Europäisches Patentamt
Beschwerdekammern

European Patent Office
Boards of Appeal

Office européen des brevets
Chambres de recours

Veröffentlichung im Amtsblatt Ja/Nein
Publication in the Official Journal Yes/No
Publication au Journal Officiel Oui/Non

Aktenzeichen / Case Number / N° du recours : T 357/87 - 3.4.1

Anmeldenummer / Filing No / N° de la demande : 82 902 577.4

Veröffentlichungs-Nr. / Publication No / N° de la publication : WO 83/00385

Bezeichnung der Erfindung: Improved capacitance pressure sensor
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : G01L 9/12

ENTSCHEIDUNG / DECISION

vom / of / du 22 September 1988

Anmelder / Applicant / Demandeur : Rosemount Inc.

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Article 56 EPC

Schlagwort / Keyword / Mot clé : "Inventive step (no)"

Leitsatz / Headnote / Sommaire

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 357/87 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal
of 22 September 1988

Appellant : Rosemount Inc.
12001 West 78th Street, Eden Prairie
US-Minnesota 55344

Representative : Mr. R.E.B. Cross c/o Boult, Wade & Tennant
27 Furnival Street
GB-London EC4A 1PQ

Decision under appeal : Decision of Examining Division 036 of the European Patent Office dated 15 April 1987 refusing European patent application No. 82 902 577.4 pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : K. Lederer
Members : E. Turrini
C. Payraudeau

Summary of Facts and Submissions

I. International patent application PCT/US82/00963 (International publication number WO83/00385) was refused by decision of the Examining Division.

II. The decision under appeal was based on Claims 1 to 8 filed on 5 May 1986.

III. The reason given for the refusal was that the subject-matter of independent Claim 1 of the effective set of claims lacked an inventive step within the meaning of Article 56 EPC in view of the prior art documents US-A-4 084 438 (D1) and US-A-3 962 921 (D2).

IV. The Appellant lodged an appeal requesting that the decision of the Examining Division be set aside and a patent granted on the basis of the set of Claims 1 to 8 filed on 5 May 1986 (main request) and alternatively on the basis of a set of Claims 1 to 6 filed on 4 August 1988 (auxiliary request). He also requests reimbursement of the appeal fee.

V. Current Claim 1 of the main request reads as follows:

"Apparatus for measuring pressure comprising a diaphragm (12) having a first side (18) for application of a first pressure thereto, and a second side (20) for application of a second pressure, at least a portion of the first side (18) of the diaphragm (12) being conductive thus forming a first capacitor electrode (18A); a reference disc (14) having a first side (26) and a second side (28) facing the diaphragm (12) and a passageway (32, 34) between the first side (26) and the second side (28) for communicating the

first pressure to the first side (18) of the diaphragm (12), at least a portion of the second side (28) of the reference disc (14) being conductive thus forming a reference capacitor electrode (28A); and a peripheral spacer (16) disposed between the diaphragm (12) and the reference disc (14) and supporting the diaphragm (12) about its edge in spaced relationship from the reference disc (14) thereby to form a cavity (40A) enclosed by the spacer (16), the diaphragm (12) and the reference disc (14), characterised in that the spacer (16), diaphragm (12) and reference disc (14) are formed from substantially the same material, and are fused together at the periphery of the cavity (40A)."

Claims 2 to 8 are dependent on Claim 1.

VI. Current Claim 1 of the auxiliary request reads as follows:

"Apparatus for measuring pressure comprising a diaphragm (12) having a first side (18) for application of a first pressure thereto, and a second side (20) for application of a second pressure, at least a portion of the first side (18) of the diaphragm (12) being conductive thus forming a first capacitor electrode (18A); a reference disc (14) having a first side (26) and a second side (28) facing the diaphragm (12), and a passageway (32, 34) between the first side (26) and the second side (28) for communicating the first pressure to the first side (18) of the diaphragm (12), at least a portion of the second side (28) of the reference disc (14) being conductive thus forming a reference capacitor electrode (28A); a peripheral spacer (16) disposed between the diaphragm (12) and the reference disc (14) and supporting the diaphragm (12) about its edge in spaced relationship from the reference disc (14)

thereby to form a cavity (40A) enclosed by the spacer (16), the diaphragm (12) and the reference disc (14); a support block (42) secured to the reference disc (14) adjacent to the periphery thereof, and on the side thereof remote from the diaphragm (12), the support block (42) having a bore (50, 54) for communicating the first pressure to the first side (18) of the diaphgram (12); a housing (71) enclosing the other parts of the apparatus and having port means (76) for communicating the second pressure to the second side (20) of the diaphragm (12); and a mounting means (70) by which the support block (42) is secured to the housing (71), characterised in that the mounting means (70) comprises a mounting ring (70) which provides a pressure barrier in the housing (71) separating the first and second pressures."

Claims 2 to 6 are dependent on Claim 1.

VII. The Appellant submitted the following reasoning.

While the preamble of Claim 1 of the main request is covered by the disclosure of document D2, the characterising portion of Claim 1 is not suggested by the disclosure of document D1.

Indeed, although the latter document discloses fusion and possibly the use of members of the same material, it lacks any teaching concerning the use of a separate spacer member which remains in the apparatus fused to the diaphragm and reference disc thereof.

Thus, a man skilled in the art wishing to improve the apparatus of document D2 would not be led to the subject-matter of Claim 1 of the main request by the disclosure of document D1.

As far as Claim 1 of the auxiliary request is concerned, its preamble is also based on the disclosure of document D2. On the contrary, the characterising feature concerning the mounting ring is not disclosed or suggested in the cited documents. Thus, the subject-matter of Claim 1 of the auxiliary request clearly involves an inventive step.

It is finally submitted that, in view of the fact that the Examining Division did not consider in the decision under appeal the patentability of the dependent claims nor gave to the Appellant an opportunity for submitting amended claims when it was decided that the response to the last communication before the decision was not convincing, a refund of the appeal fee should be granted.

Reasons for the Decision

1. The Appeal is admissible.

2. Main request.

2.1. There are no objections on formal grounds to the current version of the claims which are based on the application documents as originally filed as required under Article 123(2) EPC. Neither the Examining Division alleged any deficiency in this respect.

2.2. Novelty.

2.2.1 Document D2 describes an apparatus for measuring pressure (Figure 7; description: column 1, "Summary of the invention, columns 2 to 4) comprising a diaphragm (38) having a first side (the upper face) for application of a first pressure (the reference pressure) thereto, and a second side (the lower face) for application of a second

pressure (the pressure to be measured), at least a portion (46) of the first side of the diaphragm being conductive thus forming a first capacitor electrode; a reference disc (136) having a first side (the upper face) and a second side (the lower face) facing the diaphragm (38), and a passageway (64, 68) between the first side and the second side for communicating the first pressure to the first side of the diaphragm (38), at least a portion (142, 144) of the second side of the reference disc (136) being conductive thus forming a reference capacitor electrode (column 1 "Summary of the invention"); and a peripheral spacer (137) disposed between the diaphragm and the reference disc and supporting the diaphragm about its edge in spaced relationship from the reference disc thereby to form a cavity enclosed by the spacer, the diaphragm and the reference disc.

Thus, document D2 describes an apparatus for measuring pressure as defined in the preamble of Claim 1.

Contrary to the subject-matter of Claim 1, document D2 does not mention the characterising features of Claim 1, i.e. that spacer, diaphragm and reference disc are formed from substantially the same material and that they are fused together at the periphery of the cavity.

2.2.2 Document D1 discloses an apparatus for measuring pressure (Figure 14; column 9, lines 48 to 58) comprising a diaphragm (84) having a first side (lower face) for application of a first pressure thereto, and a second side (upper face) for application of a second pressure, at least a portion of the first side of the diaphragm (84) being conductive thus forming a first capacitor electrode (102); a reference disc (82) having a first side and a second side facing the diaphragm (84), and a passageway (118) between the first side and the second side for

communicating the first pressure to the first side of the diaphragm (84), at least a portion of the second side of the reference disc (82) being conductive thus forming a reference capacitor electrode (104), the diaphragm and reference disc being formed substantially of the same material. The Figures, and in particular Figure 14, show that they consist of the same material. Furthermore, the description on column 5, lines 67 and 68, which explicitly refers to the embodiments of Figures 1 and 2 but which apparently covers also the other embodiments, shows that diaphragm and reference disc may be of the same material, being fused together at their periphery and forming a cavity therebetween. This has not been contested by the Applicant.

Contrary to the subject-matter of Claim 1, document D1 does not mention the use of a peripheral spacer disposed between the diaphragm and the reference disc and supporting the diaphragm about its edge in spaced relationship from the reference disc.

2.2.3 The remaining documents cited in the search report and in the application in suit do not come closer to the subject-matter of Claim 1.

2.2.4 For the above reasons, the subject-matter of Claim 1 is considered to be novel within the meaning of Article 54 EPC.

2.3. Inventive step.

2.3.1. As shown in paragraph 2.2.1 above, Claim 1 is based on document D2, which discloses all the features of the preamble of Claim 1 and is, in the Board's opinion, the nearest prior art.

Starting from document D2, the man skilled in the art is faced with the objectively assessed technical problem of realising a homogeneous construction leading to an increased thermal stability.

The problem is solved by forming spacer, diaphragm and reference disc from substantially the same material and by fusing them together at the periphery of the cavity as set out in the characterising portion of Claim 1.

2.3.2 The identification of the problem does not contribute to the inventive step, since the problem is known per se (document D1, column 1, lines 40 to 43).

2.3.3 As far as the solution to the problem is concerned, the skilled man would take into consideration document D1 which recognises the technical problem, as outlined above and he would find in document D1 an unambiguous suggestion of the solution to the problem. Indeed, although D1 does not mention the spacer, it teaches to fuse together the diaphragm (84) and the reference disc (82) (column 8, lines 42 to 48 and column 9, lines 48 and 49), which may be formed from the same material (column 5, lines 67 and 68), at their periphery forming a monolithic capsule (column 2, lines 31 to 37). The application of such a teaching to the apparatus of document D2 would lead to the apparatus of Claim 1, in so far as the skilled man would as a matter of course apply the teaching contained in document D1 of forming diaphragm and reference disc of the same material also to the spacer in order to obtain the wanted homogeneous construction. Furthermore, fusing also the spacer together with the diaphragm and the reference disc would not bring apparently any additional technical difficulty.

2.3.4 The Appellant's allegations in support of an inventive step are not convincing.

While it is agreed by the Board that document D1 does not disclose the use of a separate spacer between the diaphragm and reference disc, Figure 14 of the document (where diaphragm and reference disc are clearly spaced from each other) suggests the use of spacer means integrally formed with the diaphragm and/or the reference disc.

Furthermore, the Board cannot share the Appellant's opinion that document D1 would lead away from the subject-matter of Claim 1, said document emphasising the disadvantages of fused arrangements. Indeed, a main feature of the apparatus according to D1 is the fusing feature (column 2, line 35); there is merely an optional suggestion of effecting annealing after fusing "in order to reduce internal stress developed during the fusion process" (column 2, lines 50 to 52).

2.3.5 For the above reasons, the subject-matter of Claim 1 is not considered to involve an inventive step within the meaning of Article 56 EPC.

2.4. Claim 1, accordingly, is not allowable under Article 52(1) EPC.

Dependent Claims 2 to 8 are referred back to unallowable Claim 1 and are, therefore, not allowable either.

For these reasons, Appellant's main request is rejected.

3. Auxiliary request.

3.1. Novelty.

3.1.1 Document D2 discloses an apparatus for measuring pressure (Figures 1, 2 and 7; column 2, line 14 to column 4, line 29) comprising, apart from the features already mentioned in paragraph 2.2.1 above, a support block (24; 32, 34) secured to the reference disc (136) adjacent to the periphery thereof, and on the side thereof remote from the diaphragm (38), the support block having a bore (48, 52) for communicating the first pressure to the first side of the diaphragm (38); a housing (wall 16; Figure 1) enclosing the other parts of the apparatus and having port means (22), for communicating the second pressure to the second side of the diaphragm (38); and a mounting means (14, 18, 20) by which the support block (24, 32, 34) is secured to the housing.

Thus, all the features of the preamble of Claim 1 according to the auxiliary request are known from document D2. Furthermore, there is a pressure barrier provided in the housing, separating the first and second pressures (the support block as shown in Figures 1 and 2 of D2 is sealed so that the inner portion of the support block to which the first pressure is applied, is isolated).

Contrary to the subject-matter of Claim 1, document D2 does not mention that the mounting means comprises a mounting ring which provides the pressure barrier.

3.1.2 The other cited documents, in particular document D1, are less relevant to the assessment of novelty.

3.1.3 For the above reasons, the subject-matter of Claim 1 of the auxiliary request is considered to be novel within the meaning of Article 54 EPC.

3.2 Inventive step.

3.2.1 Starting from the apparatus for measuring pressure known from document D2, which in the Board's opinion is the closest prior art, the objectively assessed problems to be solved by the characterising features of the mounting ring are to avoid the transmission of thermal stresses and to find an alternative solution for the pressure barrier.

3.2.2 Since the purpose of avoiding thermal stresses which could cause component breaking is a usual goal, and since seeking alternatives for known solutions of problems is routine for the skilled person, the two technical problems underlying the invention do not contribute to an inventive step.

3.2.3 The solution proposed in Claim 1 is also obvious, because it is self-evident that connecting two components through a mounting ring allows differential thermal expansion of the two components without causing any thermal stress. Moreover, it is obvious that the mounting ring can be utilised also as pressure barrier if its connections to the support block and the housing are properly sealed.

3.2.4 The Appellant's argumentation that an inventive step should be recognised since none of the cited documents disclose or suggest a mounting ring as proposed in Claim 1, cannot be accepted by the Board.

If a feature is self-evident in a certain context, there is no need to cite a prior art document disclosing such a feature.

3.2.5 Thus, the subject-matter of Claim 1 lacks inventive step within the meaning of Article 56 EPC.

3.3 Claim 1, accordingly, is not allowable under Article 52(1) EPC.

Dependent Claims 2 to 6 are dependent on unallowable Claim 1 and are, therefore, not allowable.

For these reasons, Appellant's auxiliary request is rejected too.

4.4 Refund of the appeal fee.

Rule 67 EPC provides that "the reimbursement of the appeal shall be ordered "where the Board of Appeal deems an appeal to be allowable".

Since this is not the case here, Appellant's request of reimbursement of the appeal fee is to be rejected.

Order

For these reasons, it is decided that:

1. The appeal is dismissed.

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

The Registrar: **The Chairman:**

F. Klein **K. Lederer**