

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 14

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte KOJI KOYAMADA, SAKAE UNO  
and TATSUO MIYAZAWA

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Appeal No. 96-3254  
Application 07/991,019<sup>1</sup>

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ON BRIEF

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Before HAIRSTON, KRASS and BARRETT, Administrative Patent Judges.

KRASS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1 through 4, 6 through 10, 12 through 14, 19 and 20, all the claims remaining in the application.

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<sup>1</sup> Application for patent filed December 15, 1992.

The invention pertains to volume rendering which shows characteristics of the interior of a 3-D object in a 2-D image. More particularly, the invention uses sampling points that are uniformly spaced, forming a group of concentric spherical slicing isosurfaces around a viewing ray.

1. A method of volume rendering comprising the steps of:

extracting a group of concentric spherical slicing isosurfaces containing sampling points positioned in equal intervals along a viewing ray originating from a viewing point, said extracting of said group of concentric spherical slicing isosurfaces is performed by mapping input volume data onto said concentric spherical slicing isosurfaces, wherein said concentric spherical slicing isosurfaces are each extracted as a set of polygons;

generating polygon data having data values at vertices of said polygons; and

executing volume rendering by displaying said polygon data in a form of partially transparent polygons.

The examiner relies on the following references:

Winget	5,113,490	May 12, 1992 (filed June 19, 1989)
Glassner	5,317,681	May 31, 1994 (filed Dec. 30, 1991)

James D. Foley, et al. (Foley), Computer Graphics, "Principles and Practice", Second Edition, Addison-Welsey Publishing Company, 1990, pp. 1034-1039.

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Claims 1 through 4, 6 through 10, 12 through 14, 19 and 20 stand rejected under 35 U.S.C. § 103 as unpatentable over Foley in view of Winget and Glassner.

Reference is made to the brief and answer for the respective positions of appellants and the examiner.

### OPINION

At the outset, we note that, in accordance with appellants' grouping of the claims at page 3 of the brief, all claims stand or fall together.

As a general proposition, in an appeal involving a rejection under 35 U.S.C. § 103, an examiner is under a burden to establish a prima facie case of obviousness. If that burden is met, the burden of going forward then shifts to appellants to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

In the instant case, we find that the examiner has failed to establish a prima facie case of obviousness.

Independent claim 1 requires, inter alia, “extracting a group of concentric spherical isosurfaces containing sampling points positioned in equal intervals along a viewing ray originating from a viewing point.”

The examiner relies on the teaching of Foley, regarding “*marching-cubes* algorithm,” at page 1035 thereof, for the extraction of surfaces “at equal intervals,” explaining that the equal dimensions of each cube means that the surfaces extracted from within the cubes are at equal intervals as measured relative to the precision of the grid containing the cubes [answer-page 3]. We are not convinced by the examiner’s rationale that Foley describes the extraction of a group of surfaces containing sampling points positioned in “equal intervals” along a viewing ray, as claimed. Just because cubes may have equal dimensions, or outside surfaces, we are not convinced that this would lead to surfaces extracted from within those cubes being at “equal intervals” relative to the precision of the grid, as the examiner argues. It would appear to us that surfaces extracted from within the cubes may be of varying dimensions and need not be along any particular viewing ray. Contrary to what the examiner appears to be contending, the “surfaces” extracted from within an object are not, necessarily, the surface, or

face, of the object itself. Therefore, we do not understand how the examiner extracts a teaching of sampling points positioned in “equal intervals” along a viewing ray from Foley’s disclosure.

Accordingly, since the examiner relies on Foley for the teaching of the “equal intervals” aspect of the claimed invention and has provided us with no convincing line of reasoning that Foley teaches or suggests such a limitation, and neither Winget nor Glassner provides for the deficiency of Foley, we will not sustain the rejection of the claims under 35 U.S.C. § 103.

Moreover, the examiner cites Winget for the proposition of using isosurfaces, pointing to the summary of the invention section of Winget, but the examiner never identifies on what portion of that summary he relies. Then, the examiner cites Glassner for the specific use of concentric spherical isosurfaces and concludes that it would have been obvious “to apply Winget’s isosurface volumetric to Foley’s generation because of Glassner’s taught example” [answer-page 4]. However, the examiner has provided no convincing rationale for making the proposed combination nor has the examiner addressed any reason as to how or why the skilled artisan would have looked to Winget and/or Glassner in order to modify Foley in such a manner as to provide for the extraction of a group of concentric spherical isosurfaces containing sampling points positioned in equal intervals along a viewing ray originating from a viewing point. Thus, even assuming, arguendo, that all that the examiner contends about the teachings of each reference is true, we remain unconvinced of any plausible reason, other than

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hindsight gleaned from appellants' disclosure, for combining these teachings in a manner to arrive at the claimed invention. Thus, even if Foley suggested extracting surfaces at equal intervals along a viewing ray, and even if Winget mentions "isosurfaces" in generating volumetric data, and even if Glassner shows concentric spherical isosurfaces, the examiner has provided us with no convincing rationale as to why the skilled artisan would have merged such teachings, without some suggestion for doing so, to miraculously arrive at the claimed subject matter wherein a group of concentric spherical isosurfaces containing sampling points positioned in equal intervals along a viewing ray are extracted.

Further, we do not find the examiner's observations regarding the obviousness of cartesian coordinate systems versus polar coordinate systems to be convincing of the obviousness of the claimed subject matter.

While, in our view, neither the examiner nor appellants has explained the instant invention with any degree of clarity, leaving some confusion in our minds as to the exact nature of the invention even after reading the specification, the initial burden, at least, is on the examiner to present a prima facie case of obviousness of the claimed subject matter, within the

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meaning of 35 U.S.C. § 103. For the reasons supra, we find that the examiner has not met this burden.

Accordingly, we will not sustain the rejection of the instant claims under 35 U.S.C.

§ 103.

The examiner's decision rejecting claims 1 through 4, 6 through 10, 12 through 14, 19 and 20 under 35 U.S.C. § 103 is reversed.

REVERSED

KENNETH W. HAIRSTON	)	
Administrative Patent Judge	)	
	)	
	)	
	)	BOARD OF PATENT
ERROL A. KRASS	)	
Administrative Patent Judge	)	APPEALS AND
	)	
	)	INTERFERENCES
	)	
LEE E. BARRETT	)	
Administrative Patent Judge	)	

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