

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VIKEN DETECTION CORP.,
Petitioner,

v.

AMERICAN SCIENCE AND ENGINEERING, INC.,
Patent Owner.

IPR2022-00027
U.S. Patent No. 8,300,763 B2

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

DANIELS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

Viken Detection Corporation (“Viken” or “Petitioner”) filed a Petition requesting *inter partes* review of claims 1–12 of U.S. Patent No. 8,300,763 B2 (Ex. 1001, “the ’763 patent”). Paper 1 (“Pet.”). American Science and Engineering, Inc., (“ASE” or “Patent Owner”) filed a Preliminary Response to the Petition. Paper 7 (“Prelim. Resp.”). Upon Petitioner’s request, we authorized a Reply to Patent Owner’s Preliminary Response to address specific issues relating to the disclosure in U.S. Patent No. 6,459,764 to Chalmers. Paper. 8. We similarly authorized Patent Owner a Sur-Reply in Support of Preliminary Response to address the same issue. Paper 10.

We instituted trial for claims 1–12 of the ’763 patent on certain grounds of unpatentability alleged in the Petition. Paper 12 (“Decision to Institute” or “Inst. Dec.”).

After institution of trial, Patent Owner filed a Patent Owner Response, (“PO Resp.,” Paper 19), along with a Declaration by Patent Owner’s Declarant, Steven W. Smith, Ph.D., (Ex. 2003). Petitioner timely filed a Reply (“Pet. Reply,” Paper 24). Subsequently, Patent Owner filed a Sur-Reply (“PO Sur-Reply,” Paper 31) to address certain arguments raised by Petitioner in its Reply.

A hearing for this proceeding was held on January 31, 2023. The transcript of the hearing has been entered into the record. Paper 36. (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6(c). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a).

For the reasons that follow, we determine that Petitioner has met its burden of showing by a preponderance of the evidence that claims 1–12 are unpatentable.

A. Real Parties in Interest

Petitioner states that it is the real party in interest. Pet. 81. Patent Owner states that it is the real party in interest, and “is a wholly owned subsidiary of OSI Systems, Inc., which is a corporation publicly traded on the NASDAQ under the symbol OSIS.” Paper 4.

B. Related Matters

The parties indicate that the ’763 patent has been asserted against Petitioner in *American Science & Engineering, Inc., v. Viken Detection Corp.*, Case No. 1:20-cv-11883 (D. Mass.) (“the infringement action”). Pet. 81; Paper 4. Petitioner 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. 3001 (Docket Entry 89 at 5).

Petitioner indicates that it has filed a petition for *inter partes* review, case number IPR2021-01585, challenging U.S. Patent No. 7,400,701, which is no longer asserted in the infringement action, and also filed a petition for *inter partes* review, case number IPR2022-00028, challenging U.S. Patent No. 7,505,562, which remains asserted in the infringement action together with the ’763 patent. Pet 82.

C. The ’763 Patent (Ex. 1001)

The ’763 patent, titled “Spatial Sequenced Backscatter Portal,” describes methods and apparatus for “inspecting objects such as cargo containers or vehicles with CBI [Compton backscatter imaging].” Ex. 1001, 1:46–47. The ’763 patent explains that “Compton backscatter imaging (CBI) is a single-sided imaging technique in which the radiation source and

the detection/imaging device are located on the same side of the object.” *Id.* at 1:21–24. A two-dimensional image is created when “[c]hanges in the backscatter photon field intensity (resulting in contrast changes in images) are caused by differences in absorption and scattering cross sections along the path of the scattered photons.” *Id.* at 1:27–30. It is also known in the art, and described in the ’763 patent, to use multiple CBI devices, each positioned on a different side, or perspective, of the object being scanned to obtain a three-dimensional view of the object. *Id.* at 1:41–48.

The ’763 patent describes that “[a] common implementation uses rotating collimators to sweep a pencil beam across an object in an inspection area. A detector measures the backscatter from the CBI pencil beam as it scans the object.” *Id.* at 1:37–41. The ’763 patent describes that, when “CBI beams are operating concurrently, a problem that may occur is cross-talk between the CBI/detector systems. That is, backscatter from one CBI beam may cause noise (a signal that is spatially irrelevant) in another CBI beam’s detector.” *Id.* at 1:52–56.

Figure 2A of the ’763 patent is reproduced below.

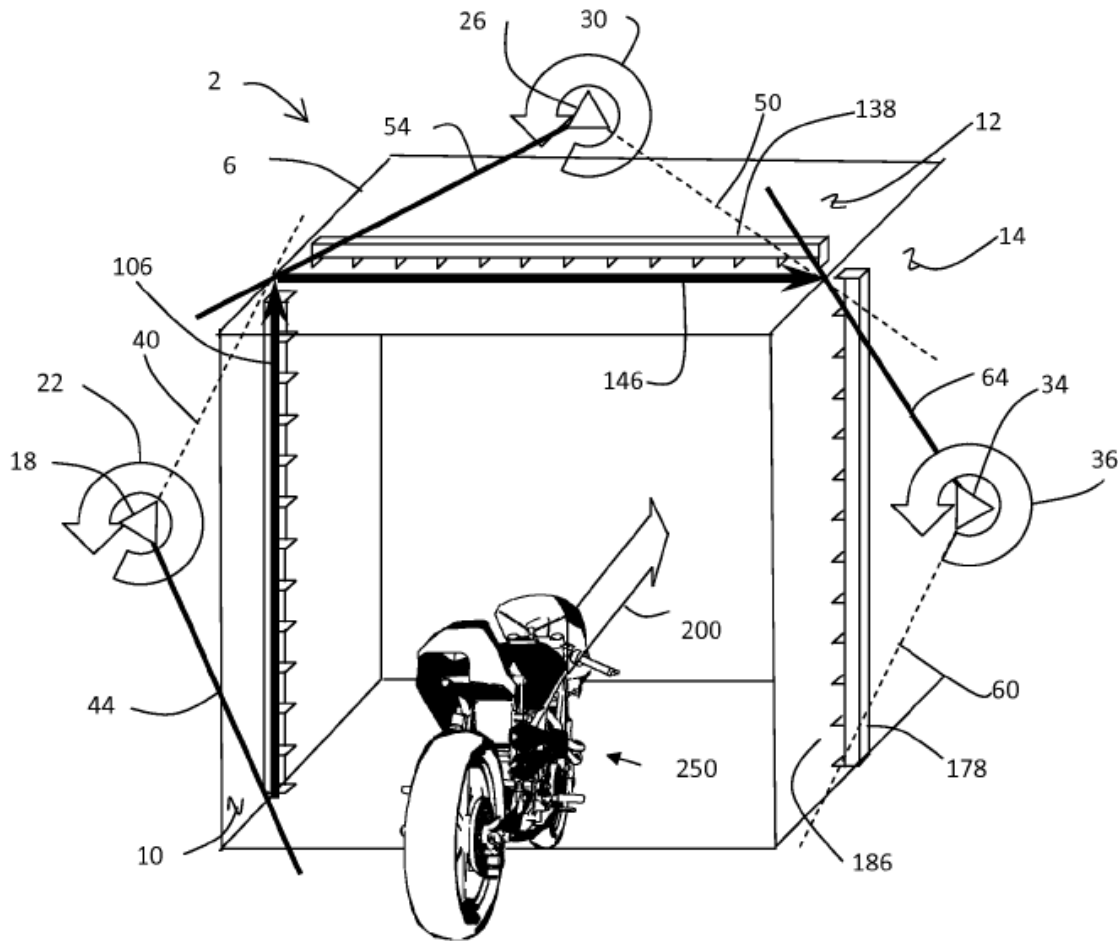


Figure 2A

Figure 2A of the '763 patent, above, illustrates motorcycle 250 queued to move through inspection area 6, in direction 200, of scanning system 2, which includes rotating collimators 18, 26, and 34. *Id.* at 2:51–52. The '763 patent describes “[o]ne or more CBI pencil beams may be used in combination with relative motion between the object and the CBI beams (the relative motion being generally orthogonal to the plane of the sweep) to raster scan an object and construct one or more 2-D images of interior portions of the object.” *Id.* at 1:41–45.

Figure 2B of the '763 patent, reproduced below, is a resulting image depicting scan line traces 254, 258 of motorcycle 250 from rotating collimator 34.

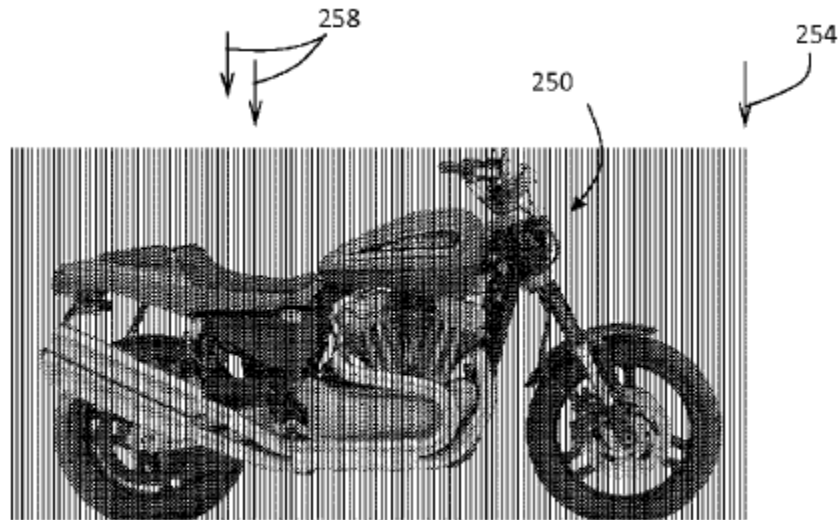


Figure 2B

Figure 2B of the '763 patent “depicts a first scan line trace **254** generated by the third rotating pencil beam radiation collimator **34** for the motorcycle **250**.”¹ *Id.* at 6:27–29. Scan lines 258 are further scan line traces also from the perspective of the third rotating pencil beam radiation collimator 34. *Id.* at 29–31.

The '763 patent describes that a known solution to unwanted cross-talk is sequencing of the rotating collimators “so that only one x-ray beam is rastering at a time in order to prevent cross-talk in the other two perspectives. However[,] this mean[s] only one x-ray beam is imaging the object at a time.” *Id.* at 3:21–24.

¹ In our Decision, bolded reference numbers are not reproduced in quotations from the '763 patent.

In order to provide a more accurate and faster imaging process, the '763 patent proposes the use of detector collimators 104, usually made of lead, that shield the detector from unwanted backscatter and

help to reduce noise in the form of scattered x-rays from other beams by preferentially accepting backscattered signals that originate from a point that is substantially orthogonal to the radiation detector (e.g., substantially orthogonal to first radiation detector 98) and at least partially shielding out signals that do not originate from a point substantially orthogonal to the detector.

Id. at 4:53–59. The '763 patent also proposes synchronizing the pencil beams so that each rotating collimator simultaneously turns on a beam entering the inspection area to begin its sweep, and simultaneously turns off the beam that has completed its sweep and is leaving the inspection area. *Id.* at 5:34–39. Additionally, the '763 patent explains that the radiation detectors can incorporate “smart sensor array[s] . . . where each photomultiplier in the array is time-gated for acceptance of scintillation detection in a time-gating pattern that corresponds to the sweep of a radiation beam.” *Id.* at 6:56–59. Time gating, the '763 patent explains, “refers to accepting or rejecting scintillation detections depending upon the position of a sweep of a radiation beam.” *Id.* at 6:59–61. Figure 3A, reproduced below, illustrates time gating photomultipliers 310, 314 being time gated “on” and “off” in cooperation with scanning x-ray pencil beam 54.

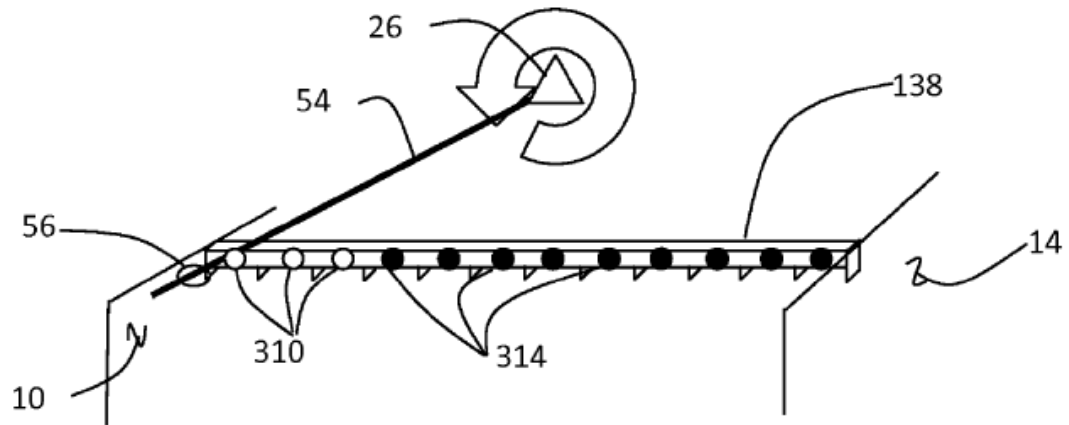


Figure 3A

Figure 3A illustrates how smart sensor array radiation detector 138 has photomultipliers 310 time-gated on, and photomultipliers 314 are time-gated off, as pencil beam 54 begins its sweep of the inspection area.

D. Illustrative Claim

Claims 1 and 8 are independent. Each of claims 2–7 and 9–12 ultimately depends from claim 1 and claim 8 respectively. Claims 1 and 2 illustrate the claimed subject matter and are reproduced below:

1. A method for scanning an object in an inspection space comprising:
 - (a) scanning the object from a first perspective that is substantially orthogonal to a first plane starting at a first entry point in the inspection space that is adjacent a first edge of the inspection space to establish a first scan line trace of the object from the first perspective;
 - (b) scanning the object from a second perspective that is substantially orthogonal to a second plane that is adjacent to but not co-planar with the first plane, starting at a second entry point on the second plane that is adjacent a second edge between the first plane and the second plane, to establish a second scan line trace of the object from the second perspective;
 - (c) providing relative motion between the object and the first scan line trace and the second scan line trace; and

(d) repeating step (a), step (b), and step (c) at least once such that the repetition of step (a) produces a first two-dimensional image of the object comprising multiple first image scan lines from the first perspective and step (b) produces a second two-dimensional image of the object comprising multiple second image scan lines from the second perspective.

2. The method of claim 1 wherein step (a) and step (b) are initiated at approximately the same time.

Ex. 1001, 8:47–9:2.

E. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–12 would have been unpatentable on the following grounds:²

Ground	Claim(s) Challenged	35 U.S.C. § ³	Reference(s)/Basis
1	1–3, 7–9, 12	102	Chalmers ⁴
2	1–3, 7–9, 12	103(a)	Chalmers, Grodzins ⁵
3	4	102	Cason ⁶
4	4	103(a)	Cason, Chalmers
5	5, 10	103(a)	Cason, Horn, ⁷ Annis ⁸
6	6, 11	103(a)	Chalmers
7	7, 12	103(a)	Chalmers, Rothschild ⁹

² Petitioner supports its challenge with a Declaration of Richard C. Lanza, Ph.D. (Ex. 1003) and Patent Owner provides the Declaration of Steven W. Smith, Ph.D. (Ex. 2003). *See infra*.

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103, effective March 16, 2013. Because the application from which the ’763 patent issued has an effective filing date prior to March 16, 2013, the pre-AIA versions of §§ 102, 103 apply. *See* Ex. 1001, code (60).

⁴ Ex. 1007, U.S. Patent No. 6,459,764 B1 (iss. Oct. 1, 2002).

⁵ Ex. 1008, U.S. Patent No. 6,151,381 (iss. Nov. 21, 2000).

⁶ Ex. 1011, U.S. Patent No. 7,400,701 B1 (iss. July 15, 2008).

⁷ Ex. 1012, U.S. Patent No. 4,718,075 (iss. Jan. 5, 1988).

⁸ Ex. 1044, U.S. Patent No. 4,799,247 (iss. Jan. 17, 1989).

⁹ Ex. 1009, U.S. Patent No. 5,930,326 (iss. July 27, 1999).

II. ANALYSIS

A. Legal Standards

A “prior art reference—in order to anticipate under 35 U.S.C. § 102—must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements ‘arranged as in the claim.’” *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)). “A single prior art reference may anticipate without disclosing a feature of the claimed invention if such feature is necessarily present, or inherent, in that reference.” *Allergan, Inc. v. Apotex Inc.*, 754 F.3d 952, 958 (Fed. Cir. 2014).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art (POSITA) to which said subject matter pertains. 35 U.S.C. § 103; *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). “[W]hen a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.” *KSR*, 550 U.S. at 416 (citing *United States v. Adams*, 383 U.S. 39, 50–51 (1966)). The question of obviousness is resolved based on underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art at the time of the '763 patent “would have had at least a bachelor’s degree in engineering and at least five years of experience working with an interdisciplinary team designing and creating systems involving penetrating radiation sources and detectors.” Pet. 18 (citing Ex. 1003 ¶¶ 21–23). Petitioner also states that “[i]ndividuals with different education and additional experience could still be of ordinary skill in the art if that additional experience compensates for a deficit in their education stated above. Additional education might substitute for some experience, and substantial experience might substitute for some educational background.” *Id.*

Patent Owner contends that a person of ordinary skill in the art “possessed the following (or equivalent): (1) a Bachelor’s degree or equivalent in physics or another relevant field of science or engineering; (2) 2 years’ experience with X-ray imaging systems for security or industrial inspection; and (3) a working understanding of X-ray physics, X-ray sources, X-ray detectors, and methods of acquiring X-ray images.

PO Resp. 20.

Despite the lesser amount of experience, i.e. two years, as proposed by Patent Owner compared to 5 years as Petitioner proposes, Petitioner’s and Patent Owner’s asserted levels of ordinary skill in the art are not terribly disparate. Both require at least a bachelor’s degree in an engineering or science field and experience with X-ray penetrating radiation to include radiation sources, detectors and imaging systems. To the extent there is a difference, it does not effect, nor do the parties argue that it should, our decision with respect to the challenged claims as either anticipated or obvious. *See, e.g.*, PO Resp. 20 (Patent Owner describing that “Petitioner

asserts an ordinary artisan had three more years of experience (or comparable additional education), Pet., 18, but even with that difference, the claims of the '763 patent are not anticipated nor would they have been obvious to an ordinary artisan.”).

C. Claim Construction

We interpret a claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b) (2020). Under this standard, we construe the claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.* Furthermore, at this stage in the proceeding, we expressly construe the claims only to the extent necessary to determine whether to institute *inter partes* review. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

Petitioner initially asserted that no claim terms require express construction, and that “all claim terms not specifically discussed below should be given their plain and ordinary meaning.” Pet. 17. In its Response, Patent Owner proposes interpretations for two claim terms, “inspection space,” and “scanning.” PO Resp. 21–28. In its Reply, Petitioner argues that there is no actual dispute with respect to “inspection space,” and that Patent Owner’s construction of “scanning” improperly equates the terms “sweeping” and “scanning.” Pet. Reply 1–6. We address the parties’ respective arguments and interpretations below.

1. inspection space

Patent Owner argues that “[t]here is . . . no dispute that a person of ordinary skill in the art would have understood an ‘inspection space’ to be a physical space with bounds defined by reference to physical components of an inspection system.” *Id.* at 21–22 (citing Pet. 18; Ex. 1003 ¶ 125). Citing to testimony by Patent Owner’s Declarant, Dr. Smith, Patent Owner contends that “[a]s was known in the art, ‘the region appropriated for scanning [an] object’ would be constrained by physical objects for safety at least, if not for other reasons.” *Id.* at 23 (citing Ex. 2001, 132:10–134:21, 135:14–137:12; Ex. 2003 ¶ 50). More specifically, Patent Owner seems to settle on the interpretation that “an ordinary artisan would have understood that an ‘inspection space’ is defined by the physical characteristics of a particular inspection system.” *Id.* at 25 (citing Pet. 19).

Petitioner does not entirely disagree with Patent Owner’s interpretation. Reply 1 (Petitioner contending that “the term itself is not a contested point.”). Petitioner refers back to its Petition which explains that “[t]he inspection space is the region appropriated for scanning the object, delineated by the dimensions of the first and second detector arrangements.” *Id.* at 2 (citing Pet. 18). During oral argument, when questioned about the relative discrepancy between Petitioner’s and Patent Owner’s interpretation of “inspection space,” Petitioner’s counsel explained:

I think that’s angels dancing on the head of a pin on this issue. As I said, I think the inspection space is where you’re inspecting, where you want to inspect. And we have conceded and agreed that in the context of the Chalmers reference, it is, in fact, defined by where the beam is and how big the detectors are. So it’s dictated by how the system is constructed. I don’t dispute that.

Tr. 12:23–13:3.

Patent Owner contends that the Board “suggest[s] a broader construction of ‘inspection space’ (and of related limitations) than either party has proposed.” PO Resp. 22. We did not provide an explicit construction of “inspection space” in the Institution Decision. However, in applying the prior art, we did say,

[f]rom a plain reading of the claim, the inspection space is bounded by at least two adjacent, non-coplanar, planar boundaries. However, the claim language does not limit how big, small, tall, wide, or long, the inspection space is, for example, relative to an object being scanned or the rotating collimators.

Inst. Dec. 24 (citing Ex. 1001, 8:49–59). We said this to clarify that there is no language in the claim that refers to any physical structure as part and parcel of the inspection space. Claim 1 simply recites “a first plane” and “a second plane” as boundaries of the “inspection space.” Ex. 1001, 8:49–59.

Notwithstanding the preceding clarification, Petitioner’s Declarant, Dr. Lanza, designates an “inspection space” generally consistent with Patent Owner’s “physical characteristics” interpretation. For example, describing Chalmers, Dr. Lanza testifies that “[i]n my opinion, the inspection space, i.e., the region appropriated for scanning the object, is the region delineated by the dimensions of the first and second detector arrangements.” Ex. 1003 ¶ 125. This is consistent with the written description and figures in the ’763 patent, specifically that “FIG. 1 depicts an inspection space with three rotating collimators.” Ex. 1001, 2:49–50. Figure 1 of the ’763 patent is reproduced below.

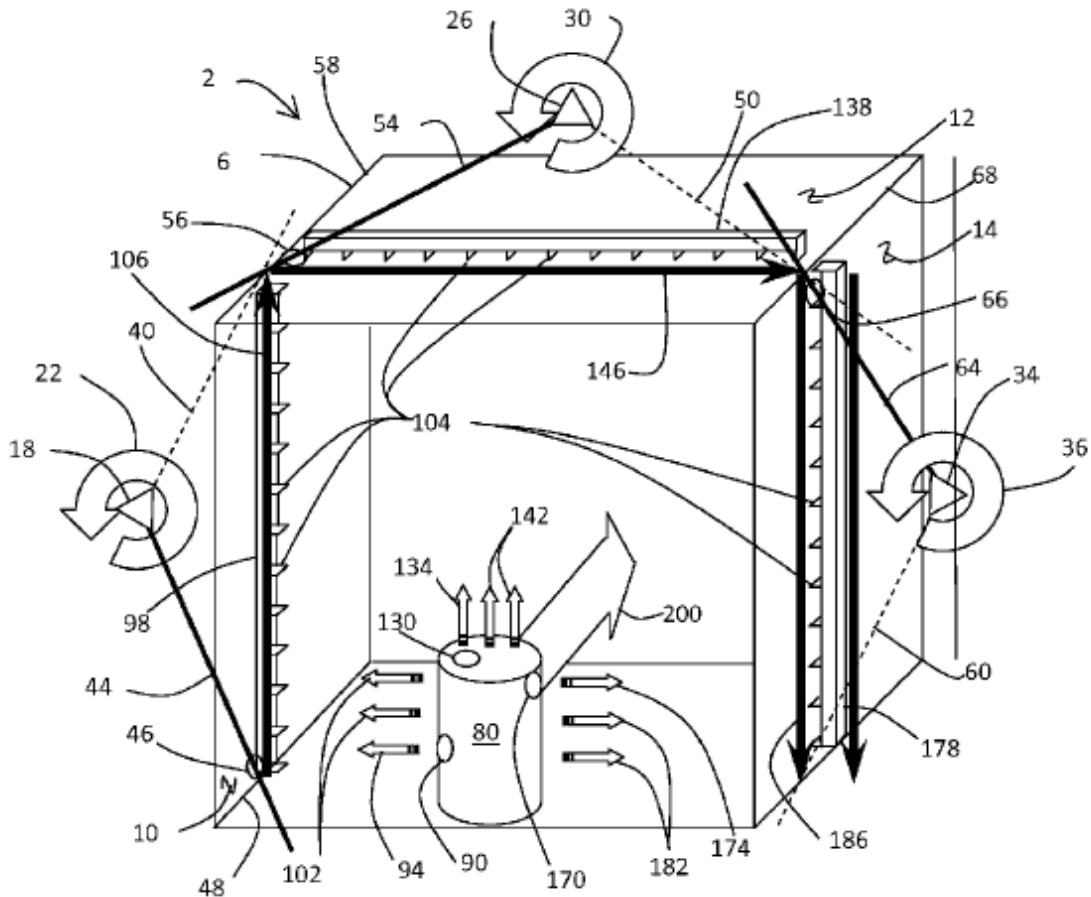


Figure 1 of the '763 patent illustrates an inspection space bounded by certain physical elements namely, first radiation detector 98, second radiation detector 138, and third radiation detector 178 for receiving backscatter radiation signals 94, 134, 174, generated by respective radiation beams emanating from associated rotating collimators 18, 26, 34. *Id.* at 4:42–5:27.

Given the relative consistency between the parties' interpretations, the claims, and the specification of the '763 patent, as well as to harmonize the record to the extent it is even necessary, we rely on Patent Owner's interpretation, which is that "an ordinary artisan would have understood that an 'inspection space' is defined by the physical characteristics of a particular inspection system." PO Resp. 25.

2. *scanning*

Patent Owner argues that “[t]he ordinary and customary meaning of the word ‘scanning,’ as used in the context of CBI systems disclosed and covered by the ’763 patent claims, is ‘sweeping a beam of penetrating radiation.’” PO Resp. 26 (citing Ex. 2003 ¶¶ 58–64). Patent Owner explains that “[t]he specification also uses the word ‘sweeping’ in several instances suggesting the equivalence between ‘sweeping a beam’ and ‘scanning.’” *Id.* at 27. To the contrary, Petitioner argues that “‘sweeping’ and ‘scanning’ refer to two different acts in the patent. ‘Sweeping’ refers to the inspection space and ‘scanning’ refers to the object being scanned.” Pet. 4 (citing Ex. 1001, 3:50, 3:59, 4:2, 6:11, 6:17, 6:19).

We find Petitioner’s interpretation more correct because the specification refers mainly to “sweeping” the inspection space and “scanning” relates particularly to the object in the inspection space. The ’763 patent describes that

[a] common implementation uses rotating collimators to sweep a pencil beam across an object in an inspection area. A detector measures the backscatter from the CBI pencil beam *as it scans the object*. One or more CBI pencil beams may be used in combination with relative motion between the object and the CBI beams (the relative motion being generally orthogonal to the plane of the sweep) to raster scan an object and construct one or more 2-D images of interior portions of the object.

Id. 1:37–45 (emphasis added). We find the first sentence is describing the function of the rotating collimators to “sweep” the CBI beam through the inspection area, albeit “across an object.” *Id.* We further find the second sentence discusses that, due to detection of backscatter radiation, it is understood that the CBI pencil beam “scans *the object*” in the inspection

area.¹⁰ We find the third sentence explains the result of “sweeping” and “scanning,” that is, “to raster *scan an object* and construct one or more 2-D images of interior portions of the object.” *Id.* (emphasis added).

Patent Owner argues that the “description tracks the claim language of the ‘scanning’ steps, except that it uses the word ‘sweep.’” PO Resp. (citing Ex. 1001, 3:48–57). However, the paragraph cited by Patent Owner is more consistent with Petitioner’s interpretation. This paragraph states in part “sweeping *the inspection space 6* with a first pencil beam 40,” and “starting to sweep *the inspection space 6* with a second pencil beam 44.” Ex. 1001, 3:48–57. Moreover, claim 1 recites the method-type limitations of, “scanning *the object . . .*” Ex. 1001, 8:49. We do not agree with Patent Owner, therefore, that “[t]his description tracks the claim language of the [claimed] ‘scanning’ steps.” PO Resp. 27.

Patent Owner argues in its Response that “‘scanning’ an object refers to the act of sweeping a beam of penetrating radiation over the object.” *Id.* at 28 (citing Ex. 2003 ¶¶ 58–59). Patent Owner’s Declarant, Dr. Smith, testifies specifically that “a POSITA would have understood ‘scanning’ an object in backscatter imaging to refer to the act of sweeping a beam of penetrating radiation over the object.” Ex. 2003 ¶ 58. This is consistent with Petitioner’s interpretation discussed above. Further, we understand from a plain reading of the ’763 patent itself that “scanning” is differentiated from “sweeping” because “scanning” includes an active backscatter detector

¹⁰We appreciate that all this assumes there is an object within the inspection space, i.e. the inspection space could, practically, include no object. Logically, in this case scanning still occurs because a detector would be operating but would simply not receive or measure any backscatter radiation from a non-existent object.

that “measures the backscatter from the CBI pencil beam *as it scans* the object.” Ex. 1001, 1:39–41 (emphasis added).

It is important to note that there is no substantive dispute in this proceeding that the prior art teaches both sweeping and scanning. But, because there is an actual dispute as to its meaning, and, to the extent it needs to be interpreted, we determine the term “scanning,” as claimed and described in the specification of the ’763 patent and understood by those of ordinary skill in the art, means “sweeping a beam of penetrating radiation over an object for detection of backscatter from the beam of penetrating radiation.”

D. Ground 1: Claims 1–3, 7–9, and 12 – Anticipation by Chalmers (Ex. 1007)

On the complete record before us, Petitioner has shown by a preponderance of the evidence that claims 1–3, 7–9, and 12 are anticipated by Chalmers for the following reasons.

1. Chalmers (Ex. 1007)

Titled “Drive-Through Vehicle Inspection System,” Chalmers describes “[a]n inspection system for inspecting a moving vehicle and for detecting material disposed within the vehicle.” Ex. 1007, Abstract, code (57). In particular, Chalmers describes an inspection system having “a source of radiation for providing a beam of penetrating radiation of specified cross-section directed in a beam direction substantially horizontal and transverse to the direction of motion of the vehicle.” *Id.* at 2:13–17.

Further, Chalmers describes that

the system has a detector arrangement disposed between the source of radiation and the moving vehicle for detecting radiation from the beam scattered by any material disposed within the moving vehicle and for generating a scattered radiation signal,

and a controller for characterizing the material disposed within the moving vehicle based at least on the scattered radiation signal.

Id. at 2:17–24. Chalmers Figure 1 is reproduced below.

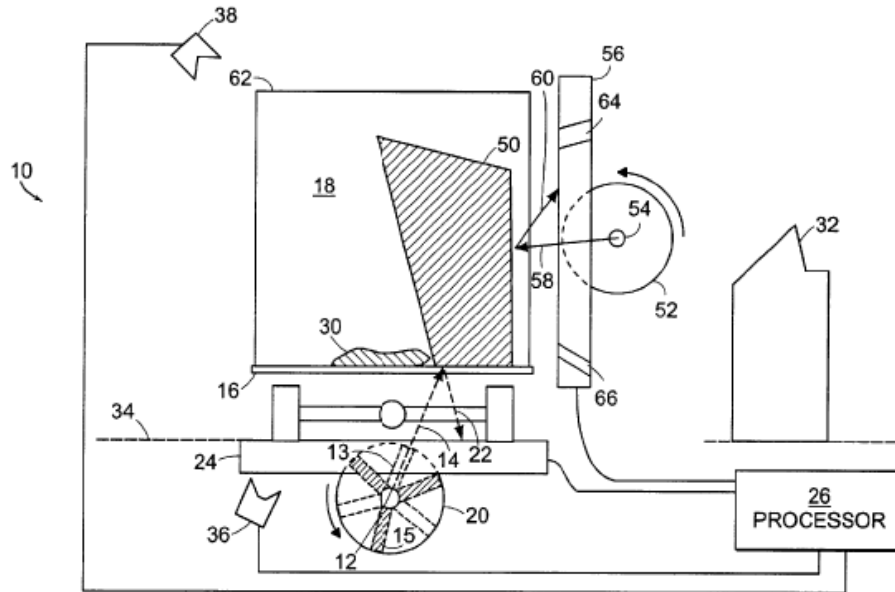


FIG. 1

Figure 1 of Chalmers illustrates vehicle (truck) 18 with objects (contents) 30 and 50 passing through inspection system 10. *Id.* at 3:13–15. Scanning mechanism 52, including x-ray source 54 and detector 56, is positioned on the right side of inspection system 10, and additional scanning mechanism 20 and detector 24 are positioned below truck 18 on the bottom side of inspection system 10. *Id.* at 3:24–61. Chalmers explains that “x-rays having maximal energies in the range between 160 keV and 300 keV are employed. At this energy, x-rays penetrate into the vehicle, and organic objects inside the vehicle can be detected.” *Id.* at 4:28–31.

Chalmers does not expressly describe all the components and functioning of scanning mechanisms 20, 52. However, Chalmers is a continuation-in-part of an application which became U.S. Patent No.

6,151,381 to Grodzins, and which Chalmers expressly incorporated by reference in its disclosure. *Id.* at 1:4–10, code (63). Grodzins discloses in greater detail specific components of scanning mechanisms such as rotating collimators and x-ray pencil beams. *See* Ex. 1008, 5:23–26 (Grodzins stating with reference to Figure 3, that “scanning mechanisms are known to persons skilled in the art to provide for scanning of beam 70 across a region of space which may include the target container 10”).¹¹ In Figure 5, reproduced below, Grodzins illustrates the basic components and scanning arc of a rotating collimator.

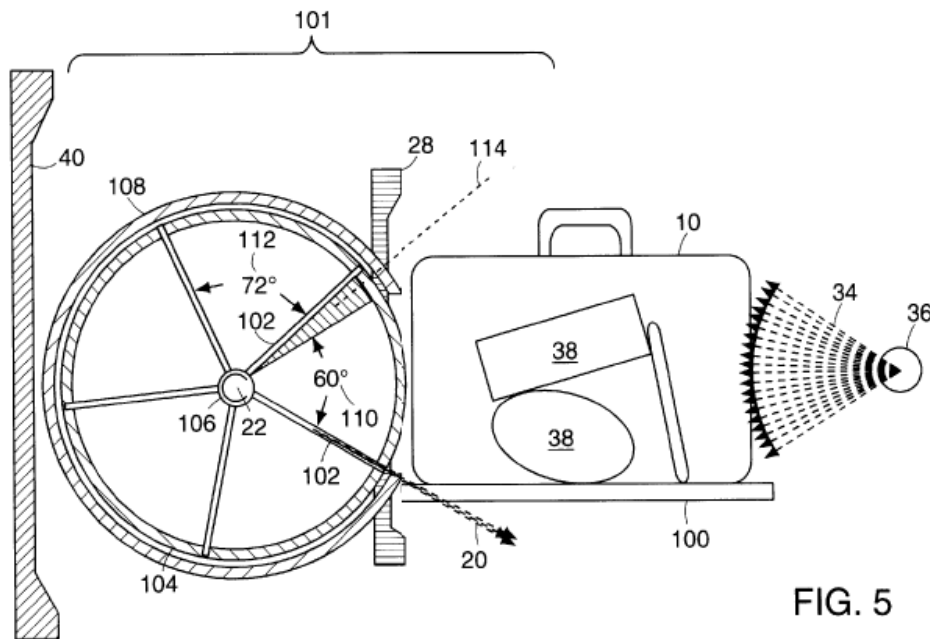


Figure 5 of Grodzins depicts that “[a]s -rays to an arc 110 of the order of 60° wheel 104 rotates, x-ray beam 20 sweeps out of the spokes in the manner of water from a sprinkler hose. An inner collimator 106 and an outer collimator 108 restrict the emerging x-ray beam.” *Id.* at 6:24–28.

¹¹ We do not reproduce bolded reference numbers as used throughout both Grodzins and Chalmers written descriptions.

Grodzins also discloses inspection systems that use different types of radiation scanning systems, e.g., backscatter x-ray systems and transmission x-ray systems. *Id.* at 3:21–29, Fig. 1. Backscatter x-ray systems detect backscatter radiation that essentially bounces off the scanned object and is detected by a detector positioned between the object and the radiation source. *Id.* at 3:30–4:7. Transmission x-ray systems produce radiation that passes through and is detected by detectors on the opposite side of the object from a radiation source such as a high energy linear accelerator (Linac). *Id.* at 4:8–44.

Although the issue of incorporation by reference is not specifically raised in Patent Owner’s Response, we determine in this proceeding that Grodzins is incorporated in its entirety into Chalmers. Chalmers states

[t]his application is a continuation-in-part of U.S. patent application Ser. No. 09/238,686, filed Jan. 27, 1999 and now issued as U.S. Pat. No. 6,151,381, [Grodzins] and contains subject matter related to that of U.S. application Ser. No. 09/395,331, filed Sep. 13, 1999, now issued as U.S. Pat. No. 6,249,567, all of which applications and patents are herein incorporated by reference.

Ex. 1007, 1:4–10. Chalmers makes clear, particularly by the last clause, that Grodzins is incorporated in its entirety into Chalmers. *See Paice LLC v. Ford Motor Co.*, 881 F.3d 894, 907 (Fed. Cir. 2018) (The Court explaining that a similar “sentence identifies with detailed particularity the specific material subject to incorporation (Severinsky, and not just particular portions thereof) and where that material can be found (U.S. Patent No. 5,343,970). Such language is plainly sufficient to incorporate Severinsky in its entirety.”).

2. Independent Claim 1

Independent claims 1 and 8 are substantively similar, as both are method claims and include many of the same limitations. Slightly different from claim 1, claim 8 requires “a second entry point on the second plane that is diagonally opposed across the inspection space from the first entry point, to establish a second scan line trace of the object from the second perspective, *wherein step (a) and step (b) are initiated at approximately the same time.*” Ex. 1001, 10:7–12 (emphasis added). We consider initially, by way of example, the elements of claim 1.

a) Petitioner’s Arguments

i. Preamble

For the preamble step of “scanning an object in an inspection space,” Petitioner argues that Chalmers discloses a scanning device for performing an inspection of a vehicle. Pet. 18 (citing Ex. 1007, 4:45–46). Petitioner also argues that Chalmers discloses an inspection space “delineated by the dimensions of the first and second detector arrangements, depicted in the annotated Figure 1 of Chalmers ’764.” *Id.* (citing Ex. 1003 ¶¶ 125–27). Also, we need not determine whether the preamble is limiting because Petitioner shows sufficiently for purposes of institution that the recitation in the preamble is satisfied by the prior art. *See Allen Eng’g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002) (“Generally, the preamble does not limit the claims.”).

ii. Limitation 1[a]

Petitioner argues that Chalmers discloses scanning the object from the side, i.e., a first perspective, that is “substantially orthogonal to a first plane starting at a first entry point in the inspection space.” *Id.* at 20 (citing Ex. 1007, 4:12–21; Ex. 1003 ¶¶ 128–32). Petitioner also argues that Chalmers

teaches “[t]he first entry point of Chalmers ’764 scanning beam 58 is adjacent a first edge of the inspection space . . . where the right planar side of the inspection space meets the top planar side of the inspection space.” *Id.* at 22 (citing Ex. 1007, Fig. 1; Ex. 1003 ¶¶ 128–32). Petitioner’s annotated Figure 1 from Chalmers is reproduced below.

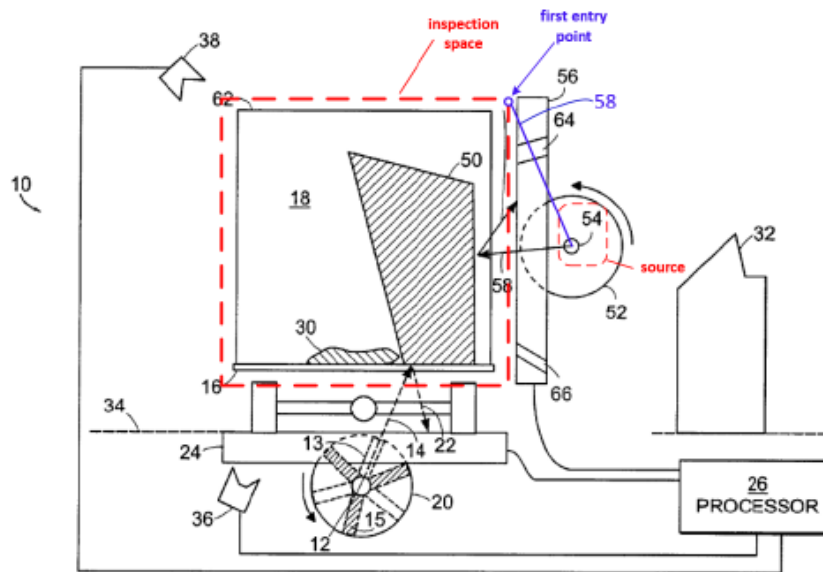


FIG. 1

Figure 1 of Chalmers as annotated by Petitioner illustrates truck 18 with objects (contents) 30 and 50 within inspection space bounded by dashed red line, and a first entry point at top right of the inspection space where rotating pencil beam 58, highlighted purple, enters the inspection space. *Id.* at 3:13–15.

iii. Limitation 1[b]

Petitioner argues that Chalmers discloses beneath the inspection space, source 12, that is “scanning the object from a second perspective that is substantially orthogonal to a second plane that is adjacent to but not coplanar with the first plane.” *Id.* at 22–23 (citing Ex. 1003 ¶¶ 133–37). Petitioner also argues that Chalmers teaches “[t]he second entry point of Chalmers ’764 scanning beam 14 is adjacent a second edge of the inspection

space . . . where the bottom planar side of the inspection space meets the right planar side of the inspection space.” *Id.* at 25 (citing Ex. 1007, Fig. 1; Ex. 1003 ¶¶ 133–137). Petitioner’s annotated Figure 1 from Chalmers is reproduced below.

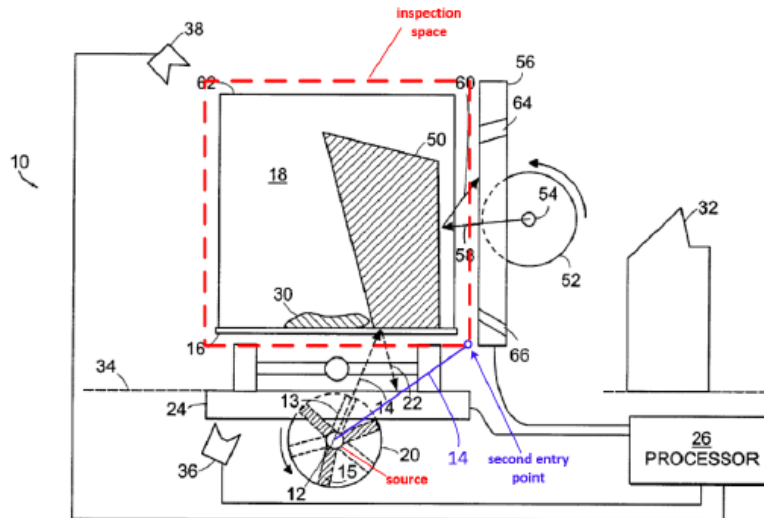


FIG. 1

Figure 1 of Chalmers as annotated by Petitioner illustrates truck 18 with objects (contents) 30 and 50 within inspection space bounded by dashed red line, and a second entry point at bottom right of the inspection space where rotating pencil beam 14, highlighted purple, enters the inspection space. Ex. 1007, 3:13–15.

iv. Limitation 1[c]

Limitation 1[c] requires “providing relative motion between the object and the first scan line trace and the second scan line trace.” Ex. 1007, 8:61–62. Petitioner argues that Chalmers “discloses that the object to be inspected moves past the scanning beams, including being self-propelled through the beams, or being pulled by a conveyer or tractor.” Pet. 25 (citing Ex. 1007, 3:25–29, 47–51; Ex. 1003 ¶ 138).

v. Limitation 1[d]

Limitation 1[d] requires repeating steps 1[a]–[c] “such that the repetition of step (a) produces *a first* two-dimensional image of the object,” and repetition of “step (b) produces *a second* two-dimensional image of the object.” Ex. 1001, 8:63–9:2 (emphasis added). According to Petitioner, in Chalmers the first detector array 56 and second detector array 24 are connected to processor 26. Pet. 27. Petitioner asserts that processing the data from the detector arrays “applies to output signals from scatter detectors” and that a person of ordinary skill in the art would have recognized “that producing a 2D image requires at least two scan lines produced by a source and the resulting scatter received by a detector.” *Id.* (citing Ex. 1003 ¶¶ 139–142; Ex. 1007, 4:47–48).

b) Patent Owner’s Arguments

Patent Owner argues that Petitioner has failed to prove that Chalmers anticipates claims 1–3, 7–9, and 12 “for the simple reason that Chalmers discloses almost nothing about the relevant geometry of [Chalmers] Figure 1 embodiment on which Petitioner relies.” PO Resp. 30. Patent Owner presents three specific arguments asserting that Petitioner has not shown Chalmers to disclose with respect to independent claims 1 and 8: (1) “(a) scanning the object from a first perspective . . . starting at a first entry point [] that is adjacent a first edge of the inspection space;” (2) “(b) scanning the object from a second perspective . . . starting at a second entry point on the second plane that is adjacent a second edge between the first plane and the second plane;” and (3) with respect to independent claim 8, “wherein step (a) and step (b) are initiated at approximately the same time.” *Id.* at 30–31.

We note that dependent claim 2 includes similar limitations to independent claim 8, and therefore address the third argument in the context of claim 2 below.

*i. Whether Chalmers discloses limitation 1(a)
“scanning the object from a first perspective . . .
starting at a first entry point in the inspection
space that is adjacent a first edge of the
inspection space”*

Patent Owner argues that Chalmers does not disclose the “first edge of the inspection space.” *Id.* at 32. Patent Owner contends, specifically, that Petitioner “fails to justify the[] dimensions” of the asserted “inspection space” shown in Petitioner’s annotated Figure 1 from Chalmers, reproduced below. *Id.* (citing Ex. 1003 ¶ 126)

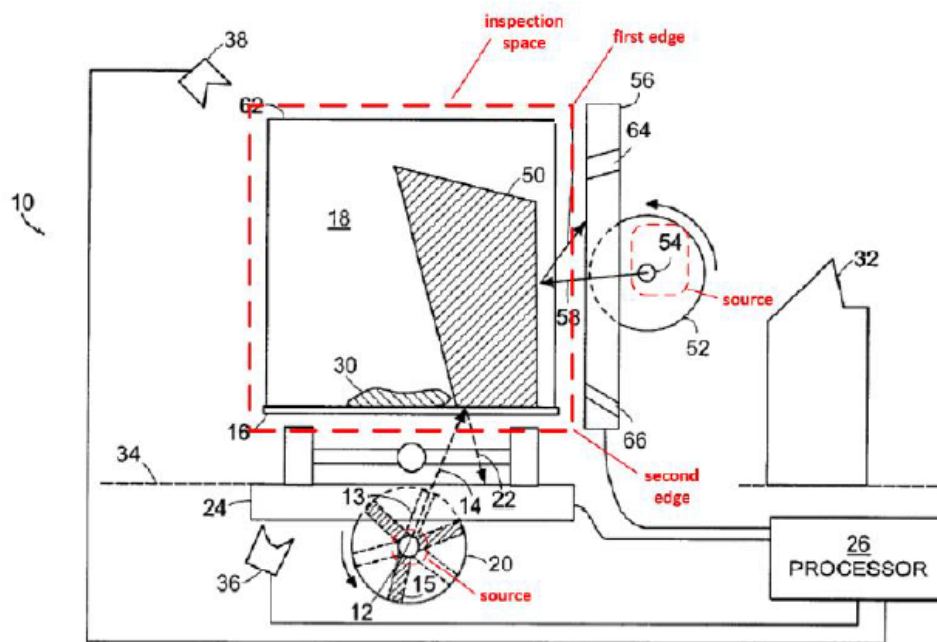


FIG. 1

Annotated Figure 1 of Chalmers shows how Petitioner contends that the figure is defining an inspection space accommodating a vehicle for inspection. Considering annotated Figure 1, Patent Owner argues that “Petitioner has (at best) shown the lowest end of a permissible range; the

inspection space would not accommodate the depicted truck if the *first edge* were substantially lower than the point identified.” *Id.* at 33–34 (citing Ex. 2003 ¶¶ 81–82).

We can agree with Patent Owner that *if* the first edge of the inspection shown in Petitioner’s annotated Figure 1, was lower (and detector 56 smaller), then the system might not be able to scan the entire vehicle. Petitioner, however, argues consistently that the “inspection space is the region appropriated for scanning the object, delineated by the dimensions of the first and second detector arrangements.” Pet.18, Pet. Reply 8. Considering the detector arrangement in Chalmers, which encompasses a cross-sectional area *larger* than the vehicle to be scanned, as shown by the dashed red box drawn by Petitioner, Dr. Lanza testifies that “[a]s shown in the annotated Figure 1 of Chalmers ’764 . . . a first edge (extending into the page) is formed where the top planar side and the right planar side of the Chalmers ’764 inspection space meet.” Ex. 1003 ¶ 127.

We find Petitioner’s arguments and evidence persuasive. Indeed, Petitioner’s arguments, including the annotated Figure 1 “inspection space,” and Dr. Lanza’s testimony are consistent with the interpretation of “inspection space” offered by Patent Owner, that is— “an ordinary artisan would have understood that an ‘inspection space’ is defined by the physical characteristics of a particular inspection system.” PO Resp. 25. In this case, considering Chalmers Figure 1, as Petitioner consistently argues and Dr. Lanza persuasively testifies, the “physical characteristics” defining Chalmers inspection space, are detectors 24, 56. Pet. 18; Pet. Reply 2; Ex. 1003 ¶ 125. We agree with Petitioner that “even under the Patent Owner’s construction, the inspection space (and the first edge) in Chalmers is an identifiable space with boundaries defined by reference to physical

components (e.g., the position and dimensions of the first detector arrangement 56 and second detector arrangement 24).” Pet. Reply 8–9. Accordingly, we are persuaded on the complete record now before us that Chalmers’ “inspection space” including “a first edge of the inspection space,” is defined by detectors 24, 56 and accurately visually delineated, and disclosed, as represented by Petitioner’s dashed red box, in annotated Figure 1 above.

Next, Patent Owner argues that Chalmers fails to disclose the “first entry point” as recited in limitation (a). PO Resp. 34. Patent Owner argues specifically that “chopper wheels do not emit radiation beams in 360°, as was well-known to those in the art” because they are enclosed in shielding. *Id.* (citing Ex. 2003 ¶¶ 86–88; Ex. 2002 at 230:17–231:10; Ex. 2003 ¶ 88; Ex. 2001, 110:6–111:5). Patent Owner argues further that “allowing more than one pencil beam from the same chopper wheel to scan the object at a time would make it difficult (maybe impossible) to determine which beam was responsible for any scattered radiation being detected.” *Id.* (citing Ex. 2003 ¶ 87; Ex. 2001, 110:20–111:5). Patent Owner explains that Chalmers discloses a six spoke chopper wheel, and thus as shown in Patent Owner’s annotated Figure 1 below, result in a scanning angle of only 60 degrees.

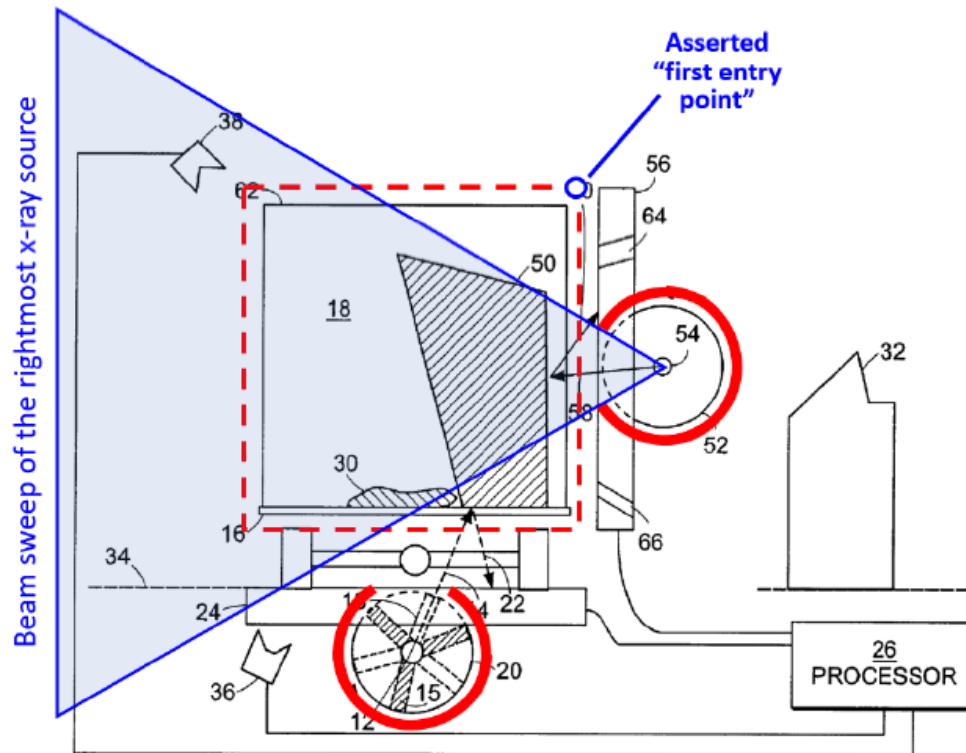


FIG. 1

As annotated by Patent Owner's Declarant, Dr. Smith, Figure 1 illustrates that a pencil beam emitted by chopper wheel 52 "would scan over a limited angle that excludes the point Petitioner identifies as the *first entry point*." *Id.* at 36 (quoting Ex. 2003 ¶¶ 92–95). Dr. Smith testifies in support that by using Chalmers' disclosed six spoke chopper wheel "[a] POSITA would therefore understand that the alleged scanning from the first perspective does not start at the Petitioner's alleged 'first entry point adjacent to a first edge of the inspection space.'" Ex. 2003 ¶¶ 93–94.

Petitioner responds, arguing that Chalmers discloses only by way of example, a six spoke chopper wheel, and because Chalmers incorporates Grodzins by reference, other examples in Grodzins expressly disclose four and five spoke chopper wheels. Pet. Reply 14, *see also* Ex. 1001, 1:4–10 (Chalmers '764 referencing U.S. Patent No. 6,151,361 to Grodzins, and stating "all of which applications and patents are herein incorporated by

reference.”). Petitioner argues that, for example, “[a] rotating wheel with four spokes would allow for scanning angle of 90° (360° divided by 4).” *Id.*

Logically, it is difficult to imagine, as Patent Owner asserts, that Chalmers is limited to scanning only a portion of a vehicle as Patent Owner’s annotated version of Figure 1, above, depicts. During his deposition, Dr. Smith was asked several times, if a person of ordinary skill in the art would desire a system to scan the entire contents of the truck shown in Figure 1. *See, e.g.*, Ex. 1051, 151:18–19. For example:

Q. Would you agree it’s a goal of Chalmers to identify contraband within the truck 62 shown in Figure 1?

...

A. Yes, that’s a stated goal, I believe.

...

Q. And to accomplish that goal, you wouldn’t want to image just half of the area of the interior of the truck, would you?

...

A. The significant example that I would give in this case is that almost half of the truck scanners deployed are detecting empty trucks; therefore, you do not have to be screening all of it in order to be able to tell that there is likely nothing in the back. So, no, it doesn’t -- it is not a given in all cases that you would need to screen all of the truck.

Id. at 152:11–153:6. Whether or not half of all scanned truck are empty skirts the questions here. Dr. Smith’s conjecture that a scan *can* be done of less than the entire truck also evades the question. Indeed, in his Declaration, Mr. Smith explained that anything less than a scan of the entire vehicle would

be undesirable in general because important information about the contents of the cargo container might be missed, but scanning in this way would not result in obtaining a “useable scan line trace over [the] entire object” as Petitioner alleges because the scan line trace would cover less than half of the cargo container and would miss the bottom of the truck altogether.

Ex. 2003 ¶ 116. Although Dr. Smith is discussing Chalmers’ example of a six spoke chopper wheel in both cases, it is difficult to reconcile Dr. Smith’s positions. Moreover, Dr. Smith agreed it was reasonable to understand Chalmers to scan the entirety of the truck.

Q. If you were examining a cargo truck as shown here in Figure 1, you would want to – for contraband, you would want to scan the entire interior of the truck; correct?

...

A. That’s reasonable for that particular application, yes.

Ex. 1051, 150:18–151:2.

With respect to Figure 1 and Chalmers’ six-spoke chopper wheel, Dr. Smith also agreed that a person of ordinary skill in the art would have known how to adjust the distance of the collimators from the inspection space in order to scan the entire vehicle:

Q. Would a person of skill in the art, given a 60-degree beam sweep . . . for these chopper wheels, would a person of skill in the art know how far to locate the chopper wheels so that it would sweep the contents of the vehicle?

...

A. In general, a person skilled in the art would certainly know how far to position an x-ray source away from the object to get a certain vertical or horizontal region of scanning.

Q. That’s just simple geometry; correct?

A. Yes, that is just simple geometry.

Ex. 1051, 159:20–160:10. While we acknowledge Patent Owner’s argument that Chalmers does not explicitly state that its scanning angles start “at a first entry point in the inspection space that is adjacent a first edge of the inspection space” as claim 1 recites, we find Petitioner’s arguments and evidence persuasive that a person of ordinary skill in the art would understand from Chalmers and adjust the parameters of the physical structure, including detectors and radiation source structures, to scan the entire truck shown in Figure 1. *See Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1379 (Fed. Cir. 2001) (explaining that “anticipation does not require actual performance of suggestions in a disclosure,” instead “anticipation only requires that those suggestions be enabling to one of skill in the art”).

Additionally, Chalmers’ detectors 24 and 56 define the inspection space consistent with Patent Owner’s claim interpretation “that an ‘inspection space’ is defined by the physical characteristics of a particular inspection system.” PO Resp. 25; Section II. C.1. And, it is within the level of ordinary skill, as Dr. Smith essentially concedes, to arrange the chopper wheel to start scanning at an edge of the inspection space defined by the edges of detectors 24 and 56, regardless of the number of pencil beams, so that detectors 24 and 56 receive backscatter signals from the entire vehicle encompassed within the inspection space. Ex. 1051, 159:20–160:10.

It is true, that Chalmers does not expressly recite an “inspection space” or a “first entry point” as in claim 1 of the ’763 patent. Yet Chalmers’ physical structures are shown and described, and on the complete record now before us, arranged and function as in claim 1. Anticipation is not an *ipsissimis verbis* test. *In re Bond* 910 F.2d 831, 832 (Fed. Cir. 1990).

For instance, Chalmers describes with respect to Figure 1 that “[i]n accordance with a preferred embodiment of the invention, rotating chopper wheel 52 is used to develop a pencil beam 58 which may be swept in a plane substantially parallel to that of the page.” Ex. 1007, 3:53–56. Figure 1 illustrates pencil beam 58 in a position generally orthogonal to the object being scanned, and the description makes clear that pencil beam 58 would actually sweep along a vertical plane, across an inspection space in Chalmers, beginning at a first entry point coinciding with the top edge of detector 56 so as to scan the entire side of the truck 18. *Id.*

We credit Petitioner’s Declarant, Dr. Lanza, who persuasively explains that a person of ordinary skill in the art would have understood that “Chalmers ’764 scanning beam 58 thus enters the inspection space at a first entry point, as shown in annotated Figure 1 of Chalmers ’764 below.” Ex. 1003 ¶ 131 (citing Ex. 1007, Figure 1). We reproduce Dr. Lanza’s annotated Figure 1 below.

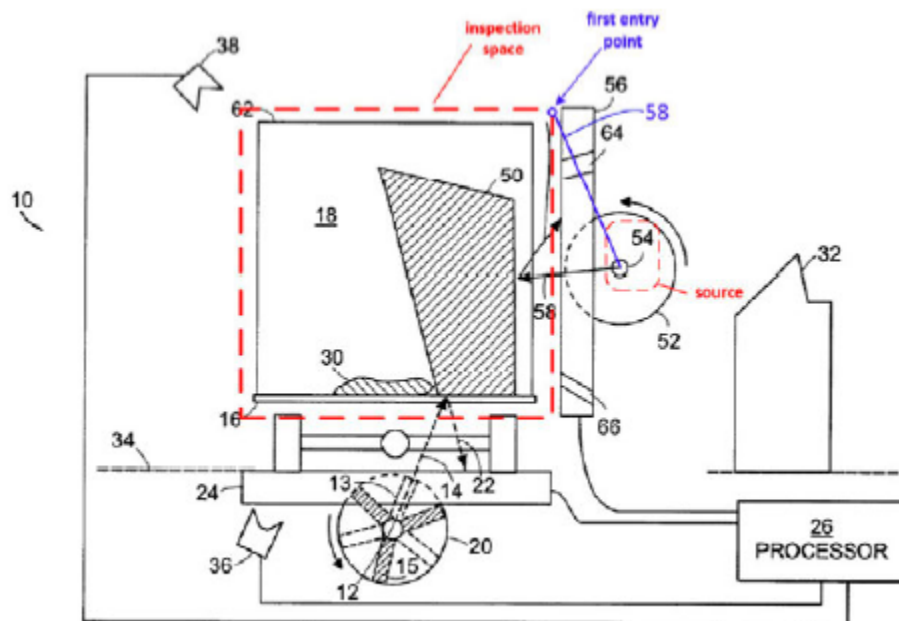
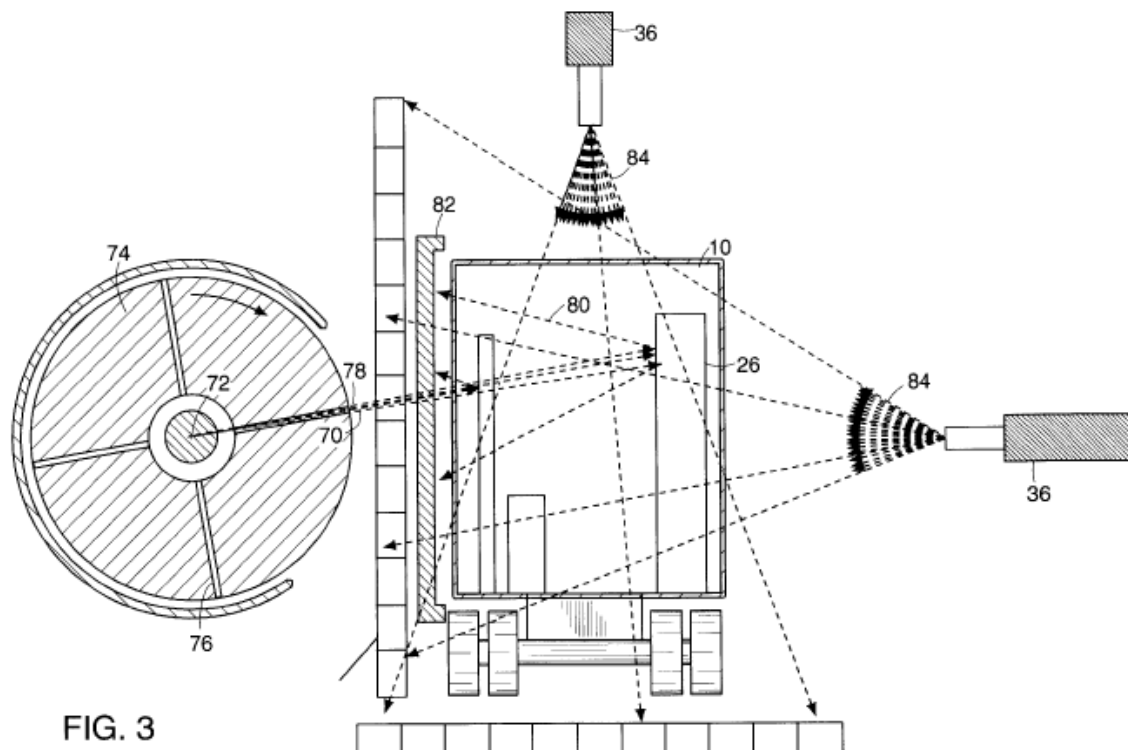


FIG. 1

Figure 1 of Chalmers as annotated by Dr. Lanza, above, illustrates truck 18 with objects (contents) 30 and 50 within an inspection space bounded by dashed red line as defined by a first entry point at top right of the inspection space where rotating pencil beam 58, highlighted purple, starts scanning. *Id.*

We further credit Dr. Lanza's testimony because it is consistent with Grodzins disclosure incorporated by reference into Chalmers. *See* Ex. 1007 1:6–10 (Chalmers stating that Grodzins, “as U.S. Pat. No. 6,151,381 . . . all of which applications and patents are herein incorporated by reference.”). Grodzins explains that it was “known to persons skilled in the art to provide for scanning of beam 70 across a region of space which may include the target container 10.” Ex. 1008, 5:24–26. By way of example, Grodzins Figure 3 is reproduced below.



Grodzins Figure 3 illustrates a four spoke rotating wheel 74 and “X-ray beam 70, generated by an x-ray source 72 in the center of a rotating wheel

74, pass out of the wheel 74 through hollow spokes 76.” *Id.* at 5:17–20. It is visually depicted here, that Grodzins’ X-ray beam 70, based on the collimator opening, will sweep the vertical length of backscatter detector 82. This results in scanning of the entire container 10, as Grodzins describes. *Id.* at 5:24–26.

Dr. Lanza’s testimony, Chalmers, and Grodzins as incorporated by reference, are consistent even with Patent Owner’s interpretations of “inspection space” and “scanning.” Dr. Lanza’s testimony and visual representation of Chalmers’ “inspection space” (Ex. 1003 ¶¶ 129–132) are defined by “the physical characteristics of [Chalmers] particular inspection system” as we determined in our claim construction. Section II.C. It is essentially undisputed that Chalmers discloses scanning mechanism 52 “sweeping a beam of penetrating radiation over the object” as also determined in our claim construction. *Id.*, see Ex. 1007, 3:25–27 (Chalmers describing that “[a] scanning mechanism 52 is provided for scanning beam 58 along a substantially vertical axis, as a vehicle 18 or other object that is to be inspected moves past beam 58 in a substantially horizontal direction.”).

Considering the evidence in Chalmers as well as Dr. Lanza’s testimony, on the complete record now before us we are persuaded that Chalmers discloses all the limitations in claim limitation 1(a) including, “scanning the object from a first perspective . . . starting at a first entry point in the inspection space that is adjacent a first edge of the inspection space.” Ex. 1001, 8:49–53.

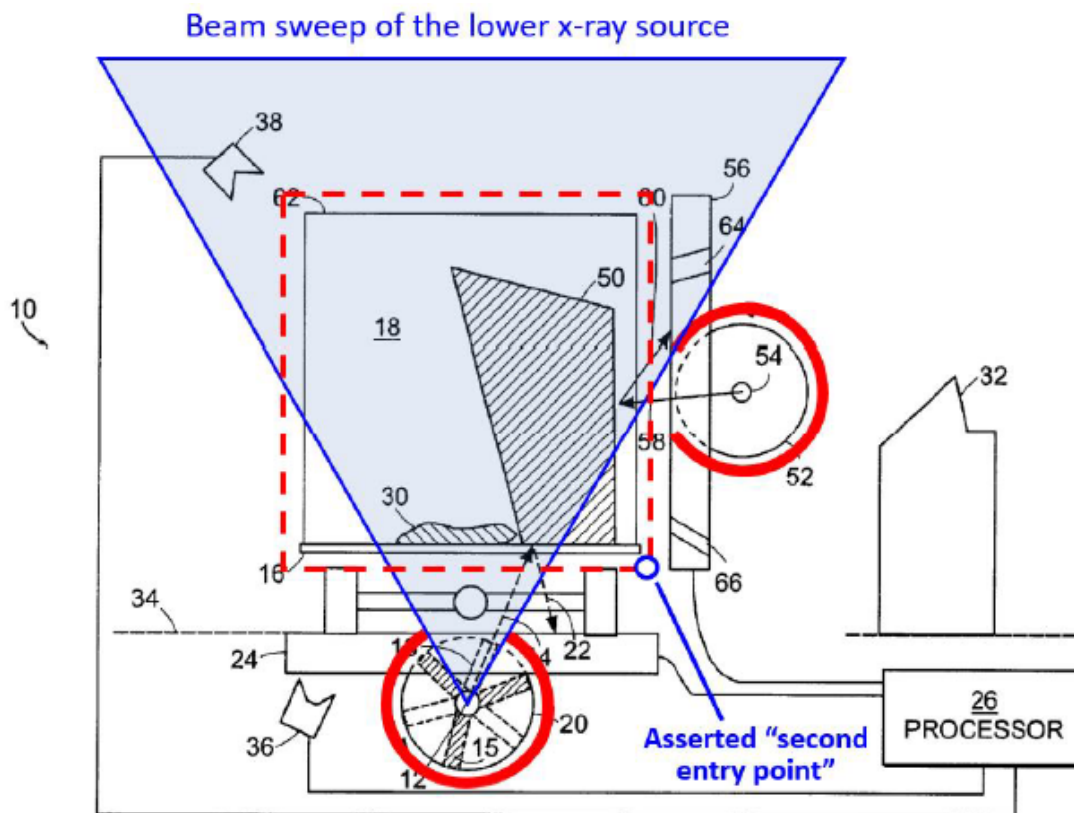
*ii. Whether Chalmers discloses limitation 1(b)
“scanning the object . . . starting at a second
entry point on the second plane that is adjacent a*

second edge between the first plane and the second plane”

Patent Owner contends that because of the limited scanning angle “Chalmers does not disclose that *scanning from the second perspective starts at the second entry point* Petitioner identifies.” PO Resp. 38–39. Patent Owner argues that “from what Chalmers does disclose, the *second entry point* would not be *adjacent a second edge between the first plane and the second plane.*” *Id.* at 39. More specifically, Patent Owner argues that

Chalmers discloses that its rotating chopper wheels have six spokes, and (as discussed above) an ordinary artisan would have understood this to mean that the scanning angle of each chopper wheel was less than 60°. *See* § IV.B.1. This scanning angle would mean that each scan starts far from the *second entry point* Petitioner identifies, as illustrated by the following figure.

Id. at 39.



Chalmers' Figure 1 is annotated by Patent Owner and Dr. Smith to show the alleged beam sweep of the lower x-ray source.

Petitioner, as it did with respect to limitation (a), argues that “[a]s discussed above, Chalmers does not limit the number of spokes to exactly six, and therefore the scanning angle for the rotating chopper wheels can exceed 60°.” Reply to PO Resp. 19. Patent Owner also argues that its Declarant, Dr. Lanza, provides testimony consistent with Patent Owner’s interpretation of “inspection space” and “establishes the boundaries of the inspection space by referencing the physical components (i.e., first and second detector arrangements).” *Id.*

For the same and similar reasons as limitation 1(a), we agree with Petitioner that Chalmers discloses scanning the object “starting at a second entry point on the second plane” as recited in limitation 1(b). First, we find Dr. Lanza’s testimony is consistent with the appropriate claim interpretation, namely “that an ‘inspection space’ is defined by the physical characteristics of a particular inspection system.” PO Resp. 25; Section II.C. 1. Dr. Lanza testified that “[i]n my opinion, the inspection space, i.e., the region appropriated for scanning the object, is the region delineated by the dimensions of the first and second detector arrangements. That region is depicted in the annotated Figure 1 of Chalmers ’764 shown below.” Ex. 1003 ¶ 125. Dr. Lanza’s annotated Figure 1 is reproduced below.



Lanza testifies further that

[a]s shown in the annotated Figure 1 of Chalmers '764 [above], a first edge (extending into the page) is formed where the top planar side and the right planar side of the Chalmers '764 inspection space meet, and a second edge (extending into the page) is formed where the right planar side and the bottom planar side of the Chalmers '764 inspection space meet.

Id. ¶ 127.

We are persuaded by Dr. Lanza’s testimony, as discussed above, also because it is consistent with Grodzins disclosure incorporated by reference into Chalmers. Ex. 1007 1:6–10. Grodzins explains that it was “known to persons skilled in the art to provide for scanning of beam 70 across a region of space which may include the target container 10.” Ex. 1008, 5:24–26. Again, given the structural arrangement of detectors 24 and 56, Dr. Lanza persuasively explains that Chalmers’ Figure 1 reveals “a cross-sectional

view of the inspection space, where drawings of the sides of the inspection space are not shown, a POSITA would understand that, in order to accommodate the vehicle/container 18 shown in Figure 1 of Chalmers '764, the inspection space of Chalmers '764 includes planar top, bottom, left, and right sides.” Ex. 1003 ¶ 126.

We again acknowledge Patent Owner’s argument, and Dr. Smith’s respective testimony, that Chalmers discloses an embodiment including a six spoke chopper wheel where “the scanning angle of each chopper wheel was less than 60°.” PO Resp. 39. However, this argument fails to explain why a chopper wheel with fewer than six spokes, and therefore wider angles as was also well-known in the art, would not encompass the inspection area, thereby “starting at a first entry point” as required by claim 1. This argument also fails to acknowledge or refute the testimony from Dr. Lanza, as well as Dr. Smith, that a person of ordinary skill in the art would have known to arrange a six-spoke chopper wheel in a position that would provide for scanning the entire vehicle within the “inspection area.” *See* Ex. 1051, 159:20–160:8 (Dr. Smith testifying that “a person skill in the art would certainly know how far to position an x-ray source away from the object to get a certain vertical or horizontal region of scanning.”).

In this regard, we are mindful of Patent Owner’s arguments as they relate to whether Chalmers is a proper anticipation reference. We find that it is. Chalmers does not expressly show the specific scanning angle of the radiation that emanates from the chopper wheel. But it is clear from reading Chalmers in context, as well as from Grodzins as incorporated by reference, that a person of ordinary skill in the art would consider the vehicle shown in Chalmers’ Figure 1 to be within “an ‘inspection space’ [] defined by the physical characteristics of a particular inspection system.” Section II. C.1.

In this case, commensurate with our claim construction, an “inspection space” as shown by Chalmers would be understood by a person of ordinary skill in the art as within the cross-section delineated by detectors 24 and 56 as shown in Figure 1. Ex. 1003 ¶¶ 125–127. It is well settled that “[t]here must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. *Scripps Clinic & Rsch. Found. v. Genentech, Inc.*, 927 F.2d 1565, 1576 (Fed. Cir. 1991).

Patent Owner argues that Dr. Lanza’s testimony insinuates that “the bottom of the inspection space would be at the level of the ground (reference number 34) in Figure 1.” PO Resp. 40 (citing Ex. 2003 ¶¶ 82–83). Patent Owner’s Declarant states that “Dr. Lanza should have identified the roadway (or other surface on which the truck rests or is driven) as the bottom planar side of the inspection space. No other ‘bottom side’ actually accommodates the vehicle.” This argument, however, takes Dr. Lanza’s testimony out of context. Ex. 2003 ¶ 83. Dr. Lanza never indicated that the roadway, or ground, is part of the “inspection space.” We appreciate that the vehicle wheels may not be accommodated within Chalmers’ inspection space, which Dr. Lanza has delineated as the cross-sectional area of the adjacent backscatter detectors 24, 56. Ex. 1003 ¶¶ 125–132. However, Dr. Lanza was consistent throughout his Declaration and testimony that the inspection space “is the region delineated by the dimensions of the first and second detector arrangements.” *Id.* ¶ 125.

Overall, we find persuasive Petitioner’s arguments and Dr. Lanza’s testimony that Chalmers discloses an “inspection space” delineated by detectors 24 and 56 shown by the dashed red box illustrated in each of Petitioner’s annotated figures. Indeed, this testimony fits hand-in-glove with

Patent Owner's claim interpretation that "an 'inspection space' is defined by the physical characteristics of a particular inspection system." PO Resp. 25; Section II.C.1. In conjunction with the testimony by both Declarants in this case that a person of ordinary skill in the art understood where to arrange the chopper wheel, regardless of the number of spokes, and to obtain a scan of the entire vehicle or object, we determine that Chalmers discloses that a scan of the vehicle beginning at the second entry point of the inspection space, as shown below in Dr. Lanza's annotated Figure 1 from Chalmers. Ex. 1051, 159:20–160:8.

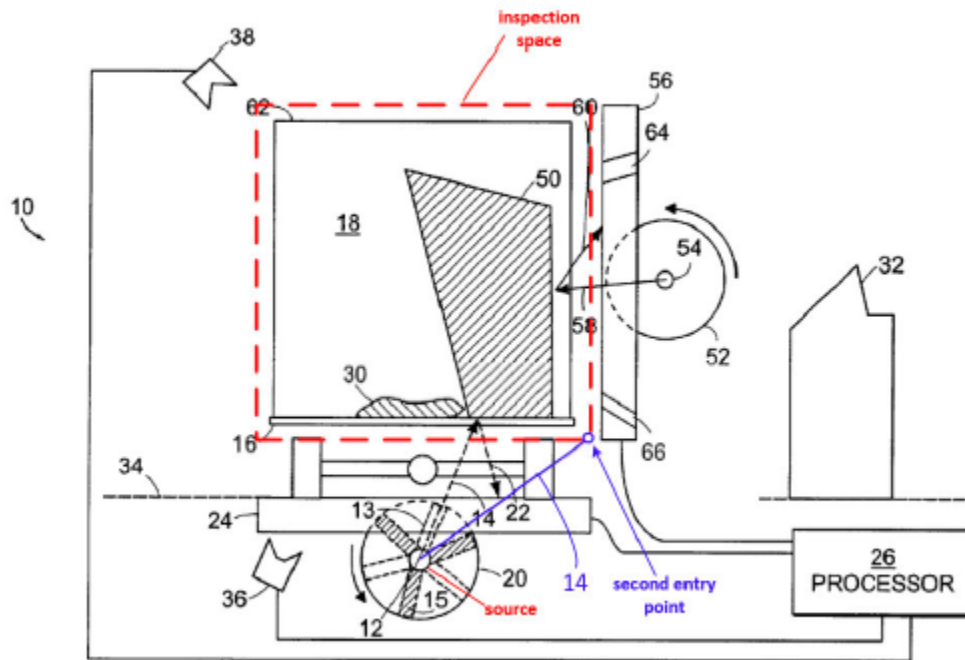


FIG. 1

Y

Figure 1 of Chalmers illustrates truck 18 with objects (contents) 30 and 50 within inspection space bounded by dashed red line, and a second entry point at bottom right of the inspection space where rotating pencil beam 14, highlighted purple, enters the inspection space, as it is defined by the physical characteristics of detectors 24 and 56. Ex. 1003 ¶ 137. We also determine that the second entry point disclosed by Chalmers coincides with,

and is adjacent, the second edge (extending into the page) between the first plane and the second plane of the inspection space as represented by Petitioner's dashed red box. *Id.*

Considering the evidence in Chalmers as well as Dr. Lanza's testimony, on the complete record before us we are persuaded that Chalmers discloses all the elements and functions in claim limitation 1(b) including, "scanning the object from a second perspective that is substantially orthogonal to a second plane that is adjacent to but not co-planar with the first plane, starting at a second entry point on the second plane that is adjacent a second edge between the first plane and the second plane." Ex. 1001, 8:54–59.

Overall, we find persuasive the evidence that Chambers discloses each and every element of claim 1, and thus claim 1 is anticipated.

3. Dependent claim 2

Claim 2 recites the step "wherein step (a) and step (b) are initiated at approximately the same time." *Id.* at 9:3–4. To meet this limitation, Petitioner argues that Chalmers' incorporation by reference of Grodzins discloses that it was known in the art to scan an object in the inspection space with two backscatter systems, at the same time, and how to avoid unwanted backscatter, i.e., cross-talk, between either two transmission scanners, and also between the two transmission scanners and the backscatter scanners

by a "temporal gating" sequence of pulses so that the horizontal transmission scanner pulses when the vertical transmission scanner is off, and vice-versa. In addition to this temporal separation, the two transmission scanners are also temporally separated from the two backscatter scanners, creating three time periods of scanning, depicted in Figure 4.

Pet. 28–29 (citing Ex. 1008, 4:57–64, Fig. 4). Figure 4 of Grodzins is reproduced below.

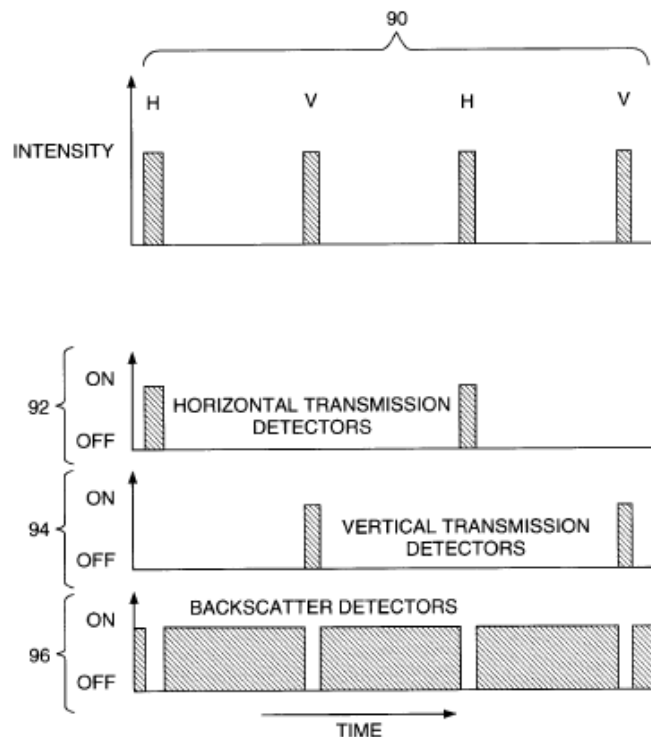


FIG. 4

Grodzins Figure 4, above, illustrates relative graphs of horizontal and vertical transmission detectors, 92, 94, as well as backscatter detectors 96, showing a time dependent, i.e., temporal, on-off “sequence for gating the transmission and backscatter detectors.” Ex. 1008 2:48–49. Importantly, as shown in Figure 4, above, at 96, Grodzins backscatter detectors, different from the transmission scanners, are shown as being operated together, simultaneously. *See id.* at 5:36–59 (Grodzins explaining that “[t]he time line . . . for the backscatter detectors [is shown] in line 96.”).

Although operating the backscatter systems at the same time can create undesirable “cross-talk,” Petitioner’s Declarant, Dr. Lanza, testifies that “Grodzins [] overcomes this backscatter scanner cross talk problem (due to simultaneous operation of the two backscatter sources) with physical

distancing.” Ex. 1003 ¶¶ 148 (citing Ex. 1008, 5:58–63). Dr. Lanza testifies that, because of the physical distancing between the two backscatter detectors, Grodzins “discloses the simultaneous timing of the two backscatter scanners performing the same function as the two backscatter scanners in Chalmers.” *Id.* ¶ 149.

Patent Owner argues that Grodzins “temporal gating” does not meet the limitations of claim 2 and that “the pencil beams in Grodzins are continuous.” PO Resp. 43 (citing Ex. 1008, 5:33–35). Patent Owner argues specifically that Grodzins only gates the backscatter detectors, not the pencil beams, and “[a]ccordingly, Grodzins does not disclose that its temporal gating applies to the scanning pencil beams.” *Id.* at 44. Patent Owner’s argument with respect to temporal gating is not persuasive because Petitioner is not arguing that Grodzins’ temporal gating between transmission and backscatter systems meets the limitations of claim 2. *See* Pet. 30 (Petitioner arguing Grodzins discloses “that unlike the transmission scanners that do not pulse at the same time, the two backscatter source assemblies 12 and 14 . . . are active at the same time”). Petitioner’s point is that there is temporal gating between the transmission and backscatter systems, and that the backscatter detectors as shown and described for example in Grodzins Figure 4 at 96 as operating simultaneously. *See* Pet. 29 (Petitioner arguing that the transmission scanners are “offset from the two ‘Backscatter Detectors’ that are represented as pulsing together.”) (citing Ex. 1008, 4:33–55).

Next, Patent Owner argues that “it is not enough that the two backscatter source assemblies of Chalmers ’764[] are *active* at the same time.” PO Resp. 44. Patent Owner argues specifically that “an ordinary artisan would have understood that the ‘wherein’ clause in claim 2 requires

the beams from each of the two scanning steps to be at their respective *entry points*, separated by a sufficiently short time.” *Id.* at 45 (citing Ex. 2003 ¶ 103). We disagree. Neither limitations 1(a) and 1(b), nor claim 2, “require[] *the beams* from each of the two scanning steps to be at their respective *entry points*,” at the same time, as Patent Owner argues. PO Resp. 45. First, there is no recitation in claim 1 or claim 2 of a backscatter “beam.” Ex. 1001, 8:47–9:4. Second, claim 1 does not recite any time or position dependent limitation as to *when* or *where* the backscatter radiation beam is as it sweeps across an object in the inspection space. Both limitations 1(a) and 1(b) recite “scanning the object . . . *starting* at a first [second] entry point in the inspection space.” Ex. 1001, 8:49–54 (emphasis added). In other words, there is no temporal or positional limitation in claim 1 that the “beams” be at the entry points *at the same time*. A plain reading of claim 1 does not require either the first or second scan *starting* when beams are at their respective first and second entry points. Accordingly, claim 2 also does not describe any specific location or time dependency of the beams, and simply requires that the scanning steps initiate, together, at the same time.

Moreover, Patent Owner points out that “each *scanning* step has a start (at an entry point) and an end (after establishing a *scan line trace*).” PO Resp. 44 (citing Ex. 1001, 8:49–60, 9:34–10:12). This is consistent with our claim construction of inspection space as being “defined by the physical characteristics of a particular inspection system.” Section II.C.1. The “entry point” of the “inspection space” is therefore the respective edge of the backscatter detectors. In other words, no matter where the beam might be, “scanning” occurs because the detectors receive backscatter radiation “substantially orthogonal to a first plane starting at a first entry point” as recited in claim 1. Ex. 1001, 8:49–51. This is consistent with the proper

claim construction of “scanning,” that is “sweeping a beam of penetrating radiation over an object and a detector measuring any backscatter from the beam of penetrating radiation.” Section II.C.2. In other words, the scanning steps in limitations 1(a) and 1(b) only require that the backscatter radiation detectors are active, and receive backscatter radiation from a beam sweeping across an object in the inspection area.

Claim 2 simply requires that “step (a) and step (b) are initiated at approximately the same time.” *Id.* at 9:3–4. Patent Owner has not explained persuasively how claim 2, by simply “initiat[ing]” the first and second scanning steps at the same time, somehow, time-wise and positionally, aligns two (unclaimed) “beams” together at the respective first and second entry points. A plain reading of claim 2 only requires that the scanning steps 1(a) and 1(b), initiate at the same time, including, as Patent Owner explains, the beams being anywhere between the entry point and establishing a scan line trace. PO Resp. 44 (citing Ex. 1001, 8:49–60, 9:34–10:12).

We determined that “‘scanning’ means ‘sweeping a beam of penetrating radiation over the object and a detector measuring the backscatter from the beam of penetrating radiation.’” Section II.C.2. Scanning, thus, occurs when the backscatter detectors are on and when the beam is sweeping the object within the inspection space. And, as shown and disclosed by Grodzins, scanning of the object by multiple backscatter detectors and radiation beams is known to occur simultaneously. Ex. 1008, Fig. 4, 5:36–63; Ex. 1003 ¶¶ 148. Dr. Smith’s testimony during his deposition essentially confirms this understanding:

Q. When you use the term “initiate scanning,” what do you mean by that?

- A. Initiating scanning is when you first start taking data from the imaging system during a scan line. It certainly in the normal case is when the x-ray beam appears on the object to be inspected, generating backscatter x-rays, and you start taking data from that backscattered x-rays.

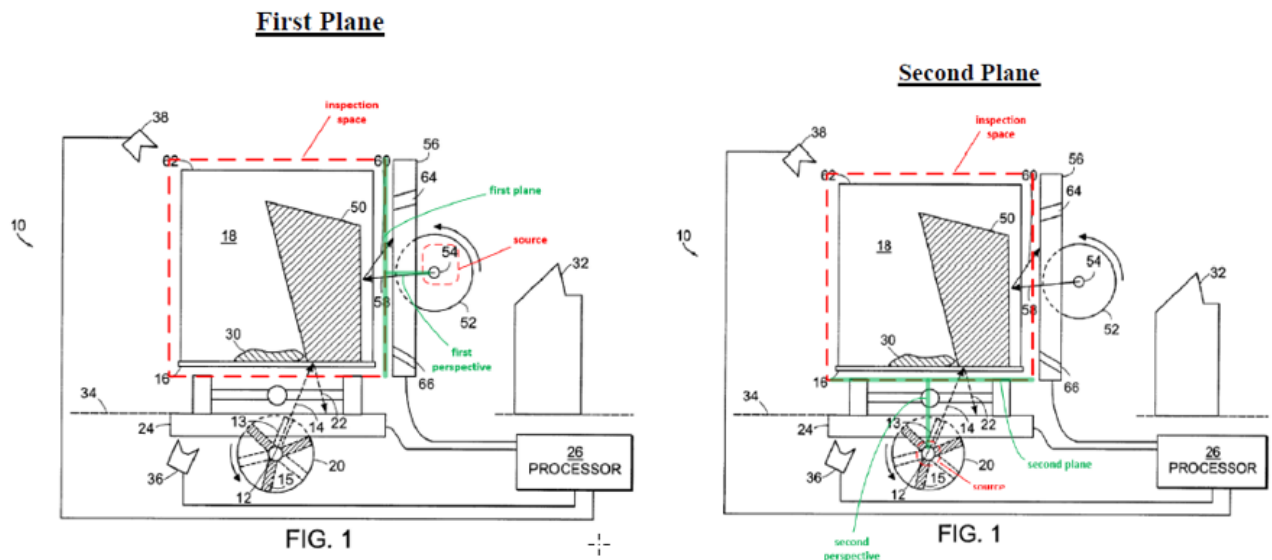
Ex. 1051, 160:13–20. This testimony informs us that scanning initiation is whenever data can be accrued by the system, which means the detector must be on and the beam is somewhere along its scan line for generating backscatter. Dr. Smith does not state that the beam is at any particular position along its scan line at “initiating,” only that it “appears on the object to be inspected.” *Id.*

Indeed, because Grodzins’ backscatter detectors are operated simultaneously *and* define the physical limitations of the claimed inspection space through which the radiation beams sweep, it is axiomatic that Grodzins’ backscatter scanners “are initiated” at approximately the same time as required by claim 2 regardless of where the radiation beam is as it sweeps the object in the inspection space. *See* Section II.C.1. (The Board agreeing with Patent Owner’s claim construction that “[a]n ‘inspection space’ is defined by the physical characteristics of a particular inspection system.”). In other words, no matter where, or when exactly, timing wise, the backscatter radiation beams sweep through the inspection space, as the proper claim construction requires, “sweeping a beam of penetrating radiation over the object and a detector measuring the backscatter from the beam of penetrating radiation” occurs in Grodzins when the backscatter detectors are simultaneously on and a beam is sweeping the object in the inspection area. Thus, Grodzins meets the limitation of claim 2 “wherein [scanning] step (a) and step (b) are initiated at approximately the same

time.” Ex. 1001, 9:3–4. On the complete record now before us, we determine that claim 2 is anticipated by Chalmers in view of Grodzin’s incorporation by reference.

4. *Dependent claim 3*

Claim 3 recites “[t]he method of claim 1 wherein the first plane is substantially orthogonal to the second plane.” *Id.* at 9:5–6.¹² Petitioner argues that as shown in its annotated versions of Figure 1, “Chalmers ’764 plainly shows, the first plane and second plane are preferably substantially orthogonal.” Pet. 31 (citing Ex. 1003 ¶ 150). We reproduce Petitioner’s annotated Figures 1 from Chalmers below.



Petitioner’s annotated Figure 1 on the left illustrates a first vertical plane highlighted in green and delineating the inspection space and, by comparison, on the right also highlighted in green, a second (horizontal)

¹² Although not at issue with respect to any claim interpretation issue, we note that Merriam-Webster defines “orthogonal” as “intersecting or lying at right angles.” MERRIAM-WEBSTER ONLINE DICTIONARY, <https://www.merriam-webster.com/dictionary/orthogonal> (last visited March 27, 2023).

plane, also delineating the inspection space, that is orthogonal to the first (vertical) plane.

Patent Owner did not provide substantive arguments with respect to claim 3, mainly arguing that claim 3 depends from claim 1 “and Petitioner fails as to [claim 3] for the same reasons it fails as to the respective corresponding independent claim”, i.e. claim 1. PO Resp. 31.

Having considered the entire record now before us, including the arguments and evidence presented by both parties, we adopt and incorporate Petitioner’s showing as to claim 3, as set forth in the Petition and summarized above, as our own. *See* Pet. 31–32. Accordingly, we are persuaded by Petitioner’s arguments and evidence that claim 3 is anticipated by Chalmers.

5. Dependent claim 7

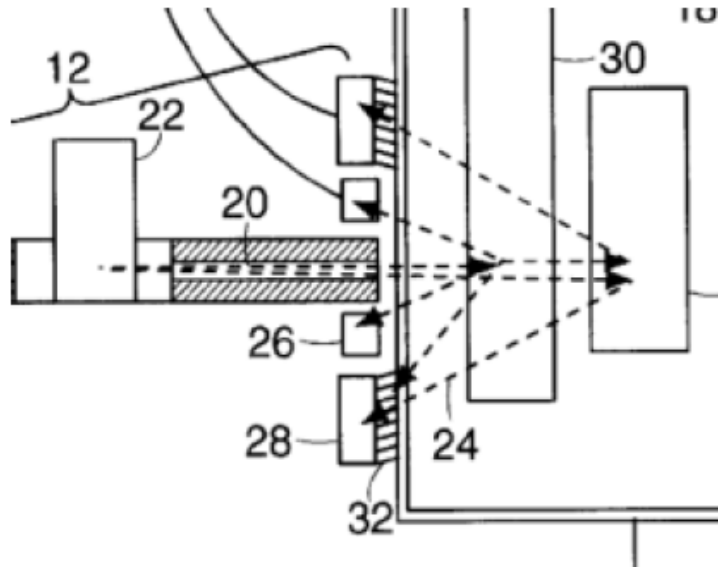
Claim 7 depends directly from independent claim 1 and recites in part “at least one step selected from the group consisting of step (a) and step (b) further comprises ortho-enhancing the scanning.” Ex. 1001, 9:29–31.

Petitioner argues that

[a]ccording to the ’763 Patent, “ortho-enhancing” is a “process of preferentially accepting signals that originate from a point that is substantially orthogonal to a radiation detector and at least partially shielding out signals that do not originate from a point substantially orthogonal to the detector (such as by using detector collimators 104).”

Pet. 32 (citing Ex. 1001, 4:61–67). Dr. Lanza testifies that considering Grodzins Figure 1, Grodzins discloses collimators 32 that “will accept signals that originate from a point that is ‘substantially orthogonal’ to the detector, while ‘least partially shielding out signals that do not originate from a point substantially orthogonal to the detector.’” Ex. 1003 ¶ 55.

Petitioner's and Dr. Lanza's testimony is persuasive, namely that Grodzins discloses "ortho-enhancing" as described and claimed in the '763 patent. Grodzins Figure 1 is reproduced, in part, below.



Grodzins Figure 1, partially reproduced above, illustrates pencil beam 20 and backscatter detectors 26 and 28 receiving backscatter radiation 24, and backscatter detectors 26 including collimators 32. Considering Figure 1, Grodzins describes, for example, that

[s]ince beam 20 is typically a pencil beam, i.e., a beam having a narrow angular extent, typically on the order of 1° , the source of detected scattering may be localized both with respect to depth and with respect to lateral position. In order to obtain greater spatial resolution of the source of scattered radiation, collimators 32 may be employed, as known to persons skilled in the X-ray art, for narrowing the field of view of segments of detector 28.

Ex. 1008, 3:66–4:8. Although neither Chalmers or Grodzins specifically recites the term "ortho-enhancing," Grodzins describes increasing the resolution of scattered resolution using collimators 32 that, in our understanding, "preferentially accept[s] signals that originate from a point

that is substantially orthogonal to a radiation detector” as the ’763 patent explains. *Id.*

Patent Owner did not provide substantive arguments with respect to claim 7, mainly arguing that claim 7 depends from claim 1 “and Petitioner fails as to [claim 7] for the same reasons it fails as to the respective corresponding independent claim”, i.e. claim 1. PO Resp. 31.

Having considered the entire record now before us, including the arguments and evidence presented by both parties, we adopt and incorporate Petitioner’s showing as to claim 7, as set forth in the Petition and summarized above, as our own. *See* Pet. 31–32. Accordingly, we are persuaded by Petitioner’s arguments and evidence that claim 7 is anticipated by Chalmers.

6. Independent claim 8

Independent claim 8 includes the same and similar limitations as independent claim 1 and also, as in claim 2, recites “wherein step (a) and step (b) are initiated at approximately the same time.” *Id.* at 10:11–12. Considering our analysis for claims 1 and 2 above, we are persuaded that Petitioner has shown by a preponderance of the evidence that Chalmers anticipates claim 8. *See* Section II.D.3.

7. Dependent claim 9

Claim 9 recites “[t]he method of claim 8 wherein the second perspective is diametrically-opposed to the first perspective.” Ex. 1001, 10:22–23. Petitioner argues that although Chalmers does not include a figure illustrating a second detector arrangement on a side “diametrically-opposed” to the first detector arrangement, Chalmer’s specification does describe an embodiment where a second detector is positioned either below, or diametrically opposed to a first detector. Pet. 42–43. Chalmers explains

that in addition to a first detector arrangement 56 and beam 58 “[a] similar detector arrangement 24 may be used supplementarily for detecting x-rays 22 Compton-scattered from beam 14 which may be disposed below vehicle 18, or, alternately, may be disposed on the side of vehicle 18 opposing beam 58.” Ex. 1007, 4:10–12.

Patent Owner does not provide substantive arguments with respect to claim 9, mainly arguing that claim 9 depends from claim 8 “and Petitioner fails as to [claim 9] for the same reasons it fails as to the respective corresponding independent claim”, i.e. claim 8. PO Resp. 31.

Having considered the entire record now before us, including the arguments and evidence presented by both parties, we adopt and incorporate Petitioner’s showing as to claim 9, as set forth in the Petition and summarized above, as our own. *See* Pet. 31–32. Accordingly, we are persuaded by Petitioner’s arguments and evidence that claim 9 is anticipated by Chalmers.

8. Dependent claim 12

Claim 12 recites, similar to claim 7, “[t]he method of claim 8 wherein at least one step selected from the group consisting of step (a) and step (b) further comprises ortho-enhancing the scanning.” Ex. 1001, 10:30–32. As discussed with respect to claim 7, although Grodzins does not specifically recite the term “ortho-enhancing,” Grodzins describes increasing the resolution of scattered radiation using collimators 32. *See* Ex. 1008, 3:66–4:8 (Grodzins describing that “[i]n order to obtain greater spatial resolution of the source of scattered radiation collimators 32 may be employed, as known to persons skilled in the x-ray art, for narrowing the field of view of segments of detector 28.”). Grodzins collimators 32, therefore, in our understanding, “preferentially accept[] signals that originate from a point

that is substantially orthogonal to a radiation detector” as the ’763 patent explains. Ex. 1001, 4:62–63.

Accordingly, we are persuaded by Petitioner’s arguments and evidence that claim 12 is anticipated by Chalmers.

9. Conclusion as to anticipation of claims 1–3, 7–9, and 12

We are persuaded that Petitioner has shown by a preponderance of the evidence that the challenged claims 1–3, 7–9, and 12 are anticipated by Chalmers, including Grodzins as incorporated by reference in Chalmers.

E. Ground 2: Claims 1–3, 7–9, and 12 – Obviousness over Chalmers (Ex. 1007) and Grodzins (Ex. 1008)

On the complete record before us, Petitioner has shown by a preponderance of the evidence that claims 1–3, 7–9, and 12 would have been obvious over Chalmers and Grodzins for the following reasons.

1. Independent Claim 1

Switching gears to obviousness over Chalmers and Grodzins, Petitioner reasons that “one having ordinary skill in the art would have been motivated to combine these references as they are directed to the same field of endeavor. Both were filed by the same assignee (owner of the challenged ’763 Patent), with a common co-inventor (Grodzins) and are directed to inspection systems using penetrating X-ray radiation to image objects.” *Id.* at 45 (citing Ex. 1003 ¶¶ 187–89). Petitioner argues that “the teachings of Chalmers[s] ’764 and Grodzins ’381 could be successfully combined because they disclose systems using the same type of equipment for the same purposes. Ex. 1003 ¶ 189.

Patent Owner does not expressly dispute the combination, but argues that for similar reasons as discussed above with respect to anticipation “Petitioner’s obviousness contentions therefore fail[] to overcome any of the

deficiencies in Ground 1 Patent Owner has established.” PO Resp. 46. Patent Owner argues more specifically that Petitioner “ignores the overall geometry of the claimed invention. The choice of where scanning begins is constrained by other design characteristics, including the angular extent of the scanning arc and the perspective of the scanning beam (among others).” *Id.* at 46 (citing Ex. 2003 ¶¶ 112–115). Patent Owner argues, similar to its position with respect to anticipation, that “the angular extent of the scanning arc in Chalmers is limited by the number of spokes in the rotating chopper wheels.” *Id.* According to Patent Owner, because of the limited scanning angle, “if the rightmost chopper wheel started scanning at the identified ‘edge of the inspection space,’ as Petitioner suggests, it would not ‘get a useable scan line trace over [the] entire object’—the truck—depicted in Figure 1 of Chalmers.” *Id.* Patent Owner also argues that shifting such a limited angle of scanning to start at the entry point would no longer permit a perspective that is “substantially orthogonal to a first plane that coincides with the right side of the inspection space.” *Id.* at 47.

We do not find Patent Owner’s limited scanning angle and different perspective arguments compelling for similar reasons as discussed above with regards to anticipation. It was well known in the art to use different numbers of spokes on a rotating chopper wheel. *See, e.g.*, PO Resp. 34–35 (“the scanning angle of a given chopper wheel would be designed to be no more than $\lceil 360^\circ \rceil$ divided by the number of ‘spokes’ in the wheel.”) (citing Ex. 2003 ¶¶ 89–90). And, Grodzins for example, discloses the use of less than 6, e.g., 4 and 5, spokes on a rotating chopper wheel. Ex. 1008, Figs. 3, 5. Notably, Patent Owner’s own Declarant, Dr. Smith, agreed that a person of ordinary skill in the art would have been motivated to scan the entire vehicle and, would also have known how to positionally and structurally

arrange the radiation source to scan the entire object, e.g. a truck. Ex. 1051, 150:18–151:2, 152:11–15, *see, e.g., id.* at 159:20–160:10 (Dr. Smith testifying that “[i]n general, a person skilled in the art would certainly know how far to position an x-ray source away from the object to get a certain vertical or horizontal region of scanning.”). Dr. Smith’s testimony in this regard is consistent with Dr. Lanza’s explanation, which we find persuasive, considering that in Figure 1 Chalmers discloses to a person of ordinary skill in the art “[t]he first perspective, which is the midpoint of the angle scanned by source 54, is substantially orthogonal to a first plane that coincides with the right side of the inspection space.” Ex. 1002 ¶ 130. *See KSR*, 550 U.S. at 401 (“if 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 his or her skill.”).

2. Claims 2 and 8

Patent Owner argues that Petitioner has failed to show that Chalmers in view of Grodzins discloses the limitations of claims 2 and 8. PO Resp. 48. Patent Owner contends that operating the scanners simultaneously, as in Grodzins Figure 4, is not sufficient to satisfy the limitation that the *scanning* steps are “initiated at approximately the same time.”

As we determined, above, for claims 2 and 8, we do not agree with Patent Owner’s position that Chalmers and Grodzins fail to disclose the scanning steps “initiated at approximately the same time.” The proper claim construction of “scanning” includes “sweeping a beam of penetrating radiation over the object and a detector measuring the backscatter from the beam of penetrating radiation.” Section II.C.2. Scanning does not require the beam being in any particular position along its scan line as Patent Owner

asserts. Scanning, thus, occurs when the backscatter detectors are on and the beam is sweeping the object within the inspection space.

To the extent that claims 2 and 8 could be understood as potentially aligning radiation beams at the entry points at the same time, as shown and disclosed by Grodzins, scanning of the object by multiple backscatter detectors and radiation beams is known by those of ordinary skill in the art to occur simultaneously. Ex. 1008, Fig. 4, 5:36–63; Ex. 1003 ¶¶ 148. With respect to aligning radiation beams at the same respective entry points, we find persuasive Dr. Lanza’s testimony that

[t]o the extent Chalmers ’764 is not deemed an anticipation because it does not expressly specify an “entry point” with respect to “the inspection space” in the same terminology, it would have been obvious to start at the edge of the inspection space because that is the most logical place to start when inspecting an area to get a useable scan line trace over the entire object.

Ex. 1003 ¶ 187. To this end, Dr. Lanza testifies further that “it would have been obvious to operate the backscatter scanners of Chalmers simultaneously as taught by Grodzins ’381 to use the entire bandwidth of the scanners and gather more data about the inspected object.” *Id.* ¶ 189. Patent Owner’s response to Dr. Lanza’s testimony in this regard again relies upon the assertion that “[t]he choice of where scanning begins is constrained by other design characteristics, including the angular extent of the scanning arc and the perspective of the scanning beam (among others).” PO Resp. 46 (citing Ex. 2003 ¶¶ 112–115). We find Dr. Lanza’s testimony the most persuasive, particularly because, as discussed above, it was well within the level of ordinary skill in the art, and in fact beneficial, if not necessary, to arrange the physical elements of a radiation backscatter scanner, including

the chopper wheel, in a manner to complete a full scan of an object within a designated inspection space.

3. Dependent claims 3, 7, 9, and 12

Patent Owner does not directly address the remaining dependent claims, 3, 7, 9, and 12 challenged in the second obviousness ground, other than asserting that these claims are non-obvious for the same reasons as their respective base claims 1, 2, and 8. PO Resp. 47.

As for dependent claims 3, 7–9, and 12, we have considered, and on the complete record at this point in the proceeding, accept as our own, Petitioner’s arguments and evidence set forth at pages 31–46 of the Petition. Accordingly, we determine that Petitioner has shown by a preponderance of the evidence that dependent claims 3, 7, 9, and 12 would have been obvious over Chalmers and Grodzins.

4. Conclusion as to obviousness of claims 1–3, 7–9, and 12

We are persuaded that Petitioner has shown by a preponderance of the evidence that challenged claims 1–3, 7–9, and 12 are obvious over Chalmers and Grodzins.

F. Grounds 3 and 4: Claim 4 – Anticipation by Cason, and obviousness over Cason, Chalmers and Grodzins

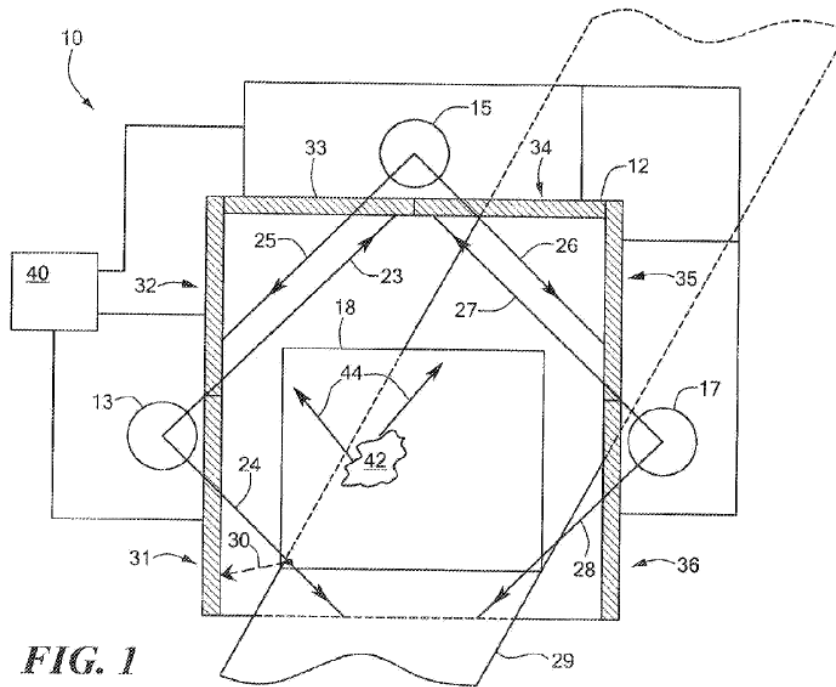
On this record, Petitioner has shown by a preponderance of the evidence that claim 4 is obvious over by Cason, Chalmers and Grodzins for the reasons explained below.

1. Cason (Ex. 1011)

Cason is directed to “[a] system and method for inspecting an object with multiple sources of penetrating radiation.” Ex. 1011, Abstract, code (57). Cason describes that

[i]rradiation of the inspected object by the sources is temporally sequenced such that the source of detected scattered radiation is unambiguous. Thus, multiple views of the inspected object may be obtained and image quality may be enhanced, even in a compact geometry in which the beams are substantially coplanar.

Id. Cason's inspection system is shown in Figure 1, reproduced below.



Cason's Figure 1 illustrates a cross-section and schematic view of inspection system 10. *Id.* at 3:24–26. Sources 13, 15, and 17 are orthogonally arranged to provide penetrating radiation, e.g., x-ray pencil beam 23, to scan object 18. *Id.* at 3:28–30. From beam 24, Compton-scatter x-ray 30 is shown by the arrow being detected by scatter detector 31. Cason's system includes scatter detectors 31–36 encompassing an area around object 18 for detecting backscatter from sources 13, 15, and 17. *Id.* at 4:23–33.

Cason, like the '763 patent, is directed to the problem of cross-talk, and explains that “cross talk is advantageously reduced or eliminated by ensuring that only one source is emitting radiation at a time.” *Id.* at 5:2–4. A solution proposed by Cason is “temporal sequencing” where

[t]he beams from each source sweep in sequence, such that no more than one source is emitting radiation at a time. Thus, source (or ‘imager’) 13 sweeps its beam first. Radiation scattered from the object, as represented by rays 44 is received by all of the detectors. The signals from each of the detectors are acquired as separate channels by an acquisition system. This process is repeated for each of the three imagers, creating “slices” of the object as it moves by.

Id. at 5:44–51.

2. Dependent claim 4 – Obviousness over Cason, Chalmers and Grodzins

Claim 4 depends directly from claim 1 adding an additional radiation scanning step and simultaneous scanning limitation, reciting in relevant part:

(e) scanning the object from a third perspective that is substantially orthogonal to a third plane that is adjacent to but not co-planar with the second plane, starting at a third entry point on the third plane that is adjacent a third edge between the second plane and the third plane . . . *wherein step (a), step (b) and step (e) are initiated at approximately the same time*

Ex. 1001, 9:8–12 (emphasis added).

Petitioner argues that Cason incorporates by reference Chalmers, which, as previously discussed, incorporates Grodzins by reference, and that at least based on this incorporation by reference, a person of ordinary skill in the art would have been motivated to combine Cason and Chalmers “as they are directed to the same field of endeavor. Both were filed by the same assignee (owner of the challenged ‘763 Patent), and are directed to inspection systems using penetrating X-ray radiation to image objects.” Pet. 52 (citing Ex. 1003 ¶ 199). Petitioner reasons that, given the disclosure of two imaging systems in Chalmers, “it would have been obvious to add a third system in Chalmers ’764, as taught by Cason ’701, in order to provide

an image from a third perspective, which provides more information about the inspected object and greater security.” *Id.*

Given the proposed combination of Cason and Chalmers, Petitioner argues that “[c]laim 4 adds a third perspective. However, these same three perspectives are disclosed in Cason ’701, and Cason ’701 incorporates by reference Chalmers ’764.” *Id.* at 48; *see also* Ex. 1011, 1:29–36 (Cason stating that Chalmers “teaches backscatter inspection of a moving vehicle by illuminating the vehicle with x-rays from above or beneath the moving vehicle, as well as from the side.”). Petitioner argues that because it is incorporated by reference, “the teachings of Chalmers ’764 as to the structures and method of scanning using a two-scanner system are applicable to the three-scanner system of Cason ’701.” Pet. 51 (citing Ex. 1003 ¶ 197).

Patent Owner does not specifically dispute the motivation or reason to combine Cason, Chalmers, and Grodzins. PO Resp 48–49. Patent Owner’s first argument is that “Petitioner fails to prove claim 4 is anticipated or obvious for at least the same reasons it fails for claim 1.” PO Resp. 48 (citing Ex. 2003 ¶¶ 120–122). However, as discussed above, we determine that Petitioner has shown by a preponderance of the evidence that claim 1 is anticipated by Chalmers and also obvious over Chalmers and Grodzins. Section II.D–E. Patent Owner’s second argument, which we address below, is that “Petitioner fails to show that Cason discloses or renders obvious the limitation that all three scanning steps *are initiated at approximately the same time.*” Pet. 49 (emphasis added). Patent Owner argues specifically that “Cason affirmatively teaches that scans from multiple perspectives do not happen at the same time.” *Id.* (citing Ex. 1011, 5:1–4).

Cason expressly incorporates Chalmers by reference without qualification. *See* Ex. 1011, 1:31–33 (Cason stating “U.S. Pat. No.

6,459,764, to Chalmers et al. (the ‘Chalmers patent’), issued Oct. 1, 2002, and incorporated herein by reference.”). *Paice LLC v. Ford Motor Co.*, 881 F.3d at 907. Cason specifically points out that “[t]he Chalmers patent teaches backscatter inspection of a moving vehicle by illuminating the vehicle with x-rays from above or beneath the moving vehicle, as well as from the side.” *Id.* at 1:34–36. Cason includes Figures 3 and 4, labeled “Prior Art,” which are substantially identical to Chalmers Figures 1 and 2. Based on this incorporation by reference, Petitioner relies on Chalmers therefore for “disclos[ing] the same configurations and method steps as to both two perspective claimed embodiments of the ’763 Patent, where the perspectives are adjacent or diametrically opposed.” Pet. 47–48. According to Petitioner, Cason mainly adds the additional scanner and a third perspective as recited in claim 4. *Id.*

Cason establishes that it was well known to use three perspectives for imaging an object. *See* Ex. 1011, 3:29–33 (“Portal 12 supports a plurality of sources 13, 15, and 17 of penetrating 30 radiation. Sources 13, 15, and 17 are typically x-ray tubes having beam forming and steering mechanisms known in the art.”). And, as Patent Owner points out, Cason discloses an embodiment that reduces cross-talk by sequencing the beams of penetrating radiation. *See* Ex. 1011, 2:9–10 (Cason describing that the inspection system may have two or more beams of penetrating radiation and that “[t]he beams of penetrating radiation are temporally interspersed.”). According to Cason, “[b]y virtue of temporal sequencing which reduces or eliminates cross-talk, sources may be placed in greater proximity than otherwise possible.” *Id.* at 5:33–35.

Cason’s disclosure of an embodiment including beam sequencing does not, however, negate the disclosure in Chalmers, as it incorporates

Grodzins by reference, that “scanning” by multiple detection systems can occur at the same time, and that the systems may be placed sufficiently apart to reduce cross-talk. Ex. 1008, Fig. 4, 5:56–59. A person of ordinary skill in the art would have understood that there are at least two ways to reduce cross-talk. One way, taught by Grodzins, is separating the detector devices sufficiently to reduce the overlap of backscatter from the detector devices. Ex. 1008, 5:56–59. Another way, as described by Cason, is sequencing the radiation beams. Ex. 1011, 5:44–51.

As discussed above, we determined that “‘scanning’ means ‘sweeping a beam of penetrating radiation over the object and a detector measuring the backscatter from the beam of penetrating radiation.’” Section II.C.2.

Scanning, thus, occurs when the backscatter detectors are on and when the beam is sweeping the object within the inspection space. And, as shown and disclosed by Grodzins, scanning of the object by multiple backscatter detectors and radiation beams is known to occur simultaneously. Ex. 1008, Fig. 4, 5:36–63; Ex. 1003 ¶¶ 148. With respect to a third perspective, Petitioner’s Declarant, Dr. Lanza testifies that “[i]n my opinion, the teachings of Chalmers ‘764 as to the structures and method of scanning using a two-scanner system are applicable to the three-scanner system of Cason ‘701.” Ex. 1003 ¶ 197. Dr. Lanza testifies further that “it would have been obvious to add a third system in Chalmers ‘764, as taught by Cason ‘701, in order to provide an image from a third perspective, which provides more information about the inspected object and greater security.” *Id.* ¶ 200. Dr. Lanza explains further that

Chalmers ‘764 (which incorporates Grodzins ‘381) discloses the same configurations and method steps as to both two perspective claimed embodiments of the ‘763 Patent, where the perspectives are adjacent or diametrically opposed. Claim 4 adds a third

perspective. However, these same three perspectives are disclosed in Cason '701, and Cason '701 incorporates by reference Chalmers '764.

Ex. 1003 ¶ 191

Overall, we are persuaded that Petitioner has shown a preponderance of the evidence that a person of ordinary skill in the art would have understood from Grodzins, as it is incorporated by reference into Chalmers, that multiple backscatter detector systems can initiate “scanning” at the same time. *See* Ex. 1008, 5:58–63 (“cross talk is minimized by spatially separating the backscatter systems 12 and 14. A 15 feet separation, which is quite practical when scanning a 40-foot container, reduces the cross talk to insignificance since pencil beams 70 are relatively weak.”). We appreciate that Cason’s main embodiment discloses sequencing the radiation beams, rather than simultaneous scanning as in Grodzins. Ex. 1011, 5:1–4. Yet, “when a patent ‘simply arranges old elements with each performing the same function it had been known to perform’ and yields no more than one would expect from such an arrangement, the combination is obvious.” *KSR*, 550 U.S. at 417, *citing Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976). Based on the substantial prior art evidence and the level of ordinary skill in the art in this case, it is not a significant leap to initiate Cason’s three scanning perspectives together where two are expressly taught in Chalmers and Grodzins. Therefore, we are persuaded that Petitioner has shown by a preponderance of the evidence that a person of ordinary skill in the art would have known to combine Cason’s teaching of scanning from three perspectives with Chalmers’ and Grodzins teaching simultaneous scanning, thus rendering obvious the limitation that all three scanning steps “are

initiated at approximately the same time” as recited in dependent claim 4.
Ex. 1001, 9:15.

3. Conclusion as to claim 4

We are persuaded that Petitioner has shown a preponderance of the evidence that claim 4 would have been obvious over Cason, Chalmers, and Grodzins as incorporated by reference in Chalmers. Because we determine that claim 4 would have been obvious over Cason, Chalmers, and Grodzins, we do not reach the question of whether claim 4 is anticipated by Cason and the relative incorporation by reference of Chalmers and Grodzins.

G. Ground 5 – Obviousness of claims 5 and 10 over Chalmers, Horn, and Annis

On this record, Petitioner has shown by a preponderance of the evidence that claims 5 and 10 would have been obvious over Chalmers, Horn, and Annis for the following reasons.

1. Horn (Ex. 1012)

Horn discloses a device for x-ray imaging of an object, including a detector formed of individual detector elements where “interrogation of the detector elements, or scan of the television camera image, may be synchronized with the movement of the X-ray source.” Ex. 1012, Abstract. In other words, Horn teaches that during scanning of an object the detector response is limited to specific detector element responses due to the x-ray beam. *Id.* at 2:49–56. Horn explains that to reduce overlapping “shadows” of x-rays, “[t]hrough each detector element 27 upon which an X-ray beam is incident may be excitable by that beam, the outputs of only a selected one or more of the detector elements is contemporaneously output for processing and/or display.” *Id.* at 4:21–25.

2. Annis (Ex. 1047)

Annis discloses a method and apparatus for reducing “afterglow” during x-ray imaging. Ex. 1047, 1:8–10. Annis explains that “afterglow” occurs when “a plurality of delayed light photons are generated that subsist for a time comparable to the time required to sweep the beam across portions of the objects.” *Id.* at 1:55–57. According to Annis, afterglow “adversely affects the signal-to noise ratio of the conventional X-ray inspection system 10 and is, thus, a limiting factor in the efficiency of that system.” *Id.* at 1:58–60. To solve this problem, Annis proposes that

when the short X-ray pulses generated by the source are intercepted by the detector, the outputs of the photomultiplier tubes are sampled for only a short period of time, which sampling period is immediately followed by a substantially longer quiescent period of time during which the photomultiplier tubes are not sampled.

Id. at 2:19–25. Annis explains further that selective “[d]e-activation of the tubes may be accomplished in connection with the electronic circuit 60 by disabling the outputs of the photomultiplier tubes since the location of the incident beam may be measured at the rotating cylindrical collimator 40.” *Id.* at 7:37–41.

3. Dependent claims 5 and 10

Dependent claims 5 and 10, which depend directly from independent claims 1 and 8, respectively, are essentially the same. Claim 5 recites:

The method of claim 1 further comprising time gating of scintillation detections during at least one step selected from the group consisting of step (a) and step (b).

Ex. 1001, 9:23–25. Petitioner argues that “[a]t the time of the alleged invention of the ’763 Patent, a POSITA understood the problem of ‘cross-talk’ between the CBI/detector systems. That is, backscatter from one CBI

beam may cause noise (a signal that is spatially irrelevant) in another CBI beam’s detector.” Pet. 60 (citing Ex. 1001, 1:54–62). Petitioner’s Declarant, Dr. Lanza, testifies that “Horn ‘075 and Annis ‘393 solve the same problem of noise by selectively accepting detections based on the position of an X-ray beam, which, in my opinion, is the definition of ‘time-gating’ specified in the ‘763 Patent, and claimed in claim 5.” Ex. 1003 ¶ 223.

Patent Owner argues that “Petitioner has shown no motivation to combine the purported teachings of Horn and/or Annis with those of Chalmers.” PO Resp. 49. Patent Owner makes two specific arguments: (1) “the mere fact that references are analogous or are in the same field is not enough to support finding a motivation to combine.” *Id.* (citing *Rembrandt Wireless Techs., LP v. Samsung Elecs. Co.*, 853 F.3d 1370, 1379–80 (Fed. Cir. 2017)); and (2) “Petitioner provides no evidence that the purported teachings of Horn and/or Annis would have mitigated any noise present in the Chalmers system nor identified any reason an ordinary artisan would have thought they would.” *Id.* at 50. We address these arguments in turn.

a) Whether Petitioner has presented sufficient motivation to combine Chalmers, Horn, and Annis.

Petitioner argues that a person of ordinary skill in the art would have been motivated to combine Chalmers, Horn, and Annis because they are analogous art “directed to nondestructive inspection systems using penetrating radiation to image objects.” Pet. 53 (citing Ex. 1007; Ex. 1012; Ex. 1047; Ex. 1003 ¶¶ 201–206). According to Petitioner, Chalmers recognizes that undesirable noise and cross-talk can occur between multiple transmission radiation systems and backscatter radiation systems. *Id.* (citing Ex. 1008, 5:44–65; Ex. 1003 ¶ 202). Horn, Petitioner argues, similarly

“recognizes the undesirable problems associated with the appearance of shadows on the image from the combined effects of overlapping X-ray beams having differing angles of incidence.” *Id.* (citing Ex. 1012, 4:39–49). Annis, Petitioner asserts, “recognizes the afterglow noise in an x-ray inspection system, where photomultiplier detectors used to detect primary scatter are also subject to delayed light photons from afterglow of the scintillator material – which introduces noise.” *Id.* at 53–54 (citing Ex. 1047, 1:55–60; Ex. 1003 ¶ 204). Petitioner’s Declarant, Dr. Lanza, testifies that “each of these references provide solutions to these common problems with X-ray inspection systems that seek to enhance image resolution through reduction of noise/cross-talk/shadows/afterglow, and thus a POSITA would be motivated to combine their teachings.” Ex. 1003 ¶ 205.

Disputing the combination, Patent Owner argues that Chalmers relates to backscatter imaging, and “[b]y definition, backscatter imaging does not involve ‘X-ray beams pass[ing] through [an] object’ on their way to a ‘detection surface.’ . . . [t]hat describes transmission imaging, to which Horn and Annis both relate.” PO Resp. 50 (citing Ex. 2003 ¶¶ 124–126). We appreciate that transmission and backscatter imaging are different imaging techniques. But Chalmers incorporates Grodzins by reference which describes an inspection system using *both* transmission and backscatter detection systems for imaging an object. Ex. 1008, Abstract. In fact, Grodzins is titled “Gated Transmission and Scatter Detection for X-Ray Imaging.” *Id.* Code 54. Grodzins also sequences or “gates” the backscatter and transmission detectors so “each of the detectors is insensitive to any radiation or detector noise that is present when their respective x-ray beams are off.” *Id.* at 5:20–52.

Importantly, claims 5 and 10 recite “time gating of scintillation detections.” Ex. 1001, 9:23–24, 10:24–25. This necessarily involves more specifically the detectors, not so much the type of radiation beams. Patent Owner’s arguments do not address or explain sufficiently why the type of beam, backscatter or transmission, particularly matters. The purpose of Grodzins time-gating is to eliminate the reception of undesirable radiation by a detector, apart from that of each detector’s respective x-ray source. Horn similarly desires to select the most desirable radiation beams to form an image, disclosing that

[i]n one application, synchronization circuit 51 and output control circuit 50 cooperate such that only the detector element directly opposite the point source is sampled as the X-ray source traverses a pattern along the surface of tube 11.

Ex. 1008, 5:29–33. Regardless of the type of radiation beams, we find Dr. Lanza’s testimony persuasive, that like Chalmers and Grodzins cross-talk issue,

Horn ‘075 recognizes the undesirable problems associated with the appearance of shadows on the image from the combined effects of overlapping X-ray beams having differing angles of incidence, yet impacting the detector surface at the same location, i.e., X-ray beams that were transmitted from different positions and pass through the object at different angles.

Ex. 1003 ¶ 203 (citing Ex. 1012, 4:39–49). Based on the evidence before us, we find, Horn’s detector operation, similarly time-gated to receive desired radiation from a particular source, transmission or otherwise, is certainly sufficient motivation for a person of ordinary skill in the art to consider Horn’s detector time-gating teachings in combination with Chalmers and Grodzins, as it is incorporated by reference. *See KSR*, 550 U.S. at 420 (“any need or problem known in the field . . . and addressed by the patent can

provide a reason for combining the elements in the manner claimed”). It is error to “hold[] that courts and patent examiners should look only to the problem the patentee was trying to solve.” *Id.*

Annis similarly discusses operation of photomultiplier tubes and radiation detectors, only with respect to “afterglow” as opposed to incident x-ray beams. Ex. 1047, 1:8–10. Whether it is afterglow, transmission radiation, or backscatter radiation, the motivation tying these references together is the issue of detection and detecting the most desirable radiation for an accurate scan and image. Perhaps more correctly, it is the motivation of *not* wanting to detect afterglow or radiation from non-associated, and undesirable x-ray beams, i.e. cross talk and shadows, by a given detector that would lead one of ordinary skill in the art to combine these references. Dr. Lanza explains persuasively that Horn and Annis “provide solutions to these common problems with X-ray inspection systems that seek to enhance image resolution *through reduction of noise/cross-talk/shadows/afterglow*, and thus a POSITA would be motivated to combine their teachings.” Ex. 1003 ¶ 205 (emphasis added).

Having considered all the evidence before us, we determine that Petitioner has shown by a preponderance of the evidence that a person of ordinary skill in the art would have been motivated to combine Chalmers, Horn, and Annis.

b) Whether Horn and/or Annis would have mitigated any noise present in the Chalmers system

Petitioner argues that a person of ordinary skill in the art would have recognized that Horn’s “detector array may effectively respond only to X-rays having an angle of incidence substantially normal to the upper surface of the detector elements.” Pet. 58 (citing Ex. 1012, 5:29–36; Ex. 1003

¶ 214). And, Petitioner argues, similarly, with respect to afterglow, “Annis ’393 teaches selectively deactivating detector elements (photomultipliers) based on the position of the X-ray beam.” Pet. 17 (citing Ex. 1047, 7:32–44).

Dr. Lanza testifies that a person of ordinary skill in the art “familiar with Horn ’075 and Annis ’393 would find that these references help solve the problem where due to movement of the X-ray point source, the X-ray beams pass through the object being X-rayed at differing angles and form shadows as their paths overlap [i.e., “cross-talk”] on route to the photographic or detection surface. The resulting images may, therefore, exhibit a lack of sharpness and uniformity.” Ex. 1003 ¶ 222. We are persuaded by Petitioner’s arguments and Dr. Lanza’s testimony that considering Chalmers “[b]oth Horn ’075 and Annis ’393 solve the same problem of noise by selectively accepting detections based on the position of an X-ray beam, which is the definition of ‘time-gating’ specified in the ’763 Patent, and claimed in claim 5.” The evidence in Horn and Annis tends to show that better data, and therefore improved images, can be determined in radiation imaging when radiation that is either not mostly orthogonal, i.e. not normal to the detector, as in Horn, or untimely, e.g., Annis’s after glow, compromises the desired received radiation. Ex. 1012, 4:21–25; Ex. 1047, 1:58–60.

Patent Owner argues that Dr. Lanza essentially admitted that Horn does not improve its own image quality during his deposition. PO Resp. 51 (citing Ex. 2002, 226:3–6, 8–227:13). Patent Owner argues that “[i]f Horn does not improve its own image quality, there is no reason to think it would have improved the quality of backscatter images in Chalmers, as Petitioner asserts.” *Id.* We acknowledge that Dr. Lanza explained during his

deposition that Horn may not be particularly efficient “[b]ecause of all the x-rays being produced here, only a small fraction, [Horn is] taking one particular element, and those are the only x-rays they’re using.” Ex. 2002, 226:19–22. However, Dr. Lanza also explained that noise is a problem:

Q. Would you agree that noise -- let me back up. Would you agree that any one source of noise could be a problem in some applications and not in others?

...

A. Noise is always a problem. It’s a question of how big a problem you want it to be. There are some applications in which you don’t care that you get a very precise measurement, so you’re not concerned so much about noise. Others require quite good precision, and you are concerned about noise.

Id. at 188:14–20. It is not necessary that an exact embodiment taught by Horn would be combined with Chalmers, only that one of skill in the art would be able to consider the teachings in Horn, and using the technical abilities appertaining to one of ordinary skill in the art, apply Horn’s teaching of “select[ing] outputs only from those detector array elements in a predetermined position with respect to the contemporaneous location of the point source **25** of the X-ray beams” to Chalmers. Ex. 1012 4:7–10, *see also Lear Siegler, Inc. v. Aeroquip Corp.*, 733 F.2d 881, 889 (Fed. Cir. 1984) (one of ordinary skill is not compelled to blindly follow the teaching of one prior art reference over the other without the exercise of independent judgment); *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (“The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference”). Moreover, Horn recognizes that x-ray beams of various angles of incidence could also be captured by the detector where Horn describes “[t]hough each detector

element 27 upon which an X-ray beam is incident may be excitable by that beam, the outputs of only a selected *one or more of the detector elements* is contemporaneously output for processing and/or display.” *Id.* at 4:21–25 (emphasis added), *see also id.* at 4:37–39 (Horn explaining that “[v]iews from different angles of incidence may provide greater detail of the three dimensional object being examined.”).

4. Conclusion as to obviousness of claims 5 and 10

On the complete record now before us we are persuaded that Petitioner has shown by a preponderance of the evidence that claims 5 and 10 would have been obvious over Chalmers, Horn, and Annis.

H. Ground 6 – Obviousness of claims 6 and 11 over Chalmers and the knowledge of a person of ordinary skill in the art

On this record, Petitioner has shown by a preponderance of the evidence that claims 6 and 11 would have been obvious over Chalmers and the knowledge of a person of ordinary skill in the art for the following reason.

1. Claims 6 and 11

Claim 6 depends directly from claim 1 and recites the further step “weighting of scintillation detections during at least one step selected from the group consisting of step (a) and step (b).” Ex. 1001, 9:26–28. Claim 11 is basically the same, and depends directly from independent claim 8. *Id.* at 10:27–29. The ’763 patent describes that

[s]ome embodiments of systems for scanning an object may employ “weighted smart sensor arrays.” Weighted smart sensor arrays, as the term is used herein, are sensor arrays where the intensity of a detected scintillation is multiplied by a weighting factor depending upon the sweep position of a radiation beam.

Ex. 1001, 7:26–31.

Patent Owner argues that “Petitioner never addresses the limitations of the independent claims in its arguments for Ground 6.” PO Resp. 53.

We disagree that Petitioner fails to address the “weighting of scintillation detections” limitations in claims 6 and 11. Petitioner argues that “weighting of observations is a common principle across many disciplines for favoring certain data that is more relevant, and disfavoring data that is less relevant or exhibits larger errors.” Pet. 66 (citing Ex. 1014; Ex. 1003 ¶ 234). Dr. Lanza testifies that where secondary undesirable backscatter detections are occurring, a person of ordinary skill “would be motivated to further manipulate the data in image reconstruction in the system processor of Chalmers ‘764 to further favor and weight the best detection data of the already narrowed data set from these hardware manipulations.” Ex. 1003 ¶ 237. Dr. Lanza testifies that “the weighting of detection data as claimed in the ‘763 patent is within the general knowledge of the POSITA. In my opinion, the use of weighting of detection data for x-ray systems in the prior art is well established, and common.” *Id.* ¶ 239.

Dr. Lanza supports his testimony with reference to certain publications, including CHAMBERS DICTIONARY OF SCIENCE AND TECHNOLOGY, Chambers Harrap Publishers Ltd., 1999, explaining that “weighting of observations is a common statistics principle used across many disciplines for favoring certain data that is more relevant, and disfavoring data that is less relevant or exhibits larger errors.” *Id.* ¶ 234 (citing Ex. 1014), *see also* Ex. 1014 (“weighting observations [] The operation of assigning factors or ‘weights’ to each of a number of observations to represent their relative liability to error under their individual conditions of measurement.”). Dr. Lanza’s testimony on these points is un rebutted and Patent Owner does not substantively address the challenge to

claims 6 and 11, except to argue that Petitioner “fails to show that Chalmers anticipates either claim 1 or claim 8, Ground 6 fails for the same reasons as Grounds 1 and 2.” PO Resp. 53–54 (citing Ex. 2003¶ 128).

2. Conclusion as to obviousness of claims 6 and 11

On the complete record now before us we are persuaded that Petitioner has shown by a preponderance of the evidence that claims 6 and 11 would have been obvious over Chalmers and the knowledge of a person of ordinary skill in the art.

I. Ground 7 – Obviousness over Chalmers and Rothschild

On this record, Petitioner has shown by a preponderance of the evidence that claims 7 and 12 would have been obvious over Chalmers and Rothschild for the following reason.

1. Rothschild (Ex. 1009)

Rothschild discloses an x-ray tomography system for measuring backscatter x-rays from an object, for example an object in an airline traveler’s baggage. Ex. 1009, Abstract, 3:41–4:13. Rothschild explains that its “tomography system may also have a plurality of collimators disposed in directions perpendicular to the beam axis for limiting the field of view of each segmented detector.” *Id.* at 2:12–15. Rothschild’s Figure 1 is reproduced below.

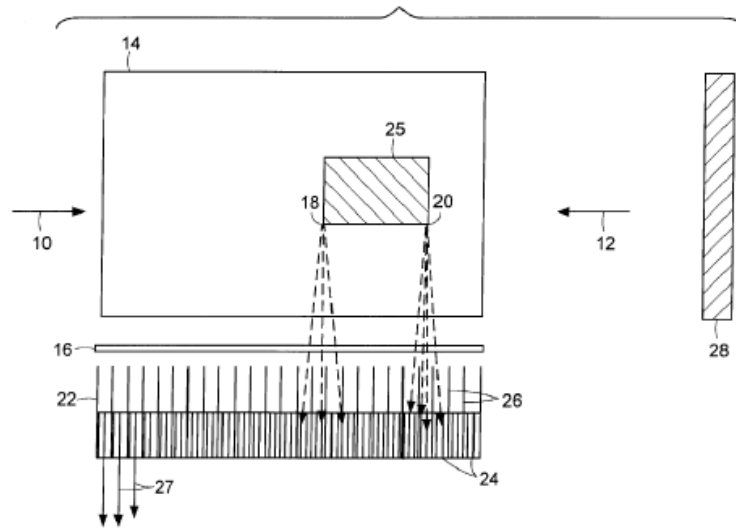


FIG. 1

Rothschild's Figure 1 illustrates detector array 22, 24 receiving backscattered x-rays 18 and 20. Rothschild describes that

[d]etector arrays 22 are collimated by collimator sheets 26 so that each detector element 24 detects x-rays 18 and 20 scattered from a different slice of container 14. In this way, the intensity of the side-scattered radiation 18 and 20 can be mapped as a function of distance along the beam through container 14.

Id. at 4:33–38. Rothschild describes further that “[t]he resolution of the mapping is determined by the width of the detector elements 24 and the thickness of the collimator sheets 26.” *Id.* at 4:38–41.

2. Claims 7 and 12

Claim 7 depends directly from claim 1 and recites “wherein at least one step selected the group consisting of step (a) and step (b) further comprises ortho-enhancing the scanning.” Ex. 1001, 9:29–31. Claim 12 is basically the same, and depends directly from independent claim 8. *Id.* at 10:30–32. Petitioner argues that a person of ordinary skill in the art would have been motivated to combine Chalmers, as it incorporates Grodzins by reference, and Rothschild because they are analogous art “directed to

inspection systems using penetrating radiation to image objects, and in particular, to use detector collimation to preferentially limit the detection of scattered radiation to only include scatter points closer to the active face of the detector.” Pet. 70–71 (citing Ex. 1003 ¶ 248). Dr. Lanza testifies that Chalmers, Grodzins, and Rothschild “are directed to inspection systems using penetrating radiation to image objects, and in particular, to use detector collimation to preferentially limit the detection of scattered radiation to only include scatter points closer to the active face of the detector.” Ex. 1003 ¶ 248. Dr. Lanza further testifies that a person of ordinary skill in the art, considering Rothschild, was aware of ortho-enhancing collimators for mapping orthogonally relevant radiation and “it would have been obvious for a POSITA at the time of the invention to employ the collimators of Rothschild ‘326 (used to increase resolution) in the systems of Chalmers ‘764, to result in the claimed invention using “ortho-enhancing” (to reduce noise).” *Id.* ¶ 261.

Dr. Lanza’s testimony with respect to claims 7 and 12 is unrebutted on the record before us, and Patent Owner does not substantively address the challenge to claims 7 and 12, except to argue that Petitioner’s “arguments fail to show anticipation of either claim 1 or claim 8, Ground 7 fails for the same reasons as Ground 1.” PO Resp. 54.

3. Conclusion as to obviousness of claims 7 and 12

On this record, we determine that Petitioner has provided articulated reasoning supported by evidentiary underpinnings sufficient to show that a person of ordinary skill in the art would have combined Chalmers and Rothschild in order to ortho-enhance the scanning step. Having reviewed the complete record, we find persuasive Petitioner’s arguments and evidence

that claims 7 and 12 would have been obvious over Chalmers and Rothschild. Pet. 71–76 (citing Ex. 1003 ¶¶ 252–262).

III. CONCLUSION¹³

For the reasons discussed above, we determine Petitioner meets its burden of establishing, by a preponderance of the evidence, that the challenged claims are unpatentable, as summarized in the following table:

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–3, 7–9, 12	102	Chalmers	1–3, 7–9, 12	
1–3, 7–9, 12	103(a)	Chalmers, Grodzins	1–3, 7–9, 12	
4	102	Cason ¹⁴		
4	103(a)	Cason, Chalmers	4	
5, 10	103(a)	Cason, Horn, Annis	5, 10	
6, 11	103(a)	Chalmers	6, 11	

¹³ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

¹⁴ Because we determine that claim 4 would have been obvious over Cason, Chalmers, and Grodzins, we do not reach the question of whether claim 4 is anticipated by Cason.

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
7, 12	103(a)	Chalmers, Rothschild	7, 12	
Overall Outcome			1–12	

IV. ORDER

For the reasons given, it is

ORDERED that, based on a preponderance of the evidence claims 1–12 of the '763 patent have been shown to be unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, any party to the proceeding seeking judicial review of this Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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Patent 8,300,763 B2

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