

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COLLEGE PRODUCTS, INC.,
Petitioner,

v.

INTIRION CORPORATION,
Patent Owner.

Case 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*.

DECISION
Granting Institution of Post-Grant Review
35 U.S.C. § 324

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.”).

We have authority to determine whether to institute a post-grant review. 35 U.S.C. § 324(c) (2018); 37 C.F.R. § 42.4(a) (2023). A post-grant review may be instituted only if “the information presented in the petition . . . demonstrate[s] that it is more likely than not that at least 1 of the claims challenged in the petition is unpatentable.” 35 U.S.C. § 324(a) (2018). Having considered the arguments and evidence presented by Petitioner and Patent Owner, we determine, for the reasons set forth below, that Petitioner has demonstrated that it is more likely than not that at least one of the challenged claims is unpatentable based on the grounds presented. Therefore, we institute a post-grant review of the challenged claims.

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.

¹ Petitioner contends that claims 1–24 of the ’746 patent are invalid under 35 U.S.C. § 112(b), and claims 10 and 14 are also invalid under 35 U.S.C. § 112(a). Pet. 1, 12–13.

Petitioner indicates that it has filed another request for post-grant review including related U.S. Patent No. 11,674,745, (“the ’745 patent”) namely PGR2024-00003. Pet. 2. Petitioner requests that we consolidate these two proceedings. *Id.*

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).² The ’746 patent describes a compact combined refrigerator and microwave appliance as reproduced below in Figure 1.

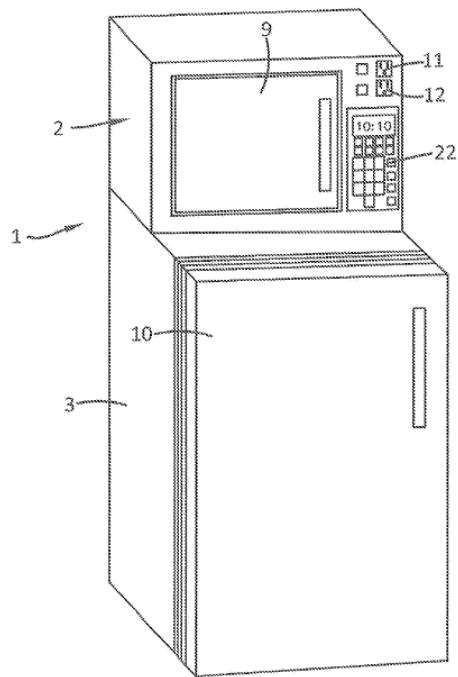


FIGURE 1

² The ’746 patent is a continuation-in-part (“CIP”) of US Application No. 16/671,383 (“the ’383 Application”), filed on November 1, 2019, which, along with other intervening applications, is a CIP of US Application No. 12/317,632, filed December 23, 2008 and referred to by Petitioner, and in this Decision where necessary, as either “Emma,” “Exhibit 1011,” or “the ’632 Application.” Ex. 1001, code (63).

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. Figure 7, reproduced below, illustrates a flow diagram of power distribution when microwave oven 2 demands power.

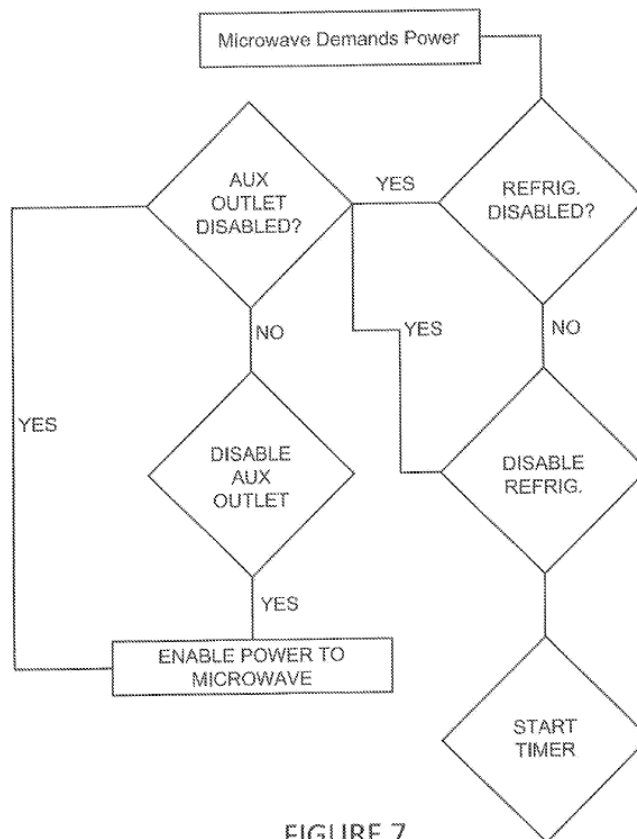


FIGURE 7

Figure 7 illustrates a flow diagram showing 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.

D. Illustrative Claim

Claims 1, 15, and 22 are independent.³ Each of dependent claims 2–14, 16–21, and 23–24 ultimately depend from independent claims 1, 15, and 22 respectively. Notably different from claim 1 in the '745 patent, the independent claims in the '746 patent in this proceeding recite only a microwave, and not a combination microwave and refrigerator. *See, e.g.*, Ex. 1001, 26:31–57. Claim 1 illustrates the claimed subject matter and is reproduced below:

³ For clarity we apply references [1pre]–[1h] to claim 1 corresponding to certain claim limitations.

[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.

E. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–24 would have been, or are, unpatentable based on the following grounds:⁴

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1	1–3, 5–6, 8–11, 13–17, 20–24	102/103	Emma ⁵ , ISDU ⁶
2	1–3, 5–6, 8–11, 13–17, 20–24	103	Emma, Smith ⁷
3	1–3, 5–6, 8–11, 13–17, 20–24	103	Emma, Butt ⁸
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		Emma, ISDU, Smith, and the level of ordinary skill in the art
7	4, 7, 8, 12, 18, 19	103	Emma, ISDU, or Smith
8	4, 7, 8, 12, 18, 19	103	Emma, ISDU, or Smith, and Quezada ⁹
9	1–28	112	Indefiniteness ¹⁰
10	10	112	Written Description, or Enablement, and

⁴ Petitioner supports its challenge with a Declaration (Ex. 1002), and a Supplemental Declaration (Ex. 1023) of Mark N. Horenstein, Ph.D. *See infra*. Patent Owner has not submitted declaration testimony at this stage.

⁵ Ex. 1011, US Patent Appl’n Pub. No. 2009/0188911A1 (July 30, 2009).

⁶ Ex. 1012, ISDU: integrated smoke detector unit for commercial microwave ovens, IRis Northeastern University, Electrical and Computer Engineering Undergraduate Capstone Projects (April 17, 2007).

⁷ Ex 1014, US Patent No. 4,496,817 (January 29, 1985).

⁸ Ex 1015, US Patent No. 8,446,048 B2 (May 21, 2013).

⁹ Ex. 1020, US Patent Appl’n Pub. No. 2012/0276763 A1 (Nov. 1, 2012).

¹⁰ 35 U.S.C. § 321 (“A petitioner in a post-grant review may request to cancel as unpatentable 1 or more claims of a patent on any ground that could be raised under paragraph (2) or (3) of section 282(b) (relating to invalidity of the patent or any claim)”).

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
			Indefiniteness
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 various references, namely, 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, “fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.” *Id.* at 901.

Additionally, Petitioner challenges dependent claims 10 and 14 under 35 U.S.C. § 112(a)–(b) as lacking at least one of written description, enablement, as well as being indefinite.

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.” Prelim. Resp. 4–5.

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, 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).

“level of smoke”

Neither Patent Owner nor Petitioner expressly indicate that any claim terms require express construction. *See* Petition 13–14; Prelim. Resp 5. However, Petitioner contends that for the phrase “level of smoke,” recited in claims 1, 15, and 22, “Patent Owner interprets ‘level of smoke’ as merely detecting smoke.” Pet. 14 (citing Ex. 1009, 6). Patent Owner argues that it “does not offer a special definition” and “asked the [district] court to give these terms their plain and ordinary meaning.” Prelim. Resp. 5, n 2. Patent Owner explains that a person of ordinary skill in the art “would similarly understand ‘level of smoke’ when read in the full context of the intrinsic record.” *Id.*

For purposes of this Decision, reading the plain language of the claims in light of the specification, we understand “level of smoke” as a predetermined level of smoke “indicative of a dangerous condition” as the specification of the ’746 patent explains. Ex. 1001, 15:43–44, *see also id.* at 15:63–65 (The ’746 patent describing “[t]he determination of a level of smoke corresponding to a dangerous condition.”). To the extent the parties disagree, they may address this issue more directly in subsequent briefing.

We also address, in our analysis below, the parties’ contentions regarding Petitioner’s indefiniteness ground pertaining to the interpretation of “the smoke sensor [] positioned in operative connection with a cooking area.” Ex. 1001, 24:31–32; Pet. 89–90; Prelim. Resp 51–52. To the extent there is a continued dispute as to the meaning of this limitation, the parties should address that issue during trial.

Apart from our discussion above, we find no express determinations are needed regarding claim construction to resolve whether to institute post grant review. *See 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. Grounds 3 and 4: Claims 1–3, 5–6, 8–11, 13–17 and 20–24—
Alleged Obviousness over Emma and Butt (Ground 3) or
alternatively over Emma, Butt and Smith (Ground 4)*

On this record, Petitioner has established that it is more likely than not to prevail on its assertion that claims 1–3, 5–6, 8–11, 13–17 and 20–24 would have been obvious at least over Emma, Butt, and Smith, for the reasons explained below.

1. *Emma (Ex. 1011)*

As discussed above, Emma is a preceding and related parent to the '746 patent. Emma is 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.

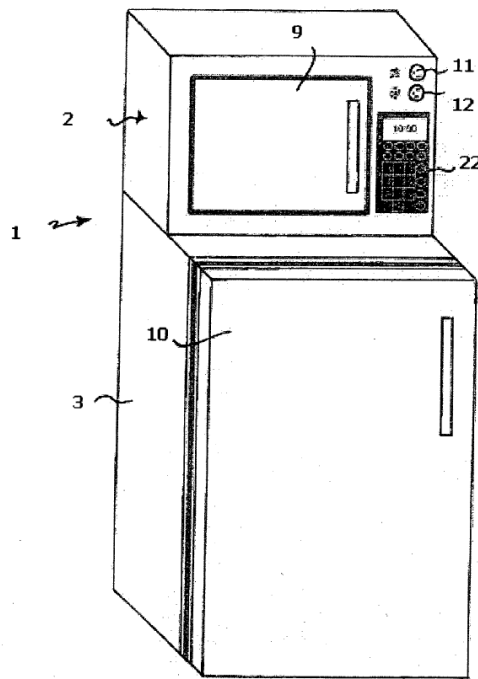


FIGURE 1

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 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.

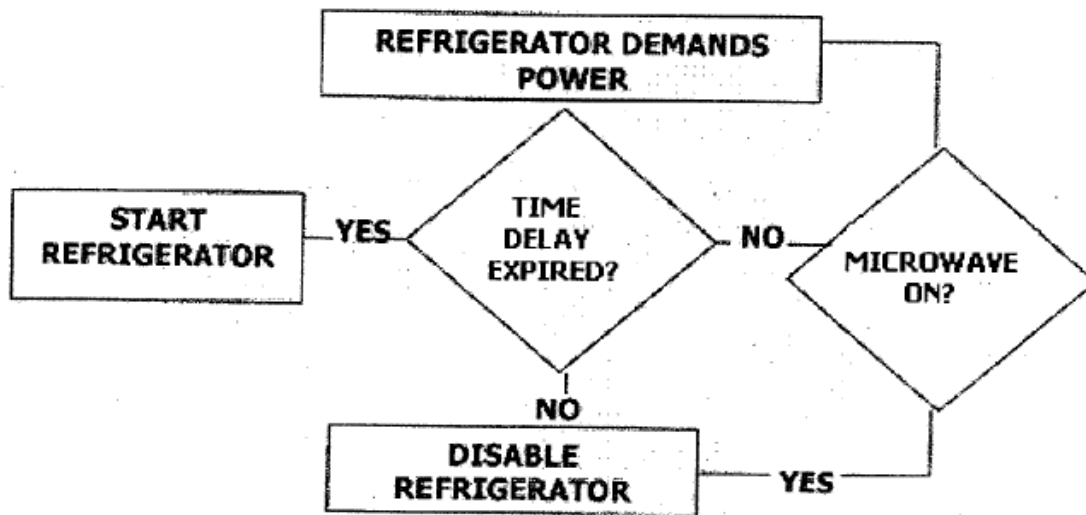


FIGURE 6

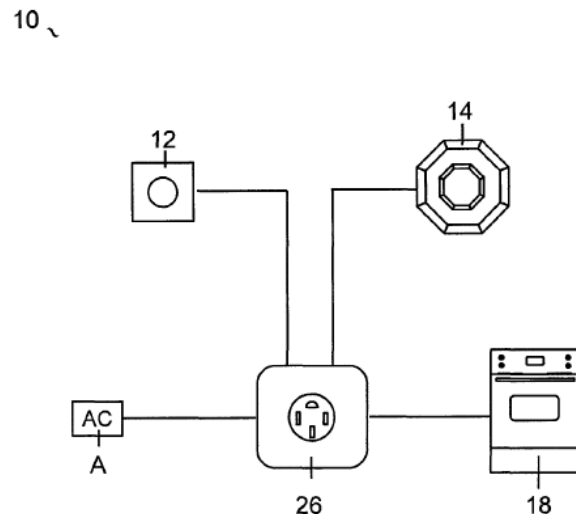
Emma's Figure 6 illustrates a power flow diagram of a particular control model where "[i]f the microwave is on, the recycling of the refrigerator will be delayed." *Id.* ¶ 33.

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



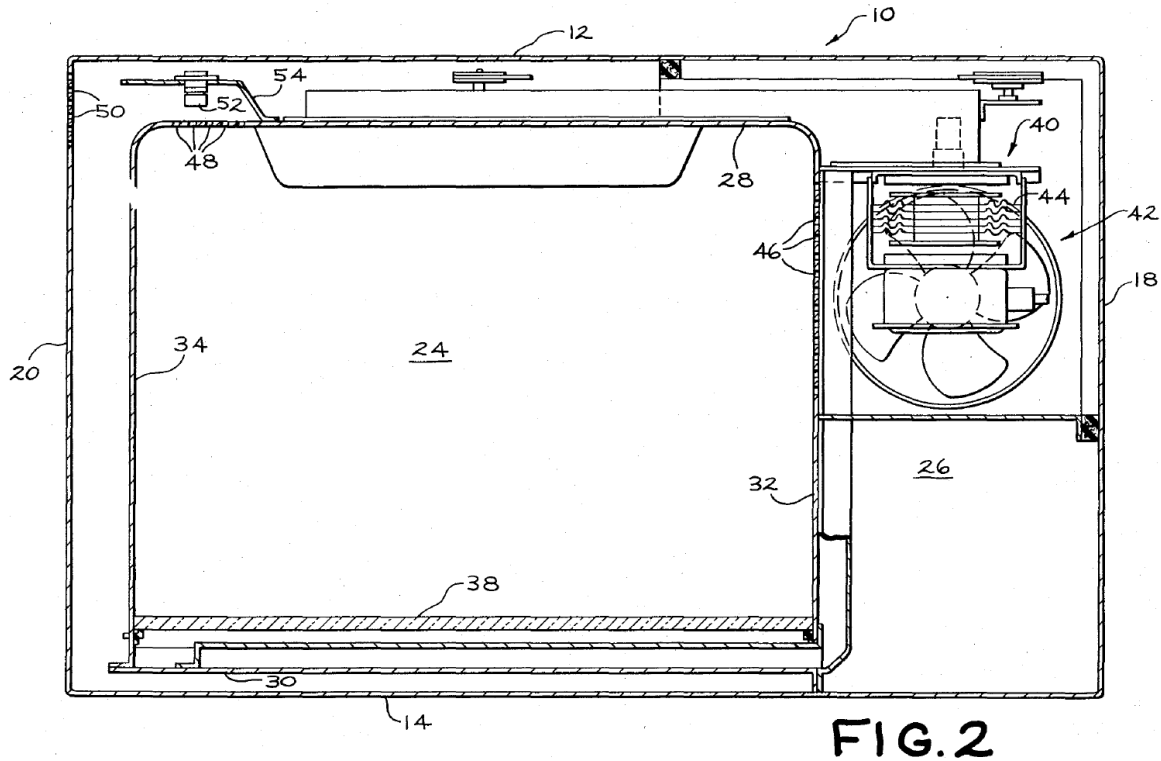
Butt’s Figure 1B depicts system 10 including smoke detector 14 connected to circuit box 26 housing controller 20. Butt explains that “[i]f the detector 14 detects the presence of smoke, then . . . signal 15 is transmitted and is received by the controller 20. Upon receiving the signal, the controller 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.



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 “upon 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 Claim 1*

We consider initially the elements of claim 1.

a) *Petitioner's Arguments*

(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.

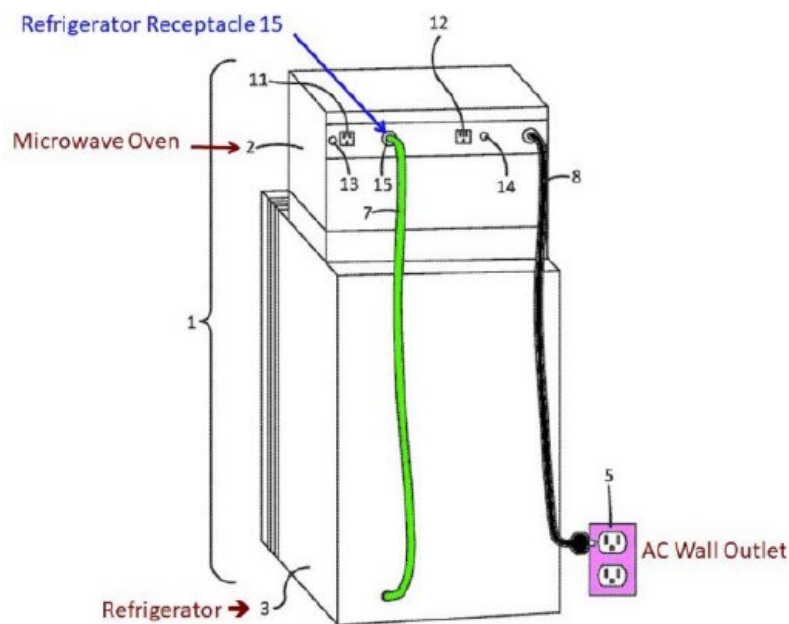


FIGURE 2

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

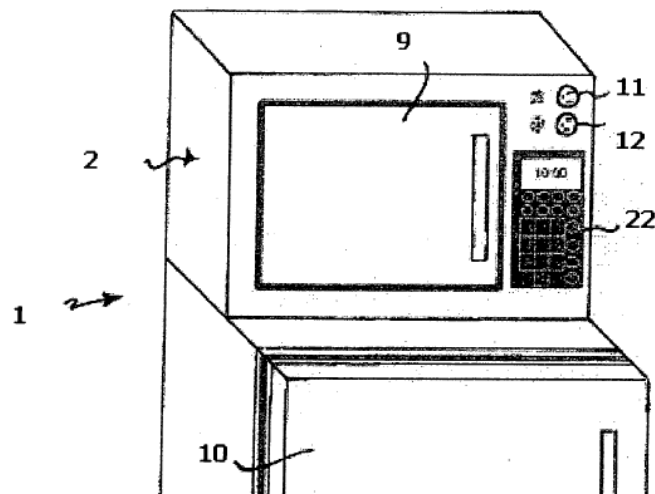
refrigerator combination to include Smith's smoke sensor to be operatively connected with its cooking area and to include Butt's smoke sensor and reset functionality." *Id.* at 76 (citing Ex 1023 ¶ 259).

(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.

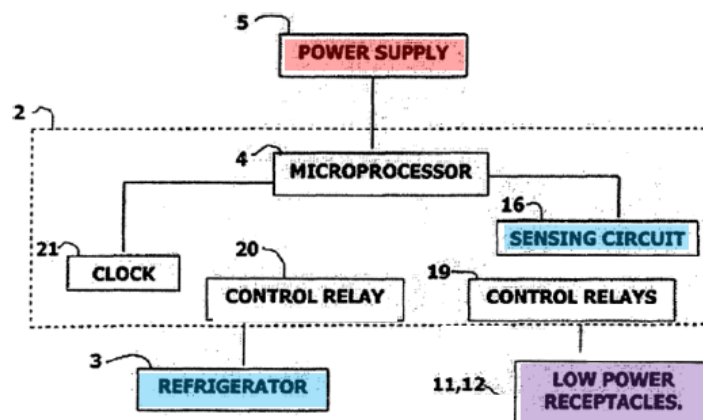


FIGURE 3

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.

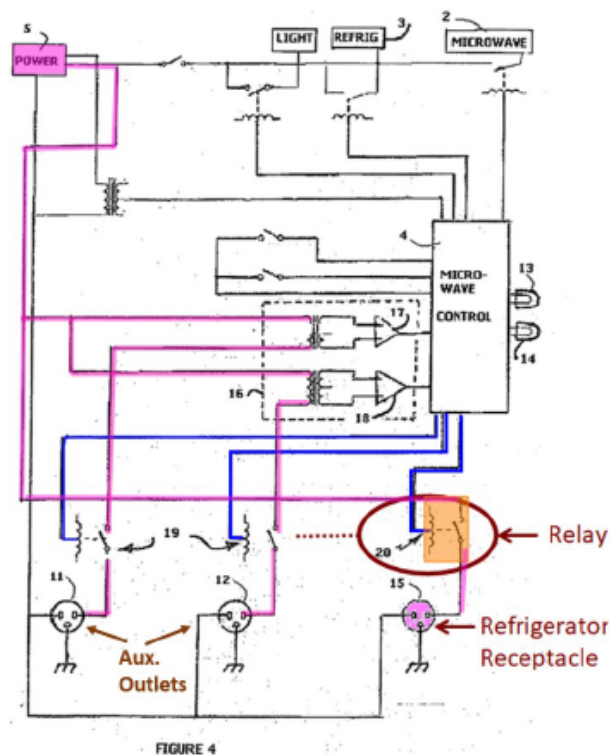


Figure 4 as annotated by Petitioner is a circuit diagram illustrating a specific power control circuit for controlling power distribution via various relays to the microwave 2, refrigerator 3 and power receptacles 11, 12 and 15.

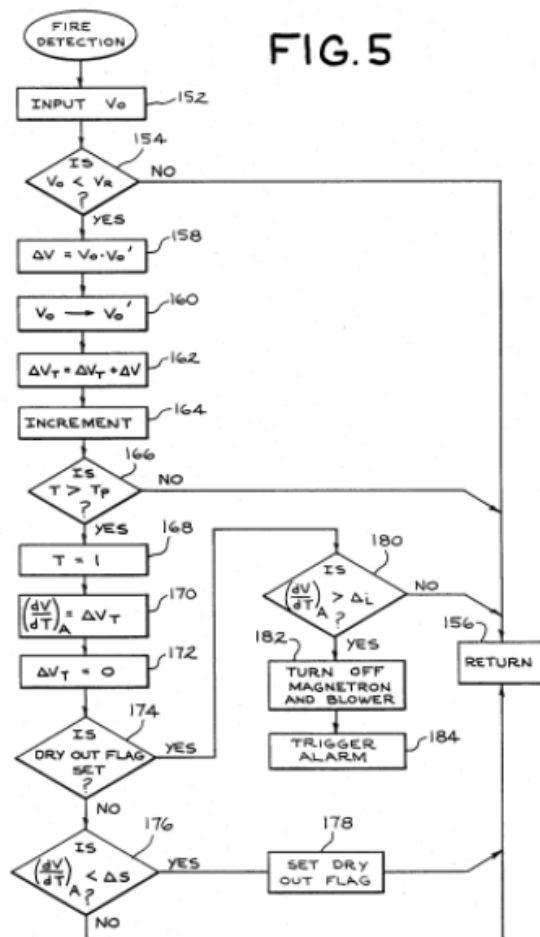
(7) [1g] wherein responsive at least in part to a level of smoke sensed by the smoke sensor, the at least one power control circuit is operative to cause cooking power to the magnetron to be withdrawn to end a current cooking session prior to a set end time of the current cooking session,

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*

Patent Owner argues, mainly as to claim limitations [1c] and [1g]–[1h], that neither the combination of Emma and Butt, (Ground 3), nor Emma, Butt, and Smith, (Ground 4), “disclose the ‘smoke sensor,’ ‘shutdown function,’ or ‘reset enable’ terms, which are recited in all independent claims of the ’746 patent. Thus, Grounds 3 and 4 fail to render obvious the ’746 patent.” Prelim. Resp. 36 (citing *KSR Int’l Co.*, 550 U.S. at 406).

We address Patent Owner’s specific arguments and the relevant limitations below.

(1) *Limitation [1c] – “Smoke sensor”*

Patent Owner argues that neither Emma, nor the combination of Emma with Butt and Smith “disclose a smoke sensor in operative connection with the cooking area or the control circuit as described in independent claims 1, 15, and 22.” Prelim. Resp. 36. To this end, limitation [1c] expressly requires “a smoke sensor, wherein the smoke sensor is positioned in *operative connection* with the cooking area.” Ex. 1001, 24:31–32 (emphasis added).

Patent Owner argues, specifically, that Emma does not disclose a smoke sensor, and that Butt’s smoke sensor is not “*positioned in operative connection with a cooking area inside the microwave oven.*” Prelim. Resp. 37. According to Patent Owner, Petitioner fails to show obviousness by merely alleging that “Butt ‘includes a smoke sensor in operative connection with the cooking area of a cooking range,’” and ignores the requirement that the smoke detector is “in operative connection with the cooking area of a cooking range.” *Id.* at 37–38. Also, Patent Owner argues that “Smith does not disclose a smoke sensor as required by the claims.” *Id.* at 40.

As to Smith, we disagree on this record that Smith does not disclose a “smoke sensor.” First, we appreciate that the specification of the ’746 patent 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 acknowledge that independent claim 1, for example, 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.”

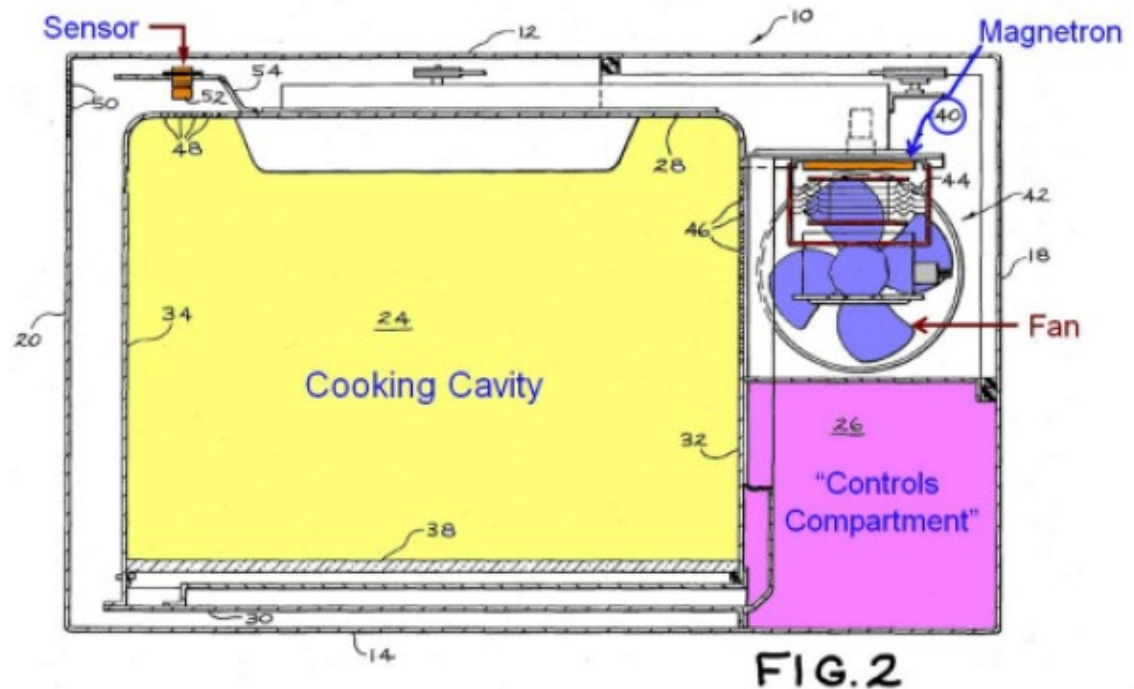
The '746 patent, however, also explains that there are different kinds of “smoke sensors.” *Id.* at 15:33–17:54. In addition to discussing infrared smoke sensors and smoke sensors that “may comprise a light sensor 334, which detects the increase smoke density within the microwave’s cooking area,” the '746 patent 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 16:53–60. 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, 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 7, 2024). In any event, it is reasonable, based at least on the intrinsic evidence of the '746 patent itself, to understand that “smoke sensors” as recited in claim 1 would have been understood by those of ordinary skill in the art to include gas sensors for sensing VOCs. Indeed, Smith describes that an exemplary gas sensor is Figaro Engineering Model TGS No. 816. Ex. 1014, 3:13–18. Dr. Horenstein testifies that based on its datasheet, in addition to VOCs, “the TGS-816 is capable of measuring carbon monoxide which is a known component of smoke.” Ex. 1002 ¶¶ 159–160 (citing *id.* at App’x C). On this record, it appears that a person of ordinary skill in the art would thus

understand that smoke sensors include at least gas sensors which sense CO and VOCs which are known constituents of smoke.

Next, acknowledging that Butt arguably does not disclose its smoke detector expressly *inside* an oven, Petitioner argues that “Smith discloses a gas sensor (i.e., ‘smoke sensor’) positioned in operative connection with a cooking area *inside* a microwave oven.” Pet. 48 (emphasis added). In addition, again equating Smith’s gas sensor with the claimed smoke sensor, Petitioner points to specific descriptions in Smith explaining that “‘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.* (quoting Ex. 1014, 3:51–54). Petitioner also points out that Smith teaches “[m]eans for sensing the concentration level of such gases in the air leaving the cavity is provided in the form of a gas sensor 52 disposed in the air flow path between perforations 48 in cavity wall 28 and vent openings 50 in cabinet wall 20.” *Id.* at 48 (quoting Ex. 1014, 3:6–16). Petitioner provides the following annotated version of Smith’s Figure 2, reproduced below.



Smith's annotated Figure 2 is a cross-section view of microwave oven 10 illustrating gas sensor 52 (orange) in relation to cooking cavity 24 (yellow). *Id.* at 49.

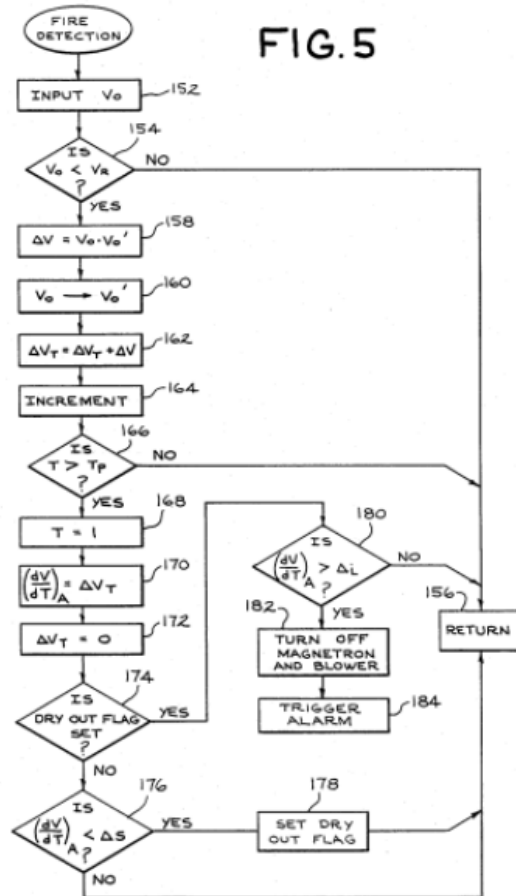
On the evidence before us at this stage of the proceeding, we are persuaded for purposes of institution that the combination of Emma, Butt, and Smith disclose limitation [1c] including “a smoke sensor . . . positioned in operative connection with the cooking area.”

(2) *Limitation [1f] – “at least one power control circuit . . . in operative electrical connection with . . . the at least one smoke sensor”*

Patent Owner argues that “nowhere does Petitioner allege a combination wherein the smoke sensor of Butt is in operative connection with the control circuit of Emma.” Prelim. Resp. 39. However, Petitioner does allege for the combination of Emma and Butt, that Emma's safety functionality of withdrawing power from the refrigerator during microwave operation, would lead a person of ordinary skill in the art to “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.” Pet. 75 (citing Ex. 1023 ¶ 259).

To the extent Butt does not disclose a specific algorithm or circuit diagram showing a smoke detector “in operative connection” with a microwave oven electronics control system, for Ground 4 Petitioner argues that Smith’s “control algorithm [is] implemented by the microprocessor [] for smoke detection.” Pet. 54 (citing Ex. 1002 ¶¶ 180–81, 289; Ex. 1023 ¶ 217). According to Petitioner, Smith’s Figure 5 illustrates an algorithm for detecting a rapid increase in gas concentration level and “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; Ex. 1023 ¶ 217).



Smith’s flow chart in Figure 5 includes the step “turn off magnetron and blower” 182 as part of the “fire detection” algorithm.

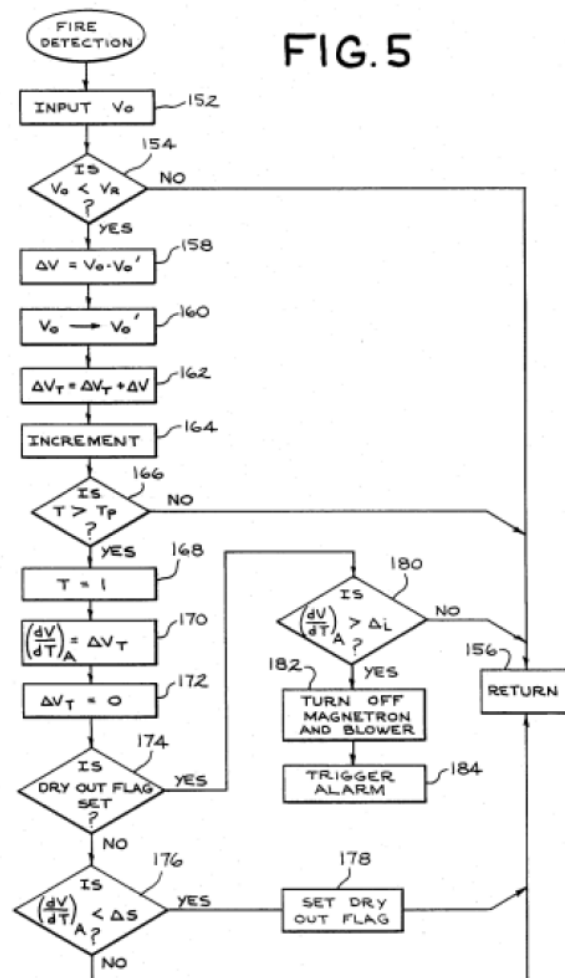
On the evidence before us at this stage of the proceeding, we are persuaded for purposes of institution that the combination of Emma, Butt, and Smith disclose limitation [1f] including “at least one power control circuit . . . in operative electrical connection with . . . the at least one smoke sensor.”

(3) Limitation [1g] – “Shut down function”

Next, Patent Owner argues that the combination of Emma, Butt, and Smith fails to “disclose the ‘shut-down function’ as described in independent Claims 1, 15, and 22,” particularly limitation [1g]. Prelim. Resp. 40. Patent Owner specifically argues that neither Emma, Butt, or Smith teach

“withdraw[ing] cooking power to a microwave prior to a set end time of a current cooking session.” *Id.* at 41. Patent Owner contends “[r]ather, as Butt teaches, Butt stops *all* power to a range in the event of a fire, to make it so that ‘the energy that would otherwise act as an accelerant for the fire is eliminated.’” *Id.* (citing Ex. 1015, 4:55–60).

Petitioner, however, in addition to Butt, relies on Smith for teaching the withdrawal of power to the microwave upon sensing a level of smoke. Smith’s Figure 5 is again reproduced below. Pet. 54.



The flow chart of Figure 5 in Smith highlights the command “turn off magnetron and blower” 182. Petitioner points out that Smith expressly discusses upon detecting an undesirable cooking condition “[t]he

deenergizing of both the magnetron and the blower motor using either technique in effect turns off power to the oven.” Pet. 54 (quoting Ex. 1014, 9:25–28).

We acknowledge that Smith does not expressly state that the microwave is turned off “prior to a set cooking time” as recited in the claims. And regardless of *why* Smith shuts off power to the microwave, e.g., fire or rapidly increasing gas levels, it would have been reasonably clear to a person of ordinary skill in the art from Smith’s written description that during a cooking event, the magnetron and blower of the microwave are turned off before a desired, or “set,” cooking time has elapsed. *See, e.g.*, Ex. 1014, 4:52–61 (Smith explaining that “by detecting the rate of change of the gas concentration level characteristic of the pre-combustion phase early in this phase, it is possible to anticipate a combustion condition in the cavity at least 2 to 3 minutes in advance. By turning off the power to the magnetron and blower at this point, fire in the cavity may be prevented.”).

On the record before us, we are persuaded that a person of ordinary skill in the art considering Smith in light of Butt and Emma, would have understood Smith’s interruption of power to the microwave during a cooking event teaches withdrawing power from the microwave prior to the end of a set cooking time as required by limitation [1g].

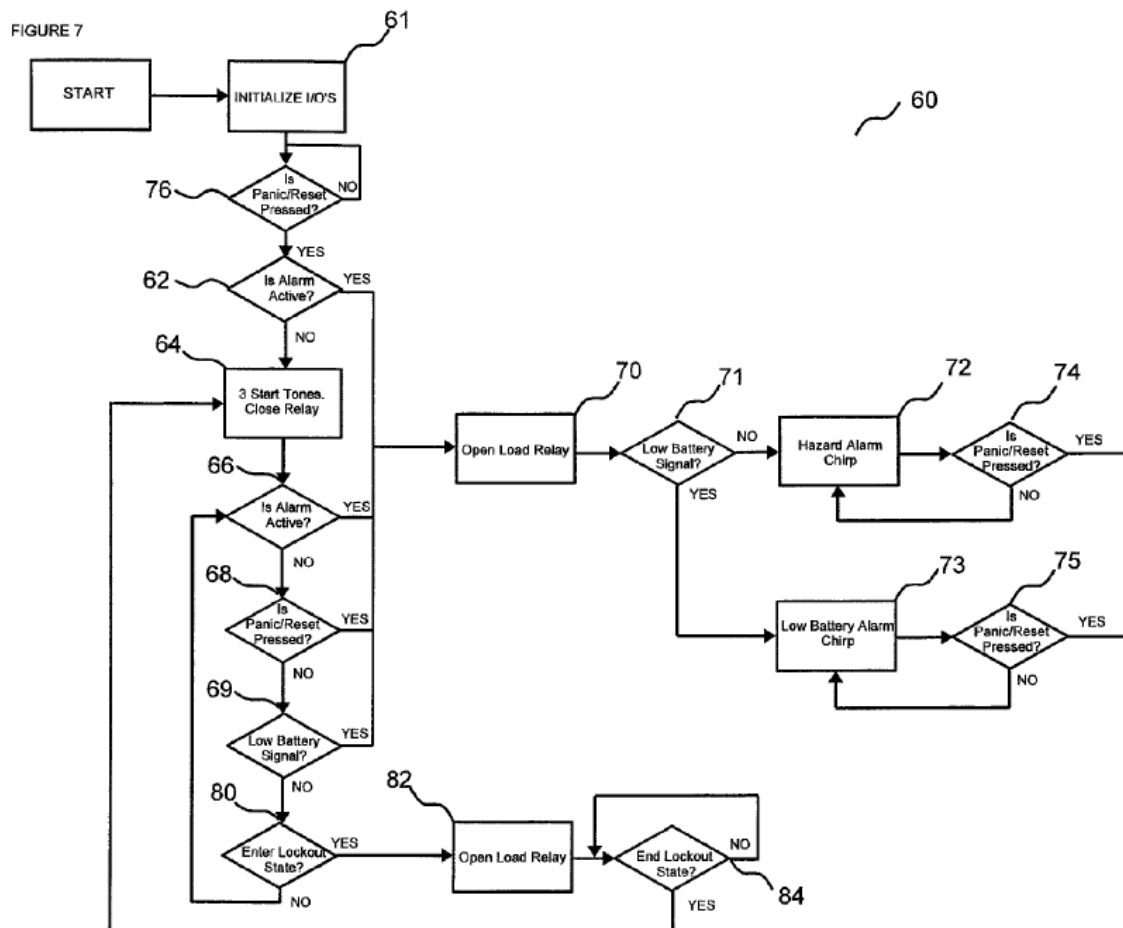
(4) *Limitation [1h] – “Reset enable function”*

Patent Owner next argues that Emma, Butt, and Smith fail to “disclose the ‘reset enable function’ element, required in independent Claims 1, 15, and 22,” namely limitation [1h]. Prelim. Resp. 42.

Petitioner argues that Butt discloses restarting the oven after any danger is over. Pet. 57–59. Butt discloses panic/reset button 12 and describes that “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.” Ex. 1015 at 3:63–67, Figs 1A–B. Petitioner’s declarant, Dr. Horenstein, testifies that a person of ordinary skill in the art “would have had no trouble in understanding that ‘danger posed by fire’ would mean that the smoke sensor had originally detected smoke; but afterwards, the appliance may be re-enabled.” Ex. 1002 ¶ 192.

Petitioner further points to Butt’s Figure 7, reproduced below, to show cooking reset functionality at block 74. Pet. 58 (citing Ex. 1015, 7:15–21).



Butt’s Figure 7 is a flow diagram illustrating an “algorithm implemented in the firmware of the microcontroller 36.” *Id.* at 6:36–37. Butt explains that if

Hazard Alarm Chirp at block 72 occurs, for example, due to smoke detection, “relay 44 remains open until the panic/reset button 12 is pressed (block 74), following which the microcontroller 36 closes the relay 44 and again enters the loop during which it waits for the smoke detector 14 to detect smoke.” Ex. 1015, 7:15–18.

On the record before us, we find persuasive Petitioner’s arguments and Dr. Horenstein’s supporting testimony that a person of ordinary skill in the art would have understood that after power has been withdrawn for safety reasons, Butt teaches a reset function enabling power to be returned to the microwave to provide “cooking power in a next subsequent cooking session,” as called for in limitation [1h].

c) Analysis and Conclusion as to Claim 1

We are persuaded that Petitioner has presented sufficient evidence and rationale showing that it is more likely than not that a person of ordinary skill in the art would have understood that Emma, Butt, and Smith, as combined, disclose each limitation of microwave and refrigerator appliance recited by the limitations of claim 1.

Considering the references themselves, along with Dr. Horenstein’s testimony, at least limitations [1pre]–[1c] and [1e] appear on this preliminary record to be components and power distribution functions of the microwave oven and control system disclosed by Emma. *See, e.g.*, Ex. 1011 ¶ 26 (Emma explaining that, in Emma’s Figure 1 “[a] single cord 8, provides input power to the system 1 from receptacle 5 through microwave 2.”). For limitation [1d], Butt discloses a smoke detector 14 used in connection with an oven, albeit not directly in “operative connection” with a cooking area inside the microwave oven. Ex. 1015, Fig. 1. However, Smith teaches a gas sensor that is in direct communication with a cooking area within a

microwave, and the '746 patent itself explains that a type of smoke sensor is a gas sensor for sensing VOCs. Ex. 1014, Fig. 2; Ex. 1001, 16:53–63. As for limitation [1g], Smith teaches withdrawing power to the microwave upon a dangerous condition being sensed. *See* Ex. 1014, Abstract (“Upon detection of the characteristic rate of change, power to the oven is turned off and indication is provided to the user that a combustion condition in the oven cavity is imminent.”). And finally, Petitioner relies upon the oven reset functionality disclosed in Butt for limitation [1h]. Pet. 57–59.

We have considered, and on the record at this point in the proceeding, for purposes of institution, find persuasive Petitioner’s arguments and evidence as set forth in the Petition. Currently, Dr. Horenstein’s testimony is unrebutted. Accordingly, we determine that Petitioner has shown it is more likely than not that the combination of Emma, Butt, and Smith disclose all the limitations and renders obvious independent claim 1.

5. *Independent claims 15 and 22*

Independent claim 15 is, like claim 1, directed to a microwave appliance including similar limitations to claim 1, adding for example, “at least one smoke sensor.” Ex. 1001, 26:36. Independent claim 22 is also directed to a microwave oven and recites similar limitations for the oven as in independent claims 1 and 15. *Id.* at 27:27–28:13. Patent Owner does not argue the independent claims separately. Prelim. Resp. 36–47.

For the same reasons as discussed above for independent claim 1, we determine that it is more likely than not that the combination of Emma, Smith, and Butt teach and disclose all the limitations of claims 15 and 22.

6. *Dependent claims 2–3, 5–6, 8–11, 13–14, 16–17, 20–21, and 23–24*

Claims 2–3, 5–6, 8–11, and 13–14 each depend directly from independent claim 1, claims 16–17 and 20–21 each depend directly from independent claim 15, and claims 23–24 each depend directly from independent claim 22. For example, each of dependent claims 13, 20, and 21 provide the limitation of “a refrigerator” in combination with, and electrically connected to, the microwave oven. *See, e.g.*, Ex. 1001, 26:18. Petitioner provides a detailed analysis of these dependent claims, as being disclosed in Emma. *See* Pet. 64 (Petitioner arguing that Emma expressly discloses, “in Figure 2, the ‘[r]efrigerator 3 is connected to microwave oven 2 by power cord 7 to refrigerator receptacle 15, shown at the rear of the microwave 2 in FIG. 2.’”) (quoting Ex. 1011 ¶ 26).

For the remainder of these dependent claims, Petitioner provides sufficient analysis for institution based on Emma, Butt, and Smith as to each of the further limitations provided in these claims. Pet. 30–56, 64–66. Patent Owner does not expressly address the dependent claims. *See, generally*, Prelim. Resp. 36–47.

Accordingly, based on the arguments and evidence on the record before us, we determine, for purposes of this Decision, that Petitioner has established that it is more likely than not dependent claims 2–3, 5–6, 8–11, 13–14, 16–17, 20–21, and 23–24 would have been obvious over Emma, Butt, and Smith.

7. *Motivation to Combine Emma, Butt, and Smith and a Reasonable Expectation of Success*

Patent Owner argues that “Petitioner has not shown a motivation to combine Butt with Emma or Emma and Smith.” Prelim. Resp. 43.

According to Patent Owner “there is no teaching in Emma that would lead a POSITA to reasonably combine Emma with a smoke sensor reference.”

Prelim. Resp. 44. We agree that Emma does not disclose a smoke sensor, but Petitioner has provided other prior art references, namely Butt and Smith, and presented several reasons, namely safety reasons, that a person of ordinary skill in the art would consider adding a smoke detector from Butt and Smith to Emma’s microwave oven. Pet. 24, 74–75. Obviousness is not determined from the perspective of the inventors or authors of a single prior art reference. Rather, obviousness is determined from the perspective of a hypothetical person having ordinary skill in the art. It is only that hypothetical person who is presumed to be aware of all pertinent prior art. *Standard Oil Co. v. American Cyanamid Co.*, 774 F.2d 448, 454 (Fed. Cir. 1985).

Petitioner argues, for instance, that Butt teaches the fire safety aspects of “a controller for interrupting a supply of electricity to an appliance upon detection of a trigger, such as [s]moke.” Pet. 24 (quoting Ex. 1015, 1:16–18). Dr. Horenstein testifies that from a safety perspective, a person of ordinary skill in the art would have “combine[d] the additional kitchen-safety appliance features of Butt with the Emma microwave/refrigerator so as to enable the Emma microwave to shut down upon the detection of smoke, and to reenable the Emma microwave for a further cooking session when the smoke had cleared.” Ex. 1023 ¶ 124. Where Butt arguably discloses a smoke detector external to an appliance, Dr. Horenstein testifies that a person of ordinary skill in the art would have looked to “Smith to include the smoke sensor *in operative connection* with the microwave oven with the reset functionality disclosed by Butt for the added benefit of reusing the microwave oven.” *Id.* ¶ 127 (emphasis added).

In addition, Dr. Horenstein testifies that “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.” *Id.* ¶ 127. Dr. Horenstein testifies further 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.* ¶ 126. Dr. Horenstein explains that

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.

Id. Moreover, Dr. Horenstein testifies that the prior art, for example, Butt, specifically recognized the need to solve the problem of fires in the home started by cooking appliances. *Id.* ¶ 128 (citing Ex. 1015, 1:22–44). Butt explains, that “[h]ome fires are a serious problem in the United States. The National Fire Protection Association reports that between the years 1999–2002, for example, there were 114,000 reported home fires associated with cooking alone.” Ex. 1015, 122–25. Similarly, Smith expressly teaches “[a] method and apparatus for anticipating the occurrence of a fire in the cooking cavity of a microwave oven.” Ex. 1014, Abstract.

As far as a reasonable expectation of success, the prior art appears to show that combination appliances, such as Emma’s combined microwave and refrigerator, are well known, and that using smoke sensors with kitchen appliances, specifically ovens (Butt) and inside microwave ovens (Smith) is

also well known to those of ordinary skill in the art. *See KSR*, 550 U.S. at 415–16 (a “patent for a combination which only unites old elements with no change in their respective functions . . . obviously withdraws what already is known into the field of its monopoly and diminishes the resources available to skillful men.”) (*quoting Great Atlantic & Pacific Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 152-153 (1950)).

The prior art combination provided here by Petitioner does not appear to be such a technological leap that a person of ordinary skill in the art would have had significant trouble adding a smoke detector to an appliance such as Emma’s combined microwave and refrigerator. Petitioner reasons persuasively that a person of ordinary skill in the art using Smith’s gas or a smoke detector located inside the microwave, “would have had a reasonable expectation of success in detecting smoke more quickly compared to attempting to detect smoke using a smoke detector positioned further away from the cooking area,” as in *Butt*. Pet. 81.

Overall, on the record before us at this early stage of the proceeding, Petitioner has shown sufficiently that it is more likely than not, that at least the limitations of independent claims 1–3, 5–6, 8–11, 13–17 and 20–24 would have been obvious over Emma, Butt, and Smith. On this record, we see no reason why the proposed modification of adding a smoke detector to a microwave oven and both stopping and resetting a cooking operation based on a detected hazardous condition is anything more than the predictable use of prior art elements according to their established functions.

8. *The Graham Factual Inquiries*

Patent Owner argues that Petitioner has not set forth the differences between the Smith and Butt references, as required under a proper *Graham* analysis, so “it is unclear what claimed subject matter Petitioner believes are

not met by Butt, or which limitations would be supplemented by Smith.” Prelim. Resp. 47. We appreciate that Petitioner does not openly acknowledge that Butt *fails* to disclose certain limitations, namely the limitation of a smoke sensor being “in operative connection” with a cooking area inside a microwave oven. Pet. 50–51. Seemingly, this is because it is relying, in Ground 3, simply on the combination of Emma and Butt. *Id.* at 12. However, it is not difficult to discern that Petitioner considers the interpretation of “operative connection” might reasonably include a smoke sensor that is outside the oven, i.e., a conventional range, as shown in Butt’s Figure 1A. In light of this, even without an express comparison of the differences between Smith and Butt, we understand that Petitioner is relying in Ground 4 on Smith, as evidence that it was well-known to put a gas, or smoke sensor, inside a microwave oven and in direct communication with the cooking area.

E. Ground 2: Emma and Smith

Patent Owner argues that neither Emma or Smith disclose “critical elements, including a smoke sensor, enabling to receiving cooking power in a next subsequent cooking session smoke sensor, which are recited in all the Challenged Claims.” Prelim. Resp. 26.

Whereas in Grounds 3 and 4 Petitioner relies on Butt for the “smoke sensor” and “reset” function recited in independent claim 1, in Ground 2, Petitioner argues that a person of ordinary skill in the art would have understood that Smith’s gas sensor is equivalent to a smoke sensor. *See* Pet. 48 (“Smith discloses a gas sensor (i.e., ‘smoke sensor’) positioned in operative connection with a cooking area inside a microwave oven.”). In addition, Petitioner argues that Smith’s electrical circuit withdraws power upon sensing a dangerous condition, and then, apparently, can reset the

microwave using “microcontroller 64 to cycle power to the microwave magnetron . . . by sending digital signals to a control the position of a relay in line with the magnetron power supply.” *Id.* at 59 (citing Ex. 1002 ¶¶ 196–97, 289). Petitioner argues further that “it would have been obvious to modify Smith and/or the Smith/Emma combination to reset the microwave oven after a smoke-based shutdown to enable the microwave/magnetron to receive cooking power in a next subsequent cooking session.” *Id.* at 72–73 (citing Ex 1023 ¶ 257).

Because we institute on other grounds on this record, we need not make a determination at this point regarding whether Petitioner has met its burden to show that the combination of Emma and Smith renders the claims of the ’746 patent obvious.

F. Grounds 1 and 5–8

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. 12–13. 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).

Patent Owner argues that neither Petitioner nor Dr. Horenstein have shown sufficiently that ISDU is publicly accessible such that the reference qualifies as a printed publication. Prelim. Resp. 6–13. Patent Owner argues specifically that Dr. Horenstein’s testimony is insufficient and “Petitioner

does not rely on anyone with first-hand knowledge of ISDU's public accessibility." *Id.* at 7. Patent Owner argues that "the date listed on ISDU itself does not establish when the reference became publicly accessible." *Id.* at 8 (citing *In re Bayer*, 568 F.2d 1357, 1361 (C.C.P.A. 1978)). Patent Owner contends that because ISDU is a student project paper, it is just as likely "that April 17, 2007, was the date the paper was submitted for a class." *Id.*

What we have at this point with respect to ISDU is mainly: (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. At the outset, it is clear that Dr. Horenstein's testimony is *not* first-hand knowledge regarding the IRis digital archive or how and when paper submission and publication generally occurred. *Id.* And, it is unclear 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 submission date, or otherwise.

We note that the "Recommended Citation" on the cover page includes the date of 2007, and it might not be unreasonable 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, we have no corroborating testimony from a person with first-hand knowledge of how, or when, papers were

catalogued, indexed, or by what search methods they could be found within IRis.

On the record at this point, the evidence may, or may not, support a finding that ISDU is a publicly accessible printed publication. We point out 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). Because we institute on other grounds, we undertake no further analysis nor make a determination on this record, regarding whether ISDU is a printed publication that was publicly available before the critical date of the ’746 patent.

G. Ground 9: Indefiniteness

Petitioner contends that claims 1–24 are indefinite, specifically because independent claims 1, 15, and 22 recite a “smoke sensor . . . positioned in *operative connection* with a cooking area.” Pet. 87, *see also*, e.g., Ex. 1001, 24:31–32 (emphasis added). Petitioner argues that “the claim language does not provide any indication of what it means for a smoke sensor to be in ‘operative connection’ with an area.” *Id.*

Simply reading the claims, we do not find that this limitation would be particularly unclear to a person of ordinary skill in the art. Claim 1 recites “a smoke sensor, wherein the smoke sensor is positioned in operative connection with a cooking area.” Ex. 1001, 24:31–32. Interestingly, here in the ’746 patent, this limitation is missing the “inside the microwave oven,” language found in the claims of the related ’745 patent. *See* US Patent No. 11,674,745, 24:53–54 (“wherein the smoke sensor is positioned in operative

connection with a cooking area *inside the microwave oven.*”) (emphasis added). While it could be that this language in the ’746 patent is intended to be broader than in the ’745 patent, to be consistent we need to consider “operative connection,” as meaning the same thing in both cases.

Accordingly, the following analysis mirrors our decision with respect to the ’745 patent. *See NTP Inc., v. Research in Motion, Ltd.*, 418 F.3d 1282, 1293 (Fed. Cir. 2005) (When construing claims in patents that derive from the same parent application and share common terms, “we must interpret the claims consistently across all asserted patents.”).

It is not entirely clear, specifically in the ’746 patent claims, that the smoke sensor must be within, i.e., “inside” the interior cooking area of the microwave or, in a connecting air passage or region connected to the interior cooking area. For example, without context, the claims could be understood to include a smoke sensor that is outside the microwave oven, perhaps nearby in the room or kitchen, wherever the microwave is located. However, on the early record in this proceeding, our understanding is informed by the specification of the ’746 patent explaining that

[i]n some exemplary arrangements such VOC sensors may be positioned to sense air in at least a portion of the microwave cooking area. In some cases 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. Such an arrangement may have an advantage in that positioning the sensor in the air passage may minimize the amount of cooking splatter and other contamination from the food cooked in the microwave oven that reaches the sensor.

Id. at 16:57–67. Other embodiments described in the specification confirm our understanding, for example, in the case of an alcohol sensor

[w]hen a set level of heating is sensed by the thermistor 228, the thermistor 228 through suitable control circuitry causes the

alcohol sensor 226 to turn on and become operational and check for properties of the gas *within the interior area* of the microwave.

Id. at 14:27–33. In other words, reading the claims in light of the specification, reveals that “operative connection” appears to mean that the smoke sensor is either within, i.e., “inside” the interior cooking area of the microwave or, in a connecting air passage or interior region of the microwave oven connected to the interior cooking area. Indeed, this makes sense because a microwave oven is only turned on to cook food when the door is shut and mostly sealed from the outside environment. A person of ordinary skill in the art, reading the specification and claims of the ’746 patent, would undoubtedly understand that a smoke sensor *inside* the microwave oven, as opposed to outside, would be more likely to provide accurate detection of smoke or fire during a cooking operation.

We do not make a final determination or undertake a complete indefiniteness analysis at this time, but leave this matter for further development at trial.

H. Grounds 10 and 11: Indefiniteness and Written Description

Considering Ground 10, Petitioner contends that the phrase “sensing the level of smoke continuously,” in dependent claim 10 is indefinite because it is unclear if this “require[s] the control circuit to sense the level of smoke uninterrupted without any process devoted to any other action?” Pet. 89 (citing Ex. 1023 ¶ 267). Petitioner argues that there is no explanation in the written description as to what this phrase means or how such continuous sensing is accomplished. *Id.*

As for Ground 11, claim 14 includes the limitation “wherein the at least one power control circuit is operative to cause electrical power to be

unavailable to the at least one electrical connector while the magnetron is operative and *for at least a preset minimum period after the magnetron becomes inoperative.*” Ex. 1001, 26–30 (emphasis added). Petitioner argues that claim 14 lacks written description support because the specification fails to “discuss causing electrical power to be unavailable to the at least one electrical connector (e.g., the refrigerator), for a preset minimum period after the magnetron becomes inoperative, that is after cooking/cooking power ceases.” Pet. 90.

Patent Owner argues that neither phrase in the dependent claims is indefinite, nor lacking in written description, asserting as to claim 14 for example, that the specification clearly discloses withdrawing power from the refrigerator compressor “for a preset minimum period.” Prelim. Resp. 53 (quoting Ex. 1001, 6:43–51). We appreciate that the specification discloses disabling the compressor for a present time, but it is not entirely clear that the present time delay is determined relative to when the magnetron becomes inoperative, as claim 14 appears to require.

With respect to claim 10, it appears that the phrase “sensing the level of smoke continuously for a predetermined time” could mean that there is a time domain within which some level of smoke or gas is sensed that would trigger ending the cooking session. *See* Ex. 1001, 25:52–57, *see also, id.* at 17:36–38 (“Combinations of absolute and relative values and rates of change thereof may be detected for purposes of evaluating possible alarm conditions.”).

In any event, because we institute on other grounds, we undertake no further analysis nor make a determination on this early record, regarding whether claims 10 and 14 are indefinite or unsupported by sufficient written description.

III. CONCLUSION

On this record, Petitioner demonstrates that it is more likely than not that the combination of Emma, Butt, and Smith, renders obvious at least claims 1–3, 5–6, 8–11, 13–17 and 20–24 of the ’746 patent. That said, a full analysis of Petitioner’s obviousness challenges based on Emma and Smith, as well as the challenges based on Emma and ISDU, Smith, and Quezada, as well as indefiniteness, enablement and written description, are best left for trial after full development of the record. 37 C.F.R. § 42.108(c); *SAS Inst. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018); *see also PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (“Equal treatment of claims and grounds for institution purposes has pervasive support in *SAS*.”). We therefore institute trial on all claims and all challenges included in the Petition.

Our determination in this Decision is not a final determination on the patentability of the challenged claims and, thus, leaves undecided any factual issues necessary to determine whether sufficient evidence supports Petitioner’s contentions by a preponderance of the evidence in the final written decision. *See TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016) (noting in the context of an *inter partes* review that “there is a significant difference between a petitioner’s burden to establish a ‘reasonable likelihood of success’ at institution, and actually proving invalidity by a preponderance of the evidence at trial”) (quoting 35 U.S.C. § 314(a) and comparing § 316(e)).

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 324(a), post-grant review is instituted as to all of the challenged claims, i.e., claims 1–24 of the '746 patent, on all of the grounds of unpatentability set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 324(c) and (d), and 37 C.F.R. § 42.4(b), notice is hereby given of the institution of a trial on the grounds of unpatentability authorized above; the trial commences on the entry date of this Decision.

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