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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* GERALD SCHROECKER

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Appeal 2016-004198  
Application 13/338,888  
Technology Center 2600

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Before JOSEPH L. DIXON, NORMAN H. BEAMER, and  
SCOTT B. HOWARD, *Administrative Patent Judges*.

DIXON, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant<sup>1</sup> appeals under 35 U.S.C. § 134(a) from a rejection of claims 1, 3–14, 16–19, 21–26, 28, and 30–36. The Examiner indicates that claims 27 and 29 are allowable over the prior art if rewritten in independent form. (Ans. 4.) Claims 2, 15, and 20 have been canceled. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

The claims are directed to a method and system for indicating light direction for a volume-rendered image. Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A method of volume-rendering 3D medical imaging data comprising:

generating a volume-rendered image from a 3D dataset acquired with a medical imaging device, wherein the volume-rendered image is shaded from a light direction;

displaying the volume-rendered image;

displaying a model of a solid at the same time as the volume-rendered image; and

displaying a light direction indicator with respect to the model of the solid, wherein the position of the light direction indicator with respect to the model of the solid corresponds to the light direction used for shading the volume-rendered image.

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<sup>1</sup> Appellant indicates that General Electric Company is the real party in interest. (Br. 3.)

## REFERENCES

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

Jensen	US 2002/0085681 A1	July 4, 2002
Yoshioka	US 2003/0037111 A1	Feb. 20, 2003
Goto	US 2004/0075658 A1	Apr. 22, 2004
Sevastianov et al. (hereinafter “Sevastianov”)	US 2006/0066616 A1	Mar. 30, 2006
Thomas et al. (hereinafter “Thomas”)	US 2009/0181769 A1	July 16, 2009
Bamford et al. (hereinafter “Bamford”)	US 2012/0284671 A1	Nov. 8, 2012

Eyewideopenmedia 1, *Blender 3D Animation – Spinning Globe with Red Cube Semi - Transparent*, YOUTUBE (Mar. 31, 2009),  
<https://www.youtube.com/watch?v=p18hHatvUQg> (hereinafter “Blender”).

3dcognition, *3ds Max – Lighting 1*, YOUTUBE (Nov. 29, 2008),  
<https://www.youtube.com/watch?v=7OHxlnSwFDw> (hereinafter “Video”).

## REJECTIONS

The Examiner made the following rejections:

Claims 1, 3, 5–14, 16–19, 23, 31, and 36 stand rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Jensen, Blender, in view of Video and further in view of Sevastianov.

Claim 4 stands rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Jensen in view of Blender in view of Video in view of Sevastianov and further in view of Yoshioka.

Claims 21, 32, 33, and 35 stand rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Jensen in view of Blender in view of Video in view of Sevastianov and further in view of Thomas.

Claim 24 stands rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Jensen in view of Blender in view of Video in view of Sevastianov and further in view of Bamford.

Claims 22, 25, 26, 28, 30, and 34 stand rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Jensen in view of Blender in view of Video in view of Sevastianov and further in view of Goto.

### ANALYSIS

With respect to independent claims 1, 14, and 19, Appellant presents arguments to the claims together. We find the limitations of the three independent claims to contain similar limitations. Therefore, we address independent claim 1 as the illustrative claim for the group.

#### *Burden on Appeal*

The allocation of burden requires that the United States Patent and Trademark Office (USPTO) produce the factual basis for any rejection in order to provide an applicant with notice of the reasons why the applicant is not entitled to a patent on the claim scope sought — the so-called “*prima facie* case.” *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984) (the initial burden of proof is on the USPTO “to produce the factual basis for its rejection of an application under sections 102 and 103” (quoting *In re Warner*, 379 F.2d 1011, 1016 (CCPA 1967))). The “*prima facie* case” serves as a procedural mechanism that shifts the burden of going forward to the applicant, who must produce evidence and/or argument rebutting the case of unpatentability. *See Oetiker*, 977 F.2d at 1445; *Piasecki*, 745 F.2d at 1472.

The Patent Trial and Appeal Board’s role on appeal is to, “review adverse decisions of examiners upon applications for patents.” 35 U.S.C. § 6(b) (2014). An appellant has the opportunity on appeal to the Board to demonstrate error in the Examiner’s position. *See In re Kahn*, 441 F.3d 977, 985–86 (Fed. Cir. 2006) (“On appeal to the Board, an applicant can overcome a rejection by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.” (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998))).

#### *Standard of review*

The Examiner has the initial burden to set forth the basis for any rejection so as to put the patent applicant on notice of the reasons why the applicant is not entitled to a patent on the claim scope that he seeks — the so-called “*prima facie case*.” *Oetiker*, 977 F.2d at 1445. An appellant may attempt to overcome an examiner’s rejection on appeal to the Board by submitting arguments and/or evidence to show that the examiner made an error in either (1) an underlying finding of fact upon which the final conclusion was based, or (2) the reasoning used to reach the legal conclusion. *See Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential). The panel then reviews the rejection for error based upon the issues identified by appellant, and in light of the arguments and evidence produced thereon. *See Oetiker*, 977 F.2d at 1445; *see also Frye*, 94 USPQ2d at 1075.

The question of obviousness is “based on underlying factual determinations including . . . what th[e] prior art teaches explicitly and

inherently.” *In re Zurko*, 258 F.3d 1379, 1383 (Fed. Cir. 2001). “The Patent Office has the initial duty of supplying the factual basis for its rejection. It may not . . . resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in its factual basis.” *In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967).

As an introduction, Appellant presents arguments and discussion of a 3D (three dimensional) volume rendered image with respect to the Specification and a prior declaration under 37 CFR § 1.132. (Br. 10–13.) We note that the declaration was directed to a prior combination of references. In response to the declaration evidence, the Examiner modified the combination of prior art references and added the Jensen reference which teaches 3D medical imaging generally. (Non-Final Act. 3–7.)

We agree with Appellant that the Examiner’s rejection is not based upon a proper combination and statement of reasoning for the combination and is based upon hindsight reconstruction. (Br. 16.)

Additionally, we find the Examiner’s line of reasoning for the combination of the four prior art references to be based upon speculation and conjecture. Furthermore, we find the limited teachings of the Video and Blender references provide insufficient technical detail regarding the rendering process to achieve the end results of shading either two-dimensional or three-dimensional objects. We find the Video and Blender references do not identify whether the references are 3D volume rendering or merely surface rendering of images. As identified by Appellant’s declaration, there is a recognized difference between the types of rendering technology and the Examiner has not provided any persuasive response in the Examiner’s Answer to Appellant’s argument.

If the Examiner intends the rejection to be based upon the underlying software packages of the Video and Blender references, the Examiner should provide a different, more detailed reference that supports the functionality the Examiner proffers in the statement of the rejection.

Moreover, the Examiner clearly recognizes the difference in the technologies and modified the grounds of rejection in the Non-Final Office Action to include the Jensen reference. Here, the Examiner has not addressed the proffered difference in the additional references that more likely than not appear to be directed to surface rendering of a three-dimensional object rather than volume rendering of a three-dimensional object.

We further agree with Appellant that one of ordinary skill in the art would have appreciated the difference between surface rendering and volume rendering. Appellant contends:

[a] fundamental misunderstanding relates to the meaning of generating a volume-rendered image from a 3D dataset acquired with a medical imaging device. Such operation is different in kind from generating images with polygonal (e.g., surface) rendering. This is because in surface rendering, objects are created using surface representations such as polygonal wire meshes. More specifically, vertices of the meshes typically form polygons or triangles that form an outer shell. Objects formed using surface rendering are surface representations and lack internal matter, meaning that they are essentially empty inside. On the other hand, generating a volume-rendered image from a 3D dataset acquired with a medical imaging device provides for representing a filled object including internal data of the object.

(Declaration ¶ 4.)

The Examiner generally addressed, in the Non-Final Office Action, Appellant's arguments regarding the declaration under 37 CFR § 1.132 by



the addition of the Jensen reference into the rejection. The Examiner maintains that:

While Jensen does not explicitly disclose, Blender discloses **displaying a model of a solid** (In every page of Blender there is a transparent/semi-transparent virtual earth that surrounds rotating cube. The virtual earth corresponds to the solid and the cube corresponds to the volume-rendered image.)

It would have been obvious for a person of ordinary skill in the art at the time of the claimed invention to modify the teachings of Jensen so a solid semi-transparent or transparent object such as a sphere maybe placed around the rotating rendered volume of an anatomical part of the patient. This allows the image to be viewed in a comprehensive 3D manner.

While the combination of Jensen and Blender does not explicitly disclose, Video discloses **displaying the volume-rendered image**; (Page 6 of Video shows the solid sphere which can be considered a volume-rendered image after all of the light and shading are in effect. However, sphere can be replaced with what 3D image constructed by Jensen using medical imaging device. Blender provides a framework in which a semi-transparent graphical object can be placed outside a small graphical volume.)

(Non-Final Act. 4–5). We disagree with the Examiner’s finding and find no corresponding description to support the Examiner’s position regarding the 3D volume rendering from the limited screen shots of the Blender and Video references. Moreover, we find error in the Examiner’s position that the Blender reference discloses “virtual earth corresponds to the solid [model] and the cube corresponds to the volume-rendered image.”

From our review of the teachings of the Blender and Video references, we agree with Appellant that the Blender and Video references are more likely than not directed to three-dimensional (3-D) surface rendering rather than volume rendering of objects with internal volume data because the

images appear to be merely combined surface renderings without internal volume data. (From a brief review of the YouTube postings for “3ds Max - Lighting” (Video reference) and “Blender 3D Animation” (Blender reference), it is more likely than not that these software application packages are addressing surface 3D renderings rather than volumetric rendering as proffered by the Examiner.) Consequently, we find the Examiner’s combination to be unpersuasive regarding the volumetric analysis and display of independent claim 1.

Alternatively, if the image of the globe/earth in the Blender reference were to be viewed as a model of a solid volume with a volume rendered image of solid volume cube on the inside, the skilled artisan would have no corresponding disclosure within the Blender reference to support the proffered contention. While we may speculate that there is a void of material between the exterior globe surface and the interior cube surface, we have no underlying factual findings or any disclosure to support this position.

Thus, the Examiner’s finding that of the Video and Blender references teach or suggest the disputed limitation of claim 1 is in error because it is not supported by a preponderance of the evidence. *See In re Caveney*, 761 F.2d 671, 674 (Fed. Cir. 1985) (Examiner’s burden of proving non-patentability is by a preponderance of the evidence); *see also In re Warner*, 379 F.2d at 1017 (“The Patent Office has the initial duty of supplying the factual basis for its rejection. It may not, because it may doubt that the invention is patentable, resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in its factual basis.”).

Additionally, whether it would have been obvious for a person of ordinary skill in the art to combine two or more references is a flexible inquiry. A factfinder “need not seek out precise teachings directed to the specific subject matter of the challenged claim” and “can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Nevertheless, obviousness cannot be established “by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *Id.* (quoting *In re Kahn*, 441 F.3d at 988).

Furthermore, we find the Examiner has not provided a sufficient rationale for the combination of the prior art teachings relied upon and the Examiner has relied upon speculation and conjecture regarding the limited teachings of the Blender and Video references. As a result, we cannot agree with the Examiner that, more likely than not, independent claim 1 would have been obvious to one of ordinary skill in the art at the time of the invention based upon the limited disclosures of the prior art references relied upon.

We find the Blender and Video references contain no specific disclosure rather than merely images of the end result of some rendering of some 3D objects. Consequently, we are left to speculate as to whether these 3D renderings are merely surface renderings of 3D objects or volumetric renderings. The Examiner has added the Jensen reference during the prosecution which takes two dimensional slices of a three-dimensional object and constructs a three-dimensional volume based upon the two-dimensional fluoroscopic images. (Jensen Abstract, ¶¶ 9–10.)

Appellant contends that there is no evidence to support that any of the cited references disclose displaying a model of a solid at the same time as the volume-rendered image. (Br. 17.) Appellant further contends that the Examiner has relied upon the Blender and Video references individually for each of the rendered images. (Br. 17.)

The Examiner maintains:

Blender discloses a semi-transparent sphere which corresponds to the model of a solid because it is a model of a solid sphere and it is transparent/semi-transparent. Inside the semitransparent sphere is another 3D geometric volume. Therefore, Blender clearly discloses that an additional 3D graphical model can be placed within the sphere. This is irrefutable evidence as disclosed in Blender. The Examiner further cites to the solid sphere in Video as the corresponding volume rendered image. This volume rendered image is a 3D volume and it can be placed within the semi-transparent sphere of Blender because Blender already discloses having another 3D object with the semi-transparent sphere at the same time. Therefore, Video modified by Blender discloses a volume rendered image placed within the model of a solid at the same time.

(Ans. 5–6.) Appellant contends that the Examiner has not made a proper showing in the prior art relied upon teaches “*displaying a model of a solid at the same time as the volume-rendered image.*” We further find the Examiner’s line of reasoning to be based upon hindsight reconstruction. The Examiner maintains that both of the renderings in the Blender reference are models and then contends that the sphere in the Video reference is a volume rendered image which can be placed within the semi-transparent sphere of the Blender reference because the Blender already has two rendered images together. We disagree with the Examiner’s findings and conclusion. Rather, we find that the single two-part image of the Blender reference is a single

rendered image and the Video reference is a single rendered image. Consequently, we find no disclosure of a rendered image and a separate model of a solid at the same time as required by the language of independent claim 1.

In response to Appellant's arguments that the Blender reference does not disclose displaying the volume-rendered image of Appellant's claim 1, the Examiner maintains:

the Examiner has explained many times previously and will continue to do so for the remainder of this Answer, the volume-rendered image is disclosed by Jensen which can replace the cube disclosed in Blender. Video and Blender are used to modify Jensen so a volume-rendered image of Jensen can be placed with a model of a solid and be illuminated by a rotating light. Jensen discloses generating a 3-D volume of object data based on 2-D fluoroscopic images. Each portion of the 3-D volume of the object data is considered a 3D dataset. Therefore, the entire 3-D volume of object data is based on the 3D dataset acquired with medical imaging of the 2-D fluoroscopic images. Not only does the medical imaging device acquire the 2-D fluoroscopic images, but it further transforms the 2-D fluoroscopic images into a 3-D volume.

(Ans. 6–7.) The Examiner further maintains that:

In fact, *paragraph [0010]* of Jensen recites “According to at least one alternative embodiment, an image processor constructs a computed tomography volume from a series of 2-D fluoroscopic images. The image processor transforms multiple 2-D fluoroscopic images into 3-D volumetric data sets. The image processor may perform an iterative reconstruction technique to construct the 3-D volume. Alternatively, the image processor may perform a back projection technique to construct the 3-D volume.” ([E]mphasis added)[.] Therefore, the 2-D fluoroscopic images are transformed into a 3-D volumetric data and then used to construct the 3-D volume.

. . . Jensen is related to a medical imaging field and specifically pertains to medical personnel who use and view the 3D volumetric data. A person of ordinary skill in the art can be a person in the medical imaging field who must have had tremendous amounts of common experience with viewing real life patients or medical objects using light sources. Thus, it would have been obvious to that person of ordinary skill in the medical imaging art at the time of the Appellant's claimed invention to use lighting to get a better view of the 3D volume rendered image. Moreover, that person of ordinary skill in the art must know that the position of the lighting in real life affects the viewing of a real life patient or medical objects. Therefore, it would have been obvious to a person of ordinary skills at the time of Appellant's claimed invention to want to know where the source of the virtual light is with respect to the 3D volume rendered image being viewed. The semi-transparent earth in Blender has a surface that reflects some of the light from a light source, thereby letting the viewer know where the light source is located and where it is moving towards. Moreover, by viewing the 3D volumetric image of Jensen within a semi-transparent/transparent sphere with a moveable light source, the person of ordinary skill in the art can better appreciate the illuminated details of the 3D volumetric image and know where the position of the light is, thereby getting a better understanding of what the illumination is displaying. Appellant argues as if the person of ordinary skill is an automaton devoid of creativity and/or medical common sense experience when modifying Jensen with the teachings of Blender and Video.

(Ans. 7–8.) We disagree with the Examiner's factual findings and conclusion regarding the combination of teachings, as discussed above. Consequently, we cannot sustain the Examiner's rejection of independent claim 1 based upon obviousness. Independent claims 14 and 19 contain similar limitations, and we cannot sustain the obviousness rejection of these claims and the dependent claims 3–13, 16–18, 23, 31, and 36.

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With respect to dependent claims 21, 22, 24–26, 28, 30, and 32–35, the Examiner has not identified how the additional references relied upon remedy the deficiency in the base combination in the obviousness rejection of the independent claims. As a result, we cannot sustain the rejection of dependent claims 21, 22, 24–26, 28, 30, and 32–35.

#### CONCLUSION

The Examiner erred in rejecting 1, 3–14, 16–19, 21–26, 28, and 30–36 based upon obviousness under 35 U.S.C. § 103.

#### DECISION

For the above reasons, we reverse the Examiner's rejections of claims 1, 3–14, 16–19, 21–26, 28, and 30–36.

REVERSED