BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS | BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE | CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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Application No.: 86 101 596.4

Publication No.: 0 192 138

Title of invention: Spring-force measuring apparatus

Classification: G01L 1/22, G01L 5/00, G01L 5/10, G01L 3/04, G21C 17/00

D E C I S I O N
of 7 May 1992

Proprietor of the patent: WESTINGHOUSE ELECTRIC CORPORATION

Opponent: SIEMENS AKTIENGESELLSCHAFT

Headword:

EPC Articles 100(a) and 102(1)

Keyword: "Novelty (main request and first auxiliary request: no)";
"Inventive step (second auxiliary request: no)"

Headnote

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 225/91 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 7 May 1992

Appellant : (Proprietor of the patent)	WESTINGHOUSE ELECTRIC CORPORATION Westinghouse Building Gateway Center Pittsburgh Pennsylvania 15 222 (US)
Representative :	Patentanwälte R. Holzer, W. Galeo Ludwigstraße 26 W - 8900 Augsburg (DE)
Respondent : (Opponent)	Siemens Aktiengesellschaft Berlin und München Postfach 22 16 34 W - 8000 München 22 (DE)
Decision under appeal :	Decision of Opposition Division of the European Patent Office dated 20 February 1991, written decision posted on 12 March 1992 revoking European patent No. 0 192 138 pursuant to Article 102(1) EPC.

Composition of the Board :

Chairman : E. Turrini
Members : R. Zottmann
L.C. Mancini

Summary of Facts and Submissions

I. European patent No. 0 192 138 was granted on the basis of European patent application No. 86 101 596.4.

II. The patent was revoked by a decision of the Opposition Division on opposition by the Respondent, on the ground of lack of novelty of the subject-matter of Claim 1 (main and auxiliary request). During the opposition procedure, in particular the following documents were referred to:

E1: DE-A-3 242 407 and

E2: M. Streb et al.: QUALITY CONTROL OF PWR SPACERS BY MEANS OF A COMPUTER ASSISTED AUTOMATED TEST DEVICE, KfK 3777, IAEA-SR-102/10, Kernforschungszentrum Karlsruhe, July 1984, pages 415-427.

III. The Appellant (Patentee) lodged an appeal against this decision and requested reimbursement of the appeal fees.

IV. Oral proceedings were held at the end of which the Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of:

- the main request (referred to as "main demand"): new Claim 1, Claim 2 as granted with amendment, Claims 3 to 17 as granted and "an amendment of the description";

- the first auxiliary request (referred to as "auxiliary demand I"): new Claims 1 to 16 and an "amendment of the description";

- the second auxiliary request (referred to as "auxiliary demand II"): new Claims 1 to 13 and an "amendment of description".

Claim 1 and the amendment of Claim 2 of the main request, the claims of the auxiliary requests and the "amendments of description" were handed over at the oral proceedings.

The Respondent requested that the appeal be dismissed.

V. Independent Claim 1 according to the main request reads as follows:

"1. A spring-force measuring apparatus for measuring the spring force imposed on a fuel rod when inserted through a cell in a support grid of a fuel assembly which cell contains fuel rod supporting spring means, the measuring apparatus comprising an assembly (62, 66) simulating a fuel rod having a predetermined outside diameter and adapted to be inserted into said support grid cell and having a member (62) which is laterally displaceable and adapted to bear against said spring means when said assembly is inserted into a grid cell, and force sensor means (112),

comprising the combination of:

a) means (80) for generating an increasing force at a location of said measuring apparatus external of said grid cell (42),

b) means (53, 54, 86) for transmitting said increasing force from said external location to said spring-means contacting member (62) so as to apply said increasing force to said spring means (44) within the cell (42) through said member, and

c) said force sensor means comprising means (106, 108, 112) for measuring the level of said increasing force at

the instance the application of said force causes deflection of said spring means (44)."

Claims 2 to 17 are dependent on Claim 1.

Independent Claim 1 of the first auxiliary request reads as follows:

"1. A spring-force measuring apparatus for measuring the spring force imposed on a fuel rod when inserted through a cell in a support grid of a fuel assembly which cell contains fuel-rod supporting spring means, characterized by the combination comprising:

a pair of front and rear members (62, 66) presettable to a minimum spacing therebetween and thereby to a minimum combined cross-sectional dimension thereof such that, when inserted into a grid cell (42), said members simulate a fuel rod (18) having a predetermined outer diameter, said front member (62) being adapted to bear against said spring means (44) and being movable away from said rear member,

means (80) for generating an increasing force at a location of said measuring apparatus external to said grid cell (42), and means (53, 54, 86) for transmitting said increasing force from said external location to said spring-means contacting front member (62) so as to apply said increasing force to said spring means (44) within the cell (42) through said member,

deflection sensing means (108) connected to at least one of said members (62, 66) for sensing when deflection of said spring means (44) occurs during application of said increasing force,

and force sensing means (106, 112) for measuring the level of force applied at the instance said deflection of the spring means (44) is occurring."

Claims 2 to 16 depend on Claim 1.

Independent Claim 1 of the second auxiliary request reads as follows:

"1. A spring-force measuring apparatus for measuring the spring force imposed on a fuel rod when inserted through a cell in a support grid of a fuel assembly which cell contains fuel-rod supporting spring means, characterized by the combination comprising:

a pair of elongate bars (52, 54) pivotally connected together at their mid-sections (56, 58) and having upper end portions (60, 64) and lower end portions (62, 66), said lower end portions extending in substantially parallel spaced relationship adjacent each other, said lower end portions having dimensions such as to be insertable together into anyone of the grid cells (42) and presettable to a minimum spacing therebetween and thereby to a minimum combined cross-sectional dimension thereof such as to simulate a fuel rod (18) having a predetermined outer diameter, one of said lower end portions bearing against said spring means (44) when inserted into a grid cell,

force generating means (80) operatively engaged with said upper end portions (60, 64) of said elongate bars (52, 54) and operable to apply thereto an increasing force transmitted through said bars to their lower end portions (62, 66) and applied by the latter, when inserted into a grid cell (42), to the spring means (44) therein,

normally closed electrical contacts (86, 110) on said lower end portions (62, 66) of the bars (52, 54) which open at the instance the applied force becomes marginally greater than the spring reaction force, and

force sensing means (106) for sensing the level of force applied at the instance said electrical contacts open."

Claims 1 to 13 are dependent on Claim 1.

VI. The arguments presented by the Appellant during oral proceedings were in substance as follows:

Generally, Claim 1 of main request and Claim 1 of first auxiliary request realise a measuring principle being totally different to E1 and E2. According to the invention in suit, before measurement the assembly of the apparatus to be inserted into the grid cell has the same diameter as the fuel rod to be inserted into said cell and therefore simulates such a fuel rod. During measurement one member is moving outward. Plug gauge (2) and piston (25) of the spring force measuring apparatus of E1, on the contrary, do not simulate the fuel rod to be inserted into the cell when the piston, during insertion of the measuring apparatus, is in its retracted position. Also the spring force measuring apparatus according to E2 does not work in the same way as the apparatus according to the invention in suit.

As to the feature of Claim 1 of first auxiliary request concerning the deflection means, the Appellant holds that in E1 sensor (9) (preferably a piezoelectric transducer) does not measure deflection. The fact that, according to said Claim 1, two means are mentioned, one for deflection sensing and another for force sensing, indicates that there are two different means for each purpose.

Therefore, Claim 1 of main request and Claim 1 of first auxiliary request are novel and inventive.

This applies even strongly to Claim 1 of second auxiliary request since said claim is still more restricted than the other versions of Claim 1.

VII. In support of his request the Respondent argued essentially as follows:

Claim 1 according to main request and Claim 1 according to first auxiliary request are not novel since they are anticipated by the teachings of E1, particularly when taking into account that piston and plug gauge of the embodiment of Figure 2 correspond to the assembly and, respectively, members (62, 66) of Claim 1. The measuring element (piezoelectric transducer) on the outer end of the piston is a means to sense deflection of the spring in the grid cell and a means to measure the force of the spring. With the apparatuses of the first two versions of Claim 1 a measuring method may be realised which is different to that of prior art, however, said versions of Claim 1 are apparatus claims.

Novelty of Claim 1 of second auxiliary request cannot be denied. However, its subject-matter lacks any inventive step, since it is obvious for the skilled person to construct said piston of E1 as pivotable bar. In particular, such an embodiment is suggested by Figures 10 and 11 of E2. As to the electrical contacts, he put forward that it is usual in the art to provide such switch means so as to keep the sensor closed until the beginning of the measurement.

Reasons for the Decision

1. The appeal is admissible.

2. Formal aspects

The Board finds that all features of the three versions of Claim 1 can be identified in the originally filed documents and that none of said versions extends the protection of Claim 1 as granted. There is therefore no formal objection under Article 123(2) and (3) EPC.

3. Closest prior art

The Board considers E1 as the state of the art closest to the subject-matter of all three versions of Claim 1, as it was also admitted by the parties during oral proceedings.

E1 discloses an apparatus for measuring forces of springs in fuel grid cells having a rod-like plug gauge ("Meßdorn 2") to be inserted into the respective grid cell. According to Figure 2 and corresponding description, said gauge has a transverse bore which houses a piston (25) carrying at its outer end a measuring element (9), e.g. a piezoelectric quartz, adapted to bear against the fuel rod supporting spring (7) in the respective grid cell. In use, pressure medium, e.g. pressurised air, is supplied into the chamber (29) behind said piston to urge it outwardly against a shoulder arranged to locate said measuring element flush with the outer circumference of said gauge. The spring is pressing on the piston and thus on the measuring element when it is in its retracted position and during its movement to its outer position, see Figure 2 and page 6 at the bottom: "... kann die Druckfeder 7 den Kolben 25 ... in den Meßdorn 2 hineindrücken bis zur Abstufung 27 ... ").

4. Main request - Novelty

4.1 E1 discloses an apparatus with all features of Claim 1:

It is undisputed that E1 describes an apparatus with all features of paragraphs 1 and 2 of the claim with the exception of the feature "simulating a fuel rod having a predetermined outside diameter" specifying the "assembly" in paragraph 2.

According to an embodiment disclosed in the description of the contested patent - see particularly Figures 5 to 7 and Claims 3 and 4 - said assembly consists of two elongate substantially parallel bars with essentially rectangular cross-sections. Consequently, said feature does not mean that said assembly has an outer shape essentially like a fuel rod and thus a shape essentially like a regular cylinder. It rather means that the outer shape of said assembly is such that it simulates, when inserted in a grid cell, the outer shape and dimensions of the fuel rod (in the inserted position) in the vicinity of the surface of the innermost parts of the spring and of the protrusions of the cell opposite the spring.

The assembly of E1 consisting of piston (25) and plug gauge (2) is in fact such an assembly. Since the spring is pressing against the piston in every position of the piston and since the fuel rod is not part of the apparatus of Claim 1 and thus the fuel rod diameter is not defined in Claim 1, said assembly of E1 simulates a fuel rod in the innermost as well as in the outermost position of the piston.

Feature a) of the claim: The pressure transmitted through tube (30) of E1 cannot be raised immediately from zero to

the level necessary to move the piston (25) and thus the pressure generating means arranged external of the grid cell according to E1 necessarily provides an increasing force at a location of the measuring apparatus external of the grid cell.

Feature b) of the claim: Tube (30) and piston assembly (24-29, 31) of E1 are, apparently, means for transmitting said increasing force from said external location (where the pressure generating means and a portion of said tube is accommodated) to the spring means contacting member (9, 25) to apply said increasing force to said spring means (7) within the cell (4) through said member (9, 25).

Feature c) of the claim: Although the last paragraph of the description of E1 (page 6 last paragraph and page 7) seems to suggest that spring force is measured preferably at the end of the deflection of the spring when the piston (25) is in its end position corresponding to the radius of the fuel rod to be inserted, the apparatus is apparently suitable for measuring the spring force before the piston has reached its end position, that is, at the instance when the application of said force to the piston causes deflection of the spring. This is a consequence of the fact that the spring (7) is pressing on the piston (and thus on the measuring element (9)) when it is in its retracted position and during its movement to its outer end position and thus measuring element (9) can provide a measuring signal from the above-mentioned instance on.

4.2 As a consequence, Claim 1 according to main request is not novel with respect to prior art E1 (Article 54(1) and (2) EPC) and said claim is therefore not acceptable (Article 52(1) EPC).

4.3 Claims 2 to 17 are also not allowable because of their dependency on Claim 1.

5. First auxiliary request - Novelty

5.1 The text of the first, third and last paragraph of Claim 1 of auxiliary request is, with the exception of minor differences, identical with the text of the first paragraph and features a), b) and c) of Claim 1 of main request. Consequently, it follows from preceding chapter 4. that document E1 discloses an apparatus with all features of the first, third and last paragraph of Claim 1 of the first auxiliary request.

Moreover, the apparatus of Figure 2 of E1 exhibits a pair of front and rear members (the outer part of the piston 25 and the part of plug gauge 2 opposite to said outer end of the piston) presettable to a minimum spacing therebetween and thereby to a minimum combined cross-sectional dimension thereof (when the piston is in its innermost position) such that, when inserted into a grid cell, said members simulate a fuel rod having a predetermined outer diameter (reference is made to the interpretation of the feature "simulating a fuel rod ... outside diameter" in preceding chapter 4.); said front member is adapted to bear against said spring (the outer end of the piston bears against the spring in all positions of the piston after insertion of the apparatus into a grid cell) and is movable away from said rear member.

Furthermore, the known apparatus comprises also the remaining feature of Claim 1 (contained in its fourth paragraph): The sensing element (9), e.g. a piezoelectric quartz, is suitable for sensing deflection of the spring (7) occurring during application of the increasing force,

since a deflection of the spring after insertion of the apparatus causes a change of the electrical signal produced by said sensor.

5.2 The Board does not agree with the argument of the Appellant that the wording of the last two paragraphs of Claim 1 indicates that there are two different means, one for deflection sensing and another for force sensing (see chapter VII). Such means can be realised not only by two means, e.g. arranged on different places of said members but also by one sensor suitable to sense deflection as well as force.

5.3 Thus, Claim 1 of first auxiliary request is not novel (Article 54(1) and (2) EPC) and not allowable under Article 52(1) EPC.

5.4 Claims 2 to 16 are also not allowable because of their dependency on Claim 1.

6. Second auxiliary request

6.1 Novelty

None of the available documents discloses an apparatus according to Claim 1. Since this has not been disputed by the Respondent there is no need for further detailed substantiation of this matter.

6.2 Inventive step

6.2.1 There are two essential differences between the subject-matter of Claim 1 and nearest prior art E1: First, the members according to Claim 1 consist of a pair of elongate bars pivotally connected together at their mid-sections whereby their lower end portions are substantially

parallel, whereas the corresponding members of E1 consist of a bar-piston assembly. Second, Claim 1 comprises electrical contacts on said lower end portions which open at initial deflection of the spring whereas in E1 such contacts are not disclosed.

6.2.2 Starting from E1, the objective problem to be solved by the different feature and, respectively, remaining feature of Claim 1 is twofold: on the one hand, mechanically simplifying the known apparatus and rendering it less costly, on the other hand, suppressing sensing signal until actual measurement begins in order to obtain a more reliable system.

It is evident that the first problem is trivial and that the second problem is a quite general problem in measuring technique, e.g. to avoid waste of energy and/or degeneration of the sensor. Thus finding the stated partial problems does not per se contribute to the presence of an inventive step.

6.2.3 The objective first partial problem is solved according to Claim 1 in that the bar-piston assembly of E1 simulating a fuel rod is replaced by a two-bars assembly pivotally connected at their mid-sections, their lower ends being substantially parallel and simulating a fuel rod. In the Board's view, such a two-bars assembly is a simple well-known mechanical equivalent exercising essentially similar effects and it is therefore obvious to a skilled person to replace the piston-bar assembly known from E1, which requires complicated water-tight sealing techniques for the piston moving mechanism, by a two-bars assembly, which simply requires a pivot, to solve the above-mentioned first partial problem. Moreover, it is a matter of course that, when using the two-bars assembly, the force

generating means is advantageously engaged with the upper end portions of said bars.

The solution of the second partial problem consists essentially in the provision of electrical contacts on said lower end portions which open at initial deflection of the spring. The Board is of the opinion that this is an obvious solution for the skilled person when it is faced with said second partial problem. Indeed the contact opening technique is common when there is no need of a continuous measuring system.

For these reasons, and since no synergistic effect between the two groups of features which solve the corresponding two partial problems can be recognised, said features cannot contribute anything to the inventive step of the claimed subject-matter.

6.2.4 Thus, Claim 1 of second auxiliary request lacks inventive step (Article 56 EPC) and is not allowable under Article 52(1) EPC.

6.2.5 Claims 2 to 13 fall because of their dependency on Claim 1.

7. Since neither one of the three requests relates to patentable subject-matter in the sense of Article 52(1) EPC, the grounds for opposition mentioned in Article 100(a) prejudice the maintenance of the European patent (Article 102(1) EPC).

8. Reimbursement of the appeal fee:

Since according to Rule 67 EPC a necessary condition for the reimbursement of appeal fees is that the Board deems the appeal to be allowable (or the decision has been

satisfied by an interlocutory revision) and since this condition is not fulfilled, the appeal fees cannot be reimbursed.

Order

For these reasons, it is decided that:

1. The appeal is dismissed.

2. The request for reimbursement of the appeal fees is rejected.

The Registrar: The Chairman:

P. Martorana E. Turrini