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D E C I S I O N
of 2 July 2003

Case Number: T 0385/01 - 3.4.2

Application Number: 90912186.5

Publication Number: 0493397

IPC: G01L 7/08, G01L 9/06

Language of the proceedings: EN

Title of invention:
Pressure transmitter with flame isolating plug

Patentee:
ROSEMOUNT INC.

Opponent:
Endress + Hauser GmbH + Co.

Headword:
-

Relevant legal provisions:
EPC Art. 56, 114(2)

Keyword:
"Inventive step (yes)"
"Late-filed documents, filed during the second appeal proceedings (not admitted)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0385/01 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 2 July 2003

Appellant: (Opponent)
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Respondent: (Proprietor of the patent)
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Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office posted 22 January 2001 concerning maintenance of European patent No. 0493397 in amended form.

Composition of the Board:

Chairman: A. G. Klein
Members: A. G. M. Maaswinkel
G. E. Weiss

Summary of Facts and Submissions

I. The opposition filed against European patent No. 0 493 397 (application No. 90 912 186.5) and founded on the ground under Article 100(a) EPC that the claimed subject-matter did not involve an inventive step within the terms of Article 56 EPC in view of the contents of documents

D9: DD-A-214 927; and

D10: "PTB-Bericht; 2. Sicherheitstechnische Vortragsveranstaltung über Fragen des Explosionsschutzes; Vorträge des 48. PTB-Seminars am 10. Februar 1983"; Edition H. Steen; ISSN 0341-6739; March 1983

was rejected by a first decision of the opposition division.

II. During the subsequent appeal procedure the appellant (opponent) filed the following new citations, which all relate to the same device:

D1la: Brochure of 07.80 "Piezoresistive Sonden DB 16,17,26, 27 A/BZ" with corresponding

D11b: Certificate of compliance PTB No. Ex-80/2142 X, as mentioned at the bottom of page 4 of citation D11a, with corresponding

Zlla: drawing No. 960164-0001 A and

Zllb: drawing No. 960164-0005 A.

In its decision T 344/97 of 15 June 1999 the Technical Board of Appeal 3.4.2 ruled that the newly cited documents D11 and Z11 were sufficiently relevant to be admitted into the procedure, and it remitted the case to the opposition division for further prosecution.

III. By interlocutory decision of 22 January 2001 the opposition division maintained the patent in amended form.

IV. The appellant filed a second appeal against the opposition division's interlocutory decision. He submitted the following new citations

D13: Löffler et al, " Piezoresistive Drucksensoren für die Automatisierungstechnik (Teil 2)" msr, Berlin 30, (1987) 7, pages 317 to 321; and

D13a: "Silizium-Halbleiter-Meßumformer für Druck und Differenzdruck"; in a catalogue of VEB-Kombinat Automatisierungsanlagenbau; 1982.

V. Oral proceedings were held on 2 July 2003 at which the appellant requested that the decision under appeal be set aside and that the European patent be revoked.

The respondent (patentee) as a main request requested that the patent be maintained in amended form on the basis of a set of claims of which claim 1, the only independent claim, reads as follows:

"1. A transmitter (10) providing an output indicating a pressure difference between a line and an atmosphere outside the transmitter, comprising:

a housing (11) forming a wall around an axis of a hole (22) extending into a cavity (12) formed in the housing;

a circuit (20) in the cavity (12) controlling the output;

a sensor (45, 92) coupled to the circuit (20) for sensing the pressure difference; and

a plug (40, 89) in the hole (22) having a sensor cavity (44, 91) holding the sensor (45, 92) a fitting (26, 81) couplable to the line along the axis at a distal end of the plug (40, 89), and a diaphragm (35A, 86A) therein coupling line pressure to the sensor (45, 92) via a liquid in a first passageway (35B, 86B) formed in the plug, the first passageway (35B, 86B) having a shape which flame-isolates the sensor (45, 92) from the line and said fitting being a sleeve-like fitting having a bore (33, 85), a first block (35, 86) mounted in said bore (33, 85) forming part of said plug (40, 89) the first block (35, 86) closing the sensor cavity in a second block (41, 90) and having the diaphragm (35A, 86A) mounted thereon and the first passageway (35B, 86B) therein, the space between the first block (35, 86) and the bore (33, 85) having a shape which flame-isolates from the line, the bore (33, 85) further including a capture ring (34, 87) between the first block (34, 86) and the process fluid to ensure that the first block (35, 86) remains in the bore (33, 85) if the first block (35, 86) is separated from the second block (41, 90) and no longer closes the sensor cavity (12)."

Alternatively, the respondent requested that the patent be maintained in amended form on the basis of one of the sets of claims in accordance with the first and the second auxiliary requests presented at the oral proceedings.

The board announced its decision at the end of the oral proceedings.

VI. The appellant in support of his request essentially submitted that the claimed subject-matter resulted from an obvious combination of the teachings in documents D11 and Z11 with those in newly filed documents D13 or D13a, which should be admitted into the procedure as a mere illustration of the general knowledge in the art, or in document D9.

The claimed transmitter was distinguished from the device disclosed in documents D11 and Z11 only in that the sensor was mounted in a cavity in the second block rather than in the first block, which was disclosed in documents D13 or D13a, in connection also with a flame-isolated pressure transmitter arrangement, and in that a capture ring was provided to ensure that the first block remained in the bore should the first and second blocks become separated. The latter feature was an obvious solution to the problem of maintaining the first block within the bore in the case of an explosion. The skilled person would readily form such a capture ring in the arrangement of documents D11 and Z11, for instance as an additional lip formed at the lower end of the plug to restrict the diameter of the opening of the bore. Such restricted opening was also present in the pressure transmitter of document D9.

VII. The respondent for his part contested that documents D13 and D13a related to a transmitter with a plug closing a hole in the transmitter housing within the meaning of claim 1. He also contested that the transmitter arrangement of document D9, which was adapted to motor car technology, had anything to do with the flame-isolated and explosion proof construction of the patent. Any combination of the teachings in documents D11 and Z11 with those in documents D9, D13 or D13a was thus tainted with hindsight.

Reasons for the Decision

1. The appeal is admissible.

2. *Admissibility into the procedure of documents D13 and D13a*

The appellant submitted documents D13 and D13a only during the present, second, appeal proceedings, which is long after expiry of the delay for filing an opposition.

The appellant had already introduced new citations D11 and Z11 during the first appeal proceedings T 344/97, which the Board considered sufficiently relevant to be admitted into the proceedings. The case was then remitted to the first instance for consideration of these citations.

In the present procedure, however, documents D13a are not considered to be of such an exceptional relevance as to justify their admission at this very late stage of the procedure and, as a consequence, a **second** remittal of the case to the opposition division.

In particular, the modular construction shown in Figure 13 of document D13 is bigger than the housing for the control circuit shown at the top of the figure and it can hardly be considered as a "plug" mounted in a hole of the housing within the meaning of the present claim 1. The construction shown in documents D13 and D13a does not comprise any fitting couplable to a line along the axis at a distal end of the plug either, nor does it include any capture ring. The construction disclosed in documents D13 and D13a thus exhibits substantial structural differences with the claimed device, and the documents do not comprise any suggestion or incentive to combine certain specific features of this construction with parts of any other prior art pressure transmitter.

Contrary to the appellant's submission, documents D13 and D13a are also dedicated to a very specific modular transmitter construction using separate standard units which can be assembled in different ways (see D13, page 318, right hand column, the penultimate paragraph or D13a, the second page, right hand column, the first sentence of the second paragraph), and they cannot therefore be considered as a mere illustration of the skilled person's general knowledge.

For these reasons documents D13 and D13a, which have not been submitted in due time, shall be disregarded as provided for in Article 114(2) EPC.

3. *Respondent's main request*

3.1 Claim 1 of the respondent's main request corresponds to a combination of independent claim 1 with dependent claims 5 and 6 of the granted version, with the additional precision that the diaphragm is mounted **on** the first block rather than **in** said block, as shown in the figures and specified page 6, lines 17 to 22 of the application as originally filed.

Dependent claims 2 to 5 correspond to dependent claims 2 to 4 and 8 as granted.

The introductory portion of the description was amended for consistence with the amended version of claim 1, as required by Rule 27(1)(c) EPC.

For these reasons, the amendments made to the patent do not offend against the provisions of Article 123(2) and (3) EPC.

3.2 Novelty

Document D9 discloses a pressure transmitter comprising a housing 18 forming a wall around an axis of a hole extending into a cavity formed in the housing, a circuit in the cavity controlling the output, a sensor 3 coupled to the circuit for sensing the pressure difference, a fitting 20 couplable to a line, with a hole, and a plug 4, 19 in the hole having a

sensor cavity holding the sensor. The plug comprises a diaphragm 13 coupling line pressure to the sensor via a liquid in a first passageway 21 formed in the plug, a first block 19 and a second block 4 (see Figures 1 and 4).

Contrary to the claimed pressure transmitter, in this prior art device the plug 4, 19 is not mounted in the bore of the fitting 20, the first block 18, which is formed of a plate of ceramics is too thin to confer the first passageway 21 a flame-isolating capacity, the sensor cavity is formed both of a recess in first block 19 and of an opposite recess in the second block 4 and the bore in fitting 20 does not comprise any capture ring.

The pressure transmitter of documents D11 and Z11, as shown for instance in drawings Z11a and and Z11b, comprises a housing (Gehäuse) forming a wall around an axis of a hole extending into a cavity formed in the housing and receiving a circuit controlling the output (Elektronikeinsatz). A plug in the hole has a sensor cavity formed in a single block mounted into a bore of a fitting (Einschraubstück) couplable to the line along the axis of a distal end of the plug and a diaphragm (Membrane) therein coupling line pressure to the sensor via a liquid in a first passageway (Übertragungsflüssigkeit) formed in the plug, the first passageway having a shape which flame-isolates the sensor from the line. The space between the block and the bore of the fitting also has a shape which flame-isolates from the line.

As shown more in details on the drawing Z11b, the cavity in the block for the sensor is closed by the sensor itself (Messnelle), maintained in position by a pressure bolt (Druckschraube) which itself is covered by successive layers of silicon rubber and printed circuit material (Leiterplatte).

Thus, the subject-matter of claim 1 is distinguished from the pressure transmitter of documents D11 and Z11 essentially in that the sensor cavity is no longer formed in the known single block but in a second block and is closed by the first, and in that a capture ring is provided within the bore of the fitting to ensure that the first block remains in the bore if it is separated from the second block and no longer closes the sensor cavity.

The remaining documents on the file do not come closer to the claimed subject-matter.

For these reasons, the subject-matter of claim 1 is novel within the meaning of Article 54 EPC.

3.3 Inventive step

The pressure transmitter of documents D11 and Z11 undisputedly constitutes the closest prior art.

The above-mentioned distinguishing features, namely the forming of the sensor cavity in a second block closed by the first block to replace the cavity formed in the first block and merely closed by the sensor itself and overlying layers of silicon rubber and printed circuit board material and the provision of a capture ring in

the bore of the fitting, improve the solidity of the construction and avoid disintegration of the transmitter in case of an internal explosion.

The substantially different arrangement of the cavity is not in any way suggested in documents D11 and Z11. Moreover, the particular shape of the first block in the known arrangement, with an enlarged portion at the distal end of the plug, is such that this first block can only be mounted into the bore of the fitting from its distal end. This would no longer be possible if the bore comprised a capture ring as set out in claim 1.

Document D9 is dedicated to a low-cost pressure transmitter construction for mass production, in particular for cars, which comprises fragile ceramic parts assembled by gluing or soldering(see page 2, the second and the penultimate paragraph) and thus exhibits no flame isolating or explosion protecting capabilities. In addition, the sensor cavity in this transmitter is formed by a recess provided both in first block 19 and in second block 4 (see Figure 4) and there is no capture ring in the bore through fitting 20.

Accordingly, the claimed subject-matter cannot in an obvious way result from any combination of the prior art arrangement disclosed in citations D11 and Z11 with the device of document D9 as was submitted by the appellant.

The other documents on the file do not come closer to the claimed subject-matter.

For these reasons, the subject-matter of claim 1 involves an inventive step within the meaning of Article 56 EPC.

3.4 The same conclusion applies to the subject-matter of claims 2 to 5 by virtue of their appendance to claim 1.

Since, taking into consideration the amendments made by the respondent, the patent and the invention to which it relates meet the requirements of the Convention, maintenance of the patent as amended can be decided (Article 102(3) EPC).

The respondent's main request thus being admissible, his auxiliary requests need not be considered further.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent as amended in the following version:

   claims 1 to 5 presented at the oral proceedings as main request;

   description and drawings attached to the decision of the opposition division dated 22 January 2001.

The Registrar: The Chairman:

P. Martorana A. G. Klein