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# Datasheet for the decision of 8 June 2016

**Case Number:** T 2249/11 - 3.5.02

**Application Number:** 04812091.9

**Publication Number:** 1692920

**IPC:** H05B3/06, H05B1/02, B29C45/27, H05B3/42

**Language of the proceedings:** EN

**Title of invention:**
TWO-WIRE LAYERED HEATER SYSTEM

**Patent Proprietor:**
WATLOW ELECTRIC MANUFACTURING COMPANY

**Opponent:**
CABINET LAURENT & CHARRAS

**Relevant legal provisions:**
RPBA Art. 13(1)
EPC Art. 54, 56

**Keyword:**
Late-filed document - admitted (yes)
Novelty - (yes)
Inventive step - (yes)

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**Case Number: T 2249/11 - 3.5.02**

# D E C I S I O N
# of Technical Board of Appeal 3.5.02
# of 8 June 2016

| | |
|---|---|
| **Appellant:** (Opponent) | CABINET LAURENT & CHARRAS<br>Le Contemporain<br>50, Chemin de la Bruyère<br>F-69574 Dardilly Cédex (FR) |
| **Respondent:** (Patent Proprietor) | WATLOW ELECTRIC MANUFACTURING COMPANY<br>12001 Lackland Road<br>St. Louis,<br>Missouri 63146 (US) |
| **Representative:** | DREISS Patentanwälte PartG mbB<br>Postfach 10 37 62<br>70032 Stuttgart (DE) |
| **Decision under appeal:** | **Interlocutory decision of the Opposition Division of the European Patent Office posted on 25 August 2011 concerning maintenance of the European Patent No. 1692920 in amended form.** |

**Composition of the Board:**

| | |
|---|---|
| **Chairman** | G. Flyng |
| **Members:** | H. Bronold |
| | W. Ungler |

## Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division to maintain the European patent in amended form on the basis of the claims of the then fourth auxiliary request.

II. In a communication under Article 15(1) RPBA accompanying the summons to oral proceedings the board informed the parties that it had doubts whether the feature TCR-characteristics was disclosed in any of documents A18, A20, A4 or A4bis.

III. Oral proceedings before the board took place on 8 June 2016 and the parties submitted the following final requests:

The appellant (opponent) requested that the decision under appeal be set aside and that the European patent be revoked.

The respondent (patent proprietor) requested that the decision under appeal be set aside and the patent be maintained in amended form on the basis of the claims of the first auxiliary request as filed during the oral proceedings of 8 June 2016.

IV. The following documents are relevant for this decision.

Cited in the opposition and appeal proceedings:

A4 : US 2003/0033055 A1

Filed together with the statement setting out the grounds of appeal:

A4bis : US 5,743,251
A18 : US 5,588,438
A20 : US 5,552,998

V. Claim 1 of the first auxiliary request reads:

"A heater system (10; 200; 300) comprising: a layered heater (12; 202; 302) comprising at least one resistive layer (24; 210), wherein the layered heater (12; 202; 302) is selected from a group consisting of thick film, thin film, thermal spray, and sol-gel, and the resistive layer (24; 210) having sufficient temperature coefficient of resistance characteristics such that the resistive layer (24;210) is a heater element and a temperature sensor; two electrical lead wires (30) connected to the resistive layer (24; 210); and a two-wire controller (14; 204) connected to the resistive layer (24; 210) through the two electrical lead wires (30), wherein the two-wire controller (14; 204) determines temperature of the layered heater (12; 202; 302) using the resistance of the resistive layer (24; 210) and controls heater temperature accordingly through the two electrical lead wires (30), wherein the heater system (10; 200; 300) provides heat to a part to be heated;
characterized in that
the two-wire controller (14; 204) further comprises a microprocessor (56) and a communications component (58), the microprocessor being in communication with the communications component (58), where temperature readings from the heater system (10) is delivered and also where TCR characteristics are provided to the heater system (10)."

Independent method claim 10 is directed to a corresponding method of operating a heater system according to one of claims 1 to 7.

Claims 2 to 9 and 11 are dependent on claims 1 and 10, respectively.

VI. The arguments of the appellant (opponent) which are relevant for the present decision can be summarised as follows:

Admittance of Documents A18 and A20 and A4bis

The search for documents A18, A20 and A4bis could only be started after the patent proprietor had filed amended claims shortly before the oral proceedings before the opposition division. The amended claims related to a problem discussed for the first time during those oral proceedings. Moreover documents A18, A20 and A4bis were prima facie highly relevant.

Document A4bis was further mentioned in document A4 as being incorporated by reference therein. Since document A4 was in the proceedings, document A4bis was deemed to have been in the proceedings as well.

Novelty

Document A18

Document A18 disclosed all features of claim 1 of the first auxiliary request. Although document A18 disclosed heater 400 together with a thermocouple 104 in figure 8, it was clear from column 9, lines 40 to 45 of A18 that the heater 400 was used as both, heater and temperature sensor. This implied that the controller of

document A18 was capable of operating the heater 400 via two wires only such that the controller of document A18 was a two-wire controller in the sense of claim 1. ROM 802 corresponded to the communications component storing TCR-characteristics of claim 1. Implicitly, temperature readings were provided to any device to which they were useful. Thus, claim 1 was not novel over the disclosure of document A18.

Document A20

The features of claim 1 were also known from document A20. In particular, document A20 disclosed in figure 1 that the heater is connected to the controller via two wires only. Further according to column 4, lines 9 to 26, a lookup-table comprising normalised resistance ratios for corresponding temperatures was used. Interpolation was carried out for temperature values in-between the stored normalised resistance values. The calculation used for the interpolation in A20 was equivalent to the claimed use of TCR-characteristics. Moreover, memory 16 of document A20 corresponded to the claimed communications component. Thus, claim 1 was not novel over the disclosure of document A20.

Inventive step

Document A20 with A18

Starting from document A20 the person skilled in the art learned from document A18 that the heater can be used as both, heater and temperature sensor. Further, ROM 802 of document A18 corresponded to the communications component claimed in claim 1 since it stored TCR-characteristics. The remaining difference was only a standard two-way communication. Providing

process parameters such as temperature readings over available communications systems was therefore obvious for the person skilled in the art. Therefore, claim 1 did not involve an inventive step over a combination of documents A20 and A18.

Document A4 with A4bis

Document A4 disclosed all features of claim 1 except a thin film layered heater and a communications component. A thin film layered heater was however known from document A4bis, column 3, line 62. Bidirectional communication as claimed by the communications component was within the general knowledge of the person skilled in the art. Thus, the subject-matter of claim 1 lacked an inventive step over a combination of documents A4 and A4bis.

VII. The arguments of the respondent (patent proprietor) which are relevant for the present decision can be summarised as follows:

Admittance of Documents A18 and A20 and A4bis

Documents A18, A20 and A4bis were not to be admitted into the proceedings since the request that triggered the filing of these documents was filed several weeks prior to the oral proceedings before the opposition division. Moreover, documents A18, A20 and A4bis did not relate to the amendment made to the claims filed in preparation of the oral proceedings before the board. There was no undue burden to produce the documents during the proceedings before the first instance. Moreover, document A4bis was not to be regarded as incorporated by reference in document A4.

Novelty

Document A18

Document A18 did not disclose a layered heater since the heater of A18 was a wrapped heater filament. In contrast, the patent related to a rigid heater, such as for example glass. Further, the controller according to document A18 was a four-wire controller, in contrast to the two-wire controller as claimed. Moreover, the communications component of document A18, i.e. the ROM 802, was only capable of delivering TCR-characteristics and did not provide the claimed temperature readings. In addition, ROM 802 was not part of the controller. Thus, claim 1 was novel over document A18.

Document A20

The subject-matter of claim 1 differed from the disclosure of document A20 in that A20 did not disclose a two-wire controller, nor the use of TCR-characteristics. A20 also failed to disclose a communications component where TCR-characteristics are provided and where temperature readings are delivered. Therefore, claim 1 was novel over document A20.

Inventive step

Document A20 with A18

Starting from document A20, the skilled person would not consider document A18. Document A20 related to the calibration of multiple heater elements. In contrast, document A18 related to a thermodilution catheter comprising a single heater only. Even if the person skilled in the art combined document A18 with A20, the

differences between the disclosure of document A20 and the claimed subject-matter were not disclosed in document A18. In particular, A18 disclosed neither a two-wire controller nor a communications component with two functions, namely to deliver temperature readings and to provide TCR characteristics. Thus, the subject matter of claim 1 was not rendered obvious by a combination of document A20 with A18.

Document A4 with A4bis

Document A4 did not disclose a two-wire controller. According to paragraph [0053] a measuring device 341 was foreseen as a separate temperature sensor. Further, neither document A4 nor document A4bis disclosed a layered heater. A4bis merely disclosed a thin platinum layer in column 3, line 62. This was however not a layered heater. Finally, document A4 did not disclose a communications component which was part of the two-wire controller and where temperature readings were delivered and TCR-characteristics were provided. Consequently, the subject-matter of claim 1 was not rendered obvious by a combination of document A4 with A4bis.

## Reasons for the Decision

1. Admittance of Documents A18, A20 and A4bis

Documents A18, A20 and A4bis were filed together with the statement setting out the grounds of appeal.

Document A18 discloses in column 9, lines 40 to 44 that filament material can be used as heat supplier and can serve as its own temperature sensor. Thus, document A18 discloses essential features of the subject-matter of the opposed patent.

Document A20 discloses in column 2, lines 24 and 25 to use thin film material as a heater and in column 4, lines 11 to 26 that the process temperature can be derived using the heater resistance value.

Document A4bis is mentioned in paragraph [0004] of document A4. It discloses in column 3, lines 60 to 62 that a heater includes a thin platinum layer, which was disputed during the procedure.

The board therefore concludes, that all of the documents A18, A20 and A4bis are prima facie highly relevant with respect to the subject-matter of the opposed patent.

Consequently, the board exercises its discretion under Article 13(1) RPBA to admit documents A18, A20 and A4bis into the procedure.

2. Novelty

2.1 Document A18

Regarding document A18, it was disputed whether document A18 disclosed a layered heater, a two-wire controller, and a communications component in the sense of claim 1.

Claim 1 defines that "the layered heater ... is selected from a group consisting of thick-film, thin film, thermal spray, and sol-gel". According to the opponent, a corresponding thin layer is disclosed in column 7, lines 31 to 35 of document A18. While it is true that the expression "thin layer" is present in column 7, line 33 of A18, this passage is directed to filament layers, i.e. a layer comprising thin filaments. Such a filament layer is however not a layered heater based on thin-films, as claimed in claim 1. As commonly known and as defined in paragraph [0003] of the opposed patent, thin-films are formed using deposition processes, such as chemical vapour deposition or sputtering.

Therefore, the board is not convinced that document A18 discloses a layered heater in the sense of claim 1.

Document A18 further discloses a controller denoted 710 in figure 15A. The controller 710 communicates via connector 116 with catheter 100, as can be seen from figure 8. While heater 400 has only two wires, the heater system of A18 provides as many as ten wires between the catheter connector 116 and controller 710. Document A18 does not disclose an embodiment with two wires between the controller and the catheter only. However, the purpose of having a controller with two

wires only is to reduce the amount of cabling, as follows from paragraph [0004], column 2, lines 1 to 5 of the patent. A controller as disclosed in document A18, that has two wires connecting to a heater but eight extra wires that connect via the same connector to the catheter comprising the heater does not provide the intended effect of the two-wire controller as claimed in claim 1. Thus, the controller of document A18 cannot be interpreted as being a two-wire controller in the sense of claim 1.

Document A18 also discloses a ROM 802, as shown in figures 8 and 15A. In column 15, lines 30 to 33, it is disclosed that the reference temperature and reference resistance of the heating element 400 are precalibrated into ROM 802.

The feature "communications component" according to claim 1 requires that at the communications component of the two-wire controller temperature readings are delivered and TCR characteristics are provided to the heater system.

While it may be argued that ROM 802 can be interpreted to be a communications component at which TCR-characteristics are provided to the heater system, document A18 is silent about any temperature readings delivered at ROM 802. It is even questionable that ROM 802 would be capable of having temperature readings delivered to it, since per definition a ROM is a read only device.

Therefore, document A18 also does not disclose a communications component in the sense of claim 1.

Since not all features of claim 1 are disclosed in document A18, claim 1 is novel over the disclosure of document A18.

2.2 Document A20

Regarding the disclosure of document A20 it was disputed amongst the parties whether A20 disclosed a two-wire controller, temperature control, TCR-characteristics and a communications component in the sense of claim 1.

The controller of document A20 is best represented in figure 2, which has to be read together with figure 1. Control according to A20 takes place via output lines 17 to switches SS1 to SSN and feedback lines Ec1 to EcN. According to column 3, lines 1 to 5, "Power to heaters 1, 2, ... N is controlled by solid state switches SS1, SS2 ... SSN, respectively. Current, through each of the heaters 1, 2, ... N is detected by a current transformer 3 to develop signals Ec1, Ec2, ... EcN". Thus, at least four wires are required according to document A20 for the control of each heater.

The board therefore concludes that document A20 does not disclose a two-wire controller in the sense of claim 1.

A20 further discloses in column 4, lines 9 to 26 a look-up table comprising normalised resistance ratios for corresponding temperatures of the heater. Interpolation is carried out to determine the normalised resistance value in between the stored values. The normalised resistance values are just numbers without measurement unit. TCR-characteristics

according to claim 1 are expressed in Ω/Ω/°C, see paragraph [0042] of the patent. Thus, the TCR-characteristics according to claim 1 imply a slope or other function according to which the TCR-values of a specific material can be determined. This is not the case for normalised resistance values at corresponding temperatures of the heater as disclosed in document A20.

Consequently, document A20 does not disclose TCR-characteristics in the sense of claim 1.

According to document A20, the look-up table including the normalised resistance values at specific temperatures is stored in external memory 16, see column 4, lines 13 and 14. However, memory 16 does not provide temperature readings. Thus, memory 16 cannot represent the communications component in the sense of claim 1. Document A20 additionally discloses in column 3, lines 27 to 29 and column 4, lines 5 to 8, a display 14 and keyboard 15 for entering process temperatures and set points as well as for entering process data and viewing heater temperatures, currents and resistance values. Even if it was assumed that display 14 delivers temperature readings in the sense of claim 1, the set points disclosed in connection with display 14 and keyboard 15 do not qualify as TCR-characteristics.

Therefore, document A20 also does not disclose a communications component in the sense of claim 1.

Since not all features of claim 1 are disclosed in document A20, claim 1 is novel over the disclosure of document A20.

3. Inventive step

3.1 Document A20 with A18

As discussed above under 2.2 with respect to novelty over document A20, the board has come to the conclusion that document A20 discloses neither a two-wire controller, nor TCR-characteristics, nor a communications component in the sense of claim 1.

As discussed above under 2.1 with respect to novelty over document A18, the board has come to the conclusion that document A18 discloses neither a two-wire controller, nor a communications component in the sense of claim 1.

Thus, even if the person skilled in the art were to combine the disclosure of document A20 with that of document A18, neither a two-wire controller nor a communications component as claimed would form part of such a combination.

Therefore, the combination of documents A20 with A18 does not render the subject-matter of claim 1 obvious for a person skilled in the art.

3.2 Document A4 with A4bis

With respect to a possible combination of the disclosures of documents A4 with A4bis, it was disputed that such a combination disclosed a layered heater, a two-wire controller, a communications component and TCR-characteristics.

Document A4bis discloses in column 4, lines 12 to 16 a “thin film heater layer” which is preferably “a thin

platinum film" being "deposited onto the tube by any suitable method such as DC magnetron sputter deposition". Therefore, a thin film layered heater in the sense of claim 1 is disclosed in document A4bis.

The board is however not convinced that document A4 discloses a two-wire controller in the sense of claim 1. The controller 350 shown in figure 3 uses three wires to control the heater 310. Heater 310 is on the one hand connected via wires 327a and 327b to a DC source 329 and a switch 340 being controlled by controller 350. On the other hand measuring device 341 is connected to controller 350 which, according to paragraph [0051], provides input relating to the temperature of the flow passage to controller 350. While paragraph [0051] contains the statement that "the controller 350 regulates the temperature of the flow passage 323 by monitoring the resistance of the heater", nothing in the description of figure 3 indicates that the measuring device and its connection wire may be omitted.

According to claim 1 the communications component is where temperature readings from the heater system are delivered and also where TCR-characteristics are provided to the heater system. Following the disclosure of document A4, perhaps display 352 in figure 3 could be interpreted as communications component. However, since a display can merely display information and not be used to input information, the board is of the opinion that no TCR-characteristics can be provided to the heater system via display 352. Moreover, the disclosure of document A4 is silent about temperature readings being delivered at display 352.

Thus, the board concludes, that neither a communications component nor TCR-characteristics in the sense of claim 1 are disclosed in document A4.

Consequently, even if the person skilled in the art were to combine the disclosure of document A4 with that of document A4bis, neither a two-wire controller nor a communications component as claimed would form part of such a combination.

Therefore, the combination of documents A4 with A4bis does not render the subject-matter of claim 1 obvious for a person skilled in the art either.

4. Conclusion

As none of the documents or combinations of documents brought forward by the opponent anticipates the subject-matter of claim 1 or renders it obvious, the board has to accede to the request of the respondent and maintain the patent based on the claims of the first auxiliary request.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent with the following claims and a description to be adapted:

   Claims No. 1 to 11 of the first auxiliary request filed during the oral proceedings of 8 June 2016.

The Registrar: The Chairman:

U. Bultmann G. Flyng

Decision electronically authenticated