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D E C I S I O N
of 11 January 2001

Case Number: T 0478/95 - 3.4.1

Application Number: 85307968.9

Publication Number: 0182529

IPC: A61B 6/00

Language of the proceedings: EN

Title of invention:
Radiographic system

Patentee:
PICKER INTERNATIONAL, INC.

Opponent:
Siemens AG

Headword:
Radiographic system/PICKER

Relevant legal provisions:
EPC Art. 52(1), 56, 84, 123(2)

Keyword:
-

Decisions cited:
T 0004/80, T 0190/87, T 0608/96, T 0863/96

Catchword:
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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0478/95 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 11 January 2001

Appellant: (Opponent)
Siemens AG
Postfach 22 16 34
D-80506 München (DE)

Representative:
-

Respondent: (Proprietor of the patent)
PICKER INTERNATIONAL, INC.
595 Miner Road
Highland Heights
Ohio 44143 (US)

Representative:
Waters, Jeffrey
Marconi Intellectual Property
Waterhouse Lane
Chelmsford
Essex CM1 2QX (GB)

Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 29 May 1995 concerning maintenance of European patent No. 0 182 529 in amended form.**

Composition of the Board:

Chairman: G. Davies
Members: U. G. O. Himmler
G. Assi

Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal, received on 7 June 1995, against the interlocutory decision of the Opposition Division, dispatched on 29 May 1995, maintaining European patent No. 0 182 529 (application No. 85 307 968.9) in amended form. The fee for the appeal was paid on 7 June 1995. The statement setting out the grounds of appeal was received the same day.

Opposition had been filed against the patent as a whole, on the basis of Article 100(a) EPC, and in particular on the grounds that the subject-matter of the claims was not patentable within the terms of Articles 52(1), 54 and 56 EPC.

The Opposition Division held that the grounds of the opposition did not prejudice the maintenance of the patent in amended form, having regard to the following documents:

(D0) EP-A-0 115 125,

(D1) DE-A-2 613 809,

(D2) DE-A-2 932 182,

(D3) DE-A-3 021 757,

(D4) DE-A-2 831 038.

II. Oral proceedings were held on 11 January 2001.

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

IV. The respondent requested that the appeal be dismissed and that the patent be maintained on the basis of the following documents:

Main request

Claims: 1 to 10 filed on 20 January 1995,

Description: pages 2 to 8, A, B filed on 20 January 1995,

Figures: pages 12-15 filed on 20 January 1995,

First auxiliary request

Claim 1 filed on 8 December 2000,

Claims: 2 to 10 filed on 20 January 1995,

Description and Figures as in the main request,

Second auxiliary request

Claims: 1 filed on 8 December 2000,
2 to 10 filed on 20 January 1995,

Description: pages 2 to 8, B filed on 20 January 1995,
page A filed on 11 January 2001,

Figures: as in the main request,

Third auxiliary request

Claims: 1 filed on 8 December 2000,
2 to 10 filed on 20 January 1995,

Description and figures as in the main request.

V. The wording of claim 1 according to the main request reads as follows:

"A radiographic system capable of producing shadow images but not computerised tomography images comprising means (S) arranged to pass a divergent beam of radiation (62 or 82) from a source (60 or 80) through a volumetric portion of a subject (P) onto a radiation detector means (64 or 84) to produce said shadow image of said portion of the subject, said detector means (64 or 84) producing electrical output signals representative of the radiation incident thereon and the system further including imaging circuitry (43, 44, 48) coupled to said detector means (64 or 84) for utilising said output signals to produce said shadow image, and said detector means (64 or 84) comprising a first detector structure (72 or 88) comprising a material sensitive to radiation within a first energy range and arranged to define a first surface on which said radiation falls, and a second detector structure (70 or 86) comprising a material sensitive to radiation within a second energy range and arranged to define a second surface on which said radiation falls and which overlies said first surface, (P) characterised in that said first and second surfaces (70, 72 or 86, 88) are curved about said source (60 or 80) so as to eliminate substantially for each one of said surfaces (70, 72 or 86, 88) differences in the lengths of the paths between said source (60 or 80) and different points on that one of said surfaces (70, 72 or 86, 88)."

The wording of claim 1 according to the first auxiliary

request differs from claim 1 of the main request in that the expression in lines 1, 2 "but not computerised tomography images" has been replaced by the term "only" immediately after "shadow images".

Claim 1 according to the second auxiliary request reads as follows:

"A radiographic system capable of producing shadow images but not computerised tomography images comprising means (S) arranged to pass a divergent beam of radiation (62 or 82) from a source (60 or 80) through a volumetric portion of a subject (P) onto a radiation detector means (64 or 84) to produce said shadow image of said portion of the subject, said detector means (64 or 84) producing electrical output signals representative of the radiation incident thereon and the system further including imaging circuitry (43, 44, 48) coupled to said detector means (64 or 84) for utilising said output signals to produce said shadow image, and said detector means (64 or 84) comprising a first detector structure (72 or 88) comprising a material sensitive to radiation within a first energy range and having a first surface on which said radiation falls, and a second detector structure (70 or 86) comprising a material sensitive to radiation within a second energy range and having a second surface on which said radiation falls and which overlies said first surface, (P) characterised in that said first and second surfaces (70, 72 or 86, 88) are curved about said source (60 or 80) so as to eliminate substantially for each one of said surfaces (70, 72 or 86, 88) differences in the lengths of the paths between said source (60 or 80) and different points on that one of said surfaces (70, 72 or 86, 88)."

VI. The arguments of the appellant may be summarised as follows:

Claim 1 of the main and second auxiliary requests includes the feature that the radiographic system is capable of producing shadow images "but not computerised tomography images". This expression implies a disclaimer which is not admissible. According to the established case law, a disclaimer is only permissible to establish either novelty or clarity, when the claimed subject-matter cannot be defined in another way. In the present case, the former condition is not met because none of the documents D0-D4 is novelty destroying. The latter condition would only be met if, at the same time, the requirements of Article 123(2) EPC are satisfied. No basis for the amendment, however, can be found in the original application. The same arguments are also valid for the amendment in claim 1 of the first and third auxiliary requests specifying that the radiographic system is capable of producing shadow images "only". Therefore, claims 1 according to all the requests are not admissible because the claimed exclusion is not possible by means of either a disclaimer or a positive wording.

Claim 1 according to the main and first auxiliary requests is not clear. It is not defined whether the feature that the first detector structure is "arranged to define a first surface" also includes the case of a detector which is moved along such a surface. The same applies having regard to the second detector structure. In this respect, reference is made to D0, page 10, lines 7 to 14, disclosing an embodiment in which the detector is moved along a surface. Should the claim

indeed include such a feature, D0 would be novelty destroying.

As to the issue of inventive step, having regard to claim 1 of the main request, the closest prior art is represented by document D0 which discloses a radiographic system comprising the features of the preamble of the claim. On page 2, lines 27 to 34, it is stated that in known scan projection radiography the image is recorded on a detector array arranged along an arcuate path. On page 7, lines 5 to 13, the field of computer tomography is mentioned, in which a two layer energy sensitive detector has been proposed. The skilled person would thus be motivated to consult documents in this field which is closely related to that of the contested invention. In particular, D1-D3 concern computer tomography systems which are capable of producing shadow images. D2, Figure 2, shows a detector array curved about an axis intersecting the focus of the x-ray tube. A similar arrangement is shown in D1, Figures 1 and 2. In these arrangements the claimed condition of equal path length is met. D4, Figure 1, represents a further example of a detector array in which the equal path condition is met. This document is particularly relevant, because it refers on page 7, first paragraph, to the possibility to replace at least a detector element in the array by the detector element shown in Figure 3, which comprises a plurality of layers with different spectral sensitivity.

Hence, in view of the combination of D0 with one of the other documents cited, the subject-matter of claim 1 of the main request is not inventive. The same conclusion applies to claim 1 according to the auxiliary request

for the same reasons.

VII. The respondent's arguments can be summarised as follows:

As to the admissibility of claim 1, the formulation "but not computerised tomography images" clarifies the type of radiographic system to which the present invention relates. From the patent specification, column 1, lines 12 to 16, the skilled person immediately recognises that the patent relates to shadow image recording apparatuses. The same conclusion can be drawn having regard to column 6, lines 35 to 44, and to the figures. Moreover, it is clear to the skilled person that a computer tomography system requires many additional components which are not included in the patent. Therefore, claim 1 according to all the requests does not contravene Article 123(2) EPC.

As to the clarity objection, the appellant's interpretation is not well-founded in the light of the description. As to D0, the linear detector array is moved along a cylindrical surface, which means that the claimed requirement of equal path length is not fulfilled. Thus, D0 cannot be novelty destroying.

As to the issue of inventive step, the closest prior art is represented by document D0. This document discloses a radiographic system for producing shadow images with a flat dual energy detector array. None of the cited prior art documents deals with the problem related to the flat geometry of the known detector arrays, namely that a ray entering a peripheral element produces a greater scintillation than does a ray of

equal value entering the central element. It is true that curved detector arrays are used in computer tomography systems (see D1 to D4), but the curved structure is due to other different reasons. Firstly, CT detectors are rather thick as compared to detectors for shadow image recording. Thus, while curving the array is required for the thick array elements, this is not the case for the much thinner shadow image detectors. Moreover, unlike in shadow image recording devices, in a computer tomograph the curved structure of the detector is adapted to the circular motion to which the x-ray source and the detector are subject.

The passages in D0 quoted by the appellant are not relevant. The citation on page 2, lines 27 to 34, does not give any information concerning the geometry of the "arcuate path" or the advantage achieved, in particular equal path lengths for all rays. The other passage referred to on page 7, lines 5 to 13, of D0 refers to computer tomography. Documents D1 to D4, which belong to this field, show curved detector arrays which do not necessarily meet the claimed condition of equal path length. None of these documents shows a detector array with dual energy elements for x-ray shadow imaging.

Hence, the subject-matter of claim 1 according to all the requests involves an inventive step.

Reasons for the Decision

1. The appeal is admissible.

2. *Article 123(2),(3) EPC*

2.1 Claim 1 of the main and the second auxiliary requests

Claim 1 includes the amendment that the radiographic system is not capable of producing tomography images. This feature was introduced by the respondent during the oral proceedings before the Opposition Division on 17 October 1994 (see minutes, Nos. 5.1 and 5.2) after an objection of lack of novelty against claim 11 had been raised (see minutes, No. 3.1). The respondent admitted (see minutes, No. 4.3) that claims 1 and 11 on file at the beginning of the oral proceedings indeed included CT imaging, which statement is in line with the fact that the application as originally filed discloses a radiographic system suitable for shadow image and CT imaging. Thus, by way of the amendment in suit, which due to its negative wording seemingly takes the form of a disclaimer, the respondent simply intended to limit the protection conferred to shadow image radiographic systems. In other words, the amended patent does not concern any longer CT imaging (see the patent in suit, column 6, lines 40 to 44). The present amendment is, therefore, distinguished from a classic disclaimer in that a basis for the excised subject-matter can be found in the original disclosure and not only in an accidental anticipation destroying novelty.

For these reasons, the Board considers that the amended claim 1 according to the main and second auxiliary requests meets the requirements of Article 123(2) EPC because it does not include any new subject-matter. The provisions of Article 123(3) EPC are also met because the amendment clearly produces the effect of reducing the protection conferred by the claim.

3. *Clarity*

3.1 Claim 1 of the main and the first auxiliary requests

Claim 1 includes the features that the first and the second detector structures are "arranged to define" a first and a second surface respectively, on which the x-rays fall. These features are ambiguous in the sense that it is not clear whether the wording of the claim also includes ideal surfaces along which a small detector with a single element may be moved. Although, during oral proceedings before the Board, the respondent declared that the interpretation based on such ideal surfaces is not justified in the light of the description and drawings, the Board nevertheless considers the interpretation as possible and reasonable.

Hence, claim 1 according to the main and the first auxiliary requests do not clearly define the subject-matter for which protection is sought (Article 84 EPC).

3.2 For these reasons, the main and the first auxiliary requests are not allowable.

4. *Inventive step*

4.1 Since the main and the first auxiliary requests are not allowable, claim 1 of the second auxiliary request is considered.

4.2 In assessing inventiveness, it is the usual practice of the Boards of Appeal to apply the problem and solution approach. Both the appellant and the respondent agree that the document D0 represents the closest state of the art. This document discloses a radiographic system comprising the features according to the preamble of

claim 1. In particular, the known system includes a flat dual energy detector array.

According to the patent specification, column 4, line 31, to column 5, line 30, a flat detector array has the disadvantage that radiation intensity falling upon a detector element depends on the relative position of the element in the array. This results from the fact that a ray entering a peripheral detector element travels a longer path than does a ray entering a central one. The different path lengths thus produce the effect that the response is falsely exaggerated at the periphery. In flat dual energy detector arrays of the "stacked" type this phenomenon causes an even greater distortion because of the presence of two detector arrays, this distortion being very difficult to correct. A further disadvantage of a flat dual energy detector consists in the fact that, due to a parallax error, the image produced by the rear detector layer slightly differs from that of the front layer, which difference degrades the quality of the image obtained with the technique of energy substraction.

The disadvantages mentioned above are not discussed in any of the available documents. The technical problem to be solved, as defined in column 5, lines 26 to 30, of the patent in suit, is therefore not known from the cited prior art. Moreover, the Board does not have any reason to consider it as obvious.

4.3 The claimed solution essentially consists in that the radiation detector means has a structure which is curved about the x-ray source so to meet the requirement of equal path length. This solution, although quite simple, is not rendered obvious by any

of the cited documents. It is useful to refer to two declarations filed by the respondent during the opposition procedure, i.e. the declaration of Mr G. T. Barnes, the inventor of D0, dated 25 April 1987, and that of Mr R. A. Sones, the inventor of the patent in suit, dated 14 May 1987. The Board regards these two persons as skilled in the field of the invention and has no reason to question the correctness of the their technical statements. According to the declaration of Mr Barnes, No. 5, at the time of D0 (the priority data of which is only two years earlier than that of the contested patent), the skilled person believed that the flat arrays were the best way of accomplishing the dual energy result. In the light of this statement, it is clear that D0 does not depart from the conventional idea of using a flat detector and is concerned with the problem of developing a detection scheme that allows one to accomplish dual energy radiography without the need of pulsing the x-ray source (see the said declaration, No. 4, and D0, page 6, lines 19 to 27). Starting from D0, the idea of curving the known dual energy detector is not obvious for various reasons. First of all, the detectors used for shadow image radiography are quite thin (less than 1 mm) as compared to the rather thick (several millimetres to several centimetres) CT detectors, according to the declaration of Mr Sones, No. 12. This means that the skilled person should not be urged to curve the detector in order to meet the requirement of equal path length at least when dealing with the thin detectors used in the shadow image radiographic systems. Moreover, a curved detector would be more difficult to manufacture than an equivalent flat detector. In order to avoid these manufacturing difficulties, the skilled person, should he feel the

need to reduce the response distortion and realise that such a distortion depends on the flat structure of the used detector array, would not immediately consider the claimed solution because other solutions could, in principle, be imagined. For instance, it might be possible to correct the spatially related inaccuracy in dual energy data by way of an algorithm in the digital processing system used to interpret the data from the detector and to produce the image, as it is stated in the declaration of Mr. Barnes, No. 6.

It is true that curved detector arrangements are known from the field of CT radiography (see, for example, D1 to D3). But detector curving makes sense in CT because of the circularly symmetric geometry on which CT systems are based (see the declaration of Mr Sones, No. 12, lines 10 to 14). There is no disclosure in these documents showing that the curved structure is intended to solve the problem underlying the present invention. Thus, presenting the curved structure as a solution to the problem would entail an *ex-post-facto* analysis which is not allowed while assessing inventing step.

4.4 The arguments brought forward by the appellant against the inventiveness of the subject-matter of claim 1 are not convincing in that they do not represent a logical chain of argument showing why the skilled person, starting from the disclosure of D0 and having to solve the problem as defined above, would inevitably arrive at the claimed solution considering the cited documents. Indeed, the appellant has not clearly used the problem-solution approach. In particular, starting from D0, he has not shown that the problem as defined in the patent in suit is known or obvious. With regard

to the solution, even though the skilled person could find a hint at curved detectors in the prior art concerning CT radiography, as the appellant argues, such a hint alone is not sufficient to deprive the claimed solution of inventive step. In particular, the hint at curved detectors does not yet prove that the claimed condition of equal path length is also fulfilled. In conclusion, no sure evidence has been provided showing that the cited prior art **would**, not simply **could**, prompt the skilled person, faced with the technical problem, to modify the radiographic system known from D0 according to the claimed solution. The Board is, however, of the opinion that, in opposition appeal proceedings, such evidence is necessary beyond doubt in order to revoke an existing right.

4.5 Hence, the subject-matter of claim 1 according to the second auxiliary request involves an inventive step. Claims 2 to 10, being dependent on claim 1, also fulfil the requirement of inventive step.

5. The description has been adapted to the amended claim 1 of the second auxiliary request.

6. Therefore, the second auxiliary request is allowable.

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 on the basis of the following documents according to the respondent's second auxiliary request:

Claims: 1 filed on 8 December 2000,
2 to 10 filed on 20 January 1995,

Description: pages 2 to 8, B filed on 20 January 1995,
page A filed on 11 January 2001,

Figures: pages 12 to 15 filed on 20 January 1995.

The Registrar: The Chairman:

R. Schumacher G. Davies