

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

---

*Ex parte* DENNIS E. PERSYK AND JOHN C. ENGDAHL

---

Appeal 2007-3853  
Application 10/873,113  
Technology Center 2800

---

Decided: April 25, 2008

---

Before KENNETH W. HAIRSTON, ANITA PELLMAN GROSS,  
and MAHSHID D. SAADAT, *Administrative Patent Judges*.  
HAIRSTON, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. §§ 6(b) and 134 from the final rejection of claims 7 to 11 and 13.<sup>1</sup>

---

<sup>1</sup> In a prior decision dated April 23, 2004 in Appeal No. 2002-2231 (App. Ser. No. 09/335,183), the Board affirmed the prior art rejections of claims 1 to 6.

The disclosed invention relates to the determination of the depth of gamma interactions in a plurality of gamma ray detectors in a positron emission tomographic nuclear medical imaging apparatus.

Claim 7 is representative of the claimed invention, and it reads as follows:

7. A method of positron emission tomographic nuclear medical imaging, comprising the steps of:

detecting a plurality of gamma interactions in a first gamma ray detector, wherein said plurality of gamma interactions corresponds to a single coincidence event;

for each of said plurality of detected gamma interactions, determining the depth of interaction in said gamma ray detector and the amount of energy deposited in said gamma ray detector;

determining which one of said plurality of detected gamma interactions in said gamma ray detector occurred first, by

1) selecting an arbitrary one of said plurality of detected gamma interactions as a tentative first interaction;

2) selecting a remaining one of said plurality of detected gamma interactions as a tentative second interaction;

3) calculating a hypothetical Compton scatter angle between said tentative first and second interactions based on the determined amount of energy deposited thereby in said gamma ray detector;

4) comparing said hypothetical Compton scatter angle with an actual Compton scatter angle as obtained from said determined depth of interaction of said tentative first and second interactions;

5) determining whether said tentative first and second interactions are actual first and second interactions based on the result of said comparison;

6) if the determination of step 5) is negative and additional remaining detected gamma interactions exist, repeating steps 2) through 5) for a different remaining one of said plurality of detected gamma interactions;

7) if the determination of step 5) is negative and no additional remaining detected gamma interactions exist, repeating steps 1) through 6) for a different arbitrary one of said plurality of detected gamma interactions; and

generating a line of interaction between a determined actual first interaction in said first gamma ray detector and a similarly determined actual first interaction in a second gamma ray detector, to thereby determine the location of said coincidence event.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Kamae	US 4,857,737	Aug. 15, 1989
Warburton	US 6,169,287 B1	Jan. 2, 2001 (filed Sep. 3, 1998)

The Examiner rejected claims 7, 10, and 13 under 35 U.S.C. § 102(b) based upon the teachings of Kamae.

The Examiner rejected claims 8, 9, and 11 under 35 U.S.C. § 103(a) based upon the teachings of Kamae and Warburton.

Turning first to the anticipation rejection, the Examiner contends that Kamae is capable of determining the depth of gamma interaction in each of the detectors 20, 21, and 22 (Ans. 3). Appellants contend that:

The detectors 20, 21 and 22 as disclosed in Fig. 9 are used to measure the spatial distribution of a radioactive isotope or fluorescent atoms in an object 23. Fig. 9 of Kamae does not illustrate a PET system. As explained by Kamae at col. 11, ll. 43-59, the three measuring devices 20, 21 and 22 are used to obtain a three-dimensional stereoscopic view of the distribution of a radiation source, and not to detect PET coincidence events as alleged by the Office action.

(App. Br. 7 and 8).

According to Appellants (App. Br. 9), “Kamae fails to disclose apparatus having a gamma ray detector being capable of determining the depth of interaction of a gamma event therein, as required by each of claims 7, 10 and 13.”

Kamae describes a system that uses multiple Compton scattering for gamma ray measurement (Figs. 1, 2, 7 and 9; Abstract; col. 1, ll. 7 to 9). Kamae clearly indicates throughout the disclosure of the system that the detectors are 2-dimensional position sensitive type radiation detectors (col. 3, ll. 46 to 66 col. 4, ll. 15 to 45; col. 5, ll. 11 to 14; col. 6, ll. 9 to 61; col. 7, ll. 46 to 50; col. 8, ll. 37 to 40; col. 9, ll. 3 to 61; col. 10, ll. 35 to 40; col. 11, ll. 2 to 27; col. 12, ll. 5 to 8). A depth dimension is not mentioned in Kamae as one of the positions detected by the 2-dimensional position sensitive radiation detectors. Kamae is equally silent as to the claimed iterative steps of determining which one of a plurality of detected gamma interactions in a gamma ray detector occurred first.

Appeal 2007-3853  
Application 10/873,113

Thus, the anticipation rejection of claims 7, 10, and 13 is reversed because each and every limitation in the claims is not found either expressly or inherently in the cited reference to Kamae. *In re Crish*, 393 F.3d 1253, 1256 (Fed. Cir. 2004).

Turning lastly to the obviousness rejection of claims 8, 9, and 11, this rejection is reversed for the same reason that the anticipation rejection was reversed, and because the Examiner's articulated reason for combining the teachings of Warburton with those of Kamae do not support a legal conclusion of obviousness. *KSR Int'l v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741 (2007).

The decision of the Examiner is reversed.

REVERSED

KIS

INTELLECTUAL PROPERTY DEPARTMENT  
170 WOOD AVENUE SOUTH  
ISELIN, NJ 08830