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Paper 49
Entered: April 09, 2025

NON-PUBLIC VERSION—PROTECTIVE ORDER MATERIAL

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COLLEGE PRODUCTS, INC.,
Petitioner,

v.

INTIRION CORPORATION,
Patent Owner.

PGR2024-00004
Patent 11,674,746 B2

Before SCOTT A. DANIELS, MATTHEW S. MEYERS, and BRENT M. DOUGAL, *Administrative Patent Judges.*

DANIELS, *Administrative Patent Judge.*

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

ORDER
Granting Patent Owner's Motions to Seal and Entering Protective Order
37 C.F.R. §§ 42.14, 42.54

I. INTRODUCTION

College Products Inc., ("College Products" or "Petitioner"), filed a Petition requesting post grant review ("PGR") of claims 1–24 of U.S. Patent No. 11,674,746 B2 (Ex. 1001, "the '746 patent"). Paper 1 ("Pet.").[1] Intirion Corporation, ("Intirion" or "Patent Owner") filed a Preliminary Response to the Petition. Paper 7 ("Prelim. Resp.").

Applying the standard in 35 U.S.C. § 324(a), we instituted a post grant review of all challenged claims on all grounds asserted in the Petition. Paper 10 ("Inst. Dec."). After we instituted trial, Patent Owner filed a Patent Owner Response. Paper 23 (sealed) ("PO Resp.").[2] Petitioner filed a Reply to Patent Owner's Response. Paper 30 (sealed), Paper 31 (redacted) ("Reply"). Patent Owner filed a Sur-reply to Petitioner's Reply. Paper 35 (sealed), Paper 36 (redacted) ("Sur-reply").[3] Patent Owner also filed a Motion to Exclude Evidence (Paper 39) and Petitioner filed an Opposition to Petitioner's Motion to Exclude Evidence (Paper 40).

An oral hearing was held on January 10, 2025, and a copy of the transcript was entered in the record. Paper 48 ("Tr.").

We have jurisdiction pursuant to 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 328(a) and 37 C.F.R. § 42.73 as to

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[1] Petitioner also contends that claims 1–24 of the '746 patent are invalid under 35 U.S.C. §112(b), and that claims 10 and 14 are further invalid under 35 U.S.C. §112(a). Pet. 13.

[2] Patent Owner must provide a proposed redacted public version of its Patent Owner Response in accordance with our Order in this Decision. *See infra*.

[3] The parties have filed several unopposed motions to seal certain briefing and exhibits which we address at the end of this Decision. Papers 20, 29, 34.

the patentability of the claims on which we instituted trial. Petitioner bears the burden of proving unpatentability of the challenged claims. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must prove unpatentability by a preponderance of the evidence. *See* 35 U.S.C. § 326(e); 37 C.F.R. § 42.1(d). For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence claims 1–3, 5, 8–11, 14–17, 20, and 22–24 of the '746 patent are unpatentable and that claims 4, 6, 7, 12, 13, 18–19, and 21 are not unpatentable.

A. Real Parties in Interest

Petitioner states that College Products Inc., is the real party in interest. Pet. 1. Patent Owner states that Intirion Corporation is the real party in interest and a wholly owned subsidiary of Danby Products Inc. Paper 4, 1.

B. Related Matters

The parties indicate that the '746 patent is at issue in *Intirion Corporation v. College Products, Inc.*, Case No. 5:23-cv-04023, in the U.S. District Court for the Northern District of Iowa. Pet. 1; Paper 4, 1.

Petitioner indicates that it has filed a request for post-grant review involving related U.S. Patent No. 11,674,745, ("the '745 patent"), namely PGR2024-00003. Pet. 2.

C. The '746 Patent (Ex. 1001)

The '746 patent issued June 13, 2023 and is titled "Multiple Linked Appliance with Auxiliary Outlet." Ex. 1001, code (54).[4] The '746 patent

[4] The '746 patent is a continuation of US Application No. 16/671,383, filed on Nov. 1, 2019, (now US Patent No. 11.274,876) which, along with other intervening applications, is itself a CIP of US Application No. 12/317,632, filed on December 23, 2008. Ex. 1001, code (63).

describes a compact combined refrigerator and microwave appliance as reproduced below in Figure 1.

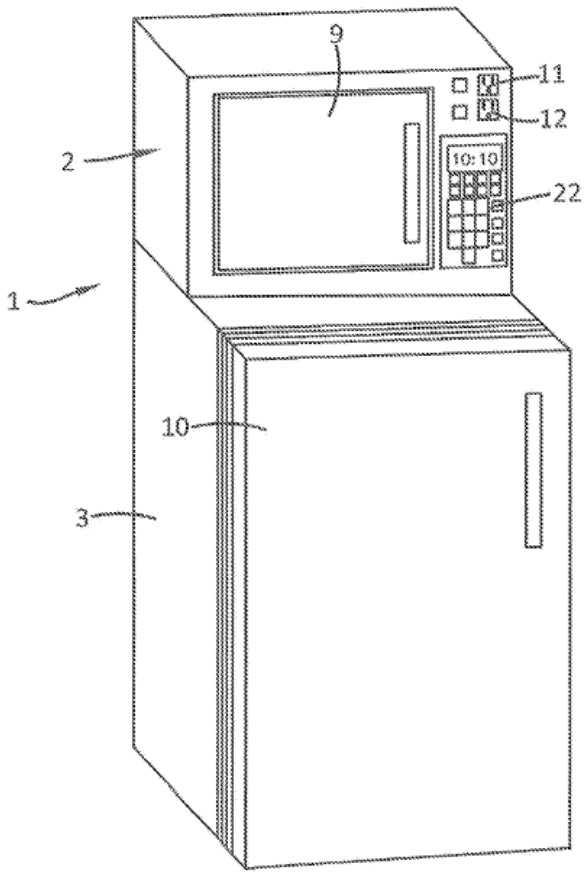


FIGURE 1

Figure 1 of the ’746 patent illustrates a combination appliance including both refrigerator 3 and microwave oven 2. A feature of the appliance is a power control circuit ensuring that “[o]ne of the microwave element and compressor does not operate when the other of the microwave element and the compressor operates.” *Id.* at 1:44–46. For example, if the microwave is running, power is withdrawn from the refrigerator. *Id.* Figure 7, reproduced below, illustrates a power distribution flow diagram when microwave oven 2 demands power.

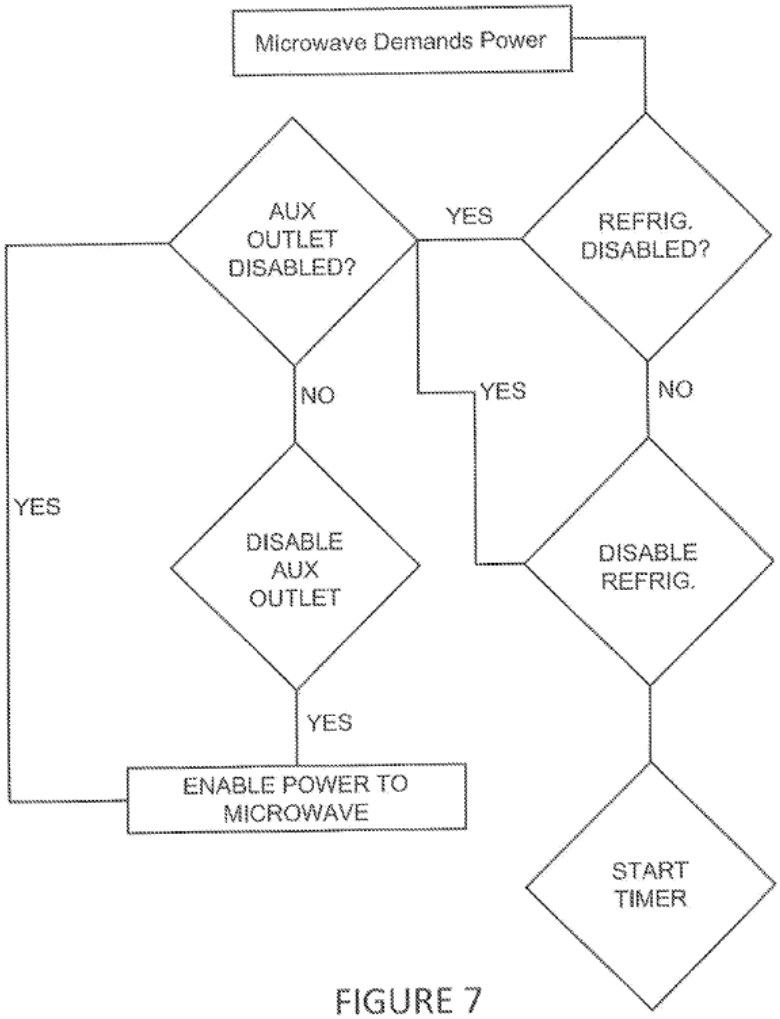


FIGURE 7

Figure 7 shows that power to the refrigerator is disabled in order for the microwave to operate. The '746 patent explains the reason for this functionality is that

> [t]he current demands of the microwave 2 when drawing cooking power are generally the most significant contribution to overload . . . . To avoid overload conditions, power to the low power receptacles 11 and 12 and refrigerator receptacle 15 is disabled during microwave magnetron operation.

Id. at 7:24–29.

Another feature described by the '746 patent is that, to avoid unsafe conditions, "a safety circuit 226 such as a smoke or gas sensor may be

provided in connection with the microwave oven 2." *Id.* at 14:8–9. The '746 patent explains that

> smoke sensor 226 operates in connection with exemplary at least one control circuit to turn off the microwave oven upon sensing smoke or polluted air indicative of a potentially dangerous condition such as excessive smoke generated from overcooked food.

Id. at 14:10–14. The '746 patent describes one photo-optical embodiment where "the safety sensor or safety circuit may comprise a light sensor 334, which detects the increase smoke density." *Id.* at 16:4–5. Other embodiments may "include sensors that are operative to detect smoke by determining the level of volatile organic compounds (VOCs) in the air in the microwave oven cooking area." *Id.* at 16:54–57.

In an alternative embodiment, the '746 patent describes that "such VOC sensors may be positioned in an air passage that extends between the microwave cooking area and the air in the atmosphere outside the microwave." *Id.* at 16:60–63. In either placement of the smoke sensor, when an unsafe condition is sensed, the smoke sensor sends a signal to a controller and "the controller 104 determines that the microwave oven 2 should be shut down and causes electricity to be withdrawn from the cooking element." *Id.* at 18:2–4. In some embodiments, the '746 explains that a reset function can restore power to the microwave "when the dangerous smoke condition is no longer detected." *Id.* at 17:27–28.

D. Illustrative Claim

Claims 1–24 are challenged, with claims 1, 15, and 22 being independent.[5] Each of dependent claims 2–14, 16–21, and 23–24 ultimately

[5] For clarity we apply references [1pre]–[1h] to claim 1 corresponding to certain claim limitations.

depend from independent claims 1, 15, and 22 respectively. Claim 1 illustrates the claimed subject matter and is reproduced below with certain limitations of interest italicized:

> [1pre] Apparatus comprising:
>
> [1a] a microwave oven, wherein the microwave oven includes
>
> [1b] a magnetron, wherein the magnetron is configured to cook items in a cooking area within the microwave oven,
>
> [1c] *a smoke sensor, wherein the smoke sensor is positioned in operative connection with the cooking area*,
>
> [1d] a power cord, wherein the power cord is configured to be releasably connected to a source of electrical power,
>
> [1e] at least one externally accessible electrical connector, wherein each electrical connector is configured to deliver electrical power that is received through the power cord through the respective electrical connector to a respective electrically powered device that is outside of the microwave oven,
>
> [1f] at least one power control circuit, wherein the at least one power control circuit is in operative electrical connection with each of the power cord, the at least one electrical connector, the magnetron, and the smoke sensor,
>
> [1g] wherein responsive at least in part to a level of smoke sensed by the smoke sensor, the at least one power control circuit is operative to cause cooking power to the magnetron to be withdrawn to end a current cooking session prior to a set end time of the current cooking session,
>
> [1h] *wherein after the current cooking session has been caused to end prior to the set end time based on the sensed level of smoke, the at least one power control circuit is operative thereafter to enable the magnetron to receive cooking power in a next subsequent cooking session*.

Ex. 1001, 24:26–58 (emphases added).

E. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–24 would have been, or are, unpatentable based on the following grounds:[6]

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1	1–3, 5–6, 8–11, 13–17, 20–24	103	Emma[7], ISDU[8]
2	1–3, 5–6, 8–11, 13–17, 20–24	103	Emma, Smith[9]
3	1–3, 5–6, 8–11, 13–17, 20–24	103	Emma, Butt[10]
4	1–3, 5–6, 8–11, 13–17, 20–24	103	Emma, Butt, Smith
5	4, 7, 8, 12, 18, 19	103	Emma, ISDU, Smith
6	4, 7, 8, 12, 18, 19	103	Emma, ISDU, Smith, the level of ordinary skill in the art
7	4, 7, 8, 12, 18, 19	103	Emma, ISDU, Smith
8	4, 7, 8, 12, 18, 19	103	Emma, ISDU, Smith, Quezada[11]
9	1–24	112	Indefiniteness
10	10	112	Written Description or Enablement and Indefiniteness

[6] Petitioner supports its challenge with a Declaration (Ex. 1002), and a Supplemental Declaration (Ex. 1023) of Mark N. Horenstein, Ph.D. Patent Owner provides a Declaration by Emad Y. Tanbour, Ph.D (Ex. 2001), a Declaration by Jared Amy (Ex. 2004), and a Declaration by Gary Hand (Ex. 2035).
[7] Ex. 1011, US Patent Appl'n Pub. No. 2009/0188911A1 (July 30, 2009).
[8] Ex. 1012, ISDU: integrated smoke detector unit for commercial microwave ovens, IRis Northeastern University, Electrical and Computer Engineering Undergraduate Capstone Projects (April 17, 2007).
[9] Ex 1014, US Patent No. 4,496,817 (January 29, 1985).
[10] Ex 1015, US Patent No. 8,446,048 B2 (May 21, 2013).
[11] Ex. 1020, US Patent Appl'n Pub. No. 2012/0276763 A1 (Nov. 1, 2012).

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
11	14	112	Written Description and Indefiniteness

II. ANALYSIS

A. Legal Standards

Petitioner challenges the patentability of claims 1–24 of the '746 patent on grounds that the claims would have been obvious under 35 U.S.C. § 103 in light of the various combinations of references, including Emma, ISDU, Smith, Butt, and Quezada. In a post-grant review, the petitioner has the burden from the onset to show *with particularity* why the patent it challenges is unpatentable. *See* 35 U.S.C. § 322(a)(3) (requiring post-grant review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim"); *cf. Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) ("[I]t was [Petitioner's] burden to explain to the Board how [the combination of prior art] rendered the challenged claims unpatentable."). This burden never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. 35 U.S.C. § 103; *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). "[W]hen a patent claims a structure already known in

the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result." *KSR*, 550 U.S. at 416 (citing *United States v. Adams*, 383 U.S. 39, 50–51 (1966)). The question of obviousness is resolved based on underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Petitioner also challenges claims 1–24 on the basis of indefiniteness. 35 U.S.C. § 112(b); *see also Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898 (2014). Under *Nautilus*, a claim is unpatentable for indefiniteness if the claim, read in light of the specification, and the prosecution history, "fails to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus* 572 U.S. at 901.

Petitioner further challenges claims 10 and 14 based on lack of written description under 35 U.S.C. § 112(a). The test for written description support is "whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date" based on an "objective inquiry into the four corners of the specification." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). The written description requirement is satisfied when the specification "set[s] forth enough detail to allow a person of ordinary skill in the art to understand what is claimed and to recognize that the inventor invented what is claimed." *Univ. of Rochester v. G.D. Searle & Co.*, 358 F.3d 916, 928 (Fed. Cir. 2004).

The written description inquiry is a question of fact, is context-specific, and must be determined on a case-by-case basis. *Ariad*, 598 F.3d at 1351 (citing *Ralston Purina Co. v. Far-Mar-Co, Inc.*, 772 F.2d 1570, 1575 (Fed. Cir. 1985); *Capon v. Eshhar*, 418 F.3d 1349, 1357–58 (Fed. Cir. 2005)). "[T]he level of detail required to satisfy the written description requirement varies depending on the nature and scope of the claims and on the complexity and predictability of the relevant technology." *Id.* (citing *Capon*, 418 F.3d at 1357–58). Factors used to evaluate the sufficiency of a disclosure include: 1) "the existing knowledge in the particular field"; 2) "the extent and content of the prior art"; 3) "the maturity of the science or technology"; and 4) "the predictability of the aspect at issue." *Id.* (citing *Capon*, 418 F.3d at 1359).

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art ("POSITA") at the time of the '746 patent

> would have had at least a bachelor's degree in electrical engineering or computer engineering . . . [a]lternatively, a POSITA could have had a bachelor's degree in mechanical engineering, industrial engineering, physics, or a related engineering or discipline, plus at least two years of experience working with control circuits, sensors, kitchen appliances, or similar fields.

Pet. 15 (citing Ex. 1002 ¶ 10). Patent Owner provides a similar level of ordinary skill in the art and states that "[t]he differences do not matter for purposes of this Petition." PO Resp. 6.

On this record, Petitioner's proposed level of ordinary skill in the art is consistent with our review and understanding of the technology and descriptions in the '746 patent and the asserted prior art references. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). For purposes of this

Decision, and because there is no dispute, we rely on Petitioner's proposed level of ordinary skill in the art.

C. Claim Construction

We interpret a claim "using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b)." 37 C.F.R. § 42.200(b) (2023). Under that standard, claim terms "are generally given their ordinary and customary meaning" as understood by a person of ordinary skill in the art at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc).

1. "level of smoke" and "amount of smoke"

Initially, neither Patent Owner nor Petitioner indicated that any claim terms required express construction. *See* Petition 13–14; Prelim. Resp 5. However, Petitioner contends that for the terms, "level of smoke" and "amount of smoke," recited in claims 1, 15, and 24, it has "applie[d] what it understands Patent Owner contends is the meaning of this term in this Petition[,] and shows below the claims are invalid under Patent Owner's construction." Pet. 14 (citing Ex. 1009, 6). Petitioner argues that it applies Patent Owner's interpretation of "'level of smoke' and 'amount of smoke' as merely detecting smoke" from the district court litigation. *Id.* at 13.

In our Institution Decision, reading the plain language of the claims in light of the specification, we preliminarily explained that we understood "level of smoke," or "amount of smoke," in the claims generally as a predetermined level of smoke "indicative of a dangerous condition" as the specification of the '746 patent describes. *See* Inst. Dec. 11 (citing Ex. 1001, 15:43–44, 63–65). Patent Owner then stated that "Intirion agrees with the Board's application of the plain and ordinary meaning for level of smoke." PO Resp. 6. The Board, however, at the time of issuing its

Institution Decision, did not realize that the term "dangerous condition" was at issue in other patent claims in different patents, in the district court litigation. *See* Ex. 1025, 8 (The District Court's Claim Construction Order was entered several months after we issued our Institution Decision). The District Court determined that "level of smoke," "amount of smoke," and "dangerous condition," are indefinite. Ex. 1025, 14–16. Consequently, Petitioner now argues in this proceeding that the term "dangerous condition" is indefinite. Pet. Reply 2–5. Because the term "dangerous condition" as it is written in the specification raises unnecessary claim construction issues in our proceedings, we retract our initial interpretation.

We apply, in this proceeding, the plain and ordinary meaning of "level of smoke" and "amount of smoke," as Petitioner originally asserted would have been understood by a person of ordinary skill in the art. The meaning includes, as Petitioner and Dr. Horenstein have framed it, the functional nature of a "'level of smoke' and 'amount of smoke' as merely detecting smoke." Pet. 14; *see* Ex. 1023 ¶ 50 (Dr. Horenstein testifying that "[m]y opinions in this Declaration do not conflict with this interpretation, hence I have also applied what I understand to be Patent Owner's proposed construal of these terms in this declaration."); *see also BASF Corp. v. Johnson Matthey Inc.*, 875 F.3d 1360, 1366 (Fed. Cir. 2017) (The Federal Circuit explaining that "the *Nautilus* standard of 'reasonable certainty' does not exclude claim language that identifies a product by what it does. Nothing inherent in the standard of 'reasonable certainty' precludes a relevant skilled artisan from understanding with reasonable certainty what compositions perform a particular function.").

Petitioner's construction, as we have adopted it, is also consistent with the scope of this claim limitation as testified to by Patent Owner's declarant,

Dr. Tanbour, who points to examples of smoke detection in the '746 patent including "certain parameters that may serve as the threshold 'amounts' or 'levels' of smoke sensed by the smoke sensor that could trigger an alarm or cause power to the microwave to be disabled, such as the 'smoke point of oil.'" Ex. 2001 ¶ 65 (citing Ex. 1001, 15:57–62). The '746 patent explains, for instance, that "[t]he exemplary safety circuit may use the smoke point of oil or similar food products as the basis for its threshold amount." Ex. 1001, 15:52–54.

Indeed, consistent with Dr. Tanbour, Dr. Horenstein testifies that "[i]t would have been obvious to a POSITA to combine the additional kitchen-appliance safety features of Butt with the Emma microwave/refrigerator combination so as to enable the Emma microwave *to shut down upon the detection of smoke*." Ex. 1023 ¶ 124 (emphasis added). Dr. Tanbour was consistent in his deposition testimony when questioned about his explanation that a person of ordinary skill in the art would have understood how to design a sensor that disabled power to a microwave magnetron when there was "excessive smoke:"

> Q. What do you mean by "excessive smoke"?
>
> A. Excessive smoke is what I understand is what a POSITA understands to be indicative of a dangerous condition.
>
> Q. . . . Do you agree that when cooking food, there is some smoke that is emitted that is not excessive; correct?
>
> A. That's why the word "excessive" is in here, yeah.
>
> Q. When does that smoke level become excessive? How does one know?
>
> . . .

> A. A POSITA, who is an expert in designing these, they have R&D labs, and they burn things, and they decide what is excessive and what is not. I have been in these facilities all my tenure in the industry, and a POSITA would know what is excessive and what is not based on their R&D and the product development process.

Ex. 1027 41:23–43:4. Dr. Tanbour's testimony and supporting evidence explaining that a person of ordinary skill in the art would have understood what "amount of smoke" would indicate a dangerous condition or would have triggered shut down procedures is unrebutted in this proceeding and consistent with "merely detecting smoke" as advanced by Petitioner. *See* Ex. 2001 ¶ 67 (Dr. Tanbour referencing that in the '746 patent "[t]he specification also notes the known difference between 'normal smoke emitted during the cooking or heating of food or beverages' (Ex. 1001, 15:57–62) and 'excessive smoke generated from overcooked food' (*id.* at 14:15–19)."

Overall, we find there is persuasive testimony, from both declarants, and evidence in this proceeding showing that a person of ordinary skill in the art would have understood the scope of the "power control circuit" being "responsive at least in part to a level of smoke sensed by the smoke sensor, . . . to end a current cooking session," as recited in claim 1. *See Nautilus*, 572 U.S. at 910 ("[W]e read § 112, ¶ 2 to require that a patent's claims, viewed in light of the specification and prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty."). In this case, given Petitioner's construction and the level of ordinary skill in the art, while the claim does not express any particular range or values of smoke or gas, it can be reasonably understood to encompass the definite function of "merely detecting smoke" which is consistent with the claim language and

written description. *See BASF*, 875 F.3d at 1366 ("we have long held that nothing in the law precludes, for indefiniteness, 'defining a particular claim term by its function.'") (citation omitted). In our view, this limitation may be broad—because there is no express range or value of smoke or gas for triggering shut down—but through testing and experience a person of ordinary skill in the art would have been able to determine the ranges and values of smoke or gas which would trigger the microwave to shut down. *See* Ex. 1027, 41:23–43:4 (Dr. Tanbour testifying that "[a] POSITA, who is an expert in designing these, they have R&D labs, and they burn things, and they decide what is excessive and what is not.").

2. "in operative connection"

We also address, in our analysis below, the parties' contentions regarding Petitioner's indefiniteness ground pertaining to the interpretation of "wherein the smoke sensor is positioned *in operative connection* with the cooking area." Ex, 1001, 24:31–32 (emphasis added); Pet. 87–88; PO Resp 64–66.

Apart from our indefinite analysis below, we find no express claim construction is necessary to resolve this issue, because, as discussed *infra*, we determine that a person of ordinary skill in the art would be able to ascertain with reasonable certainty the meaning of this phrase based on the claim language when read in light of the specification of the '746 patent. *See Nautilus*, 572 U.S. at 901 ([A] patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention."); *see also Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) ("The Board is required to construe 'only those terms . . . that are in controversy, and only to the extent

necessary to resolve the controversy.'" (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Patentability of Claims 1–3, 5–6, 8–11, 13–17, and 20–24, over Emma and ISDU (Ground 1), and Patentability of Claims 4, 7, 8, 12, 18, and 19 over Emma, ISDU, Smith and all Other Combinations of Prior Art Including ISDU (Grounds 5–8)

On the complete record before us Petitioner has not established by a preponderance of the evidence that claims 1–24 would have been obvious over the combination of any asserted prior art reference and ISDU, for the reasons explained below.

1. Whether ISDU Qualifies as Prior Art

Whether a reference qualifies as a "printed publication" is a legal conclusion based on underlying factual findings. *Jazz Pharm., Inc. v. Amneal Pharm., LLC*, 895 F.3d 1347, 1356 (Fed. Cir. 2018). The underlying factual findings include whether a reference was publicly accessible. *Id.* (citing *In re NTP, Inc.*, 654 F.3d 1279, 1296 (Fed. Cir. 2011)). We look to the underlying facts to make a legal determination as to whether a reference is a printed publication. *Suffolk Techs., LLC v. AOL Inc.*, 752 F.3d 1358, 1364 (Fed. Cir. 2014). In a post grant review, the petitioner bears the burden of establishing that a particular document is a prior art printed publication. *Jazz Pharm.*, 895 F.3d at 1356 (citing *Medtronic, Inc. v. Barry*, 891 F.3d 1368, 1380 (Fed. Cir. 2018)). The determination of whether a given reference qualifies as a prior art "printed publication" involves "a case-by-case inquiry into the facts and circumstances surrounding the reference's disclosure to members of the public." *In re Klopfenstein*, 380 F.3d 1345, 1350 (Fed. Cir. 2004) (citation omitted). Public accessibility is a key question in determining whether a document is a prior art printed publication and is determined on a case-by

case basis. *Suffolk Techs.*, 752 F.3d at 1364; *see also In re Lister*, 583 F.3d 1307, 1311 (Fed. Cir. 2009) (To qualify as a printed publication, a document "must have been sufficiently accessible to the public interested in the art."). "A reference will be considered publicly accessible if it was disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence can locate it." *Medtronic*, 891 F.3d at 1380 (internal quotation marks omitted). The key inquiry is whether the reference was made "sufficiently accessible to the public interested in the art" before the critical date. *In re Cronyn*, 890 F.2d 1158, 1160 (Fed. Cir. 1989); *see In re Wyer*, 655 F.2d 221, 226 (CCPA 1981). "A given reference is 'publicly accessible' upon a satisfactory showing that such document has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can locate it." *Bruckelmyer v. Ground Heaters, Inc.*, 445 F.3d 1374, 1378 (Fed. Cir. 2006).

The challenges in Grounds 1 and 5–8 all rely upon the ISDU non-patent literature reference which is alleged by Petitioner to be published on a Northeastern University digital archive, "IRis," on April 17, 2007. Pet. 20–22. Petitioner's declarant, Dr. Horenstein, testifies that "ISDU indicates its date of publication as April 17, 2007 and indicates on its face that it was published on 'IRis.'" Ex. 1002 ¶ 96. Dr. Horenstein also testifies that an IRis brochure (Pet. App'x B) indicates that the digital archive has been operational since 2006, prior to the ISDU publication date and thus "confirms that ISDU was published in open access format -- that is, publicly available." *Id.* (citing Pet. App'x B).

In our Institution Decision we explained that "the evidence may, or may not, support a finding that ISDU is a publicly accessible printed

publication." Inst. Dec. 42. Following our Institution Decision, Petitioner entered (without Board authorization) a series of emails as Exhibit 1024 between Petitioner's counsel and Sarah Sweeney, an employee of Northeastern University, requesting her declaration testimony as to publication of ISDU.[12] Ex. 1024. We granted Petitioner authorization to file a motion with the Board under 37 C.F.R. § 42.52(a) requesting to serve a subpoena on Northeastern University and compel testimony and documents relating to the public accessibility of ISDU. Paper 17. After considering Petitioner's motion and Patent Owner's opposition (Paper 18) we denied Petitioner's motion for the reasons set forth in our Decision Denying Petitioner's Motion for Additional Discovery. Paper 27.

In its Patent Owner Response, Patent Owner argues that neither Petitioner nor Dr. Horenstein have shown sufficiently that ISDU was publicly accessible such that the reference qualifies as a printed publication. PO Resp. 9–18. Patent Owner argues specifically that Dr. Horenstein's testimony is insufficient and "Petitioner does not rely on first-hand knowledge of the system on which ISDU was allegedly published ("IRis")." *Id.* at 9. Patent Owner argues that Petitioner's evidence is limited to "(1) ISDU itself; (2) two unauthenticated documents that generically describe the IRis system, . . . and (3) its technical expert's declaration, purportedly offering opinions regarding ISDU's public accessibility by quoting the IRis

[12] In our Order denying Petitioner's motion for a subpoena, we explained in footnote 4 that "[o]n May 24, 2024, more than one month after entry of our Institution Decision, without authorization by the Board or a motion to submit supplemental information as required under 37 C.R.F. § 42.123(b), Petitioner entered, as Exhibit 1024, the April 30, 2024 email between Petitioner's counsel and Sarah Sweeney, an employee of Northeastern University." Paper 27 (citing Ex. 1024).

Brochure and PowerPoint." *Id.* at 9–10. According to Patent Owner "[n]one of this evidence, alone or collectively, satisfies Petitioner's burden." *Id.* at 10.

We agree with Patent Owner. First, we do not consider Petitioner's improperly filed supplemental information—that is evidence offered to support public accessibility of ISDU—in Ex. 1024. 37 C.F.R. § 42.123. Even if we were to consider it, it is undoubtedly inadmissible hearsay. Fed. R. Evid. 802. Ms. Sweeney's email statements are an out of court statement, not under oath, and offered to prove the truth of the matter asserted, i.e., the publication date of ISDU. *See id.* at 702, 801; *see also, e.g.*, Ex. 1024 (Ms. Sweeny stating, *inter alia*, that "I can tell you that the paper was not available in IRis before December 2009."). Second, to the extent that any of her email testimony could be considered an exception to the rule against hearsay, Ms. Sweeney's statement that "I feel pretty confident saying that the file was public in IRis by December 2013" is speculation, and not based upon personal knowledge. *See id.* at 602. Ms. Sweeney must have personal knowledge of the subject matter of her statement, here the publication date, and no evidence has been presented by Petitioner showing Ms. Sweeney had any personal knowledge as to the publication date of ISDU. Moreover, noting that Northeastern University migrated away from the IRis system in 2015, Ms. Sweeney explained that the school "did not keep any technical or administrative metadata in the migration, so I have no documentation that would indicate whether or not the file was public (and therefore indexed by Google and other major search engines) or private during the time it was in IRis." Not only does Ms. Sweeney not have personal knowledge as to the public accessibility of ISDU, she also apparently does not have access to resources or data indicative of the public or private nature of ISDU in IRis.

Accordingly, to the extent Ms. Sweeney's testimony regarding ISDU might be admissible, we give it no probative weight.

On the complete record now before us, what we have mainly for evidence of public accessibility of ISDU is: (1) on the title page, (Ex. 1012, 2), an April 17, 2007 date; (2) a cover page (Ex. 1012, 1) apparently showing that ISDU was input into the IRis digital archive; (3) the cover page echoes the April 17, 2007 date of the title page; and (4) we also have the testimony of Dr. Horenstein, who upon reviewing the circumstances and dates of ISDU, along with the IRis brochure, testifies that this is sufficient for public accessibility. Ex. 1002 ¶ 96.

As we noted in our Institution Decision it is clear that Dr. Horenstein's testimony and his review of an IRis Brochure (Ex. 1002, App'x B) is *not* first-hand knowledge regarding the IRis digital archive or how and when paper submission and publication generally occurred. *Id.* ¶¶ 96–98 (citing Ex. 1002, App'x B); Inst. Dec. 41. And, it is certainly not first-hand knowledge as to the public availability of ISDU. Also, apart from speculation, Dr. Horenstein provides no persuasive explanation as to what the April 17, 2007 date, either on the cover page or the title page, is intended to reflect, i.e., a publication date, a project or paper submission date, or otherwise. *See id.* ¶ 96 (Dr. Horenstein testifying without support that "ISDU indicates its date of publication as April 17, 2007 and indicates on its face that it was published on 'IRis.'").

We note that the "Recommended Citation" on the cover page includes the date of 2007, and it might be reasonable to assume that paper was lodged in IRis within some period of time, e.g., months, after the paper was submitted, which could potentially indicate entry in IRis in 2007. Ex. 1012, 1. The cover page explains that "[t]his work is available open access, hosted

by Northeastern University." However, as discussed above, we have no persuasive corroborating testimony from a person with first-hand, or even second-hand knowledge as to how, or when, papers were catalogued, indexed, or by what search methods, and by whom, ISDU or any other papers could be found and accessed within IRis. *See, e.g.*, Ex. 1024, 5 (Ms. Sweeney's statement that "[w]e migrated away from the IRis system in 2015, so unfortunately I can't confirm the exact date the paper was made available to the public.")

2. Conclusion as to Whether ISDU is Prior Art

It is well-settled that "the burden is on the petitioner to identify with particularity evidence sufficient to establish a reasonable likelihood that the reference was publicly accessible before the critical date of the challenged patent, and therefore that there is a reasonable likelihood that it qualifies as a printed publication." *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 16 (PTAB Dec. 20, 2019) (precedential), *see also Medivis, Inc., v. Novarad Corp.*, IPR2023-00042, Paper 37 at 5 (PTAB Apr. 23, 2024) (The Board explaining that "at the final decision stage, Petitioner must establish public accessibility by a preponderance of the evidence.").

Considering the complete record now before us, and based on our analysis above, Petitioner's evidence does not persuade us that ISDU qualifies a prior art reference necessary to support Petitioner's challenges, i.e., Grounds 1 and 5–8, to the '746 patent.

E. Patentability of claims 1–3, 5–6, 8–11, 13–17, and 20–24 over Emma and Butt (Ground 3) or alternatively over Emma, Butt and Smith (Ground 4)

At the outset we note that Petitioner essentially argues Grounds 3 and 4 together explaining that "[t]o the extent the Board determines that the

combination of Emma and Butt do not render obvious the afore-mentioned claims, Ground 4 is it would be obvious to a POSITA to combine Emma with Butt and Smith." Pet. 76 (citing Ex. 1023 ¶ 259). Petitioner relies on Smith for allegedly teaching a "smoke sensor to be operatively connected with its cooking area." *Id.*

On the complete record, for the reasons below, Petitioner has not established by a preponderance of the evidence that claims 6, 13, and 21 would have been obvious over Emma and Butt (Ground 3), or Emma, Butt, and Smith (Ground 4), however, Petitioner has established by a preponderance of the evidence that claims 1–3, 5, 8–11, 14–17, 20, and 22–24 would have been obvious, for the reasons explained below.

1. Emma (Ex. 1011)

As discussed above, Emma is a preceding and related parent to the '746 patent. Titled "Multiple Linked Appliances with Auxiliary Outlet," Emma discloses that "[a] combination microwave and refrigerator system is constructed having a single plug input supply." Ex. 1011, Abstract. Emma's Figure 1 is reproduced below.

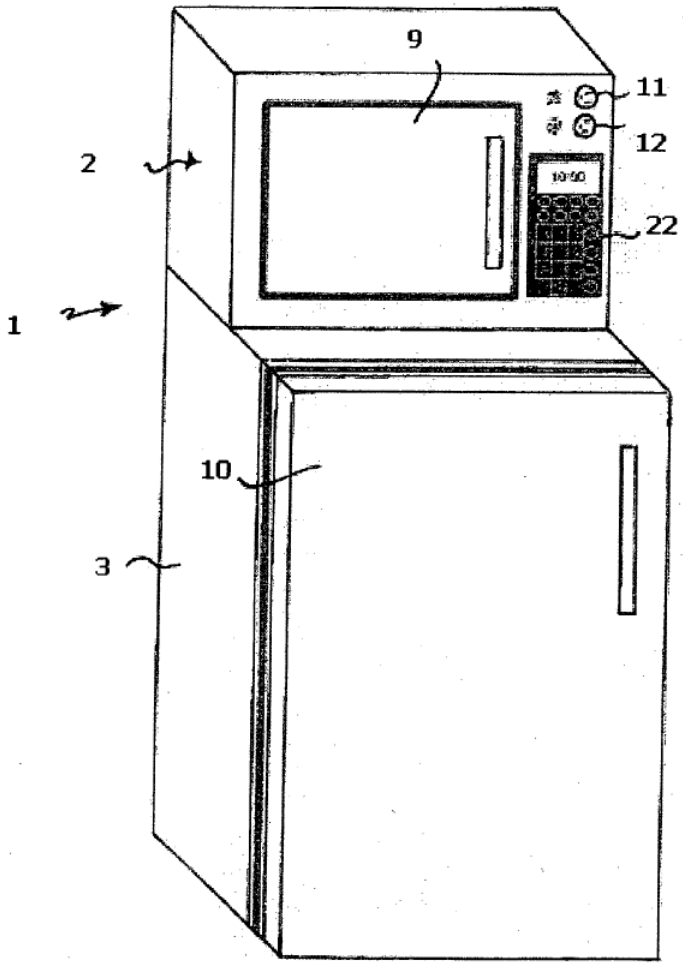


FIGURE 1

Emma's Figure 1 (which is ostensibly identical to Figure 1 of the '746 patent) illustrates a combined microwave 2 and refrigerator 3. Emma also discloses a power control model where power to the refrigerator's compressor is reduced or shut off when microwave 2 is in operation. *Id.* ¶ 11. Emma explains that

> [a]s part of the control model, the power to the compressor is monitored to sense operation of the compressor. When power to the microwave is demanded, the compressor is disabled for a preset minimum period. When microwave demand ceases, refrigerator power is restored provided, that the preset minimum period has expired.

Id.

Emma further discloses an electrical power control circuit in Figure 4, reproduced below, including digitally operated relay 19 controlling the low power auxiliary outlets 11 and 12, as well as relay 20 controlling refrigerator outlet receptacle 15.

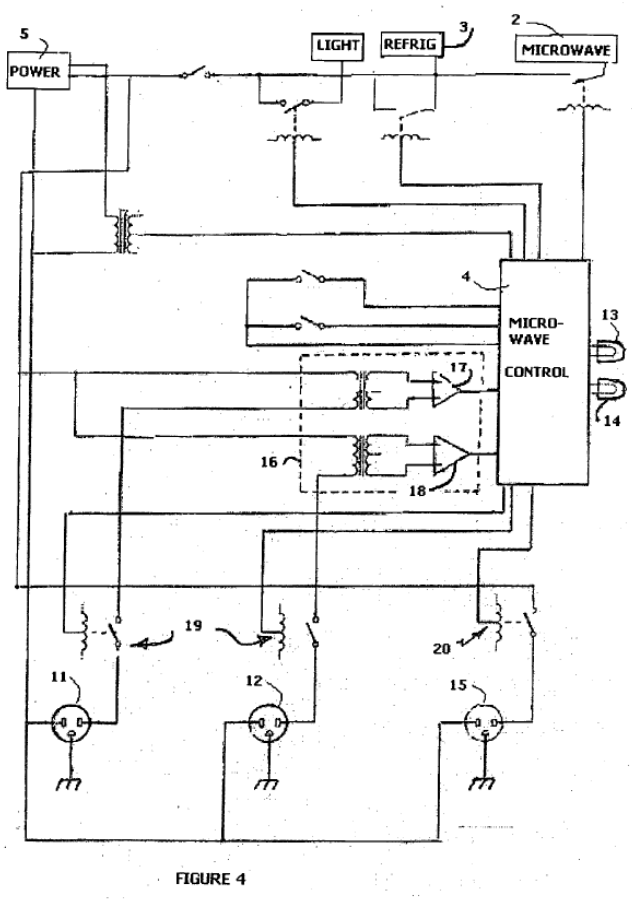


FIGURE 4

Figure 4 is a circuit diagram illustrating a power control circuit for controlling power distribution to the microwave 2, refrigerator 3 and receptacles 11, 12 and 15. Emma explains that "[t]he current demands of the microwave 2 are generally the most significant contribution to overload." *Id.* ¶ 33. Using the power control circuit of Figure 4, Emma teaches "[t]o avoid overload conditions, power to the low power receptacles 11 and 12 and refrigerator receptacle 15 is disabled during microwave operation." *Id.*

Emma discloses several control models to selectively limit power to the refrigerator during microwave operation. An exemplary control model is illustrated by the flow diagram in Emma's Figure 6, reproduced below.

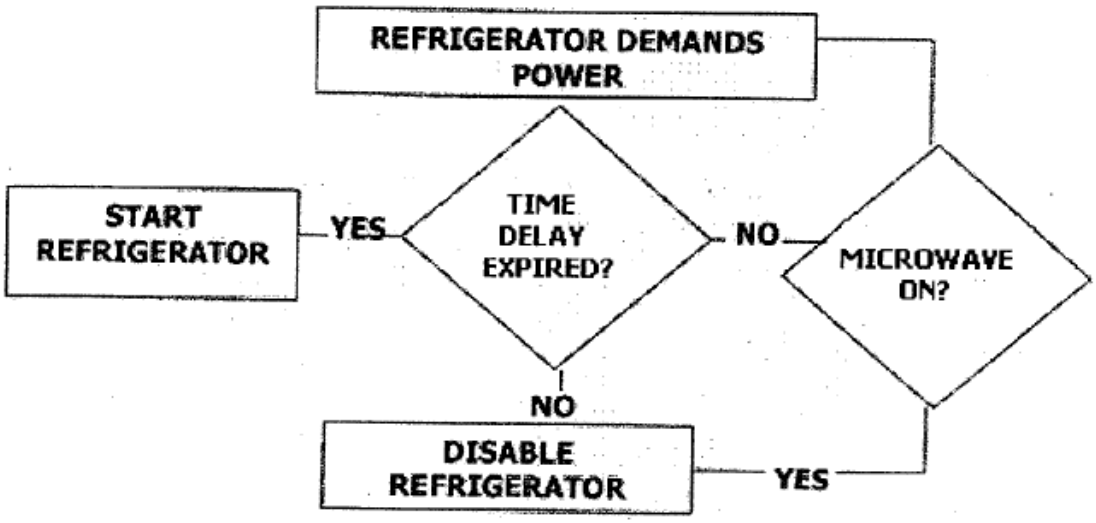


FIGURE 6

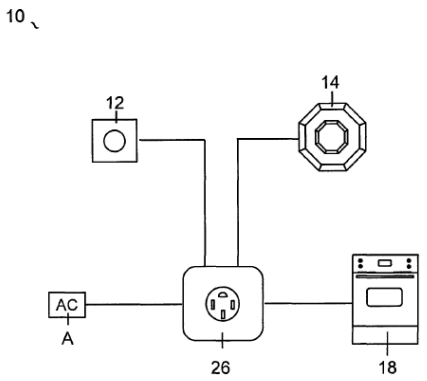
Emma's Figure 6 illustrates a power flow diagram of a particular control model where "[i]f the microwave is on, the recycling of the refrigerator will be delayed." *Id.* ¶ 33.

2. Butt (Ex. 1015)

Butt is titled "Controller for a Safety Shut-Off system," and discloses a smoke detector and safety power shut off for electrical kitchen appliances to prevent fires. Ex. 1015, code (54), 3:64–66. In particular, Butt describes that the "invention relates to a safety shut-off system, and more particularly to a controller for interrupting a supply of electricity to an appliance upon detection of a trigger, such as smoke." *Id.* at 1:15–18.

Butt's Figure 1B is reproduced below.

Figure 1B



Butt's Figure 1B depicts system 10 including smoke detector 14 connected to circuit box 26 housing controller 20. Butt explains that "[i]f the detector 14 detects the presence of smoke, then . . . signal 15 is transmitted and is received by the controller 20. Upon receiving the signal, the controller interrupts the AC power supply to the appliance 18 and consequently shuts the appliance 18 off." *Id.* at 4:53–58.

In addition, Butt teaches reset button 12 that re-enables the system for further use by checking for a smoke alarm system signal and then closing a relay to reconnect the electrical appliance to AC power. *Id.* at 6:53–7:20.

3. Smith (Ex. 1014)

Smith is titled "Automatic Fire Detection for a Microwave Oven," and discloses "a method and apparatus for anticipating the occurrence of a fire in the cooking cavity of a microwave oven." Ex. 1014, code (54), 1:55–57. Smith describes "[a] sensor responsive to the concentration of gases in the circulating air monitors the gas concentration level and generates an output signal representative thereof." *Id.* at Abstract. Smith's Figure 2 is reproduced below.

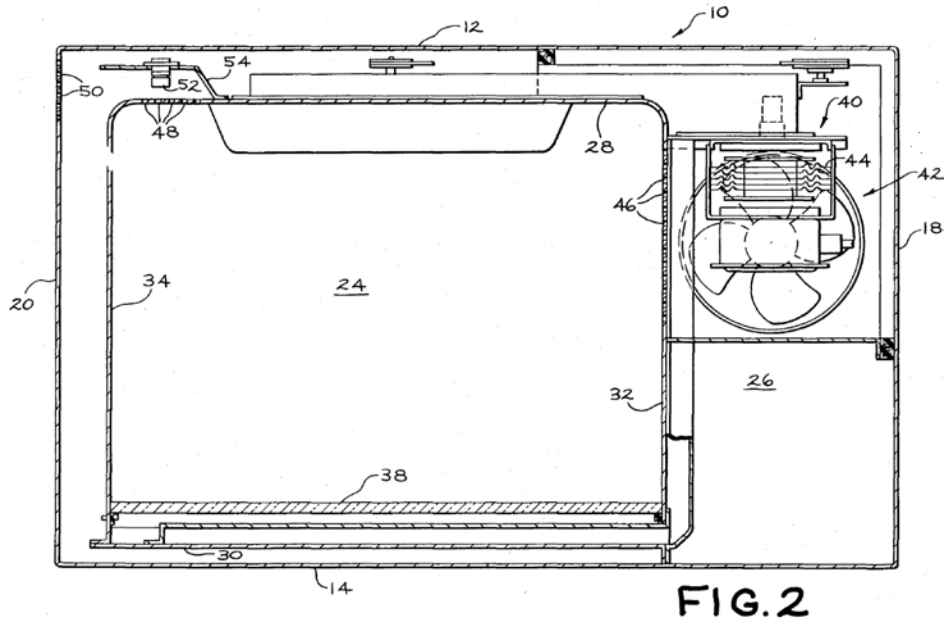


FIG. 2

Smith's Figure 2 illustrates oven 10 having "a blower for continuously circulating air and a sensor [52] responsive to the concentration of gases in the circulating air." *Id.* at Abstract.

Smith's sensor 52 monitors for a rapidly changing gas concentration in the circulating air and "[u]pon detection of the characteristic rate of change, means responsive to the sensor monitoring means de-energizes the oven and provides an indication to the user that a combustion condition in the oven cavity is imminent." *Id.* at 1:68–2:4.

4. Independent Claims 1, 15, and 22

Because the parties do not substantively address the specifics of the other independent claims 15 and 22, nor for that matter the respective independent claims, we focus on the specific limitations in independent claim 1, as these limitations are largely common to independent claims 15 and 22.

a) Petitioner's Arguments for Independent Claim 1

(1) [1pre] Apparatus comprising

[1a] a microwave oven, wherein the microwave oven includes

Petitioner argues that "Emma discloses an appliance with a microwave oven that has an interior cooking area." Pet. 30 (citing Ex. 1011 ¶ 26, Fig. 2). We reproduce Petitioner's annotated version of Emma's Figure 2 below.

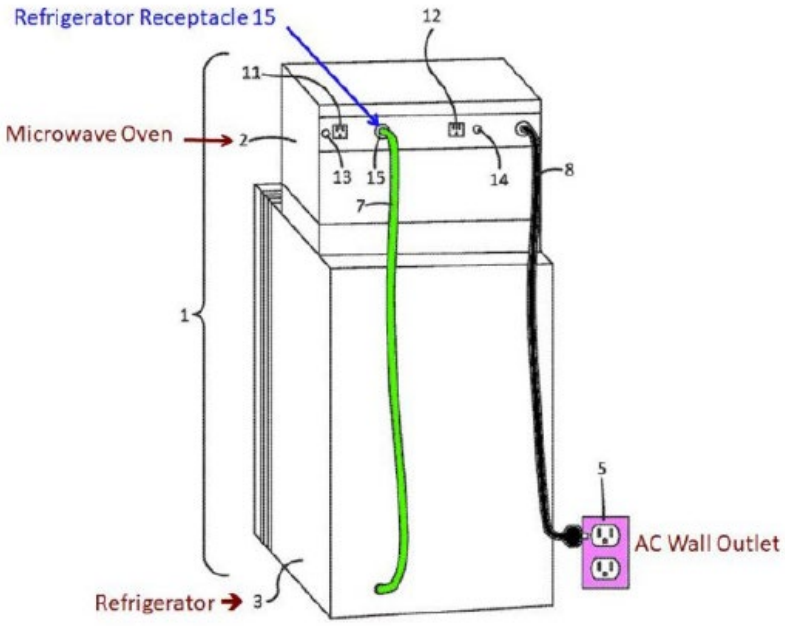


FIGURE 2

Petitioner's annotated version of Emma's Figure 2 illustrates a combined microwave 2 and refrigerator 3 connected by power cord 7. *Id.* at 31.

(2) [1b] a magnetron, wherein the magnetron is configured to cook items in a cooking area within the microwave oven,

Petitioner argues that a magnetron is a well-known component of a microwave oven. Pet. 32. Dr. Horenstein points out that Emma expressly states "[t]he internal components of the appliances are well known." Ex.

1023 ¶ 160 (citing Ex. 1011 ¶¶ 8, 10, 11, Fig. 10). Accordingly, Dr. Horenstein testifies, "the microwave also includes a magnetron configured to cook items in the cooking area." *Id.*

> *(3) [1c] a smoke sensor, wherein the smoke sensor is positioned in operative connection with the cooking area,*

Given that Emma does not disclose a smoke sensor, Petitioner argues that Butt is directed specifically to the problem of fires caused by kitchen appliances, and for a kitchen appliance such as a stove, "the Butt system includes a smoke detector 14, panic/reset button 12 (green) and a wireless transmitter." Pet. 51 (citing Ex. 1015, 4:29–34). According to Petitioner "Butt includes a smoke sensor in operative connection with the cooking area of a cooking range." *Id.* (citing Ex. 1015, 2:22–25). Petitioner argues that it would have been obvious to a person of ordinary skill in the art "to combine the additional kitchen appliance safety features of Butt into the Emma microwave/refrigerator combination namely to enable the Emma microwave to shut down upon the detection of smoke." *Id.* at 75 (citing Ex. 1023 ¶ 259). Further, Petitioner argues that a person of ordinary skill in the art would have known to "reenable the Emma microwave for a further cooking session when the smoke has cleared." *Id.*

To the extent Butt does not appear to expressly teach a smoke sensor "inside" the oven, that is—in "operative connection" with the cooking area, Petitioner argues that "Smith discloses a gas sensor (i.e., 'smoke sensor') positioned in operative connection with a cooking area *inside* a microwave oven." *Id.* at 48 (emphasis added). Petitioner argues that a person of ordinary skill in the art "would have combined the elements as disclosed by known methods for the purposes of modifying Emma's microwave

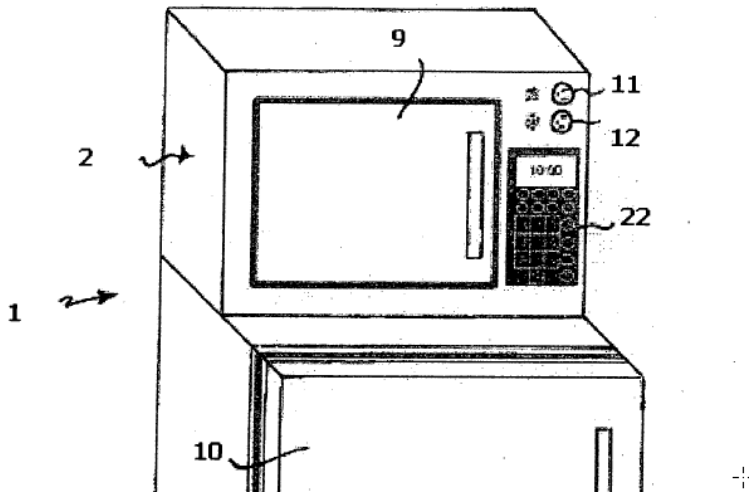
refrigerator combination to include Smith's smoke sensor to be operatively connected with its cooking area and to include Butt's smoke sensor and reset functionality." *Id.* at 76 (citing Ex 1023 ¶ 259).

> *(4) [1d] a power cord, wherein the power cord is configured to be releasably connected to a source of electrical power,*

Petitioner argues that "Emma discloses a microwave oven (which includes the magnetron) and refrigerator combination with both appliances being powered only though a single power cord 8 [] that is releasably connectable to a power outlet 5." *Id.* at 34 (citing Ex. 1011 ¶ 8; Ex. 1023 ¶ 169).

> *(5) [1e] at least one externally accessible electrical connector, wherein each electrical connector is configured to deliver electrical power that is received through the power cord through the respective electrical connector to a respective electrically powered device that is outside of the microwave oven,*

Petitioner argues that "Emma discloses an input power to the system from receptacle 5, a control circuit providing for digitally operating relays 19, 20 for controlling electrically powered devices outside the microwave through the low power auxiliary outlets 11, 12." *Id.* at 36. Emma's Figure 1 is reproduced, in part, below.



A partial reproduction of Emma's Figure 1 illustrates microwave 2 and pictures electrical outlets 11, 12 on the front of the microwave.

> *(6) [1f] at least one power control circuit, wherein the at least one power control circuit is in operative electrical connection with each of the power cord, the at least one electrical connector, the magnetron, and the smoke sensor,*

Petitioner argues that Emma's Figure 3, reproduced below, as annotated by Petitioner, illustrates microprocessor 4 and power distribution through control relays 19, 20, to refrigerator 3 and power receptacles 11, 12. *Id.* at 36.

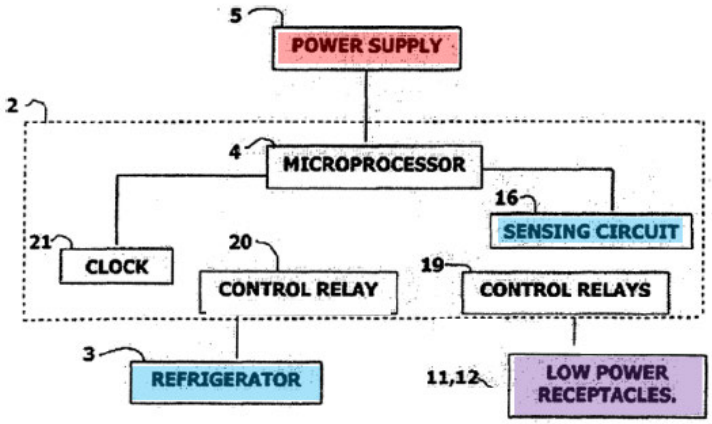


FIGURE 3

Emma's Figure 3, as annotated by Petitioner, shows microprocessor-based control of the microwave oven 2 which is in operative connection with power supply 5, low power receptacles 11 and 12, and sensing circuit 16, as further illustrated in Petitioner's annotated version of Emma's Figure 4 reproduced below. *Id.* at 36.

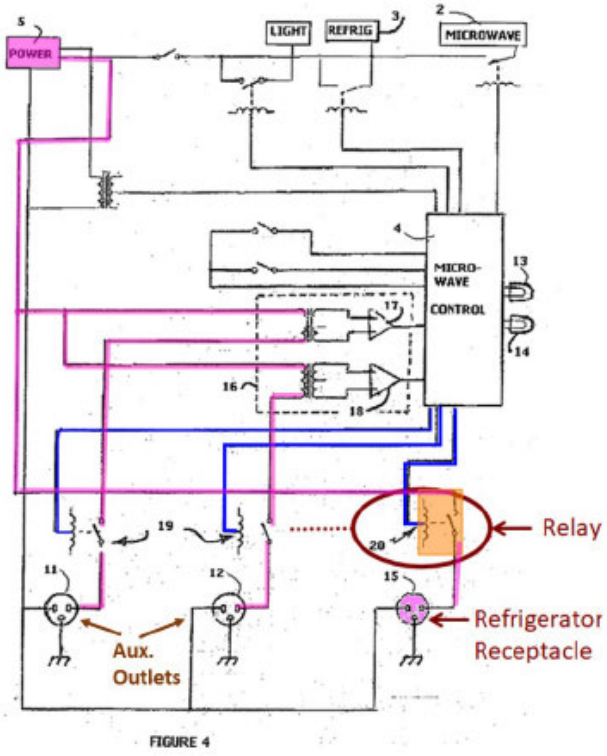


Figure 4 as annotated by Petitioner is a circuit diagram illustrating a specific power control circuit for controlling power distribution via various relays to the microwave 2, refrigerator 3 and power receptacles 11, 12 and 15.

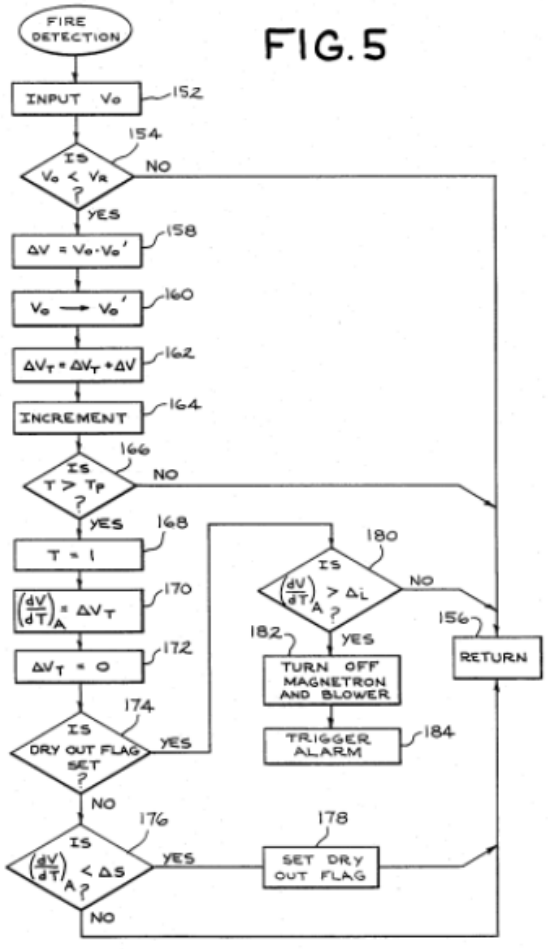
> *(7) [1g] wherein responsive at least in part to a level of smoke sensed by the smoke sensor, the at least one power control circuit is operative to cause cooking power to the magnetron to be withdrawn to end a current cooking session prior to a set end time of the current cooking session,*

Petitioner argues that "Smith discloses a gas sensor that can cause cooking power, i.e., power to the magnetron, to be withdrawn upon the gas

sensor sensing smoke by the smoke sensor over time." Pet. 54. To shut off the microwave, Petitioner points to Smith's specific disclosure that

> [b]y detecting the occurrence of a rapid increase in the rate of change of concentration level by the hereinbefore described method, magnetron 40 is deenergized 35 prior to the load being heated in the oven reaching its actual combustion temperature, thereby anticipating a potential fire condition and preventing the load from reaching its combustion point.

Id. (quoting Ex. 1014, 9:17–39). Petitioner points to Smith's Figure 5, reproduced below, including the "turn off magnetron and blower" function 182. *Id.* at 55.



The flow chart of Figure 5 includes the step "turn off magnetron and blower" 182.

Where Smith describes a "gas sensor," and not expressly a "smoke sensor," Petitioner argues that "Butt teaches that if the detector (i.e., 'smoke sensor') senses smoke and consequently interrupts power to the microwave, it will be stopping the microwave before the end time of the cooking session set by the user." *Id.* at 55.

> *(8) [1h] wherein after the current cooking session has been caused to end prior to the set end time based on the sensed level of smoke, the at least one power control circuit is operative thereafter to enable the magnetron to receive cooking power in a next subsequent cooking session.*

Petitioner refers to this limitation as the "reset enable function." Pet. 57. Petitioner argues that

> Butt teaches that a user may press the panic/reset button to enable the controller to restore power to the appliance: 'when the danger posed by the fire has passed, a user can press the panic/reset button 12, which will transmit an RF signal 13 to the controller 20, and the controller 20 will restore the AC power supply to the appliance 18.'

Id. at 57–58 (quoting Ex. 1015 at 3:63–67).

b) Patent Owner's Arguments and Analysis

Patent Owner's arguments focus mainly on the limitations in [1c], [1g], and [1h], including the limitation of "a smoke sensor, wherein the smoke sensor is positioned *in operative connection with the cooking area*." Ex. 1001, 24:31–32 (emphasis added). To this end, Patent Owner makes several arguments including, (1) that the combination of Emma and Butt fails to show a microwave having a smoke detector in "operative connection" with a cooking area, (2) The Emma and Butt combination does not disclose the "shutdown function" or "reset enable function," (3) that a

person of ordinary skill in the art would not have combined Emma, Butt, and, Smith, and (4) the addition of Smith does not cure the combination of Emma and Butt because "Smith does not teach a smoke sensor at all, let alone in operative connection with a cooking area inside the microwave oven." PO Resp. 44–62.

With respect to the combination of Emma and Butt, Patent Owner argues specifically that Butt only "teaches a 'a controller for a safety shut-off system' installed in/as part of an electrical outlet or socket 'within a wall,' using separate generic wireless smoke detectors." *Id.* at 44 (quoting Ex. 1015, 4:27–52). PO argues further that "[t]here is no teaching or suggestion that this functionality should be moved inside any appliance, let alone inside a microwave." *Id.* (citing Ex. 2001 ¶¶ 174–75).

We agree with Patent Owner that Butt does not teach or disclose a smoke detector in "operative connection with a cooking area inside the microwave oven," as claimed. Petitioner acknowledges that Butt's smoke sensor is not inside the microwave, yet argues that a person of ordinary skill in the art would have

> combine[d] the additional kitchen appliance safety features of Butt into the Emma microwave/refrigerator combination namely to enable the Emma microwave to shut down upon the detection of smoke and reenable the Emma microwave for a further cooking session.

Pet. 77 (citing Ex 1023 ¶ 259). Petitioner's declarant, Dr. Horenstein testifies that a person of ordinary skill in the art would have "place[d] the smoke sensor to be in operative connection with the cooking area inside the microwave oven, because doing so would place the sensor *in closer proximity to the source of smoke* (initiating at the food being heated)." Ex. 1023 ¶ 121 (emphasis added). Dr. Horenstein testifies further that "[t]he

smoke detector would need to be in operative connection for it to function as a smoke detector." *Id.*

Dr. Horenstein's testimony, however, does not answer the question *why* one of ordinary skill in the art would put the smoke sensor in closer proximity to the food within the microwave. Dr. Horenstein does not offer any insight as to why a smoke detector would work better inside and in "closer proximity" to the cooking food, than outside the oven. Dr. Horenstein supplied, and referenced, in his original declaration (Ex. 1002), exemplary smoke detectors described in Butts, including ADEMCO 5806. Ex. 1002 ¶ 297 (citing Ex. 1015, 4:49–52). Contrary to Dr. Horenstein's testimony, ADEMCO has instructions warning "LOCATE DETECTORS AT LEAST 20 FEET (6m) FROM KITCHENS," and describes not to put detectors "NEAR FORCED-AIR DUCTS used for hearing or air conditioning – Air movement may prevent smoke from reaching the detector." *Id.* at App'x E, 4. ADEMCO 5806 also describes that "[d]etectors should be located as close to the center of the ceiling as possible." Ex. 1002 App'x E, 5.

Not only does Dr. Horenstein fail to offer a persuasive explanation for putting the detectors inside the oven, but the evidence—ADEMCO 5806—he relies upon teaches exactly the opposite of placing Butt's smoke detector in close proximity to the cooking area where food is heated in a microwave oven. Dr. Horenstein's Declaration does not provide any facts, data, or persuasive analysis to support the opinion stated. Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight. 37 C.F.R. § 42.65(a). Given the dearth of explanation, we find Dr. Horenstein's testimony, that a person of ordinary skill in the art would place Butt's external smoke sensor inside and in

"operative connection with the cooking area," to be hindsight and unsupported by sufficient reasons, facts, or evidence. Accordingly, with respect to the combination of Emma and Butt, we are not persuaded that a person of ordinary skill in the art would have simply moved Butt's smoke detector into "closer proximity" with the microwave oven much less into "operative connection with the cooking area" as called for in claim 1.

Next, turning to the addition of Smith, Patent Owner argues first that a person of ordinary skill in the art would not have combined Emma, Butt, and Smith. *See* PO Resp. 52 (Patent Owner arguing that a person of ordinary skill in the art "would not have combined Emma, Butt, and Smith as Petitioner proposes, nor had a reasonable expectation of success."). Second, Patent Owner argues that, even including Smith "Petitioner offers no motivation for combining both sensors of Butt and Smith." *Id.* at 53 (citing Ex. 2001 ¶ 201.

With respect to the second argument, Petitioner, in this combination, is relying on Smith's sensor, *not* a combination of Butt and Smith's sensor. In this combination of Emma, Butt, and Smith, Petitioner relies on Smith to teach "a gas sensor (i.e., 'smoke sensor') positioned in operative connection with a cooking area inside a microwave oven." Pet. 48. Petitioner argues that Smith's annotated Figure 1, reproduced below, discloses gas sensor 52, i.e., smoke sensor, positioned in "operative connection" with a cooking cavity 24 (highlighted yellow) inside the microwave oven. *Id.*

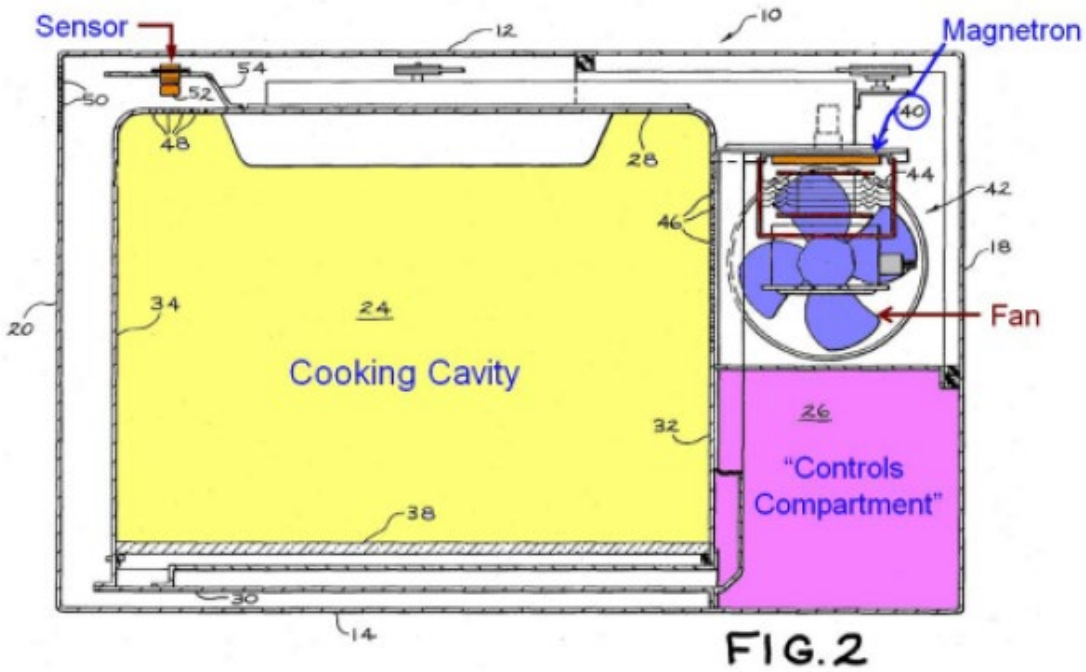


FIG. 2

Petitioner's annotated Figure 2 illustrates a cross sectional view of microwave 10 including sensor 52 in communication with cooking cavity 24 (highlighted yellow) via perforations (passages) 48 in cavity wall 28. Petitioner points out that Smith also discloses a "control algorithm implemented by the microprocessor [] for smoke detection." *Id.* at 54 (citing Ex. 1002 ¶¶ 180–81, 289; Ex. 1023 ¶ 217). In addition, Petitioner asserts that "Smith discloses an electrical circuit ('at least one electrical power control circuit') as shown in FIG. 4 (annotated below), which is configured to allow the microprocessor 64 to cycle power to the microwave magnetron." *Id.* at 59.

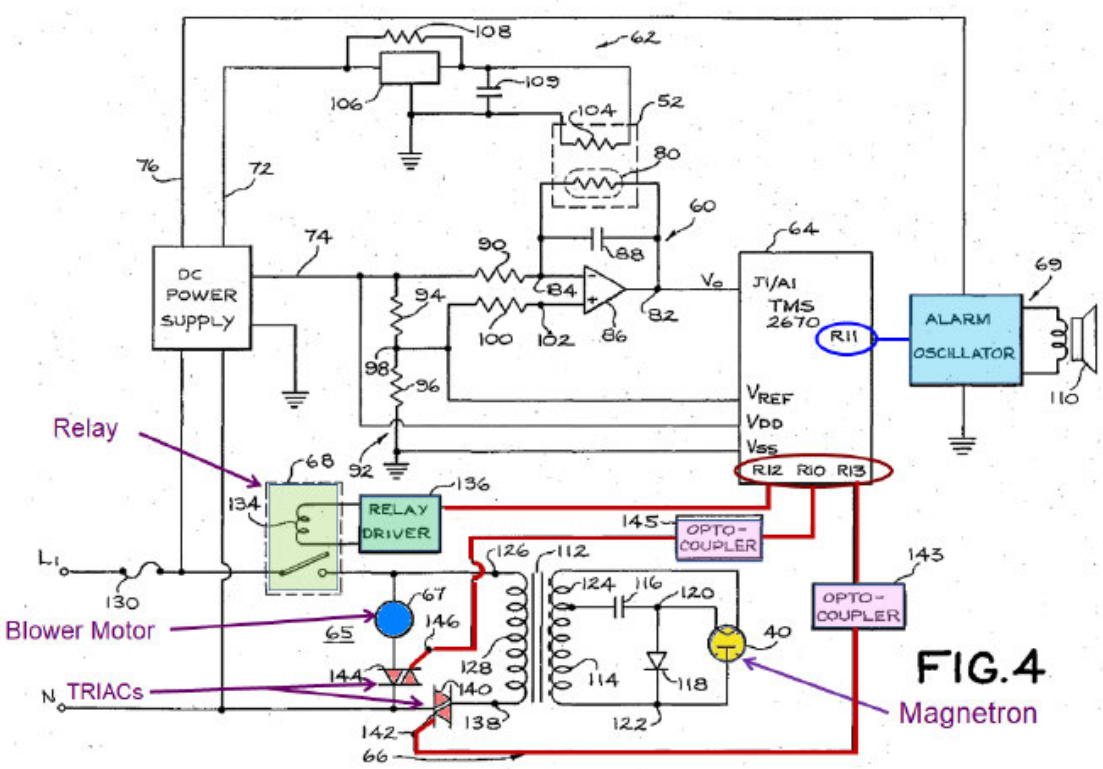


Figure 4, as annotated by Petitioner, is a circuit diagram showing power control relay 68 driven by microprocessor 64 for "de-energizing magnetron 40 and the blower motor 67" which "turns off power to the oven." Ex. 1014, 9:17–28. Smith's description of sensor 52 meets the plain and ordinary meaning of a "'level of smoke' and 'amount of smoke' as merely detecting smoke." Section II.C.; *see also* Ex. 1014, 4:66–5:3 ("Smith explaining that "[t]he circuit of FIG. 4 includes a gas sensing circuit 60 for sensing the concentration level of gases in the circulating air as it exits cooking cavity 24.").

And considering Patent Owner's first argument, Petitioner did in fact offer several motivations to combine Smith with Emma and Butt, for example arguing that "[f]irst, Emma, Butt and Smith each relate to optimizing electric cooking appliances." Pet. 76 (citing Ex. 1023 ¶ 259).

Also, Petitioner argues that the combination is simply well-known appliance functionalities that together "would have yielded nothing more than predictable results to one of ordinary skill in the art." *Id.* Petitioner's declarant, Dr. Horenstein, testifies that

> [a]ny inclusion of Butt's reset functionality with Smith's smoke sensor operatively connected with the cooking area into Emma would result in such elements merely performing the same function as they do separately, i.e., sensing smoke to withdraw electrical power from an electrical cooking appliance and then re-enabling the electrical cooking appliance.

Ex. 1023 ¶ 126. In addition, Petitioner argues that the references themselves suggest the combination because "Emma, Butt and Smith are each directed towards shutting down a component of the device in response to a sensor output indicative of an unwanted condition," e.g., smoke or fire. Pet. 77 (citing Ex. 1023 ¶ 259).

Considering the references together, Dr. Horenstein testifies that a person of ordinary skill in the art would have "modif[ied] Emma with Butt and Smith to include Smith's smoke sensor in 'operative connection' with the microwave oven, and including the reset functionality disclosed by Butt for the added benefit of reusing the microwave oven." Ex. 1023 ¶ 127. We find these reasons to combine persuasive. It is well known to a person of ordinary skill in the art, if not anyone, that smoke and fire are a dangerous and unwanted condition of any oven. Ex. 1002 ¶¶ 91, 95. The ability or desire to reset the microwave to run, after for example, someone burns their popcorn, to work again is nothing more than simple logic. *Id.* ¶¶ 184, 192. Overall, we find persuasive Petitioner's combination and Dr. Horenstein's testimony that a person of ordinary skill in the art would have included Smith's internal gas, or smoke sensor, along with the appliance and sensor

reset functionality of Butt, with Emma's microwave and refrigerator combination to provide an integral appliance that can safely turn off, to avoid a dangerous condition, and then be reset and returned to operation.

We also acknowledge Patent Owner's argument that Butt discloses a smoke sensor positioned on a wall or ceiling apart from the oven appliance itself. PO Resp. 53–54. However, the assertion that Butt teaches a smoke sensor spaced from the oven misstates Petitioner's combination and improperly attacks the references individually. Petitioner is relying on the gas, or smoke detector in Smith, not Butt. Pet. 48. The asserted obviousness challenge is based on a combination of Butt's reset functionality with Smith's gas, or smoke, sensor 52 that is in "operative connection" with the cooking area in the microwave. *Id.* at 76–80. It is well settled that non-obviousness cannot be established by attacking Butt and Smith individually when the rejection is predicated upon a combination of all the prior art disclosures. *See In re Merck & Co. Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986).

We also acknowledge Patent Owner's argument that Smith's gas sensor 52 is not specifically described as a "smoke sensor." PO Resp. 32–37. We appreciate, for example, that Petitioner often simply equates the two types of sensors. *See, e.g.*, Pet. 48 (Petitioner arguing that Smith "discloses a gas sensor 52 (i.e., 'smoke sensor') positioned in operative connection with a cooking area.").[13] The relevant question is whether a person of

[13] Petitioner's equating "gas sensor" and "smoke sensor" is not entirely without basis. Smith does describe that "[e]ventually, the temperature of the food closely approaches its combustion temperature. However, before actually reaching the ignition point, the food begins to char, smoke or smolder, resulting in a second period of relatively rapidly increasing gas

ordinary skill in the art would have understood Smith as disclosing a "smoke sensor" as recited in claim 1. *See* PO Resp. 57 (Patent Owner arguing that "Smith does not teach a smoke sensor at all, let alone in operative connection with a cooking area inside the microwave oven.").

Consider, for example, the specification of the '746 patent which describes "a safety circuit 226 such as a smoke *or* gas sensor may be provided in connection with the microwave oven 2." Ex. 1001, 14:8–10 (emphasis added). And, we point out that independent claim 1 recites a "smoke sensor," not a "gas sensor." Ex. 1001, 24:31. Thus, on one hand, it could be understood that there is a difference between a "smoke sensor" and a "gas sensor." The '746 patent, however, also explains that there are different kinds of "smoke sensors." *Id.* at 15:32–17:49. In addition to discussing infrared smoke sensors and smoke sensors that "may comprise a light sensor 334, which detects the increase smoke density within the microwave's cooking area," the '746 patent also describes

> [a]lternative arrangements may include other types of smoke sensors. For example, some arrangements may include sensors *that are operative to detect smoke by determining the level of volatile organic compounds (VOCs) in the air in the microwave oven cooking area.* In some exemplary arrangements such VOC sensors may be positioned to sense air in at least a portion of the microwave cooking area.

Id. at 16:53–57 (emphasis added). The American Lung Association explains that "[v]olatile organic compounds, or VOCs, are gases that are emitted into the air from products or processes. Some are harmful by themselves,

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concentration in the circulating air, comparable to that rate of increase which characterizes the normal cooking period." Ex. 1014, 3:50–57.

including some that cause cancer. In addition, some can react with other gases and form other air pollutants after they are in the air." *See* American Lung Association, Volatile Organic Compounds, https://www.lung.org/clean-air/indoor-air/indoor-air-pollutants/volatile-organic-compounds (last visited March 18, 2025).

Smith expressly describes an exemplary sensor from Figaro Engineering, Inc., Model TGS No. 186, that "is responsive to the cumulative concentration of water vapor and various organic gases. Use of such a sensor in a microwave oven for automatic cooking control is known in the art." Ex. 1014, 3:15–19. Thus, where the '746 patent describes that a smoke sensor can include a VOC gas sensor, a person of ordinary skill in the art would have understood that Smith describes an organic gas sensor for "sensing the concentration level of such gases in the air leaving the cavity." *Id.* at 3:7–8. Although not all organic gases are VOCs, organic gases as a genus encompass VOCs. *See* 40 C.F.R. § 51.100(s) ("Volatile organic compounds (VOC) means any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions."). Based at least on the disclosure of organic gases as a catalyst in Smith, we determine that "smoke sensors" as recited in claim 1 of the '746 patent would have been considered by those of ordinary skill in the art to include gas sensors for sensing VOCs as described in Smith.

Patent Owner argues that "[t]here is no reference in Smith to 'VOCs.'"). PO Resp. 36. Technically, this is true. However, Smith expressly describes in the context of cooking food that its gas sensor "is responsive to the cumulative concentration of water vapor *and various organic gases*." Ex. 1014, 3:16–18 (emphasis added). A reference need not

teach a limitation *in haec verba*. *In re Bode*, 550 F.2d 656, 660 (CCPA 1977). Patent owner's argument appears to be mainly a distinction without a difference because a person of ordinary skill in the art would have understood that Smith's broad description of "organic gases" inside an oven would include VOCs emitted from cooking food. *See* Ex. 1002 ¶ 167 (Dr. Horenstein testifying that "[t]he Smith gas sensor is adapted to detect VOCs and is thus a VOC sensor.") (citing *id.* ¶¶ 165–170). The point of Smith's gas and smoke sensor is that "a fire condition in the cavity of a microwave oven *may be anticipated* by monitoring the gas concentration level of the air circulated through the cavity during the cooking cycle." Ex. 1014, 3:64–67 (emphasis added). This is because, during heating,

> [e]ventually, the temperature of the food closely approaches its combustion temperature. However, before actually reaching the ignition point, the food begins to char, smoke or smolder, resulting in a second period of relatively rapidly increasing gas concentration in the circulating air, comparable to that rate of increase which characterizes the normal cooking period.

Id. at 3:50–57. Furthermore, although Patent Owner's declarant, Dr. Tanbour, testifies "that 'water vapor' and 'various organic gases' are not synonymous with volatile organic compounds (VOCs)," Dr. Tanbour does not explain why VOCs indicative of smoke are not constituents of organic gases produced during food heating, particularly in light of the fact that Smith describes that "the food begins to char, smoke or smolder, resulting in a second period of relatively rapidly increasing gas concentration in the circulating air." Ex. 1014, 3:52–55.

Additionally, Patent Owner contends that we should disregard Dr. Horenstein's testimony "referring to a 'TGS-816' document dated nearly 20 years later—September 1999." PO Resp. 35. Patent Owner argues that

Figaro TGS-816 (Ex. 1014, App'x C) is a different sensor than TGS-186 described in Smith. *Id.* Regardless of whether TGS-186 was a typographical error as Petitioner contends, a plain reading of Smith discloses a known smoke or gas sensor which detects organic gases prior to combustion leading to a fire. Ex. 1014, 3:16–18. Here, we credit Dr. Horenstein's testimony with respect to Smith's gas and smoke sensor sensing VOCs based on the pre-combustion state described in Smith where "the food begins to char, **smoke** or smolder, resulting in a second period of relatively **rapidly increasing gas concentration** in the circulating air." *Id.* at 3:52–55 (emphasis added). While we acknowledge as Dr. Tanbour testifies, that "[n]ot all VOC sensors are smoke sensors," (Ex. 2001 ¶ 140), Dr. Horenstein's testimony is the most consistent with Smith's explicit reference to "smoke and smolder" and sensing of "organic gases," which, encompass VOCs.

Patent Owner focuses their arguments on the specific limitations discussed above in independent claim 1, and does not specifically address either the additional independent claims 15 and 22 or the respective dependent claims. PO Resp. 43–62. Patent Owner states mainly that "Petitioner failed to show obviousness for independent claims 1, 15, and 22, and thus also fails to demonstrate invalidity for the challenged dependent claims. *Id.* at 52. We find persuasive, and incorporate as our own, Petitioner's arguments and evidence as to these additional independent and dependent claims. Pet. 29–66, 74–80.

Accordingly, considering the combination of Emma, Butt, and Smith, we determine that Petitioner's evidence weighs slightly in favor of a conclusion of obviousness of claims 1–3, 5–6, 8–11, 13–17 and 20–24.

c) Objective Indicia of Nonobviousness with Respect to Claims 1–3, 5–6, 8–11, 13–17, and 20–24

Patent Owner further argues that objective indicia of nonobviousness demonstrate that the substitute claims are patentable over the prior art. PO Resp. 68–85. Patent Owner asserts that the submitted evidence demonstrates that: (1) a nexus exists between the '746 patent claims and the objective indica of nonobviousness; (2) Patent Owner's "MicroFridge" brand products embodying the claims are a commercial success; (3) there is strong evidence of a long-felt need for increasing the safety and reliability of combination appliances in dormitories, offices, and apartments and the invention recited in the claims satisfied this need; and (4) multiple sources teach away from the claimed invention incorporating a smoke detector into a microwave oven; and (5) Petitioner's products, specifically the brand "MicroChill," are copies of Patent Owner's MicroFridge Products. *Id.* We first address whether Patent Owner has proven that it is entitled to a presumption of nexus for its MicroFridge produce before addressing the evidence of commercial success, long-felt need, teaching away, and copying.

(1) Presumption of Nexus

For objective indicia of nonobviousness to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention. *ClassCo, Inc., v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016). "[T]here is no nexus unless the evidence presented is 'reasonably commensurate with the scope of the claims.'" *Id.* (quoting *Rambus Inc. v. Rea*, 731 F.3d 1248, 1257 (Fed. Cir. 2013)). A patentee is entitled to a presumption of nexus "when the patentee shows that the asserted objective evidence is tied to a specific product and that product 'embodies the claimed features, and is coextensive with them.'" *Fox*

Factory, Inc. v. SRAM, LLC, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (quoting *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018) (quoting *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000))). "[T]he purpose of the coextensiveness requirement is to ensure that nexus is only presumed when the product tied to the evidence of secondary considerations 'is the invention disclosed and claimed.'" *Id.* at 1374 (quoting *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988)). "[T]he degree of correspondence between a product and the patent claim falls along a spectrum. At one end of the spectrum lies perfect or near perfect correspondence. At the other end lies no or very little correspondence." *Id.* "A patent claim is not coextensive with a product that includes a 'critical' unclaimed feature that is claimed by a different patent and that materially impacts the product's functionality." *Id.* at 1375.

Patent Owner provides an analysis demonstrating that its products are coextensive with the challenged claims. PO Resp. 68–76. First, Patent Owner argues that "[t]he claimed combination of features recited in claims 1–24[]of the '746 Patent is the entire MicroFridge Product that Intirion makes and sells, rather than simply one component or subset of components of the product." *Id.* at 71 (citing Ex. 2001 ¶ 245). Patent Owner argues that the MicroFridge product is the first "microwave-refrigerator appliance with a smoke sensor within the microwave, a reset function that enabled subsequent cooking sessions, a control circuit that prevented power overdraw, and auxiliary outlets for charging such as USB ports." *Id.* Patent Owner points to its marketing materials, reproduced below, which query "What if your combination appliance helps prevent unnecessary fire alarms from going off?"

Patent Owner's marketing material depicts, and touts, a combination microwave-refrigerator appliance including "Patented 1st Defense™ Smoke Sensor, "USB Charging Station," and "Patented current limiting technology." Ex. 2005. Additional marketing material, reproduced below, depicts particular safety aspects of the combined appliance.

Patent Owner's marketing material further explains that the 1st Defense™ Smoke Sensor is "internal" and "automatically shuts microwave operation and alerts user of smoke before any damage is done." *Id.* The marketing

material also describes "two USB ports and one traditional outlet" and that "Safe Plug™ Technology" provides "one-plug to the wall operation." *Id.*

Although Petitioner argues that Patent Owner has not shown commercial success, a long-felt need, or copying, Petitioner does not specifically argue that Patent Owner is not entitled to a presumption of nexus. *See, generally*, Pet. Reply 25–29.

In this case, Patent Owner is entitled to a presumption of nexus for certain claims because the asserted objective evidence is tied to a specific product, namely a microwave-refrigerator appliance with, among other features, an internal smoke detector in the microwave embodied in the MicroFridge product. *Fox Factory,* 944 F.3d at 1373. Importantly, the MicroFridge product is coextensive *with some* of the claims in the '746 patent, specifically those claiming an apparatus including a combination microwave-refrigerator appliance with overdraw protection, i.e., "current limiting technology." For example, different from the '745 patent, independent claim 1 in the '746 patent *does not* include a combination microwave-refrigerator appliance, as it recites only "a microwave oven." Ex. 1001, 24:26–58. Nor does claim 1 include the limitation relating to power overdraw protection. *Id.* Dependent claim 6, which depends directly from claim 1, does add the limitations of "a refrigerator" and overdraw protection by withholding power from the refrigerator "during at least a portion of the time that the magnetron is operative." *Id.* at 25:20–27. Similarly, dependent claim 13 of the '746 patent depends directly from claim 1 and adds the limitations of "a refrigerator" and overdraw protection by withholding power from the "refrigerator during at least a portion of the time that the magnetron is operative." *Id.* at 26:16–24.

Independent claim 15 also does not include a combination microwave-refrigerator appliance, reciting only "a microwave oven," and not a refrigerator. Ex. 1001, 24:26–58. And, claim 15 does not include the limitation relating to power overdraw protection. *Id.* Dependent claim 20, which depends directly from claim 15, does add the limitation of "a refrigerator" *but fails to include* the limitation of overdraw protection by withholding power from the refrigerator during the time that the magnetron is operative. *Id.* at 27:11–15. Dependent claim 21, which depends directly from claim 15, adds the limitations of "a refrigerator" and overdraw protection by withholding power from the refrigerator "while cooking power is delivered to the magnetron and for a period of time thereafter." *Id.* at 27:19–26. Overall, only dependent claims 6, 13, 20, and 21 include the limitation of a combination microwave-refrigerator, and only claims 6, 13, and 21 include the overdraw protection limitation where power is withheld from the refrigerator when the microwave is in operation.

Based on our review of the claims, we disagree with Patent Owner's argument that "[t]he claimed combination of features recited in claims 1–24[]of the '746 Patent is the entire MicroFridge Product that Intirion makes and sells, rather than simply one component or subset of components of the product." PO Resp. 71 (citing Ex. 2001 ¶ 245). As discussed above, we agree that the MicroFridge product is embodied in dependent claims 6, 13, and 21, as they depend from their respective independent claims. For example, claim 1 recites "a microwave oven" and an "electrical connector." Ex. 1001, 24:27–36. Claim 6 adds "a refrigerator in electrical connection" with the "electrical connector" on the microwave. *Id.* at 25:24. Together, claims 1 and 6 claim exactly what is advertised in the marketing material, a microwave as part of a complete "combination appliance" depicting a

microwave and refrigerator together as a unit. Ex. 2005. Therefore, we find that claims 6, 13, and 21 include all the corresponding limitations to the explicit advertised features of the MicroFridge product and are entitled to a presumption of nexus. *See Fox Factory*, 944 F.3d at 1373 (The Federal Circuit explaining that "presuming nexus is appropriate when the patentee shows that the asserted objective evidence is tied to a specific product and that product embodies the claimed features, and is coextensive with them.") (internal quotations and citations omitted).

Petitioner does not substantively dispute Patent Owner's assertions and evidence as to a presumption of nexus. For example, Petitioner neither identifies a claim limitation that is not met by the MicroFridge marketing material (Ex. 2005), the wiring diagrams in MicroFridge Instruction Manual (Ex. 2006), and MicroFridge Service Manual (Ex. 2007), nor persuasively points to any unclaimed features. Pet. Reply 25–29. Although Petitioner attacks the sufficiency of Patent Owner's showing of commercial success, long-felt need, teaching away, and copying (Pet. Reply 25–29), we determine that Patent Owner's evidence is sufficiently specific to show that the MicroFridge product embodies and is coextensive with claims 6, 13, and 21. *See Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072–73 & n.7 (Fed. Cir. 2018) (finding that the patent owner's undisputed evidence was sufficient even though it lacked a claim chart).

On the complete record now before us, Petitioner fails to rebut the presumption of nexus for the MicroFridge product. *See* Pet. Reply 25–29. Petitioner argues that "Patent Owner took its own known prior art (Emma) and added features that (a) were known in the prior art, and (b) were admittedly known to a POSITA by Patent Owner's expert." *Id.* at 25–26

(citing Ex. 1027, 78:19–79:5). In support of its position, Petitioner points to several paragraphs of Dr. Tanbour's deposition testimony reproduced below.

> Q. That's what I was trying to understand. The smoke sensor that is described in the patents at issue, is it your understanding that those smoke sensors were commonly available at the time?
>
> A. That's true.
>
> . . .
>
> A. That's my understanding.
>
> Q. So, I mean, the invention wasn't the invention of a smoke sensor; correct?
>
> A. That's correct.

Ex. 1027, 78:19–79:5

However, this testimony belies Petitioner's position. Dr. Tanbour concedes that the invention in the '746 patent is not specifically a smoke sensor. *Id.* Dr. Tanbour was not asked, nor did he discuss or concede, whether it was known to position a smoke sensor in operative connection with a cooking area as shown for example in MicroFridge Service Manual, as well as include power allocation and reset functions. Ex. 2007, 12. Petitioner's assertions fail to show, for example, that the evidence of known smoke detectors as Dr. Tanbour testified to during his deposition, "exclusively relates" to the recited, and *allegedly* known concept, "wherein the smoke sensor is positioned in operative connections with a cooking area inside the microwave oven." Ex. 1001, 24:31–32; *see Yita v. MacNeil*, 69 F.4th 1356, 1364 (Fed. Cir. 2023) (The Court explaining that "our case law makes clear that 'objective evidence of nonobviousness lacks a nexus if it exclusively relates to a feature that was '*known* in the prior art.'"). Indeed, Petitioner never contends (or establishes) that positioning a smoke sensor

integral within the microwave and in "operative connection" with the cooking area along with the claimed power allocation, microwave power cessation and reset functionality as a whole, was known in the art. As a result, we do not agree that Patent Owner's evidence relating to the MicroFridge relates exclusively to a combination of features known in the prior art.

On the complete record before us, Patent Owner is entitled to a presumption of nexus for evidence relating to the MicroFridge product and claims 6, 13, and 21.

(2) Commercial Success

"When a patentee can demonstrate commercial success, usually shown by significant sales in a relevant market, and that the successful product is the invention disclosed and claimed in the patent, it is presumed that the commercial success is due to the patented invention." *J.T. Eaton & Co. v. Atlantic Paste & Glue Co.*, 106 F.3d 1563, 1571 (Fed. Cir. 1997). "Commercial success is relevant because the law presumes an idea would successfully have been brought to market sooner, in response to market forces, had the idea been obvious to persons skilled in the art." *Galderma Lab'ys, L.P. v. Tolmar, Inc.*, 737 F.3d 731, 740 (Fed. Cir. 2013) (quoting *Merck & Co. v. Teva Pharm. USA, Inc.*, 395 F.3d 1364, 1376 (Fed. Cir. 2005)). Patent Owner argues that the commercial success of the MicroFridge weighs in favor of nonobviousness. PO Resp. 73–76.

Patent Owner argues that the MicroFridge was commercially successful because "[s]ince 2015, in the Academic Market alone, Intirion has sold nearly [redacted] MicroFridge Products for a total revenue of approximately [redacted]" PO Resp. 73 (quoting Ex. 2004 ¶ 5). Patent Owner provides a chart, reproduced below, prepared by Intirion's

Senior Product Manager, Jared Amy, of MicroFridge revenue from 2015 to 2023. Ex. 2004 ¶ 6.

Patent Owner's chart of MicroFridge revenue from 2015 to 2023 illustrates sales revenue of approximately [redacted] *Id.* at 72 (citing Ex. 2004 ¶¶ 6–7).

Patent Owner argues that "customers began modeling their RFPs off the '746 Patent's patented features." *Id.* at 75 (citing Ex. 2004 ¶ 9). Patent Owner points to [redacted] RFP referencing a MicroFridge Product as the 'preferred model' and naming its features in the description of services." *Id.* (citing Ex. 2010, 4–5). A partial copy of [redacted] RFP "Scope of Work" is reproduced below.

Ex. 2009, 6. A partial reproduction of [redacted] "Scope of Work" for microwave and refrigerator combination appliance requires "1st Defense™ Internal Smoke Sensor" or equivalent, that "automatically shuts down microwave operation and alerts the user of smoke before any damage is done." *Id.* Also, the RFP requires "Safe Plug" power restriction features, and that the "[u]nit must facilitate one-plug-to-the-wall operation. This is necessary to conserve electricity and free up wall outlets while allowing the unit to be used safely in all conditions, without special wiring." *Id.*

Petitioner makes several arguments: (1) That there is no nexus because all the features of the claimed invention "(a) were known in the prior art, and (b) were admittedly known to a POSITA by Patent Owner's expert"; (2) that Patent Owner's evidence "fails to show the sales increase would not have occurred but for the claimed invention"; (3) Patent Owner's

"evidence shows RFPs with extensive requirements unrelated to the products, including [redacted] (4) "Patent Owner has not shown as a whole that the patented features drove sales." Pet. Reply 25–27 (citing *Geo M. Martin Co. v. Alliance Mach. Sys. Intern. LLC*, 618 F.3d 1294, 1304 (Fed. Cir. 2010); Ex. 2009; Ex. 2012; Ex. 2013; Ex. 1027, 78:19–79:5).

With respect to Petitioner's argument (1), we discussed above that Patent Owner is entitled to a presumption of nexus and Petitioner's incorrect assertions and evidence that the MicroFridge marketing materials simply highlight known prior elements. For example, Petitioner has not shown that for such a combined appliance that the prior art contemplated a smoke sensor positioned "in operative connection with the microwave cooking area" and "a single power cord" along with reset and power allocation functions as recited in claims 1 and 6.

As for Petitioner's argument (2), Patent Owner's evidence of various colleges and universities RFPs including specific requirements for an "[i]nternal" microwave smoke sensor and a "one-plug-to-the-wall" power cord (elements that Petitioner has not shown are in the prior art) *is* persuasive evidence that these claimed and expressly marketed features drove sales. *See, e.g.*, Ex. 2012, 3 (University of Georgia RFP requiring "1st Defense Smoke Sensor™ must be hard-wired into the unit. Units must only have one plug to the wall."). Clearly these marketed and claimed feature are desirable, otherwise these universities' RFPs would not have made them requirements for any proposal for a combined microwave and refrigerator appliance.

In addition, Patent Owner introduced the MicroFridge Unit sales chart below, provided by Jared Amy, showing significantly increasing sales and testifying that "MicroFridge Products have been sold to hundreds of colleges and universities across the United States." Ex. 2004 ¶ 8.

The chart of MicroFridge units sold from 2015 to 2023 shows significant growth since 2015. PO Resp. 72 (citing Ex. 2004 ¶¶ 6–7). Mr. Amy testifies that "[t]he impact of the MicroFridge Products completely changed the market for microwave-refrigerator combination appliances . . . evidenced by the fact that colleges and universities began specifically identifying the MicroFridge Products and their unique features, including the internal smoke sensor and USB ports, in their Requests for Proposals ('RFPs')." Ex. 2004 ¶ 9. Contrary to Petitioner's position, the evidence of the universities' RFPs identifying MicroFridge Products and claimed safety features, along with the markedly increasing sales data from 2015, together, is persuasive that commercial success is due, at least in part, to the claimed features of the invention.

Turning to Petitioner's argument (3), Petitioner does not explain why the fact that RFPs include other requirements, such as rental service contracts; direct marketing, fulfilment and installation services, would lessen the weight of the persuasive evidence of marketed and claimed aspects of an "[i]nternal" microwave smoke sensor, reset function, and a "one-plug-to-the-wall" power cord. In other words, even if sales were due in part to a direct marketing program for the appliance, this does not lessen the compelling evidence that the RFP requirements include the "single power cord" and internal smoke detector and reset aspects of the claimed invention. *See Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1394 (Fed. Cir. 1988) (The Federal Circuit explaining that "[a] patentee is not required to prove as part of its prima facie case that the commercial success of the patented invention is *not* due to factors other than the patented invention. It is sufficient to show that the commercial success was of the patented invention itself. A requirement for proof of the negative of all imaginable contributing factors would be unfairly burdensome, and contrary to the ordinary rules of evidence.").

As for argument (4), we disagree that Patent Owner has failed to show "that the patented features drove sales." Pet. Reply 27. In addition to the marketing and advertising evidence and the express requirements in the RFPs, Patent Owner introduces an email by Petitioner's Chief Procurement Officer, [redacted] explaining that Penn State University was requiring College Products' bid to include a microwave with an internal smoke sensor. *See* Ex. 2008 ([redacted] writing that Penn State's representative, [redacted] "was giving us a heads up that they will be asking for a unit that has an internal smoke sensor."). In our view, Petitioner's email is strong evidence that having an internal smoke sensor in "operable connection" with the

microwave cooking area is not only driving sales, but in fact mandatory to even make a sale.

Overall, Patent Owner's evidence shows that "the thing" that is commercially successful is a combined microwave and refrigerator operated by a single electrical plug, and the microwave including an internal smoke sensor with reset and power allocation functionality, all of which is coextensive with the claimed invention as recited in claims 6, 13, and 21. *Demaco Corp.*, 851 F.2d at 1392 ("A prima facie case of nexus is generally made out when the patentee shows both that there is commercial success, and that the thing (product or method) that is commercially successful is the invention disclosed and claimed in the patent."). Accordingly, we find that the sales and revenue data in addition to the RFP requirements for the MicroFridge product are indicative of commercial success and we assign strong weight to this evidence.

(3) Failure of Others and Long-Felt Need

"Evidence of a long-felt but unresolved need can weigh in favor of the non-obviousness of an invention because it is reasonable to infer the need would not have persisted had the solution been obvious." *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1056 (Fed. Cir. 2016).

Patent Owner argues that "the market had been trying for decades to solve the problem of increasing the safety and reliability of combination appliances in dormitories, offices, and apartments." PO Resp. 76 (citing Ex. 2001 ¶ 252). According to Patent Owner "[p]lacing a smoke sensor inside the microwave was not seen as a viable option, given the high likelihood of false alarms that would require unnecessary evacuations." *Id.* (citing Ex. 2001 ¶ 253; Ex. 1002 at 306 (App'x E)). Patent Owner argues further that

[redacted]

[redacted]"

PO Resp. 77 (quoting Ex. 2021, 2–3). Patent Owner further contends that

[redacted]

Ex. 2024 at 7.

Petitioner argues that Patent Owner provides no "evidence, that '[p]lacing a smoke sensor inside the microwave was not seen as a viable option' because of likely false alarms," and that "[t]he Challenged Claims fail to claim any element that solved that alleged problem" of "false alarms." Pet. Reply 27 (quoting PO Resp. 74). In addition, Petitioner argues that Patent Owner's reliance on *Leo Pharmaceutical Products, Ltd. v. Rea*, 726 F.3d 1346 (Fed. Cir. 2013), and the intervening time between the prior art the claimed invention is misplaced because Patent Owner has failed to show there is sufficient evidence of long-felt need. *Id.*

We agree with Petitioner as to long-felt need because Patent Owner has not provided persuasive supporting evidence for its broad assertion that "the market had been trying for decades to solve the problem of increasing the safety and reliability of combination appliances in dormitories, offices, and apartments." PO Resp. 74 (citing Ex. 2001 ¶ 252). Dr. Tanbour's testimony describes a valuable outcome, namely "improving the safety and reliability of combination appliances in dormitories, offices, and apartments without the drawbacks associated with unnecessary evacuations caused by

false fire alarms." Ex. 2001 ¶ 252. Yet Dr. Tanbour offers no supporting evidence that the market, e.g., universities and colleges, were clamoring for the MicroFridge product as it is embodied in the claimed invention. By way of example, Patent Owner has not provided any evidence of students or universities proactively requesting or searching for such a combined appliance and safety features prior to the MicroFridge introduction in 2015. Such evidence might show that there was an unmet need for a combined appliance including a microwave, or a microwave including safety features such as a smoke sensor, in dorm rooms. But we do not have any such corroborating evidence before us. *See* 37 C.F.R. § 42.65(a) ("Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.").

On the other hand, we find persuasive Patent Owner's evidence that [redacted] Ex. 2023, 2 (Petitioner's Project manager also explaining that [redacted] *See* Ex. 2024, 7 (Eric Hennings

[redacted] Petitioner does not specifically address Patent Owner's failure of others evidence. *See* Pet. Reply 27–28.

Here, we assign some weight to the evidence showing Petitioner's failure to bring to market a competing product with an internal smoke sensor, reset, and power allocation functionality. But, we do not give Patent Owner's long-felt-need evidence any weight.

(4) Teaching Away and Unexpected Results

Patent Owner makes several arguments including that the ISDU reference as well as "industry regulations taught away from locating a smoke sensor in a microwave oven." PO Resp. 80 (citing Ex. 2001 ¶ 260). We give any evidence pertaining to ISDU reference no weight as Petitioner has failed to show that ISDU is prior art to the '746 patent. Section II.D.1. As for industry regulations, Patent Owner argues that placing a smoke sensor within a microwave was not feasible based on the proposed Energy Conservation Standard for Cooking Products being a maximum standby power rating of 1 watt. *Id.* (citing 73 Fed. Reg. 62034 at 62036 (Oct. 17, 2008)). Patent Owner asserts that under this standard, "the regulation discouraged the industry from taking Intirion's path of designing a product with a smoke sensor in operative connection with a microwave." *Id.* (citing Ex. 2001 ¶ 262; Ex. 2035 ¶ 9).

Petitioner argues that "the asserted regulation was not enforceable until two years after the priority date, and only applied to units 'intended for use as a stand-alone microwave.'" Pet. Reply 28 (citing PO Resp. 7; Ex. 2001 ¶ 263).

While it may be that an off-the-shelf smoke sensor might draw more power than 1 watt, Dr. Tanbour does not explain why those in the industry could not have designed a smoke sensor that used less 1 watt or less power during standby operation. *See* Ex. 2001 ¶¶ 259–263. More importantly, as Dr. Tanbour admits, this regulation only applies to stand-alone microwaves. *See id.* ¶ 263 (Dr. Tanbour testifying that "[b]y the time the regulation became enforceable, it only applied to microwave units solely intended for use as a stand-alone microwave. *See* 78 Fed. Reg. 36316 at 36316-17 (June 17, 2013) (stating the date of compliance is 'June 17, 2016')."). Neither Dr. Tanbour, nor Patent Owner, explain persuasively how or why the proposed, or final regulation, would have been understood by an ordinary skilled artisan to apply to a combined appliance such as the MicroFridge. Accordingly, we give Patent Owner's evidence of teaching away no weight.

We do have some evidence in the prior art indicating that placing a smoke sensor in a kitchen appliance, or even in a kitchen, was not conventional. The Butt reference relied upon by Petitioner describes that the exemplary ADEMCO 5608 smoke detector (Ex. 1015, 4:49–50), warns users "Where Not to Locate Detectors," specifically in "KITCHENS - Smoke from cooking may cause a nuisance alarm. LOCATE DETECTORS AT LEAST 20 FEET (6m) FROM KITCHENS, IF POSSIBLE." Ex. 1002, App'x E at 306. However, this alleged evidence of unexpected results does not persuade us that a smoke detector designed for internal location within a microwave would not work, but that it would be subject to different environmental characteristics. Patent Owner presents no persuasive evidence that a person of ordinary skill in the art would not have been able to design or obtain a smoke sensor to account for such different environments. *See, e.g.*, Ex. 2001 ¶ 264 (Dr. Tanbour relying on the

teachings of ADEMCO 5608.). ADEMCO 5608, however, pertains to a standard off-the-shelf smoke detector for a room or building, whereas a person of ordinary skill in the art contemplating an integrated smoke sensor within a microwave would most likely consider different smoke or gas sensors, such as described in Smith. *See* Ex. 1014, 3:14–16 (The Smith reference describing "a gas sensor readily commercially available from Figaro Engineering, Inc., identifiable as Model TGS No. 186.").

Accordingly, we give little to no weight to Patent Owner's arguments and evidence regarding teaching away and unexpected results.

(5) Copying

"It is well established that copying by a competitor is a relevant consideration in the objective indicia analysis" and "may be evidence that the patented invention is nonobvious." *Liqwd, Inc. v. L'Oreal USA, Inc.*, 941 F.3d 1133, 1137 (Fed. Cir. 2019) (citing *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004)). For this, there must be evidence of actual copying—i.e., "duplication of features of the patentee's work based on access to that work"—not just a showing that the allegedly copied product falls within the scope of the claims. *Id.* (*quoting Institut Pasteur & Universite Pierre Et Marie Curie v. Focarino*, 738 F.3d 1337, 1347–48 (Fed. Cir. 2013)). "Evidence of access and substantial similarity is evidence of copying." *Medtronic, Inc. v. Teleflex Innovations S.a.r.l.*, 70 F.4th 1331, 1340 (Fed. Cir. 2023); *see also Iron Grip Barbell*, 392 F.3d at 1325 (explaining that copying may be demonstrated through "access to, and substantial similarity to, the patented product (as opposed to the patent)").

Patent Owner argues that Petitioner copied its invention. PO Resp. 81–84; PO Sur-Reply 24. In support, Patent Owner introduces evidence to show that (1) Petitioner's MicroChill products are "close copies of Intirion's

MicroFridge Products;" [redacted] PO Resp. 81–84.

Petitioner does not specifically dispute the events alleged by Patent Owner. *See* Pet. Reply 29. Instead, as we address in more detail below, Petitioner mainly responds that "Patent Owner's copying allegation is irrelevant. Petitioner included a known smoke detector in a microwave." *Id.*

We find a nexus between Patent Owner's evidence of copying and the claimed invention. *See Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1364 (Fed. Cir. 2012) ("[A] nexus between the copying and the novel aspects of the claimed invention must exist for evidence of copying to be given significant weight in an obviousness analysis."). We agree with Patent Owner that at least part of the novel aspect of its claimed invention is the internal smoke sensor in "operative connection with a cooking area" that includes a reset function as recited by claim 1. *See* PO 71; *supra* § II.E.4.(1)–(8) (limitation-by-limitation analysis of claim 1). Patent Owner's allegation is that Petitioner copied this novel structure and function of its claimed combined appliance and the evidence summarized above is relevant to evaluating that allegation. *Id.* at 79–82. Moreover, we find that Patent Owner's MicroFridge products include an internal smoke sensor in "operative connection with a cooking area" that includes a reset function as recited by claim 1. *See id.* at 68; Ex. 2001 ¶¶ 244–249, App'x B.

We also find that Petitioner had access to Patent Owner's MicroFridge products before releasing its competing MicroChill products. *See Iron Grip Barbell*, 392 F.3d at 1325 (explaining that copying may be demonstrated through "access to, and substantial similarity to, the patented product"). The record shows that Petitioner's President, Eric Hennings, [redacted]. Ex. 2015, Ex. 2016; Ex. 2026: Ex. 2027. For example, the evidence includes [redacted] Ex. 2016, 2.

The record next shows that in [redacted] Hennings [redacted]

[redacted]

Ex. 2024, 6. Eventually, in [redacted] Petitioner's vendor [redacted]. Ex. 2029, 3. The vendor stated that [redacted] *Id.* Indeed, the record includes no evidence of independent design by Petitioner. Petitioner's emails with their vendor provide strong circumstantial, if not direct, evidence of copying.

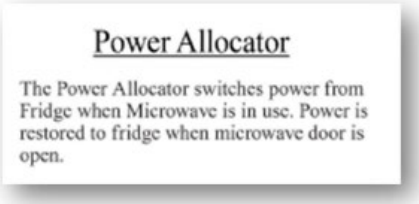
We also find Dr. Tanbour's testimony and evidence comparing the MicroFridge and MicroChill products in Appendix C of his declaration,

compelling evidence of copying. Ex. 2001 ¶¶ 266–268, Appx C. Dr. Tanbour testifies "that Petitioner's product is substantially similar, if not virtually identical, to Intirion's MicroFridge Products." *Id.* ¶ 266. We reproduce below, in part, Dr. Tanbour's chart comparing certain aspects, including the claimed power control and internal smoke recited in claim 1.

APPENDIX C: PRODUCT COMPARISON

Product Feature	Intirion's MicroFridge	College Product's MicroChill
A microwave-refrigerator combination appliance	 Ex. 2005 (MF004429 at 1).	 Ex. 2033 (CP_000256)

The above comparison shows in a first side-by-side comparison the MicroFridge product and the MicroChill product as advertised to customers. Both products depict an "appliance including a microwave oven" stacked on top of "a refrigerator" as recited in claim 1. Ex. 1001, 24:33–35.

Product Feature	Intirion's MicroFridge	College Product's MicroChill
A linked control circuit that utilizes power allocation technology to conserve energy and protect against circuit overloads.	 "This technology, built into the microwave, works by temporarily shutting off the power to the refrigerator and charging outlets when the microwave is in use." Ex. 2006 (MF003462 at 4).	 Ex. 2034 (CP_000258)

In this comparison, media for both products touts the power conservation functionality of switching off electrical power to the refrigerator when the microwave is operating. *See id.* at 24:46–48 (Claim 1 reciting "electrical power to be withheld from at least one component of the refrigerator when a magnetron of the microwave oven draws cooking power.")

Product Feature	Intirion's MicroFridge	College Product's MicroChill
An internal smoke sensor that is positioned in operative connection with the microwave's cooking area (i.e., the cooking cavity).	 Ex. 2005 (MF004429 at 2)  Ex. 2030 (MF003487)	 Ex. 2034 (CP_000258)  Photograph of MicroChill Unit provided by College Products

In the above comparison, advertising for both products tout safety considerations of the appliance having an internal smoke sensor, and provides photographic comparison of each products internal smoke sensor "wherein the smoke sensor is positioned in operative connections with a cooking area inside the microwave oven" as required by claim 1. *Id.* at 24:52–54.

Product Feature	Intirion's MicroFridge	College Product's MicroChill
A plug from the refrigerator that plugs into an outlet located on the back, upper left-hand corner of the microwave to provide energy efficient one-plug to the wall operation.	 Ex. 2005 (MF004429 at 2).	 Ex. 2032 (CP_000253)

Dr. Tanbour compares the above depictions of Patent Owner's MicroFridge "Safe Plug Technology," on the left, to MicroChill's "tamper resistant strap" and single electrical cord and plug, on the right.

Petitioner argues that "Patent Owner's copying allegation is irrelevant. Petitioner included a known smoke detector in a microwave. There is no evidence of any other aspects of Petitioner's product that was allegedly copied." Pet. Reply 29. We disagree for the reasons discussed above, namely that Dr. Tanbour's comparison chart shows, *inter alia*, the MicroChill combined microwave and refrigerator product includes a smoke sensor in operative connection with the cooking area of a microwave, power allocation to the microwave during cooking operations, and single power cord operation for the combined microwave and refrigerator appliance. Ex.

2001, Appx C), *see also Medtronic, Inc. v. Teleflex Innovations S.a.r.l.*, 70 F.4th 1331, 1339 (Fed. Cir. 2023) (The Court explaining that "[t]he fact that a competitor copied the patentee's invention, rather than one within the public domain, is probative of nonobviousness because it suggests the competitor saw value in the invention that he could not achieve without copying.").

On the complete record, we find that Patent Owner has shown copying. The Federal Circuit has said that copying can be strong evidence of nonobviousness. *Volvo Penta of the Americas, LLC v. Brunswick Corp.*, 81 F.4th 1202, 1213 (Fed. Cir. 2023) ("[A]lthough copying is not alone dispositive of nonobviousness, [the Federal Circuit has] usually considered a determination of copying to be 'strong evidence of nonobviousness.'" (quoting *Panduit Corp. v. Dennison Mfg. Co.*, 774 F.2d 1082, 1099 (Fed. Cir. 1985))). But *see Ecolochem, Inc. v. S. California Edison Co.*, 227 F.3d 1361, 1380 (Fed. Cir. 2000) ("[A] showing of copying is only equivocal evidence of non-obviousness in the absence of more compelling objective indicia of other secondary considerations."). On this record, given the facts of this proceeding, we are persuaded that Patent Owner's evidence of copying is strong evidence of nonobviousness.

d) Conclusion as to Claims 6, 13, and 21

Weighing the record as a whole in view of our findings and analysis above, we conclude that Petitioner has not met its burden to show, by a preponderance of the evidence, that dependent claims 6, 13, and 21 as they also include the elements of their respective independent claims, would have been obvious over Emma, Butt, and Smith. Petitioner establishes that an ordinarily skilled artisan would have had a motivation to use Smith's smoke sensor internally within a microwave as disclosed in Emma, and to use the

reset functionality taught by Butt to reset the device after the smoke sensor was activated and the potential danger posed by any burning food had passed. Petitioner shows that this proposed combination teaches each limitation of the claim. But Patent Owner establishes copying by Petitioner (which we weigh heavily) and commercial success (which we also weigh heavily) and we assign moderate weight to the evidence showing [redacted] bring to market a competing product with an internal smoke sensor. On balance, Patent Owner's strong evidence showing nonobviousness outweighs Petitioner's evidence of obviousness. In particular, we find that Petitioner fails to show that the subject matter of claims 6, 13, and 20 would have been obvious because Petitioner's evidence is outweighed by Patent Owner's evidence of copying and commercial success that is tied to the combination of claimed features, as a whole, and that combination was not previously known. Accordingly, we determine that Petitioner has not shown by a preponderance of the evidence that claims 6, 13, and 20 are unpatentable.

e) Conclusion as to Claims 1–3, 5, 8–11, 14–17, 20, and 22–24

Patent Owner has not shown that nexus can be presumed with respect to claims 1–3, 5, 8–11, 14–17, 20, and 22–24 and the MicroFridge product. Independent claims 1, 15, and 22, for example, all fail to recite the refrigerator and power allocation limitations. Ex. 1001, 24:26–58, 26:31–57, 27:27–28:13. Dependent claims 2, 3, 5, 8–14, 16, 17, 20, and 22–24 also fail to rectify the missing refrigerator and power allocation limitations in the independent claims. *Id.* at 24:59–67, 25:13–19, 33–67, 26:25–67, 27:12–18, 28:13–36.

Notably, Patent Owner fails to assess or address the fact that these claims are directed solely to a subcomponent of the MicroFridge product, namely the microwave. PO Resp. 68–85, *see also* Ex. 1001, 24:26–58 (Claim 1 reciting only an "[a]pparatus comprising: a microwave oven," and not a refrigerator). *See Fox Factory*, 944 F.3d at 1373 (The Court explaining that "when the thing that is commercially successful is not coextensive with the patented invention—for example, if the patented invention is only a component of a commercially successful machine or process, the patentee is not entitled to a presumption of nexus.") (internal quotations and citations omitted).

In this case, Patent Owner has not shown a presumption of nexus for these claims nor has Patent Owner made any effort to show that the evidence of commercial success, copying, and failure of others is tied to only a microwave with an internal smoke detector and reset function absent the additional features of a refrigerator and power allocation functionality. Accordingly, commensurate with our determination as to obviousness in Section II.E.4(b), claims 1–3, 5, 8–11, 14–17, 20, and 22–24 are unpatentable as obvious over Emma, Butt, and Smith.

F. Patentability of Claims 1–3, 5–6, 8–11, 13–17, and 20–24 over Emma and Smith (Ground 2)

Because the combination of Emma and Smith is subsumed within Petitioner's challenge based on Emma, Butt, and Smith as discussed above, Patent Owner's objective indicia of nonobviousness applies to the same extent as with Emma, Butt and Smith. In other words, even if we were to determine that the combination of Emma and Smith, or the combination of Emma and Butt, weighed in favor of unpatentability of claims 6, 13, and 21, Patent Owner's strong evidence of nonobviousness for these claims

outweighs Petitioner's evidence of obviousness for this challenge for the same reasons as discussed above with respect to Petitioner's challenge relying on Emma, Butt and Smith in Ground 4.

In particular, we find that Petitioner fails to show that the subject matter of claims 6, 13, and 21, including their respective base claims, would have been obvious because Petitioner's evidence, and excluding Butt, is outweighed by Patent Owner's strong evidence of copying and commercial success. Accordingly, we determine that Petitioner has not shown by a preponderance of the evidence that claims 6, 13, and 21, would have been unpatentable over Emma and Smith.

For the remaining claims in this ground we need not reach a decision because we have found them unpatentable as obvious for the reasons discussed above as to ground 4.

G. Indefiniteness of Claims 1–24 (Ground 9)

Petitioner asserts that, for each of independent claims 1, 15, and 22, a person of ordinary skill in the art would be unable to determine with reasonable certainty the meaning of a smoke sensor in "operative connection" with a cooking area inside the microwave oven. Pet. 88.

1. Legal Standard for Indefiniteness

"[A] patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus*, 572 U.S. at 901. However, despite the absence of explicit antecedent basis, "[i]f the scope of a claim would be reasonably ascertainable by those skilled in the art, then the claim is not indefinite." *Bose Corp. v. JBL, Inc.*, 274 F.3d 1354, 1359 (Fed. Cir. 2001).

2. Indefiniteness Analysis

Petitioner argues that each of independent claims 1, 15, and 22 recite the same or similar limitation that the claimed smoke sensor is in "operative connection" with the cooking area of the microwave. Pet. 88. Petitioner argues that the claims fail to describe "what it means for a smoke sensor to be in 'operative connection' with an area." *Id.* at 89 (citing Ex. 1023 ¶ 265). However, Petitioner acknowledges that the specification of the '746 patent "provides certain specific examples of a safety sensor being positioned, e.g., 'in the microwave cavity 332 adjacent air exhaust vents 338, 340 of the microwave, which comprises an air passage that connects an area where food is cooked in the microwave oven to the air outside the housing of the microwave oven.'" *Id.* (quoting Ex. 1001 at 16:27–30). Petitioner's main argument is that because "the claims are not so limited – a POSITA would have to guess as to what "operative connection" means in the context of the claims as written." *Id.* (citing Ex. 1023 ¶ 140.3).

We agree with Patent Owner that "operative connection" is a generally descriptive term indicating a position and functional relationship between the smoke sensor and the cooking area within the microwave that is not indefinite. PO Resp. 64. As Petitioner acknowledges, there are several examples in the specification describing the relationship of the smoke sensor to the cooking area. For example, in one embodiment an "optical motion sensor 336 may be positioned in the microwave cavity 332 adjacent air exhaust vents 338, 340 of the microwave." Ex. 1001, 16:26–28. In another embodiment a sensor "detect[s] smoke by determining the level of volatile organic compounds (VOCs) in the air in the microwave oven cooking area," and also describes that "such VOC sensors may be positioned in an air

passage that extends between the microwave cooking area and the air in the atmosphere outside the microwave." *Id.* at 16:55–63.

In light of the written description which expressly discusses sensing the "cooking area" and an "air passage" within the microwave, and a plain reading of the claim itself, we are persuaded that a person of ordinary skill in the art would have understood that a smoke sensor is positioned internally within the microwave such that it can sense gases and smoke within the microwave. Dr. Tanbour persuasively testifies that "[w]hen read in light of the specification, this term plainly describes that the cooking area is connected to the smoke sensor such that the smoke sensor is able to operate, *i.e.* sense smoke in the cooking area." Ex. 2001 ¶ 227. "Operative connection" may not tell us exactly where inside the microwave the sensor is positioned, but considering the written description it would strain the plain meaning of the term to consider that the smoke sensor is anywhere but internal to the microwave. A claim may be broad, for example here, encompassing the cooking area and connecting passageways within the microwave, but it is not indefinite where the scope of such operative connections is reasonably ascertainable to a person of ordinary skill in the art. *See* Ex. 2001 ¶ 229 (Dr. Tanbour testifying that a person of ordinary skill in the art would have understood that "the smoke sensor operates based *on being connected* to the [cooking] area" not simply being in the vicinity of the microwave) (emphasis added).

Petitioner's declarant, Dr. Horenstein testified that even though the specification describes examples of the sensor being within the microwave "the claims are not so limited – a POSITA would have to guess as to what "operative connection" means in the context of the claims as written. This testimony is not consistent with the requirement that the meaning of the

claims is read in light of the specification. *See Nautilus*, 572 U.S. at 910, (The Supreme Court explaining that "we read § 112, ¶ 2 to require that a patent's claims, viewed in light of the specification and prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty. The definiteness requirement, so understood, mandates clarity, while recognizing that absolute precision is unattainable."). We find the claim is understandable, and that Dr. Tanbour's explanation of this limitation to be the most consistent with the written description and claim language as understood by a person of ordinary skill in the art, that is "that the cooking area is connected to the smoke sensor such that the smoke sensor is able to operate, i.e., sense smoke in the cooking area." Ex. 2001 ¶ 227. We agree with Patent Owner because, in this situation, the scope of the claim recitation is reasonably ascertainable by those skilled in the art. *Bose*, 274 F.3d at 1359.

3. Conclusion as to Indefiniteness of Claims 1–24

For the reasons stated above, we determine that claims 1–24 are not indefinite under 35 U.S.C. § 112(b).

H. Indefiniteness of Claim 10 (Ground 10)

Claim 10 has been determined to be unpatentable and therefore we need not reach the issue of indefiniteness, written description or enablement with respect to this claim. Pet. 88–90.

I. Indefiniteness and Written Description of Claim 14 (Ground 11)

Claim 14 has been determined to be unpatentable and therefore we need not reach the issue of indefiniteness or written description with respect to this claim. Pet. 90–91.

J. Patent Owner's Motion to Exclude

The party moving to exclude evidence bears the burden of proof to establish that it is entitled to the relief requested—namely, that the material sought to be excluded is inadmissible under the Federal Rules of Evidence. *See* 37 C.F.R. §§ 42.20(c), 42.62(a). Patent Owner moves to exclude Exhibit 1024. PO Mot. to Exclude.

Exhibit 1024 relates to the public availability of ISDU. Regardless of the admissibility of this exhibit, as discussed, *supra*, on the evidence in this proceeding we have determined that Petitioner has not met its burden to show that ISDU is prior art to the '746 patent. Section II.D.1.–2. With respect to this exhibit, we deny Patent Owner's Motion to Exclude as moot because we do not rely on this exhibit in a manner adverse to Patent Owner for our Decision.

For these reasons, Patent Owner's Motion is dismissed as moot to the extent it pertains to Exhibit 1024.

K. The Parties' Unopposed Motions to File Under Seal (Papers 20, 29, and 34) and Entry of Protective Order

The parties filed several unopposed motions to seal, *inter alia*, the Patent Owner Response, Petitioner's Reply, and Patent Owner's Sur-Reply (including various redacted versions filed under seal at Papers 31 and 36). Petitioner's Motion requested that Petitioner's Reply to Patent Owner's Response, (Paper 30), be filed under seal. Paper 29. To encompass its briefing, Patent Owner filed two Unopposed Motions to File Under Seal. Papers 20, 34, ("Mots. to seal"). We address all the motions to seal together, which reference the following papers and exhibits:

> Patent Owner's Response (Paper 22), Petitioner's Reply to Patent Owner's Response, (Paper 29), Patent Owner's Sur-Reply to Petitioner's Reply (Paper 34), Exhibits 2001, 2004, 2008,

2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2021, 2022, 2023, 2024, 2025, 2026, 2028, 2029, 2030, 2031, 2035, 2036.

Mots. to seal, 1. The parties do not oppose each other's motions. Because Petitioner and Patent Owner have shown good cause to protect certain confidential information in this proceeding, we conditionally grant the parties' requests that these documents remain under seal. We make our grant conditional on the filing of appropriately redacted public versions of Paper 22 and Exhibit 2001. No public versions of these documents, which contain extensive amounts of non-confidential information, have been filed. We also enter in this proceeding the parties' jointly agreed upon Protective Order attached as Exhibit A to each of Patent Owner's Motions.

III. CONCLUSION

For the foregoing reasons, we determine that Petitioner has established by a preponderance of the evidence that claims 1–3, 5, 8–11,14–17, 20, 22–24 of the '746 patent are unpatentable, and has not established that claims 4, 6, 7, 12, 13, 18–19, 21 are unpatentable.

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–3, 5–6, 8–11, 13–17, 20–24	103	Emma, ISDU		1–3, 5–6, 8–11, 13–17, 20–24
1–3, 5–6, 8–11, 13–17, 20–24	103	Emma, Smith		1–3, 5–6, 8–11, 13–17, 20–24
1–3, 5–6, 8–11, 13–17, 20–24	103	Emma, Butt		1–3, 5–6, 8–11, 13–17, 20–24

1–3, 5–6, 8–11, 13–17, 20–24	103	Emma, Butt, Smith	1–3, 5, 8–11, 14–17, 20, 22–24	6, 13, 21
4, 7, 8, 12, 18, 19	103	Emma, ISDU, Smith		4, 7, 8, 12, 18, 19
4, 7, 8, 12, 18, 19	103	Emma, ISDU, Smith		4, 7, 8, 12, 18, 19
4, 7, 8, 12, 18, 19	103	Emma, ISDU, Smith		4, 7, 8, 12, 18, 19
4, 7, 8, 12, 18, 19	103	Emma, ISDU, Smith, Quezada		4, 7, 8, 12, 18, 19
1–24	112	Indefiniteness		1–24
10[14]	112	Indefiniteness		
14	112	Indefiniteness		
Overall Outcome			1–3, 5, 8–11, 14–17, 20, 22–24	4, 6, 7, 12, 13, 18,19, 21

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 4, 6, 7, 12, 13, 18–19, 21 of U.S. Patent No. 11,674,746 B2 are not unpatentable;

ORDERED that claims 1–3, 5, 8–11, 14–17, 20, 22–24 of U.S. Patent No. 11,674,746 B2 are unpatentable;

[14] As explained above, because we determine that the challenged claims are unpatentable under one ground, we decline to address the remaining grounds.

ORDERED that, because this is a Final Written Decision, the parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirement of 37 C.F.R. § 90.2;

ORDERED that to the extent it is not moot, the Motion to Exclude (Paper 39) is *denied*;

ORDERED that parties' Unopposed Motions to File Under Seal (Papers 20, 29, 34) are conditionally *granted*, and that the parties' agreed upon Protective Order attached to the Motions as Exhibit A is entered in this proceeding;

ORDERED that this Decision is filed under seal, designated as "For Board and Parties Only" as it discusses and cites to the documents under seal;

ORDERED that within ten (10) business days from the entry of this Decision, Patent Owner must file a proposed redacted version of its Patent Owner Response (Paper 23) and Exhibit 2001 for public entry into the record; and

FURTHER ORDERED that within ten (10) business days from the entry of this Decision, Patent Owner and Petitioner jointly file a proposed redacted version of this Decision for public entry into the record.

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