

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VIKEN DETECTON CORPORATION,
Petitioner,

v.

AMERICAN SCIENCE AND ENGINEERING, INC.,
Patent Owner.

IPR2022-00028
Patent 7,505,562 B2

Before SCOTT A. DANIELS, CARL M. DeFRANCO JR., and
GREGG I. ANDERSON, *Administrative Patent Judges*.

DeFRANCO, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

American Science and Engineering, Inc. (“ASE”) is the owner of U.S.
Patent No. 7,505,562 B2 (Ex. 1001, “the ’562 patent”).¹ Viken Detection

¹ According to ASE, it is a wholly-owned subsidiary of OSI Systems, Inc., which publicly trades on the NASDAQ under the symbol OSIS.

Corporation (“Viken”) filed a Petition requesting *inter partes* review of claims 1–3, 6, 7, and 9–13 of the ’562 patent. Paper 1 (“Pet.”). ASE filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). Because we determine that Viken demonstrates a reasonable likelihood that at least claim 1 of the ’562 patent is unpatentable, we institute an *inter partes* review of all claims as challenged in the Petition. *See* 35 U.S.C. § 314(a).

I. BACKGROUND

A. *Related Matters*

The ’562 patent is the subject of an infringement action filed October 19, 2020 in *American Science & Engineering, Inc., v. Viken Detection Corp.*, No. 1:20-cv-11883 (D. Mass.). Pet. 61–62; Paper 3 at 2.

Pending before the Office are petitions filed by Viken for *inter partes* review of two related patents, namely, U.S. Patent Nos. 7,400,701 B1 (IPR2021-01585) and 8,300,763 B2 (IPR2022-00027). The latter patent is also the subject of the above-identified infringement action. Viken moved to stay the infringement action pending the outcome of our review of Viken’s petitions. *See* Ex. 3001 (Docket Entries 81–83). The district court granted the stay because “[t]hough discovery has begun, it is not yet complete, and the claim construction process has not started,” and also because ASE “acknowledged ‘the still-early stage of this case.’” Ex. 3002 (Docket Entry 89 at 5).

B. *The ’562 Patent*

The ’562 patent is directed to a system and method for imaging an object using one or more arrays of discrete x-ray sources to illuminate the object. *See* Ex. 1001, 1:13–17. In one embodiment, one-dimensional array 20 of X-ray sources 22 is disposed between backscatter detectors 23. *Id.* at

4:14–16, Fig. 2. Array 20 and detectors 23 can move together in transverse direction 25, or, alternatively, just array 20 can rotate about longitudinal vertical axis 21 such that X-ray beam 26 sweeps in a transverse direction. *Id.* at 4:16–21. In either case, imaging is done by scanning and turning on each of sources 22 one at a time in rapid succession. *Id.* at 4:16–23, 4:26–29. In another embodiment, a two-dimensional array 30 of x-ray sources 32 is disposed between the detectors, and the array “can use a raster scan mechanism similar to a CRT or pattern beams (Hadamard or other coding mechanism).” *Id.* at 4:50–55, Fig. 3.

C. The Asserted Challenges

Claims Challenged	35 U.S.C. §	Basis
1, 6, 7, 9–13	102(e)	Lu ²
1–3, 10, 12, 13	102(b)	Seppi ³
1–3, 10, 12, 13	103	Seppi and Zhang ⁴
1, 10, 12, 13	102(e)	Cason ⁵
1, 10, 12, 13	103	Cason and Zhang

In further support of these challenges, Viken submits the declaration of Richard C. Lanza, Ph.D. *See* Ex. 1003. ASE does not submit a rebuttal declaration, at least not yet.

We also note that Viken’s anticipation challenge based on Lu also relies on two provisional applications that Lu expressly incorporates by

² US 2007/0206726 A1, pub. Sep. 6, 2007 (Ex. 1009, “Lu”).

³ WO 2004/010127 A1, pub. Jan. 19, 2004 (Ex. 1012, “Seppi”).

⁴ J. Zhang et al., *A multi-beam x-ray imaging system based on carbon nanotube field emitters*, PROCEEDINGS OF SPIE – THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING (March 2006) (Ex. 1004, “Zhang”).

⁵ US 7,400,701 B1, iss. July 15, 2008 (Ex. 1015, “Cason”).

reference, namely, U.S. Provisional Application Nos. 60/737471 (Ex. 1010, “Lu ’471”) and 60/787810 (Lu ’810). *See* Ex. 1009 ¶ 1. At this stage, ASE does not meaningfully dispute Viken’s reliance on Lu’s incorporation by reference as proof of anticipation. *See* Prelim. Resp. 13. Nor does ASE meaningfully rebut Viken’s showing that Lu qualifies as prior art. *See id.* Without more from ASE, we see no reason to reject Viken’s showing on these points. *See* Pet. 20–25, 28.

D. The Challenged Claims

Three of the challenged claims are independent—claims 1, 10, and 12. The claims generally fall into two groups. The first group (claims 1–9) recites, in part, “activating an array . . . in a prescribed temporal pattern,” “detecting with a detector X-rays of the beam scattered,” and “constructing an image . . . based on the time variation of the detector signal.” Ex. 1001, 7:2–8:4. The second group (claims 10–13) recites, in part, “a plurality of linear arrays.” *Id.* at 8:5–30.

Claim 1 recites:

1. A method for imaging an object, the method comprising:
 - a. activating an array of discrete X-ray sources in a prescribed temporal pattern so as to illuminate the object with a beam varying in spatial orientation;
 - b. detecting with a detector X-rays of the beam scattered after interaction with the object and generating a detector signal; and
 - c. constructing an image of the object based on the time variation of the detector signal.

Id. at 7:2–10.

And claim 10⁶ recites:

10. An inspection system for inspecting an object, the inspection system comprising:

- a. a plurality of linear arrays of discrete sources of penetrating radiation;
- b. at least one scatter detector configured to generate a scatter signal based upon detection of penetrating radiation scattered by the inspected object; and
- c. a processor for receiving the scatter signal and generating an image of the object.

Id. at 8:5–14.

II. ANALYSIS

A. Claim Construction

We apply the claim construction standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). That is, “the words of a claim ‘are generally given their ordinary and customary meaning’ . . . that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *Id.* at 1312–13. Here, both Viken and ASE each propose a construction of the claim language “an array of discrete X-ray sources.” *See* Pet. 13–20; Prelim. Resp. 18–21. At this stage, there is no need to construe that limitation because, as discussed below, the prior art satisfies the limitation under either of the proposed constructions. *See, e.g., Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (approving Board decision not to construe claim language “where the construction is not material to the . . . dispute”)

⁶ ASE acknowledges that independent claims 10 and 12 “recite parallel limitations.” Prelim. Resp. 9.

(internal quotation marks omitted). We will address further construction of that limitation, if necessary, at the trial stage.⁷

B. Level of Ordinary Skill in the Art

Viken’s declarant, Dr. Lanza, testifies that one skilled in the art during the relevant time frame “would be a person with Ph.D. in physics or similar discipline and at least two years of experience working with an interdisciplinary team designing and creating systems involving penetrating radiation sources and detectors” and that “[a] person with less education but more relevant practical experience may also meet this standard.” Ex. 1003

¶ 20. According to Viken’s declarant, that person—

would most likely have been a nuclear or experimental physicist, and would have had a good understanding of the principles of physics. He or she would also have had overview knowledge of the physical properties of x-ray sources and x-ray detectors, how x-ray sources and x-ray detectors are integrated to form imaging systems, how images are created, and how they are used for the inspection of objects.

Id. ¶ 21.

At this stage, ASE does not contest that testimony. *See* Prelim. Resp. 17 (“Patent Owner assumes Petitioner has correctly stated the level of skill in the art.”). Nor do we discern any reason to question its credibility at this

⁷ Under the pretext of claim construction, ASE raises an argument as to the meaning of the claim language “time variation of the detector signal.” Prelim. Resp. 17–18. But, in doing so, ASE simply states that this language “refers to the effect of the ‘prescribed temporal pattern’ . . . in step a (the ‘activating’ step) on the ‘detector signal’ generated in step b (the ‘detecting’ step).” *Id.* at 17. That explanation, in our view, says nothing more than what the claim language plainly recites. Thus, we see no reason to further construe that language at this stage.

stage. Thus, for purposes of institution, we review the asserted prior art mindful of the level of skill in the art as stated by Viken’s declarant.

C. Single Claim Threshold for Institution

We begin with Viken’s challenge that independent claim 1 is unpatentable as anticipated by Lu (and Lu ’471, as incorporated by reference) (collectively, “Lu”). *See* Pet. 32. In doing so, Viken provides a detailed mapping of how Lu meets each of the steps as recited in claim 1, as well as providing further support from its declarant. *See id.* at 32–38. ASE responds primarily with two arguments, disputing Viken’s showing as to the claimed “activating” and “constructing” steps (i.e., steps a and c, respectively). *See* Prelim. Resp. 23–24. We note, however, that ASE does not dispute Viken’s showing that Lu discloses the claimed “detecting” step (i.e., step b). *See id.* at 25. With that in mind, we address ASE’s arguments below.

1. The “activating” step

For this step, ASE faults Viken for relying on “separate embodiments” in Lu, “some of which describe transmission imaging and not backscatter imaging—without any evidence that these [embodiments] relate to one another.” Prelim. Resp. 23. According to ASE, Viken “relies on the scatter detectors 316 from Lu’s Figure 3 for step b of claim 1 (the ‘detecting’ step),” whereas for step a of claim 1 (the “activating” step), Viken “relies on disclosures from Lu that have no connection to backscatter imaging, in general, and no relation to the backscatter imaging component of Figure 3, in particular.” *Id.* at 24. In support, ASE points to Viken’s reliance on Lu’s paragraph 22 to meet the claimed “activating” step, and argues that paragraph 22 describes a different embodiment than the Figure 3

embodiment described in paragraph 31 and upon which Viken relies to meet the claimed “detecting” step. *See id.* at 25–27 (comparing Ex. 1009 ¶¶ 23, 31, 36 Fig. 3, *with id.* ¶ 22). From there, ASE surmises that the pencil beam 312 of Figure 3, which is detected by scatter detectors 316, is not the same “beam” that Viken relies for the activating step because paragraph 22 “does *not* apply to backscatter imaging.” *Id.* at 26–27.

Although we agree with ASE that paragraph 22 describes the generation of x-ray beams for transmission detection, we disagree with ASE’s assertion that paragraph 22 relates solely to transmission detection. That is because paragraph 22 of Lu also describes a “field-emission cathode” that can be used to generate x-ray beams not only for transmission detection but also for backscatter detection. As described therein, the field emission cathode comprises “a plurality of individually-controllable pixels configured to emit electron beams.” Ex. 1009 ¶ 22. Lu later adds that the field emission cathode “can include one or more triode cathodes” and that “one pixel of an x-ray source can correspond to a single triode cathode,” which, in turn, can be activated to emit “x-ray fan beams *and x-ray pencil beams.*” *Id.* ¶ 27 (emphasis added); *see also id.* ¶ 34 (describing essentially same). That the field emission cathode can generate x-ray pencil beams, which indisputably are used for backscatter imaging, supports Viken’s reliance on paragraph 22’s overview of the field emission cathode as meeting the activating step of claim 1.

In other words, though paragraph 22 describes “one aspect” of using the field-emission cathode, i.e., for generating x-ray beams for transmission detection, that description clearly does not exclude paragraph 23’s description of “another aspect” of using the field-emission cathode, i.e., for

generating x-ray beams for backscatter detection. Ex. 1009 ¶¶ 22–23. Indeed, Lu’s Figure 3 contemplates just such an x-ray imaging system. *See, e.g., id.* ¶¶ 31–36 (describing system 300 in Figure 3 as including backscatter detectors 316 and transmission detectors 318). Thus, ASE does not persuade us that Viken is relying on “separate embodiments” in Lu to meet the “activating” step of claim 1. Rather, it appears ASE is disregarding the teachings of Lu as a whole.

2. *The “constructing” step*

Next, ASE argues that Viken fails to show that Lu discloses step c of claim 1, namely, the “constructing” step. *See* Prelim. Resp. 24. According to ASE, “Lu relates to the use of a predetermined *frequency* pattern, *see* Ex. 1009 ¶ [0037], not a *temporal* pattern, as recited in claim 1.” *Id.*; *see also id.* at 30 (“The frequency-based modulation Lu discloses is not the alleged ‘prescribed temporal pattern,’ however.”). We disagree.

Contrary to ASE’s argument, Lu expressly states that the x-ray source can be activated at a predetermined “duty cycle” and explains that such activation is based “on time” that is “programmed into control system 308” so that the scatter signal from the generated beam is “separated in the time domain.” Ex. 1009 ¶ 36; *see also id.* ¶ 41 (“each pencil beam 412 can be individually controllable so that pencil beams 412 can be turned on selectively in a programmable pattern.”). In that same vein, Lu also explains that control system 308 performs “temporal Fourier transformation of intensity versus time data detected by backscatter x-ray detector 316.” *Id.* ¶ 37. At this stage, those disclosures provide ample support for Viken’s

showing that Lu’s x-ray sources are activated in a “temporal pattern,” as required by claim 1.⁸

As for constructing an image based on that time variation, Lu expressly discloses that the detected x-ray beams are processed “using an inversion Hadamard transformation matrix for constructing an image.” *Id.* That Lu’s disclosure of a Hadamard transformation matrix relates to a “temporal pattern” and “time variation” is shown by the simple fact that the ’562 patent itself admits as much. *See, e.g.*, Ex. 1001, Abstract, 2:52–53, 7:24–25. Thus, at this stage, we reject the notion that Viken fails to account for the “temporal pattern” and “time variation” aspects of claim 1 when showing that Lu meets the claimed “constructing” step.

3. Conclusion

Having reviewed the preliminary record, including Viken’s showing as to how Lu discloses each of the method steps of claim 1 (*see* Pet. 32–38), we conclude that Viken demonstrates a reasonable likelihood that claim 1 is unpatentable as anticipated by Lu. At this stage, ASE does not persuade us to the contrary.

D. Independent Claims 10 and 12

Viken also relies on Lu alone to challenge independent claims 10 and 12. Pet. 39–43. For these challenged claims, ASE faults Viken’s showing that Lu discloses the claimed “plurality of linear arrays.” Prelim. Resp. 32. According to ASE, Viken “again relies on passages from Lu describing two distinct embodiments: one that describes using two pencil beam sources (neither one of which is a linear array) and another that describes only a

⁸ Also, one skilled in the art may have understood Lu’s use of the term “duty cycle” as inferring a “temporal period.” *See* Cason, 2:33–35.

single linear array, not a plurality.” *Id.* (citing Pet. at 39–43). In particular, ASE contends that Viken fails to show that Lu’s teaching of “[a] linear array of x-ray pencil beams” in paragraph 45 applies to Lu’s description of the Figure 4 embodiment. *See* Prelim. Resp. 34 (“There is no evidence, for instance, that either of the sources 406 (in Figure 4) is ‘a multiple beam field emission x-ray (MBFEX) source,’ as used in the embodiment of paragraph [0045].”).

We disagree. ASE again fails to appreciate Lu’s teachings as a whole. In fact, Lu makes clear that the description of the “multiple beam field emission x-ray (MBFEX) source” in paragraph 45 can be used in the Figure 4 embodiment by stating expressly that “[s]ystem 400 can comprise multiple field-emission cold cathode based x-ray sources.” Ex. 1009 ¶¶ 38, 49. At this stage, we see no difference between the field emission sources described in Lu’s paragraphs 38, 45, and 49, aside from the fact that paragraph 45 elaborates on their ability to generate a linear array of pencil beams. Having reviewed the preliminary record, including Viken’s showing as to how Lu discloses each of the system elements of claim 10 and method steps of claim 12 (*see* Pet. 39–43), we conclude that Viken demonstrates a reasonable likelihood that those claims are unpatentable as anticipated by Lu.

E. Dependent Claims 6, 7, 9, 11, and 13

For claims 6, 7, 9, 11, and 13, ASE simply relies on their dependency from the independent claims as a reason we should deny Viken’s challenge. *See* Prelim. Resp. 35. As discussed above, we find unpersuasive ASE’s arguments with respect to the independent claims. Keeping in mind, however, that Viken bears the burden here, we have fully considered

Viken’s showing with respect to dependent claims 6, 7, 9, 11, and 13, and conclude that Viken demonstrates a reasonable likelihood they are anticipated by Lu.

F. Viken’s Alternative Challenges

Viken also challenges claims 1–3, 10, 12, and 13 as anticipated by Seppi or as obvious over Seppi and Zhang, and challenges claims 1, 10, 12, and 13 as anticipated by Cason⁹ or obvious over Cason and Zhang. Pet. 4, 43–58. With respect to the anticipation challenges of claim 1, ASE responds that Seppi lacks the “activating” and “constructing” steps, and that Cason lacks the “constructing” step. Prelim. Resp. 36–41, 45–46, respectively.

We disagree, at least as the record stands now. For instance, on its face, Seppi appears to satisfy the disputed “activating” step as claimed by disclosing that “[t]he groups of sources may be cycled on in succession as the sources 16a-16f are moved across the rail 18, under the control of the computer 26” (Ex. 1012 ¶ 57) and that “[t]he sources 16a–16f may be moved along the rail . . . to enable the pencil beam or beams to scan the suspicious region from a plurality of angles” (*id.* ¶ 75). And Seppi also appears to satisfy the disputed “constructing” step by disclosing that “[t]he detector array 20 is electrically connected to a processor 26, such as a computer, which reconstructs the data output by the detector array 20 into images . . .” (*id.* ¶ 46).

As for Cason’s satisfaction of the “constructing” step, we note its disclosure of an arrangement of scatter detectors that generate “output signals,” which, in turn, are “transmitted to a processor 40, and processed to

⁹ Viken challenges all the claims of the Cason patent in the related 1585 IPR referenced above in section I.A.

obtain images of feature 42 inside the inspected object 18.” Ex. 1015, 4:23–33, 4:51–54. Temporal sequencing of Cason’s pencil-beam sources results in the signals generated by the scattered radiation being “acquired as separate channels” to “eliminate[] cross-talk.” *Id.* at 5:33–49; *see also id.* at 2:9–14, 2:17–19 (essentially same). On the current record, those disclosures in Cason, as well as those in Seppi, provide ample support for Viken’s anticipation challenges of claim 1.

In sum, at this stage, we are persuaded that Viken demonstrates a reasonable likelihood of prevailing on its challenges that Seppi and Cason each anticipate at least claim 1. That said, Viken’s other Seppi-based and Cason-based challenges of the remaining independent and dependent claims are best left for trial after full development of the record. Because “[e]qual treatment of claims and grounds for institution purposes has pervasive support in *SAS*,” we institute review of all the Seppi-based and Cason-based challenges as raised in Viken’s Petition. *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018).

III. CONCLUSION

For the above reasons, we determine that the information presented in Viken’s Petition shows a reasonable likelihood that at least claim 1 of the ’562 patent is unpatentable as anticipated by Lu. Because Viken demonstrates that one claim of the ’562 patent meets the threshold for institution, we institute an *inter partes* review of all claims as challenged in the Petition. 37 C.F.R. § 42.108(c); *SAS Inst. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018).

IV. ORDER

Accordingly, it is:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–3, 6, 7, and 9–13 of the '562 patent is *instituted*; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), notice is hereby given of the institution of trial, which will commence on the entry date of this Decision.

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