENERAL ELECTRIC COMPANY

**Opponent:**
Framatome ANP GmbH

**Headword:**
Fuel bundle with debris catching grid for boiling water reactors/GENERAL ELECTRIC COMPANY

**Relevant legal provisions:**
EPC Art. 123(2)(3), 54, 56

**Keyword:**
"Admissiblity of amendments (yes)"
"Novelty (yes)"
"Inventive step (yes)"

**Decisions cited:**
-

**Catchword:**
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

**Case Number:** T 1041/00 - 3.4.1

# D E C I S I O N
**of the Technical Board of Appeal 3.4.1**
**of 27 January 2004**

| | |
|---|---|
| **Appellant:** (Proprietor of the patent) | GENERAL ELECTRIC COMPANY<br>1 River Road<br>Schenectady, NY 12345 (US) |
| **Representative:** | Szary, Anne Catherine, Dr.<br>London Patent Operation<br>Genral Electric International, Inc.<br>15 John Adam Street<br>London WC2N 6LU (GB) |
| **Respondent:** (Opponent) | Framatome ANP GmbH<br>Freyeslebenstrasse 1<br>D-91058 Erlangen (DE) |
| **Representative:** | Mörtel & Höfner<br>Patentanwälte<br>Blumenstrasse 1<br>D-90402 Nürnberg (DE) |
| **Decision under appeal:** | **Decision of the Opposition Division of the European Patent Office posted 17. August 2000 revoking European patent No. 0620558 pursuant to Article 102(1) EPC.** |

**Composition of the Board:**

**Chairman:** G. Davies
**Members:** H. K. Wolfrum
M. G. L. Rognoni

## Summary of Facts and Submissions

I. The appellant (patent proprietor) lodged an appeal against the decision of the opposition division, dispatched on 17 August 2000, revoking European patent No. 0 620 558. The notice of appeal was received on 11 October 2000 and the prescribed fee was paid on the same day. On 22 December 2000 the appellant filed grounds of appeal and requested the maintenance of the patent in amended form on the basis of a main request and two subsidiary requests.

II. Pursuant to Articles 100(a) and 100(b) EPC, the opposition was based on the grounds of lack of novelty and inventive step (Articles 100(a), 52(1), 54(1) and (2) and 56 EPC) as well as insufficiency of disclosure (Articles 100(b) and 83 EPC).

In the appeal, the respondent (opponent) raised novelty and inventive step objections against the subject-matter of amended claim 1 of the appellant's main request, making reference to document :

**D1**: EP-A-0 432 738.

The ground of insufficiency of disclosure was not maintained. With respect to the claimed subject-matter according to the appellant's first and second auxiliary requests, the respondent raised objections under Article 123(2) EPC.

III. In response to a communication of the Board of 17 September 2003 summoning the parties to oral proceedings, the respondent, by letter of 12 December

2003, withdrew its request for oral proceedings and informed the Board, by letter of 19 January 2004, that it would not attend the oral proceedings.

IV. Oral proceedings were held on 27 January 2004 in the absence of the respondent. In the oral proceedings the appellant replaced all former requests by a single request based on the former first auxiliary request with amendments made in the oral proceedings.

V. The appellant requested that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of the following documents filed in the oral proceedings :

| | |
|---|---|
| claims: | 1 to 7; |
| description: | pages 1, 2, 2a, 3 to 7; |
| drawings: | Figures 1, 2A, 2B, 3A, 3B, 3C, 4A and 4B. |

VI. The respondent requested in writing, by letter dated 20 March 2001, that the appeal be dismissed.

VII. Independent claim 1 of the appellant's request reads as follows:

*"1. A boiling water reactor fuel bundle including a debris catching grid construction (80',100,110) for placement within a flow volume (V) defined by a lower hollow tie plate assembly (T) having an inlet nozzle (N) at a lower end thereof and a fuel rod supporting grid (G) at an upper end thereof, said fuel rod supporting grid (G) providing a mechanical support connection for supporting the weight of individual fuel*

*rods of the fuel bundle (B), with said flow volume defined between said inlet nozzle (N) and said fuel rod supporting grid (G), the debris catching grid (80';100;110) being a perforated plate construction and having means mounting said perforated plate construction within said flow volume of said lower tie plate assembly (T);*

*wherein said perforated plate construction is formed by a perforated plate provided with numerous corrugations and is non-planar with side-by-side holes forming a three dimensional construction having a total flow area exceeding the planar cross sectional area of said flow volume of said lower tie plate assembly between said inlet nozzle (N) and said rod supporting grid (G) such that a substantial portion of coolant flowing through said flow volume is caused to change direction between the inlet nozzle (N) and the fuel rod supporting grid (G).*"

Claims 2 to 7 are dependent on claim 1.

VIII. The appellant essentially relied on the following submissions:

The claimed invention concerned a particularly advantageous structure of a debris catching grid in a boiling water reactor fuel bundle. Forming the debris catching grid by a perforated plate provided with numerous corrugations and making it a three-dimensional construction allowed to significantly increase the available flow area through the grid. Hence debris could be effectively prevented from reaching the fuel rods without impeding the flow of coolant through the

fuel bundle. Moreover, the construction was easy to manufacture.

The only example given in the prior art of a debris catcher having a three-dimensional perforated plate construction was a funnel-shaped structure indicated in document D1 which had its narrower opening pointing to the inlet nozzle. The presence of said narrower opening, albeit reducing the resistance to the coolant flow, reduced the efficiency of catching debris or rendered additional means necessary to avoid debris from passing the debris catcher, such as guide vanes for the coolant exerting centrifugal forces on the debris particles. At any rate, neither D1 nor any other prior art document on file hinted at the idea of providing a perforated plate construction with corrugations so as to further increase its surface.

IX. In the course of the opposition and appeal proceedings, the respondent did not put forward any substantiated objection concerning the patentability of a debris catching grid being a perforated plate construction provided with numerous corrugations.

The objections raised by the respondent in writing against the former first subsidiary request, from which the sole request in suit was derived, exclusively concerned alleged ambiguities of the claim wording and the issue of added subject-matter considered to be included in dependent claims.

## Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.

2. *Amendments*

2.1 Amended claim 1 is based on claim 1 of the patent as granted. The amendments concern in essence the replacement of the term "total cross-sectional area" by the term "total flow area" and the introduction of the feature that the perforated plate construction "is formed by a perforated plate provided with numerous corrugations". The latter feature, albeit in a different wording, was the subject of the first subsidiary request filed by the appellant with the statement of grounds of appeal.

The first amendment serves to remove an ambiguity and to define more precisely the fact that it is the total area of the holes in the perforated plate construction which should exceed the cross-sectional area of the flow volume within the tie plate assembly. It is disclosed in column 8, line 50, to column 9, line 8, of the published application.

The second amendment corresponds basically to the additional feature given in claim 6 of the patent as granted. Its exact wording, which is disclosed in column 11, lines 1 and 2, of the published application, is better suited to cover the embodiments according to Figures 6 to 8 of the patent as granted than would be the wording of said claim 6.

2.2 Dependent claims 2, 6 and 7 correspond to claims 5, 7 and 8, respectively, of the patent as granted.

Dependent claims 3 to 5, which have no precedent in the claims of the patent as granted, are directed to the embodiment of Figures 7A, 7B, 7C, 8A and 8B. The additional feature according to claim 3 is immediately apparent from originally-filed Figures 7A, 7B and 7C and the corresponding description. The additional features of claims 4 and 5 are disclosed in column 11, lines 7 and 8, of the published application.

The respondent saw added subject-matter in the introduction of claims 3 to 5 of the then first subsidiary request due to the fact that the additional features according to these claims were disclosed only for the embodiment of Figures 7A, 7B and 7C, whereas the claims defined these features in combination with features of other embodiments, for which combinations the application documents as originally filed did not provide any basis. In the Board's view, these objections are invalid for the present set of claims due to the fact that no mutual references are made between groups of dependent claims referring to different embodiments.

2.3 For the above reasons, the subject-matter of the amended claims does not extend beyond the content of the application documents. Moreover, the amendments limit the scope of protection with respect to that of the claims as granted.

Therefore, the claims on file comply with the requirements of Articles 123(2) and 123(3) EPC.

2.4 Although the aforementioned amendments were filed at a late stage in oral proceedings at which the respondent had decided not to be represented, the amendments lie within the framework of the requests which had been filed by the appellant since the beginning of the appeal proceedings so that the respondent had had ample opportunity to comment on them. Consequently, the Board saw no reason not to admit the appellant's request filed during the oral proceedings.

3. *Patentability (Articles 52(1), 54 and 56 EPC)*

3.1 The only prior art document discussed by the parties in the appeal proceedings is document D1. It relates to a boiling water fuel bundle having a debris catching grid construction in the form of a strainer plate placed below the fuel rod supporting grid (tie plate 11) within the flow volume formed within the lower hollow tie plate assembly (see in particular column 1, line 31, to column 3, line 1; column 5, lines 13-19; and Figure 9). Various shapes and arrangements of the strainer plate are disclosed, which may consist of sheet metal from which circular or elongated holes are punched out and include *inter alia* three-dimensional funnel-shaped constructions with the narrower part of the funnel pointing toward the bottom inlet nozzle. Figure 9 of D1 shows an embodiment of this type, wherein the opening at the lower, narrower funnel end takes up a considerable part of the cross section of the flow volume. In this case, guide vanes are arranged in the flow volume below said opening such as to impart

centrifugal forces on the water and thus to prevent debris from passing through the debris catcher. An alternative embodiment, according to which the funnel-shaped strainer may cover the entire cross section of the flow volume, is mentioned in column 2, lines 36 to 42. Although doubts may remain as to the exact three-dimensional structure of the debris catcher in this embodiment, it can be safely assumed that a substantial portion of the coolant flowing through the tie plate assembly would be caused to change direction between the inlet nozzle and the fuel rod supporting grid. This is due to the fact that the wall of the funnel-shaped debris catcher would be inclined at an oblique angle to the main (vertical) direction of flow.

D1 repeatedly mentions the requirement that the debris catcher should constitute an as small as possible obstacle to the flow of coolant. However its teaching is silent as to the actual extent of the total flow area formed by the holes in the debris catcher.

3.2 Hence, the subject-matter of claim 1 under consideration is distinguished from the teaching of D1 in that

- the total flow area exceeds the planar cross sectional area of the flow volume in the lower tie plate assembly,

- and the perforated plate construction is formed by a perforated plate provided with numerous corrugations.

The second feature entails a further increase of the surface area of the three-dimensional plate

construction. Thus, in comparison to the plate construction known from D1, the number of holes can be increased, which in turn allows to put into practice the first feature without weakening the mechanical strength of the three-dimensional plate construction. Moreover, as a matter of fact, corrugations as such impart an increased rigidity to otherwise planar surfaces. In this context, the patent specification in column 7, lines 52 to 55, draws attention to the requirement that a debris catching grid construction should be sufficiently rigid so that it "does not under any circumstances break apart, fail to stop debris, and become the source of further debris itself".

Consequently, the two distinguishing features solve the objective problem of further reducing the flow resistance of the debris catching grid without impairing its debris catching efficiency, jeopardising its mechanical strength and complicating the manufacturing process.

3.3 The various aspects of the problem concern requirements or goals which as such are known from or at least rendered obvious by the teaching of D1 so that the problem itself is not considered inventive.

However, neither document D1 nor any other document which was discussed in the opposition proceedings or is mentioned in the European Search Report hints at the claimed solution, by which a new optimum has been found between such conflicting requirements. As a matter of fact, none of the available prior art documents shows a debris catching grid formed as a three-dimensional

plate construction from a perforated plate provided with corrugations.

For the above reasons, the subject-matter of claim 1 under consideration is to be considered novel and inventive within the meaning of Articles 54 and 56 EPC.

3.4 The dependent claims relate to embodiments of the invention defined in claim 1.

4. In summary, the Board has come to the conclusion that, taking into consideration the amendments made to the patent documents according to the appellant's sole request, the patent and the invention to which it relates meet the requirements of the EPC.

## Order

## For these reasons it is decided that :

The decision under appeal is set aside.

The case is remitted to the first instance with the order to maintain the patent on the basis of the appellant's request filed during oral proceedings.

The Registrar The Chairman

R. Schumacher G. Davies