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**Datasheet for the decision
of 17 July 2007**

Case Number: W 0006/07 - 3.4.01

Application Number: PCT/PT 2005/000016

Publication Number: WO 2006/049523 A2

IPC: G01T 1/29

Language of the proceedings: EN

Title of invention:

Tomography by emission of positrons (PET) system

Applicants:

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Opponent:

-

Headword:

-

Relevant legal provisions:

PCT R. 40.1, 40.2, 13.1, 13.2

PCT Art. 17(3)(a)

EPC Art. 154(3)

Keyword:

-

Decisions cited:

W 0026/06, W 0001/06, W 0020/06, W 0002/07, W 0022/06,
W 0004/85, W 0011/89, W 0004/94, W 0003/93, W 0014/89,
W 0006/91, W 0006/97, W 0017/03, G 0001/89, G 0002/89

Catchword:

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Case Number: W 0006/07 - 3.4.01

International Application No. PCT/PT 2005/000016

D E C I S I O N
of the Technical Board of Appeal 3.4.01
of 17 July 2007

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Decision under appeal:

Protest according to Rule 40.2(c) of the Patent
Cooperation Treaty made by the applicants
against the invitation (payment of additional
fees) of the European Patent Office
(International Searching Authority) dated .

Composition of the Board:

Chairman: B. Schachenmann
Members: F. Neumann
P. Fontenay

Summary of Facts and Submissions

I. International patent application No. PCT/PT2005/000016 was filed on 30 September 2005. The application contained 20 claims. Independent claim 1 reads as follows:

"1. Positron Emission Tomography (PET) system dedicated to examinations of human body parts such as the breast, axilla, head, neck, liver, heart, lungs, prostate region and other body extremities or, in particular, to the detection and follow-up of various types of cancers in various parts of the human body, which system can also be used to produce functional images of the interior of various parts of the human body or the body of small animals, based on the affinity of specific molecules marked with a positron emitter to certain regions, organs, tissues, activity or functions of the human body, characterized in that it is composed of:

At least two detecting plates (detector heads) with dimensions that are optimized for the breast, axilla region, brain and prostrate (*sic*) region or other extremities;

Motorized mechanical means to allow the movement of the plates under manual or computer control, making it possible to collect data in several orientations as needed for tomographic image reconstruction;

An electronics system composed by a front-end electronics system, located physically on the detector heads, and a trigger and data acquisition system located off-detector in an electronic crate;

A data acquisition and control software; and

An image reconstruction and analysis software that allows reconstructing, visualizing and analyzing the data produced during the examination."

Dependent claims 2 to 20 relate to preferred embodiments of the PET system set out in claim 1.

II. On 3 May 2006 the European Patent Office (EPO), acting in its capacity as an International Searching Authority (ISA) informed the applicant that the application did not comply with the requirement of unity of invention (Rule 13.1 PCT) and invited the applicant to pay two additional search fees pursuant to Article 17(3)(a) and Rule 40.1 PCT.

In the invitation the ISA stated that all features of claim 1 were either known from D1 or were obvious and in consequence thereof, the subject matter of claim 1 can no longer define a common inventive concept linking the different embodiments defined in the dependent claims. The ISA identified the following three groups of inventions:

Group 1: claims 1, 2-7 and 17-20

Group 2: claims 8-12

Group 3: claims 13-16,

each group relating to a different problem.

III. On 31 May 2006, the applicant paid two additional search fees under protest pursuant to Rule 40.2(c) PCT. In support of the protest, the applicant submitted the following arguments by fax on 1 June 2006:

Claim 1 is only intended to characterise the basic features of the invention: specific details of the detector system, the data processing and the image reconstruction are given in the dependent claims. For the design of a highly specific PET instrument with a spatial resolution of about 1mm it was necessary to develop all components and systems which, together, achieve this aim. It is the fundamental problem of "how to integrate in a moveable and compact PET system, capable to examine closely several body parts without moving the patient, the detection principles that allow intrinsic high performance" which provides the link between the various aspects of the device. This problem is solved by a combination of the various specific aspects set out in the dependent claims.

- IV. On 22 November 2006 the internal review panel of the EPO acting as ISA concluded, after examination of the protest, that the invitation to pay additional fees was justified. The applicant was invited to pay the protest fee within one month pursuant to Rule 40.2(e) PCT.

- V. On 21 December 2006 the applicant paid the required protest fee.

Reasons for the Decision

1. *Procedural issues*

- 1.1 Given that the international application under consideration has an international filing date of 30 September 2005, the protest is subject to the Regulations under the PCT as in force from 1 April 2005.

- 1.2 Recent case law of the Boards of Appeal has suggested that there is a situation of conflict between the amended Regulations under the PCT and some of the provisions of the EPC (see, for example, W 26/06, points 3 to 7). In particular, two sources of conflict have been identified:
- 1.2.1 Firstly, in W 1/06 and W 26/06 it was held that the provisions of Rule 40 PCT and Article 150(2) EPC (prevalence of PCT over EPC in cases of conflict) do not leave room for a preliminary review of the protest: the prevailing amended provisions of Rule 40.2(c) PCT provide for a single review only.
- 1.2.2 Secondly, it was pointed out in W 20/06 that Rule 40.1 PCT requires that the invitation to pay the protest fee should be issued together with the invitation to pay additional fees. The fact that the EPO acting as ISA only issues the invitation to pay the protest fee at a later point in time, namely together with the results of the internal review (in accordance with the Notice from the EPO dated 1 March 2005 (OJ EPO 2005, 226) - hereinafter referred to as "the Notice"), raises the question whether or not a protest fee paid only in response to this later invitation is in fact timely paid.
- 1.2.3 These concerns both arise as a result of the changes to Rule 40 PCT as in force from 1 April 2005 and the fact that the EPO continues to perform a preliminary review of the protest before inviting the applicant to pay the protest fee (see the Notice, point 3).

1.3 In both issues the present Board adopts the position taken in decisions W 20/06, W 2/07 and W 22/06 and considers (i) that the "review body" referred to in Rule 40.2(c) PCT is - under the presently valid EPC - a board of appeal, (ii) that an internal preliminary review may be performed prior to submission of the protest to the board of appeal and (iii) that the protest fee may be regarded as paid on time if it is paid within the one-month time limit defined in the Notice.

1.3.1 In particular, with regard to the question of a two-stage review procedure, the present Board takes the view that in accordance with Article 154(3) EPC, the Boards of Appeal shall be the competent "review body" referred to in Rule 40.2(c) PCT.

Moreover, although the ISA is no longer obliged to perform a prior review of the protest, the EPO nevertheless carries out an internal review on a voluntary basis (see the Notice, point 3). Rule 40.2 PCT does not explicitly provide for such a prior review of the protest but this possibility is not excluded.

Hence, the Boards of Appeal shall be responsible for deciding on the protest, but an internal review, performed prior to submission of the protest to the Boards of Appeal may nevertheless be performed.

1.3.2 With regard to the timely payment of the protest fee, it is noted that in accordance with Rule 105(3) EPC, the applicant is only invited to pay the protest fee if the prior review finds that the invitation to pay additional search fees was at least partly justified.

The Board notes that this procedure, as set out in the Notice (point 4), does not correspond with the provisions of Rule 40.1(iii) PCT with regard to the point in time at which the invitation to pay the protest fee has to be made. However, the legal effect foreseen in Rule 40.2(e) PCT, i.e. the protest shall be considered not to have been made, cannot occur without a preceding, explicit invitation for payment of the protest fee within one month of this invitation (see W 20/06, point 15).

Thus, taking into account the principle of protection of legitimate expectations, the present Board takes the view that it has only to be examined if the payment of the protest fee was made on time within the framework of the procedure set out in the Notice.

- 1.4 In the present case, the applicant was invited with the communication of 22 November 2006 to pay the protest fee within one month. Payment was made on 21 December 2006. Thus, the payment was made in time and the protest is considered to have been made (Rule 40.2(e) PCT, second sentence).

2. *Unity "a posteriori"*

In the present case the ISA objected to lack of unity "*a posteriori*" i.e. after having performed the search. In the decisions G 1/89 (OJ 1991, 155) and G 2/89 (OJ 1991, 166) the Enlarged Board of Appeal held that the consideration of novelty and inventive step by the ISA for deciding whether the application lacks unity *a posteriori* is only provisional in the sense that this consideration has only the procedural effect of

initiating the special procedure laid down in Article 17 PCT and Rule 40 PCT. Therefore any statement on novelty and inventive step made by the Board in the following is provisional in this sense.

3. *Substantiation of the invitation*

3.1 Rule 40.1 PCT requires that the invitation to pay additional fees shall specify the reasons for which the application is not considered as complying with the requirement of unity of invention.

3.2 Decision W 4/85 (OJ EPO 1987, 63, point 3) explained that the purpose of this provision was to enable the applicant and review body to examine whether the invitation was justified. This requires that the basic considerations behind the finding must be set out in a logical sequence.

Decision W 11/89 (OJ EPO 1993, 225, point 4.1) set out that, unless the case is straightforward, a reasoning should be provided explaining why there is no technical connection or interaction between the separate inventions. This in turn requires addressing the problems underlying the inventions. Decision W 4/94 (OJ EPO 1996, 73, point 4.1) stated that the obligation to provide justification in the invitation was not infringed if the prime reason for the decision was identifiable, even though the reasons could be seen as insufficient or incorrect.

3.3 In the present case, after establishing that all features of claim 1 are either known or obvious, the ISA's invitation contained essentially only a list of

the special technical features of and problems solved by the groups of dependent claims, with no explicit discussion of why there was no single general inventive concept between these groups. However, the Board is of the opinion that the ISA's invitation is nevertheless sufficiently reasoned within the meaning of Rule 40.1 PCT because the implied lack of common features and lack of common problems between the groups raises prima facie a reasoned case for lack of unity, which the applicant can understand and answer in the protest.

4. *Examination of the current protest*

4.1 The purpose of the protest procedure under Rule 40.2(c) PCT is to enable the justification for the invitation to pay additional fees to be submitted to a substantive review; the only issue to be examined therefore is whether, considering the reasons stated by the ISA and the submissions made in support of the protest, retaining the additional search fees was justified (see W 3/93, point 4).

4.2 In the invitation to pay additional fees (Form PCT/ISA/206) the ISA indicated that W098/27443 (hereinafter referred to as D1) discloses a device with "most of the features of claim 1" and identified the passages where these features of claim 1 are to be found in D1. The ISA indicated that the movement of the detector to allow data collection in several orientations is a normal feature of tomographic devices and concluded that the features of claim 1 are either known or obvious and therefore cannot define a common inventive concept linking the various embodiments defined in the dependent claims.

The invitation then separated the dependent claims into groups and listed, in very general terms, the special technical features of each of these groups with respect to D1. The problems considered to be solved by those features were also identified. The ISA held that since not only the special technical features but also the underlying problems of each of the groups are different, the three groups of claims lack unity in the sense of Rule 13.1 PCT.

- 4.3 In accordance with Rule 13.1 PCT, unity of invention requires the existence of a single general inventive concept. Rule 13.2 PCT defines that "Where a group of inventions is claimed ... the requirement of unity of invention referred to in Rule 13.1 shall be fulfilled only when there is a technical relationship among those inventions involving one or more of the same or corresponding special technical features. The expression "special technical features" shall mean those technical features that define a contribution which each of the claimed inventions, considered as a whole, makes over the prior art." The PCT International Search and Preliminary Examination Guidelines (as in force from 25 March 2004, paragraph 10.02) set out that whether or not any particular technical feature makes a "contribution" over the prior art, and therefore constitutes a "special technical feature", is considered with respect to novelty and inventive step. Thus, if a document found in the international search shows that there is a presumption of lack of novelty or inventive step in the independent claim, then the question whether there is still an inventive link between all the claims dependent on that claim needs to

be considered. If there is no link remaining, an objection of lack of unity *a posteriori* may be raised (PCT International Search and Preliminary Examination Guidelines, as in force from 25 March 2004, paragraph 10.08).

4.4 The *a posteriori* lack of unity objection raised by the ISA was based on the finding that the features of claim 1, all being either "known or obvious", cannot define a common inventive concept linking the dependent claims. The Board has interpreted this statement to mean that the subject matter of claim 1 as a whole was found to be lacking an inventive step. Therefore it first has to be established whether this finding is correct.

4.4.1 D1 discloses a Positron Emission Tomography (PET) system (see page 25, lines 24-26; Fig. 23) dedicated to examinations of human body parts (see page 1, lines 3-6; page 13, lines 25-27; page 25, lines 24-32), which system can also be used to produce functional images of the interior of various parts of the human body based on the affinity of specific molecules marked with a positron emitter to certain regions, organs, tissues, activity or functions of the human body (this effectively only defines what a PET system actually does), the PET system comprising:
at least two detecting plates (see Fig. 23; page 25, lines 24-29) which apparently have dimensions that are "optimised" for the area to be scanned (see Fig. 23; page 18, lines 20-21);
an electronics system composed of a front-end electronics system (see page 16, lines 26-30; Fig. 8), located physically on the detector heads (page 19,

line 20), and a trigger and data acquisition system located off-detector in an electronic crate (page 14, lines 26-30; page 20, line 14 to page 21, line 18); a data acquisition and control software (page 17, lines 14-17); and an image reconstruction and analysis software (page 17, lines 14-18 and 31-32) that allows reconstructing, visualizing and analyzing the data produced during the examination (page 17, line 31 to page 18, line 12).

4.4.2 Claim 1 of the present invention is distinguished from the disclosure of D1 in that a motorized mechanical means is provided to allow the movement of the plates under manual or computer control, making it possible to collect data in several orientations as needed for tomographic image reconstruction. As observed by the ISA, in D1 the camera heads each comprise a servo motor which enables the detector rows to be moved in a step-wise fashion in the plane of the camera head (page 16, lines 14-25; page 18, lines 17-32). This is however to be distinguished from the motorized means that is defined in claim 1 of the current application which causes movement of the plates (not just the detector rows within these plates) such that the detector plates are positioned at different angular orientations around the imaging region. The ISA held that moving the detector in this manner is obvious since this is a normal feature of tomographic devices. The implication of this assertion is that although D1 does not disclose such a motorized mechanical means for moving the plates, the skilled person would nevertheless consider including such a means in the PET system of D1.

4.4.3 In contrast, the applicant was of the opinion that conventional PET systems are cylindrical and have static components. This, the applicant argued, is to be distinguished from X-ray computer tomography in which the X-ray source rotates around the subject to be scanned.

4.4.4 Positron Emission Tomography (PET) imaging systems essentially use two major types of detector systems. In non-rotating systems, a static arrangement of detector elements are provided to encircle the imaging region. Typical arrangements of this type would be a ring of detector elements or two hemicylindrical shells of detector elements. In such systems, rotation of the detector arrangement is not required since full angular coverage is obtained from the annular arrangement. In rotating systems the detector elements are provided, for example, as two diametrically opposed arcuate arrangements or as two diametrically opposed planar detector heads. Since the detector heads in these systems only cover a limited angular area, it is necessary to rotate the detectors around the imaging region in order to obtain data from all of the angles necessary to produce a tomographic image. This rotation will conventionally be performed by motorised means. EP-A-0 933 652 (cited in the Partial International Search Report which was issued together with the invitation to pay additional fees), discusses both types of PET detector systems (paragraphs [0005] and [0006]) and indicates that the dual or triple head gamma radiation detectors are rotated around the imaging region by means of a motor and drive assembly (see col. 5, lines 23-50).

4.4.5 Thus, in the view of the Board and in accordance with the view of the ISA, a PET system as defined in claim 1, i.e. comprising at least two detecting plates, will of necessity require that the detector plates are rotated in order that data can be collected from several orientations around the object to be scanned such that fully tomographic images can be reconstructed. In view of the disclosure of EP-A-0 933 652, the use of a motorised mechanical means to provide this rotation is not considered to be inventive.

4.4.6 Therefore the Board agrees with the finding of the ISA that claim 1 does not involve an inventive step and as such cannot define a common inventive concept of the different groups of inventions defined in the dependent claims. The question of unity therefore depends on whether or not there is still an inventive link between all of the dependent claims, i.e. whether or not the dependent claims are so linked as to form a single general inventive concept, as required by Rule 13.1 PCT.

4.5 The various inventions of the dependent claims have been separated by the ISA into the following three groups on the basis of the technical features that define a contribution which each of the claimed inventions, considered as a whole, makes over the prior art.

4.5.1 Group 1: claims 1, 2-7, 17-20

The dependent claims define additional features relating to the structure of the detector array, the scintillating crystals, the photosensors, the motorised mechanical means and the uses of the PET system.

The problem identified for the first group of inventions was the improvement of detection parameters such as sensitivity, uniformity and efficiency.

Group 2: claims 8-12

These dependent claims define additional features relating to the subdivision of the electronics into front-end and data-acquisition systems and the functionality of the electronics and software.

The problem identified for the second group of inventions was the provision of a compact system which enables fast processing with short dead time.

Group 3: claims 13-16

These dependent claims define additional features relating to details of the image processing, visualisation and analysis.

The problem identified for the third group of inventions was to provide flexible image formation and the maximum information from the acquired data.

- 4.5.2 At a first glance the inventions included in these groups may appear to be rather inhomogeneous. For example, group 1 includes claims directed to details of the detector head arrays (claims 2 to 6) but also includes claims directed to details of the motorised mechanical means (claim 7) and claims directed to the uses of the PET system (claims 18 to 20). Similarly, group 2 includes claims which concern the front-end electronic architecture (claims 9 and 10) but also claims concerning the separate data acquisition electronics (claim 11) and the acquisition and control software (claim 12). Group 3 includes claims directed to the image reconstruction (claim 14), the

visualisation of the image (claims 15) and the analysis of the image (claim 16).

4.5.3 In accordance with decisions W 11/89, W 14/89 and W 6/91, the determination of the technical problem underlying the invention is a mandatory pre-condition for the assessment of unity of invention. Starting from what is considered in the description as having been achieved by the claimed invention, as advocated by W 6/97, it may be seen that the various aspects contained within each group of inventions address a different problem. For example, the detector dimensions and the crystal properties have a direct impact on the detector sensitivity (page 32). The use of APDs enable higher quantum efficiency, better lateral uniformity and less inter-channel cross talk whilst permitting a very compact construction (page 33). The vertical, horizontal and rotational movement of the plates enables integration with other imaging systems (pages 27 to 31). The provision of a high degree of front-end electronics integration achieves a compact system (pages 34 and 36). The use of multi-event storage and pipeline trigger processing improves the efficiency of the data acquisition system without introducing dead-time (pages 33-34). Thus it may be seen that the description itself recognises that several distinct problems have been solved by the various features defined in the dependent claims within each group.

4.5.4 As set out in W 17/03, when formulating the problems of the various inventions in a unity assessment, the aim of the exercise is to see whether any commonality may be established between the inventions. When grouping the inventions, the ISA has thus redefined the very

specific problems associated with each of the dependent claims, to arrive at a more general problem. In so doing, the ISA has managed to group together a number of aspects which, when taking a very narrow approach are apparently unconnected both in terms of structural features and in terms of problems solved.

4.5.5 Thus in group 1, despite a first impression that the technical features of the various claims actually solve very distinct problems, it may be seen that the more generalised problem of an improvement of sensitivity, efficiency and uniformity is achieved by the detector heads, the photosensors and the motorised movement means. The question of whether or not claims 18 to 20 may legitimately be included in this grouping and whether or not their inclusion has any effect on the assessment of unity may be left open, since, in accordance with Rule 40.2(c) PCT, it is only necessary to examine whether the protest is justified, i.e. whether the present application actually contains claims to the three inventions identified by the ISA and on which the invitation to pay additional fees was based.

Similarly, although each of the claims in group 2 concerns a different specific problem, the more general problem of providing fast processing whilst maintaining a compact system could be identified.

Likewise, the claims in group 3 are each directed to distinct problems but the ISA has nevertheless identified the more general problem of providing flexible image formation and enabling a wide range of information from the acquired data to be obtained.

4.5.6 Structural similarities between the technical features which define the contribution which each of these three inventions makes over the prior art do not exist. These three aspects concern the concrete details of the device which collects the data, specific details of the electronics which process this data and particular details of the software which displays and analyses this data. In structural terms, the special technical features of the three groups of claims cannot therefore be considered to be the same or corresponding.

4.5.7 Moreover, the problems to be solved are not connected. As shown above, the first group concerns the improvement of detection parameters, the second group concerns the provision of a compact system which enables fast processing with short dead time and the third group concerns the provision of flexible image formation and provision of the maximum information from the acquired data. Thus, also in terms of the underlying problems to be solved, the special technical features cannot be considered to be the same or corresponding.

This is not contested by the applicant in the submissions of 01.06.2006, where it is acknowledged that the detection principles of claims 2 to 6 allow high efficiency and image resolution, the mechanical system of claim 7 allows close-up examination of several body parts, the electronics and data acquisition of claims 8 to 12 allow fast processing of a high volume of data with short dead time and the image reconstruction system of claims 13 to 16 is specific to the planar geometry of the detector heads.

4.5.8 However, the applicant argued that the problem to be solved by the invention can be further abstracted to "how to integrate in a moveable and compact PET system, capable to examine closely several body parts without moving the patient, the detection principles that allow intrinsic high performance." The applicant argued that the solution of this general problem - which involves the development of the various components of the PET which are listed in claim 1 and specified in greater detail in the dependent claims - provides the common inventive concept linking the various groups of independent claims.

In the view of the Board, this problem concerns either aspects which are not defined in the claims and so cannot be considered when formulating the problem, or aspects which are so general that they are known or generally desirable. In particular, the PET system as claimed is neither defined as a "moveable and compact PET system, capable to examine closely several body parts without moving the patient" nor can it be derived from the claims that this functionality is inevitable. The problem to be solved cannot therefore be formulated taking these aspects into consideration. What remains of the problem submitted by the applicant is that the detection principles in the PET system should allow intrinsic high performance. This problem is of such general nature that it is itself already known or could be recognised as generally desirable or obvious (see W 6/90, OJ EPO 1991, 438, point 3.4): high performance is a fundamental requirement that the skilled person will always strive for in PET systems. This problem

therefore cannot be considered to endow unity upon the three inventions identified by the ISA.

4.6 The invitation of the ISA to pay additional fees in accordance with Article 17(3)(a) and Rule 40.1 PCT was therefore justified.

Order

For these reasons it is decided that:

The protest under Rule 40.2(c) PCT is dismissed.

The Registrar:

The Chairman:

R. Schumacher

B. Schachenmann