

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WEBER, INC.,
Petitioner,

v.

PROVISUR TECHNOLOGIES, INC.,
Patent Owner.

IPR2022-00599
Patent 8,408,109 B2

Before MITCHELL G. WEATHERLY, FRANCES L. IPPOLITO, and
JON M. JURGOVAN, *Administrative Patent Judges*.

IPPOLITO, *Administrative Patent Judge*.

DECISION
Final Written Decision
Dismissing Petitioner's Motion to Exclude
Dismissing Patent Owner's Motion to Strike
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 328(a)

I. INTRODUCTION

Petitioner Weber, Inc. filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 1–17 of U.S. Patent No. 8,404,109 B2 (Ex. 1001, “the ’109 patent”). Patent Owner, Provisur Technologies, Inc. did not file a Preliminary Response. Upon review of the arguments and supporting evidence, we instituted *inter partes* review of all challenged claims and on all grounds asserted in the Petition. Paper 6 (“Dec. Inst.”). After institution, Patent Owner filed a Response. Papers 16, 18 (“PO Resp.”)¹, Petitioner filed a Reply (Papers 27, 28, “Pet. Reply”)², and Patent Owner filed a Sur-reply (Papers 45, 46 “PO Sur-reply”)³. After authorization, Petitioner filed a Sur-sur-reply (Paper 49, “Pet. Sur-sur-reply”).

Petitioner also filed a Motion to Exclude Exhibits 2026, 2028, 2035–2037, 2052–2055, 2057, 2058, 2061, 2065, 2066, 2070, and 2075. Paper 48 (“Motion to Exclude” or Mot. Excl.”). Patent Owner filed an Opposition to the Motion to Exclude. Papers 53, 54 (“Mot. Excl. PO

¹ Patent Owner filed a confidential version (Paper 16) and a public, redacted version (Paper 18) of its Response. Citations are made to the confidential version of the Response unless noted otherwise.

² Petitioner filed a confidential version of its Reply at Paper 27. A public version is available at Paper 28. Citations are made to the confidential version unless noted otherwise.

³ Patent Owner filed a confidential version of its Sur-reply at Paper 45. A public version is available at Paper 46. Citations are made to the confidential version unless noted otherwise.

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Resp.”).⁴ Petitioner filed a Reply to Patent Owner’s Opposition. Paper 55 (“Mot. Excl. Pet. Reply”).

Patent Owner filed a Motion to Strike Exhibits 1066–1068 and the citations in Petitioner’s Reply relying on these exhibits. Paper 33 (“PO’s Mot. Strike”). Petitioner opposes. Paper 41 (“Pet.’s Opp’n Mot. Strike”).

An oral hearing was held with the parties on May 25, 2023. A transcript of the hearing has been entered into the record. Paper 63 (“Public Tr.”); Paper 64 (“Confidential Tr.”).⁵

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the record before us, Petitioner has shown by a preponderance of the evidence that claims 1–15 and 17 of the ’109 patent are unpatentable. Petitioner has not shown by a preponderance of the evidence that claim 16 of the ’109 patent is unpatentable.

A. Related Matters

The parties indicate that the ’109 Patent has been asserted in *Provisur Technologies, Inc. v. Weber, Inc. et al.*, Case No. 5-21-cv-06113 (WDMO), filed September 21, 2021 (“District Court Litigation”). Pet. 84; Paper 4, 1.

⁴ Petitioner filed a confidential version of its opposition to Petitioner’s Motion to Exclude at Paper 53, and a public version at Paper 54. Citations are made to the confidential version unless noted otherwise.

⁵ A separate confidential transcript for the non-public portion of the oral hearing has been filed as Paper 64.

B. The '109 Patent

The '109 patent is entitled “Food Article Feed Apparatus for a Food Article Slicing Machine.” Ex. 1001, code (54). The '109 patent discloses that typically, food loaves are sliced, weighed, and grouped, and machines have been used to slice such food articles at high speed. *Id.* at 1:23–25, 32–35. Such machines have an automatically loaded and continuous feed, with “side-by-side upper and lower conveyor pairs” that drive food articles into the cutting plane, and a gate located in front of the conveyors for loading initial food articles. *Id.* at 1:39–47. The '109 patent discloses that however, “it would be desirable to slice up to four food articles or more with independent feeding and weighing capabilities, with hygienic and operational enhancements.” *Id.* at 2:14–19. Thus, the '109 patent purports to provide a high speed slicing apparatus that meets these desires. *Id.* at 2:28–31.

Figure 1, reproduced below, shows such a slicing machine.

FIG. 1

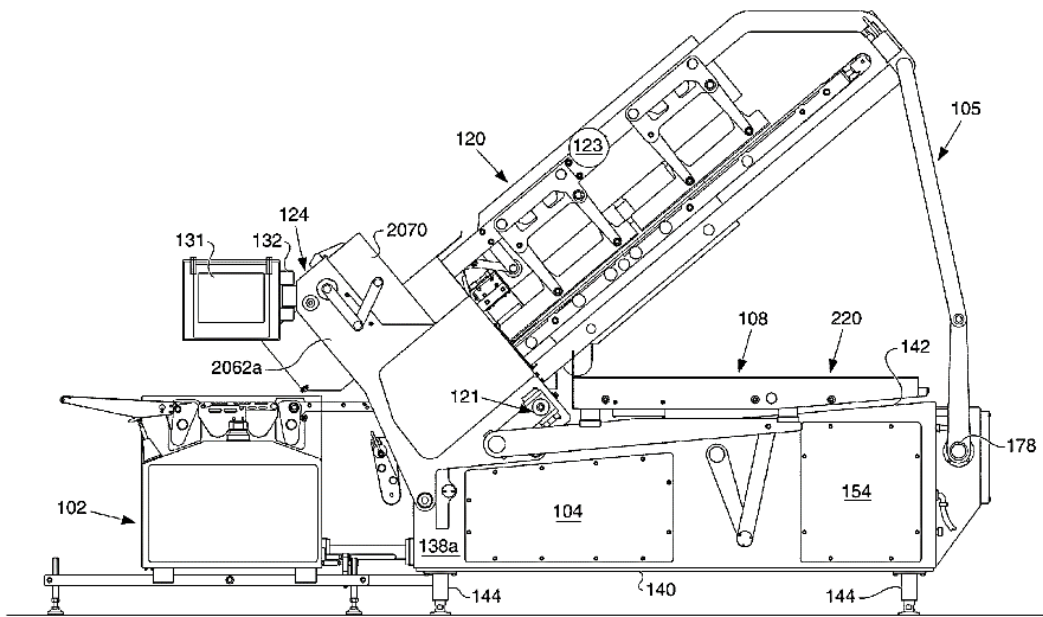


Figure 1 above is “a near side elevational view of a slicing machine and a weighing and classifying conveyor combination.” Ex. 1001, 3:37–38. The ’109 patent’s slicing machine and conveyor combination include base section 104, automatic food article loading apparatus 108 that receives food articles to-be-sliced, and food article feed apparatus 120. *Id.* at 6:60–66. The slicing machine and conveyor combination further include a high speed slicing apparatus having slicing head apparatus 124, slice receiving apparatus 130 (identified in Figure 2), and computer display touch screen 131. *Id.* at 6:60–7:4.

Figure 14, reproduced below, shows a food article feed apparatus of the '109 patent.

FIG. 14

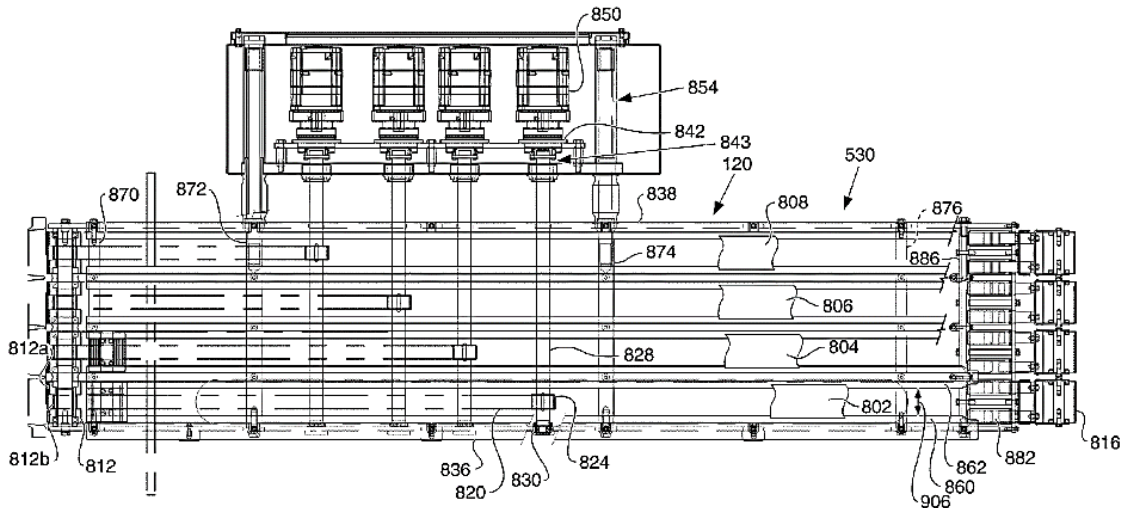


Figure 14 above is a plan view of a food article feed apparatus. Ex. 1001, 4:4. The '109 patent discloses that food article feed apparatus 120 shown in Figure 1 includes lower conveyor 530 shown in Figure 14. *Id.* at 12:5–6. Lower conveyor 530 includes four independently driven endless conveyor belts 802, 804, 806, 808 and each of the belts is identically driven as compared to the others. *Id.* at 12:6–9. For example, belt 802 is wrapped around and engaged with toothed front drive roller or pulley 812 and back idler roller or pulley 816. *Id.* at 12:18–21. Drive roller 812 includes toothed outer diameter 812a and toothed, recessed diameter 812b. *Id.* at 12:21–22. Endless drive belt 820 wraps around recessed diameter 812b and operates within the larger operating path of larger endless conveyor belt 802 (shown in Figure 15A). *Id.* at 12:25–26. Drive belt 820 wraps around drive

roller 824 that is fixed to drive shaft 828. *Id.* at 12:27–28. Drive belt 820 circulates within the perimeter defined by the endless belt 802. *Id.* at 12:35–36. Servomotor 850 drives drive shaft 828, which turns drive roller 824, which circulates drive belt 820, which rotates drive roller 812, which then circulates belt 802. *Id.* at 12:37–39. Endless conveyor belts 804, 806, 808 are driven in a similar manner as described above for belt 802. *Id.* at 12:8–9.

Figure 21, reproduced below, shows a gripper attachment to a belt of the '109 patent.

FIG. 21

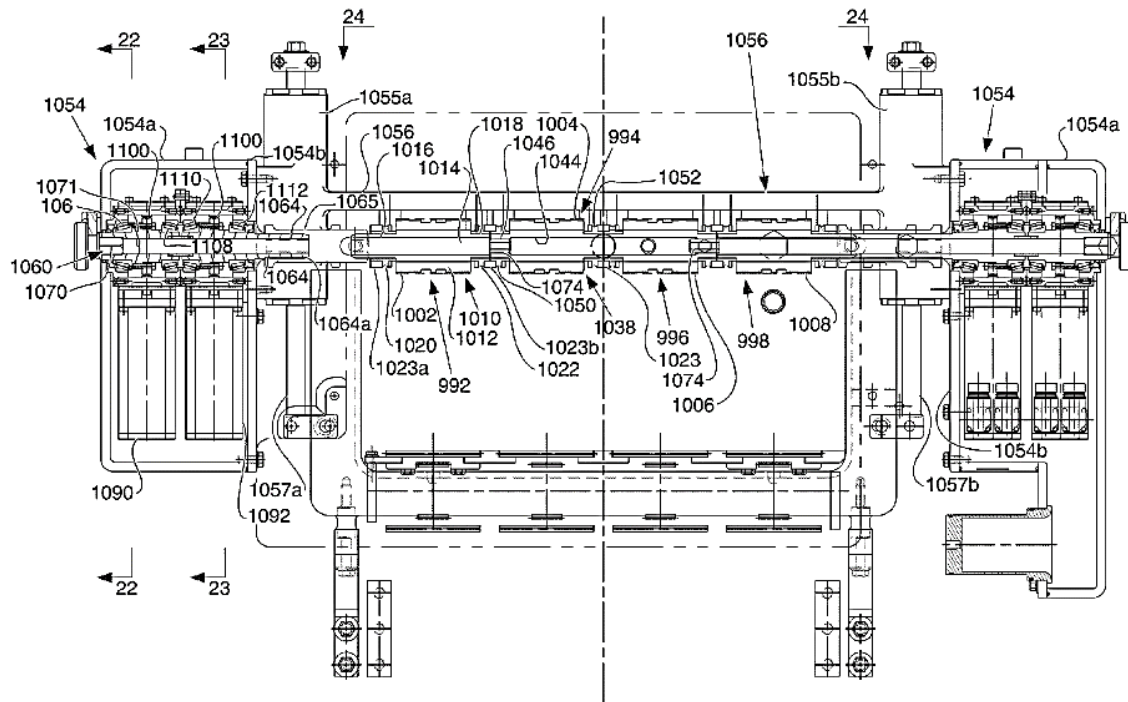


Figure 21 above is a sectional view of a gripper attached to a belt at a front end of food article feed apparatus 120 shown in Figure 1. Ex. 1001, 4:19–22, 13:24–25. The '109 patent discloses that four upper feed conveyors 992,

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994, 996, 998 have endless belts 1002, 1004, 1006, 1008, respectively, which are independently driven and are directly opposed to lower conveyor belts 802, 804, 806, 808, respectively, which are shown in Figure 14 and discussed above. *Id.* at 13:26–30. A belt pair, such as upper belt 1002 and lower belt 802 are “circulated in opposite directions to drive a food article clamped there between into the slicing plane.” *Id.* at 13:30–33.

The ’109 patent further discloses that at a front end of food article feed apparatus 120, a food article gate “is movably positioned to provide a stop for food articles that are loaded onto” conveyor 530 in order to commence slicing of the food articles. *Id.* at 14:63–67. The ’109 patent further discloses that “a round knife blade” can “be used with the apparatus” for slicing large food articles. *Id.* at 6:25–32.

C. Challenged Claims

Petitioner challenges claims 1–17. Claim 1 and 6 are independent claims. Claim 1 is reproduced below:

1. A food article feed apparatus for conveying food articles in a slicing machine comprising:

a first conveyor having at least one first endless belt that moves to provide a first conveying surface on top of the first endless belt for moving a first food article toward a cutting plane;

a second conveyor having at least one second endless belt that moves to provide a second conveying surface on top of the second endless belt for moving a second food article toward the cutting plane;

said first conveyor driven by rotation of a hollow first shaft; said second conveyor driven by rotation of a second shaft; said second shaft independently operating concentrically within said hollow first shaft;

a first motor driving the hollow first shaft into rotation;
and a second motor driving the second shaft into rotation.

Ex. 1001, 24:41–56.

D. Alleged Grounds of Unpatentability

Petitioner asserts that claims 1–17 are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–12	103(a) ⁶	Pryor, ⁷ Reifenhäuser ⁸
13–15	103(a)	Pryor, Reifenhäuser, Penta ⁹
16	103(a)	Pryor, Reifenhäuser, Lindee ¹⁰
17	103(a)	Pryor, Reifenhäuser, Carey ¹¹
1–12	103(a)	Wygol, ¹² Alotto ¹³

⁶ The Leahy-Smith America Invents Act, Pub. L. No. 112–29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103. Because the filing date of this application is before the effective date of the applicable AIA amendment, we refer to the pre-AIA version of 35 U.S.C. § 103. Ex. 1001, codes (22), (60).

⁷ U.S. Patent Appln. Publ. No. 2006/0196328 A1, published Sept. 7, 2006 (“Pryor,” Ex. 1005).

⁸ German Patent Appln. Publ. No. DE 10018568 A1, published Oct. 25, 2001 (“Reifenhäuser,” Ex. 1006). Certified English-language translation of Reifenhäuser also provided in Exhibit 1006.

⁹ U.S. Patent No. 6,415,711 B1, issued July 9, 2002 (“Penta,” Ex. 1007).

¹⁰ U.S. Patent Appln. Publ. No. 2004/0055439 A1, published Mar. 25, 2004 (“Lindee,” Ex. 1008).

¹¹ U.S. Patent No. 5,481,466, issued Jan. 2, 1996 (“Carey,” Ex. 1009).

¹² U.S. Patent No. 5,410,954, issued May 2, 1995 (“Wygol,” Ex. 1010).

¹³ International Patent Publ. No. WO 02/10018 A1, published Feb. 7, 2002 (“Alotto,” Ex. 1011).

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
13–15	103(a)	Wygal, Alotto, Penta
16	103(a)	Wygal, Alotto, Lindee
17	103(a)	Wygal, Alotto, Carey

Pet. 16. In addition to the references listed above, Petitioner relies on the Declarations of Dr. Richard Hooper, Ph.D., P.E. (Exs. 1003, 1039), a Declaration of Mr. Joseph Stout (Ex. 1038), and a Declaration of Mr. Jorg Schmeiser (Ex. 1068). *Id.* Patent Owner relies on the Declaration of Dr. William S. Howard Ph.D., P.E. (Ex. 2002) and the Declaration of Mr. Scott T. Scriven (Ex. 2004). The depositions for these witnesses have been entered into the record. Ex. 1052 (Scriven); Ex. 1057 (Howard); Ex. 2059 (Hooper); Ex. 2068 (Stout); Ex. 2071 (Schmeiser); Ex. 2077 (Hooper).

II. ANALYSIS

A. Level of Ordinary Skill in the Art

In determining the level of skill in the art, we consider the type of problems encountered in the art, the prior art solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level of active workers in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Indus. Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986); *Orthopedic Equip. Co. v. U.S.*, 702 F.2d 1005, 1011 (Fed. Cir. 1983).

Petitioner contends that a person of ordinary skill in the art (“POSA” or “POSITA”) at the time of the invention of the ’109 patent

would typically have had (1) a bachelor’s degree (or equivalent) in mechanical engineering (or a similar field) and at least two

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years of experience working as an engineer (or similar role) on food processing and/or packaging systems (or in a similar field); or (2) at least seven years of experience working as an engineer (or similar role) on food processing and/or packaging systems (or in a similar field).

Pet. 11 (citing Ex. 1003 ¶ 33). Petitioner argues that a POSITA “would have had knowledge of the technical literature concerning food processing and packaging systems, including conveyor mechanisms (in both food processing and packaging machines, as well as other conveying machines)” and “may have worked as part of a multidisciplinary team and drawn upon not only her or his own skills, but of others on the team, *e.g.*, to solve a given problem.” *Id.* at 12 (citing Ex. 1003 ¶¶ 33–68).

In its Response, Patent Owner does not dispute Petitioner’s proposed level of skill in the art. *See generally* PO Resp. Nonetheless, Patent Owner’s expert, Dr. Howard, proposes in his Declaration that a POSITA would have “an associate’s degree [like mechanical engineering] and approximately one year of experience working with high speed food processing and packaging systems (or equivalent).” Ex. 2002 ¶ 40.

Though there is a difference in years of experience and education, we consider the parties’ positions on the level of ordinary skill in the art to be substantially similar. Both proposals are directed to food processing and packaging systems, which aligns with the subject matter of the ’109 patent, *i.e.*, food article feed apparatus for conveying food articles in a slicing machine. *See* Ex. 1001, 24:41–56 (claim 1).

Moreover, based on our review of the complete record, the level of skill is not determinative to the outcome or resolution of this case.

Dr. Howard testified that his opinion “is the same whether I apply Dr. Hooper’s definition of a POSA or mine.” Ex. 2002 ¶ 39.

Nevertheless, we observe that Dr. Hooper more adequately explains with an overview of the prior art that “industrial food slicers are complicated pieces of equipment, requiring knowledge and implementation of numerous engineering concepts.” Ex. 1003 ¶¶ 34–67. On the other hand, Dr. Howard states that he considered the “education of other individuals involved in prior cases between these parties,” but does not fully explain how the backgrounds of these named individuals supports his definition. *See* Ex. 2002 ¶ 42. As such, we find Petitioner’s proposal is supported by the testimony of Dr. Hooper and is consistent with the ’109 patent specification and the asserted prior art. *See Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 666–67 (Fed. Cir. 2000) (identifying factors); *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the prior art may reflect an appropriate level of skill in the art). Accordingly, we adopt the level of ordinary skill as articulated by Petitioner.

B. Principles of Law

In *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1 (1966), the Supreme Court set out a framework for assessing obviousness under § 103 that requires consideration of four factors: (1) the “level of ordinary skill in the pertinent art,” (2) the “scope and content of the prior art,” (3) the “differences between the prior art and the claims at issue,” and (4) “secondary considerations” of non-obviousness such as “commercial success, long-felt but unsolved needs, failure of others, etc.” *Id.* at 17–18. “While the sequence of these questions might be reordered in any particular

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case,” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 407 (2007), the Federal Circuit has “repeatedly emphasized that an obviousness inquiry requires examination of all four *Graham* factors and that an obviousness determination can be made only after consideration of each factor.” *Nike, Inc. v. Adidas AG*, 812 F.3d 1326, 1335 (Fed. Cir. 2016).

We note that, with respect to the fourth *Graham* factor, the record in this proceeding does not include any argument or evidence directed to secondary considerations of nonobviousness. The analysis below addresses the first three *Graham* factors.

C. Claim Construction

We apply the same claim construction standard used in the federal courts, in other words, the claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), which is articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). See 37 C.F.R. § 42.100(b) (2021).

Petitioner proposes construction for the terms “a [first/second] conveying surface on top of the [first/second] endless belt for moving a [first/second] food article.” See Pet. 12–14 (alteration in original).

For purposes of this decision, we do not expressly construe any terms. See *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017)) (noting that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’”) (citing *Vivid Techs.*, 200 F.3d at 803).

D. Overview of the Prior Art

1. Summary of Pryor (Ex. 1005)

Pryor is a reference entitled “Loaf Seam Synchronization Device for Continuous Loaf Feed Slicing Machine.” Ex. 1005, code (54). Pryor discloses that in machines that slice loaves of food, subsequently loaded loaves could be offset resulting in slices that are not neat. *Id.* ¶ 6. Pryor provides a solution to this problem by allowing parallel loaves to be “engaged by a common loaf feed drive or side-by-side, independent loaf feed drives” that are driven simultaneously. *Id.* ¶ 7. Pryor explains that its “high speed food loaf slicing machine” includes “a slicing station that includes a knife blade and a knife blade drive that drives the knife blade along a predetermined cutting path” and “a loaf support for supporting a first food loaf and a second food loaf for movement along parallel first and second loaf paths, respectively, into the slicing station for repetitive slicing of both loaves by the knife blade.” *Id.* ¶ 8. A loaf feed drive is used to advance a first food loaf and a second food loaf along the loaf path and a clamp device “is arranged to clamp the first and second loaves on the first and second loaf paths.” *Id.*

Figure 2, reproduced below, shows such a slicing machine.

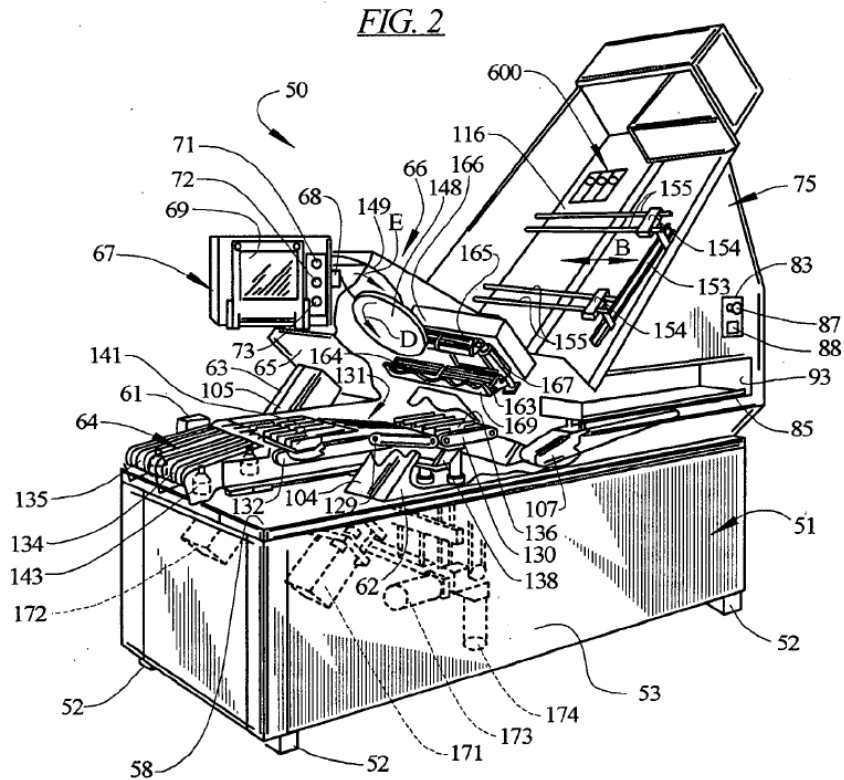


Figure 2 above is a perspective view of Pryor's slicing machine. Ex. 1005 ¶ 29. Slicing machine 50 includes base 51 that “affords an enclosure for” computer 54. *Id.* ¶ 37. Slicing machine 50 also includes slicing station 66 and loaf feed mechanism 75. *Id.* ¶¶ 38, 40.

Figure 3, reproduced below, shows “a simplified, partially exploded perspective view of operating components of the slicing machine” shown in Figure 2. Ex. 1005 ¶ 31.

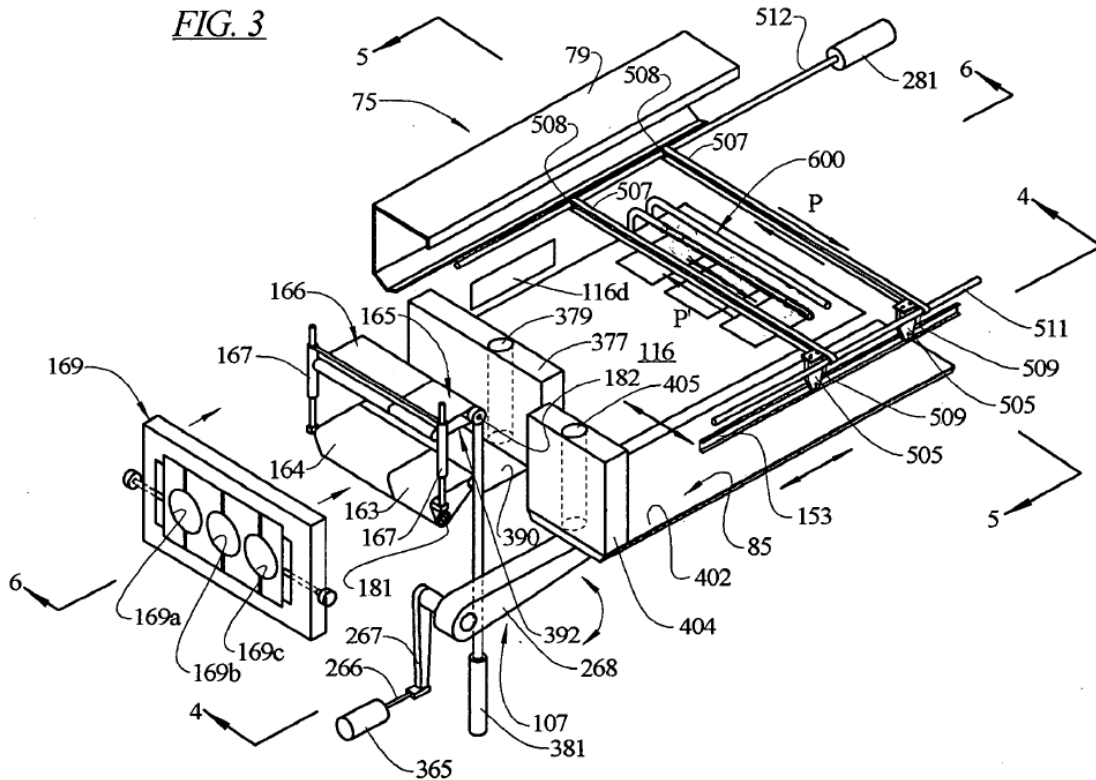


Figure 3 above shows slicing machine 50 of Figure 2 includes “a system of short conveyors for advancing food loaves from loaf feed mechanism 75 into slicing [station] 66” (slicing station 66 is identified in Figure 2). *Id.* at ¶ 51. Pryor discloses that two short lower loaf feed conveyors 163 and 164 are located “on the near and far-sides of slicing machine 50, respectively,” and are also “located immediately below two short upper feed conveyors 165 and 166, respectively.” *Id.*

2. Summary of Reifenhäuser (Ex. 1006)

Reifenhäuser is a German Patent Application Publication that is entirely in German. Ex. 1006, *passim*. Reifenhäuser was accompanied by a

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certified English translation in the same exhibit. All references in the following summary will refer to the English translation.

Figure 1 of Reifenhäuser is reproduced below.

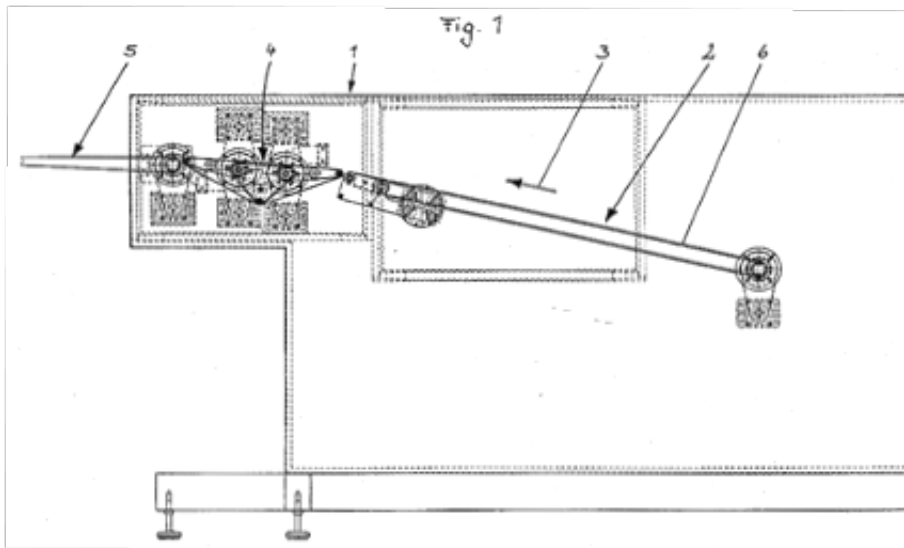


Figure 1 is a front view of transport device 1. Ex. 1006 ¶ 30. Reifenhäuser teaches that transport device 1 includes a cutting device for cutting foodstuff into slices, a scale, and track switch 2 in the form of an upstream conveyor belt and another conveyor belt 5 connected to distributing device 4 for transferring sliced foodstuffs to a packaging part of the line. *Id.*

Distributing device 4 consists of drive part 9 and conveyor part 10. *Id.* ¶ 33.

Figure 5 of Reifenhäuser is reproduced below.

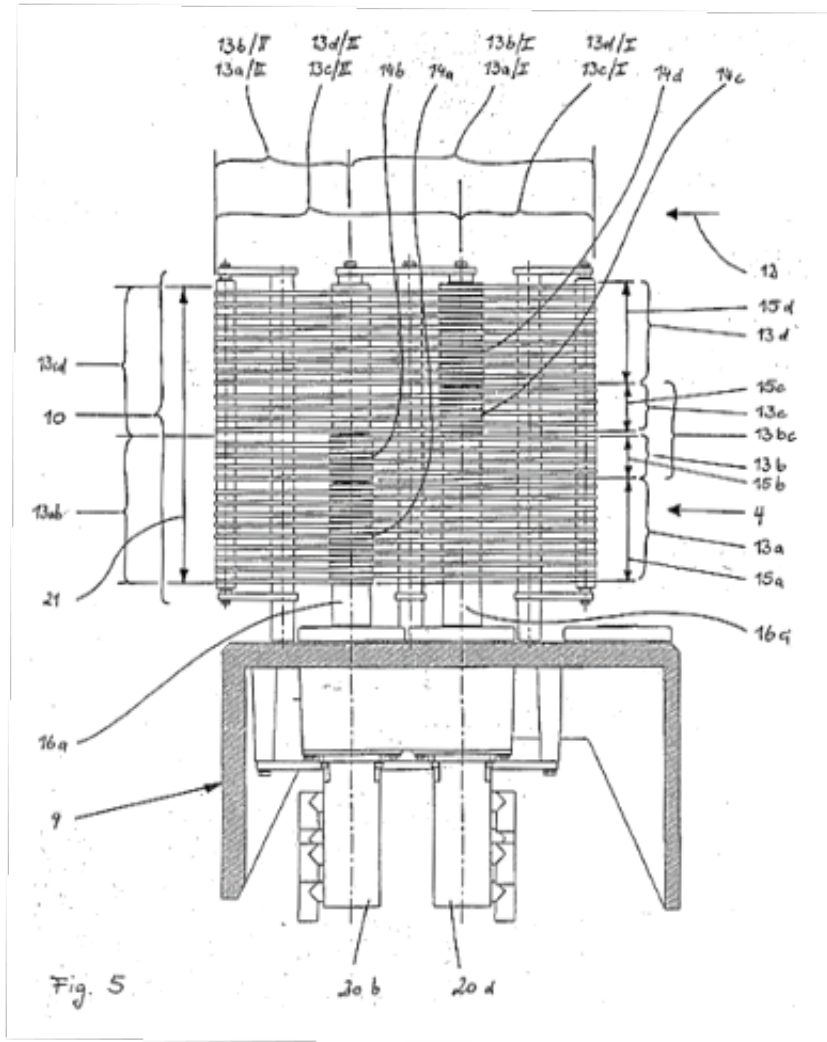


Figure 5 is a top view of distributing device 4. Ex. 1005 ¶ 27. Distributing device 4 includes transport part 10 that is divided into four tracks 13a to 13d running parallel to one another and arranged side by side, each capable of being driven independently of the others. *Id.* ¶ 33. The front and rear sections of each track 13a-13d are driven by the same drive roller 14a-14c. *Id.* ¶ 34. Each drive roller is driven by drive shafts 16a-16d. *Id.* ¶ 35. Pulley 18a is mounted on drive shaft 16a adjacent to wall 17 inside housing 9 and is drivably by drive servomotor 20a via belt 19a. *Id.* ¶ 36. Shaft for

deflecting roller 14b passes through pulley 18a and carries its end a pulley 18b which is driven by motor 20b by belt 19b. *Id.*

3. Summary of Penta (Ex. 1007)

Penta is a reference entitled “Cheese Shredder Apparatus.” Ex. 1007, code (54). Penta discloses an apparatus that transports “a block of cheese in a downstream longitudinal direction to a predetermined, first zone” and then “through a fragmentation zone” and then “through a shredding zone.” *Id.* at 3:61–4:10.

Figure 1, reproduced below, shows Penta’s apparatus.

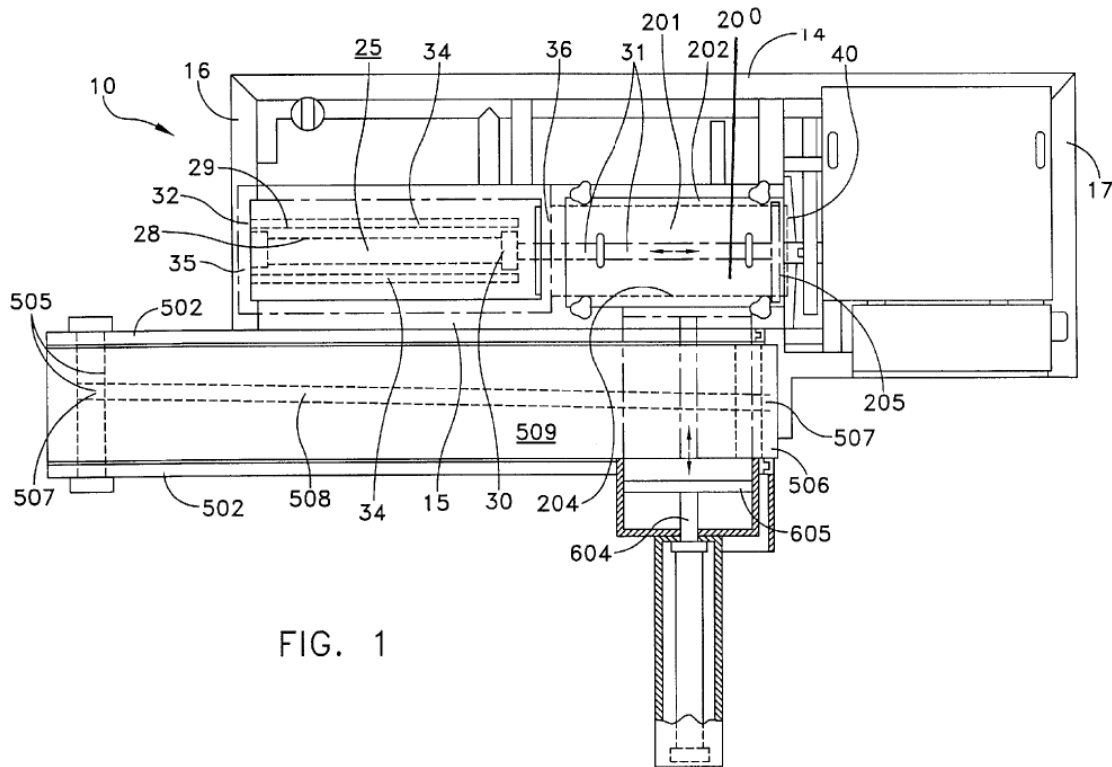


Figure 1 above shows a top plan view, partially broken away of Penta’s apparatus. Ex. 1007, 5:19–20. Cheese extrusion apparatus 10 includes sub-assembly 25, which has primary ram assembly 28, which in turn, has

pneumatic/hydraulic cylinder 29. *Id.* at 5:61, 6:7–13. Penta discloses that Figure 1 shows a primary cheese conveying system that includes upstream roller 505 and downstream roller 506, in which each of rollers 505, 506 includes central depression 507 within which drive belt 508 “may be disposed so that it entrains” and drives rollers 505, 506. *Id.* at 8:31–39. Penta further discloses that “[s]uitable means (not seen) which are well-known to those skilled in the art, are used to drive [] drive belt 508” and conveyor belt 509 “includes the usual tension controlling rollers” while entraining rollers 505, 506. *Id.* at 8:39–42.

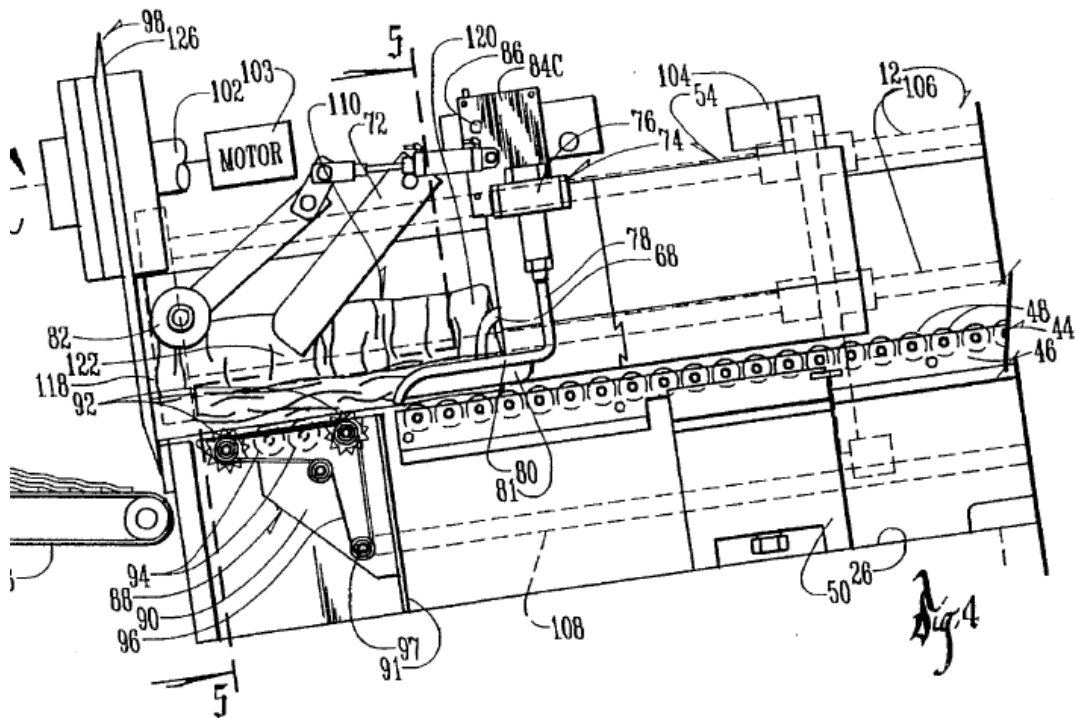
4. Summary of Lindee (Ex. 1008)

Lindee is a reference entitled “Reload System for Slicing Machine.” Ex. 1008, code (54). Lindee discloses that when using slicing machines, “[t]he remaining butt end of the food loaf usually should not be sliced” because “it is likely to yield undersized slices.” *Id.* ¶ 60. To accomplish this, Lindee discloses that when a gripper of a slicing machine reaches its end position, the gripper is tracked by an encoder or by a servomotor “which causes the machine’s computer to stop movement of the loaf toward the slicing station.” *Id.* ¶ 61.

5. Summary of Carey (Ex. 1009)

Carey is a reference entitled “Meat Slicing Machine and Method of Use Thereof.” Ex. 1009, code (54).

Figure 4, reproduced below (partially cropped), shows Carey’s meat slicing machine.



Cropped Figure 4 above shows an enlarged scale, partial side elevational view of a meat slicing machine with a slab of meat being sliced. Ex. 1009, 2:59–61. Meat slicing machine 12 includes slicing blade 98 and gate 72. *Id.* at 3:9, 4:31–32, 5:13. As seen in Figure 4, gate 72 is in an open position so that bacon slab 110 can move towards slicing blade 98. *Id.* at 4:50, 5:13, Fig. 4. Carey discloses that after bacon slab 110 engages gate 72, “the gate moves upwardly to a horizontal position to permit the slab of meat to continue moving towards a slicing location.” *Id.* at 3:58–61.

6. Summary of Wygal (Ex. 1010)

Wygal is a reference entitled “Three Dimensional Automatic Food Slicer.” Ex. 1010, code (54). Wygal relates to “a continuous feed automatic slicer that is capable of slicing food products into cubes.” *Id.* at 1:10–13.

Figure 1, reproduced below, shows Wygal's slicing machine.

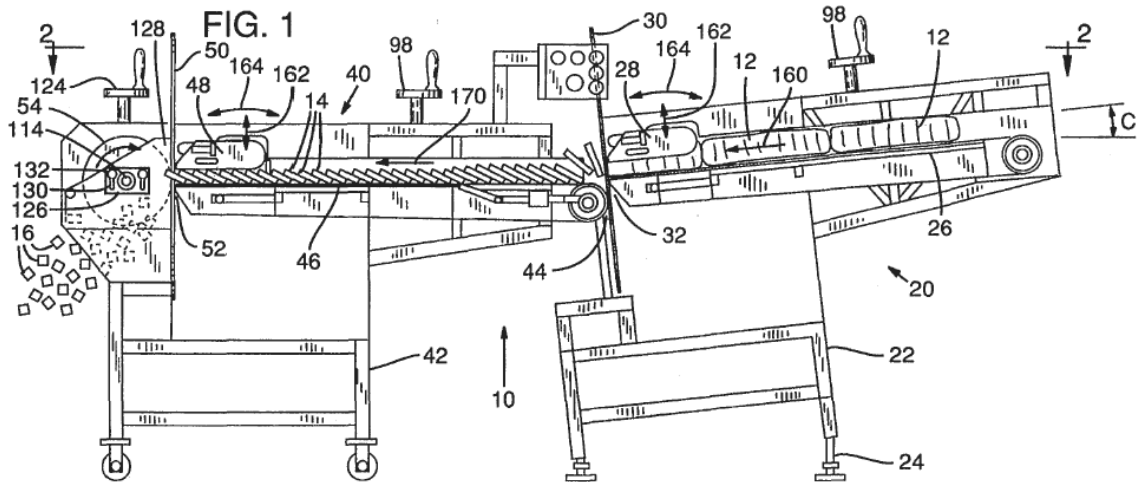


Figure 1 above shows a front view of Wygal's slicing machine. Ex. 1010, 2:57–58. Machine 10 slices loaf 12 into cubes 16 “in a single continuous operation.” *Id.* at 3:6–8. Machine 12 includes two lower conveyors 26, 46 in which one belongs to first slicing station 20 and the other belongs to second slicing station 40 for producing multiple slices or slabs 14 and multiple cubes 16, respectively. *Id.* at 3:23–24, 3:33–39. Slicing station 20 also has rotating cutoff knife 30 whereas slicing station 40 has rotating cutoff knife 40. *Id.* at 3:57–59, 6:1–2. Slicing station 20 further includes “floating upper belt type conveyor 28 that is positioned above and strategic to” lower conveyor 26 to accommodate the height of loaf 12 and have “an improved biasing arrangement.” *Id.* at 3:40–56. Lower conveyor 26 and upper conveyor 28 are driven by controlling motor 60 and knife 30 is driven by variable speed motor 64. *Id.* at 4:10–13, 4:25–27; Fig. 3.

7. Summary of Alotto (Ex. 1011)

Alotto is a reference entitled “System and Method of Feeding a Packaging Machine.” Ex. 1011, code (54). Alotto explains that packaging

machine feed systems are known to include “a conveying system.” *Id.* at 1:13–14. Alotto provides a feed system that prevents damage of stacks of objects that are fed while allowing “performance of the follow-up packaging process.” *Id.* at 1:26–2:16. Alotto discloses that stacks can be “food products arranged one on top of the other.” *Id.* at 4:5–8.

Figure 4, reproduced below, shows an embodiment of Alotto’s system.

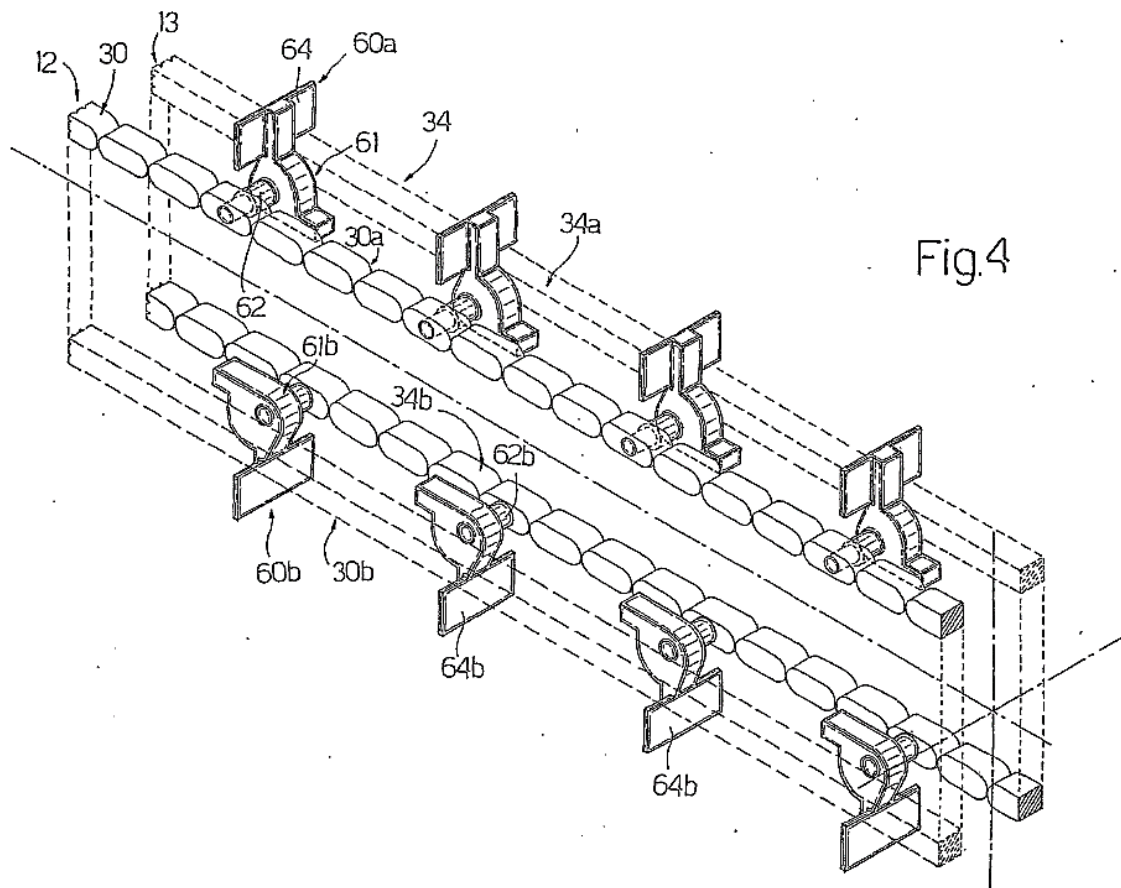


Figure 4 above shows a perspective view of a portion of Alotto’s system. *Id.* at 3:13–14. A feed system includes first straight linear conveying system 12 and second straight linear conveying system 13 “extending parallel to each

other.” *Id.* at 4:25–28. First straight linear conveying system 12 includes first powered chain 30 “extending between toothed end pulleys” and second straight linear conveying system 13 includes second powered chain 34 extending between another pair of toothed end pulleys. *Id.* at 5:15–21.

Figure 7, reproduced below, shows the pulleys of Alotto’s system.

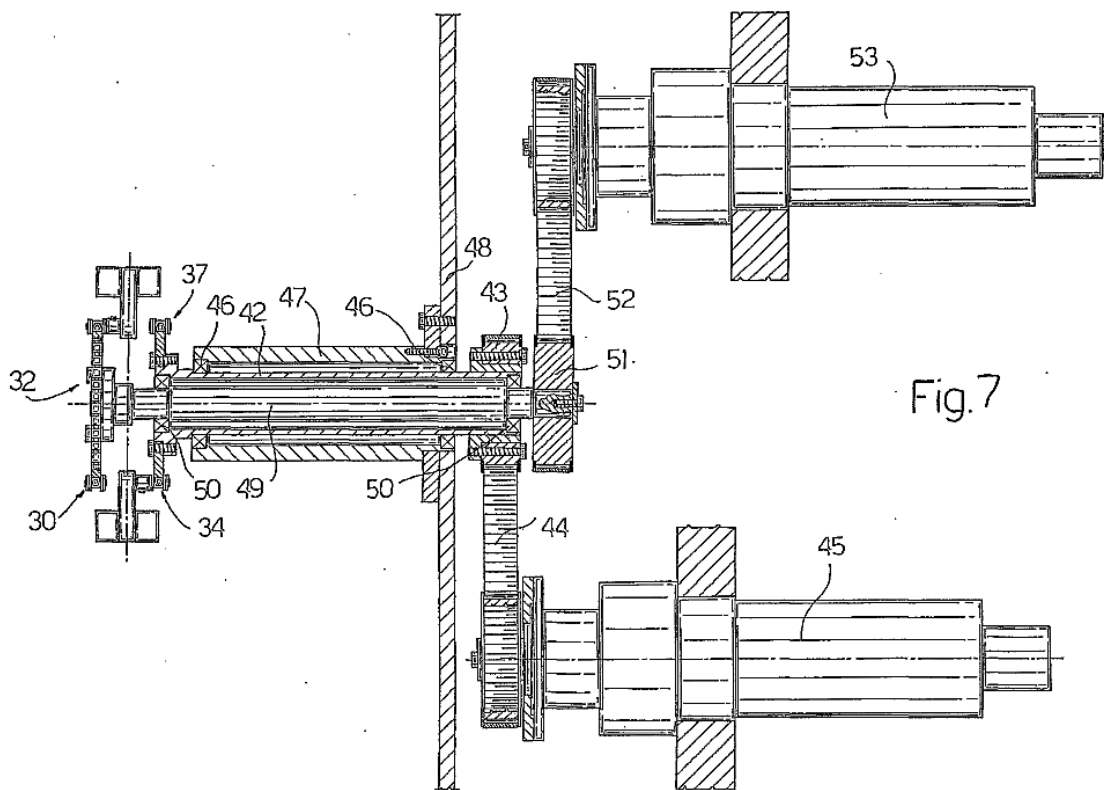


Fig.7

Figure 7 above shows a cross section of one end of Alotto’s system. *Id.* at 3:19–20. Pulley 37 is connected to a first end of tubular sleeve 42, which has a second end fitted with toothed pulley 43, which is rotated via toothed belt 44 and electric motor 45. *Id.* at 6:5–8. Pulley 32 is located at a first end of a shaft 49 that is housed coaxially inside tubular sleeve 42, in which shaft 49 is fitted to toothed pulley 51, which is connected by toothed belt 52 and electric motor 53. *Id.* at 6:12–19.

E. Obviousness based on Pryor and Reifenhäuser — Claims 1–12

Petitioner asserts claims 1–12 would have been obvious based on the teachings of Pryor and Reifenhäuser. Pet. 17–45.

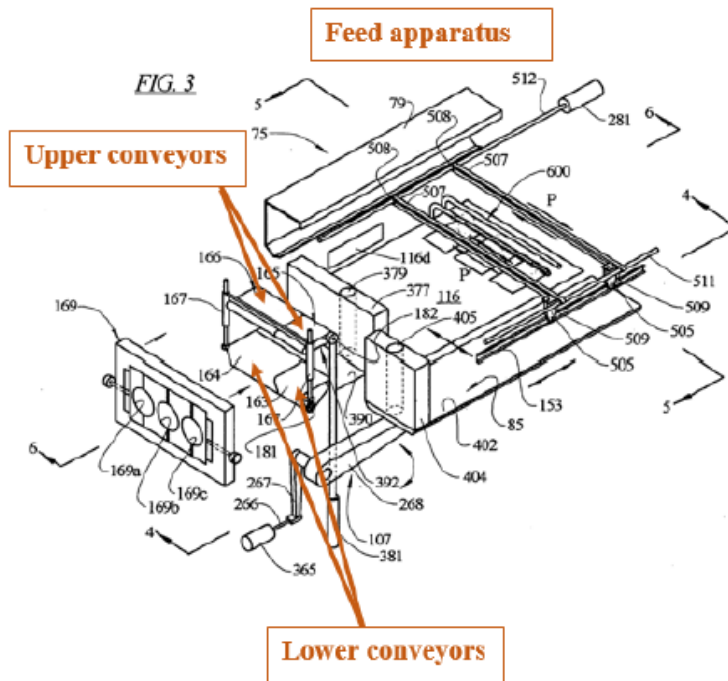
1. Analysis of Claim 1

a) “first conveyor” and “second conveyor”

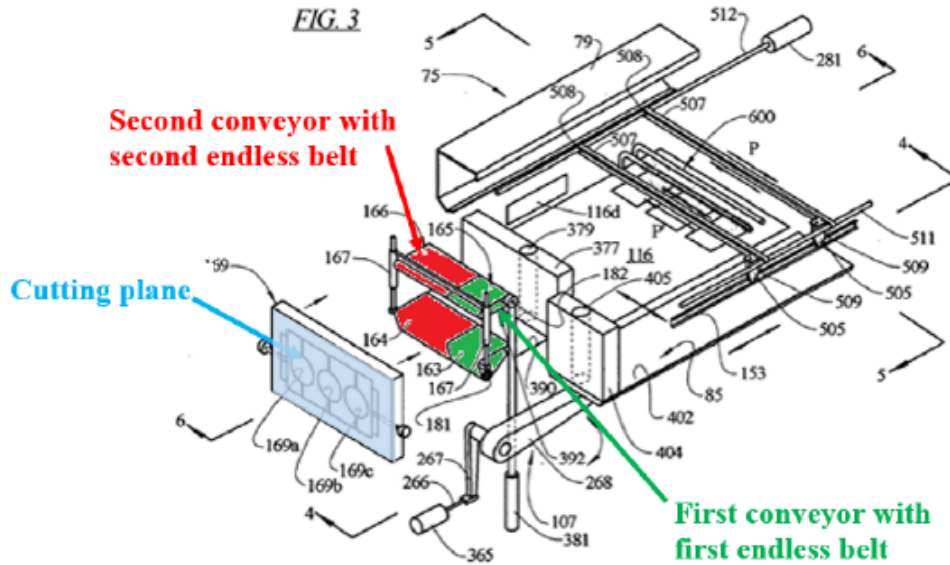
Independent claim 1 is directed to a food article feed apparatus for conveying food articles in a slicing machine that includes “a first conveyor having at least one first endless belt that moves to provide a first conveying surface on top of the first endless belt for moving a first food article toward a cutting plane” and “a second conveyor having at least one second endless belt that moves to provide a second conveying surface on top of the second endless belt for moving a second food article toward the cutting plane.”

Ex. 1001, 24:41–50.

Petitioner contends that Pryor’s slicing machine 50 includes short conveyors for advancing food loaves into slicing head 66. Pet. 18 (citing Ex. 1005 ¶ 5; Ex. 1003 ¶ 79). Petitioner’s annotated version of Pryor’s Figure 3 is provided below.



Petitioner’s annotated version of Pryor’s Figure 3 appears on page 19 of the Petition with upper and lower conveyors marked. *Id.* at 19. According to Petitioner, Pryor’s feed system includes “two short lower loaf feed conveyors 163 and 164” that “are located immediately below two short upper feed conveyors 165 and 166.” *Id.* at 20 (citing Ex. 1005 ¶ 51, Figs. 2–3). Petitioner adds that “[e]ach of these conveyors has an endless belt.” *Id.* (citing Ex. 1005, Fig. 3; Ex. 1003 ¶¶ 81–82). Additionally, Petitioner provides another annotated version of Figure 3, which is reproduced below.



Petitioner’s annotated version of Figure 3 from page 20 of the Petition marks a second conveyor with second endless belt in red and marks in green a first conveyor with first endless belt. *Id.*

Patent Owner does not address these limitations. *See generally* PO Resp.¹⁴

We agree with Petitioner. Specifically, Pryor teaches slicing machine 50 with “a system of short conveyors for advancing food loaves from loaf feed mechanism 75 into slicing [station] 66” (slicing station 66 is identified in Figure 2). Ex. 1005 ¶ 51. Pryor discloses that two short lower loaf feed conveyors 163 and 164 are located “on the near and far-sides of slicing

¹⁴ Although Patent Owner does not expressly discuss these limitations, Patent Owner presents arguments as to why a POSITA would not have combined the teachings of Pryor and Reifenhäuser. We address those arguments below in Section II.E.1.c.

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machine 50, respectively,” and are also “located immediately below two short upper feed conveyors 165 and 166, respectively.” *Id.*

b) “hollow first shaft,” “second shaft,”

Claim 1 further recites

said first conveyor driven by rotation of a hollow first shaft; said second conveyor driven by rotation of a second shaft; said second shaft independently operating concentrically within said hollow first shaft;

a first motor driving the hollow first shaft into rotation; and a second motor driving the second shaft into rotation.

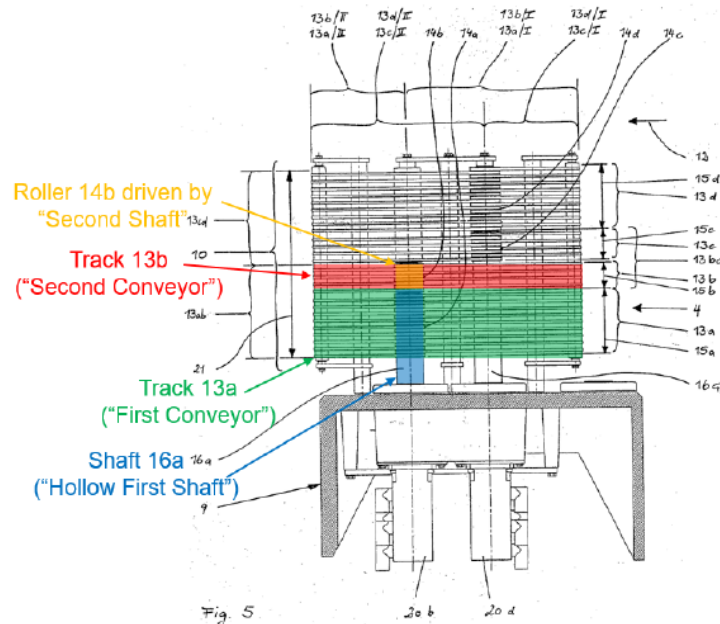
Ex. 1001, 24:51–56.

(1) Petitioner’s Contentions

For these limitations, Petitioner asserts that

Reifenhäuser’s system includes four conveyors or “tracks 13a to 13d running parallel to one another and arranged side by side, each of which can be driven independently.” EX1006, ¶33. Each track is made of multiple narrow endless belts and driven by one of the drive rollers 14a to 14d, which are in turn driven by drive shafts. EX1006, ¶¶33-35.

Pet. 22. Petitioner further provides an annotated version of Reifenhäuser’s Figure 5.



On page 23 of the Petition, Petitioner has marked a first conveyor (green), second conveyor (red), hollow first shaft (blue), and second shaft (yellow) on Reifenhäuser’s Figure 5. According to Petitioner, Reifenhäuser teaches that track 13a is driven by drive roller 14a, which is driven by hollow drive shaft 16a. *Id.* at 23 (citing Ex. 1006 ¶¶ 34–35, Fig. 5). Petitioner further argues that track 13b is driven by roller 14b that is driven by a drive shaft “aligned coaxially with respect” to hollow shaft 16a. *Id.* (citing Ex. 1006 ¶¶ 34–35, Fig. 5).

Petitioner asserts that Reifenhäuser’s drive motor 20a drives “hollow drive shaft 16a (and thus drive roller 14a and track 13a) into rotation via belt 19a and pulley 18a.” Pet. 24 (citing Ex. 1006 ¶¶ 34–36, Figs. 5–7; Ex. 1003 ¶ 92). Similarly, Petitioner asserts that Reifenhäuser teaches drive motor 20b “that drives the inner shaft for roller 14b (and thus drive roller 14b and

track 13b) into rotation via belt 19b and pulley 18b.” *Id.* (citing Ex. 1006 ¶¶ 34–36, Figs. 5–7; Ex. 1003 ¶ 93).

Petitioner acknowledges that “Pryor discloses the food article feed apparatus recited in claim 1 except for the arrangement between the motors and the conveyors of a hollow first shaft with a second shaft that is concentrically within the hollow first shaft.” Pet. 24 (citing Ex. 1005 ¶¶ 8, 51–53, Figs. 2–3; Ex. 1003 ¶¶ 94–95). Petitioner contends that Reifenhäuser discloses this arrangement and that it would have been obvious to a POSITA “to combine Reifenhäuser’s teachings with Pryor to take advantage of hollow shafts ‘permit[ting] other shafts to operate through the interior.’” *Id.* at 24–25 (citing Ex. 1019, 216–217; Ex. 1003 ¶ 96). According to Petitioner, Reifenhäuser discusses advantages to using concentric drive shafts because “[w]ith the aid of this principle involving hollow shafts, adjacent tracks can be provided with their drives at aligned positions.” *Id.* at 25 (citing Ex. 1006 ¶ 17).

Relying on Dr. Hooper’s testimony, Petitioner argues that “concentric drive shafts can directly connect to concentric drive inputs of adjacent tracks, which allows the drive components to be located in a single area by the motors, away from the feed path.” Pet. 25 (citing Ex. 1006, Figs. 4–7; Ex. 1003 ¶ 96). Petitioner adds that “[a] POSA also would have understood the space saving advantages with such alignment of drives.” *Id.* (citing Ex. 1003 ¶¶ 99–102). Petitioner further contends that POSA would have had a reasonable expectation of success in implementing Reifenhäuser’s concentric shafts teachings with Pryor’s conveyor system teachings. Pet. 28 (citing Ex. 1003 ¶ 111). According to Petitioner, “[a]lthough Reifenhäuser’s

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conveyor is downstream from the cutting plane, the same principles apply in an upstream conveyor, such as Pryor's Moreover, a POSA would have been able to implement concentric drive shafts and motors in a way that accounted for the adjustability of Pryor's upper conveyors." Pet. 28 (citing Ex. 1003 ¶¶ 112–113).

(2) Patent Owner's Contentions

In its Response, Patent Owner acknowledges that

[Reifenhäuser's drive rollers]

are driven by means of the drive shafts 16a and 16c, which have a slight height offset and are each designed as hollow shafts inside which the drive shafts for the drive rollers 14b and 14d, which are aligned coaxially with respect thereto and are not visible in the figure, extend.

PO Resp. 15–16 (citing Ex. 1006 ¶ 35).

Patent Owner further contends that the evidence of record disproves Petitioner's purported motivations to combine Pryor and Reifenhäuser to "(1) improve cleanliness/maintenance; and (2) save space." PO Resp. 23–24 (citing Pet. 24–27, 70–72; Ex. 1003 ¶¶ 145, 243; Ex. 2002 ¶¶ 167–233).

(a) Cleanliness and Maintenance

First, Patent Owner contends that a POSITA would not have used Reifenhäuser's downstream concentric shafts in slicer feed lanes because of major hygiene and safety concerns. PO Resp. 24. Patent Owner asserts that since 2004, the leading American Meat Institute ("AMI") trade association has advised the meat and cheese processing industry not to use hollow shafts because of the serious risk of contamination from foodborne pathogens. *Id.* at 26 (citing Ex. 2002 ¶¶ 143–148; Ex. 2005, 2; Ex. 2010, 2–3; Ex. 2013, 6). According to Patent Owner, AMI describes hollow rollers as "congested"

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and instructs designers to use “an open design and solid rollers so bacteria do not have the opportunity to survive, grow and reproduce.” *Id.* (citing Ex. 2005, 2). Patent Owner further argues that AMI teaches that “[h]ollow areas of equipment, such as frames and rollers, must be eliminated wherever possible or permanently sealed.” *Id.* (alteration in original). Patent Owner further relies on AMI’s “Sanitary Design Checklist,” which recommends “[a]ll rotating members, such as drive sprockets or belt pulleys, are to be solid or filled with dye and fully sealed with continuous welds.” *Id.* at 27 (citing Ex. 2010, 2) (alteration in original); *see also* Ex. 2006; Ex. 2012, 6, 14; Ex. 2013, 7; Ex. 2004 ¶¶ 15–17; Ex. 2002 ¶¶ 143, 179; Ex. 2025, 4).

Second, Patent Owner contends that its own product, PowerMax4000 (“PM4K”) has concentric shafts and was “[d]esigned to meet or exceed the 10 AMI Sanitary Design Principles.” PO Resp. 28 (citing Ex. 2018, 4; Ex. 2020, 12). To do so, Patent Owner asserts that PM4K has special “double sealed enclosures” and an extensive daily wash down procedure requiring removal of the inner and outer concentric drive shafts. *Id.* at 28–29 (citing Ex. 2002, ¶¶ 69–70; Ex. 2015, 183). Patent Owner contends that these steps were contrary to standard industry practices, which attempted to minimize the number of components that required daily cleaning. *Id.* (citing Ex. 2002 ¶ 216).

Third, Patent Owner further argues that Petitioner’s employees and patents have consistently expressed hygiene concerns for similar slicers and circumstances. *See, e.g.*, PO Resp. 29 (citing Ex. 2002 ¶¶ 238–242); *see also* Ex. 2024. Patent Owner also contends that Petitioner’s own patents describe the high risk of contamination for areas of the slicer that are

transition points between feed conveyor lanes, as well as between the lanes and the blade. PO Resp. 30; *see* Ex. 2002 ¶¶ 188–191).

Fourth, Patent Owner contends that Dr. Hooper’s testimony is entitled to little weight because Dr. Hooper has little expertise regarding hygiene in the food processing industry and was not aware of the AMI’s 10 Sanitary Design Principles before his deposition in this case. PO Resp. 33 (“Dr. Hooper’s experience designing food equipment occurred before the publication of the AMI standards, or long after the date of the ’109 patent.”); *see id.* at 34 Ex. 2059, 25:19–26:10. Patent Owner further argues that “Dr. Hooper could not identify a *single* hygiene concern unique to hollow shafts” and that Dr. Hooper’s proposal to seal a concentric shaft in a single space creates more serious risks. *Id.* at 31 (citing Ex. 2059, 208:8–15; Ex. 2002 ¶¶ 188–91).

Patent Owner adds that Dr. Howard explains a POSA would understand that a concentric shaft system requires placing an additional seal (e.g., two) in the food article feed lane—a design choice that all experts agree is not favored by a POSA. PO Resp. 32 (citing Ex. 2005, 2; Ex. 2012, 5; Ex. 1003 ¶ 296; Ex. 2002 ¶ 190). Patent Owner further contends that servicing any aspect of the inner drive shaft, or its additional components, would require disassembly and removal of the inner drive shaft. *Id.* at 33 (citing Ex. 2002 ¶¶ 213–216; Ex. 2015, 145). Patent Owner asserts concentric shafts arrangements are more difficult to maintain because the inner components are concealed and much more difficult to access. *Id.* at 32 (citing Ex. 2002 ¶¶ 213–216).

(b) Space Saving

Patent Owner further argues that Dr. Hooper provides no reason why a POSITA would modify Pryor to allow “easy access” to interior conveyors because Pryor does not have interior conveyors. PO Resp. 35 (citing Ex. 2002 ¶¶ 196–198). Patent Owner contends that Pryor only discloses a slicer with a far side and near side conveyor. *Id.* at 35–36 (citing Ex. 1005, Abstract, ¶ 51, Fig. 3).

Patent Owner argues that Reifenhäuser may refer to aligning concentric drive shafts, but says nothing about space saving or access to interior conveyors. PO Resp. 36 (citing Ex. 1006 ¶ 17) (“Advantageously, a drive shaft of a drive roll of a central track [is] guided through the hollow drive roll of the adjacent outer track. With the aid of this principle involving hollow shafts, adjacent tracks can be provided with their drives at aligned position.” (alteration in original)). Additionally, Patent Owner contends that Petitioner relies on textbook excerpts in Exhibit 1019, which describes specific circumstances when hollow shafts may be preferred, but does not explain how this disclosure applies to the purported prior art combination. *Id.* (citing Ex. 1019, 216–217).

Patent Owner further contends that concentric drive shafts would result in no change to the overall footprint of the Pryor slicers or that it would be a matter of inches. PO Resp. 37 (citing Ex. 2002 ¶¶ 199–203). Petitioner contends that Pryor’s motors are already underneath the conveyors and feed path in the most convenient, space saving location because Figure 2 shows servomotor 174 for short loaf conveyors on the near side of the machine in machine base 51. *Id.* at 37–38 (citing Ex. 1005, Fig. 2, ¶ 53; Ex.

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2002 ¶¶ 125, 203). Patent Owner also asserts that “a POSA would also understand that a machine with two motors side-by-side (such as in a hollow shaft arrangement) would result in the same overall footprint as a machine with two motors on opposite sides of a machine.” *Id.* at 39 (citing Ex. 2002 ¶¶ 201–202).

Patent Owner adds that a POSA would have appreciated that the alleged concentric, hollow drive shaft would have resulted in *more* components – bearings or fittings along the common length of the inner and outer shaft. PO Resp. 39–40 (citing Ex. 2002 ¶¶ 204–211).

Patent Owner further contends that Petitioner is mistaken that there are cognizable benefits for shortening electrical cables by arranging motors near each other because “[a]ny potential safety risks from the cables or length of cables in the machines are already adequately addressed by adhering to the safety requirements that all manufacturers must follow regarding cables in machines.” PO Resp. 40 (citing Ex. 2002 ¶¶ 217–222). Patent Owner adds that “as the specification discloses, there are multiple sets of conveyors in these slicers that are driven by servo motors. Those servo motors would have the same voltage cables as any servo motors used in a concentric, hollow shaft arrangement.” *Id.* at 40 (citing Ex. 1001, 8:22–23, 8:63–64; 11:14–15; 11:35–36; Ex. 2002 ¶ 220). Further, Patent Owner contends that reducing the length of cable that spans between two motors would have no cognizable effect on the length of all the other high voltage cables in a slicer. *Id.* at 40–41.

c) Discussion

Initially, we observe that Patent Owner contends Dr. Hooper’s testimony is entitled to little weight because Dr. Hooper has little expertise regarding hygiene in the food processing industry and was not aware of the AMI principles before his deposition in this case. PO Resp. 33–34 (citing Ex. 2002 ¶¶ 7–19; Ex. 2059, 209–11 (“Dr. Hooper’s experience designing food equipment occurred before the publication of the AMI standards, or long after the date of the ’109 patent.”), Ex. 2059, 25:19–26:10). Patent Owner adds that Dr. Howard explains a POSITA would understand that a concentric shaft system requires placing an additional seal (e.g., two) in the food article feed lane—a design choice that all experts agree is not favored by a POSITA. PO Resp. 32 (citing Ex. 2005, 2; Ex. 2012, 5; Ex. 1003 ¶ 296; Ex. 2002 ¶ 190).

We decline to find Dr. Hooper less credible based solely on the relative experience of the witnesses. There is no dispute that both of the witnesses are at least as skilled as a person having ordinary skill in the art. *See* Ex. 1004 (CV of Dr. Hooper); Ex. 2002 ¶¶ 5–28. Therefore, both Dr. Hooper and Dr. Howard may give expert testimony. *See Kyocera Senco Indus. Tools Inc. v. ITC*, 22 F.4th 1369, 1376–77 (Fed. Cir. 2022) (“To offer expert testimony from the perspective of a skilled artisan in a patent case—like for claim construction, validity, or infringement—a witness must at least have ordinary skill in the art.”). Instead, in judging the credibility of experts, our analysis below considers whether (1) the witness offers corroboration for his opinions and (2) provides opinions that are consistent with the prior art and the witness’ cross-examination testimony.

Next, the parties do not dispute that Reifenhäuser teaches first/second conveyors, concentric shafts, and two motors, which are required by claim 1 of the '109 patent. *See generally* PO Resp. 23–41. We agree.

We observe Reifenhäuser teaches that transport 10 is divided into four tracks 13a to 13d that run parallel to one another and are arranged side-by-side, “which can be driven independently of one another.” Ex. 1006 ¶¶ 33. Moreover, Reifenhäuser teaches that the four tracks are driven by rollers 14a–14d. *Id.* ¶¶ 34–35. In particular, Reifenhäuser teaches that

drive rollers 14a and 14c are driven by means of the drive shafts 16a and 16c, which have a slight height offset and are *each designed as hollow shafts inside which the drive shafts for the drive rollers 14b and 14d, which are aligned coaxially with respect thereto and are not visible in the figures, extend.*

Ex. 1006 ¶ 35 (emphases added). Additionally, as Petitioner points out, Reifenhäuser’s drive motor 20a drives “hollow drive shaft 16a (and thus drive roller 14a and track 13a) into rotation via belt 19a and pulley 18a” and drive motor 20b “drives the inner shaft for roller 14b (and thus drive roller 14b and track 13b) into rotation via belt 19b and pulley 18b.” Pet. 24 (citing Ex. 1006 ¶¶ 34–36, Figs. 5–7; Ex. 1003 ¶¶ 92–93).

We further agree with Petitioner’s position that a POSITA would have combined the relevant teachings of Pryor and Reifenhäuser with a reasonable expectation of success. Specifically, Petitioner has explained adequately that a POSITA would have combined Pryor’s food article feed apparatus with Reifenhäuser’s arrangement of motors and concentric shafts because this arrangement is well-known and provides space and cost saving advantages with the alignment of the drives. Pet. 25–26 (citing Ex. 1003

¶¶ 99–102). As Petitioner’s expert, Dr. Hooper, explains, concentric shafts allow “at least some of the components . . . [to] be nested within each other, thus saving space.” Ex. 1003 ¶ 101. Dr. Hooper further testifies that “[e]liminating a second, separate drive belt along with other transmission components (and the necessary space surrounding it) on one side of the conveyors would allow a machine designer to reduce the overall footprint of the machine.” *Id.* Additionally, Dr. Hooper testifies that “[b]y aligning the axis of the shafts with the conveyor rollers, at least some of the belts and pulleys may be eliminated, making the transmission arrangement simpler. Other components can be eliminated because the nested shafts can share some components.” Ex. 1003 ¶ 98.

Dr. Hooper supports his testimony with citations to the record, including excerpts from the textbook titled, “Introduction to Machine Design,” by V.B. Bhandari published in 2001 (Exhibit 1019, “Bhandari”). Bhandari teaches that hollow shafts offer several advantages, including that “[t]hey allow internal support or permit other shafts to operate through the interior.” Ex. 1019, 216. Based on this disclosure, among other things, Dr. Hooper reasons that hollow shaft arrangement is “particularly useful when dealing with multiple lanes of conveyors including interior conveyors to facilitate access to interior conveyors.” Ex. 1003 ¶ 96 (citing Ex. 1006, Fig. 5).

As discussed above, Patent Owner contends that Dr. Hooper provides no reason why a POSITA would modify Pryor to allow “easy access” to interior conveyors because Pryor does not have interior conveyors. PO Resp. 35 (citing Ex. 2002 ¶¶ 196–198). Patent Owner contends Pryor

discloses a far side conveyor and a near side conveyor. PO Resp. 36 (citing Ex. 1005, Abstract, ¶ 51, Fig. 3); Ex. 2002 ¶ 198 (“A POSA would understand that the conveyors in Pryor’s two lanes could be accessed from their respective outer side.”).

Patent Owner, however, misses the point. Dr. Hooper testifies that the hollow shaft arrangement is useful when dealing with *multiple* lanes of conveyors. Ex. 1003 ¶ 96. By Patent Owner’s own description, Pryor teaches a “far side” conveyor and a “near side” conveyor, which indicates at least multiple conveyors, if not also a conveyor that is positioned away from the “near side” conveyor. Moreover, Petitioner and Dr. Hooper explain that “[m]aintenance is also improved because using a hollow shaft system makes placing pairs of motors on the same side easier.” *Id.* ¶ 100. Indeed, Pryor discloses

[o]n the near side of machine 50 the loaf feed drive mechanism comprising the short loaf feed conveyors 163 and 165 is driven by a servo motor 174. A like motor 175 on the far side of machine 50 (not shown in FIG. 2) affords an independent drive for the “short” loaf feed conveyors 164 and 166 on that side of the slicing machine; *see* FIG. 4.

Ex. 1005 ¶ 53. In other words, Pryor’s motors are on opposite sides in order to drive their respective conveyors. However, with a concentric shaft arrangement, such as Reifenhäuser’s, the motors would be on the same side, which would advantageously allow same side access to maintain the operation of a conveyor that is further away (e.g., “far side conveyor”) from the motors.

Patent Owner further argues that Reifenhäuser may refer to aligning concentric drive shafts, but says nothing about space saving or access to interior conveyors. PO Resp. 36 (citing Ex. 1006 ¶ 17).

Even assuming that is correct, there is no requirement that the relied upon references themselves explicitly provide the rationale for the combination. “A motivation to combine may be found “explicitly or implicitly in market forces; design incentives; the ‘interrelated teachings of multiple patents’; ‘any need or problem known in the field of endeavor at the time of invention and addressed by the patent’; and the background knowledge, creativity, and common sense of the person of ordinary skill.” *Realtime Data LLC v. Iancu*, 912 F.3d 1368, 1374 (Fed. Cir. 2019) (citing *ZUP, LLC v. Nash Mfg., Inc.*, 896 F.3d 1365, 1371 (Fed. Cir. 2018) (quoting *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354 (Fed. Cir. 2013))).

Here, Reifenhäuser teaches that the concentric hollow shaft arrangement is advantageous because “adjacent tracks can be provided with their drives at aligned position.” Ex. 1006 ¶ 17. This disclosure is consistent with Bhandari’s teaching that, generally, hollow shafts offer the advantage that “[t]hey allow internal support or permit other shafts to operate through the interior.” Ex. 1019, 216. As such, we find that these teachings support Dr. Hooper’s testimony that there were common, well-known advantages of using a hollow drive shaft arrangement applicable to the multiple conveyors disclosed in Pryor. In fact, “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.”
KSR, 550 U.S. at 417.

We are also not persuaded otherwise by Patent Owner’s contentions that concentric drive shafts would result in no change to the overall footprint of the Pryor slicers and would have resulted in *more* components — bearings or fittings along the common length of the inner and outer shaft. PO Resp. 37 (citing Ex. 2002 ¶¶ 199–203), 39–40 (citing Ex. 2002 ¶¶ 204–211). Patent Owner’s expert, Dr. Howard, testifies that “by moving one motor from one side of the machine to the other, the overall width of the machine is not significantly reduced. Instead, the width that was provided by the motor on the far side of the machine is simply shifted to additional width on the near side of the machine.” Ex. 2002 ¶ 202. Dr. Howard further testifies that a hollow shaft system requires at least the same number of components as a non-hollow shaft system and that a POSITA would have used a direct drive system for the fewest number of drive components. Ex. 2002 ¶¶ 204–205.

Patent Owner’s arguments are unavailing. First, Dr. Howard asserts that Petitioner’s proposed modification would increase overall machine width because the second motor would be placed further from the conveyors than the first motor, which takes up more space. *See* Ex. 1039 ¶ 43; Ex. 2002 ¶¶ 201–202. However, Dr. Hooper explains that there are well-known ways a POSITA would arrange the two motors on one side of the conveyors. One such way is that taught by Reifenhäuser, which places one motor vertically above the other without adding width to the machine. Ex. 1039 ¶ 45 (citing Ex. 1006, Figs. 4–5). Therefore, we credit

Dr. Hooper's testimony, which is better supported by the evidence of record, as establishing that: 1) the use of concentric drive shafts (with motors) was a well-known arrangement for transmitting rotary power; and 2) motors could be situated on the same side of the machine in a space saving placement. *See* Ex. 1019, 216–217; Ex. 1006; Figs. 4–5.

Second, Dr. Howard asserts that a hollow shaft system would have *more* not fewer driver components than the Pryor system. Ex. 2002 ¶¶ 205–211. We agree with Dr. Howard and Patent Owner that it is not entirely clear whether Petitioner's proposed modification results in more, fewer, or the same number of components. Nevertheless, we are not persuaded that the ultimate parts count is dispositive. We understand Petitioner reasons that the use of concentric drive shafts in Pryor's slicer simplifies Pryor's arrangement by reducing the space taken up by the drive shafts. Dr. Hooper explains that at least some of the components of the concentric drive shafts can be nested within each other, thus saving space. Ex. 1003 ¶ 101. Dr. Hooper's point, therefore, is that a concentric drive shaft design with same-side motor arrangement uses space more efficiently; without focusing on how the number of parts may be affected. In this manner, Dr. Hooper explains that the concentric drive shaft arrangement benefits from the well-known advantages of nesting drive shaft components to independently operate multiple conveyors. *Id.* ¶ 107. Thus, we do not agree that the mere addition of bearings, bushings, or the like detracts from these advantages. *See* Ex. 2002 ¶ 209. “[A] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily

obviate motivation to combine.” *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006).

Additionally, Dr. Howard contends that concentric drive shafts make the machine more difficult to maintain because the inner drive shaft inside of the outer drive shaft is more difficult to access or inspect. Ex. 2002 ¶ 213. Dr. Howard asserts that non-concentric drive shaft systems do not pose these same difficulties because an employee would not have to disassemble two drive systems to maintain it. *Id.*

To start, we note that Dr. Howard is overly narrow in his concept of “maintenance,” which requires disassembly of the drive shafts for all access or inspection. *See* Ex. 2002 ¶ 213. Dr. Hooper explains that the placement of motors and concentric drive shafts on the same side “concentrates the drive components in a single area that can be located away from the feed path.” Ex. 1003 ¶ 97. As such, we agree with Dr. Hooper that there are advantages in concentrating the drive components in a single area for access and inspection. *Id.* Even assuming Dr. Howard is correct that disassembly is required for most maintenance of concentric drive shaft systems, we are not persuaded that this disassembly or any disassembly and maintenance of a slicer machine does not benefit from having the drive shaft components located in a single area. In other words, if disassembly of the drive shaft is necessary, it would be advantageous to perform that maintenance in an area away from the feed path as Dr. Hooper explains. *See* Ex. 1003 ¶ 97.

Patent Owner further contends that there are no “cognizable benefits” for shortening electrical cables by arranging motors near each other because “[a]ny potential safety risks from the cables or length of cables in the

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machines are already adequately addressed by adhering to the safety requirements that all manufacturers must follow regarding cables in machines.” PO Resp. 40 (citing Ex. 2002 ¶¶ 217–222).

We understand the thrust of Petitioner’s argument to be that the use of common, well-known nested concentric drive shafts in Pryor’s system comes with efficiencies in the use of space and arrangement of components. Moreover, even if manufacturers already follow safety requirements regarding cables as Patent Owner proposes, it does not follow that there are no “cognizable” benefits from additional efficiencies in space management. Or that those benefits can be ignored. For obviousness, it is “not necessary to show that a combination is the best option, only that it be a suitable option.” *Intel Corp. v. PACTXPP Schweiz AG*, 61 F.4th 1373, 1380 (Fed. Cir. 2023) (emphasis omitted).

Additionally, Patent Owner presents several arguments for why a POSITA would not have used Reifenhäuser’s downstream concentric shafts in slicer feed lanes because of major hygiene and safety concerns. PO Resp. 24–34; PO Sur-reply 5–11. For these arguments, Patent Owner relies on AMI’s 10 Principles of Sanitary Design (“AMI’s 10 Sanitary Design Principles”) that Patent Owner contends teaches against the use of hollow rollers. PO Resp. 26 (citing Ex. 2005, 2; Ex. 2006; Ex. 2010, 2; Ex. 2012, 6, 14; Ex. 2013, 7; Ex. 2004 ¶¶ 15–17; Ex. 2002 ¶¶ 143, 179; Ex. 2025, 4).

We note that the AMI’s 10 Sanitary Design Principles include Principle No. 5, which states:

5. Hollow areas should be hermetically sealed: Hollow areas of equipment such as frames and rollers must be eliminated wherever possible or permanently sealed. Bolts, studs, mounting

plates, brackets, junction boxes, nameplates, end caps, sleeves and other such items must be continuously welded to the surface not attached via drilled and tapped holes.

Ex. 2005, 2; *see also* Ex. 2012, 6, 14; 2012, 7. Additionally, section 5 of the AMI Sanitary Design Checklist is provided below:

PRINCIPLE #5 - HOLLOW AREAS HERMETICALLY SEALED			S	M	U	NA	Deficiency
5.1	All rotating members, such as drive sprockets or belt pulleys, are to be solid or filled with dye and fully sealed with continuous welds.	AMI					30
5.2	All stationary hollow tube construction, such as frame members or blade spacers, are fully sealed with continuous welds to prevent interior contamination.	NSF 5.2.1					30
5.3	There are no fastener penetrations into hollow tube construction.	AMI					30
5.4	Threaded leg adjustments are internal and do not penetrate the tube frame members.	NSF 5.2.4					30
5.5	Name plates & tags are minimized. When attached, plates & tags are continuously welded. Rivets or screw attached plates (often sealed with caulk) are absent.	AMI					30
			150	150			150

Ex. 2010, 2–3. Dr. Howard contends that “AMI recognized that hollow shafts were known to allow ‘bacteria [to] harbor[,]’ and AMI also determined that hollow shafts were ‘not acceptable’ in standard designs.”

Ex. 2002 ¶ 177 (citing Ex. 2005, 2; Ex. 2013) (alterations in original).

In its Reply, Petitioner argues that Patent Owner overstates and mischaracterizes the AMI principles and intent. Pet. Reply. 7–8. Petitioner relies on the testimony of Mr. Joseph Stout (Exhibit 1038) who led the AMI’s Equipment Design Task Force that was responsible for developing AMI’s 10 Sanitary Design Principles in the early 2000s. *Id.* at 7 (citing Ex. 1038 ¶ 15). In his declaration, Mr. Stout explains that

the AMI principles were designed to raise awareness in the industry about the importance of hygienic design and effective cleaning/sanitizing protocols. There was no expectation that

equipment manufacturers would, or even could, follow every design principle. Rather, the principles provided guidance and tools for manufacturers to develop higher levels of food safety, and to understand when particular care should be taken to account for certain design aspects.

Ex. 1038 ¶ 49. Mr. Stout further testifies that “the AMI checklist tool was not designed to simply grade each principle on an acceptable or unacceptable basis.” *Id.* ¶ 43. Rather, Mr. Stout explains “equipment designers, manufacturers, and food processors would have understood at the time of the ’109 patent, certain design deficiencies could be addressed through validated cleaning and sanitizing protocols.” *Id.* ¶ 44. Referring to Principle 10, Mr. Stout testifies that the cleaning & sanitizing are considered in the design process. *Id.* (citing Ex. 2010, 4 (Principle 10.1)).

We find that Mr. Stout’s testimony directly refutes Dr. Howard’s and Patent Owner’s position that the AMI’s 10 Sanitary Design Principles “are a clear and explicit teaching to the industry to avoid unhygienic hollow shafts.” PO Sur-reply 5 (citing Ex. 2005, 2; Ex. 2002 ¶¶ 142–148, 169); *id.* at 7 (“AMI Principles taught away from hollow shaft design.”). Rather, Mr. Stout, who led the development of AMI’s 10 Sanitary Design Principles, explains that the AMI provided guidelines with no expectation that all ten principles could and would be followed. *See* Ex. 1038 ¶ 49. As discussed, the principles include Principle No. 10 that takes into account cleaning and sanitizing protocols used by manufacturers for their designs. Ex. 2010, 4. Thus, considering the disclosure of AMI’s 10 Sanitary Design Principles in its entirety and the explanatory testimony from Mr. Stout, we are not persuaded by Patent Owner that a POSITA would have understood these ten

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principles as teaching away from the use of concentric driver shafts in Pryor's system.

Moreover, by Patent Owner's admission, its own product, the PM4K, contains concentric shafts, but "was designed to meet or exceed the 10 AMI Sanitary Design Principles." PO Resp. 28. Patent Owner contends it did so by using "double sealed enclosures" and "extensive daily wash down procedures." *Id.* at 28–29 (citing Ex. 2002 ¶¶ 69–70, 216). As such, we observe that Principle No. 5 did not "teach away" from Patent Owner's use of concentric draft shafts, but, rather, informed Patent Owner's consideration of other features, such as seals and cleaning/sanitation protocols, for the PM4K's design.

Patent Owner also asserts Petitioner's employees and patents have consistently expressed hygiene concerns for similar slicers and circumstances. *See, e.g.*, PO Resp. 29–30; Ex. 2002 ¶¶ 188–191, 238–242; Ex. 2029.

It comes as no surprise that Petitioner and Patent Owner have both considered methods to mitigate and handle contamination. Neither party disputes that sanitation and cleaning protocols are part of machine design. Moreover, both are familiar with AMI's 10 Sanitary Design Principles. However, these facts only further support Petitioner's and Mr. Stout's positions that manufacturers knew also of common cleaning techniques to address contamination concerns that could have been applied to machine designs. *See* Ex. 1038 ¶¶ 50–56.

On balance, we find that the advantages of the concentric drive shaft (e.g., space savings and efficient arrangement of components) are not

eliminated or outweighed by the need to consider sanitation protocols. Petitioner explains that “[u]nder the AMI principles, a POSA would consult with their team and choose a design that would allow for effective cleaning and sanitizing protocols to control bacterial harborage and growth.” Pet. Reply 10 (citing Ex. 1038 ¶¶ 74–76). Mr. Stout further testifies that “[n]umerous cleaning and sanitizing techniques existed at the time of the ’109 patent . . . [which, included] clean-in-place (CIP) techniques, clean-out-of-place (COP) techniques, steam tenting, or a combination of these techniques. Ex. 1038 ¶ 51 (citing Ex. 1044; Ex. 1054, 5; Ex. 1055, 4–5; Ex. 1064, 27). Dr. Howard agrees that COP is “a known technique” that “goes back as long as I’ve been in food processing machinery.” Ex. 1057, 196:19–197:9. Thus, in light of the numerous sanitation techniques available, we are not persuaded by Patent Owner that the governing industry standards and practices would have led a POSITA away from combining Pryor and Reifenhäuser as Petitioner proposes. PO Resp. 30.

Furthermore, we do not find the cases cited by Patent Owner controlling. PO Sur-reply 3–4. The Federal Circuit in *Henny Penny* found nonobviousness where the feature to be combined (a TPM sensor) required additional features (diverting oil through a heat dissipator) such that the combination would need those additional features or degrade faster, leading to “an unappetizing combination.” *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019). The Federal Circuit further noted that *Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340 (Fed. Cir. 2000) stands for the principle that “the benefits, both lost and gained, should be weighed against one another.” *Winner*, 202 F.3d at 1349 n.8. Here, the crux of

Patent Owner's arguments is essentially that Petitioner's proposed modification leads to too many lost benefits and would not, for example, satisfy the sanitary requirements of the AMI's 10 Sanitary Design Principles. This argument, however, is not persuasively supported by the record. As discussed in detail above, we have weighed both the benefits lost and gained as presented by the parties, and considered Patent Owner's contentions regarding the AMI's 10 Sanitary Design Principles. We find the record more persuasively supports Petitioner's position and reasoning, including that a POSITA would understand the concentric drive shafts were a well-known arrangement that would have been advantageously implemented in a food slicing machine with proper consideration of sanitation/cleaning protocols. *See* Ex. 1006; Ex. 1019, 216–217; Ex. 1038.

d) Conclusion Regarding Claim 1

For the reasons set forth above, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 1 would have been obvious over Pryor and Reifenhäuser.

2. Analysis of Claims 5 and 11

Claim 5 depends from 1. Claim 11 depends from claim 6. Both recite substantially the same additional limitations. Ex. 1001, 25:4–18, 25:59–26:16. For example, claim 5 is directed to the food article feed apparatus of claim 1, and further requires

a third conveyor for moving a third food article; a fourth conveyor for moving a fourth food article; said fourth conveyor driven by a second hollow shaft; said third conveyor driven by a third shaft; said third shaft operating within said second hollow shaft;

said first conveyor is adjacent to said second conveyor;
said third conveyor is adjacent to said fourth conveyor;
said second conveyor is adjacent to said third conveyor;
said hollow first shaft and said second shaft extend from a non-adjacent side of said first conveyor to independent drive sources;

said second hollow shaft and said third shaft extend from a non-adjacent side of said fourth conveyor to independent drive sources.

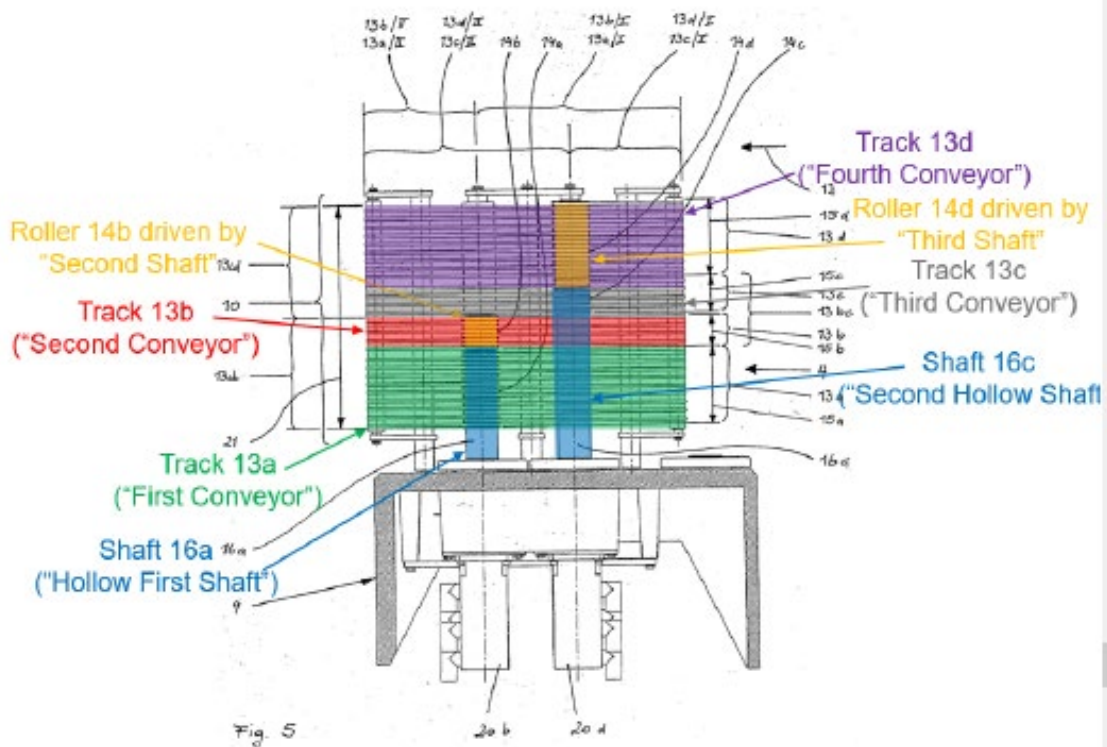
Ex. 1001, 25:4–18.

Petitioner argues that Pryor illustrates two sets of upper and lower conveyors, but also teaches that “[t]wo, three or more loaves can be sliced simultaneously.” Pet. 37–38 (citing Ex. 1005 ¶43, Fig. 3) (emphasis omitted, alteration in original). Petitioner contends that “a POSA would have found it obvious to include additional conveyors for more than three loaves for increased production (including when one of the lanes is inoperative because it requires maintenance) with more flexibility (for example, to provide a different slice thickness in each lane).” *Id.* (citing Ex. 1003 ¶ 165). Petitioner adds that Reifenhäuser teaches discloses third and fourth conveyors for conveying food articles (e.g., tracks 13c and 13d). *Id.* (citing Ex. 1006 ¶¶ 33–36, Fig. 5). According to Petitioner, “it would have been obvious to include third and fourth sets of conveyors (both upper and lower conveyors) in Pryor’s system next to short conveyors 163–166.” *Id.* (citing Ex. 1003 ¶¶ 165–167).

Petitioner further argues that two pairs of motors driving four conveyors via concentric shafts can be placed on either the same side or on opposite sides. Pet. 40 (citing Ex. 1003 ¶ 168). Nonetheless, Petitioner

takes the position that “a POSA would have placed the second set of concentric shafts and their motors *on the opposite side of the conveyors* because of the short length of the conveyors, which would make it difficult to include the two sets of concentric drive shafts adjacent to each other the way it is shown in Reifenhäuser.” *Id.* (citing Ex. 1005 ¶¶ 51, Figs. 2–3; Ex. 1003 ¶¶ 168–169) (emphasis added); *see also* Ex. 1003 ¶¶ 170–175. Petitioner adds that it would have been routine for a POSITA to make each conveyor equal width and mirror the conveyor/concentric drive system discussed for claim 1. *Id.* at 42.

Based on the complete record, we agree with Petitioner. For convenience, Petitioner’s annotated version of Reifenhäuser, Figure 5, is reproduced below:



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Petitioner's version of Reifenhäuser's Figure 5 annotates "Track 13a" as the "First Conveyor," "Track 13b" as the "Second Conveyor," "Track 13c" as the "Third Conveyor," "Track 13c" as the "Fourth Conveyor," "Shaft 16a as the Hollow First Shaft, Roller 14b as the "Second Shaft," "Shaft 16c" as the "Second Hollow Shaft," and "Track 13d" as the "Fourth Conveyor."

Pet. 41.

As shown in Petitioner's annotated Figure 5, Reifenhäuser teaches "transport 10 is divided into four tracks 13a to 13d running parallel to one another and arranged side by side, each of which can be driven independently of one another." Ex. 1006 ¶ 33. Reifenhäuser further discloses that "[t]he front and rear sections of each track 13a to 13d are driven by the same drive roller 14a to 14c."¹⁵ *Id.* ¶ 34. Based on this disclosure, we agree with Petitioner that Reifenhäuser characterizes its transport as having *four* independent tracks, which correspond to four independently driven conveyors.

We are not persuaded by Patent Owner's contention that a "correct" translation of Reifenhäuser teaches otherwise. *See* PO Resp. 43–44. Patent Owner argues that "a certified translation of the pertinent paragraphs" in Reifenhäuser properly translates "Guttstrangen" as "product strands." *Id.* (citing Ex. 2048). Exhibit 2048 contains a certified translation of Reifenhäuser's paragraphs 2, 4, and 31. However, Patent Owner does not contest the translation Petitioner provided of paragraphs 33–34 of

¹⁵ While paragraph 34 describes only three rollers 14a to 14c, Reifenhäuser's Figure 5 shows rollers 14a to 14d for the four (4) independently driven tracks 13a to 13d. Ex. 1006, Fig. 5.

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Reifenhäuser. These translated paragraphs, as discussed above, expressly teach *four* tracks 13a–13d, which supports Petitioner’s reading of the reference as teaching four conveyor lanes. *See* Ex. 1006 ¶¶ 33–34. Therefore, we are not persuaded by Patent Owner that the term “product strands” makes a difference in our understanding of Reifenhäuser.

Additionally, we do not agree with Patent Owner that Petitioner provides no evidence of independent four lane slicers before the ’109 patent. To the contrary, Dr. Hooper testified that “Julian [(Exhibit 1013)] discloses a food slicer with a four lane feed system that includes a ‘slant conveyor system having slant conveyors 16 a, b, c, d.’” Ex. 1003 ¶ 170 (citing Ex. 1013 ¶ 21). Exhibit 1013 is U.S. Patent Application Publication No. 2005/0278228 (herein after “Julian”), titled “Proportional Length Food Slicing System.” Ex. 1013, code (54). Among other things, we find that Julian expressly teaches a four-lane slicer. *Id.* ¶ 21. Specifically, Julian discloses “a conventional feed conveyor 12, conventional shaker conveyor 14 having cutting lanes 15a, b, c, d, slant conveyor system having slant conveyors 16a, b, c, d (FIG. 9), cutting system having more than one cutting assembly 18, outfeed conveyor 20 and control system 22.” *Id.* ¶ 11.

Patent Owner contends that Petitioner has not provided any evidence that a POSITA would have applied Julian to Petitioner’s “high-speed, high-precision slicing machine” combination. PO Sur-reply 23–24 n.11. We disagree, Petitioner relies on Julian as evidence of the general background knowledge possessed by a POSITA, which is that four-lane slicers were well-known in the art. *See* Ex. 1003 ¶ 238; *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1365 (Fed. Cir. 2015) (explaining that evidence

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submitted with a petition may be considered to demonstrate the general knowledge that one of skill in the art “would bring to bear in reading the prior art identified as producing obviousness”); *see also Randall Mfg. v. Rea*, 733 F.3d 1355, 1362–63 (Fed. Cir. 2013) (emphasizing that additional prior art references or evidence are not for the purpose of changing the prior art combination that forms the basis of the asserted ground, but rather are merely for the purpose of providing evidence of the state of the art, including the general background knowledge of a person of ordinary skill in the art).

We also find unavailing Patent Owner’s arguments that a POSITA would not reasonably expect to succeed at increasing the number of independent drives on a slicer because doing so would require extensive modifications that are technically challenging, costly, and time consuming. PO Resp. 44–45 (citing Ex. 2002 ¶¶ 238–242). First, Dr. Howard’s testimony is not helpful in this regard. Although Dr. Howard testifies that it would cost hundreds of thousands of dollars and take weeks to add independent drives (Ex. 2002 ¶ 241), Dr. Howard also provides no basis to evaluate how these costs (or expenditure of time) would be perceived by a POSITA. Under cross-examination, he admitted that there’s a range for costs, and that

[i]n some cases or some machines, you can do upgrades and they’re may be *expensive* but not *crazy expensive*. Other machines you upgrade from the equivalent of a two-lane to a four-lane and the costs *just blow up and become exorbitant*. *So it really can be anywhere. There’s no single answer to that. It depends on a lot of information that I don’t have, but it could be either way.*

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Ex. 1057, 164:1–8 (emphases added). We understand Dr. Howard’s cross-examination testimony to be that the costs depend on the situation and that his opinion would depend on “a lot of information” he *did not have*. *Id.* Indeed, we find that Dr. Howard’s testimony on this subject to be based on incomplete information. Dr. Howard admitted that he did not know for sure if the systems he considered for his testimony in his declaration were slicers or not. Ex. 1057, 154:8–20. Thus, we attribute less weight to his testimony in this regard. *Id.*

Nonetheless, even assuming Patent Owner is correct that designing a four-lane slicer increased costs as well as the time required to accomplish those designs, we find that Patent Owner has not explained sufficiently how these factors would have deterred a POSITA from employing four conveyors for their known and expected advantages of providing multiple lanes for slicing. *See* Ex. 1013 ¶ 21. “[T]he fact that the two disclosed apparatus [sic] would not be combined by businessmen for economic reasons is not the same as saying that it could not be done because skilled persons in the art felt that there was some technological incompatibility that prevented their combination. Only the latter fact is telling on the issue of nonobviousness.” *Orthopedic Equip.*, 702 F.2d at 1013; *see also Grit Energy Solutions, LLC v. Oren Technologies, LLC*, 957 F.3d 1309, 1323–1324 (Fed. Cir. 2020) (“Thus, even if we accept the Board’s factual determination that swapping Eng Soon’s components would result in a more expensive system, that determination, standing alone, is insufficient to reject each of Grit Energy’s arguments as to why a skilled artisan would have been motivated to make the proposed swap.”).

In addition, Patent Owner further contends that Mr. Stout’s cross-examination testimony indicates that a POSITA would have had no reasonable expectation of success in redesigning the prior art slicers because a slicer is “really complicated” and “very sophisticated.” PO Sur-reply 17 (citing Ex. 2068, 105:16–19, 114:1–3, 145:7–8, 145:16–18, 204:17–205:1). Patent Owner further argues that Petitioner does not provide any arguments “why a POSA would expect success in designing a slicer with four independent lanes.” *Id.* at 18; *see* PO Resp. 44–45 (citing Ex. 2002 ¶¶ 238–242).

We disagree. Even if four-lane conveyors were considered to be “sophisticated,” the record supports Petitioner’s position that a POSITA would have been aware of well-known implementations of four-lane conveyors as taught in both Julian and Reifenhäuser. As discussed, Petitioner contends that four-lane conveyors were common and well-known as evidenced by Reifenhäuser’s tracks 13a–13d, and Julian’s four lane slicer. Ex. 1006 ¶¶ 33–34; Ex. 1013 ¶ 21; *see* Pet. 42 (relying on arguments and evidence presented for claim 1); *see also id.* at 28 (“A POSA would have had a reasonable expectation of success in implementing Reifenhäuser’s concentric shafts teachings with Pryor’s conveyor system teachings Concentric drive shafts provide a common, well-known arrangement for transmitting rotary power to separate components that engineers used in many industries, including food slicing. . . . A POSA would have known how to implement this well-known arrangement to drive pre-slicing conveyors in a food slicing machine, such as Pryor’s, using well-known, predictable components, such as shafts, gears, pulleys, and/or belts.”). Thus,

we find that Petitioner has persuasively established that a POSITA would have had a reasonable expectation of success in modifying Pryor with well-known and common arrangements of four conveyors and concentric drive shafts.

In addition to the above, we agree with Petitioner that “a POSA would have placed the second set of concentric shafts and their motors *on the opposite side of the conveyors* because of the short length of the conveyors, which would make it difficult to include the two sets of concentric drive shafts adjacent to each other the way it is shown in Reifenhäuser.” *Id.* (citing Ex. 1005 ¶ 51, Figs. 2–3; Ex. 1003 ¶¶ 168–169); *see also* Ex. 1003 ¶¶ 170–175.

Patent Owner argues that Petitioner ignores Reifenhäuser’s explicit teaching that “in order to provide the required installation space for drives, it is further proposed that . . . the servomotors are all located on the same side of the distributing device.” PO Resp. 52 (citing Ex. 1006 ¶ 19) (alteration in original). Patent Owner adds that, with respect to claim 1, Petitioner argued that using concentric drive shafts allows the motors and components to be placed on the same side of the conveyors to save space. *Id.* at 52–53 (citing Pet. 25; Ex. 1003 ¶ 101). Patent Owner contends that Petitioner now contradicts itself by arguing the opposite—[that] “it makes sense to place two motors on one side and two motors on the other side of the conveyors.” *Id.* (quoting Ex. 1003 ¶ 174).

We discern that Reifenhäuser teaches explicitly that “*in order to provide the required installation space* for the drives, it is further proposed that the hollow drive rollers are arranged offset from each other in the

horizontal direction and that *the servomotors are all located on the same side* of the distributing device.” Ex. 1006 ¶ 19 (emphases added).

Nevertheless, we also note that Pryor teaches motors on opposite sides. Ex. 1005 ¶ 53 (“On the near side of machine 50 . . . the short loaf feed conveyors 163 and 165 is driven by a servo motor 174. A like motor 175 on the far side of machine 50 . . . affords an independent drive for the ‘short’ loaf feed conveyors 164 and 166 on that side of the slicing machine.”). As such, the record reflects that a POSITA would have been aware that the motors could be placed on the same or opposite sides of the driven conveyors.

Moreover, Dr. Hooper confirms that the arrangement of motors on opposite sides was a well-known placement. He explains that

[g]iven how Pryor’s conveyors 163–166 are arranged along the centerline of the machine, it makes sense to place two motors on one side and two motors on the other side of the conveyors because the short length of Pryor’s short conveyors *would make it difficult to include the two sets of concentric drive shafts adjacent to each other the way it is shown in Reifenhäuser*. Specifically, it is more difficult to stagger the hollow shafts as shown in Reifenhäuser without having the hollow shafts, and their drive motors and support structure, interfere with each other. Thus, a POSA would have viewed placing the sets of hollow shafts on opposite sides of the conveyors as a desirable alternative to Reifenhäuser’s exact configuration.

Ex. 1003 ¶ 174 (emphasis added). Dr. Hooper further explains that

rearranging the location of parts without changing their function or fundamental structure is obvious absent other complicating factors. Here, there is no reason why moving two of the motors to the other side of the four conveyors *would change the function or structure of those motors. In fact, simply flipping the hollow shaft system and motors along the centerline of the conveyors (i.e., the line between conveyors 2 and 3)* would be one way that

a POSA would have thought of making this modification. Thus, this modification would have been obvious as a simple rearrangement of parts.

Id. ¶ 175 (emphases added).

Dr. Howard's cross-examination testimony agrees with Dr. Hooper's as shown by the exchange below:

Q. Would a skilled artisan at the time of the '109 patent have understood that you could place drive motors on the far side of the machine?

A. I'm -- they definitely would have understood it was possible, yes, of course.

Q. Would a skilled artisan at the time of the '109 patent have understood you could place drive motors on the near side of the machine? . . .

A. *Again, as I said, near side, far side, which I'm understanding you're using because of this is a relative term, but I think that a skilled artisan would understand that motors in the abstract can be placed on either side. It's just a question of where it makes sense to.* And I think in the case of the '109 patent, one of the inventive aspects is that the motors are on opposite sides for the concentric drive systems.

Q. Are there any other locations in a slicer where a skilled artisan would have considered placing drive motors?

A. I mean, the most likely one is underneath. You could do it on top. There were some machines in some of our earlier IPRs where they were placed at the rear of the machine. *So, I mean, as I originally said, there's six sides to a machine. You could put the motor on any of them.*

Ex. 1057, 179:4–180:8 (emphases added). Therefore, on the whole, Petitioner's position is better supported by testimony of both experts.

Separately, Patent Owner reiterates its arguments regarding hygiene risks that we have addressed with regard to claim 1. *See* PO Resp. 48. For

same reasons discussed, we are not persuaded that the hygiene risks outweigh the advantages of Petitioner’s proposed combination Ex. 1038 ¶ 51 (citing Ex. 1044; Ex. 1054, 5; Ex. 1055, 4–5; Ex. 1064, 27); Ex. 1057, 196:19–197:9.

For the reasons set forth above, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claims 5 and 11 would have been obvious over Pryor and Reifenhäuser.

3. Analysis of Claim 12

Claim 12 depends from claim 6 and further recites:

a third upper conveyor for moving a third food article; said second upper conveyor is between said first upper conveyor and said third upper conveyor;

at least three lower conveyors corresponding said upper conveyors; each lower conveyor and each corresponding upper conveyor engaging opposite sides of a food article; each said corresponding pair of upper and lower conveyors operating synchronously to move a food article toward a cutting plane.

Ex. 1001, 26:17–26.

For the upper conveyor limitations, Petitioner relies on the arguments and evidence presented for claims 5 and 11. Pet. 44. For the lower conveyors, Petitioner contends that “Pryor discloses that its upper conveyors 165 and 166 were paired with corresponding lower conveyors 163 and 164.” *Id.* (citing Ex. 1005 ¶ 51). Petitioner further argues that “[w]hen adding a third conveyor, a POSA would have added a lower conveyor corresponding to it to match Pryor’s other conveying lanes.” *Id.* (citing Ex. 1003 ¶ 184).

We adopt Petitioner’s arguments and evidence as our own.

For these additional limitations of dependent claim 12, Patent Owner contends that “doubling the drive components would create more cracks and crevices in rollers, belts, and shafts and more risk of contamination in each location.” PO Resp. 48 (emphasis omitted).

For same reasons discussed with respect to claims 1, 5, and 11, we are not persuaded that the hygiene risks outweigh the advantages of Petitioner’s proposed combination. Again, the experts agree that numerous sanitation techniques were available at the time of the claimed invention to mitigate hygiene concerns. Ex. 1038 ¶ 51; Ex. 1044; Ex. 1054, 5; Ex. 1055, 4–5; Ex. 1064, 27); Ex. 1057, 196:19–197:9.

Accordingly, Petitioner has shown by a preponderance of the evidence that the subject matter of claim 12 would have been obvious over Pryor and Reifenhäuser.

4. Analysis of Claims 2–4 and 6–10

Petitioner argues that the combination of Pryor and Reifenhäuser teaches the limitations recited in claims 2–4 and 6–10 and that a person having ordinary skill in the art would have combined the teachings with a reasonable expectation of success. Pet. 29–36, 42–44. Petitioner’s arguments are supported by citations to the prior art and the testimony of Dr. Hooper. *See id.* at 29–36, 42–44.

Patent Owner does not address separately the additional limitations recited in claims 2–4 and 6–10. *See generally* PO Resp.

We adopt Petitioner’s arguments and evidence as our own. *See* Pet. 29–36, 42–44. Based on the same, Petitioner has shown by a preponderance

of the evidence that the subject matter of claims 2–4 and 6–10 would have been obvious over Pryor and Reifenhäuser.

F. Obviousness based on Pryor, Reifenhäuser, and Penta — Claims 13–15

Petitioner asserts claims 13–15 would have been obvious based on the teachings of Pryor, Reifenhäuser, and Penta. Pet. 45–50.

1. Claim 13

Claim 13 depends from claim 12 and further recites “wherein at least one of said lower conveyors comprises a drive belt for connecting a drive source to a first drive roller, and a first conveyor belt; said first drive roller for driving said corresponding conveyor.” Ex. 1001, 26:27–31.

For claim 13, Petitioner contends that

Penta discloses a conveyor (e.g., primary cheese conveying system 500) that comprises (1) a drive belt (e.g., drive belt 508) for connecting a drive source (e.g., unseen “[s]uitable means” that drive the drive belt 508) to a first drive roller (e.g., roller 505 or roller 506), and (2) a first conveyor belt (e.g., conveyor belt 509). . . . Penta’s rollers are for driving the conveyor.

Pet. 45–46 (citing Ex. 1007, 8:28–47, Fig. 1; Ex. 1003 ¶ 188) (first alteration in original).

Petitioner adds that “a POSA would have had a reason to combine a drive belt (as in Penta) with Pryor’s conveying system.” Pet. 47 (citing Ex. 1003 ¶ 189). Petitioner contends that “[a]lthough concentric drive shafts have benefits, it would be difficult to fit concentric drive shafts (and their motors) for the lower conveyors in addition to the upper conveyors, especially when loaves with a smaller height are being sliced.” *Id.* (citing Ex. 1005 ¶ 51, Figs. 2–3; Ex. 1003 ¶ 189). Petitioner asserts that a POSITA would have been motivated to use an alternative drive arrangement for the

lower conveyors that spaced the motors and drive shafts along the length of the conveyor. *Id.* (citing Ex. 1003 ¶ 189). “An interior drive belt, like Penta’s, is one of the options that facilitates spacing the motors along the conveyor length because the drive shaft does not need to be coaxial with a drive roller at the end of the conveyor.” *Id.* (citing Ex. 1003 ¶ 190), *see also id.* (“Penta’s arrangement was particularly advantageous for driving an interior conveyor that did not have immediate access to the drive rollers via a side of the conveyor. . . . Indeed, using interior drive belts was a well-known technique to drive conveyor belts.”) (citing Ex. 1007, 8:28–47, Fig. 1; Ex. 1015, 6:35–7:13, Figs. 10–11; Ex. 1003 ¶ 190).

Patent Owner does not address separately the additional limitations recited in claim 13. *See generally* PO Resp.

We adopt Petitioner’s arguments and evidence as our own.

Accordingly, Petitioner has shown by a preponderance of the evidence that the subject matter of claim 13 would have been obvious over Pryor, Reifenhäuser, and Penta.

2. Claim 14

Claim 14 depends from claim 13 and further recites, “wherein said first drive roller comprises: an outer diameter and a recessed diameter; said drive belt is connected around said recessed diameter; said first conveyor belt is connected around said outer diameter.” Ex. 1001, 26:32–36.

For claim 14, Petitioner argues that Penta’s drive rollers 505, 506 have a central depression 507, which creates an outer diameter and a recessed diameter. Pet. 49 (citing Ex. 1007, 8:36–37; Ex. 1003 ¶ 194). Petitioner adds that Penta’s drive belt 508 is disposed within the central

depression 507 (i.e., connected around the recessed diameter). *Id.* (citing Ex. 1007, 8:37–39).

Patent Owner contends that Pryor teaches a slicer where each pair of upper and lower conveyors is driven by a single motor. PO Resp. 54 (citing Ex. 1005, ¶ 53, Fig. 2). Patent Owner argues that Petitioner uses impermissible hindsight to “ignore that design and instead add a second set of motors to drive only the lower conveyors.” *Id.* Patent Owner contends that Dr. Hooper argues the combination with Reifenhäuser would minimize the number of components, but then contradicts himself by adding additional components to drive the lower conveyors. *Id.* (Ex. 2059, 136:17–137:2, 141:9–16).

We do not agree that Petitioner’s reasoning amounts to impermissible hindsight. Dr. Hooper explains that in Pryor, “the lower conveyor is located directly under a corresponding upper conveyor, and it has its end roller aligned with the end roller of the upper conveyor.” Ex. 1003 ¶ 189. Dr. Hooper explains that “[t]his means that the space around the end of the conveyor is constrained, especially vertically, because of the close spacing between conveyors. The vertical constraints are tightened when loaves with a smaller height are being sliced because the upper and lower conveyors are closer together.” *Id.* Where there are three conveyors, Dr. Hooper further explains that

[u]sing an interior drive belt, like Penta’s, facilitates driving a middle conveyor in a conveying lane because the drive shaft does not need to be coaxial with a drive roller at the end of the conveyor. Instead, *the drive shaft can transmit power to the interior drive belt anywhere along the conveyor through the adjacent conveyors, and the drive belt can drive the drive roller.*

This allows the motors to be placed away from the space near the end of the conveyors, which improves design flexibility.

Id. ¶ 190 (emphases added). Dr. Hooper also explains that “using interior drive belts was a well-known technique to drive conveyor belts.” Ex. 1003 ¶ 190 (citing Ex. 1007, 8:28–47, Fig. 1; Ex. 1015, 6:35–7:13, Figs. 10–11).

Under cross-examination, Dr. Howard agreed that “if there *had been reasons* . . . [a POSITA] would have done independent driving.” Ex. 1057, 100:21–101:2 (emphasis added). Here, Dr. Hooper provides those *reasons* for the proposed use of Penta’s interior driving belts for independently driving of Pryor’s conveyors. *See* Ex. 1003 ¶ 190. Dr. Howard does not dispute these reasons, namely that (1) interior drive belts were a well-known technique for driving conveyor belts; and (2) “[u]sing an interior drive belt, like Penta’s, facilitates driving a middle conveyor in a conveying lane because the drive shaft does not need to be coaxial with a drive roller at the end of the conveyor.” *See* Ex. 2002 ¶¶ 245–250; Ex. 1003 ¶ 190.

Moreover, we do not find Petitioner’s reasoning to be contradictory. Petitioner explains that even if the “number of motors may increase,” a POSITA would understand that there were trade-offs to consider for “better spacing of drive shafts and removal of intervening drive components.” Pet. Reply 22. Therefore, we do not agree that Petitioner’s contentions are rooted in *impermissible* hindsight. *See, e.g., In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971) (“Any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made and does not include

knowledge gleaned only from applicant’s disclosure, such a reconstruction is proper.”).

Accordingly, Petitioner has shown by a preponderance of the evidence that the subject matter of claim 14 would have been obvious over Pryor, Reifenhäuser, and Penta.

3. Claim 15

Claim 15 depends from claim 13 and further recites, “wherein said drive belt operates in a path that is within an operating path of said first conveyor belt.” Ex. 1001, 26:37–39.

For claim 15, Petitioner refers to Penta’s Figure 1, which shows the dotted lines for drive belt 508 located between rails 502 and within conveyor belt 509. Pet. 50 (citing Ex. 1007, Figs. 1–2).

Patent Owner does not address separately the additional limitations recited in claim 15. *See generally* PO Resp.

We adopt Petitioner’s arguments and evidence as our own.

Based on the same, Petitioner has shown by a preponderance of the evidence that the subject matter of claim 15 would have been obvious over Pryor, Reifenhäuser, and Penta.

G. Obviousness based on Pryor, Reifenhäuser, and Lindee — Claim 16

Petitioner asserts claim 16 would have been obvious based on the teachings of Pryor, Reifenhäuser, and Lindee. Pet. 50–54.

Claim 16 depends from claim 12 and further recites:

a machine control for controlling each said upper and lower conveyor; and

the machine control having instructions ending machine slicing of all loaves on the food article feed apparatus when the shortest food article is sliced to a minimum length.

Ex. 1001, 26:40–47.

Petitioner argues that Pryor teaches computer 54 connected to “a cycle stop switch 72,” “a loaf feed on-off switch,” and “an emergency stop switch” 87 “for interrupting all operations of slicing machine 50.” Pet. 51 (citing Ex. 1005 ¶¶ 37, 39–40, 42). Petitioner further asserts Lindee discloses that a “remaining butt end of [a] food loaf usually should not be sliced” because “it is likely to yield undersized slices.” *Id.* at 52 (citing Ex. 1008 ¶ 60) (alteration in original). Petitioner argues that Lindee discloses when its gripper “reaches its end position 151A” (which is “selected to coincide closely with the end of effective slicing size for the food loaf,” *id.*), “it is tracked by an encoder (not shown) or by a servomotor, which causes the machine’s computer program to stop movement of the loaf toward the slicing station” and discard the butt end of the food loaf. *Id.* (citing Ex. 1008 ¶ 61). Petitioner adds that “[a] POSA would have been motivated to modify Pryor’s machine control to include instructions ending machine slicing as taught in Lindee to ensure that ragged or unsightly slices are not produced by the machine.” *Id.* (citing Ex. 1005 ¶ 7; Ex. 1003 ¶ 206).

Patent Owner contends that the crucial difference between Pryor and Lindee is that Pryor discloses a continuous feed slicer that cuts butt ends whereas Lindee discloses a back-clamp or gripper type slicer that avoids cutting butt ends. PO Resp. 56 (citing Ex. 2002 ¶¶ 287–289, 303–307). Patent Owner explains that

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mechanical grippers grasp the end of a loaf, those grippers advance, and a servomotor or encoder tracks the position of the grippers. . . . Once the gripper reaches a predetermined end position, the machine causes the gripper to stop advancing and retract until it is over a support door, which is opened. The gripper releases the butt end (which falls through the open door) and continues to retract into its home position New loaves are loaded and the cycle is repeated.

Id. at 57 (citing Ex. 2002 ¶ 307; Ex. 1008 ¶¶ 58–61) (emphasis omitted).

Patent Owner adds that a POSITA would have understood that stopping “a continuous feed slicer during operation when a loaf gets short defeats the very purpose of a continuous feed slicer.” *Id.* at 57–58 (citing Ex. 2002 ¶ 311).

Based on the complete record, we agree with Patent Owner. As Patent Owner points out, Pryor expressly teaches a loaf seam synchronization device for a *continuous* loaf feed slicing machine.

Ex. 1005, code (54). More specifically, Pryor discloses that

[t]he invention provides a mechanism and method for controllably loading multiple food loaves into the slicing station of a *continuous* slicing machine. The mechanism and method of the invention provides that parallel loaves that are engaged by a common loaf feed drive or side-by-side, independent loaf feed drives are engaged by the loaf feed drive or drives simultaneously such that the interface or seam between a preceding loaf and a trailing loaf in different loaf feed paths are located substantially at the same location during slicing of two side-by-side loaf streams. *Since the cut slices at this location are more likely to be ragged or unsightly, it simplifies production if this seam location occurs at the same location during slicing of two parallel food loaf streams.*

Id. ¶ 7 (emphases added). Pryor further teaches that “the seam alignment apparatus 600 effectively loads the initial loaves into the short conveyors in a controlled manner which ensures the lead ends of the loaves are engaged at the same longitudinal position.” *Id.* ¶ 70. In addition, Pryor’s food loaves are fed together to abut the trailing ends of the preceding loaves. *Id.* ¶ 69. Thus, we agree with Patent Owner that Pryor’s disclosure is directed to a continuous load feed slicing machine that sought to address “ragged” or “unsightly” slices through seam alignment synchronization, which is different from Lindee.

In Lindee, the butt ends are unsliced and discarded. Lindee discloses that when using slicing machines, “[t]he remaining butt end of the food loaf usually should not be sliced” because “it is likely to yield undersized slices.” Ex. 1008 ¶ 60. To accomplish this, Lindee discloses that when a gripper of a slicing machine reaches its end position, the gripper is tracked by an encoder or by a servomotor “which causes the machine’s computer to stop movement of the loaf toward the slicing station.” *Id.* at ¶ 61. The butt end is then left unsliced and discarded. *Id.* (“[T]he gripper is reversed energized to open its tines 32 and allow the butt end of the food loaf to drop down clear of the food path.”).

Petitioner contends that a POSITA would have understood that “[p]ausing slicing . . . allows both lead and butt ends [of Pryor’s slicer] to be aligned before slicing and discarding, which simplifies production.” Pet. Reply 24 (citing Pet. 52–53; Ex. 1005 ¶ 7; Ex. 1039 ¶ 59) (emphasis omitted). However, neither Petitioner nor Dr. Hooper explains sufficiently how “pausing slicing” in Pryor aligns both lead and butt ends. As discussed,

Pryor's continuous slicer already aligns both the leading and trailing ends of food loaves. "If the loaves are the initial loaves, the three loaves are fed together into the short conveyors. If the loaves are succeeding loaves, the three loaves are fed together *to abut the trailing ends* of the proceeding loaves." Ex. 1005 ¶ 69 (emphasis added). Further, even assuming that the trailing ends (i.e., butt ends) are misaligned, we find that Petitioner and Dr. Hooper have also not explained adequately how "pausing" aligns the butt ends or simplifies production. Lindee teaches the discarding of butt ends, but does not otherwise teach pausing the slicing to align butt ends before slicing or discarding. *See* Ex. 1008 ¶ 61.

Additionally, Petitioner argues that Pryor teaches both non-continuous and continuous feeds. Pet. Reply 24. Petitioner contends that Pryor incorporates the gripper disclosure of U.S. Patent No. 5,628,237 (Exhibit 1027, "the '237 patent"), which indicates a POSITA would have understood that either non-continuous or continuous feeds could have been used with the Pryor's system. We discern that Pryor incorporates by reference the disclosure presented in the '237 patent. Ex. 1005 ¶ 37. Even so, Pryor teaches that the systems disclosed in the '237 patent can be constructed and modified for *continuous* loaf feed and automatic loading. *Id.* Thus, we do not read Pryor's disclosure as teaching both non-continuous and continuous load feed slicing machines, but that Pryor incorporates the '237 patent teachings to construct a *continuous* load feed slicer. With this in mind, we are not persuaded that Petitioner has explained adequately why a POSITA would have modified Pryor's *continuous* load feed slicing machine

to accommodate Lindee’s grippers and operational method that is not continuous.

In response, Dr. Hooper states that nothing in his declaration relies on Pryor’s “slicer being continuous or non-continuous feed, and nothing in claim 16 requires discarding butt ends of a food loaf (or any particular technique.” Ex. 1039 ¶ 56. “As I made clear in my deposition, I was not relying only on ‘continuous feed’ aspects of Pryor or Wygal—I accounted for the known use of grippers in my analysis, even if Pryor’s ‘continuous feed’ variant does not use one.” *Id.* ¶ 60.

That, however, is the problem. Dr. Hooper fails to adequately consider and account for the “scope and content of the prior art” and “the “differences between the prior art and the claims at issue,” which are required factors for an obviousness analysis. *Graham*, 383 U.S. at 17–18. “While the sequence of these questions might be reordered in any particular case,” *KSR*, 550 U.S. at 407, the Federal Circuit has “repeatedly emphasized that an obviousness inquiry requires examination of all four *Graham* factors and that an obviousness determination can be made only after consideration of each factor.” *Nike*, 812 F.3d at 1335.

Dr. Hooper does acknowledge that Pryor’s continuous feed slicer does not use grippers like Lindee or the ’237 patent, and further admits that he did not consider the “existence of a gripper” in his analysis. *See* Ex. 2059, 105:17–19; Ex. 1039 ¶ 62. In his Reply declaration, he switches course and testifies that he did “account[] for the known use of grippers[,]” but conceded that “Pryor’s ‘continuous feed’ variant does not use one.” Ex. 1039 ¶ 60. He further asserts that this didn’t matter because

[a POSITA] would have understood that Pryor’s discarding of butt ends could either be accomplished upstream or downstream of the slicing blade. In other words, the butt end of the food loaf is either sliced and then discarded/recycled, or slicing ceases before the butt end of the food loaf reaches the slicing blade, and the butt end can be discarded/recycled without being sliced.

Id. ¶ 62. Dr. Hooper contends “both are viable ways to discard or recycle nonconforming food product.” *Id.* However, even assuming there are tradeoffs, Dr. Hooper has not explained sufficiently why a POSITA would seek to trade off the advantages of the continuous feed system for the non-continuous slicer when Pryor already addresses the same problem.

Dr. Hooper contends “[u]sing a mechanism like disclosed in Lindee and Pryor’s incorporated ’237 patent would limit spreading of food debris, discarding the butt end of the food loaf before reaching the slicing blade.”

Id. ¶ 62. But because Dr. Hooper does not cite to any evidence or support for this conclusory statement, we give less weight to his testimony.

“[C]onclusory expert testimony is inadequate to support an obviousness determination on substantial evidence review.” *TQ Delta, LLC v. CISCO Sys., Inc.*, 942 F.3d 1352, 1359 (Fed. Cir. 2019); *see also InTouch Techs., Inc. v. VGO Commc’ns, Inc.*, 751 F.3d 1327, 1349, 1353–54 (Fed. Cir. 2014) (reversing district court’s judgment of invalidity because the expert testimony “failed to provide any meaningful explanation for why one of ordinary skill in the art would be motivated to combine these references at the time of this invention”).

On the whole, Petitioner has failed to articulate a reasoned explanation why a POSITA would have been motivated to modify Pryor’s continuous food loaf feed slicer with Lindee’s operational method that stops

food slicing. *Nuvasive*, 842 F.3d 1376, 1382 (Fed. Cir. 2016) (requiring a reasoned explanation why the additional information would benefit an ordinarily skilled artisan in an obviousness determination).

Accordingly, Petitioner has not shown by a preponderance of the evidence that the subject matter of claim 16 would have been obvious over Pryor, Reifenhäuser, and Lindee.

H. Obviousness based on Pryor, Reifenhäuser, and Carey — Claim 17

Petitioner asserts claim 17 would have been obvious based on the teachings of Pryor, Reifenhäuser, and Carey. Pet. 54–60.

Because we determine that claim 17 would have been obvious under 35 U.S.C. § 103(a) in view of the combination of Wygal, Alotto, and Carey as explained in Part II.I.4 below, we do not address the parties' arguments regarding the combination of Wygal, Alotto, Penta, Lindee, or Carey. *See Boston Scientific Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App'x 984, 990 (Fed. Cir. 2020) (“We agree that the Board need not address issues that are not necessary to the resolution of the proceeding.”)

I. Obviousness based on Wygal, Alotto, Penta, Lindee, or Carey

Petitioner asserts claims 1–17 would have been obvious based on various combinations of the teachings of Wygal, Alotto, Penta, Lindee, and Carey. Pet. 60–80 (Claims 1–12 based on Wygal and Alotto), 80–81 (claims 13–15 based on Wygal, Alotto, and Penta), 81–83 (claim 16 based on Wygal, Alotto, and Lindee, 83 (claim 17 based on Wygal, Alotto, and Carey).

1. Claims 1–5 and 7–15

Because we determine that claims 1–5 and 7–15 would have been obvious under 35 U.S.C. § 103(a) in view of the combination of Pryor and Reifenhäuser alone or with Penta, we do not address the parties’ arguments regarding the combination of Wygal, Alotto, Penta, Lindee, or Carey for those claims. *See Boston Scientific*, 809 F. App’x at 990 (“We agree that the Board need not address issues that are not necessary to the resolution of the proceeding.”)

2. Claim 6

Though we have determined that claims 6 would have been obvious under 35 U.S.C. § 103(a) in view of the combination of Pryor and Reifenhäuser alone or with Penta, we address both claims 16 and 17 here. Claims 16 and 17 depend from independent claim 6.

Independent claim 6 is directed to a food article slicing machine that includes

a slicing station comprising a knife blade and a knife blade drive driving the blade along a cutting path;

a food article feed apparatus supporting food articles for movement along food article paths intersecting the cutting path; and the food article feed apparatus having

a first upper conveyor having at least one first endless belt that moves to provide a first conveying surface on top of the first endless belt for moving a first food article, and a second upper conveyor having at least one second endless belt that moves to provide a second conveying surface on top of the second endless belt for moving a second food article,

said first upper conveyor driven by rotation of a hollow first shaft;

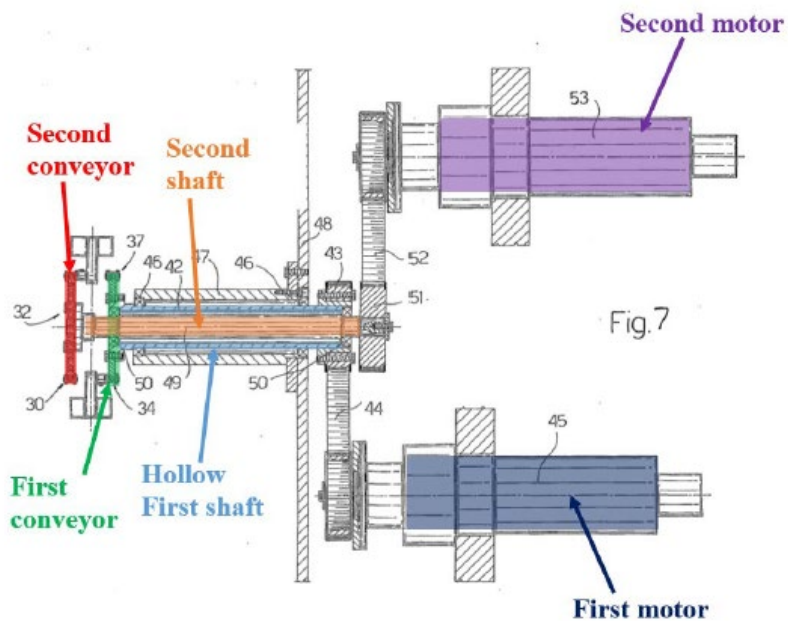
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said second upper conveyor driven by rotation of a second shaft;
said second shaft independently operating concentrically within
said hollow first shaft;
a first motor driving the hollow first shaft into rotation; and
a second motor driving the second shaft into rotation.

Ex. 1001, 25:19–39.

For these limitations, Petitioner contends that Wygal discloses “a conveyor unit (a lower conveyor 26 in combination with an upper conveyor 28) for transporting a product (loaf 12) to be sliced into a travel path of a rotating cutoff knife (knife 30).” Pet. 63 (citing Ex. 1010, 6:47–51). Petitioner acknowledges that Wygal discloses a single upper conveyor and does not teach a concentric drive shaft arrangement. *Id.* at 66, 68. Petitioner relies on Alotto for these limitations. Petitioner contends that Alotto discloses a system for packaging stacks of food product with two adjacent conveyors. Pet. 67 (citing Ex. 1011, 3:24–4:28; Ex. 1003 ¶ 277). Petitioner argues that “using multiple lanes with a conveyor for each lane was a known way to ‘increase throughput’ from a POSA’s background knowledge.” *Id.* at 66 (citing Ex. 1003 ¶ 276). Petitioner adds that “a POSA would have been motivated to double (or triple or quadruple) Wygal’s single lane to increase throughput and allow for continued production even if one of the lanes is inoperative because it requires maintenance.” *Id.* (citing Ex. 1013 ¶¶ 8, 48; Ex. 1003 ¶ 276).

Petitioner further argues that Alotto teaches the concentric drive shaft system required by claim 6. Pet. 68–70. For convenience, Petitioner’s annotated version of Alotto’s Figure 7 is provided below:



Petitioner’s annotated version of Alotto’s Figure 7 marks “first conveyor” in green, a “second conveyor” in red, a “hollow first shaft” in blue, a “second shaft” in orange, a “second motor” in purple. *Id.* at 69.

Petitioner contends that using multiple conveyors increases throughput and that “a POSA would have considered known ways to drive adjacent conveyors, including Alotto’s concentric shafts arrangement. Pet. 70–71 (citing Ex. 1011, 6:5–20, Fig. 7; Ex. 1003 ¶¶ 242, 292). Petitioner further argues that “[c]oncentric shafts were well-known . . . used by engineers in various fields. *Id.* at 71; Ex. 1003 ¶ 292. Petitioner then relies on the arguments it provided with respect to its proposed combination of Pryor and Reifenhäuser. Pet. 71–72.

Patent Owner does not dispute that Wygal and Alotto teach the limitations recited in claim 6. Rather, Patent Owner contends that Petitioner has not articulated a reasoned explanation why a POSITA would have been

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combined Wygal and Alotto. PO Resp. 23–41. Specifically, Patent Owner contends that hygiene and safety concerns from concentric drive shaft arrangement would discourage a POSITA from the combination even if there were potential, marginal space savings. *See id.*

We observe that these are the same arguments Patent Owner has presented against the combination of Pryor and Reifenhäuser, which are addressed in detail above. PO Resp. 23–41. For example, Patent Owner’s arguments rely heavily upon AMI’s 10 Sanitary Design Principles and the testimony of Dr. Howard. *Id.* However, for the same reasons discussed, we find Petitioner has the better position.

For example, Patent Owner contends AMI’s 10 Sanitary Design Principles teaches against the use of hollow rollers. PO Resp. 26 (citing Ex. 2005, 2; Ex. 2006; Ex. 2010, 2; Ex. 2012, 6, 14; Ex. 2013, 7; Ex. 2004 ¶¶ 15–17; Ex. 2002 ¶¶ 143, 179; Ex. 2025, 4).

Again, Principle No. 5, which states:

5. Hollow areas should be hermetically sealed: Hollow areas of equipment such as frames and rollers must be eliminated wherever possible or permanently sealed. Bolts, studs, mounting plates, brackets, junction boxes, nameplates, end caps, sleeves and other such items must be continuously welded to the surface not attached via drilled and tapped holes.

Ex. 2005, 2 (emphasis omitted); *see also* Ex. 2012, 6, 7, 14. Additionally, section 5 of the AMI Sanitary Design Checklist is provided below:

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PRINCIPLE #5 - HOLLOW AREAS HERMETICALLY SEALED		S	M	U	NA	Deficiency
5.1	All rotating members, such as drive sprockets or belt pulleys, are to be solid or filled with dye and fully sealed with continuous welds.	AMI				30
5.2	All stationary hollow tube construction, such as frame members or blade spacers, are fully sealed with continuous welds to prevent interior contamination.	NSF 5.2.1				30
5.3	There are no fastener penetrations into hollow tube construction.	AMI				30
5.4	Threaded leg adjustments are internal and do not penetrate the tube frame members.	NSF 5.2.4				30
5.5	Name plates & tags are minimized. When attached, plates & tags are continuously welded. Rivets or screw attached plates (often sealed with caulk) are absent.	AMI				30
			150	150		150

Ex. 2010, 2–3.

For the same reasons discussed above, we agree with Petitioner. Mr. Stout’s testimony directly refutes Dr. Howard’s and Petitioner’s position that AMI’s 10 Sanitary Design Principles “are a clear and explicit teaching to the industry to avoid unhygienic hollow shafts.” PO Sur-reply 5 (citing Ex. 2005, 2; Ex. 2002 ¶¶ 142–148, 169); *id.* at 7 (“AMI Principles taught away from hollow shaft design.”). Rather, AMI’s 10 Sanitary Design Principles takes into account numerous cleaning and sanitizing protocols used by manufacturers for their designs. Ex. 2010, 4; Ex. 1038 ¶ 51 (citing Ex. 1044; Ex. 1054, 5; Ex. 1055, 4–5; Ex. 1064, 27); Ex. 1057, 196:19–197:9.

We further agree with Petitioner’s position that a POSITA would have combined the relevant teachings of Wygal and Alotta with a reasonable expectation of success. Specifically, Petitioner has explained adequately that a POSITA would have combined Wygal’s food article feed apparatus with Alotto’s arrangement of concentric shafts because this arrangement is well-known and advantageously allows for multiple conveyors. Pet. 71. “[A] POSA would have considered known ways to drive adjacent

conveyors, including Alotto’s concentric shafts arrangement.” Pet. 70–71 (citing Ex. 1011, 6:5–20, Fig. 7; Ex. 1003 ¶¶ 242, 292).

In sum, we find that the advantages of the concentric drive shaft (e.g., space savings and efficient arrangement of components) are not eliminated or outweighed by need to consider sanitation protocols or hygiene concerns. *Winner*, 202 F.3d at 1349 n.8. (“[T]he benefits, both lost and gained, should be weighed against one another.”).

For the reasons set forth above, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 6 would have been obvious over Wygal and Alotto.

3. Claim 16

Claim 16 depends from claim 12 and further recites:

a machine control for controlling each said upper and lower conveyor; and

the machine control having instructions ending machine slicing of all loaves on the food article feed apparatus when the shortest food article is sliced to a minimum length.

Ex. 1001, 26:40–47.

For this challenge, Petitioner contends that Wygal teaches “a continuous feed automatic slicer” with a machine control that could contain instructions that stop the conveying systems as taught by Alotto. Pet. 81 (citing Ex. 1011, 9:18–28, 11:13–16, 14:16–20, Fig. 8; Ex. 1003 ¶¶ 358–360). Petitioner contends that stopping the conveying in Wygal’s machine would stop slicing as well. *Id.* at 82 (citing Ex. 1003 ¶¶ 358–362). Petitioner concludes that “[b]ased on common sense and Lindee’s teachings, it would have been obvious to program the control to provide instructions to

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end slicing when the shortest food article is sliced to a minimum length, as discussed for Ground 3.” *Id.* at 82 (citing Ex. 1008 ¶¶ 60–61; Ex. 1003 ¶¶ 363–364). Petitioner adds that a POSITA “would have had a reason (e.g., maintaining quality of food slices) to combine Lindee’s teachings of instructions ending machine slicing with Wygal’s and Alotto’s machine control teachings.” *Id.* at 82–83 (citing Ex. 1005 ¶ 7; Ex. 1008 ¶¶ 60–61; Ex. 1003 ¶¶ 363–364).

Patent Owner contends that this challenge suffers from the same deficiencies as those discussed for Petitioner’s combination based on Pryor, Reifenhäuser, and Lindee. PO Resp. 55–59. According to Patent Owner, Petitioner has again not explained sufficiently why a POSITA would modify Wygal’s continuous feed slicer to use Lindee’s gripper type slicer that stops the continuous feed in order to discard butt ends. *Id.* at 59.

We agree with Patent Owner. Wygal is a reference entitled “Three Dimensional Automatic Food Slicer.” Ex. 1010, code (54). Wygal relates to “a continuous feed automatic slicer that is capable of slicing food products into cubes.” *Id.* at 1:10–14.

Figure 1, reproduced below, shows Wygal's slicing machine.

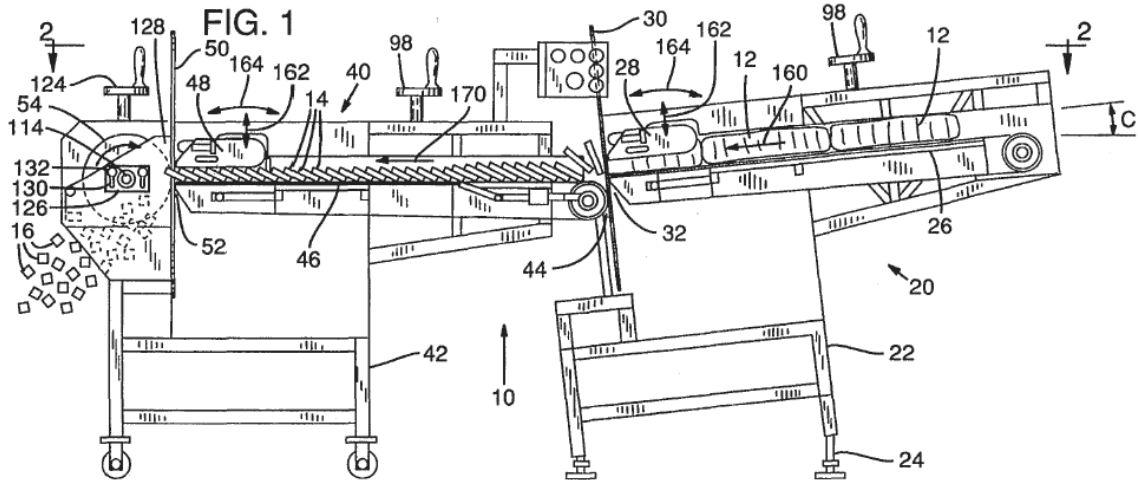


Figure 1 above shows a front view of Wygal's slicing machine. *Id.* at 2:57–58. As shown, machine 10 slices loaf 12 into cubes 16 “in a single continuous operation.” *Id.* at 3:6–8. Moreover, as Patent Owner notes, the food loaves abut one another end-to-end at seams to provide a continuous feed through the automatic slicer. Dr. Howard further testified that “continuous feed slicers are designed to continuously slice food product. With such a design, the seam location ends up being sliced. A POSA would understand that any non-uniform slices or piles could be managed downstream of the slicer.” Ex. 2002 ¶ 291.

Dr. Hooper responds that nothing in his declaration relies on “Wygal's slicer being continuous or non-continuous feed, and nothing in claim 16 requires discarding butt ends of a food loaf (or any particular technique.” Ex. 1039 ¶ 56. “As I made clear in my deposition, I was not relying only on ‘continuous feed’ aspects of Pryor or Wygal—I accounted for the known use of grippers in my analysis, even if Pryor's ‘continuous feed’ variant does not use one.” *Id.* ¶ 60.

Again, Dr. Hooper fails to adequately consider and account for the “scope and content of the prior art” and “the “differences between the prior art and the claims at issue,” which are required factors for an obviousness analysis. *Graham*, 383 U.S. at 17–18; *KSR.*, 550 U.S. at 407; *Nike*, 812 F.3d at 1335.

Here, Wygal is directed to continuous feed automatic slicer that is not designed to stop the slicing of food loaf butt ends. To propose modification otherwise with Lindee’s operation method, Petitioner and Dr. Hooper must adequately consider and examine the scope, content, and differences between those references, particularly with respect to the changes proposed to Wygal’s operation and system. That, by Dr. Hooper’s admission, has not occurred, particularly with respect to Wygal’s *continuous* feed operation, which is largely ignored by Dr. Hooper in his Reply declaration. *See Ex. 1039 ¶¶ 56–63.*

Accordingly, Petitioner has not shown by a preponderance of the evidence that the subject matter of claim 16 would have been obvious over Wygal, Alotto, and Lindee.

4. Claim 17

Petitioner asserts claim 17 would have been obvious based on the teachings of Pryor, Reifenhäuser, and Carey. Pet. 54–60.

Claim 17 depends from claim 6 and further recites:

a food article gate for separating said slicing station from said food article feed apparatus;

said food article gate having a closed position and a withdrawn position;

said closed position located between and separating said slicing station from said food article feed apparatus;

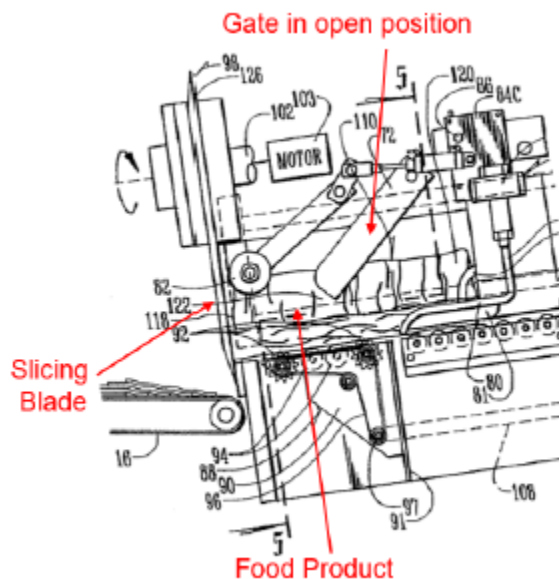
said withdrawn position being raised horizontally and recessed longitudinally toward said slicing station whereby food articles may pass into said slicing station.

Ex. 1001, 26:48–58.

For these additional limitations, Petitioner contends Carey discloses a gate with the features recited in claim 17. Pet. 83 (citing Ex. 1003

¶¶ 365–375; Ex. 1009, 3:36–61, 4:32–38, 5:11–13, 5:54–56, Figs. 3–4).

Petitioner’s annotated version of Carey’s Figure 3 is provided below:



Petitioner’s annotated version of Carey’s Figure 3 provided on page 58 of the Petition has the “Gate in open position,” “Slicing Blade,” and “Food Product” marked in red. Pet. 58. Petitioner further argues that “a POSA would have been motivated to modify Wygal’s slicing machine to include a stop gate (as taught in Carey) between its knife 30 and its upper and lower conveyors 28, 26 to ensure that a food loaf does not prematurely enter the

cutting plane when loading.” *Id.* at 83 (citing Ex. 1009, 3:53–61; Ex. 1003, ¶¶ 365–375).

Patent Owner responds that Wygal does not disclose a gate and “[g]iven, for example, the shallow feed angle disclosed in Wygal, a POSA would not expect a gate to be necessary.” PO Resp. 62 (citing Ex. 2002 ¶¶ 335–337). Patent Owner adds that Petitioner has also not explained why a POSA would use “a gate that rotated outward into a longitudinally recessed position.” *Id.* at 62–63.

We find that Petitioner has the better supported position. Patent Owner contends that Wygal does not need a gate because the feed angle is shallow. PO Resp. 62. Dr. Howard asserts the same in his declaration and includes a copy of Wygal’s Figure 1 for support. Ex. 2002 ¶ 335. However, Dr. Howard’s testimony is contradicted by the express disclosure in Wygal. First, Wygal does not teach the exact feed angle shown in Figure 1, which then begs the question of how Dr. Howard and Petitioner has determined the angle is too shallow for a gate. *See generally* Ex. 1010. Second, Wygal discloses that the angle of the slicing station 20 is *adjustable*. Wygal discloses that

slicing station 20 is supported on a stand (frame) 22 that is arranged with *adjusting mechanisms 24*, such as adjusting screws, to adjust the angle of inclination of the slicing station 20 and particularly the angle of inclination of the lower conveyor 26. The lower angle of inclination of the lower conveyor 26 is designated as angle C.

Id. at 3:39–45 (emphasis added). This disclosure better supports Petitioner’s position that a POSA would have modified Wygal with Carey’s gate to ensure that a food loaf does not prematurely enter the cutting plane when

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loading, especially because the inclination angle of the lower conveyors is adjustable.

Accordingly, Petitioner has shown by a preponderance of the evidence that the subject matter of claim 17 would have been obvious over Wygal, Alotto, and Carey.

III. MOTIONS

A. Patent Owner's Motion to Strike

Patent Owner filed a Motion to Strike Exhibits 1066–1068 and the citations in Petitioner's Reply relying on these exhibits. PO's Mot. Strike. Petitioner opposes. Pet.'s Opp'n Mot. Strike. Patent Owner contends that Petitioner raised new arguments involving evidence related to the GigaSlicer that is untimely and should have been submitted with the Petition. PO's Mot. Strike 1–5.

Petitioner contends that the Gigaslicer evidence provided in Exhibits 1066–1068 responds directly to Patent Owner's statements made in the Patent Owner's Response regarding the non-existence of four-lane slicers before the '109 patent. Pet.'s Opp'n Mot. Strike. 1. Petitioner further contends that its evidence was timely filed with the Petitioner's Reply because there was no "cause to present the GigaSlicer evidence with the Petition because it is not a basis for any ground of unpatentability." *Id.* at 3. Petitioner further argues that Patent Owner had an opportunity to depose Petitioner's declarant (Exhibit 1068) and file a sur-reply to address the Gigaslicer evidence.

Our rules do not prohibit Petitioner from citing new evidence in response to Patent Owner's arguments. CPTG 73 ("A party also may submit

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rebuttal evidence in support of its reply.”); *see also Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1077–78 (Fed. Cir. 2015). In this case, Patent Owner argued in its Response that Petitioner had not shown independent four-lane slicers existed before the ’109 patent. *See* PO Resp. 44. Petitioner’s arguments and evidence sought to contradict that argument. *See* Pet. Reply 16–19. Such evidence and argument are proper in a reply. Nevertheless, we determine that this motion is moot because we have not relied upon the evidence submitted in Exhibits 1066–1068 for our analysis.

Accordingly, we dismiss Patent Owner’s Motion to Strike as moot.

B. Petitioner’s Motion to Exclude Exhibits 2026, 2028, 2035–2037, 2052–2055, 2057–2058, 2061, 2065, 2066, 2070, and 2075.

Petitioner also filed a Motion to Exclude Exhibits 2026, 2028, 2035–2037, 2052–2055, 2057–2058, 2061, 2065, 2066, 2070, and 2075. Mot. Excl. Patent Owner opposes. Mot. Excl. PO. Resp. Patent Owner filed a Reply to Petitioner’s Opposition. Mot. Excl. Pet. Reply.

We do not, in this Final Written Decision, rely on any of the contested evidence. Accordingly, Petitioner’s motion is dismissed as moot.

IV. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 1–15 and 17 of the ’109 patent are unpatentable, but has not demonstrated by a preponderance of the evidence that claim 16 is unpatentable on the bases set forth in the following table.¹⁶

¹⁶ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this

Claims	35 U.S.C. §¹⁷	References/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–12	103(a)	Pryor, Reifenhäuser	1–12	
13–15	103(a)	Pryor, Reifenhäuser, Penta	13–15	
16	103(a)	Pryor, Reifenhäuser, Lindee		16
17	103(a)	Pryor, Reifenhäuser, Carey		
1–12	103(a)	Wygol, Alotto	6	

Final 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).

¹⁷ We did not reach a decision on the ground in which Petitioner contends that the combined teachings of Pryor, Reifenhäuser, and Carey renders claim 17 unpatentable because we determined that claim 17 was unpatentable on other grounds. *See* Part II.H. We also do not reach a decision on the ground in which Petitioner contends claims 1–5 and 7–15 are unpatentable as obvious over at least Wygol and Alotto because we determined that these claims were unpatentable on other grounds. *See* Part II.I.1.

Claims	35 U.S.C. §¹⁷	References/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
13–15	103(a)	Wygol, Alotto, Penta		
16	103(a)	Wygol, Alotto, Lindee		16
17	103(a)	Wygol, Alotto, Carey	17	
Overall Outcome			1–15, 17	16

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has demonstrated by a preponderance of the evidence that claims 1–15 and 17 of the '109 patent are 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;

FURTHER ORDERED that, Patent Owner's Motion to Strike Exhibits 1066–1068 is dismissed as moot;

FURTHER ORDERED that, Petitioner's Motion to Exclude Exhibits 2026, 2028, 2035–2037, 2052–2055, 2057–2058, 2061, 2065, 2066, 2070, and 2075 is dismissed as moot; and

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FURTHER ORDERED that the parties shall, no later than 14 days from the entry of this Decision, jointly file a public version of this Decision.

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