UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/185,785	06/17/2016	Joseph Frank Floyd	B86918 2240US.1 (0141.2)	5457

128836 7590 01/31/2019

WOMBLE BOND DICKINSON (US) LLP
Attn: IP Docketing
P.O. Box 7037
Atlanta, GA 30357-0037

EXAMINER
WU, YANNA

ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
01/31/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentadmin@Boeing.com
ipdocketing@wbd-us.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JOSEPH FRANK FLOYD, PATRICK JAMES EAMES, BRENT LOUIS HADLEY, ROBERT JAMES MARTIN, NICHOLAS SHEPHERD, IVAN RUMSEY, and JEREMY DAVID SCOTT

Appeal 2018-005549
Application 15/185,785[1]
Technology Center 3600

Before ERIC S. FRAHM, JOHNNY A. KUMAR, and JENIFFER S. BISK, *Administrative Patent Judges*.

FRAHM, *Administrative Patent Judge*.

DECISION ON APPEAL

---

[1] According to Appellants, The Boeing Company is the real party in interest (App. Br. 1).

STATEMENT OF THE CASE

Introduction

Appellants appeal under 35 U.S.C. § 134(a) from a final rejection of claims 1–24. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

Exemplary Claim

Appellants disclose and claim an apparatus for (claim 1), a method of (claim 9), and a computer-readable storage medium for (claim 17), rendering a scene including a three-dimensional (3D) model of a structure, such as "a 3D model of a large and complex structure such as an aircraft" (Spec. ¶ 4). *See* Title; Abstract; Spec. ¶¶ 1–4. Using computer aided design (CAD) software, digital design of a structure in 3D can be improved by using a multi-pass rendering process. *See* Title; Abstract; Spec. ¶ 3; Claims 1, 9, 17; Fig. 2. Exemplary independent claim 1 under appeal, with emphases added, reads as follows:

> 1. An apparatus for rendering a scene including a digital three-dimensional (3D) model of a structure, the apparatus comprising a processor and a memory storing executable instructions that, in response to execution by the processor, cause the apparatus to at least:
>
> load a scene graph composed of a hierarchical group of nodes representing respective 3D objects of the digital 3D model;
>
> traverse the scene graph and select nodes of the hierarchical group of nodes, the nodes so selected representing a plurality of 3D objects of the respective 3D objects of the digital 3D model;
>
> add the plurality of 3D objects to a render queue; and
>
> *after the scene graph is traversed* and the nodes are selected and the plurality of 3D objects are added to the render queue:

> *perform a multiple-pass rendering of the plurality of 3D objects from the render queue*, the apparatus being caused to perform the multiple-pass rendering including in a pass of a plurality of passes, the apparatus being caused to render a threshold portion but not all of the plurality of 3D objects to a framebuffer for output to a display device, at least one of the plurality of 3D objects being left in the render queue after rendering the threshold portion.

Examiner's Rejections

(1) The Examiner rejected claims 1, 2, 4, 5, 9, 10, 12, 13, 17, 18, 20, and 21 as being unpatentable under 35 U.S.C. § 103(a) over Berdardini (US 6,574,360 B1; issued June 3, 2003), Davidson (US 8,576,228 B2; issued Nov. 5, 2013), and Zhu (US 2012/0260157 A1; published Oct. 11, 2012).[2] Final Act. 3–12; Ans. 3–9.

(2) The Examiner rejected claims 3, 11, and 19 under 35 U.S.C. § 103(a) as being unpatentable over the base combination of Berdardini, Davidson, and Zhu, taken with Levanon (US 2007/0182734 A1; published Aug. 9, 2007). Final Act. 12–14.

(3) The Examiner rejected claims 6, 14, and 22 under 35 U.S.C. § 103(a) as being unpatentable over the base combination of Berdardini,

---

[2] Appellants present general arguments as to claims 1–24 as a group without discussing any particular claim, and primarily argue with regard to independent claims 1, 9, and 17 that (i) Zhu is non-analogous art (App. Br. 7–10; Reply Br. 3–5); and (ii) there is no motivation to combine the references (App. Br. 10–15; Reply Br. 6–7). Claims 1, 9, and 17 recite similar subject matter pertaining to rendering a scene of a digital 3D model of a structure by performing multiple-pass rendering on 3D objects after a scene graph is traversed. We select independent claim 1 as representative of the group of claims consisting of claims 1, 2, 4, 5, 9, 10, 12, 13, 17, 18, 20, and 21.

Davidson, and Zhu taken with Zimmerman (US 2013/0330055 A1; published Dec. 12, 2013). Final Act. 14–16.

(4) The Examiner rejected claims 7 and 8 under 35 U.S.C. § 103(a) as being unpatentable over the base combination of Berdardini, Davidson, and Zhu taken with Bishop (US 4,910,683; issued Mar. 20, 1990). Final Act. 16–20.

Principal Issues on Appeal[3]

Based on Appellants' arguments (App. Br. 4–17; Reply Br. 1–9), the following principal issue is presented:

Did the Examiner err in rejecting claims 1–24 as being unpatentable under 35 U.S.C. § 103(a) over the base combination of Berdardini, Davidson, and Zhu as being obvious because the references are not properly combinable and/or Zhu is non-analogous to Appellants' invention recited in representative claim 1?

ANALYSIS

We have reviewed the Examiner's rejections (Final Act. 3–20) in light of Appellants' contentions in the Appeal Brief (App. Br. 4–17; Reply Br. 1–

[3] Appellants rely on the arguments presented as to independent claims 1, 9, and 17 with respect to the patentability of claims 3, 6–8, 11, 14, 19, and 22 depending respectively therefrom, and fail to present any *separate* arguments with regard to the rejections of (i) claims 3, 11, and 19 under § 103(a) over Berdardini, Davidson, Zhu, and Levanon; (ii) claims 6, 14, and 22 under § 103(a) over Berdardini, Davidson, Zhu, and Zimmerman; and/or (iii) claims 7 and 8 under § 103(a) over Berdardini, Davidson, Zhu, and Bishop (*see* App. Br. 16; Reply Br. 7–8). Therefore, we will decide the outcome for the rejections of claims 3, 6–8, 11, 14, 19, and 22 with the outcome of claim 1 pertaining to the base combination of Berdardini, Davidson, and Zhu.

9) that the Examiner has erred, as well as the Examiner's response to Appellants' arguments in the Appeal Brief (Ans. 3–9). We disagree with Appellants' arguments and conclusions.

With regard to representative claim 1, we adopt as our own (1) the findings and reasons set forth by the Examiner in the action from which this appeal is taken (Final Act. 3–7), as well as the Advisory Action mailed October 27, 2017 (p. 2); and (2) the reasons set forth by the Examiner in the Examiner's Answer in response to Appellants' Appeal Brief (Ans. 3–9). We concur with the conclusions reached by the Examiner as to claim 1, and highlight and address specific findings and arguments for emphasis as follows.

Motivation

A rationale to support a conclusion that a claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art would have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art. *KSR Int'l Co. v. Teleflex Inc.,* 550 U.S. 538, 416 (2007). Such understandings about reasons to combine or countervailing reasons not to combine could come from the knowledge, skill, and creativity of the ordinarily skilled artisan. *KSR*, 550 U.S. at 418.

In the instant case, we agree with the Examiner's well-articulated rationale for combining the teachings of Berdardini, Davidson, and Zhu (*see* Final Act. 3–7; Ans. 3–9; Adv. Act. p. 2). Specifically, we agree with the Examiner that (i) Davidson teaches a rendering queue (Final Act. 6); (ii) Berdardini in view of Davidson teaches traversing a scene graph,

selecting nodes, and adding 3D objects to a rendering queue to perform rendering *while* traversing a scene graph (Final Act. 6); (iii) Zhu teaches nodes are selected and objects are saved to perform rendering *after* a scene graph is traversed (Final Act. 7); (iv) it would have been obvious to try Zhu's method (performing rendering after scene graph traversal) from the available options (i.e., during and after traversal). *See* Final Act. 7; Ans. 5.

Furthermore, we agree with the Examiner's response to Appellants' arguments concerning the motivation to combine as stated at pages 3–9 of the Answer, and specifically that (i) Zhu is analogous art (Ans. 3–4); (ii) it would have been obvious to try Zhu's method of rendering *after* scene graph traversal in place of Berdardini in view of Davidson's method of rendering *during* scene graph traversal (Ans. 5); and (iii) it would have been obvious to modify Berdardini's Process Octree Node procedure 304 to render primitives assigned to current leaf nodes after the tree is traversed as shown in Berdardini's Figure 8B (Ans. 7–9).

We agree with the Examiner (Ans. 7–9) that modifying Berdardini's process shown in Figure 8B with Zhu's process of rendering after scene graph traversal can be done by combining Zhu's teachings after step 3048 (which checks if the node is a leaf node) within Berdardini's process shown in Figure 8B, such that after a leaf node is discovered at step 3048, at step 3050 objects are saved in memory instead of being rendered, and then objects saved in memory can be retrieved and rendered after the tree traversal loop is finished, while still inserting valid occludes into an occlusion map (*see* Ans. 8). Further, we agree with the Examiner's explanation in the Advisory Action, as follows:

> Berdardini uses an on-line rendering method, i.e. the raw 3D objects are converted into a octree data struture, during traversing the octree, when a leaf node that need to be rendered is found, the method will render the leaf node immedially. By combing the teachings of Berdardini, Davidson and Zhu, an rendering queue is introduced, when a leaf node that need to be rendered is found, this leaf node saved into the rendering queue. After the octree is traversed, the nodes are selected and the 3D objects are added to the render queues, perform the rendering of 3D objects (leaf nodes). The occlusion map is just used to decide which node is to be rendered, it does not control the rendering time of a node. If the current leaf node is not rendered during traversal before updating the occlusion map, and instead is saved in a render queue. It still can be aquired from the render queue later and be rendered.

Adv. Act. p. 2.

Reasonable Expectation of Success

Where there is a reason to modify or combine the prior art to achieve the claimed invention, the claims may be rejected as *prima facie* obvious provided there is also a reasonable expectation of success. *In re Merck & Co., Inc.,* 800 F.2d 1091 (Fed. Cir. 1986); *Amgen Inc. v. F. Hoffman-LA Roche Ltd.*, 580 F.3d 1340, 1362 (Fed. Cir. 2009) ("An obviousness determination requires that a skilled artisan would have perceived a reasonable expectation of success in making the invention in light of the prior art.").

The "reasonable expectation of success" requirement refers to the likelihood of success in combining references to meet the limitations of the claimed invention, and does not look to whether one would reasonably expect the prior art references to operate as those references intended once combined. Instead, there must be a motivation to combine accompanied by a reasonable

expectation of achieving what is claimed. The teachings of the prior art can provide a sufficient basis for a reasonable expectation of success. *In re Merck & Co., Inc.,* 800 F.2d 1091 (Fed. Cir. 2009). In the case before us, the Examiner has met this burden in making findings about the teachings of the individual references as they relate to the claimed subject matter. Specifically, the Examiner makes findings as to why a person of ordinary skill in the art would have a reasonable expectation of success, based on the teachings of the references (*see* Final Act. 3–7; Ans. 3–9). *See Merck & Co., Inc.,* 800 F.2d 1091; *see also* Final Act. 3–6 (finding Berdardini and Davidson are in the analogous art of rendering 3D objects of a 3D image/model); Ans. 4 (Zhu is in an analogous art of objects rendering).

In addition, evidence showing there was *no* reasonable expectation of success may support a conclusion of nonobviousness. *In re Rinehart,* 531 F.2d 1048 (CCPA 1976). In the instant case, Appellants have not provided sufficient evidence or reasoning showing there was no reasonable expectation of success. In light of our agreement with the Examiner's articulation of the motivation and reasoning for modifying Berdardini's process shown in Figure 8B with Davidson and Zhu discussed *supra,* Appellants' contentions (*see* App. Br. 11–15; Reply Br. 6–7) do not persuade us that the Examiner erred.

Analogous Art

Appellants do not dispute the Examiner's determination (*see* Final Act. 3–7) that the combined teachings and suggestions of Berdardini (method and apparatus for rendering a scene including a digital 3D model of a structure), Davidson (adding elements to a rendering queue for rendering of 3D images), and Zhu (object rendering) render obvious the subject matter

recited in representative claim 1. Instead, Appellants' arguments (App. Br. 8–10; Reply Br. 4–5) of record are primarily drawn to whether one of ordinary skill in the rendering art would have looked to Zhu (alleged to relate to saving battery life in a mobile device during mobile browsing) to improve object rendering in Berdardini (i.e., whether Zhu is analogous art). For the reasons that follow, we find Zhu (as well as Berdardini and Davidson, which are also drawn to object rendering of a 3D scene) to be analogous to the subject matter recited in claim 1.

A reference qualifies as prior art for an obviousness determination under § 103 only when it is analogous to the claimed invention. *In re Klein*, 647 F.3d 1343, 1348 (Fed. Cir. 2011); *Innovention Toys, LLC v. MGA Entm't, Inc.*, 637 F.3d 1314, 1321 (Fed. Cir. 2011); *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004); *In re Clay*, 966 F.2d 656, 658 (Fed. Cir. 1992). A reference is considered analogous prior art: (1) if the reference is from the same field of endeavor as the claimed subjected matter, regardless of the problem addressed, or (2) if "the reference still is reasonably pertinent to the *particular* problem with which the inventor is involved," even though the reference is not within the field of the inventor's endeavor. *Bigio*, 381 F.3d at 1325 (emphasis added).[4]

[4] We agree with the Examiner (*see* Ans. 3–4) that the second step of the correct test for analogous art is whether the reference is reasonably pertinent to the *particular* problem with which the inventor's claimed invention is involved, and not whether the reference is reasonably pertinent to the *entire* problem with which the inventor's claimed invention is involved as asserted by Appellants (*see* App. Br. 7; Reply Br. 4). And, notably, the PTAB decision in *Schott Gemtron Corp. v. SSW*, Final Written Decision, IPR2014-00367, 2015 WL 3430088, p. 17, 21 (PTAB May 26, 2015), cited by

The "field of endeavor" test asks if the structure and function of the prior art is such that it would be considered by a person of ordinary skill in the art, because of the similarity to the structure and function of the claimed invention as disclosed in the application. *Id.* at 1325–27. It is necessary to apply "*common sense*" in "deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor." *Id.* at 1326 (citing *In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992)).

As to the "reasonably pertinent" test: A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem. Thus, the purposes of both the invention and the prior art are important in determining whether the reference is reasonably pertinent to the problem the invention attempts to solve. If a reference disclosure has the same purpose as the claimed invention, the reference relates to the same problem, and that fact supports use of that reference in an obviousness rejection. An inventor may well have been motivated to consider the reference when making his invention. If it is directed to a different purpose, the inventor would accordingly have had less motivation or occasion to consider it. *Clay*, 966 F.2d at 659.

In the instant case, we agree with the Examiner (Ans. 3–4) that Zhu is analogous art to Appellants' claimed invention. Specifically, we agree with the Examiner that Appellants' invention (recited in claim 1 – an apparatus

---

Appellants for support (App. Br. 7; Reply Br. 4), is not a precedential decision, and therefore not binding in this case.

for rendering of 3D objects) and Zhu (also an apparatus for rendering objects, albeit on a mobile phone) are both directed to rendering objects (*see e.g.*, Zhu ¶¶ 48, 49 (describing layered rendering in Z-coordinates by traversing rendering trees 230). We also agree with the Examiner that Zhu relates to the same problem as the claimed invention of "how to effectively reduce the complexity of rendering processing" (*see* Ans. 5).

In view of the foregoing, we agree with the Examiner (Ans. 3–4) that Zhu (as well as Berdardini and Davidson), are analogous to the subject matter recited in representative claim 1 (objects rendering to produce a 3D image), and thus, are properly combinable.

Obvious to Try

Appellants contend, with respect to combining Zhu with Berdardini and Davidson, it would not have been obvious to try using Zhu's process of performing rendering after traversing a scene graph in place of Berdardini in view of Davidson's process of doing so during traversal of a scene graph (*see* App. Br. 10–11).

The Federal Circuit has previously identified two categories of impermissible "obvious to try" analyses that run afoul of *KSR* and § 103: when what was "obvious to try" was (a) to vary all parameters or try every available option until one succeeds, where the prior art gave no indication of critical parameters and no direction as to which of many possibilities is likely to be successful; or (b) to explore a new technology or general approach in a seemingly promising field of experimentation, where the prior art gave only general guidance as to the particular form or method of achieving the claimed invention. *See In re Kubin*, 561 F.3d 1351, 1359

(Fed. Cir. 2009) (quoting *In re O'Farrell*, 853 F.2d 894, 903 (Fed. Cir. 1988)). We have neither case here before us.

In *KSR International Co. v. Teleflex Inc.,* 550 U.S. 398, 421 (2007), the Federal Court explained that "obvious to try" may apply when "there are a finite number of identified, predictable solutions" to a known problem. The Court explained that when the path has been identified and "leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense." *Id.* This court has elaborated that the identified path must "present a finite (and small in the context of the art) number of options easily traversed to show obviousness." *Ortho-McNeil Pharm., Inc. v. Mylan Labs., Inc.,* 520 F. 3d 1358, 1364 (Fed. Cir. 2008). This is the case before us. Namely, we agree with the Examiner (Ans. 5) that we have two specific and limited options to choose from: (1) performing rendering *while* traversing a scene graph (as in Berdardini in view of Davidson), or (2) performing rendering *after* traversing a scene graph (as in Zhu). One of ordinary skill in the art would understand that performing rendering *before* traversing a scene graph would not be an option since no data would be available yet for rendering.

Summary

In view of the foregoing, the references are properly combinable and are analogous to Appellants' recited invention, and as a result, Appellants have not sufficiently shown that the base combination of Berdardini, Davidson, and Zhu fails to teach or suggest apparatus for rendering a scene by performing multiple-pass rendering after the scene graph is traversed, as recited in representative claim 1. Therefore, we sustain the Examiner's obviousness rejection of claim 1 over the base combination of Berdardini,

Davidson, and Zhu, as well as claims 2, 4, 5, 9, 10, 12, 13, 17, 18, 20, and 21 grouped therewith. And, for the same reasons as provided for claim 1, we also sustain the Examiner's remaining obviousness rejections over the same base combination taken with either Levanon (claims 3, 11, and 19), Zimmerman (claims 6, 14, and 22), or Bishop (claims 7 and 8).

CONCLUSIONS

(1) The Examiner has not erred in rejecting claims 1–24 as being obvious over the base combination of Berdardini, Davidson, and Zhu.

(2) The Examiner has provided sufficient motivation to combine Berdardini, Davidson, and Zhu.

(3) Zhu is analogous art as it pertains to the subject matter recited in representative claim 1; therefore, the Examiner did not err in rejecting claims 1–24 as being obvious over the base combination of Berdardini, Davidson, and Zhu because the references are properly combinable and are analogous to Appellants' recited invention.

DECISION

The Examiner's rejections of claims 1–24 under 35 U.S.C. § 103(a) are affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED