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Paper 60
Entered: May 4, 2017

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VARIAN MEDICAL SYSTEMS, INC.,
Petitioner,

v.

WILLIAM BEAUMONT HOSPITAL AND ELEKTA, LTD.,
Patent Owner.

Case IPR2016-00187
Patent 7,826,592 B2

Before MICHAEL W. KIM, KALYAN K. DESHPANDE, and MATTHEW R. CLEMENTS, *Administrative Patent Judges*.

KIM, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

A. Background

Varian Medical Systems, Inc. ("Petitioner") filed a Petition requesting *inter partes* review of claims 25–29 and 35–42 of U.S. Patent No. 7,826,592 B2 (Ex. 1001, "the '592 patent"). Paper 1 ("Pet."). William Beaumont Hospital and Elekta, Ltd. (collectively "Patent Owner") filed a Preliminary Response. Paper 11 ("Prelim. Resp."). On May 6, 2016, based on the record before us at the time, we instituted an *inter partes* review of claims 25–29 and 35–42. Paper 14 ("Decision to Institute" or "Dec."). We instituted review on the following challenges to the claims:

Reference(s)	Basis	Challenged Claim(s)
Jaffray '97[1] and Span[2]	§ 103(a)	25–28
Jaffray '97, Span, and Antonuk[3]	§ 103(a)	29
Jaffray '97	§ 102(b)	35 and 40–42
Jaffray '97 and Lim[4]	§ 103(a)	36–39

Dec. 22–23.

After institution, Patent Owner filed a Patent Owner Response (Paper 25, "PO Resp."), and Petitioner filed a Reply (Paper 41, "Reply"). Petitioner relies on the Declarations of Dr. James J. Balter (Exs. 1003, 1500). Patent

[1] D.A. Jaffray and J.W. Wong, *Exploring "Target of the Day" Strategies for a Medical Linear Accelerator With Conebeam-CT Scanning Capability*, PROCEEDINGS OF THE XIITH INTERNATIONAL CONFERENCE ON THE USE OF COMPUTERS IN RADIATION THERAPY, MEDICAL PHYSICS PUBLISHING, pp. 172–75 (May 27–30, 1997) (Ex. 1004, "Jaffray '97")
[2] U.S. Patent No. 4,459,485, issued July 10, 1984 (Ex. 1005).
[3] U.S. Patent No. 5,262,649, issued Nov. 16, 1993 (Ex. 1006).
[4] WO 91/06876, published May 16, 1991 (Ex. 1008).

Owner relies on the Declaration of Ali Bani-Hashemi, Ph.D. (Ex. 2080). We heard oral argument on January 31, 2017. A transcript of the argument has been entered in the record (Paper 59, "Tr.").

We have jurisdiction under 35 U.S.C. § 6. The evidentiary standard is a preponderance of the evidence. *See* 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

For the reasons expressed below, we conclude that Petitioner has demonstrated by a preponderance of evidence that claims 25–29 and 35–42 are not patentable.

B. Related Proceedings

Petitioner and Patent Owner identify the following district court proceeding concerning the '592 Patent: *Elekta Ltd. v. Varian Medical Systems, Inc.*, No. 2:15-cv-12169-AC-MKM (E.D. Mich.). Pet. 1; Paper 9, 1. Patent Owner identifies further the following *inter partes* reviews directed to U.S. Patent No. 6,842,502 B2, to which the '592 Patent claims priority: IPR2016-00160, IPR2016-00162, IPR2016-00163, and IPR2016-00166. Paper 9, 2. Patent Owner identifies additionally the following *inter partes* reviews directed to U.S. Patent No. 7,471,765 B2, to which the '592 Patent claims priority: IPR2016-00169, IPR2016-00170, and IPR2016-00171. *Id*.

C. The '592 Patent

The '592 Patent discloses that it is directed to a conebeam computed tomography system that employs an amorphous silicon flat-panel imager for use in radiotherapy applications where images of a patient are acquired with

the patient in a treatment position on a treatment table. Ex. 1001, 1:29–34. Figure 17(b) of the '592 Patent is reproduced below.

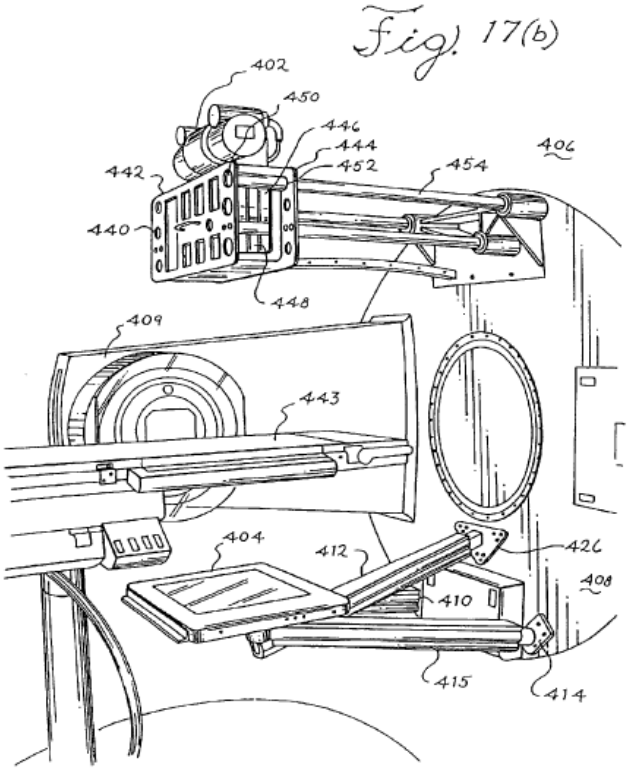

Figure 17(b) depicts a diagrammatic view of one orientation of an exemplary wall-mounted cone beam computerized tomography system employing a flat-panel imager. Ex. 1001, 6:60–63. Specifically, wall-mounted cone beam computerized tomography system 400 includes an x-ray source, such as x-ray tube 402, and flat-panel imager 404 mounted on gantry 406. Ex. 1001, 19:53–58. X-ray tube 402 generates beam of x-rays 407 in a form of a cone or pyramid. Ex. 1001, 19:58–61. Flat-panel imager 404 is mounted to a face of flat, circular rotatable drum 408 of gantry 406. Ex. 1001, 20:11–14. X-ray beam 407 produced by x-ray tube 402 is approximately orthogonal to treatment beam 411 produced by radiation therapy source 409. Ex. 1001, 20:14–16. Attachment of flat-panel imager

404 is accomplished by imager support system 413, which includes arms 410, 412, 415 that are attached to plate 424. Ex. 1001, 20:17–19. Figures 20(a)–(b) of the '592 patent are reproduced below.

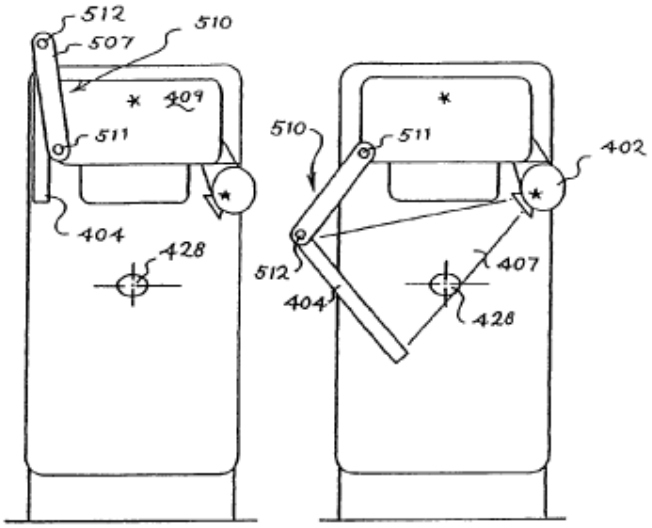

Fig. 20(a) Fig. 20(b)

Figures 20(a)–(b) show a front view of a wall-mounted cone beam computerized tomography system of Figure 17, but employing another mechanism for attaching flat-panel imager 404. Ex. 1001, 7:6–9. Specifically, imager support system 507 includes pivoting arm 510 that has one end 511 pivotably attached to a lower corner of radiation therapy source 409, and another end 512 pivotably attached to an end of flat-panel imager 404. Ex. 1001, 21:33–38. Using this mechanism, flat-panel imager 404 is movable from a retracted position, as shown in Figure 20(a), to an extended position, as shown in Figure 20(b), and vice versa. Ex. 1001, 21:38–41.

D. Illustrative Claims

Petitioner challenges claims 25–29 and 35–42 of the '592 Patent. Claims 25 and 35 are the only independent claims at issue, and are reproduced below:

> 25. An imaging system comprising:
>
> a rotating drum;
>
> an x-ray source that emits x-rays towards an object, wherein said x-ray source is attached to said rotating drum;
>
> an imager that receives x-rays from said object based on said emitted x-rays and forms an image of said object;
>
> an imager support system that attaches said imager to said rotating drum, wherein said imager support system comprises: a pivoting arm that has one end pivotably attached to said rotating drum and another end pivotably attached to said imager.

Ex. 1001, 29:34–45.

> 35. A method of adding an auxiliary imaging system to an existing radiation therapy system, said method comprising:
>
> providing an existing radiation therapy system that comprises a radiation source that is supported on a support structure; and
>
> attaching an imager that does not directly face said radiation source to said support structure.

Ex. 1001, 30:26–32.

II. ANALYSIS

A. Claim Interpretation

"A claim in an unexpired patent that will not expire before a final written decision is issued shall be given its broadest reasonable construction in light of the specification of the patent in which it appears." 37 C.F.R. § 42.100(b); *see also Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2142 (2016) (affirming that USPTO has statutory authority to construe claims according to 37 C.F.R. § 42.100(b)). When applying that standard, we interpret the claim language as it would have been understood by one of ordinary skill in the art in light of the Specification. *In re Suitco Surface, Inc.*, 603 F.3d 1255, 1260 (Fed. Cir. 2010). Thus, we generally give claim

terms their ordinary and customary meaning. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007) ("The ordinary and customary meaning 'is the meaning that the term would have to a person of ordinary skill in the art in question.'").

In the Decision to Institute, we construed the claim terms "pivotably attached" and "imager." Dec. 7–9. After institution, neither party disputes the Board's construction of those terms. PO Resp. 11–12; Reply 2. Accordingly, we adopt the constructions set forth in the Decision to Institute. *See SAS Institute, Inc. v. ComplementSoft, LLC.*, 825 F.3d 1341, 1351 (Fed. Cir. 2016) (The Board may not change a claim interpretation from the institution decision where neither party anticipated that "already-interpreted terms were actually moving targets."). No other claim terms require express constructions. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (explaining that only those terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy).

B. The Parties' Post-Institution Arguments

In our Decision to Institute, we concluded that the argument and evidence adduced by Petitioner demonstrated a reasonable likelihood that claims 25–29 and 35–42 were not patentable based on the challenges identified in the table in Part I.A above. Dec. 10–22. We must now determine whether Petitioner has established by a preponderance of the evidence that the specified claims are unpatentable over the cited prior art. 35 U.S.C. § 316(e). We previously instructed Patent Owner "any arguments for patentability not raised in the [Patent Owner Response] will be deemed waived." Paper 15, 2–3; *see also* 37 C.F.R. § 42.23(a) ("Any material fact

not specifically denied may be considered admitted."). Additionally, the Board's Trial Practice Guide states that the Patent Owner Response "should identify all the involved claims that are believed to be patentable and state the basis for that belief." Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012).

In connection with the arguments and evidence adduced by Petitioner in the Petition to support its positions that Patent Owner chose not to address in its Patent Owner Response, the record now contains persuasive, unrebutted arguments and evidence presented by Petitioner regarding the manner in which the asserted prior art teaches all corresponding elements of the claims against which that prior art is asserted. Based on the preponderance of the evidence before us, we conclude that the prior art identified by Petitioner describes all limitations of the reviewed claims, in view of our analysis of those that Patent Owner contested in the Patent Owner Response, which we address below.

C. Person of Ordinary Skill in the Art

Dr. Balter opines the following concerning the person of ordinary skill in the art:

> In my opinion, a person of ordinary skill in the art as of February 2000 would be a medical physicist with a Ph.D. (or similar advanced degree) in physics, medical physics, or a related field, and two or more years of experience in radiation oncology physics and image processing/computer programming related to radiation oncology applications. Alternatively, one of ordinary skill in the art might have an M.D. degree and a similar level of familiarity and practice experience with the radiation oncology topics already mentioned, in a therapy setting. One of ordinary skill in this art will also be familiar with diagnostic imaging, including x-ray and computed tomography topics. In addition, one of ordinary skill in this art would also be familiar with the

> topics of image-guided or dynamic conformal radiation therapy. Finally, one of ordinary skill in this art would further have at least two years of practical experience working with medical linear accelerators in the context of image guided radiation therapy.

Ex. 1003 ¶ 14.

Dr. Bani-Hashemi opines the following concerning the same:

> It is my opinion that a person of ordinary skill in the art relevant to the '592 Patent would be a person with a graduate degree (M.S. or Ph.D.) in medical physics or a related field (e.g. Physics, Engineering) and three years of experience in radiation oncology physics, imaging science, and image processing related to radiation oncology applications beyond the completion date of their degree.

Ex. 2080 ¶ 17.

The Declarants are in agreement that the person of ordinary skill in the art has a relatively high level of skill, and also are in agreement as to the basic qualifications for that person. Accordingly, we adopt Patent Owner's Declarant's articulation of the level of ordinary skill as our own, if for no other reason than for conciseness, with the understanding that the differences between the proffered levels of ordinary skill are, at best, limited and inconsequential in our analysis.

D. Claims 35 and 40–42: Anticipation by Jaffray '97.

Petitioner challenges the patentability of claims 35 and 40–42 on the ground that those claims are anticipated by Jaffray '97. Pet. 41–45 (citing Exs. 1003, 1004). Patent Owner does not respond to this challenge. *See generally* PO Resp. 12–29; Tr. 17:23–18:13 (MR. McCRAW: "So you are referring to ground 5, which is petitioner's anticipation ground. Patent owner has not provided any argument on those claims. Petitioner has the burden to show invalidity. But we haven't provided any argument.").

1. Jaffray ’97 (Ex. 1004)[5]

Jaffray ’97 discloses a conebeam computed tomography (CBCT) scanner for integration with a medical linear accelerator. Ex. 1004, 172. Figure 1 of Jaffray ’97 is set forth below.

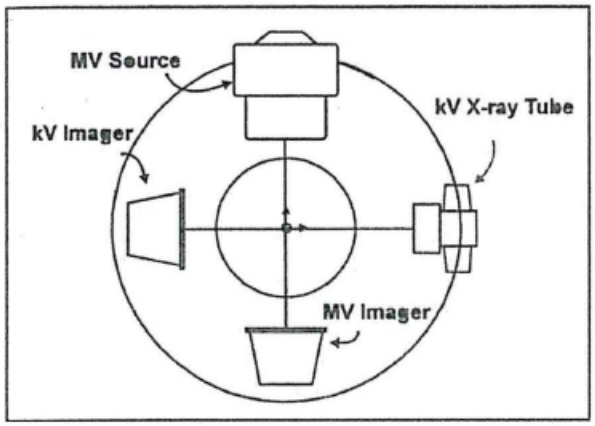

Figure 1 is a schematic view of a dual-beam system used for CBCT. Ex. 1004, 173. Two fluoroscopic imaging systems, kV imager and MV imager, are attached to a gantry, and are configured to receive exposure from an opposing kV x-ray tube and MV source, respectively. Ex. 1004, 173–74. The gantry rotates continuously. Ex. 1004, 174.

2. Analysis

Petitioner asserts that Jaffray ’97 anticipates claims 35 and 40–42. Pet. 41–45 (citing Exs. 1003, 1004). For example, independent claim 35 recites “providing an existing radiation therapy system that comprises a radiation source that is supported on a support structure.” Petitioner cites Jaffray ’97 for disclosing a rotating gantry including an MV source. Independent claim 35 recites further “attaching an imager that does not directly

[5] We refer to the original pagination of Jaffray ’97, and not Petitioner’s pagination.

face said radiation source to said support structure." Petitioner cites Jaffray '97 for disclosing a kV imager that does not directly face the MV source. Petitioner provides similar analyses for claims 40–42. Patent Owner does not dispute any of the Petitioner's assertions.

3. Conclusion

After considering all of the above-referenced evidence and arguments anew, in light of the appropriate standard, we are persuaded that Petitioner has shown, by a preponderance of the evidence, that claims 35 and 40–42 are anticipated by Jaffray '97.

E. Claims 25–28: Obviousness in view of Jaffray '97 and Span

Petitioner challenges the patentability of claims 25–28 on the ground that the claims are obvious in light of Jaffray '97 and Span. Pet. 19–29 (citing Exs. 1003–1005). Patent Owner disagrees. PO Resp. 12–29 (citing Exs. 1004, 1005, 1008, 2080). Petitioner replies. Reply 3–10 (citing Exs. 1001, 1003, 1004, 1005, 1500).

The Supreme Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398 (2007), reaffirmed the framework for determining obviousness as set forth in *Graham v. John Deere Co*., 383 U.S. 1 (1966). The *KSR* Court summarized the four factual inquiries set forth in *Graham* that we apply in determining whether a claim is reasonably likely to be unpatentable as obvious under 35 U.S.C. § 103(a) as follows:

1. determining the scope and content of the prior art,
2. ascertaining the differences between the prior art and the claims at issue,
3. resolving the level of ordinary skill in the pertinent art, and
4. considering objective evidence present in the application indicating obviousness or nonobviousness.

KSR, 550 U.S. at 406. With these standards in mind, we address the challenges based on obviousness below.

1. Span (Ex. 1005)

Span discloses a radiation apparatus where an element to be positioned is supported by a balance suspension system. Ex. 1005, 1:7–11. Figure 1a of Span is set forth below.

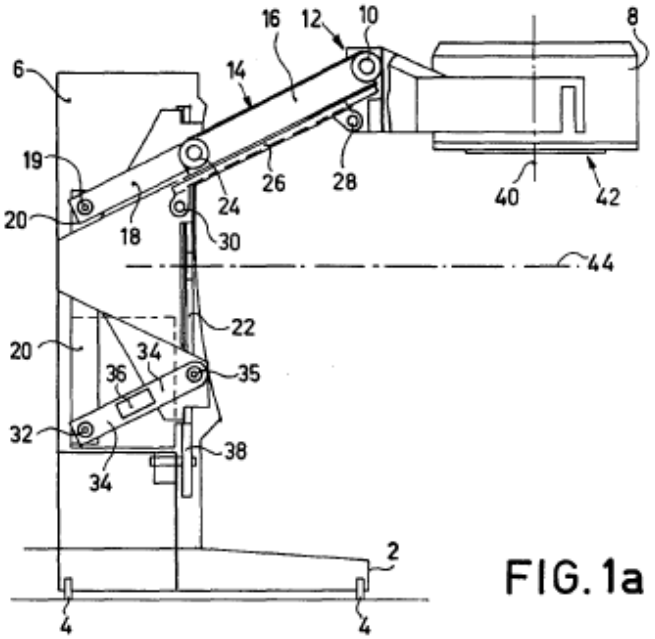

FIG. 1a

Figure 1 of Span is a perspective view of a radiation apparatus where base 2 supports housing 6 and accommodates a suspension system for gamma camera 8. Ex. 1005, 2:29–34. Specifically, gamma camera 8 is suspended from arm 14 of supporting device 12 via pivot 10. Ex. 1005, 2:35–37.

2. Analysis

Petitioner asserts that a combination of Jaffray ’97 and Span renders obvious claims 25–28. Pet. 19–29. For example, independent claim 25 recites “a rotating drum.” Petitioner cites Jaffray ’97 for disclosing a gantry that is rotated. Independent claim 25 recites further “an x-ray source that

emits x-rays towards an object, wherein said x-ray source is attached to said rotating drum." Petitioner cites Jaffray '97 for disclosing a kV x-ray tube. Independent claim 25 recites additionally "an imager that receives x-rays from said object based on said emitted x-rays and forms an image of said object." Petitioner cites Jaffray '97 for disclosing a kV imager. Independent claim 25 recites also "an imager support system that attaches said imager to said rotating drum, wherein said imager support system comprises: a pivoting arm that has one end pivotably attached to said rotating drum and another end pivotably attached to said imager." Petitioner cites Span for disclosing arm 14 that is (1) connected to gamma camera 8 via pivot 10, and (2) connected to rotating support ring 22 via pivot 24. For the rationale to modify Jaffray '97 in view of the aforementioned portion of Span, Petitioner asserts the following:

> One of ordinary skill in the art would have been motivated to combine the imaging support structure of Span with the x-ray tomography system of Jaffray '97. In both settings, heavy diagnostic equipment is commonly mounted on a gantry to facilitate movement of the equipment and therefore both settings present similar mounting difficulties. (Balter Decl. ¶ 73.) Although Jaffray '97 teaches mounting one or more detectors to the drum, it does not teach an imager support system pivotably mounted to the drum or the imager. (Ex. 1004 at Fig. 1.) However, Jaffray '97 does suggest that "important characteristics [of the imaging system] include . . . (iii) flexibility of use . . . and, (v) convenience." (Id. at 5.) Span addresses this flexibility and convenience, explaining that, with the disclosed support structure, equipment "can be very easily moved by rotation of the arm 14 about the pivot 24 . . . ." (Ex. 1005 at 2:59–63.) Thus, it would have been obvious to the skilled artisan to apply the known mounting technique of Span to the known x-ray source and imaging techniques of Jaffray '97 with no change in their

> respective functions and with a reasonable expectation of success. (Balter Decl. ¶¶ 74–75.)

Pet. 27–28. Petitioner provides similar analyses for claims 26–28.

Patent Owner argues that a person of ordinary skill in the art would not have modified the CBCT imaging system of Jaffray '97 to include the movable support of Span, because a movable support does not provide any benefit to a CBCT system. PO Resp. 14–20 (citing Exs. 1005, 1:12–21, 1:30–35, 2:35–36, 2:38–44, 2:48–55, 2:59–63, 3:2–4, Fig. 1a; 2080 ¶¶ 78–85, 100–103, 117). In particular, Patent Owner asserts that the nuclear imaging system of Span is expressly designed to facilitate movement of a detector toward and away from a patient to minimize the distance between the patient and the detector, whereas movement of the detector to be close to a patient is unimportant for CBCT systems like Jaffray '97. PO Resp. 14–20 (citing Exs. 1005, 1:12–21, 1:30–35, 2:35–36, 2:38–44, 2:48–55, 2:59–63, 3:2–4, Fig. 1a; 2080 ¶¶ 78–85, 100–103, 117).

Patent Owner's arguments are not persuasive. Initially, we note that Patent Owner does not dispute that Span discloses the movable imager support system recited in claim 25. Nor does Patent Owner dispute that Span's movable support system is a known improvement. Ex. 1005, 2:59–63 (disclosing that due to the movable support structure, imaging equipment "can be very easily moved by rotation of the arm 14 about the pivot 24"). Instead, Patent Owner alleges that one of ordinary skill would not have modified the CBCT system of Jaffray '97 to include the Span's movable support system, for the known improvement of facilitating movement of a detector *toward and away from a patient*, because there is no need for such an improvement for a CBCT system. PO Resp. 14–20 (citing Exs. 1005,

1:12–21, 1:30–35, 2:35–36, 2:38–44, 2:48–55, 2:59–63, 3:2–4, Fig. 1a; 2080 ¶¶ 78–85, 100–103, 117).

Patent Owner's argument is misplaced, because Petitioner's proffered modification is for the known improvement of movement *generally*, and not limited to the movement of a detector toward and away from a patient disclosed in Span. Specifically, Petitioner asserts:

> Jaffray '97 does suggest that "important characteristics [of the imaging system] include . . . (iii) flexibility of use . . . and, (v) convenience." (Id. at 5.) Span addresses this flexibility and convenience, explaining that, with the disclosed support structure, equipment "can be very easily moved by rotation of the arm 14 about the pivot 24 . . . ." (Ex. 1005 at 2:59–63.)

Pet. 27–28. *KSR Int'l Co.*, 550 U.S. at 419 ("The second error of the Court of Appeals lay in its assumption that a person of ordinary skill attempting to solve a problem will be led only to those elements of prior art designed to solve the same problem."). The Petition does not rely on the movement in Span being limited to "toward and away from a patient." *See generally* Pet. 27–28.

Even assuming that we agree with Patent Owner's assertion that Span's support system is specifically designed to permit movement of the detector toward and away from a patient, we are unpersuaded by the following implication, required for Patent Owner to prevail on this assertion, that one of ordinary skill would have realized only this one specific type of movement as being the only benefit associated with a moveable system. As indicated above, the level of ordinary skill is "a graduate degree (M.S. or Ph.D.) in medical physics or a related field (e.g. Physics, Engineering)." We find that such a person, having a graduate degree in fields such as physics or engineering, would have had no trouble appreciating something as basic as

the concept of "making something movable has advantages," which would include, at a minimum, the self-evident ability to move should a need arise, such as for readjustment. *KSR Int'l Co.*, 550 U.S. at 421 ("A person of ordinary skill is also a person of ordinary creativity, not an automaton"); s*ee also* Reply 6–7 (citing Exs. 1001, 21:55–60; 1004, 173–174; Ex. 1500 ¶¶ 14–15) (movement preferable for purposes of flexibility and convenience, for example, to avoid collisions).

Furthermore, Span explicitly teaches that the movable support structure provides benefits to not only imaging systems involving gamma cameras, but also to X-ray imaging systems. Ex. 1005, 1:67–2:5; *see also* Ex. 1500 ¶ 17 (confirming relevance of citation); Dec. 12–13 ("Span itself discloses that it is a 'radiation apparatus' generally (Ex. 1005, 1:7), and that its source and detector may be x-rays. Ex. 1005, 4:3–7."). Jaffray '97 discloses a CBCT system, which is a type of X-ray imaging system. Ex. 1004, 173 ("The conebeam imaging sequence consists of ~100 exposures over 194° of rotation. . . . At a fixed angular increment, the x-ray generator delivers a short 30 ms exposure (100 mA).").[6] Consequently, we are persuaded, for the reasons stated in the Petition at pages 27 to 28, that Petitioner's proposed modification to the CBCT system, i.e., an X-ray imaging system, of Jaffray '97 to include the movable support system of Span, which Span expressly discloses can be used in X-ray imaging systems, would have been obvious to a person of ordinary skill in the art as the

[6] Indeed, the '592 Patent itself discloses that "[c]one-beam computed tomography has been a topic of active research and development for over a decade in areas such as nuclear medicine . . . ." Ex. 1003 ¶¶ 73, 126 (citing Ex. 1001, 19:33–37). Patent Owner admits that Span and Lim are each directed to nuclear imaging. PO Resp. 14.

application of a known technique to improve a similar device in the same way. *KSR Int'l Co.*, 550 U.S. at 417 ("[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person's skill.").

Patent Owner also argues that Petitioner ignores both the express teachings of Jaffray '97 and the level of ordinary skill in the art by suggesting that the movable support systems of Span would provide flexibility and convenience to the CBCT imaging system of Jaffray '97. PO Resp. 25–26 (citing Exs. 1004, 173; 2080 ¶¶ 93–99, 112–116, 119–123). Relatedly, Patent Owner asserts that the only evidence that the movable support system of Span would provide flexibility and convenience to the CBCT system of Jaffray '97 is unsubstantiated *ipse dixit*. PO Resp. 25. Patent Owner also contends that the imaging systems of Jaffray '97 and Span do not present similar mounting difficulties because of the differences between the requirements of CBCT imaging and nuclear medicine. PO Resp. 26–27 (citing Ex. 2080 ¶¶ 79–99, 124, 125). These arguments are unpersuasive for the reasons set forth in the previous paragraphs.

Patent Owner also argues accurate imaging is a primary function of the CBCT system of Jaffray '97, and that modifying the CBCT system of Jaffray '97 to have a movable support system would degrade the image quality. PO Resp. 20–26, 28 (citing Exs. 1004, 172–173; 2080 ¶¶ 42–46, 47–49, 86–99, 112–115, 120–123, 127). According to Patent Owner, a movable support system would undermine calibration, which is needed for accurate imaging. PO Resp. 20–25 (citing Exs. 1004, 172–173; 2080 ¶¶ 42–46, 47–49, 86–99, 112–114, 120).

Patent Owner's arguments are not persuasive. As an initial matter, we note that claim 25 is directed to an imaging system having an imager support system made up of "a pivoting arm that has one end pivotably attached to said rotating drum and another end pivotably attached to said imager." Ex. 1001, 29:43–45. Although the aforementioned components of the imager support system must unambiguously be capable of pivoting, claim 25 does not require any particular movement of the support system at any specific point in time. Rather, the claim merely requires *the ability* to move. Dec. 8 (construing "pivotably attached" as "connected *to allow* hinged movement toward and away from each other"; emphasis added.). Accordingly, insofar as Patent Owner is asserting that movement of the imager *during image acquisition* is disfavored, we agree. *See also* Ex. 1500 ¶¶ 14, 16, 18 (agreeing with that assessment). The assertion is misplaced, however, because nothing indicates that Petitioner's proposed combination is for movement during image acquisition.

Secondly, we note that Patent Owner argues that movement renders *a particular* calibration useless and undermines accurate imaging. We agree that assessment is accurate. Patent Owner's arguments and evidence also indicate, however, that calibrating a CBCT imaging system is well-known in the art. PO Resp. 21 (citing Ex. 2080 ¶ 95 ("By the filing date of the '592 patent, it was already well-known that a CBCT imaging system needed to be calibrated . . . .")); *see also* Ex. 1500 ¶ 18 ("One of ordinary skill in the art would understand that after moving the imager out of the way, one would simply need to put the imager back into appropriate position prior to the next use."). We agree, and find the same. Accordingly, we find that one of ordinary skill in the art would have known that movement would require

recalibration. Thus, Petitioner's proposed combination of the CBCT imaging system of Jaffray '97 with Span's moveable support system would still provide accurate imaging, even with movement, with the understanding that recalibration would be required after such movement.

Patent Owner's assertions, then, are really about tradeoffs: that a person of ordinary skill in the art would not have sacrificed the image quality of the CBCT system of Jaffray '97 for the movability of Span's support system. PO Resp. 24–25 (citing Ex. 1004, 173; Ex. 2080 ¶¶ 86–108, 114, 117–118, 120). Although Patent Owner's assertions may have some merit, after weighing all the evidence, we are persuaded by Petitioner's assertion that one of ordinary skill, again, having a relatively high level of skill in physics or engineering, would have made the proffered modification. We are further unpersuaded that Patent Owner's purported tradeoff is so disadvantageous one of ordinary skill would not make what, at the end of the day, is a straightforward mechanical modification for a well-known mechanical purpose. At oral hearing, Petitioner stated:

> Span is exclusively about a mechanical way in which to connect an imager to a rotating drum using a pivot arm. And one of ordinary skill in the art, especially here where the level of ordinary skill is very high, would understand how to combine Jaffray '97 and the Span reference to achieve a predictable result.

Tr. 7:7–12. The fact that the combination of a movable support system in a CBCT imaging system may have *some* disadvantages is not persuasive, as many if not all technical choices have *some* advantages and disadvantages. One of ordinary skill is not an automaton, and is presumed to be able to make certain choices over others based on various technical requirements with those advantages and disadvantages in mind. *See Winner Int'l Royalty*

Corp. v. Wang, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000) ("The fact that the motivating benefit comes at the expense of another benefit, however, should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another. Instead, the benefits, both lost and gained, should be weighed against one another."). So long as the combination would have been known to one of ordinary skill, however, and we do not take Patent Owner to be asserting that the aforementioned combination, both the advantages and disadvantages, would not have been known, especially to one having such a high level of skill, we are persuaded that Petitioner's proffered known modification for known improvements is more than adequate. *KSR Int'l Co.*, 550 U.S. at 419.

Patent Owner further argues that "[a] person of ordinary skill in the art following the teachings of Jaffray '97 would, therefore, choose a support system that keeps the detector and other components of the imaging system in fixed positions within the shared, rotating frame of reference to improve image quality." PO Resp. 23–24 (citing Ex. 2080 ¶ 115). These arguments are unpersuasive for the same reasons as set forth above in the previous paragraphs.

After reviewing all relevant evidence and arguments presented by Petitioner and Patent Owner, we are persuaded that claims 25–28 are unpatentable as obvious in view of Jaffray '97 and Span for the reasons proffered by Petitioner in the Petition, taking into account any findings set forth *supra*.

3. Conclusion

After considering all evidence and arguments anew, in light of the appropriate standards, we are persuaded that Petitioner has shown, by a

preponderance of the evidence that claims 25–28 are unpatentable as obvious in view of Jaffray ’97 and Span.

F. Claim 29: Obviousness in view of Jaffray ’97, Span, and Antonuk

Petitioner challenges the patentability of claim 29 on the ground that the claim is obvious in light of Jaffray ’97, Span, and Antonuk (Pet. 29–32, citing Exs. 1003–1006). Patent Owner disagrees for the same reasons discussed above with regard to claims 25–28. PO Resp. 12–29 (citing Exs. 1004, 1005, 1008, 2080). Petitioner replies. Reply 3–10 (citing Exs. 1001, 1003, 1004, 1005, 1500).

1. Analysis

Petitioner asserts that a combination of Jaffray ’97, Span, and Antonuk renders obvious dependent claim 29. Pet. 29–32 (citing Exs. 1003–1006). Specifically, dependent claim 29 recites “wherein said imager comprises an amorphous silicon flat-panel imager.” Petitioner cites Antonuk for disclosing “[a] thin-film, flat-panel, pixelated detector array serving as a real-time digital imager and dosimeter for diagnostic or megavoltage X rays or gamma rays, including a plurality of photodiodes made of hydrogenated amorphous silicon arrayed in columns and rows upon a glass substrate.” Ex. 1006, Abstract. Petitioner provides a rationale for modifying Jaffray ’97 by swapping out a kV imager with the “thin-film, flat-panel pixelated detector array” of Antonuk. Pet. 31–32. Specifically, Petitioner asserts:

> One of ordinary skill in the art would have been motivated to combine the amorphous silicon flat-panel imager of Antonuk with the drum-mounted x-ray tomography system of Jaffray ’97. Both references address the use of medical diagnostic imaging on a rotating support structure. (Balter Decl. ¶ 85.) Indeed, Antonuk explains that the disclosed amorphous silicon flat-panel imager “[i]n the case of diagnostic x-ray imaging, as in

> localization imaging, the goal is to produce a high quality image with a minimum of radiation. The present invention allows images to be produced in real-time both for fluoroscopic and radiographic modes of operation whether the radiation is megavoltage or diagnostic x-ray." (Ex. 1006 at 18:31-36.) Although Jaffray '97 teaches the use of a phosphor screen with a CCD, it emphasized that important characteristics of the imaging system included "flexibility of use" and "convenience." (Ex. 1004 at 5.) Moreover, Jaffray '97 explains that "[t]he flexibility to image any treatment site will depend upon: imager field-of-view (FOV), and collision of the imaging system with other structures . . . ." (*Id.* at 6.)
>
> Antonuk directly addresses these concerns. In fact, Antonuk also recognizes that imagers employing a CCD for fluoroscopic imaging "are relatively bulky" and notes that "[t]his is a definite hindrance in various clinical procedures." (Ex. 1006 at 4:31-52.) The amorphous silicon flat-panel imager of Antonuk is "far more compact than an image-intensifier fluoroscopic unit" and thus overcomes this problem. (*Id.* at 6:23-27.) Accordingly, one of ordinary skill in the art would have been motivated to replace the bulky phosphor screen and CCD of Jaffray '97 with the more compact amorphous flat-panel imager of Antonuk with no change in their respective functions and with a reasonable expectation of success. (Balter Decl. ¶¶ 83–95.)

Pet. 31–32.

Patent Owner does not address Antonuk, and instead relies on its assertions concerning Jaffray '97 and Span. PO Resp. 14, n. 3 ("For Ground 2, which is directed solely to dependent claim 29, Petitioner further relies on Antonuk '93. Petitioner still relies on the combination of Jaffray '97 and Span for all the limitations of independent claim 25, from which claim 29 depends."). Those assertions are not persuasive for the reasons set forth above.

After reviewing all relevant evidence and arguments presented by Petitioner and Patent Owner, we are persuaded that dependent claim 29 is

unpatentable as obvious in view of Jaffray '97, Span, and Antonuk for the reasons proffered by Petitioner in the Petition, taking into account any findings set forth *supra*.

2. Conclusion

After considering all evidence and arguments anew, in light of the appropriate standards, we are persuaded that Petitioner has shown, by a preponderance of the evidence, that claim 29 is unpatentable as obvious in view of Jaffray '97, Span, and Antonuk.

G. Claims 36–39: Obviousness in view of Jaffray '97 and Lim

Petitioner challenges the patentability of claims 36–39 on the ground that the claims are obvious over Jaffray '97 and Lim (Pet. 45–54, citing Exs. 1003, 1004, 1008). Patent Owner disagrees for the same reasons discussed above with regard to claims 25–28. PO Resp. 12–29 (citing Exs. 1004, 1005, 1008, 2080). Petitioner replies. Reply 3–10 (citing Exs. 1001, 1003, 1004, 1005, 1500).

1. Lim (Ex. 1008)[7]

Lim discloses a gantry and pallet assembly including a camera for conducting whole body or single photon emission computed tomography (SPECT) scans. Ex. 1008, 1:3–7. Figure 6 of Lim is set forth below.

[7] We refer to the original pagination of Lim, and not Petitioner's pagination.

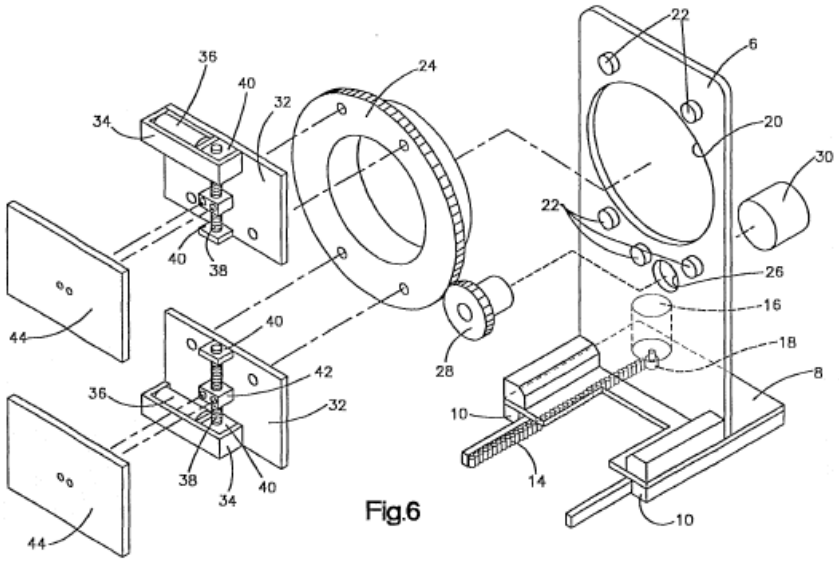

Figure 6 is an exploded view of elements for rotating ring 24, translating gantry 2, and radially translating detectors 46. Ex. 1008, 7:18–20. Detector 46 is mounted to mounting block 42 and radial back plate 32 via detector mounting plate 44. Ex. 1008, 10:18–30. Drive motors 36 cause mounting block 42 to be radially translated relative to rotation ring 24. Ex. 1008, 10:21–27.

2. Analysis

Petitioner asserts that the combination of Jaffray ’97 and Lim renders obvious dependent claim 36–39. Pet. 45–54. Claims 36–39 depend from independent claim 35, which is discussed in Section II.C above. Dependent claim 36 recites “wherein said attaching comprises: attaching said imager to an imager support system.” Petitioner cites Lim for disclosing mounting detector 46 to gantry 2 via mounting plate 44, mounting block 42, radial back plate 32, and rotation ring 24. Dependent claim 36 recites further “forming an opening in said support structure.” Petitioner cites Lim for disclosing openings in rotation ring 24. Dependent claim 36 recites additionally “inserting a male member through an opening formed in said

imager support system and said opening formed in said support structure." Petitioner cites Lim for disclosing a bolt inserted into openings on radial back plate 32 and rotation ring 24. Dependent claim 36 recites also "attaching said inserted male member to said support structure and said imager support system." Petitioner cites Lim for disclosing attaching a nut to the end of the bolt. Petitioner sets forth a rationale for attaching a kV imager of Jaffray '97 to the gantry of Jaffray '97 via the mounting system of Lim. Pet. 48–49. Petitioner provides similar analyses for claims 37–39. Pet. 52–54.

Patent Owner makes the same assertions concerning Petitioner's proffered modification of Jaffray '97 in view of Lim, as were made for Jaffray '97 in view of Span. *See generally* PO Resp. 12–29. Those assertions are unpersuasive largely for the same reasons as set forth above with respect to the combination of Jaffray '97 in view of Span. While Lim does not disclose expressly the same connection to X-ray imaging as identified above for Span, this difference is insufficient to alter our ultimate conclusion that it would have been obvious to modify Jaffray '97 in view of Lim, in the manner set forth by Petitioner for claims 36–39.

After reviewing all relevant evidence and arguments presented by Petitioner and Patent Owner, we are persuaded that dependent claims 36–39 are unpatentable as obvious in view of Jaffray '97 and Lim for the reasons proffered by Petitioner in the Petition, taking into account any findings set forth *supra*.

3. Conclusion

After considering all evidence and arguments anew, in light of the appropriate standards, we are persuaded that Petitioner has shown, by a

preponderance of the evidence, that claims 36–39 are unpatentable as obvious in view of Jaffray ’97 and Lim.

H. Petitioner’s Allegedly Improper New Arguments and Evidence in Reply

Patent Owner asserts that certain portions of Petitioner’s Reply and Dr. Balter’s Supplemental Declaration allegedly contain improper new arguments and evidence. We have considered Patent Owner’s listing (Paper 47) and Petitioner’s responsive listing (Paper 53) concerning this assertion. Patent Owner’s assertions are moot, because our Decision does not rely on those portions of the Reply and Dr. Balter’s Supplemental Declaration. More specifically, while the aforementioned analysis does cite literally to pages 6 and 7 of the Reply and to paragraphs 15 and 18 of Dr. Balter’s Supplemental Declaration, our Decision does not rely on the specific portions of those pages and paragraphs objected to by Patent Owner.

I. Conclusion

For the reasons expressed above, we conclude that Petitioner has demonstrated by a preponderance of evidence that claims 25–29 and 35–42 are not patentable.

III. ORDER

For the reasons given, it is:

ORDERED that claims 25–29 and 35–42 of the ’592 patent are held unpatentable; and

FURTHER ORDERED that because this is a final written decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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