BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [ ] To Chairmen
(D) [X] No distribution

Datasheet for the decision of 2 September 2009

Case Number: T 1438/06 - 3.5.02

Application Number: 99200961.3

Publication Number: 0926647

IPC: G08B 17/12

Language of the proceedings: EN

Title of invention:
Method for detecting a fire condition

Patentee:
SPECTRONIX LTD.

Opponent:
DETECTOR ELECTRONICS CORPORATION

Headword:
-

Relevant legal provisions:
EPC Art. 100(b)(c)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Insufficiency of disclosure (yes - main request and first auxiliary request)"
"Admissibility of late-filed requests (no - second and third auxiliary requests)"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1438/06 - 3.5.02

D E C I S I O N
of the Technical Board of Appeal 3.5.02
of 2 September 2009

Appellant: (Opponent)	DETECTOR ELECTRONICS CORPORATION 6901 West 110th Street Bloomington Minnesota 55438 (US)
Representative:	Foster, David Martyn MATHISEN & MACARA The Coach House 6-8 Swakeleys Road Ickenham Uxbridge UB10 8BZ (GB)
Respondent: (Patent Proprietor)	SPECTRONIX LTD. 18 Rival Street IL-67 778 Tel Aviv (IL)
Representative:	Dennemeyer, John James Dennemeyer & Associates S.A. 55, rue des Bruyères LU 1274 Howald (LU)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted 18 July 2006 rejecting the opposition filed against European patent No. 0926647 pursuant to Article 102(2) EPC 1973.**

Composition of the Board:

Chairman: M. Ruggiu
Members: M. Rognoni
E. Lachacinski

Summary of Facts and Submissions

I. The opponent (appellant) appealed against the decision of the opposition division rejecting the opposition filed against the European patent No. 0 926 647.

II. In the decision under appeal, the opposition division held, *inter alia,* that the late filed ground for opposition pursuant to Article 100(c) EPC was not admissible, and that the patent in suit disclosed the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC).

III. In reply to an objection under Article 100(c) EPC put forward by the appellant in the statement of grounds of appeal, the patent proprietor (respondent), with a letter dated 30 March 2007, filed a new set of claims 1 to 3 by way of main request and a new claim by way of auxiliary request.

IV. Oral proceedings were held on 2 September 2009.

V. The appellant requested that the decision under appeal be set aside and that the patent be revoked.

VI. The respondent requested that the decision under appeal be set aside and the patent be maintained in amended form on the basis of claims 1 to 3 of the main request filed with the letter of 30 March 2007, subsidiarily on the basis of the single claim of the first, second or third auxiliary request received during the oral proceedings.

VII. Claim 1 according to the respondent's main request reads as follows:

"A method of detecting a fire condition in a monitored region, including using sensors each of which is sensitive to radiation within a respective bandwidth and processing their output signals to determine the existence of fire in the monitored region, characterized by the following operations:
(a) concurrently monitoring said region by a first sensor [IR_1] sensitive to radiation within a first bandwidth which includes the CO_2 emission band, by a second sensor [IR_2] sensitive to radiation within a second bandwidth which includes wavelengths mainly lower than the CO_2 emission band, and by a third sensor [IR_3] sensitive to the radiation within a third bandwidth which includes wavelengths higher than the CO_2 emission band, and producing first, second and third measurements of radiation variations emitted from said monitored region;
(b) determining two cross-correlation values, a first of said two cross-correlation values [C_{13}] being determined by cross-correlating said first and third measurements, and a second of said two cross-correlation values [C_{23}] being determined by cross-correlating said second and third measurements;
(c) forming a correlation ratio of said two cross-correlation values;
(d) comparing said correlation ratio with a predetermined threshold; and
(e) utilizing the results of said comparison in determining the presence or absence of a fire condition in the monitored region.

Claims 2 and 3 are dependent on claim 1.

The only claim according to the first auxiliary request differs from claim 1 of the main request in that feature (e) reads as follows:

"(e) utilizing the results of said comparison in determining the presence or absence of a fire condition in the monitored region; and wherein said first sensor [IR_1] senses radiation within the 4.3-4.6 µm emission band, said sensor [IR_2] senses radiation within the 3.8-4.1 µm emission band; and said third sensor [IR_3] senses radiation within the 3.8-4.7 µm emission band."

The only claim according to the second auxiliary request differs from the claim of the first auxiliary request in that feature (a) reads as follows:

"(a) concurrently monitoring said region by a first sensor [IR_1] sensitive to radiation within a first specific bandwidth which includes the CO_2 emission band, by a second sensor [IR_2] sensitive to radiation within a second specific bandwidth, and by a third sensor [IR_3] sensitive to the radiation within a third specific bandwidth, and producing first, second and third measurements of radiation variations emitted from said monitored region;"

The claim according to the third auxiliary request differs from the claim of the second auxiliary request only in that the third specific bandwidth of feature (a) is defined as "a specific broad bandwidth" (emphasis added).

VIII. The appellant's arguments relevant to the present decision may be summarized as follows:

Whereas claims 2 and 3 of the parent application as originally filed required forming a *"ratio"* of the two cross-correlation values and comparing the *"correlation ratio"* with a predetermined threshold, these features in the opposed patent had been generalised so that claim 1 of the patent as granted required forming a *"function"* of two cross-correlation values and comparing said *"function"* with a predetermined threshold. The term *"function"* was clearly much broader than *"ratio"* and included many other different functions in addition to a ratio. This broadening was not supported and amounted to an inadmissible generalisation contrary to Article 100(c) EPC.

A significant body of case law of the boards of appeal regarding the interpretation of Article 100(b) and Article 83 EPC had confirmed that in order to comply with such articles, it was necessary for the patent to disclose the invention sufficiently clearly and completely so as to enable the skilled person to perform the invention throughout the scope of the claims.

However, the definition of the bandwidths recited in claim 1 of the respondent's main request was so broad that the majority of the combinations of bandwidths covered by the claim could not be made to work by the person skilled in the art on the basis of the teaching provided in the patent. For instance, the wording relating to the three bandwidths covered the

possibility of all three bandwidths being identical. In other words, each one of the sensors could be sensitive to all the wavelengths within 3.8 to 4.7 µm and to no wavelengths outside this range. As it included the CO_2 emission band (about 4.4 µm), this range complied with the feature of claim 1 relating to the first sensor. The range 3.8 to 4.7 µm also included wavelengths mainly lower than the CO_2 emission band and thus satisfied the feature of claim 1 relating to the second sensor. Finally, the range 3.8 to 4.7 µm also included wavelengths higher than the CO_2 emission band and so satisfied the feature of claim 1 relating to the third sensor. The patent however provided no teaching that would enable the skilled person to perform the invention when the three bandwidths were identical.

Furthermore, as explained in paragraph [0021] of the contested patent, the purpose of the third sensor was to improve the signal-to-noise ratio of the signals from the first and second sensors. This was achieved by cross-correlation between the signal from the third sensor and each of the signals from the first and second sensors. In order to fulfil its function, it would seem that the signal from the third sensor had to be a relatively strong signal and that it had to include a wavelength which was emitted by fire, such as the CO_2 emission band. If the third sensor was not sensitive to radiation emitted by fire, then the cross-correlation between the first and third signals would not improve the signal-to-noise ratio of the first signal. Similarly, if the third signal was only a weak signal, cross correlation using the third signal would not satisfactorily improve the signal-to-noise ratios of the first and second signals. However, claim 1

required only that the third sensor be sensitive to radiation within a third bandwidth which included wavelengths higher than the CO_2 emission band.

Accordingly, the definitions of three bandwidths given in claim 1 were so broad that they encompassed embodiments which the skilled person would not be able to put into practice.

The claim according to the respondent's first auxiliary request was not limited to the use of sensors which sensed all the frequencies located within the specified emission bands. On the contrary, the only restriction that the claim imposed on the choice of sensors was that they sensed some unspecified radiation located within the given emission bands. Thus, also the claim of the first auxiliary request covered embodiments which the skilled person would not be able to implement.

The second and third auxiliary requests had been filed late and did not overcome the objection under Article 100(b) EPC raised against the main request and the first auxiliary request. Furthermore, the claims of these requests no longer contained the limitation that the third bandwidth should include wavelengths higher than the CO_2 emission band and thus violated Article 123(3) EPC. For these reasons, the respondent's second and third auxiliary requests should be rejected as inadmissible.

IX. In response to the appellant's submissions, the respondent argued essentially as follows:

The objection under Article 100(c) EPC raised by the appellant in the statement of grounds of appeal should not be admitted into the appeal proceedings because the opposition division had already decided that it was not an admissible ground for opposition.

It was consistent case law of the boards of appeal that sufficiency of disclosure within the meaning of Article 83 EPC and Article 100(b) EPC had to be assessed on the basis of the application or of the patent as a whole, including the description and the claims.

According to the teaching of the contested patent, the three sensors had to respond to different bandwidths, whereby the first bandwidth included the CO_2 emission band, the second bandwidth mainly wavelengths lower than the CO_2 emission band and the third bandwidth wavelengths higher than the CO_2 emission band. Examples of sensors fulfilling these conditions were disclosed in the patent. Even if theoretically covered by the claim, the possibility that the sensitivities of the three sensors were identical did not make technical sense and thus did not fall under the scope of the claim considered as a whole. In fact, a skilled person reading the claim in the context of the whole disclosure would immediately exclude all the notional combinations of three sensors which might in principle be covered by the wording of the claim but did not make any sense from a technical point of view. Thus, the objection under Article 100(b) EPC raised by the appellant was unfounded.

The claim of the first auxiliary request was limited to the use of sensors which sensed radiation within the emission bands specified in the context of the embodiment of Figure 1. As the subject-matter of the claim now reflected the teaching explicitly disclosed in connection with the embodiment of Figure 1, there was no reason to suspect that the skilled person might not been able to carry out the invention as claimed.

The second and third auxiliary requests submitted in the oral proceedings were aimed at overcoming the appellant's objection under Article 100(b) EPC. Hence, they should be admitted into the proceedings despite their late filing.

Reasons for the Decision

1. The appeal is admissible.

Main Request

2.1 Claim 1 according to the respondent's main request differs from claim 1 of the patent as granted only in that the expression *"correlation ratio"* has replaced the term *"function"* in the method steps (c) and (d).

2.2 As the amended claim 1 effectively overcomes the appellant's objection under Article 100(c) EPC, there is no need for the Board to consider the respondent's request not to admit such an objection as a late filed ground for opposition into the appeal proceedings.

3.1 Claim 1 relates to a *"method of detecting a fire condition in a monitored region"* which essentially comprises the following steps:

(a) concurrently monitoring a region by means of a first sensor IR_1, a second sensor IR_2 and a third sensor IR_3, and producing first, second and third measurements of radiation variations emitted from said monitored region;

(b) determining a first cross-correlation value by cross-correlating said first and third measurements and a second cross-correlation value by cross-correlating said second and third measurements;

(c) forming a "*correlation ratio*" of said two cross-correlation values;

(d) comparing said ratio with a predetermined threshold; and

(e) utilizing the results of said comparison in determining the presence or absence of a fire condition in the monitored region.

As to the sensors' responses to the emitted radiation, claim 1 specifies the following:

- the first sensor IR_1 is *"sensitive to radiation within a first bandwidth which includes the CO_2 emission band"*;

- the second sensor IR_2 is *"sensitive to radiation within a second bandwidth which includes wavelengths mainly lower than the CO_2 emission band";* and

- the third sensor IR_3 is *"sensitive to the radiation within a third bandwidth which includes wavelengths higher than the CO_2 emission band".*

In other words, claim 1 merely requires that the first sensor respond to some radiation located in a first bandwidth comprising the CO_2 emission band, that the second sensor respond to some radiation located in a second bandwidth including wavelengths mainly lower than the CO_2 emission band, and that the third sensor respond to the radiation in a bandwidth including wavelengths higher than the CO_2 emission band.

3.2 According to the appellant, the definition of the three sensors and in particular of their sensitivity ranges provided in claim 1 of the main request covered methods of detecting a fire condition which did not reflect the actual teaching of the patent. As the claimed "invention" encompassed all possible embodiments falling within the terms of claim 1 and at least some of these embodiments were not compatible with the disclosed teaching, the contested patent did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a skilled person.

3.3 Although the respondent acknowledged that the wording of claim 1 covered combinations of sensors having sensitivities different from those required by the

teaching of the patent, he argued essentially that such combinations of sensors manifestly did not make any technical sense and thus would not be considered by the skilled person as being part of the claimed invention.

4.1 As stated in paragraph [0010] of the patent specification, Figure 1 illustrates one apparatus for detecting a fire condition in accordance with the present invention.

In fact, the apparatus shown in Figure 1 comprises two correlation circuits 20 and 22 for producing correlation values between the measurements of the third sensor IR_3 and the other two sensors IR_1 and IR_2, respectively. The comparators 32 and 34 compare the outputs of the correlation circuits 20 and 22 with corresponding threshold values T_1 and T_2 and output a binary "1" when the correlation values are equal to or exceed their corresponding threshold values T_1 and T_2. The circuit 38 determines the ratio of the correlation values C_{13} and C_{23} and feeds it to a comparator 39 where it is compared with a threshold value T_3.

According to the apparatus of Figure 1, a fire condition in the monitored region is determined when the following three criteria are met:

- the first correlation value C_{13} is equal to or exceeds a predetermined threshold T_1,

- the second correlation value C_{23} is equal to or exceeds a predetermined threshold T_2,

- the ratio of the correlation values C_{13} and C_{23} is equal to or exceeds a predetermined value T_3.

4.2 As explained in paragraph [0020] of the patent specification, the apparatus according to Figure 1 defines a fire condition as an IR source which alternates at a frequency of 2 to 10 Hz (flame flicker frequency) and which emits strongly in the CO_2 emission band (4.3 - 4.6 µm) and weakly below the CO_2 emission band (3.8 - 4.1 µm). According to paragraph [0021], the *"use of the third sensor IR_3 substantially increases the sensitivity of the system, to increase the range of fire detection and/or decrease the size of a detectible fire, without substantially increasing the false alarm rate".* In fact (see patent specification, column 5, lines 14 to 25), *"by adding the third sensor IR_3 to produce a measurement concurrently with the measurements of the other two sensors IR_1, IR_2, the signal component of the third sensor is in phase with the signal components of the other two sensors and therefore increases the signal component of the overall signal, without increasing the noise component since the noise component of the third sensor is out of phase with the noise components of the other two sensors. The overall result is an improvement in the signal-to-noise ratio in the overall system, thereby increasing its sensitivity without significantly increasing its false alarm rate"*.

In other words, the teaching underlying the invention, as disclosed in connection with the embodiment of Figure 1, implies using a first sensor for detecting strong radiation only within the CO_2 emission band, a second sensor for detecting weak radiation only below

the CO_2 emission band and a third sensor for providing an output signal which comprises the signal components of the other two sensor outputs, whereby the output of the third sensor is used to improve the signal-to-noise ratio in the overall system.

4.3 The contested patent comprises two other block diagrams according to Figures 7 and 8 which are supposed to illustrate "*two further forms of apparatus constructed in accordance with the present invention*" (patent specification, column 3, lines 1 to 3). As specified in paragraph [0033], the arrangement of Figure 7 has a third sensor IR_3 which is *"sensitive to radiation of about 4.8 - 5.1, preferably 5.0 µm"* and thus falls within the sensitivity range of the third sensor IR_3 as specified in claim 1. It is, however evident that the method for detecting a fire condition implemented by the apparatus of Figure 7 or 8 is not covered by claim 1 because it does not comprise the steps of forming the ratio of the cross-correlation between the outputs of the first and third sensors and of the cross-correlation between the outputs of the second and third sensors.

Hence, claim 1 covers the combinations of sensors of the embodiments of Figures 1, 7 and 8, although only the embodiment of Figure 1 actually relies on a set of criteria for detecting a fire condition which is in accordance with the wording of the claim.

4.4 In summary, claim 1 of the main request is not limited to a method of detecting a fire condition which uses the combination of sensors disclosed in connection with the embodiment of Figure 1. Thus, claim 1 does not

imply that the output of the third sensor IR_3 should comprise a signal component in phase with the signal components of the other sensors.

On the other hand, the methods of detecting a fire condition referred to in paragraphs [0020], [0029] and [0033] of the patent specification show that combinations of sensors different from the one of the embodiment of Figure 1 are technically viable, if combined with appropriate criteria for determining a fire condition.

4.5 In the Board's opinion, a person skilled in the art reading the patent in suit would have no reason to suspect that some combinations of sensors covered by the wording of claim 1 of the respondent's main request should *a priori* be excluded from the claimed subject-matter as basically unsuitable for carrying out a method of detecting a fire condition. Although some sensor combinations are indeed not in compliance with the teaching underlying the embodiment of the invention according to Figure 1, they may work with different criteria for detecting a fire condition, as shown by the apparatuses of Figures 7 and 8.

However, the skilled person finds in the patent specification no teaching which would enable him to decide whether some combinations of sensors covered by the claims are essentially unsuitable for implementing a method of detecting a fire condition on the basis of the ratio between two correlations, or only suitable if further criteria are defined. In particular, the patent in suit does not provide any teaching concerning the relationship between a claimed combination of sensors

and the criteria to be met by the corresponding sensor outputs in order to detect a fire condition according to the claimed method.

4.6 As the teaching underlying the only embodiment of the claimed method explicitly disclosed in the contested patent does not enable the skilled person to carry out the invention for any of the claimed combinations of sensors, *i.e.* within the whole ambit of the claim, the patent specification does not disclose the invention according to claim 1 in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC).

First auxiliary request

5.1 The respondent's first auxiliary request filed in the oral proceedings before the Board is identical to the auxiliary request filed with the letter dated 30 March 2007.

The claim according to this request differs from claim 1 of the main request in that it further comprises the following features:

- *"wherein said first sensor [IR_1] senses radiation within the 4.3-4.6 µm emission band, said second sensor [IR_2] senses radiation within the 3.8-4.1 µm emission band and said third sensor [IR_3] senses radiation within the 3.8-4.7 µm emission band"*.

5.2 The Board agrees with the appellant that the wording of the claim does not necessarily imply that each sensor actually senses all radiation within the specified

emission band. It requires only that a sensor be responsive to some radiation located within the given emission band. In particular, the claim covers also a method of detecting a fire condition which uses a third sensor responsive only to radiation above the emission band of CO_2 (about 4.4 µm). As pointed out above, such combination of sensors does not comply with the teaching underlying the embodiment of Figure 1, although it may, in principle, provide signals suitable for detecting a fire condition once they are appropriately processed and combined, as shown by the apparatuses of Figures 7 and 8.

In other words, the claim of the first auxiliary request is also directed to methods of detecting a fire condition which do not reflect the teaching of the patent as exemplified by the embodiments of Figures 1, 7 or 8.

5.3 As the contested patent does not specify how the sensitivities of the three sensors and the corresponding criteria for determining a fire condition should be selected, it does not disclose the claimed invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC).

Second and third auxiliary requests

6.1 The claims according to the second and third auxiliary requests differ from the claim of the first auxiliary request in that:

- the bandwidths of the three sensors are defined as *"specific"* bandwidths;

- the claims no longer specify that the second bandwidth *"includes wavelengths mainly lower than the CO_2 emission band",* and that the third bandwidth *"includes wavelengths higher than the CO_2 emission band".*

The claim of the third auxiliary request further specifies that the third sensor is sensitive to radiation within a third specific *"broad"* bandwidth.

6.2 As far as the definition of the radiation sensed by the sensors is concerned, there is no substantial difference between the claims of the first, second and third auxiliary requests. Consequently, these requests do not overcome the objection under Article 100(b) EPC raised by the appellant.

Furthermore, the deletion of the feature that the third band *"includes wavelengths higher than the CO_2* emission band has actually extended the protection conferred by the second and third auxiliary requests, since the corresponding claims merely require that the third sensor be responsive to some radiation within the 3.8-4.7 µm emission band. For this reason, the second and third auxiliary requests do not comply with Article 123(3) EPC.

6.3 Under these circumstances, the Board in the exercise of its discretion decides not to admit the respondent's second and third auxiliary requests into the appeal proceedings.

7. In the result, the Board comes to the conclusion that none of the respondent's requests provides a basis for the maintenance of the patent in amended form. Thus, the patent has to be revoked in accordance to the appellant's request.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

U. Bultmann M. Ruggiu