Paper No. 22

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte E. Anne Sivers

Appeal No. 1997-0730
Application 08/476,984[1]

ON BRIEF

Before THOMAS, KRASS and HECKER, Administrative Patent Judges.

HECKER, Administrative Patent Judge.

DECISION ON APPEAL

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[1] *Application for patent filed June 07, 1995. According to the appellant, this application is a continuation of 08/405,396, filed March 15, 1995, which is a continuation of 07/991,050, filed December 15, 1992.*

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This is a decision on appeal from the final rejection of claims 4 through 7, 9, 17 and 18. Claim 10 is indicated as being allowable if placed in independent form. Claims 1 through 3, 11 and 13 through 16 were canceled in paper no. 13 when replacement claims 17 and 18 were entered. Paper no. 13 also made claims 8 and 12 allowable if placed in independent form.

Appellant's invention relates to a helical computerized tomography (CT) system which is typically used for medical diagnostic purposes. In a CT system, a patient is supported on a table within a rotatable, ring-like X-ray unit (referred to as a gantry) which has an X-ray source and X-ray detectors on diametrically opposite sides of the patient. The X-ray unit and the patient are rotated relative to each other in an X-Y reference plane and are moved relative to each other along a longitudinal Z-axis, transverse to the X-Y plane. The X-ray detectors generate data indicating variations in the amount of X-ray radiation received by the detectors along the helical path. A computer uses programmed mathematical procedures to process the resultant helical path data and generate image

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slices. In particular, as shown in Figure 1, gantry 22 rotates and X-ray source 24 and top and bottom detector arrays 26 and 28 are disposed on the gantry 22 in diametrically opposite positions. The data processed for a set of paired views taken by the respective detectors 26 and 28 is interpolated for each pair of views to the midplane by the block 74, and is then weighted to provide raw reconstructed image data for further processing. Representative independent claim 17 is reproduced as follows:

17. A helical computerized tomography system in which an x-ray tube for radiating an x-ray and an object irradiated with the x-ray are relatively rotated with respect to each other, and the x-ray tube and the object are relatively moved along an axial direction of the object, thus performing a helical scan on the object, and the x-ray transmitted through the object is detected by an x-ray detector, thus reconstructing a tomograph at a desired position of a reference plane of reconstruction in the axial direction, said apparatus comprising:

a radiation detector arrangement having first and second array of detectors disposed along the axial direction of the object for collecting transmitted data of the x-ray transmitted through the object during the helical scan;

data extracting means for extracting first and second transmitted data each collected by said first and second arrays of detectors, the first and second transmitted data correspond to a same detector angle but different axial positions and the data extracting means extract one of the first and second transmitted data closer to the reference

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plane than the other;

means for interpolating projection data based on the first and second transmitted data extracted by said data extracting means to produce interpolated projection data at the position of the reference plane; and

reconstructing means for reconstructing a tomogram at the position of the reference plane based on the interpolated projection data obtained by said interpolating means.

The references relied on by the Examiner are as follows:

Heuscher et al.	(A)	4,965,726	Oct. 23, 1990
Heuscher	(B)	5,262,946	Nov. 16, 1993 (filed Aug, 14, 1990)

Claims 4 through 7, 17 and 18 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Heuscher (B).

Claim 9 stands rejected under 35 U.S.C. § 102(e) as anticipated by Heuscher(B) or, in the alternative, under 35 U.S.C. § 103 as obvious over Heuscher (B) in view of Heuscher (A).

Rather than repeat the arguments of Appellant or the Examiner, we make reference to the brief and the answer for the respective details thereof.

OPINION

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After a careful review of the evidence before us, we agree with the Appellant that claims 4 through 7, 17 and 18 are patentable over Heuscher (B) under 35 U.S.C. § 102(e); and that

claim 9 is patentable over Heuscher (B) under 35 U.S.C. § 102(e) and Heuscher (B) in view of Heuscher (A) under 35 U.S.C. § 103.

At the outset, we note that Appellant has indicated on page 11 of the brief that all rejected claims stand together. We will therefore consider claim 17 as the representative claim.

It is axiomatic that anticipation of a claim under § 102 can be found only if the prior art reference discloses every element of the claim. See In re King, 801 F.2d 1324, 1326, 231 USPQ 136, 138 (Fed. Cir. 1986) and Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co., 730 F.2d 1452, 1458, 221 USPQ 481, 485 (Fed. Cir. 1984). "Anticipation is established only when a single prior art reference

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discloses, expressly or under principles of inherency, each and every element of a claimed invention." RCA Corp. v. Applied Digital Data Systems, Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984), cert. dismissed, 468 U.S. 1228 (1984), citing Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 772, 218 USPQ 781, 789 (Fed. Cir. 1983).

Heuscher [B] uses interpolation with a single detector array for views collected over more than two revolutions of the spiral path. On the other hand, Appellant claims interpolation on data from two detector arrays irrespective of any revolutions. Also, although Heuscher [B] discloses a multiple detector array embodiment, the detector arrays are summed, averaged, or the like (column 13, lines 8-10), not interpolated.

Appellant cites several portions of Heuscher [B] to evidence this distinction. Appellant argues on page 13 of the

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brief:

> Heuscher '946 [B] discloses a data "combining" operation, but fails to disclose or suggest interpolation of data from different arrays. In Heuscher '946 [B], columns 11-13, reference is made only to weighting and filtering or averaging (column 12, lines 40-44, and column 13, lines 8-10). Moreover, in the multiple mode, the three slices are separately processed (column 13, lines 21, 22) as opposed to combining detector array data for processing to slice images.
>
> In column 2, lines 56-60, Heuscher '946 [B] discloses interpolation between corresponding data from more that two spirals of revolution, but fails to disclose interpolation of data from two spirals of revolution associated with the respective (two) detector arrays.
>
> At column 3, lines 53-59, Heuscher '946 [B] makes reference to two or more interleaved data spirals, but no reference is made to the use of two detector arrays with collected data being interpolated between the two arrays. Similarly, at column 10, line 57 - column 11, line 2, Heuscher '946 [B] only references three interleaved spirals without any disclosure regarding interpolation.
>
> In column 5 at lines 3-20, Heuscher '946 [B] describes the detectors 26a and 26b, but these detectors are operated such that data from corresponding center detector cells and corresponding side detector cells are combined to produce a set of data. Accordingly, this Heuscher '946 [B] operation employs a combination process, but does not employ an interpolation process in which interpolation is performed between the data of one array and the data of another array as disclosed and claimed for the invention.

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Appellant's argument is summed up in the following statement:

> Thus, Heuscher '946 [B] interpolates with a common detector array and does not interpolate with different detector arrays. (Brief-page 14.)

We agree with Appellant. Heuscher [B] simply does not disclose interpolating data from two detector arrays as recited in both independent claims 17 and 18. Thus we will not sustain the 35 U.S.C. § 102(e) rejection of claims 17 and 18, and likewise claims 4 through 7 which depend therefrom and contain the same limitations.

With regard claim 9, dependent from claim 17, we will not sustain the 35 U.S.C. § 102(e) rejection for the same reasons supra. With regard to the 35 U.S.C. § 103 rejection of claim 9, the question of whether or not convolution is shown in the reconstruction means is irrelevant since the claimed interpolating has not been met by the references. Thus, we will not sustain the 35 U.S.C. § 103 rejection of claim 9.

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In view of the foregoing, the decision of the Examiner rejecting claim 4 through 7, 9, 17 and 18 under 35 U.S.C. § 102(e) is reversed, and the decision of the Examiner rejecting claim 9 under 35 U.S.C. § 103 is reversed.

REVERSED

James D. Thomas)
Administrative Patent Judge)
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) *BOARD OF PATENT*
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Errol A. Krass) *APPEALS AND*
Administrative Patent Judge)
) *INTERFERENCES*
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Stuart N. Hecker)
Administrative Patent Judge)

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