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Title: REFRIGERATION UNIT CONDENSATION
PREVENTION

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**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 7,207,181 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42**

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LIST OF EXHIBITS

EX1001	U.S. Patent No. 7,207,181
EX1002	U.S. Patent No. 7,207,181 File History
EX1003	Declaration of Dr. Gregor P. Henze
EX1004	U.S. Patent No. 7,137,262 (Carter)
EX1005	U.S. Patent No. 6,422,062 (King)
EX1006	U.S. Patent No. 5,778,689 (Beatenbough)
EX1007	U.S. Patent No. 6,502,409 (Gatling)
EX1008	U.S. Patent No. 5,396,796 (Kotani)
EX1009	U.S. Publication No. 2005/0172649
EX1010	U.S. Prov. Appl. No. 60/569,581
EX1011	U.S. Prov. Appl. No. 60/559,113
EX1012	U.S. Patent No. 3,939,666
EX1013	U.S. Patent No. 3,696,360
EX1014	U.S. Publication No. 2005/0007136
EX1015	ACT2-CS Convenience Store Controller, Johnson Controls (1999)
EX1016	U.S. Patent No. 4,260,876
EX1017	CPC Products, Computer Process Controls (Sept. 1, 2004), https://web.archive.org/web/20040901092452/http://www.cpcus.com/products.htm

- EX1018 Altech Controls XPRT Eagle Controls Manual (Section A-B)
- EX1019 Altech Controls XPRT Eagle Controls Manual (Section C)
- EX1020 Sensirion, SHT1x/SHT7x Humidity & Temperature Sensor (revised May 2005).
- EX1021 Altech Controls AASC Anti-Sweat Heater Controller
- EX1022 Anthony Engineering Change Notice—Engineering Drawings for Altech Controls AASC Control Assembly and Altech Controls Sensors
- EX1023 Steven J. Slayzak & Joseph P. Ryan, Instrument Uncertainty Effect on Calculation of Absolute Humidity Using Dewpoint, Wet-Bulb, and Relative Humidity Sensors (National Renewable Energy Laboratory) 1998
- EX1024 David H. Walker et al., Investigation of Energy-Efficient Supermarket Display Cases, Oak Ridge National Laboratory (Dec. 2004)
- EX1025 P.H.J. van Eijk, Verifying Relay Circuits using State Machines (Utrecht University, Department of Philosophy) (1997)
- EX1026 Robert P. Benedict, P.E., Fundamentals of Temperature, Pressure, and Flow Measurements (3d ed. 1984)
- EX1027 Contemporary Control Systems Inc., Introduction to Control, Vol. 2. Issue 2 (2001)
- EX1028 Shivakumar Raman & Paul H. Cohen, Remote sensing for on-line temperature estimation in machining: A basic framework, 38 J. of Materials Processing Tech. 613 (1993)
- EX1029 U.S. Publication No. 2004/0050072
- EX1030 Sensirion, SHTxx Humidity & Temperature Sensmitter, Application Note Dew-point Calculation (revised January 2005)

- EX1031 ASHRAE Psychometric Chart No. 1 (1992)
- EX1032 Low Cost Humidity Sensor SHT10, Sensirion (Mar. 12, 2006),
https://web.archive.org/web/20060312033617/http://www.sensirion.com/en/02_sensors/00_products.htm?cat=3&category=&art=11&product=humidity%20sensor%20SHT10
- EX1033 Larry D. Wittie, Microprocessors and Microcomputers (Encyclopedia of Computer Science) (2003)
- EX1034 Ramin Faramarzi, P.E. et al., Anti-Sweat Heaters in Refrigerated Display Cases, ASHRAE J. 64 (2001)
- EX1035 U.S. Publication No. 2007/0130968
- EX1036 U.S. Patent No. 5,369,753
- EX1037 Complaint (Document 1), *ControlTec, LLC v. Anthony, Inc. et al.* 1:24-cv-00883 (DDE)
- EX1038 Stipulation and [Proposed] Order to Stay Proceedings (Document 20), *ControlTec, LLC v. Anthony, Inc. et al.* 1:24-cv-00883 (DDE)
- EX1039 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2002 ASHRAE Handbook: Refrigeration (excerpt)
- EX1040 U.S. Patent No. 5,778,147
- EX1041 U.S. Patent No. 3,859,502
- EX1042 U.S. Patent No. 4,862,701

LISTING OF CHALLENGED CLAIMS

Claim 1	
[1.pre]	Condensation control apparatus for a refrigerated display case having at least one door, a frame and at least one frame/door heater, said apparatus comprising:
[1.a]	a frame temperature sensing unit adapted for monitoring temperature of one of the display case door or display case frame and including a carrier having a temperature sensor thereat;
[1.b]	a dew point sensing unit adapted for monitoring ambient air temperature and relative humidity outside of the display case and including a carrier having at least one dew point sensing component thereat;
[1.c]	a control unit communicating with said sensing units and including processing means connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a preselected set point above a dew point value derived from monitored ambient temperature and relative humidity; and
[1.d]	housing means for locating said sensing units including structure establishing thermal isolation of said sensing units by minimizing heat transfer contacts between said sensing units and said housing means and locating said temperature sensor and said at least one dew point sensing component amid insulated air pockets formed by said structure of said housing means.

Claim 2	
[2]	The apparatus of claim 1 wherein said housing means includes a frame temperature sensing unit housing, said frame temperature sensing unit housing including a base and a cover, said cover having a depth creating a first one of said air pockets at one side of said temperature sensing unit and said base including an opening for receiving said temperature sensor therethrough, said opening having an opening area greater than surface area of said temperature sensor thus establishing a second one of said air pockets around said temperature sensor.

Claim 3	
[3]	The apparatus of claim 2 wherein said frame temperature sensing unit housing includes a single locating post at said cover for securing position of said temperature sensing unit relative to said cover.

Claim 4	
[4]	The apparatus of claim 1 wherein said housing means includes a dew point sensing unit housing, said dew point sensing unit housing including a mounting base and cover, said cover including a cover face opening therethrough for receiving said at least one dew point sensing component therein, said cover face opening including a protective shield thereover having air gaps therearound allowing air flow between said protective shield and said cover and thus over said at least one dew point sensing component.

Claim 5	
[5]	The apparatus of claim 4 wherein said cover of said dew point sensing unit housing includes opposite end openings to establish ambient air flow through said dew point sensing unit housing.

Claim 6	
[6]	The apparatus of claim 4 wherein said mounting base of said dew point sensing unit housing includes protrusions establishing retaining pockets receiving said carrier of said dew point sensing unit at outer edges of said carrier and further establishing a first one of said air pockets amid said protrusions and adjacent to said carrier.

Claim 7	
[7]	The apparatus of claim 1 wherein said housing means includes a cover and a base, said cover including a cover face opening therethrough for receiving said at least one dew point sensing component therein, said cover face opening including a protective shield thereover having air gaps therearound allowing air flow between said protective shield and said cover and thus over said at least one dew point sensing component, and said base having depth creating a first one of said air pockets at least at one side of said temperature sensing unit and a second one of said air pockets at one side of said dew point sensing unit.

Claim 8	
[8.pre]	A system for condensation control at an array of refrigerated display cases, the cases each having at least one door, a frame and at least one frame/door heater, said system comprising:
[8.a]	sensing and control apparatus configured for location at each display case in the array of display cases,
[8.b]	said apparatus including a frame temperature sensing unit adapted for mounting at the display case for monitoring temperature of one of the display case door or display case frame,

[8.c]	[said apparatus including...] a dew point sensing unit adapted for mounting at the display case for monitoring ambient air temperature and relative humidity outside of the display case,
[8.d]	[said apparatus including...] an internal case temperature sensing unit positionable inside the display case, and
[8.e.i]	[said apparatus including...] processing means mountable at the display case and connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a first preselected set point above a dew point value derived from monitored ambient temperature and relative humidity, for deactivating the frame/door heater when monitored display case door or frame temperature rises above a second preselected set point above said dew point value, and
[8.e.ii]	[processing means...connected...] for storing data related to readings at said sensing units and operation of the frame/door heater; and
[8.f]	a communication control unit associated with said processing means for coordinating programming and data download access to said processing means of said apparatus.

Claim 9

[9]	The system of claim 8 further comprising a central processing unit and wherein said communication control unit includes a transmitter/receiver for wireless communication with said central processing unit.
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Claim 10

[10]	The system of claim 8 wherein said processing means of said apparatus is separately housed in a housing having dimensions selected so that said housing is mountable between standard door frame mullions provided at the display case.
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Claim 11	
[11]	The system of claim 8 wherein said processing means of said apparatus includes a reset/programming interface.

Claim 12	
[12]	The system of claim 8 wherein said frame temperature sensing unit and said dew point sensing unit are mounted together in a housing.

Claim 13	
[13]	The system of claim 8 further comprising housing means for locating said temperature sensing unit and said dew point sensing unit and including structure establishing thermal isolation of said sensing units by minimizing heat transfer contacts between said temperature sensing unit and said dew point sensing unit and said housing means and locating said temperature sensing unit and said dew point sensing unit amid insulating air pockets formed by said structure of said housing means.

Claim 14	
[14.pre]	A system for condensation control at a refrigerated display case having at least one door, a frame and at least one frame/door heater, said system comprising:
[14.a]	a temperature sensing unit in contact with the display case frame to monitor case frame temperature;
[14.b]	a dew point sensing unit on the display case to monitor ambient air temperature and relative humidity outside the display case; and

[14.c]	control means for receiving data from said sensing units and utilizing monitored case frame temperature, ambient air temperature and relative humidity to anticipate formation of condensation at the display case and activating and deactivating the frame/door heater responsive thereto.
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Claim 15

[15]	The system of claim 14 further comprising means for thermally isolating said dew point sensing unit from variations in temperature of the display case frame or display case door.
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Claim 16

[16]	The system of claim 14 further comprising means for thermally isolating said temperature sensing unit from variations in temperature of ambient air.
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Claim 17

[17]	The system of claim 14 further comprising an internal case temperature sensing unit mounted inside the display case and communicating with said control means for monitoring internal case temperature.
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Claim 18

[18]	The system of claim 17 further comprising data storing means communicating with said control means for storing data related to readings at said sensing units and operation of the frame/door heater.
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Claim 19	
[19]	The system of claim 18 further comprising means for wirelessly accessing stored data at said data storing means.

Claim 20	
[20]	The system of claim 14 wherein said means for wirelessly accessing data is configured for remotely updating control parameters at said control means utilized for monitoring case frame temperature, ambient air temperature and relative humidity to anticipate formation of condensation at the display case and activating and deactivating the frame/door heater.

CONVENTIONS OF THE PETITION

- All emphasis is added unless noted otherwise;
- Bold-italic emphasis correlates to claim language;
- Quotations are generally from exhibits, not claim language; and
- The phrase “as discussed” and equivalent phrases incorporate fully the analysis of the cross-cited portion of the Petition.

Anthony Inc. (“Petitioner”) petitions for IPR of Claims 1–20 (“Challenged Claims”) of U.S. Patent No. 7,207,181 (“the ’181 patent”) based on the compelling evidence of obviousness presented throughout this Petition.

I. REQUIREMENTS FOR IPR—37 C.F.R. §42.104

A. Grounds for Standing—37 C.F.R. §42.104(a)

The ’181 patent is available for IPR, and Petitioner is not barred or estopped.

B. Challenge and Relief Requested—37 C.F.R. §42.104(b)

Petitioner requests IPR of the Challenged Claims on the grounds below.

ID	Claims	Basis for Rejection
1A	1–2, 14–18	§103: Carter (US 7,137,262)
1B	1–7, 14–18	§103: Carter, Beatenbough (US 5,778,689), King (US 6,422,062)
1C	17–20	§103: Carter, Beatenbough, King, Gatling (US 6,502,409)
1D	1–6	§103: Carter, Beatenbough, Kotani (US 5,396,796)
1E	8–13	§103: Carter, Beatenbough, Gatling

Each of these references pre-dates the ’181 patent’s filing date of March 1, 2005.

Reference	Prior Art Date	Status
Carter [EX1004]	Filed December 5, 2003	§102(e)
King [EX1005]	Issued July 23, 2002	§102(b)
Beatenbough [EX1006]	Issued July 14, 1998	§102(b)
Gatling [EX1007]	Issued January 7, 2003	§102(b)
Kotani [EX1008]	Issued March 14, 1995	§102(b)

II. THE '181 PATENT

A. Pertinent Disclosure

The '181 patent aims to use “frame and/or door heating” for “remediat[ing] condensation build-up in refrigerated display cases” and, to that end, “relates to...devices and methods for activation and deactivation of such heating.” EX1001, 1:6–10; EX1003, ¶¶26–30. Figure 1 illustrates “a common commercial freezer/cooler display unit 21 including a display container 23 having a frame [27]...and doors 25.” EX1001, 5:14–20. The display unit 21 further includes “a local controller unit 31” connected to an array of sensors—e.g., “external case frame temperature sensor 35 and dew point sensor 37.” EX1001, 5:14–27.

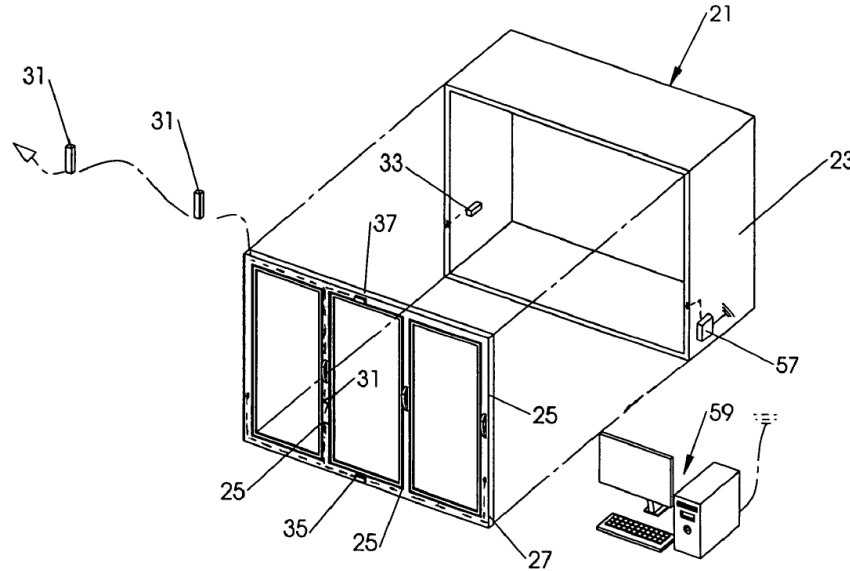


FIGURE 1

EX1001, Figure 1.

The local controller unit 31 utilizes inputs from sensors 35, 37 to derive a dew point value and activate door/frame heaters using a relay 43 when “the frame temperature approaches the dew point.” EX1001, 8:29–45, 8:53–9:3.

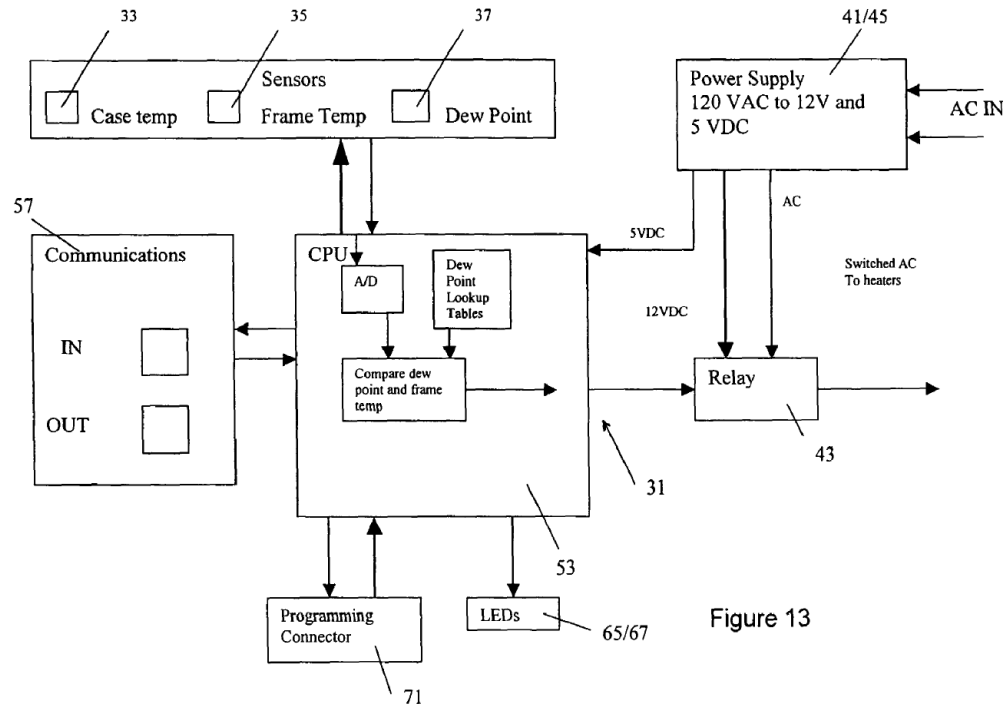


Figure 13

EX1001, Figure 13.

B. Prosecution History

On March 1, 2005, the Applicant filed the '181 patent as U.S. Appl. No. 11/069,378. EX1002, pp.79–145. The Examiner issued an Office Action subjecting original claims 1–20 to a restriction requirement. *Id.*, pp.70–74. The Applicant responded, selecting claims 1–13 for examination, canceling claims 14–20, and adding new claims 21–27. *Id.*, pp.26–37. One month later, the Examiner issued a Notice of Allowance. *Id.*, pp.10–21; *see also* pp.7–9.

III. LEVEL OF ORDINARY SKILL

The qualifications for a POSITA would have included a bachelor's degree in mechanical engineering, electrical engineering, or a comparable field and at least three to five years of experience related to heating, ventilating, air conditioning, and refrigeration (HVAC&R) systems. EX1003, ¶¶31–32. As Petitioner's Dr. Henze explains, a POSITA would have possessed pertinent background knowledge and understanding of the technologies employed by the '181 patent. EX1003, ¶¶33–55.

IV. CLAIM CONSTRUCTION—37 C.F.R. §42.104(b)(3)

Below, Petitioner identifies the specific portions of the '181 patent's specification that describe the corresponding structures for various means-plus-function claim terms. Claim terms not addressed below should be construed according to their ordinary meaning in view of the specification.

A. “Processing means connected for activating...” (Element[1.c])

Claimed Function: “[A]ctivating the display case frame/door heater when monitored display case door or frame temperature drops below a preselected set point above a dew point value derived from monitored ambient temperature and relative humidity.”

Corresponding Structure: A “microprocessor” executing the three-step algorithm of: [1] Discounting frame temperature by a preselected set point; [2] Determining if the discounted frame temperature is below a dew point value derived

from ambient temperature and relative humidity; and [3] Turning on a heater relay if the discounted frame temperature is below the dew point value. *See* EX1001, 5:34–50 (microprocessor 53), 8:29–45, 8:63–9:5 (algorithm), Figure 13, Figure 14b; *EON Corp. IP Holdings LLC v. AT&T Mobility LLC*, 785 F.3d 616, 621 (Fed. Cir. 2015) (“the corresponding structure...is the algorithm”).

B. “Housing means for locating...” (Element[1.d])

Claimed Function: “[L]ocating said sensing units.”

Corresponding Structure: The corresponding structure for the claimed “means” is set forth in the surrounding claim language, which expressly calls for a “housing” with “structure establishing thermal isolation of said sensing units by minimizing heat transfer contacts between said sensing units and said housing means and locating said temperature sensor and said at least one dew point sensing component amid insulated air pockets formed by said structure of said housing means.” *Cf. TI Grp. Auto. Sys. (N. Am.), Inc. v. VDO N. Am., L.L.C.*, 375 F.3d 1126, 1135 (Fed. Cir. 2004) (finding 112(6) “not invoked” where “[t]he claim limitation at issue recites not only a pumping means, but its structure...”); *Cole v. Kimberly-Clark Corp.*, 102 F.3d 524, 531 (Fed. Cir. 1996) (similar).

Alternatively, if the “means” of Element[1.d] is interpreted under 112(6), the corresponding structure in the ’181 patent’s specification constitutes: A “base” and a “cover” that, when mated together, establish the claimed insulated air pockets. *See*

EX1001, 6:32–7:10, Figures 3–6 (frame/door surface temperature sensor housing 83 including cover 85 and base 87 establishing air pockets 105 and 107), 7:11–62, Figures 7–9 (dew point sensor housing 115 including cover 117 and base 119 establishing air pocket 155), 8:11–28, Figures 10–12 (a single housing 115 “utilized to house both sensors”).

C. “Processing means...connected for activating...for deactivating...and for storing” (Elements[8.e.i]–[8.e.ii])

Claimed Function:

- “[A]ctivating the display case frame/door heater when monitored display case door or frame temperature drops below a first preselected set point above a dew point value derived from monitored ambient temperature and relative humidity”;
- “[D]eactivating the frame/door heater when monitored display case door or frame temperature rises above a second preselected set point above said dew point value”; and
- “[S]toring data related to readings at said sensing units and operation of the frame/door heater.”

Corresponding Structure:

- Activating Structure: *Supra*, §IV.A (materially the same claim language).

- Deactivating Structure: A “microprocessor” executing the three-step algorithm of: [1] Discounting frame temperature by a preselected set point; [2] Determining if the discounted frame temperature is above a dew point value derived from ambient temperature and relative humidity; and [3] Turning off a heater relay if the discounted frame temperature is above the dew point value. *See* EX1001, 5:34–50 (microprocessor 53), 8:29–45, 8:63–9:5 (algorithm), Figure 13, Figure 14b (similar).
- Storing Structure: A “processor” or “microprocessor.” *See* EX1001, 2:59–63 (“The processor stores data related to readings at the sensing units and operation of the frame/door heater...”), 5:34–45 (“microprocessor 53”), 8:29–45, 8:63–9:11 (“Microprocessor 53 looks up the dew point value from a stored table...”), Figure 13, Figure 14b; *In re Katz Interactive Call Processing Patent Litigation*, 639 F.3d 1303, 1316 (Fed. Cir. 2011) (a patent need not disclose anything beyond “the general purpose processor” for basic functions like “storing” data).

D. “Housing means for locating...” (Element[13])

Supra, §VI.B (materially the same claim language).

E. “Control means for receiving data...and [for] activating and deactivating” (Element[14.c])

Claimed Function:

- “[R]eceiving data from said sensing units and utilizing monitored case frame temperature, ambient air temperature and relative humidity to anticipate formation of condensation at the display case”; and
- [A]ctivating and deactivating the frame/door heater responsive thereto.”

Corresponding Structure:

- Receiving Structure: A “microprocessor.” *See* EX1001, 5:34–45 (“microprocessor 53” includes “frame temperature sensor and dew point sensor connectors”), 8:29–45 (“Sensors 33 and 35 inputs are...input to the central processing unit microprocessor 53...”), 8:63–9:11 (microprocessor 53 uses “[i]nput from monitored dew point sensor 37 and frame temperature sensor 35”), Figure 13, Figure 14b; *In re Katz*, 639 F.3d at 1316 (a patent need not disclose anything beyond “the general purpose processor” for basic functions like “receiving” data).
- Activating Structure: *Supra*, §IV.A (articulating three-step heater activation algorithm).

- Deactivating Structure: *Supra*, §IV.C (articulating three-step heater deactivation algorithm).

F. “Means for thermally isolating said dew point sensing unit...” (Element[15])

Claimed Function: “[T]hermally isolating said dew point sensing unit from variations in temperature of the display case frame or display case door.”

Corresponding Structure: A “housing” having a base and a cover that, when mated together, establish an air pocket around the dew point sensing unit. *See* EX1001, 7:11–62, Figures 7–9 (dew point sensor housing 115 including cover 117 and base 119 establishing air pocket 155), 8:11–28, Figures 10–12 (a single housing 115 “utilized to house both sensors”); *supra* §IV.B.

G. “Means for thermally isolating said temperature sensing unit...” (Element[16])

Claimed Function: “[T]hermally isolating said temperature sensing unit from variations in temperature of ambient air.”

Corresponding Structure: A “housing” having a base and a cover that, when mated together, establish an air pocket around the temperature sensing unit. *See* EX1001, 6:32–7:10, Figures 3–6 (frame/door surface temperature sensor housing 83 including cover 85 and base 87 establishing air pockets 105 and 107), Figures 10–12 (a single housing 115 “utilized to house both sensors”); *supra* §IV.B.

H. “Data storing means...for storing data...” (Element[18])

Claimed Function: “[S]toring data related to readings at said sensing units and operation of the frame/door heater.”

Corresponding Structure: *Supra*, §IV.C (materially the same claim language).

I. “Means for wirelessly accessing...” (Element[19])

Claimed Function: “[W]irelessly accessing stored data at said data storing means.”

Corresponding Structure: A “communication board/transmitter/receiver.”

See EX1001, 5:33–6:8, 9:10–14.

V. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. GROUND 1A: Claims 1–2, 14–18 Are Obvious Over Carter

1. Carter (EX1004)

Like the ’181 patent, Carter relates to the “control of heating functions” in refrigeration or freezer equipment for the purpose of “prevent[ing] condensation from forming.” EX1004, 1:7–11, Abstract; EX1003, ¶¶76–78.¹ As shown in Figure 1 (below), Carter’s refrigeration equipment 10 includes “a door having an installed door latch assembly 14” in addition to “a control unit 28, a switching unit 30, a sensor assembly unit 32, and a heating unit 34.” EX1004, 3:54–67, 4:36–43.

¹ General descriptions of asserted references and combinations are incorporated into each claim element analysis that includes citations to these references/combinations.

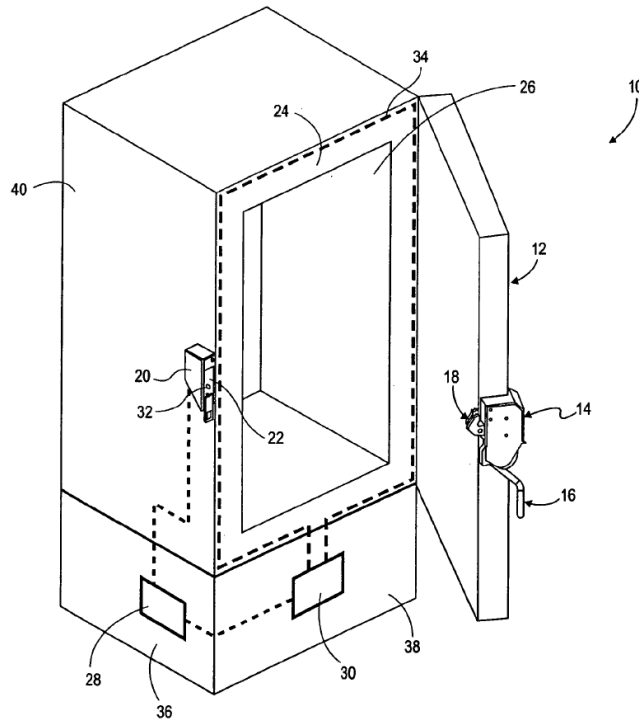


FIG. 1

EX1004, Figure 1. As the '181 patent concedes was known, Carter teaches that readings from the sensor assembly unit are used to compare a surface temperature of the refrigeration equipment to a dew point value and “determine whether it is necessary to supply supplemental heat” to prevent condensation. EX1004, 5:15–20, 7:7–9; *see also* 4:44–61, 5:21–63, Figure 3.

2. Claim Element Analysis

(a) Claim 1

Element[1.pre]: Condensation control apparatus...

Carter renders obvious Element[1.pre]. EX1003, ¶¶79–81. Carter describes an “*apparatus* that provides supplemental heat from a heat source based upon the operating environment of a *refrigerat[or]* or freezer,” where “[t]he supplemental

heat is automatically *controlled* to provide heating to a sealing area to prevent *condensation* from forming.” EX1004, Abstract; *see also* 1:1–11, 2:22–31, 2:35–43, 3:40–53, 4:44–55, 6:30–49. Carter’s Figure 1 illustrates exemplary “*refrigerator* or freezer equipment 10” in the form of a *case* with “a *door* 12 having an installed door latch assembly 14 attached thereto” and “a sealing surface 24...[that] serve[s] to retain and maintain an operating temperature within a compartment chamber 26.” EX1004, 3:54–4:2; EX1003, ¶80.

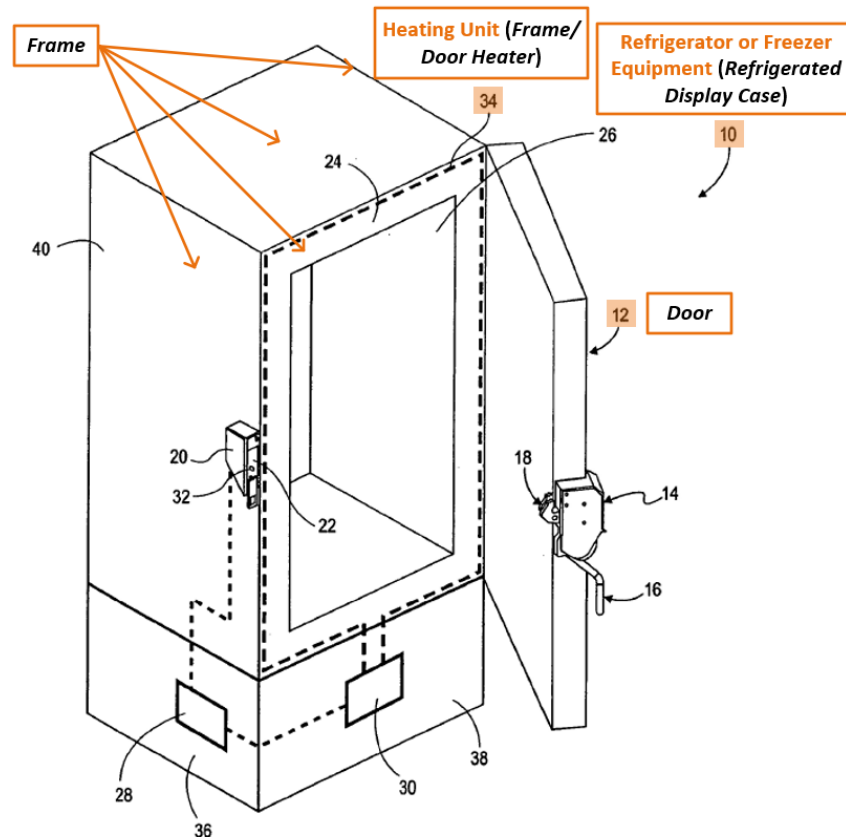


FIG. 1

EX1004, Figure 1 (annotated).

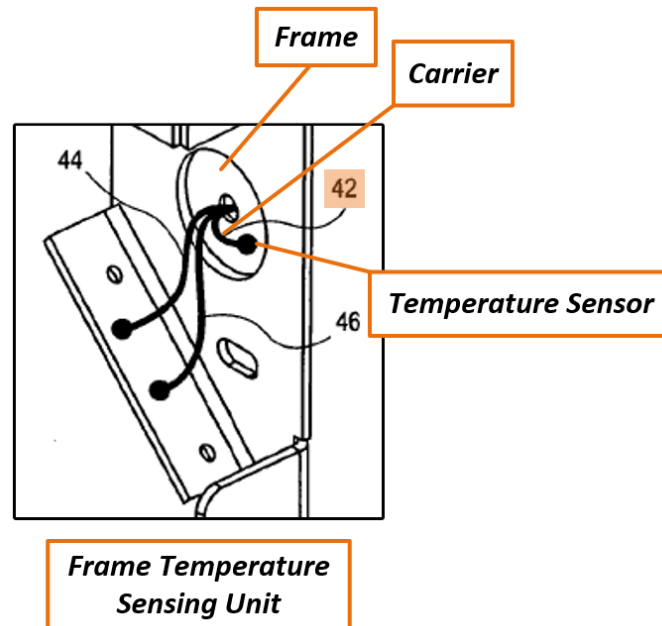
The sealing surface 24 is part of a *frame* against which the door 12 seals when held shut by the door latch assembly 14. EX1004, 3:54–4:2; EX1003, ¶80. A (*frame/door*) “*heating* unit 34” “traverses” this portion of the frame, “providing supplement[al] heat generally to the sealing surface area” of both the frame and door, such that “the effects of condensation can be...prevented.” EX1004, 4:36–67.

Carter explains that the above-discussed *refrigerated case* can be used for “housing specimens requiring subjection to certain operating temperatures for one of a variety of reasons,” such as “to ensure that it doesn’t spoil.” EX1004, 4:3–12. A POSITA would have been motivated to apply Carter’s *apparatus* to the well-known use case of *refrigerated display cases* that store retail food items in an environment where “undesirable condensation can occur.” EX1003, ¶81 (quoting EX1004, 1:15–2:32), ¶¶34–41. Just as *condensation control apparatus* were desirable in the context of refrigerated cases for specimens, they were also sought by skilled artisans for refrigerated cases used to display food items. *Id.*

Element[1.a]: a frame temperature sensing unit...

Carter renders obvious Element[1.a]. EX1003, ¶¶82–84. Carter describes a “sensor assembly unit 32 [that] is composed of a surface *temperature sensor* 42, an ambient temperature sensor 44, and an ambient relative humidity sensor 46.” EX1004, 5:1–20; *see also* 4:36–43. Using surface *temperature sensor* 42, sensor assembly unit 32 *monitors* a “surface *temperature* of the refrigerator or freezer

equipment 10” (*display case*). EX1004, 5:31–40, Figure 3; *see also* 3:42–46, 4:17–22. As shown below in Figure 2, Carter’s illustrated embodiment portrays surface temperature sensor 42 placed against—and, thus, *monitoring the temperature of*—the display case *frame*. EX1003, ¶83.

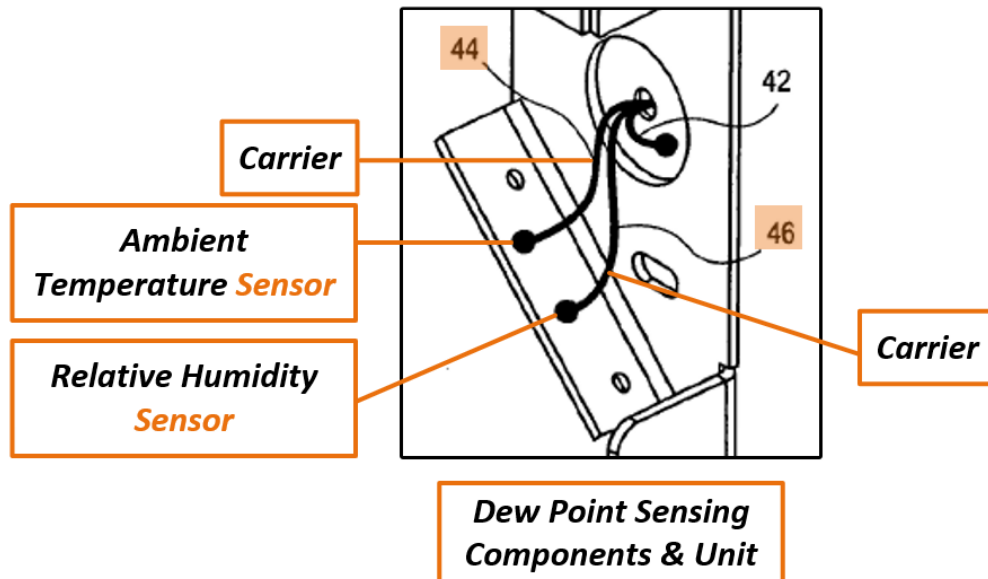


EX1004, Figure 2 (annotated). Carter’s Figure 2 depicts surface temperature sensor 42 as a *unit* comprised of a sensing probe at the end of a wire/cable. EX1003, ¶84. Under the interpretation Patent Owner promotes in its district court infringement allegations, there is no debate that Carter’s teachings regarding surface temperature sensor 42 render obvious *a carrier having a temperature sensor thereat*. *See* EX1037, p.8 (“The carrier is the wire...”), p.104.²

² For a narrower interpretation, *see* Ground 1B (King’s teachings).

Element[1.b]: a dew point sensing unit...

Carter renders obvious Element[1.b]. EX1003, ¶¶85–87. As discussed at Element[1.a], Carter describes a “sensor assembly unit 32 [that] is composed of a surface temperature sensor 42, an ***ambient temperature*** sensor 44, and an ambient ***relative humidity*** sensor 46.” EX1004, 5:1–20. Using sensors 44 and 46, sensor assembly unit 32 ***monitors*** “the ***ambient temperature*** and...the ambient ***relative humidity***” ***outside of the display case***. EX1004, 5:31–40; *see also* 1:5–11 (providing supplemental heat “based upon the operating environment of refrigeration or freezer equipment”), 1:15–28, 2:22–32. These ambient temperature and relative humidity readings from sensors 44 and 46 are used to “calculate[] ***dew point***.” EX1004, 2:44–67, 5:31–40, 6:30–40, 7:1–9, Figure 3.



EX1004, Figure 2 (annotated).

As discussed at Element[1.a], Carter’s Figure 2 depicts each of ambient temperature sensor 44 and relative humidity sensor 46 as part of a **unit** comprised of sensing probes at the end of flexible wires/cables. EX1003, ¶87. Under the interpretation Patent Owner promotes in its district court infringement allegations, there is no debate that Carter teachings regarding ambient temperature sensor 44 and relative humidity sensor 46 render obvious ***a carrier having at least one dew point sensing component thereat***. See EX1037, p.8, p.104.³

Element[1.c]: a control unit...

Carter renders obvious Element[1.c]. EX1003, ¶¶88–102. Referencing Figure 1 (below), Carter discloses a condensation control apparatus including “a **control unit** 28, a switching unit 30, [and] a **sensor assembly unit** 32.”⁴ EX1004, 4:36–55, Figure 1. “The control unit 28 is generally responsible for receiving information from”—and, thus, ***communicating with***—“the sensor assembly unit 32 and for [determining] whether a set condition exists that would promote surface condensation.” *Id.*

³ For a narrower interpretation, see Ground 1B (King’s teachings).

⁴ See Elements[1.a]–[1.b], mapping sensor assembly unit 32 to the ***sensing units***.

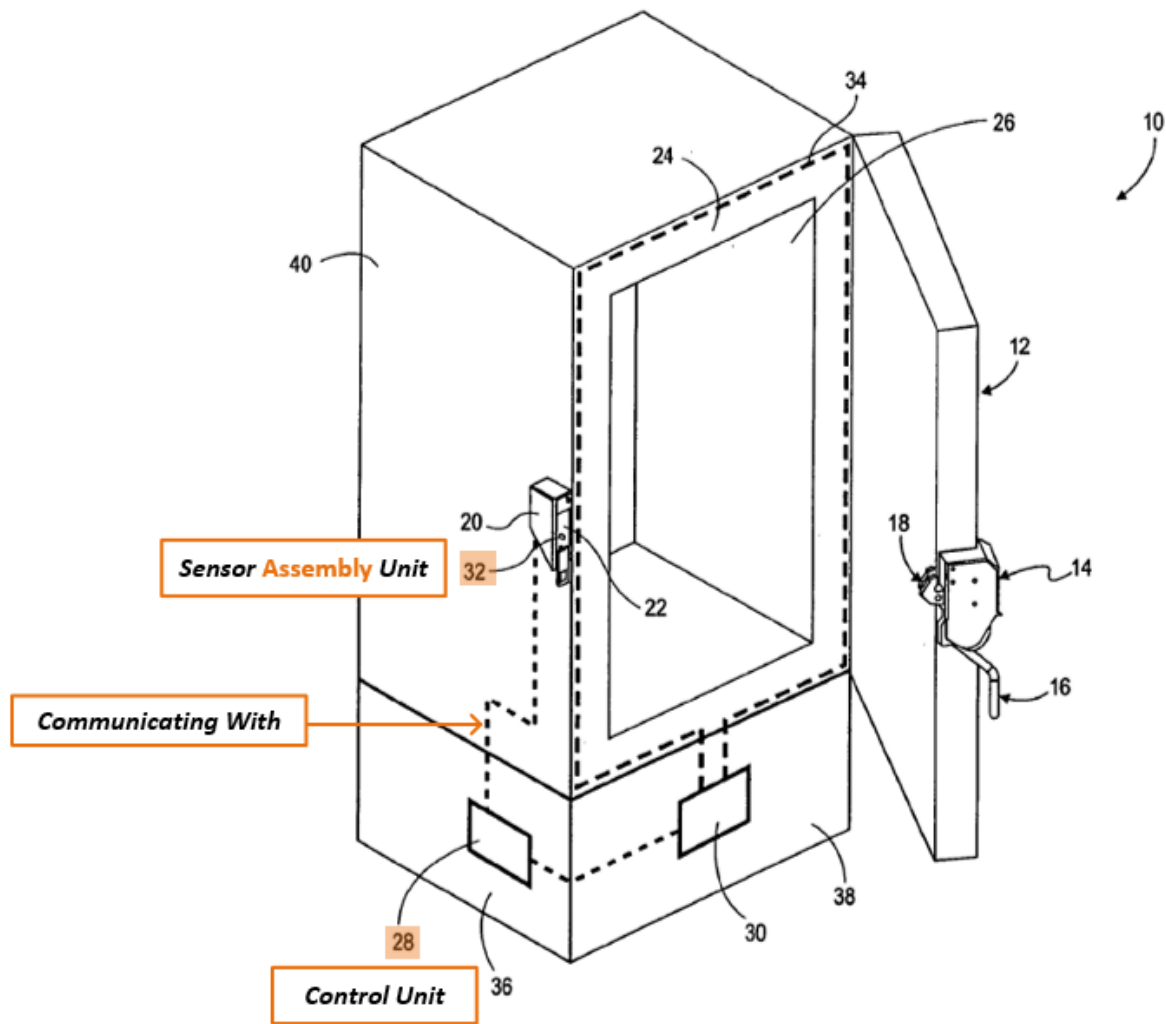
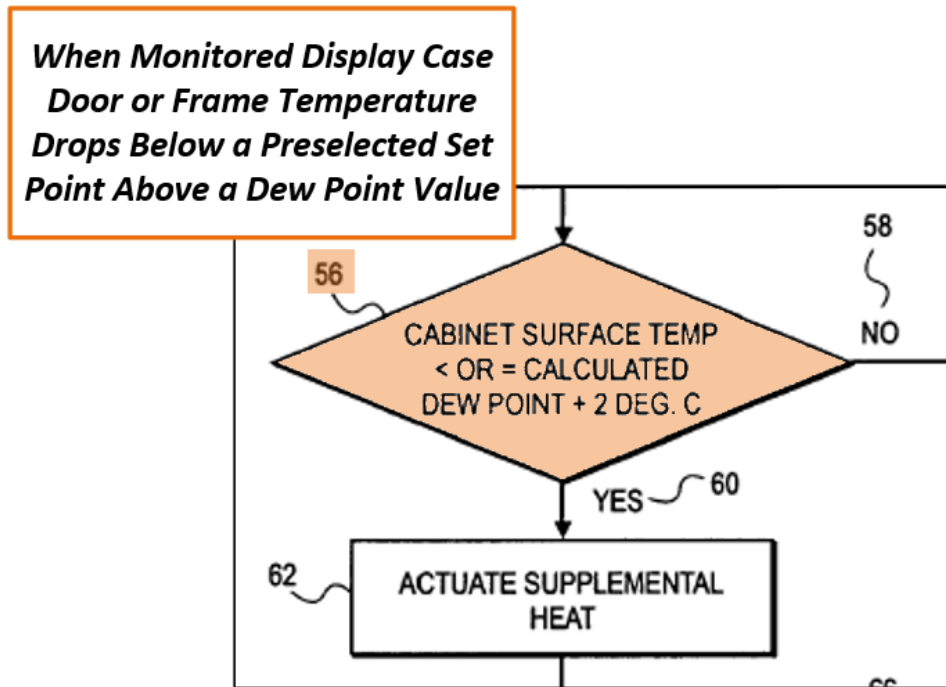


FIG. 1

EX1004, Figure 1 (annotated).

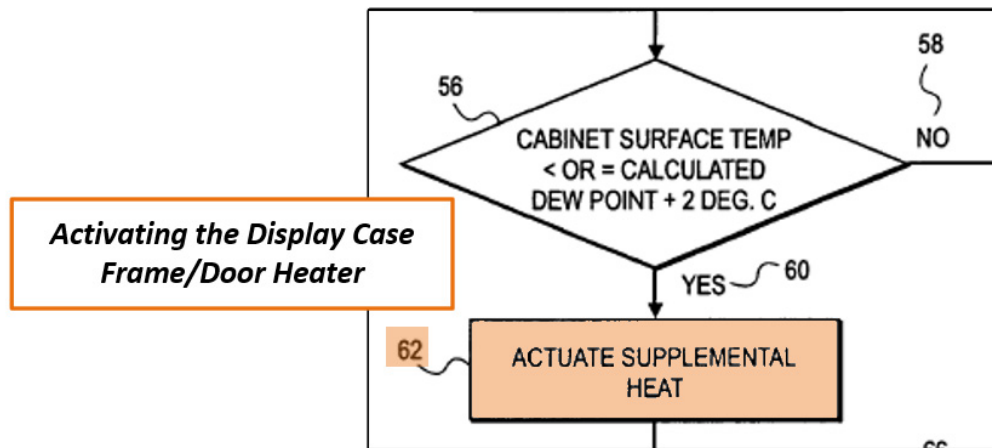
Carter goes on to teach a “*process*” where this “set condition” corresponds to *when* “the cabinet surface temperature” (*monitored display case door or frame temperature*, per Element[1.a]) “is less than” (*drops below*) “the *dew point* plus 2 degrees C.” EX1004, 5:21–54, Figure 3. Carter’s “2 degrees C” *point* value is a “constant” *selected* for determining whether the likely condensation “*set* condition

exists” and, thus, teaches or at least renders obvious the claimed *preselected set point*.⁵ *Id.*; EX1003, ¶¶89–92.



EX1004, Figure 3 (excerpted-annotated). More, when a “positive determination is made” regarding the likely condensation condition, “the control unit 28 enacts the switching unit 30 to *activate* supplemental heat 62 to the sealing surface 24 of the refrigerator or freezer equipment via the heating unit 34” (*display case frame/door heater*, per Element[1.pre]). EX1004, 5:49–54; *see also* 2:4–32, 3:40–53.

⁵ For a narrower interpretation, *see* Ground 1B (Beatenbough’s teachings).



EX1004, Figure 3 (excerpted-annotated); *see also* Figure 1.

Having established that Carter teaches or renders obvious the recited *activating* function of the claimed *processing means*, this analysis will now address Carter’s teachings with respect to the ’181 patent’s corresponding structure outlined above at §IV.A. *See* EX1003, ¶¶93–102.

To start, and as discussed above, Carter compares “CABINET SURFACE TEMP” (*frame temperature*, per Element[1.a]) to a “CALCULATED *DEW POINT*” value using a less-than inequality operator and a *preselected set point* of “2 DEG. C.” EX1004, 5:21–54, Figure 3. Carter’s inequality expression increases the calculated *dew point* value by the *preselected set point*, which is a mathematically equivalent operation to the ’181 patent’s approach of discounting the *frame temperature* by the *preselected set point*. EX1003, ¶¶95–96. Not only are these mathematical equivalents, but they are also patently obvious variants when viewed through the lens of a POSITA. *Id.*

Additionally, and like the '181 patent's algorithm, when the less-than inequality between *frame temperature* and *dew point* is true, Carter's process "ACTUATE[S] SUPPLEMENTAL HEAT"—i.e., "the control unit 28 enacts the switching unit 30 to activate supplemental heat 62...via the heating unit 34," such as an "electrical heater." EX1004, 5:48–54, Figure 3; *see also* 2:35–43 ("a switching unit that switches the heating unit on and/or off"). A POSITA would have understood Carter's disclosure of a "switching unit" that activates an "electrical heater" to teach, suggest, or render obvious the notion of turning on a relay, as disclosed in the '181 patent. EX1003, ¶97.

Further still, Carter teaches that the above-discussed process is orchestrated by a singular "control unit 28" that is "mounted...along the refrigerator or freezer equipment at a lower side surface." EX1004, 4:36–55. From a POSITA's perspective, Carter's disclosure of a locally mounted control unit that performs a task-specific algorithm (*see, e.g.*, Figure 3) teaches, suggests, or at least renders obvious the ubiquitous structure of a microprocessor, as disclosed by the '181 patent. EX1003, ¶¶98–99, ¶50; EX1001, 8:42–45, 8:63–9:9.

If Patent Owner alleges distinctions between the specific algorithmic steps of Carter and the '181 patent, doing so would not make Element[1.c] (or Claim 1 as a whole) unobvious. After all, "the individual [algorithmic steps]...of an overall structure that corresponds to the claimed function are not claim limitations. Rather,

the claim limitation is the overall structure corresponding to the claimed function.”
See Odetics, Inc. v. Storage Tech. Corp., 185 F.3d 1259, 1268 (Fed. Cir. 1999). And here, Carter’s overall algorithm performs the ’181 patent’s claimed **activating** function in at least substantially the same way—i.e., comparing frame temperature to dew point using a buffer value—to achieve at least substantially the same result—i.e., heater activation responsive to sensed conditions likely to produce condensation. EX1003, ¶100; *see Odetics*, 185 F.3d at 1267.

Lastly, Element[1.c] (and Claim 1 as a whole) would still be obvious even if Patent Owner were to assert an erroneous, narrower formulation of the corresponding structure that incorporates implementation details not necessary to perform the claimed **activating** function—e.g., averaging multiple sensor readings, or using a lookup table to retrieve stored dew point values. EX1003, ¶101 (citing EX1001, 8:63–9:3, Figure 14b). These insignificant implementation details do not materially change the way and result of the ’181 patent’s algorithm and, thus, would not represent substantial differences from the above-discussed algorithm that Carter provides. EX1003, ¶102. Besides, such details were well-known and obvious. *Id.*

Element[1.d]: housing means...

Carter renders obvious Element[1.d]. EX1003, ¶¶103–113. Carter explains that “the sensor assembly unit 32”—including surface **temperature sensor** 42 (of the **frame temperature sensing unit**, per Element[1.a]), ambient temperature sensor 44,

and relative humidity sensor 46 (*components* of the *dew point sensing unit*, per Element[1.b])—“is integrated within the interior portion 22 of the door latch cover assembly 20.” EX1004, 5:1–20, Figures 1–2; *see also* 6:50–56. A *housing for locating the sensing units*, Carter’s door latch cover assembly provides “added protection from outside elements” and “helps localize the measurements...to generally produce more accurate temperature readings.” *Id.*; *see also* EX1003, ¶103.

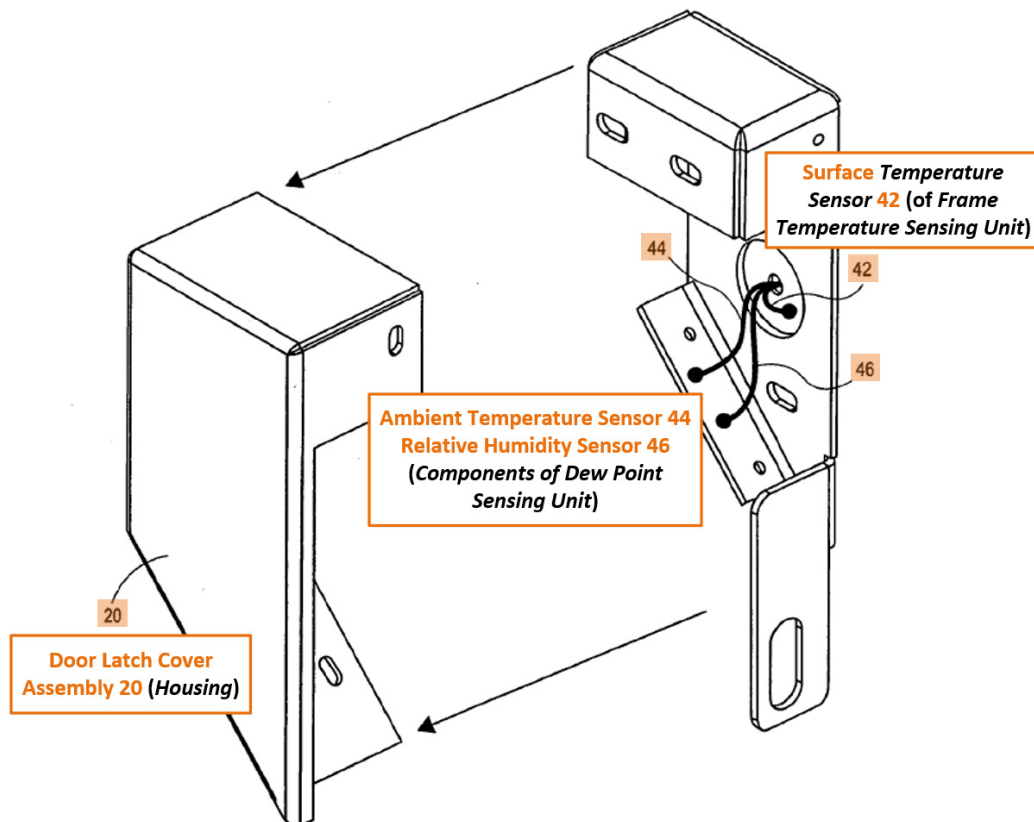


FIG. 2

EX1004, Figure 2 (annotated). It would have been further apparent or obvious to a POSITA that Carter’s door latch cover assembly (*housing*) also *includes structure establishing thermal isolation of the sensing units*. EX1003, ¶¶104–110.

To start, and for at least the following three reasons (taken individually or collectively), it would have been apparent or obvious to a POSITA reading Carter’s disclosure that the *structure* of the door latch cover assembly (*housing*) has *minimized heat transfer contacts* with the *sensing units*. EX1003, ¶¶105–108.

First, Carter suggests as much by emphasizing that the design of the door latch assembly makes the sensor readings “more accurate.” EX1004, 5:12–15. As a POSITA would have known, the accuracy of humidity and temperature readings is diminished by inadvertent heat transfer—i.e., heat transfer between the sensing elements and a source other than the subject of the measurement. EX1003, ¶106, ¶¶42–49. Here, where the subjects of the measurement are the surface of the refrigerated case and the ambient air, achieving Carter’s goal of “more accurate” sensor readings would naturally entail *minimizing heat transfer contacts between the sensing units and* other heat sources/sinks, including the door latch cover assembly (*housing*). *Id.*

Second, even without Carter’s teaching to promote sensor accuracy, doing so was a known design goal that a POSITA would have sought to achieve in the normal course of pursuing a control system like Carter’s that relies on sensor readings to operate heating elements in a manner that prevents condensation. EX1003, ¶107, ¶¶42–49. Motivated by the benefit of promoting sensor accuracy, the POSITA

would have employed the known technique of *minimizing heat transfer contacts between the sensing units and* their *housing* enclosure. *Id.*

Third, Carter's Figures 1–2 (above) illustrate an arrangement where there is *minimal* (if any) *heat transfer contact between the sensing units and* the door latch cover assembly (*housing*). EX1003, ¶108. Carter's corresponding description supports this understanding of Figures 1–2. *Id.* Notably, Carter only states that the components of “the sensor assembly unit 32 [are] integrated within the interior portion 22 of the door latch cover assembly 20” (*housing*) and never says or implies that these components *contact* the housing. EX1004, 5:1–20.

Additionally, it would have been apparent or obvious that the *structure* of Carter's *housing* (door latch cover assembly 20) *locates the temperature sensor* (surface temperature sensor 42) *and the at least one dew point sensing component* (including ambient temperature sensor 44 and/or ambient relative humidity sensor 46) *amid insulated air pockets formed by the structure of the housing*. EX1003, ¶¶109–111. To wit, Carter explains that these components of “the sensor assembly unit 32 [are] integrated within the interior portion 22 of the door latch cover assembly 20” (*housing*), and Carter's figures show that this interior portion receives the sensing components *amid insulated air pockets formed by the structure of the housing*. EX1004, 5:1–20, 6:50–56, Figures 1–2; EX1003, ¶110 (air is a thermal insulator); EX1001, 7:25–28 (“insulating air gap”).

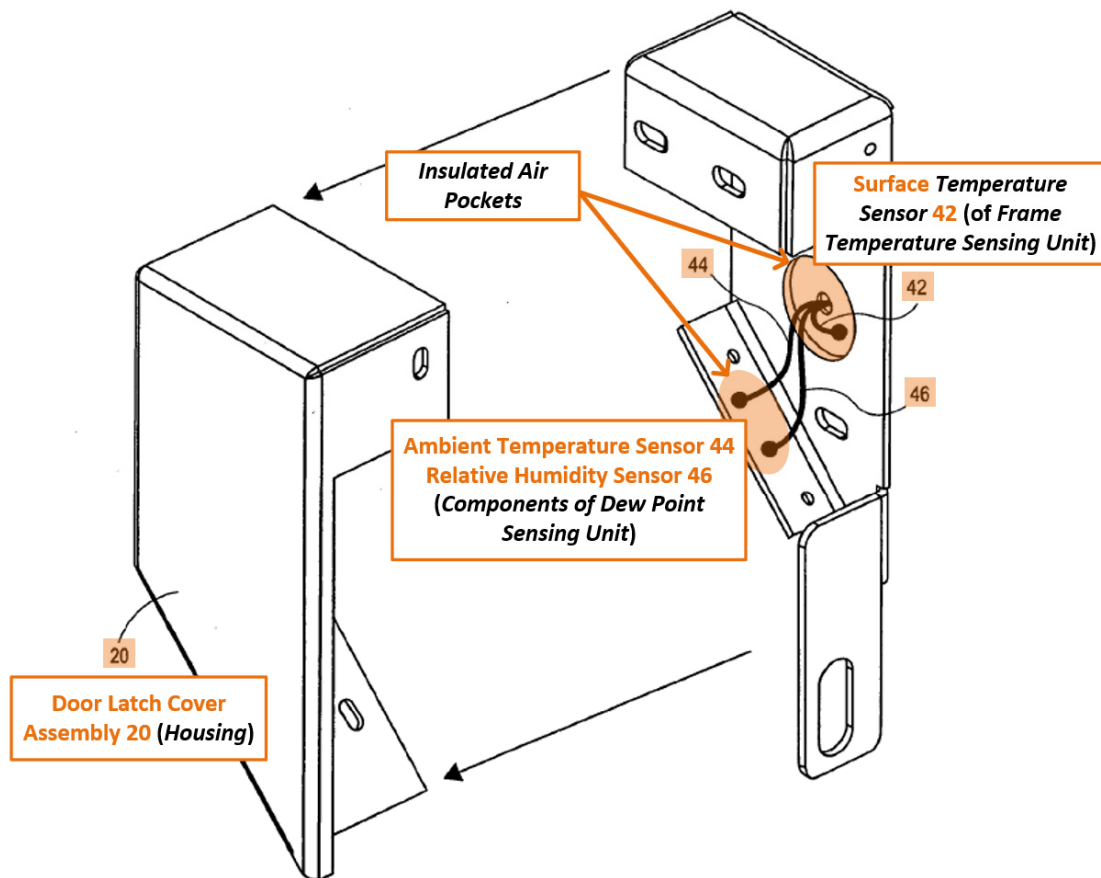


FIG. 2

EX1004, Figure 2 (annotated).

Having established that Carter teaches or renders obvious the recited *locating* function of the claimed *housing means*, this analysis will now address Carter's teachings with respect to the '181 patent's corresponding structure outlined above at §IV.B. As shown below and discussed above, Carter's door latch cover assembly (*housing*) likewise includes a base and a mated cover that together form *insulated air pockets* receiving temperature and dew point sensing components. EX1004, 5:1–20, 6:50–56, Figures 1–2; EX1003, ¶¶112–113.

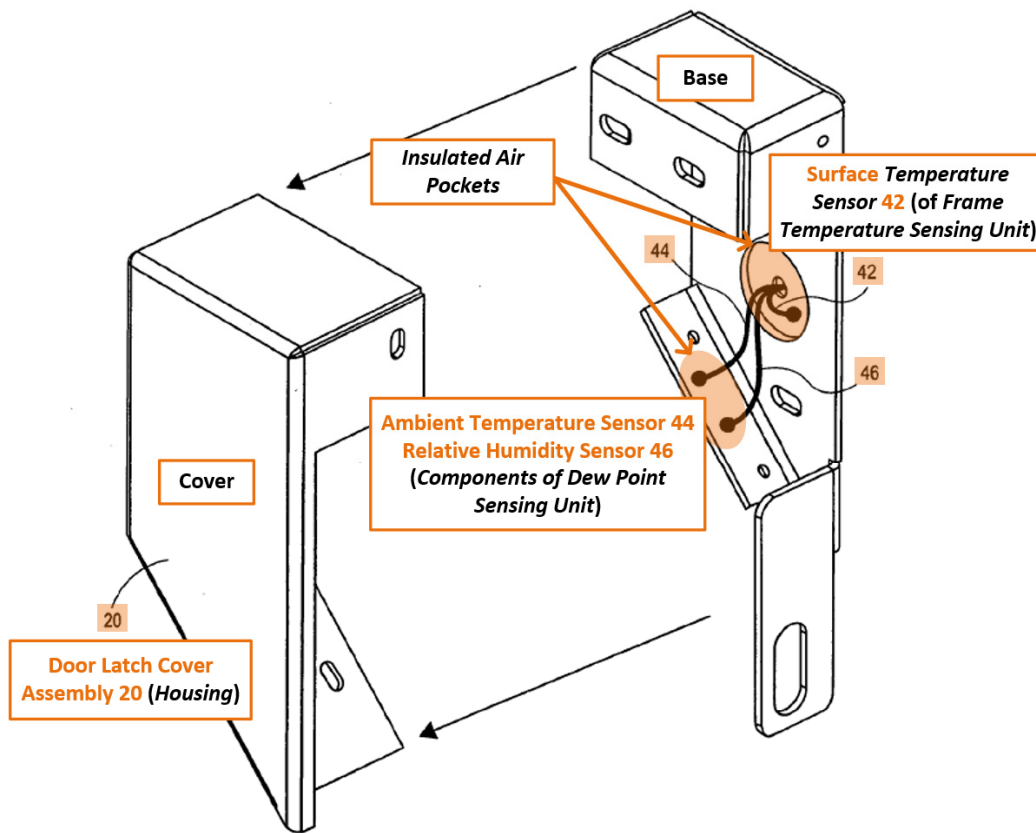


FIG. 2

EX1004, Figure 2 (annotated). Thus, in comparison to the '181 patent, Carter teaches a *housing* solution that accomplishes the claimed *locating* function in the same/substantially the same way—i.e., via a mated base and cover—to achieve the same/substantially the same result—i.e., receiving the sensing components within air pockets. EX1003, ¶113; *Odetics*, 185 F.3d at 1267.

(b) Claim 2

Element[2]

Carter renders obvious Element[2]. As discussed at Element[1.d], Carter teaches a *housing* (door latch cover assembly) having a *base* and a mated *cover* that

together *create air pockets* around the *frame temperature sensing unit* (temperature sensor 42, per Element[1.a]). Carter's Figure 2 shows that *the cover has a depth creating a first air pocket, and the base includes an opening for receiving the temperature sensor, the opening having an opening area greater than surface area of said temperature sensor thus establishing a second one of the air pockets around the temperature sensor.* EX1003, ¶114.

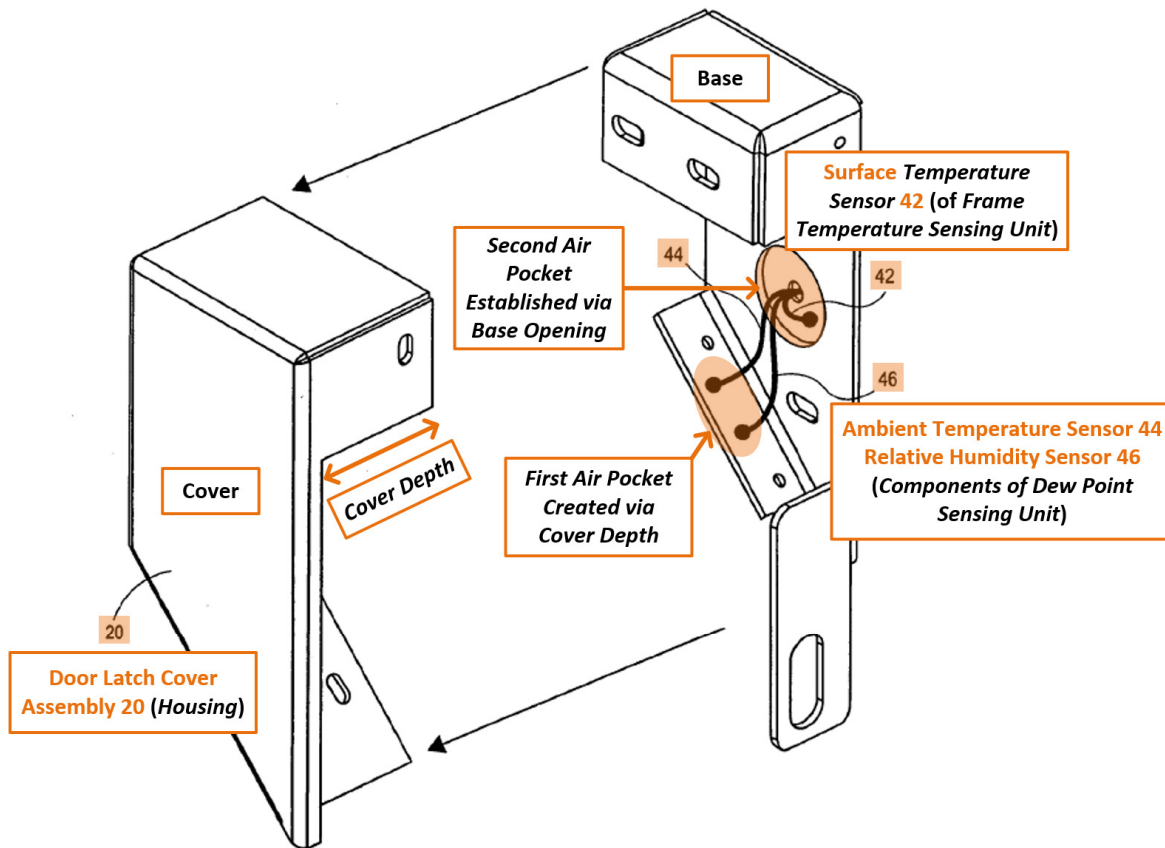


FIG. 2

EX1004, Figure 2 (annotated).

(c) **Claim 14**

Element[14.pre]: A system for condensation control...

See Element[1.pre], Ground 1A. EX1003, ¶115.

Element[14.a]: a temperature sensing unit...

See Element[1.a], Ground 1A (explaining that temperature sensor 42 is placed against a surface of the display case frame). EX1003, ¶116.

Element[14.b]: a dew point sensing unit...

See Element[1.b], Ground 1A. EX1003, ¶117.

Element[14.c]: control means...

Carter renders obvious Element[14.c]. EX1003, ¶¶118–133. To start, and as discussed at Element[1.c], Carter teaches a “***control*** unit 28 [that] is generally responsible for ***receiving*** information [(data)] ***from the sensor*** assembly ***unit*** 32 and for [determining] whether a set condition exists that would promote surface condensation.”⁶ EX1004, 4:36–55, Figure 1; *see also* 2:22–32, 3:42–53, 4:13–35. Thus, instead of merely reacting to the existence of condensation, Carter’s ***control*** unit seeks to proactively “prevent” this phenomenon in the first place by “switching on [(activating)] electrical ***heaters***” ***in response to anticipating the formation of condensation*** based on “thermal conditions” reflected by “sensors ***monitoring***

⁶ See Elements[1.a]–[1.b], mapping sensor assembly unit 32 to the ***sensing units***.

external surface [(*frame*)] *temperature*[...] *ambient temperature*, and the ambient *relative humidity*.” EX1004, 4:13–55; *see also* 5:21–54.

As discussed at §IV.E, the ’181 patent’s structure corresponding to Element[14.c]’s heater *activating* function of the claimed *control means* is the same as that of Element[1.c]’s heater *activating* function of the claimed *processing means*. Accordingly, Carter renders obvious a microprocessor executing the same or an equivalent algorithm as that of the ’181 patent for all the same reasons discussed above at Element[1.c] (and incorporated here). EX1003, ¶119; EX1004, 2:4–32, 3:40–53, 4:13–61, 5:21–54, 6:8–18, 6:57–58, Figure 3.

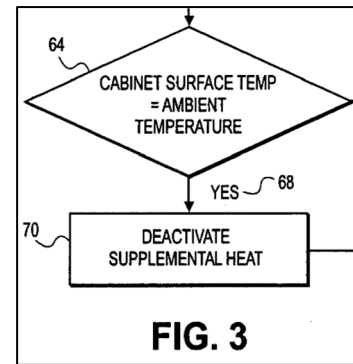
Carter also teaches or renders obvious the claimed function of *deactivating the frame/door heater responsive to anticipating the formation of condensation*. EX1003, ¶120. Recognizing that “providing a continuous[] supply of supplemental heat...can waste unnecessary energy and drive up the operating/maintenance costs of the freezer/refrigeration system,” Carter explains that such supplemental heat “is only activated under conditions that would promote surface condensation.” EX1004, 2:4–32; *see also* 3:42–53. When *condensation* is no longer *anticipated*—e.g., “[i]f the cabinet surface temperature is equal to the ambient temperature”—“the control unit will *deactivate* the supplemental *heat*.” EX1004, 5:55–63, Figure 3.

Having established that Carter teaches or renders obvious the recited *deactivating* function of the claimed *control means*, this analysis will now address

Carter's teachings with respect to the '181 patent's corresponding structure outlined above at §IV.E.

As discussed, Carter teaches that the heater is deactivated when the frame temperature reaches the ambient temperature:

If the cabinet surface temperature is equal to the ambient temperature 38 the control unit 28 will deactivate the supplemental heat 70 by deactivating the switching unit[] 30.



EX1004, 5:58–63, Figure 3 (above, right). As Petitioner's Dr. Henze explains, a POSITA would have recognized that Carter's heater deactivation technique accounts for dew point by employing a floating offset responsive to ambient conditions. EX1003, ¶¶122–123. That is, the POSITA would have known that ambient temperature is virtually always greater than dew point and the difference between them depends on—floats according to—the humidity of the ambient environment. *Id.* Thus, Carter's comparison expression shown in Figure 3 (Step 64):

$$\text{Cabinet Surface Temp} = \text{Ambient Temp}$$

is mathematically equivalent to:

$$\text{Cabinet Surface Temp} = \text{Dew Point} + \text{Floating Offset},$$

which parallels the '181 patent's expression from Figure 14b:

$$\text{Frame Temp} - \text{Set Point High} > \text{Dew Point}$$

and its mathematical equivalent:

$$\textbf{Frame Temp} > \textbf{Dew Point} + \textbf{Set Point High}.$$

From the perspective of a POSITA, the differences between Carter's algorithm and the '181 patent's algorithm are insubstantial. EX1003, ¶¶124–129. First, it has already been established above at Element[1.a]/Element[14.a] that Carter's cabinet surface temperature provides the surface temperature of the display case frame—i.e., frame temperature. Second, it would have been apparent or obvious to the POSITA that Carter's teaching to determine when the cabinet/frame temperature reaches ambient temperature is not limited to a strict equal-to (“=”) operator but would also include a greater-than (“>”) operator. EX1003, ¶126. Otherwise, the heater would remain running unless and until there was an exact match in temperature, which would undermine Carter's goal of avoiding wasted energy and increased operating/maintenance costs associated with running the heater continuously. EX1003, ¶¶127–128 (citing EX1004, 2:4–32), ¶¶40–41.

Third, that the '181 patent uses a preselected set point and Carter uses a floating offset is an insubstantial and obvious distinction to a POSITA. EX1003, ¶129. In each case, the set point/offset serves as a buffer value to ensure that the frame temperature of the display case is far enough away from the dew point value to prevent anticipated condensation without excessive on-off cycling of the heater. EX1003, ¶129. More, a POSITA looking to improve Carter would have been

motivated to employ a preselected set point for the purpose of achieving a more flexible control system, e.g., one more adaptable to different climates and conditions. EX1003, ¶¶130–132 (explaining the efficiency and operational advantages of selecting set points based on climates/conditions).

If Patent Owner alleges distinctions between the specific algorithmic steps of Carter and the '181 patent, doing so would not make Element[14.c] (or Claim 14 as a whole) unobvious. *Odetics*, 185 F.3d at 1268 (individual algorithmic steps “are not claim limitations”). What matters is that Carter’s overall algorithm performs the '181 patent’s claimed **deactivating** function in at least substantially the same way—i.e., comparing frame temperature to dew point using a buffer value—to achieve at least substantially the same result—i.e., heater deactivation responsive to conditions unlikely to produce condensation. EX1003, ¶133; *Odetics*, 185 F.3d at 1267.

(d) **Claim 15**

Element[15]:

See Element[1.d], Ground 1A (Carter’s teachings regarding housing means for thermally isolating the dew point sensing unit amid insulated air pockets). EX1003, ¶134.

(e) **Claim 16**

Element[16]:

See Element[1.d], Ground 1A (Carter’s teachings regarding housing means for thermally isolating the frame temperature sensing unit amid insulated air pockets). EX1003, ¶135.

(f) **Claim 17**

Element[17]:

Carter renders obvious Element[17]. EX1003, ¶¶136–137. Carter repeatedly emphasizes the importance of “maintain[ing] a prescribed operating temperature” within the freezer/refrigeration equipment (*refrigerated display case*, per Element[1.pre]) to ensure its contents do not “spoil.” EX1004, 1:45–62, 1:34–44. Temperature-controlled refrigeration systems were ubiquitous in the art at the time of the ’181 patent, and they were known to include *an internal case temperature sensing unit mounted inside the display case* for the purpose of facilitating closed control loops and product quality monitoring. EX1003, ¶136. A POSITA would have expected a feature-rich system like Carter’s—one featuring a supplemental closed control loop for preventing condensation—to include basic closed-loop refrigeration control for maintaining a prescribed internal operating temperature. EX1003, ¶136.

Additionally, it would have been obvious to place such an *internal case temperature sensing unit in communication with the* above-described *control means*. EX1003, ¶137. Using Carter's control unit (*control means*, per Element[14.c]) as a local nerve center for coordinating the various functions of the freezer/refrigeration equipment would have been nothing more than a rudimentary design choice that a POSITA would have been motivated to pursue based on the known benefits of consolidated centralized control systems (e.g., simplified system architecture and lower capital costs from fewer controllers). EX1003, ¶137, ¶52.

(g) **Claim 18**

Element[18]

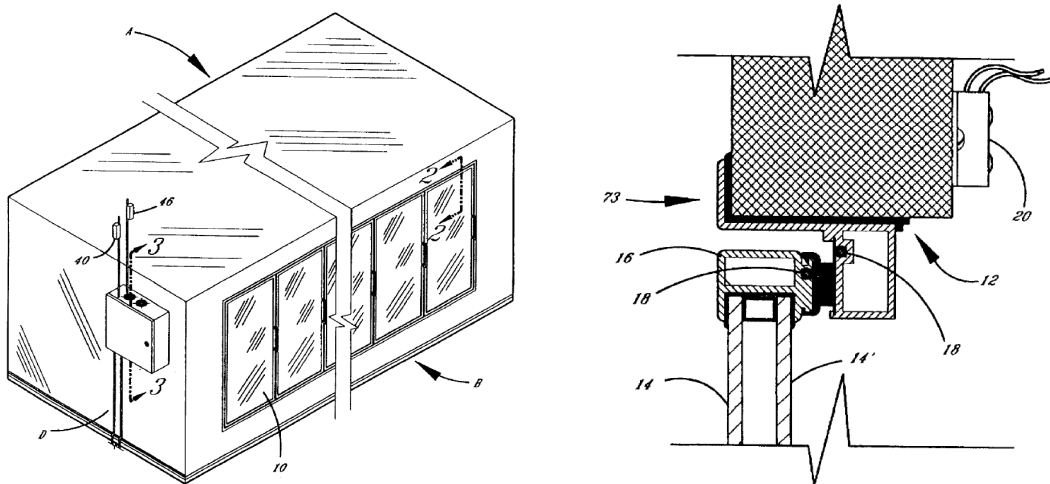
Carter renders obvious Element[18]. As discussed at Elements[1.a]–[1.c] and Elements[14.a]–[14.c], Carter renders obvious the notion of a control unit implemented via a microprocessor (*control means*) that utilizes *data related to readings at the sensing units and operation of the frame/door heater* (e.g., temperature readings, operational parameters such as set points, and algorithmic program instructions). It would have been further apparent or obvious to a POSITA that provisioning a microprocessor to access and utilize such *data* would naturally involve *storing* the *data*—for at least a short period of time—using well-known computer memory structures (*means*), such as a cache, register, or active memory

module associated with the microprocessor. EX1003, ¶138; *see also* §IV.H (corresponding structure of *means for storing data*).

B. GROUND 1B: Claims 1–7, 14–18 Are Obvious Over Carter, Beatenbough, and King

1. Beatenbough (EX1006)

Like the '181 patent, Beatenbough describes “a system for maintaining glass doors of refrigeration/freezer units free of condensation.” EX1006, Abstract, 1:6–9; EX1003, ¶¶139–140. As shown below in Figures 1–2, the “glass display doors” are mounted in a “metal frame 16,” which contains “a plurality of resistance wires 18” used “for heating the surface of the glass” to prevent “the formation of condensation.” EX1006, 1:46–52, 2:59–3:6. A “processor” causes the wires 18 to heat the door by delivering “an electrical pulse having a determined width” based on the current dew point. EX1006, Abstract, 1:45–2:3, 3:27–4:6.

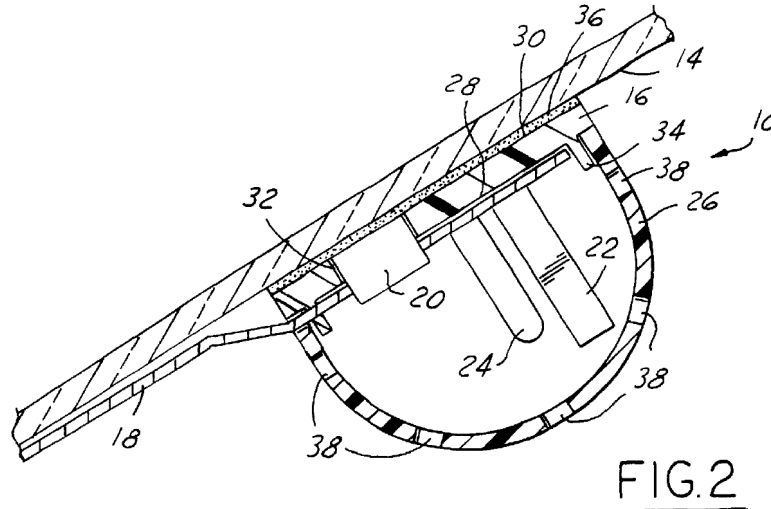


EX1006, Figure 1 (left), Figure 2 (right).

2. King (EX1005)

(a) Brief Summary of King's Disclosure

King describes “an automotive windshield fog sensor” that provides the necessary data to “predict glass fog formation.” EX1005, Abstract, 1:4–6; EX1003, ¶¶141–143. Similar to the '181 patent, King's sensor package includes “an ambient air temperature sensor [22], an ambient humidity sensor [24] and a glass temperature sensor [20]” that is “in thermal contact with the glass surface 14 in order to measure [its] temperature.” EX1005, 1:54–60, 2:48–50. As shown below, these sensors are connected by a “flex circuit” and located in a shared housing formed by a “thermal barrier tray 16” and “a protective dome 26.” EX1005, 1:61–2:7, 2:40–50.



EX1005, Figure 2.

(b) King Is Analogous Art

King is analogous art to the '181 patent. EX1003, ¶¶144–149; *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004).

Field of Endeavor: Broadly stated, the '181 patent pertains to the field of “remediat[ing] condensation build up.” EX1001, 1:5–10, 1:41–47 (explaining that “condensation control” is “utilized in a variety of applications”); EX1003, ¶¶145–146; *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1238 (Fed. Cir. 2010) (courts “construe the scope of analogous art broadly”). A POSITA would have understood that King’s disclosure of an integrated sensor package for use in a system that prevents “fog”—condensation—falls within the '181 patent’s field. EX1003, ¶147.

Reasonable Pertinence: King and the '181 patent similarly address the design problem of provisioning a housing for a sensor package including a surface temperature sensor, an ambient air temperature sensor, and a relative humidity temperature sensor. *Compare* §II (summarizing the '181 patent), *with* §V.B.2(a) (summarizing King). In both King and the '181 patent, the design problem involves mechanically supporting, electrically connecting, and thermally isolating the sensors. EX1003, ¶¶148–149. King is therefore reasonably pertinent to at least one of the problems that the '181 patent’s inventors were trying to solve. *See Donner Tech., LLC v. Pro Stage Gear, LLC*, 979 F.3d 1353, 1359–61 (Fed. Cir. 2020).

3. Motivation to Combine and Reasonable Expectation of Success

The Carter-Beatenbough-King Combination represents the predictable and expected result of applying in the context of Beatenbough’s refrigerated display case

with condensation control capabilities: **(a)** Carter's complementary teachings on triggering heater activation/deactivation based on door/frame surface temperature; and **(b)** King's complementary teachings on an integrated sensor package suitable for implementing the Carter-Beatenbough condensation control scheme. EX1003, ¶150. From a POSITA's perspective in 2005, integrating the complementary teachings of Carter, Beatenbough, and King would have involved nothing more than applying known solutions to known problems and achieving predictable outcomes. EX1003, ¶150. The fundamental aspects of Beatenbough's disclosure would remain intact, bolstered by the beneficial teachings of Carter and King in a way that the POSITA would reasonably expect to succeed. EX1003, ¶150.

(a) Applying Carter's complementary teachings on triggering heater activation/deactivation based on door/frame surface temperature

A POSITA would have been motivated to incorporate Carter's teachings on selectively triggering heater activation/deactivation based on the monitored door/frame surface temperature of a refrigerated case with Beatenbough's teachings of a variable pulse width technique for operating the heater(s) on a refrigerated display case more efficiently. EX1003, ¶151. Each of these references is primarily concerned with using supplemental heat to prevent condensation from forming on the refrigerated case. *Supra* §V.A.1 (summarizing Carter); §V.B.1 (summarizing Beatenbough). Thus, the predictable result of this Carter-Beatenbough Combination

includes a refrigerated display case with a comprehensive condensation control scheme that operates the heater(s) on the case in an energy-efficient manner to prevent condensation. EX1003, ¶151. The following reasons, taken separately or collectively, support the Combination. EX1003, ¶¶152–158.

First, a POSITA would have been prompted to pursue this Combination based on the teachings and suggestions evident from Beatenbough. EX1003, ¶153. Beatenbough discloses that the doors of the display case should “be kept at no less than 2° above the dew point.” EX1006, 4:7–8. This teaching would have suggested to a POSITA that heater activation should occur when the sensed temperature at the door drops to or below the dew point temperature plus two degrees. EX1003, ¶153. Thus, the POSITA would have pursued supplemental references like Carter that disclose specific algorithmic steps to implement such a control scheme. EX1003, ¶153 (citing EX1004, Figure 3 at Steps 62 and 64).

Second, even under the hypothetical assumption that Beatenbough does not specifically suggest Carter’s approach to heater activation (which it does), there would still be ample motivation to combine these references. EX1003, ¶¶154–155. Indeed, a POSITA would have been prompted to make the Combination by the evident design need to seek an appropriate control algorithm for achieving Beatenbough’s goal of maintaining the door of the refrigerated case “at no less than 2° above the dew point.” EX1006, 4:7–8; EX1003, ¶154. While Beatenbough’s

disclosure focuses on an improved variable pulse width technique for actuating the heater, it leaves other implementation details—such as determining when to actuate the heater—for the POSITA to fill in with common knowledge and/or supplemental disclosures like Carter. EX1003, ¶155 (discussing EX1006, 1:9–22), ¶¶34–41.

Third, a POSITA would have pursued the Carter-Beatenbough Combination based on the understanding that Carter’s heater activation technique and Beatenbough’s variable pulse width technique for heater operation rely on a shared operating variable—a dew point value derived from ambient temperature and relative humidity sensor readings. *See* EX1004, 5:31–54; EX1006, 3:51–4:34; EX1003, ¶156. Given that Beatenbough’s condensation control system is already monitoring the dew point value on which Carter’s control scheme depends, the POSITA would have appreciated that integrating the teachings of these two references would have been particularly straightforward. EX1003, ¶156.

Fourth, a POSITA would have been motivated to pursue the Carter-Beatenbough Combination because Carter’s heater activation technique further promotes Beatenbough’s desire to increase energy efficiency. EX1003, ¶¶157–158. Where Beatenbough fulfills a need in the art for accurately “determining the percent of [heater] run time required” and avoiding wasted energy, (EX1006, 1:5–43), Carter similarly seeks to improve energy efficiency by remedying the fact that prior solutions were “typically configured to provide continuous heating,” an approach

that “can waste unnecessary energy and drive up the operating/maintenance costs,” (EX1004, 1:15–2:32). Given their shared focus on energy efficiency and cost savings, a POSITA would have naturally sought to combine the teachings of Beatenbough and Carter to maximize these benefits. EX1003, ¶157, ¶¶40–41.

(b) Applying King’s integrated sensor package teachings for implementing the Carter-Beatenbough condensation control scheme

A POSITA would have been motivated to incorporate King’s teachings of an integrated sensor package for implementing the Carter-Beatenbough condensation control scheme. EX1003, ¶159. The following reasons, taken separately or collectively, support the Combination. EX1003, ¶¶160–164.

First, a POSITA would have been prompted to integrate King’s teachings with Carter and Beatenbough based on the following understandings:

- (i) that the Carter-Beatenbough condensation control scheme relies on surface temperature, ambient air temperature, and relative humidity sensors;
- (ii) that the housing and mounting accommodations for these sensors significantly impacts the accuracy of their sensor readings, and
- (iii) that the accuracy of the sensor readings significantly impacts whether the heater on the refrigeration case is operated effectively and efficiently, as envisioned by Carter and Beatenbough.

EX1003, ¶160, ¶¶42–49. Thus, when tasked with implementing the Carter-Beatenbough condensation control scheme, the POSITA would have faced a routine sensor packaging problem. *Id.* Recognizing that King’s disclosure represents a known and suitable solution to this problem—one that specifically addresses the three types of sensors at issue—the POSITA would have been motivated to make the Carter-Beatenbough-King Combination. EX1003, ¶¶161–162.

Second, a POSITA would have been motivated to make the Carter-Beatenbough-King Combination because King’s teachings provide the advantage of a compact solution that mounts and houses all three of the requisite sensors in a single package. EX1003, ¶163. As the POSITA would have understood, King’s integrated sensor package would facilitate a more streamlined installation process compared to other designs that mount the sensors separately. EX1003, ¶163.

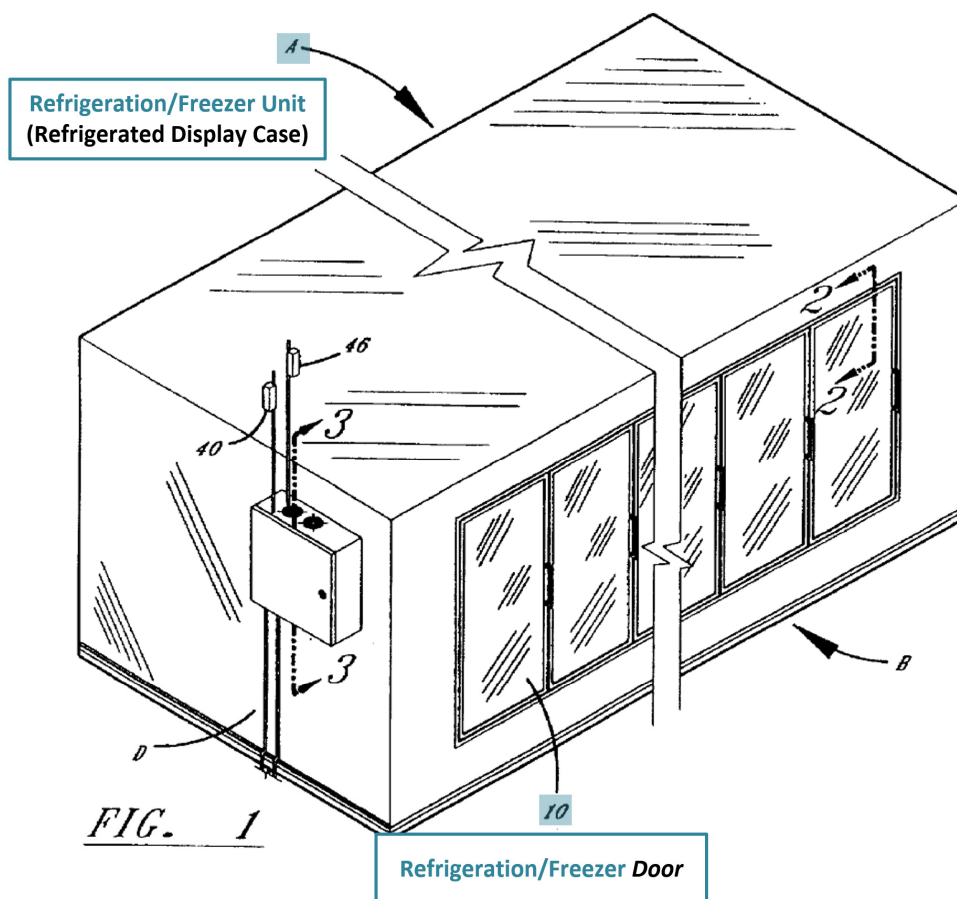
Third, a POSITA would have appreciated that King’s integrated sensor package provides the further advantage of lowering manufacturing, assembly, and installation costs by reducing the number of components compared to other designs that mount the sensors separately. EX1003, ¶164; EX1005, 1:36–45 (other designs may “require[] separate wire harnesses” to mount the ambient temperature and relative humidity sensors away from the surface temperature sensor), 2:8–16 (“reducing manufacturing costs” by “simplification of [the] wiring by use of a common ground”) (“providing a simple, inexpensive” solution).

4. Claim Element Analysis

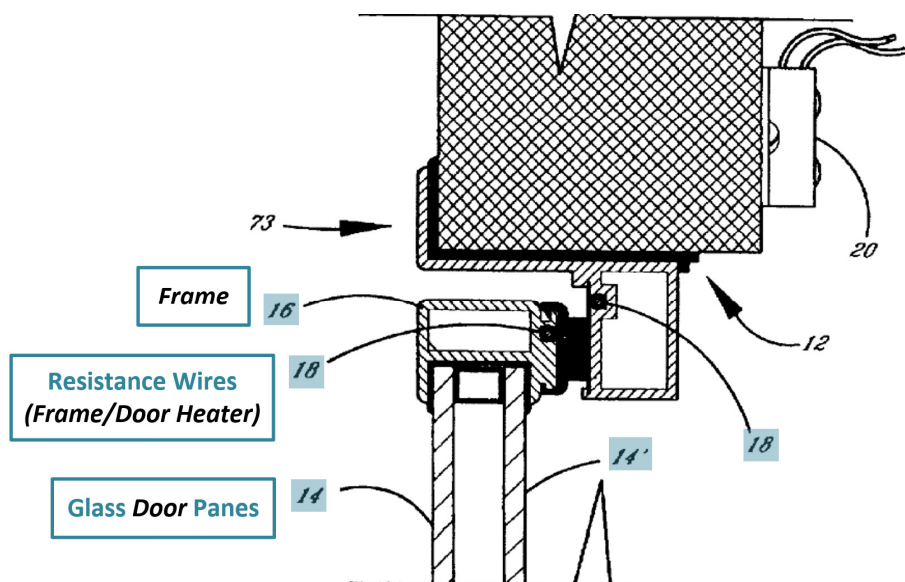
(a) Claim 1

Element[1.pre]: Condensation control apparatus...

The Carter-Beatenbough-King Combination renders obvious Element[1.pre]. EX1003, ¶165. As discussed at §V.B.3(a), the Combination includes Beatenbough’s teachings to deploy a *condensation control apparatus* like Carter’s “for use with *display* type *refrigeration* and freezer units [(cases)] having glass *display doors* for preventing the formation of *condensation* and frost on the glass of the doors.” EX1006, Abstract, 1:1–2:33, 3:2–4:42; *see also* EX1004, Abstract 1:1–11, 2:22–31, 2:35–43, 3:40–53, 4:44–55, 6:30–49; *supra* Element[1.pre], Ground 1A. Per Beatenbough, “[a] single refrigeration/freezer unit (A)” (*refrigerated display case*) has “a bank of individual *doors* (B),” where each “*door* 10 is supported in [a] metal door jam[b] 12 and includes a glass area usually consisting of two glass panes 14, 14’ mounted in [a] metal *frame* 16.” EX1006, 2:59–65. “Door jam[b] 12 and *door frame* 16 are provided with a plurality of resistance wires 18,” serving as a *frame/door heater*, “for heating the surface of the glass” via a “very thin transparent electrically conductive layer” coated on one of the glass panes. EX1006, 2:65–3:2.



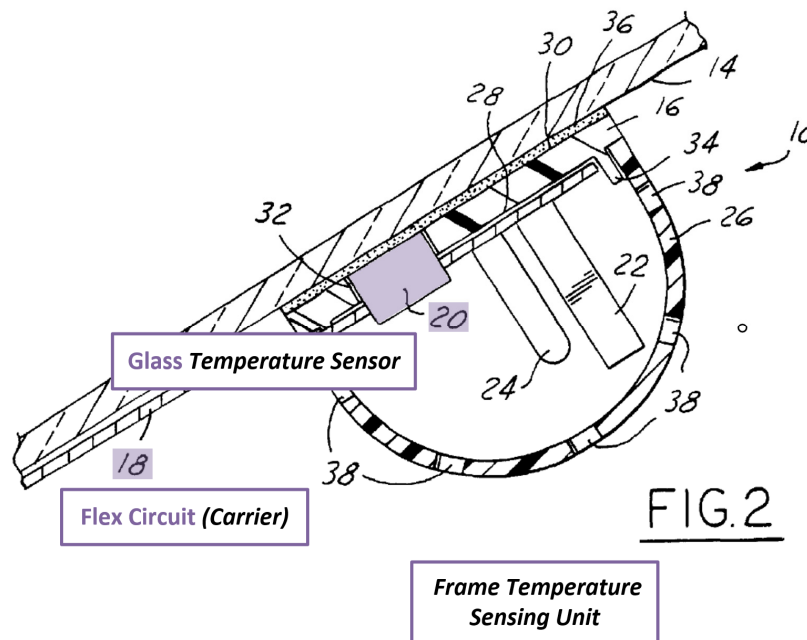
EX1006, Figure 1 (annotated).



EX1006, Figure 2 (annotated).

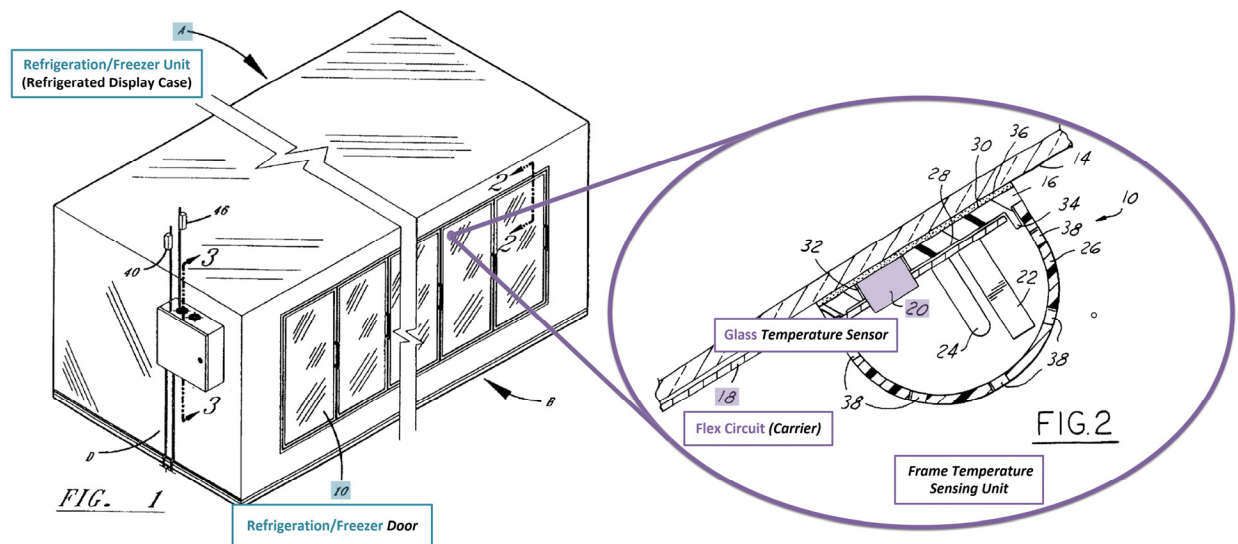
Element[1.a]: a frame temperature sensing unit...

The Carter-Beatenbough-King Combination renders obvious Element[1.a]. EX1003, ¶¶166–169. As discussed at §V.B.3(b), the Combination features King’s teachings regarding a “*sensor unit*” in conjunction with teachings from Beatenbough and Carter regarding a *refrigerated display case* with a condensation control apparatus. King’s *sensor unit* includes “an ambient air temperature sensor, an ambient humidity sensor and a glass *temperature sensor*,” where “[t]he electrical connections are made by using a flex circuit.” EX1005, 1:54–60. The flex circuit (*carrier*) serves to physically locate and secure the sensors and functions as a “thermal barrier.” See, e.g., EX1005, 1:66–2:7, 3:3–19 (“Sensors 20, 22, and 24 are typically soldered to flex circuit end 42.”).



EX1005, Figure 2 (annotated).

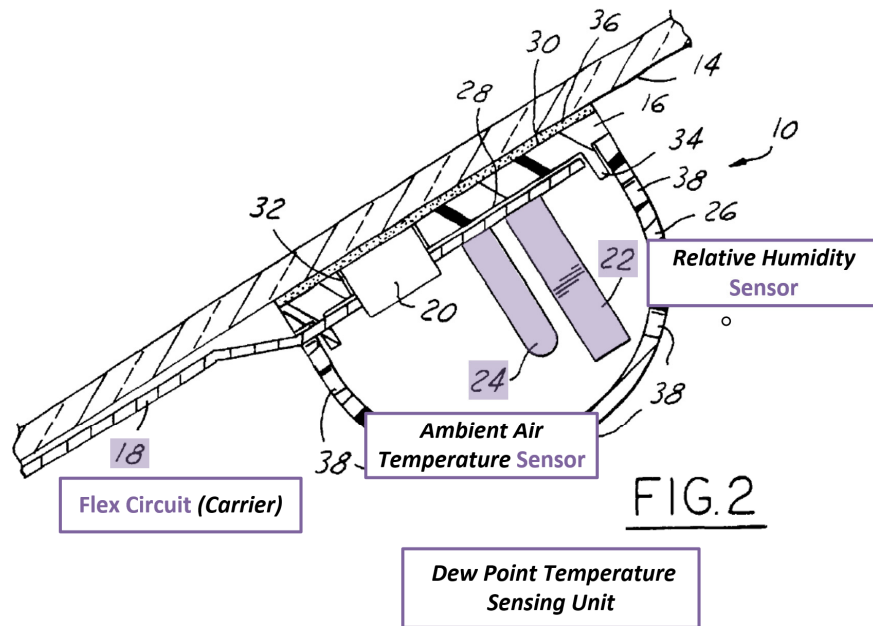
In pursuing the Carter-Beatenbough-King Combination, a POSITA would have contemplated locating a “*sensor unit*” according to King’s teachings such that the above-discussed glass *temperature sensor* is placed against—and, thus, *monitors the temperature of*—the outer glass pane supported by the *frame* of Beatenbough’s display case *door*. EX1003, ¶167.



See EX1003, ¶168 (discussing visual aid). It would have been an obvious alternative solution to locate a “*sensor unit*” like the one King teaches against the *display case frame* to monitor frame temperature, as was well known in the art and even taught by Carter (see Element[1.a], Ground 1A). EX1003, ¶169. As a POSITA would have appreciated, a frame-mounted deployment would position the sensor unit more discreetly without sacrificing its functional capabilities. *Id.*

Element[1.b]: a dew point sensing unit...

The Carter-Beatenbough-King Combination renders obvious Element[1.b]. EX1003, ¶¶170–172. As discussed at §V.B.3(b) and Element[1.a], the Combination features King’s teachings regarding a “*sensor unit*” in conjunction with teachings from Beatenbough and Carter regarding a *refrigerated display case* with a condensation control apparatus. King’s *sensor unit* includes “an *ambient air temperature* sensor, an ambient *humidity* sensor and a glass temperature sensor,” where “[t]he electrical connections are made by using a flex circuit.” EX1005, 1:54–60. The flex circuit (*carrier*) serves to physically locate and secure the sensors and functions as a “thermal barrier.” *See, e.g.*, EX1005, 1:66–2:7, 3:3–19 (“Sensors 20, 22, and 24 are typically soldered to flex circuit end 42.”). As in Beatenbough and Carter, King teaches that “humidity and ambient temperature values” produced by sensors 22 and 24 (*dew point sensing components*) are used “for the calculation of the ambient dew point.” EX1005, 3:21–4:10, Figure 4; *see also* 1:9–14, 2:52–60.



EX1005, Figure 2 (annotated).

The Board should reject any argument by Patent Owner that Element[1.a] and Element[1.b] require separate and distinct *carriers*. Each of these elements generically recites a carrier, using only the indefinite article “a” as a precursor without distinguishing labels or descriptions to indicate that no specific carrier is required. In each instance, any carrier will do. Thus, the scope of the ’181 patent’s Claim 1 includes (but is not limited to) embodiments where the carrier that satisfies Element[1.a] is the same carrier that satisfies Element[1.b]. Besides, even if these elements were erroneously interpreted to require two separate carriers, Claim 1 would be no less obvious.⁷ The notion of implementing King’s flex circuit (*carrier*)

⁷ See also Ground 1D, which relies separately on teachings from Carter and Kotani.

as a two-piece structure—one piece for the surface temperature sensor and another piece for the ambient temperature and relative humidity sensors—would have been an obvious design choice that a POSITA would have considered by applying ordinary skill and common sense to the sensor packaging problem at hand. EX1003, ¶172 (discussing the benefits of supporting different sensors using distinct flex circuits, e.g., for improved thermal isolation).

Element[1.c]: a control unit...

The Carter-Beatenbough-King Combination renders obvious Element[1.c]. EX1003, ¶¶173–175. As discussed at §V.B.3(a), the Combination employs Carter’s condensation control scheme in the context of Beatenbough’s refrigerated display case. The Combination thus renders obvious Element[1.c] for at least the same reasons presented above in Ground 1A regarding Carter.

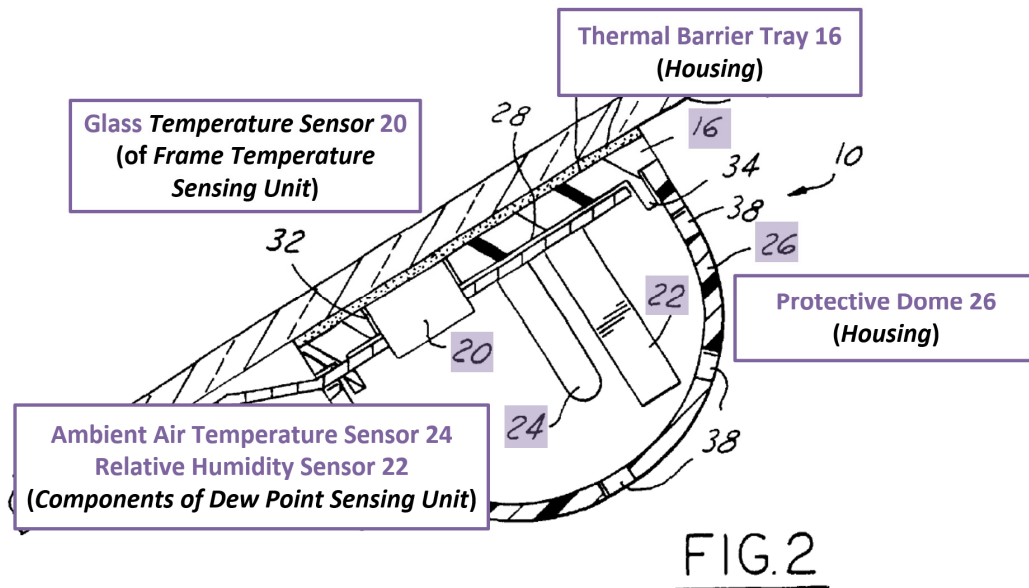
Additionally, Beatenbough’s teachings further support a conclusion of obviousness by disclosing the notion of implementing a condensation control scheme using a control unit with a “processor” that activates heating elements via “relays.” EX1006, Abstract, 1:46–2:3, 2:7–9, 2:59–3:9, 3:10–27. While these aspects of the ’181 patent’s corresponding structure for the claimed ***activating*** function are no doubt provided or rendered obvious by Carter, Beatenbough’s disclosure is even more explicit. EX1003, ¶174. More, in the event Patent Owner asserts a narrow interpretation of the claim term ***preselected set point***, Beatenbough

teaches the notion of providing user-adjustable “rotary dials” to “*set*” operational parameters for a condensation control scheme. EX1006, 3:45–4:6. Appreciating the benefits of increased flexibility and adaptability to different locations, climates, and conditions, a POSITA would have been motivated to apply Beatenbough’s teachings regarding operational setpoints that are selected by a user as a predictable improvement on Carter’s teaching to provide a “constant” buffer value of “2 degrees C.” EX1004, 5:21–54, Figure 3; EX1003, ¶175.

Element[1.d]: housing means...

The Carter-Beatenbough-King Combination renders obvious Element[1.d]. EX1003, ¶¶176–184. As discussed at §V.B.3(b), the Combination features King’s teachings regarding a “sensor unit” including a glass *temperature sensor* 20 (of the *frame temperature sensing unit*, per Element[1.a]), an ambient air temperature sensor 22, and relative humidity sensor 24 (*components* of the *dew point sensing unit*, per Element[1.b]). According to King, “[a]ll three sensors are located beneath a protective dome which is secured to a perimeter wall of [a thermal barrier] tray.” EX1005, 1:48–65, Figure 2. The tray “assures that surface temperature does not alter the ambient air temperature or relative humidity levels,” and “the protective dome surrounds, and serves to protect, the sensors from any impacts.” EX1005, 2:55–63; *see also* 1:48–65 (“The tray and the flex circuit also serve as a thermal barrier isolating the ambient air sensor and humidity sensor from the potentially cold

glass surface.”). In this way, the protective dome and the thermal barrier tray together form a *housing for locating the sensing units*. EX1003, ¶176.

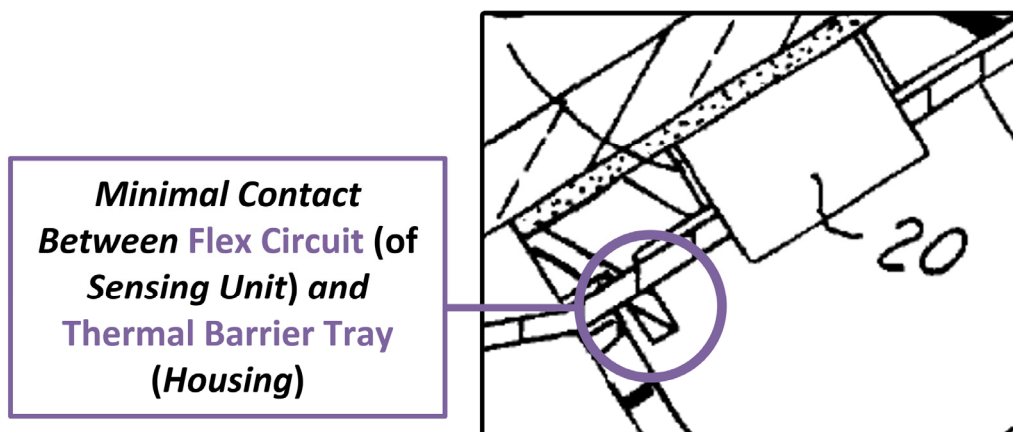


EX1005, Figure 2 (annotated). In addition to *housing* these *sensing units*, it would have been apparent or obvious to a POSITA that King’s dome-and-tray assembly also *includes* the claimed *structure establishing thermal isolation of the sensing units*. EX1003, ¶¶177–182.

To start, and for at least the following three reasons (taken individually or collectively), it would have been apparent or obvious to a POSITA from King’s disclosure that the *structure* of the dome-and-tray assembly (*housing*) has *minimized heat transfer contacts* with the *sensing units*. EX1003, ¶¶178–181. First, King teaches that the *sensing units* are secured to the dome-and-tray assembly (*housing*) by an interface between the flex circuit and the tray’s perimeter wall.

EX1005, 3:11–16 (“The conductor sensor end 42 [of the flex circuit 18] generally conforms to the perimeter wall 34, thereby securing the end 42 and soldered sensors 20, 22, and 24 to 15 the tray 16.”). King makes no mention of any further contact between the housing in the sensing units, and a POSITA would have appreciated that contact limited to the outer periphery of the flex circuit and the tray’s perimeter wall is *minimal*. EX1003, ¶179.

Second, King’s figures illustrate the *minimal heat transfer contact* between the *sensing units* and the dome-and-tray assembly (*housing*). EX1003, ¶180 (citing EX1005, Figures 1–2). Consistent with King’s description, the only contact interface King illustrates is at the periphery of the flex circuit and the perimeter wall of the tray, which a POSITA would have deemed *minimal*. *Id.*

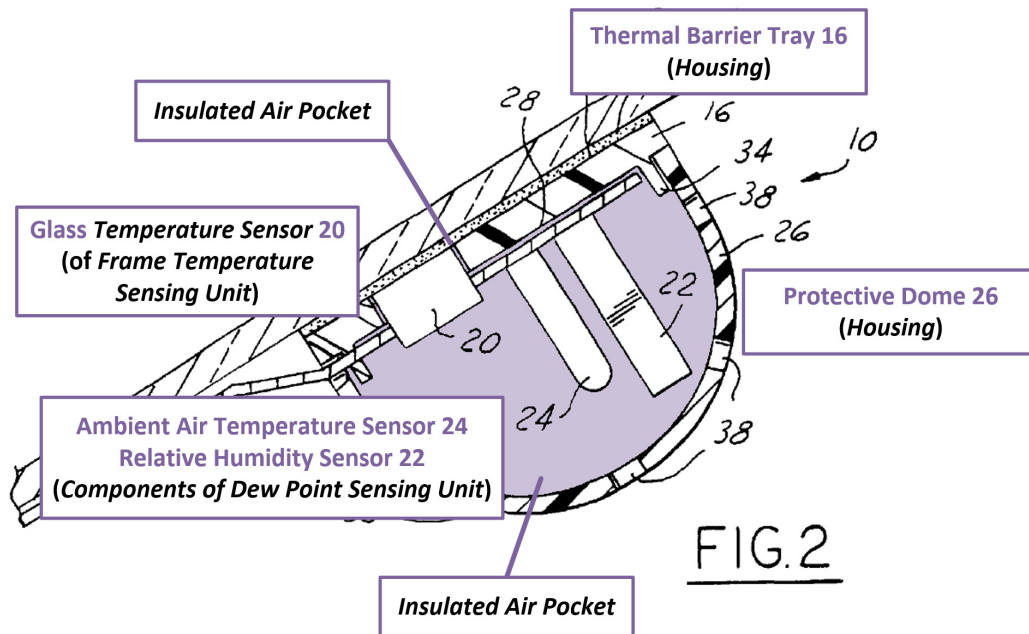


EX1005, Figure 2 (excerpted-annotated).

Third, as discussed above in Ground 1A, a POSITA would have been motivated to pursue the commonplace design goal of promoting sensor accuracy,

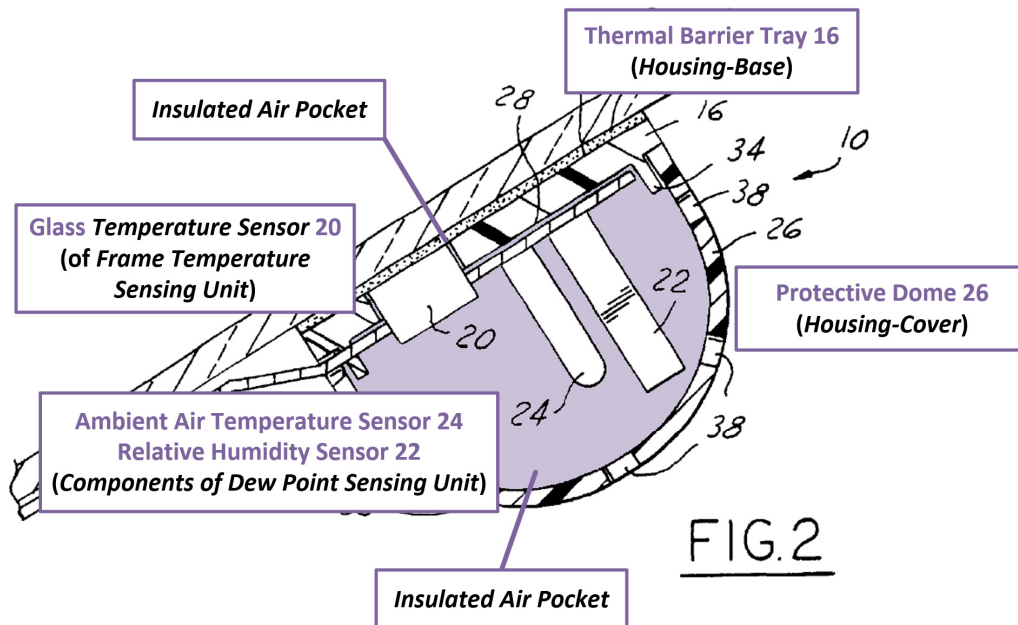
particularly in the context of a condensation control system reliant on sensor readings like that of the Carter-Beatenbough-King Combination. EX1003, ¶181, ¶¶42–49. To achieve this goal, the POSITA would have employed the known technique of *minimizing heat transfer contacts between the sensing units and* any potential heat sources/sinks—like the protective *housing*—that are not the subject of the respective sensor measurements. *Id.*

Additionally, it would have been apparent or obvious that the *structure* of King’s dome *housing* (dome 26 and tray 16) *locates the temperature sensor* (glass temperature sensor 20) *and the at least one dew point sensing component* (ambient air temperature sensor 22 and/or relative humidity sensor 24) *amid insulated air pockets formed by the structure of the housing*. EX1003, ¶182. For example, King’s figures show that these sensing components are received *amid insulated air pockets formed by the structure of the housing*. EX1005, 1:48–65 (“The glass temperature sensor sits within a hole, penetrating the tray and the flex circuit...[and a]ll three sensors are located beneath a protective dome which is secured to a perimeter wall of the tray.”), 2:40–3:2, Figures 1–2; EX1003, ¶182 (air is a thermal insulator); EX1001, 7:25–28 (“insulating air gap”).



EX1005, Figure 2 (annotated).

Having established that the Carter-Beatenbough-King Combination renders obvious the recited *locating* function of the claimed *housing means*, this analysis will now address the Combination with respect to the '181 patent's corresponding structure outlined above at §IV.B—namely a base and a cover that, when mated together, establish the claimed *insulated air pockets*. As shown below and discussed above, the Combination's *housing* likewise includes a base (thermal barrier tray, per King) and a mated cover (protective dome, per King) that together form *insulated air pockets* receiving temperature and dew point sensing components. EX1005, 1:48–65, 2:40–3:2, Figures 1–2; EX1003, ¶184.



EX1005, Figure 2 (annotated). Thus, in comparison to the '181 patent, the Carter-Beatenbough-King Combination includes a **housing** that accomplishes the claimed **locating** function in the same/substantially the same way—i.e., via a mated base and cover—to achieve the same/substantially the same result—i.e., receiving the sensing components within air pockets. EX1003, ¶184; *Odetics*, 185 F.3d at 1267.

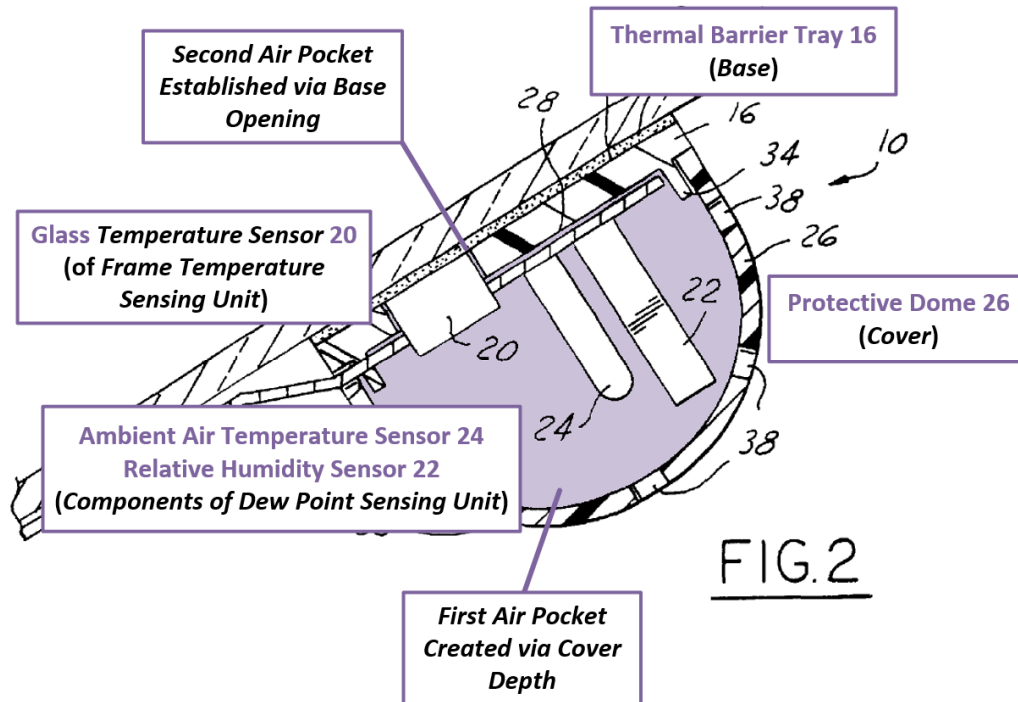
(b) **Claim 2**

Element[2]:

The Carter-Beatenbough-King Combination renders obvious Element[2]. As discussed at Element[1.d], King teaches a **housing** having a **base** (thermal barrier tray) and a mated **cover** (protective dome) that together **create air pockets** around the **frame temperature sensing unit** (glass temperature sensor, per Element[1.a]). King's Figure 2 shows that **the cover has a depth creating a first air pocket, and**

the base includes an opening for receiving the temperature sensor, the opening having an opening area greater than surface area of the temperature sensor thus establishing a second one of said air pockets around the temperature sensor.

EX1003, ¶185.



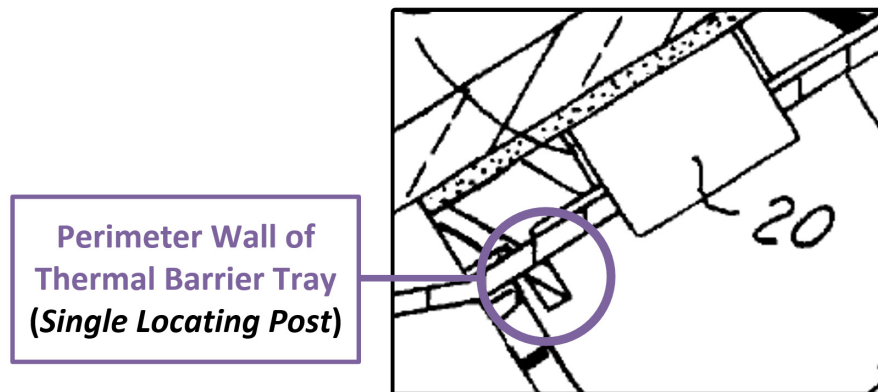
EX1005, Figure 2 (annotated).

(c) **Claim 3**

Element[3]:

The Carter-Beatenbough-King Combination renders obvious Element[3]. As discussed above at Element[1.d], King's ***housing*** provides a single contact interface between the flex circuit 18 and the perimeter wall 34 of the tray 16, which serves as ***a single locating post for securing the position of the temperature sensing unit***

relative to the protective dome 26 (*cover*). See EX1005, 3:11–16 (“The conductor sensor end 42 [of the flex circuit 18] generally conforms to the perimeter wall 34, thereby securing the end 42 and soldered sensors 20, 22, and 24 to 15 the tray 16.”); EX1003, ¶186. As shown below, the perimeter wall 34 (*locating post*) is proximate and adjacent to (*at*) the protective dome 26 (*cover*).



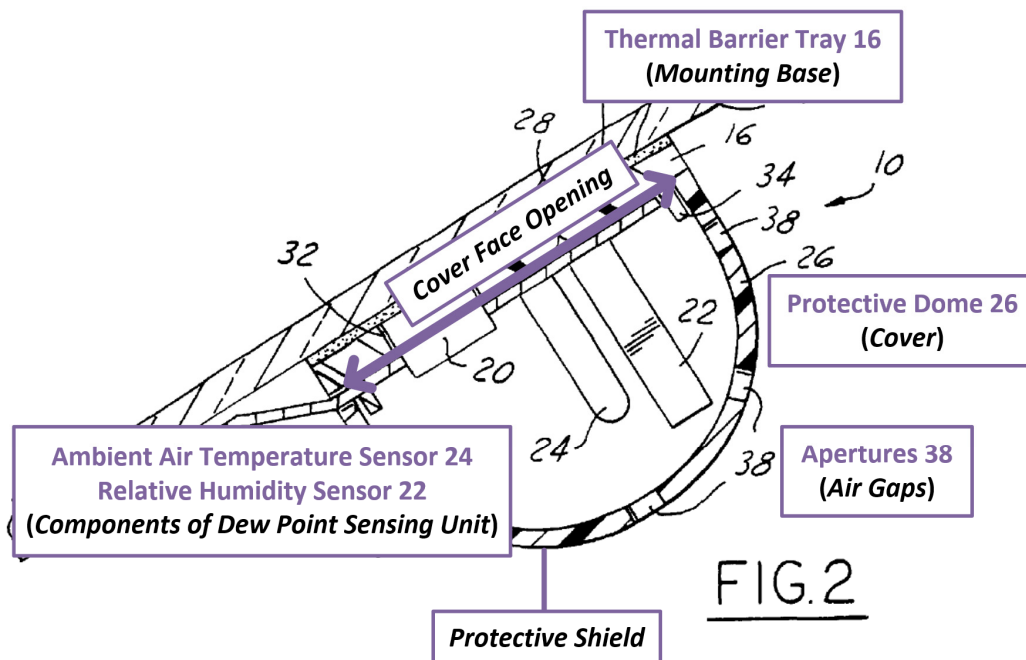
EX1005, Figure 2 (excerpted-annotated).

Additionally, if Element[3] is interpreted more narrowly, it would have been a binary design choice—and thus obvious—to incorporate the *locating post* as part of the protective dome 26 (*cover*) rather than the thermal barrier tray 16. EX1003, ¶187. As a POSITA would have recognized, there are only two components to the *housing*—the tray (*base*) and dome (*cover*)—and the *locating post* used to secure the flex circuit (and thus the *sensors*) can be part of either housing component without changing its function of effectiveness. *Id.*

(d) Claim 4

Element[4]:

The Carter-Beatenbough-King Combination renders obvious Element[4]. As discussed at Element[1.d], King teaches a *housing* having a *mounting base* (thermal barrier tray) and a mated *cover* (protective dome) that *create air pockets* within which *components* of the *dew point sensing unit* (air temperature and humidity sensors, per Element[1.b]) reside. King's Figure 2 shows that the *cover includes a cover face opening therethrough for receiving the dew point sensing components therein, the cover face opening including a protective shield thereover having air gaps therearound allowing air flow between the protective shield and the cover and thus over the at least one dew point sensing component*. EX1003, ¶188.

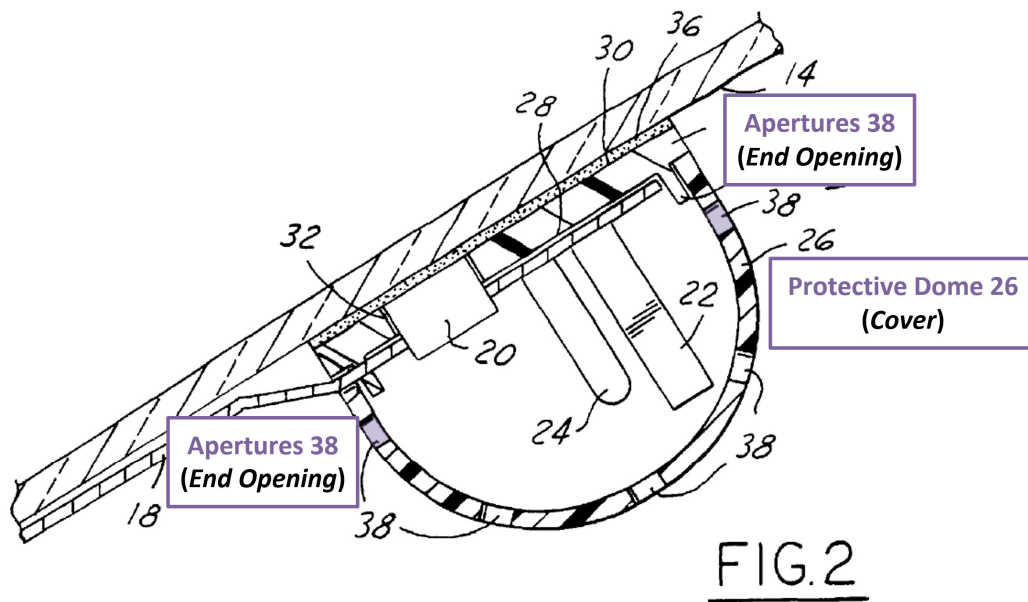


EX1005, Figure 2 (annotated); see also 2:61–3:2.

(e) **Claim 5**

Element[5]:

The Carter-Beatenbough-King Combination renders obvious Element[5]. King's Figure 2 shows that the *cover includes opposite end openings to establish ambient air flow through the dew point sensing unit housing*. EX1003, ¶189; *supra*, Elements[1.d], [4].



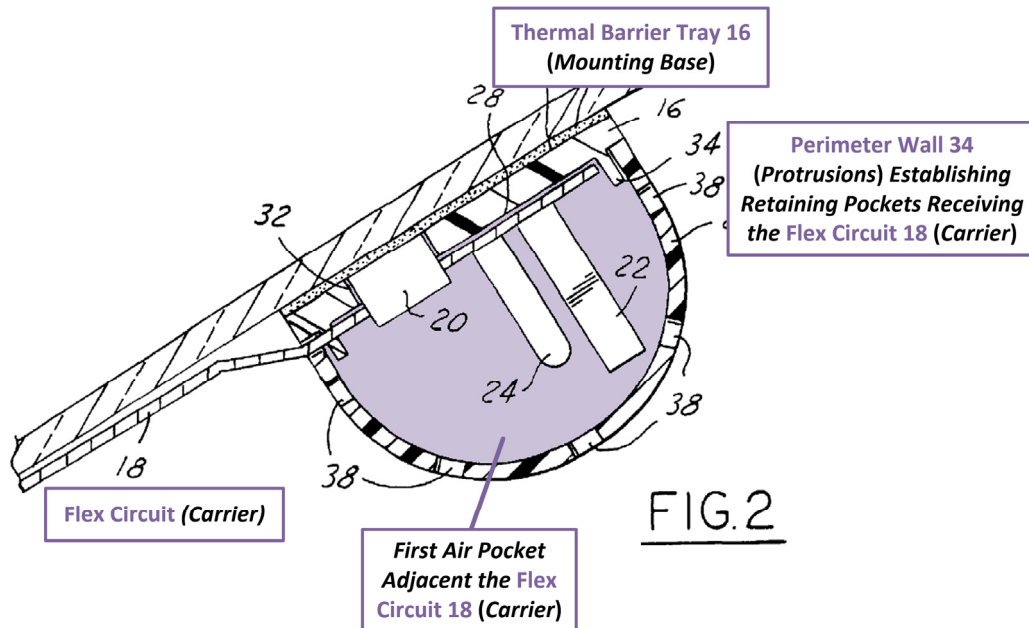
EX1005, Figure 2 (annotated).

(f) **Claim 6**

Element[6]:

The Carter-Beatenbough-King Combination renders obvious Element[6]. EX1003, ¶¶190–191. As discussed above at Elements[1.d], [4], King's *dew point sensing unit housing* provides a contact interface between the flex circuit 18 (*carrier*, per Element[1.b]) and the perimeter wall 34 of the tray 16 (*mounting base*).

See EX1005, 3:11–16 (“The conductor sensor end 42 [of the flex circuit 18] generally conforms to the perimeter wall 34, thereby securing the end 42 and soldered sensors 20, 22, and 24 to 15 the tray 16.”). King’s Figure 2 shows that the tray’s perimeter wall 34 provides *protrusions establishing retaining pockets receiving the carrier* (flex circuit) *of the dew point sensing unit* (including sensors 22, 24) *at outer edges of the carrier* (flex circuit) *and further establishing a first one of the air pockets*. EX1003, ¶190.

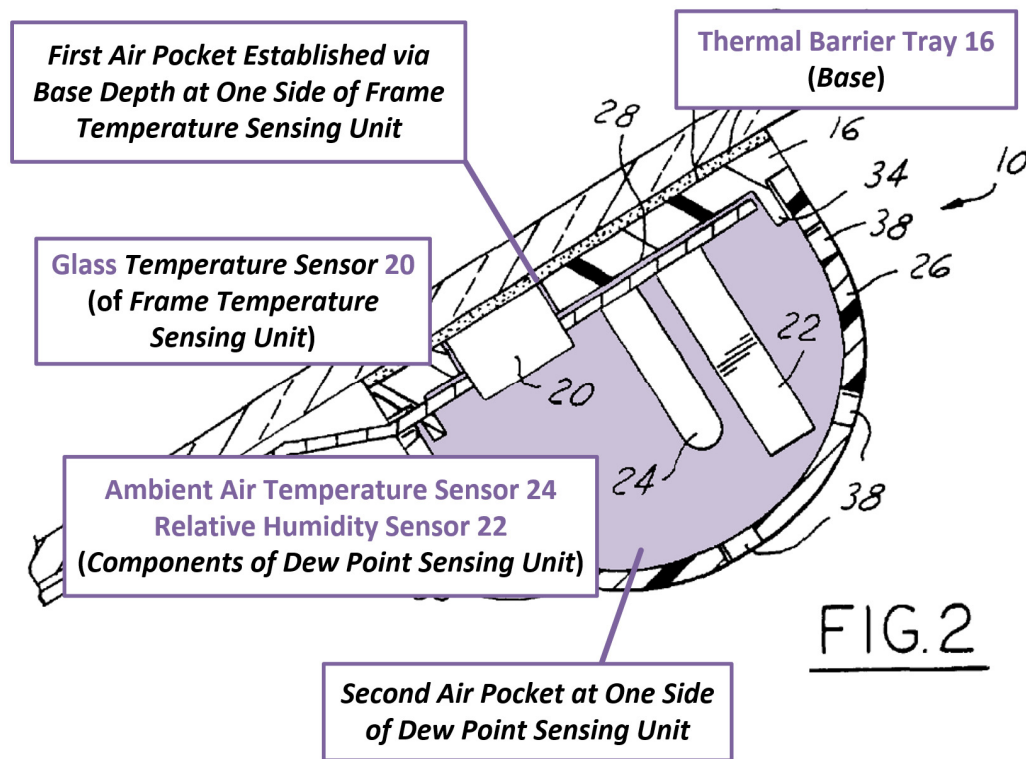


EX1005, Figure 2 (annotated). Notably, Patent Owner points to a similar perimeter wall around a printed circuit board as the claimed *protrusions* of Element[6] in its district court infringement allegations against Petitioner. See EX1037, p.121.

(g) Claim 7

Element[7]:

The Carter-Beatenbough-King Combination renders obvious Element[7]. As discussed at Element[1.d], King teaches a ***housing*** having a ***base*** (thermal barrier tray) and a mated ***cover*** (protective dome) that together ***create air pockets*** around the ***frame temperature sensing unit*** (including glass temperature sensor, per Element[1.a]) and ***components*** of the ***dew point sensing unit*** (including ambient air temperature sensor 22 and relative humidity sensor 24, per Element[1.b]). As discussed at Element[4], which includes verbatim language, King further teaches the claimed limitations regarding ***a cover face opening***. EX1003, ¶192. Further still, and consistent with the analysis at Elements[1.d] and [2], King's Figure 2 shows that ***the base has depth creating a first one of said air pockets at least at one side of said temperature sensing unit and a second one of said air pockets at one side of said dew point sensing unit. Id.***



EX1005, Figure 2 (annotated).

(h) Claim 14

Element[14.pre]: A system for condensation control...

See Element[1.pre], Ground 1B. EX1003, ¶193.

Element[14.a]: a temperature sensing unit...

See Element[1.a], Ground 1B (frame-mounted sensor option). EX1003, ¶194.

Element[14.b]: a dew point sensing unit...

See Element[1.b], Ground 1B. EX1003, ¶195.

Element[14.c]: control means...

See Element[1.c], Ground 1B (the Combination includes Carter's teachings regarding a condensation control scheme) and Elements[1.c] and [14.c], Ground 1A

(Carter's teachings render obvious the activating/deactivating functions and at least equivalent structure to that of the '181 patent). EX1003, ¶196.

(i) **Claim 15**

Element[15]:

See Element[1.d], Ground 1B (King's teachings regarding housing means for thermally isolating the dew point sensing unit amid insulated air pockets). EX1003, ¶197.

(j) **Claim 16**

Element[16]:

See Element[1.d], Ground 1B (King's teachings regarding housing means for thermally isolating the frame temperature sensing unit amid insulated air pockets). EX1003, ¶198.

(k) **Claim 17**

Element[17]:

See Element[17], Ground 1A. EX1003, ¶199.

(l) **Claim 18**

Element[18]:

See Element[18], Ground 1A. EX1003, ¶200.

C. GROUND 1C: Claims 17–20 Are Obvious Over Carter, Beatenbough, King, and Gatling

1. Gatling (EX1007)

Gatling describes a system for “monitoring and controlling temperature” in an array of refrigerated display cases. EX1007, 1:7–10, Abstract; EX1003, ¶201. Among other things, Gatling discloses placing a “product-simulating probe 50” in each refrigerated case to measure the temperature within. EX1007, 4:66–5:15. The probe wirelessly transmits temperature data to a receiver, which, in turn, transmits the data to a controller that “logs and analyzes the temperature data and controls the temperature of the display case[.]” EX1007, 6:15–24.

2. Obviousness Analysis

(a) Claim 17

Element[17]:

The Carter-Beatenbough-King-Gatling Combination renders obvious Element[17]. EX1003, ¶¶202–204. The Combination includes Gatling’s teachings to control the refrigeration of a *display case* based on “multiple temperature readings including air-discharge temperature sensed by a discharge temperature sensor and/or food product temperatures approximated by a product simulating probe.” EX1007, 4:58–65 (reference numbers omitted); *see also* 1:40–54, 3:16–4:5, 6:15–24, 6:41–61, 7:20–8:12, Figures 1, 5–8. Per Gatling, the discharge temperature sensor and product simulating probe (individually or collectively, *internal case temperature*

sensing unit) are mounted inside the display case for monitoring internal case temperatures. Id.

A POSITA would have been motivated to incorporate Gatling's above-discussed teachings with Carter-Beatenbough-King and would have had a reasonable expectation of success in doing so. EX1003, ¶203. First, using temperature sensors within a refrigerated display case for monitoring temperatures within the case, as Gatling teaches, was well known at the time of the '181 patent for the beneficial purpose of facilitating closed-loop refrigeration/temperature control and ensuring product quality. EX1003, ¶203 (citing EX1007, 1:40–45). Second, even if internal case temperature sensors were not so ubiquitous (which they were), a POSITA would have (i) appreciated that one basic design goal of a refrigerated display case is to achieve a target operating temperature and (ii) recognized that a common-sense approach to achieving that goal includes monitoring the existing temperature within the case. EX1003, ¶203.

More, as discussed at Element[17] of Ground 1A, it would have been an obvious design choice to use a common *control means* for controlling all the various functions of the refrigerated display case and, thus, *communicating with* all the various sensors—including the *internal case temperature sensing unit*, the frame temperature sensing unit, and the dew point sensing unit. EX1003, ¶204.

(b) **Claim 18**

Element[18]:

The Carter-Beatenbough-King-Gatling Combination renders obvious Element[18] for at least the same reasons discussed above at Element[18] of Grounds 1A–1B. EX1003, ¶¶205–206. In addition to the above-discussed understanding of a POSITA in view of Carter’s teachings, Gatling reinforces that the Combination includes *storing means for storing data related to readings at said sensing units and operation of the frame/door heater*. EX1003, ¶206. Gatling, for example, teaches a controller for a refrigerated display case with data “logging capabilities.” EX1007, 3:40–43, 6:15–24, 6:62–7:3, 1:40–41. A POSITA would have been motivated to include a long-term *storage means* (e.g., non-volatile memory) logging *sensor readings* and *heater operation* data for the purpose of facilitating system performance analyses. EX1003, ¶206, ¶53.

(c) **Claim 19**

Element[19]:

The Carter-Beatenbough-King-Gatling Combination renders obvious Element[19]. EX1003, ¶¶207–208. For example, Gatling teaches the notion of *wirelessly accessing stored data* from a refrigerated display case for the beneficial purpose of avoiding “expensive and extremely cumbersome” wired communications. EX1007, 1:1–3, 1:40–54, 1:55–2:6, 5:12–30, 6:25–61, Figures 6–

7. More, Gatling teaches a “wireless transceiver” for carrying out this function, which mirrors (or is at least equivalent to) the ’181 patent’s corresponding structure of a “communications board/transmitter/receiver.” *Id.*; EX1001, 5:33–6:8; *see also* EX1003, ¶207; *supra*, §IV.I (claim construction).

A POSITA would have been motivated to employ Gatling’s teachings regarding a *means for wirelessly accessing stored data* for the purpose of communicating data from the above-discussed data *storing means* (*supra*, Element[18]) to a remote computing device. EX1003, ¶208. For one, the POSITA would have appreciated that the data storage, processing, and human interface capabilities on a refrigerated display case are limited compared to that of a personal computer, server, or workstation. *Id.* Accordingly, the POSITA would have been motivated to convey data collected and stored on the case to a more capable central computing device. *Id.* And the POSITA would have been motivated to do so using a wireless transceiver to obtain the predictable cost, flexibility, and scalability benefits over wired transmission lines. *Id.*

(d) **Claim 20**

Element[20]:

The Carter-Beatenbough-King-Gatling Combination renders obvious Element[20]. EX1003, ¶¶209–210. As discussed at Element[1.c] of Ground 1B, the Combination includes Beatenbough’s teachings on providing *updatable control*

parameters—set points—for a condensation control scheme implemented by the *control means to activate/deactivate a frame/door heater based on monitored frame temperature, ambient air temperature, and relative humidity*. EX1006, 3:45–4:6; *supra*, Element[14.c] of Grounds 1A and 1B. Additionally, as discussed at Element[19] of Ground 1C, Gatling teaches a wireless transceiver (*means for wirelessly accessing data*) for communicating *remotely*. EX1007, 1:1–3, 1:40–54, 1:55–2:6, 5:12–30, 6:25–61, Figures 6–7. A POSITA would have been motivated to employ Gatling’s teachings on wireless communications/transceivers to predictably enhance Beatenbough’s teachings on updatable control parameters, allowing updates to be made more easily—i.e., via a remote computer rather than manual rotary dials. EX1003, ¶210 (citing EX1007, 4:2–5), ¶55.

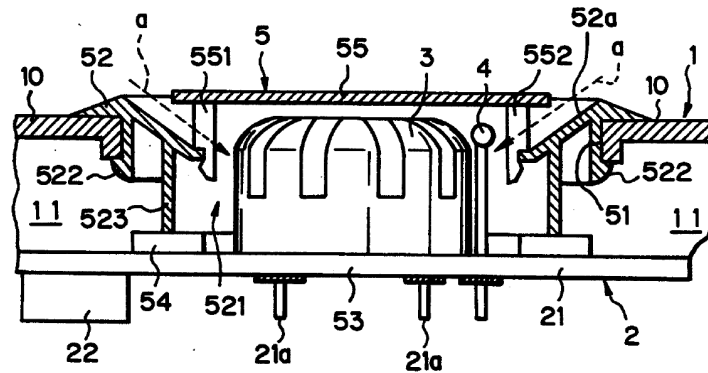
D. GROUND 1D: Claims 1–6 Are Obvious Over Carter, Beatenbough, and Kotani

1. Kotani (EX1008)

(a) Brief Summary of Kotani’s Disclosure

Kotani describes a “humidity meter” mounted on a printed circuit board. EX1008, Abstract, 1:8–12; EX1003, ¶211. Kotani’s humidity meter includes a humidity sensor assembly 3 and a temperature sensor 4, both mounted in a shared sensor room 5. EX1008, 2:35–40, 2:63–3:1, 5:30–38. As in the ’181 patent, Kotani’s “sensor room 5 is completely separated from the inner space 11 of the housing 1 so that the humidity sensor assembly 3 is disposed in open air.” EX1008,

2:63–66, 3:32–36. This configuration also causes the sensor room to be “thermally separated,” such that the sensor elements are “not influenced by heat dispersed by other circuits and provides accurate measure[ments].” EX1008, 5:39–44.



EX1008, Figure 2A.

(b) Kotani Is Analogous Art

Kotani is analogous art to the '181 patent, satisfying at least the reasonable pertinence prong of the test. EX1003, ¶¶212–213; *In re Bigio*, 381 F.3d at 1325. Kotani and the '181 patent similarly address the design problem of provisioning a housing for a sensor package including an ambient air temperature sensor and a relative humidity temperature sensor. Compare §II.A (summarizing the '181 patent), with §V.D.1(a) (summarizing Kotani). In both Kotani and the '181 patent, the design problem involves mechanically supporting, electrically connecting, and thermally isolating the sensors. EX1003, ¶¶212–213. Kotani is therefore reasonably pertinent to at least one of the problems that the '181 patent's inventors were trying to solve. *Id.*; see also *Donner Tech.*, 979 F.3d at 1359–61.

2. Motivation to Combine and Reasonable Expectation of Success

The Carter-Beatenbough-Kotani Combination represents the predictable and expected result of applying in the context of Beatenbough's refrigerated display case with condensation control capabilities: **(a)** Carter's complementary teachings on triggering heater activation/deactivation based on door/frame surface temperature sensed by a surface temperature sensor; and **(b)** Kotani's complementary teachings on a "humidity meter" for implementing the Carter-Beatenbough condensation control scheme. EX1003, ¶214. From a POSITA's perspective in 2005, integrating the complementary teachings of Carter, Beatenbough, and Kotani would have involved nothing more than applying known solutions to known problems and achieving predictable outcomes. *Id.* The fundamental aspects of Beatenbough's disclosure would remain intact, bolstered by the beneficial teachings of Carter and Kotani in a way that the POSITA would reasonably expect to succeed. *Id.*

The discussion above in Ground 1B sets forth a POSITA's motivation to combine the teachings of Beatenbough and Carter to provide a refrigerated display case with a comprehensive condensation control system. Ground 1D combines Beatenbough and Carter in substantially the same way as Ground 1B, differing only in that Ground 1D further incorporates Carter's teachings directed to a surface temperature sensor mounted to and monitoring the frame of the case (as set forth in

Ground 1A). The Ground 1B motivation-to-combine discussion is fully incorporated here in Ground 1D. These motivation rationales support the Carter-Beatenbough Combination as to both Carter's condensation control scheme and the concomitant surface temperature sensor, the latter providing sensor readings on which the former relies. EX1003, ¶215.

A POSITA would have been further motivated to incorporate Kotani's teachings of a "humidity meter" with a relative humidity sensor and an ambient air temperature sensor for implementing the Carter-Beatenbough condensation control scheme. EX1003, ¶216. The following reasons, taken separately or collectively, support the Carter-Beatenbough-Kotani Combination. EX1003, ¶¶217–220.

First, a POSITA would have been prompted to integrate Kotani's teachings with Carter and Beatenbough based on the following understandings:

- (i) that the Carter-Beatenbough condensation control scheme relies on ambient air temperature and relative humidity sensor readings;
- (ii) that the housing and mounting accommodations for these sensors significantly impacts the accuracy of their sensor readings, and
- (iii) that the accuracy of the sensor readings significantly impacts whether the heater on the refrigeration case is operated effectively and efficiently, as envisioned by Carter and Beatenbough.

EX1003, ¶217, ¶¶42–49. Thus, when tasked with implementing the Carter-Beatenbough condensation control scheme, the POSITA would have faced a routine

sensor packaging problem. *Id.* Recognizing that Kotani’s disclosure represents a known, suitable, and “simple” solution to this problem—one that specifically addresses the ambient temperature and relative humidity sensors at issue—the POSITA would have been motivated to make the Carter-Beatenbough-Kotani Combination. *Id.* (citing EX1008, 1:34–62).

Second, a POSITA would have been motivated to make the Carter-Beatenbough-Kotani Combination because Kotani’s teachings have the advantage of providing a modular unit including, (i) the relative humidity and ambient temperature sensors; (ii) a supporting substrate for the sensors; (iii) electronic circuits for processing the sensor output; and (iv) a single housing. EX1003, ¶218. The POSITA would have appreciated the known benefits of a modular sensor design like Kotani’s. EX1003, ¶¶218–219 (“simplified installation,” etc.).

Third, the POSITA would have appreciated that Kotani’s modular sensor package is further beneficial in that the housing is specifically designed to support and protect the sensors, while at the same time promoting sensor accuracy by providing sufficient thermal isolation and exposure to ambient airflow. EX1003, ¶220 (citing EX1008, 1:50–62).

3. Claim Element Analysis

(a) Claim 1

Element[1.pre]: Condensation control apparatus...

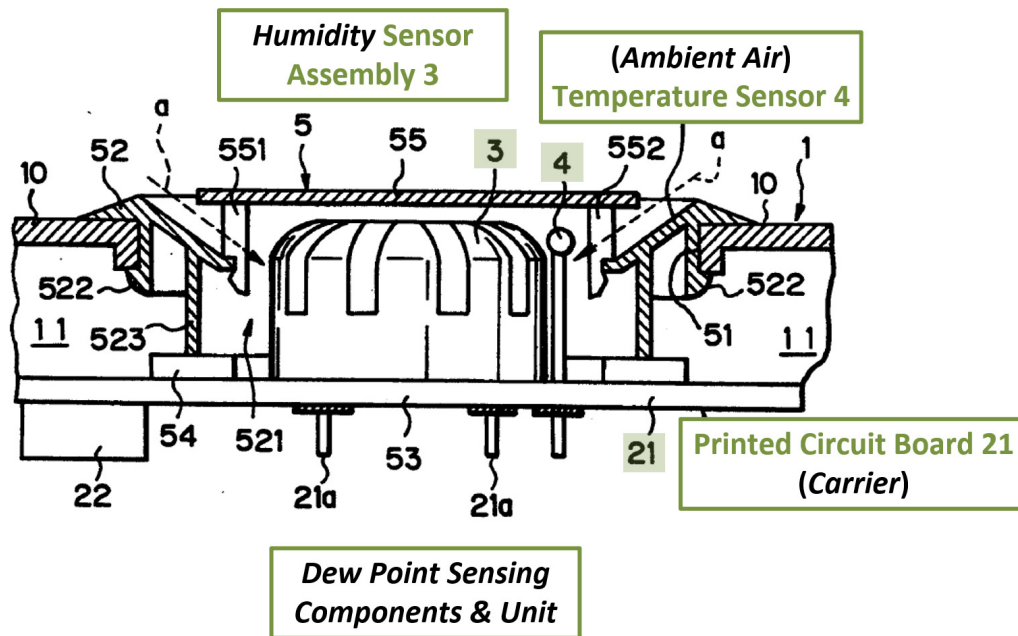
See Element[1.pre], Ground 1B (the combination of teachings from Carter and Beatenbough). EX1003, ¶221.

Element[1.a]: a frame temperature sensing unit...

See Element[1.a], Ground 1A (Carter’s teachings). EX1003, ¶222.

Element[1.b]: a dew point sensing unit...

The Carter-Beatenbough-Kotani Combination renders obvious Element[1.b]. EX1003, ¶223. As discussed at §V.D.2, the Combination includes the application of Kotani’s “humidity meter” (*dew point sensing unit*) ***for monitoring ambient air and relative humidity outside of the display case***. EX1008, 2:29–62, 2:63–3:13 (the sensors are “disposed in open air”), 3:51–4:18 (the output “is linearly proportional to measured relative humidity”), 5:30–44 (“the present device may indicate both humidity and temperature”), Figures 1–3. To this end, Kotani’s humidity meter includes a humidity sensor assembly 3 and a temperature sensor 4 (*dew point sensing components*) mounted on (*at*) a printed circuit board 21 (*carrier*). *Id.*



EX1008, Figure 2A (annotated).

Element[1.c]: a control unit...

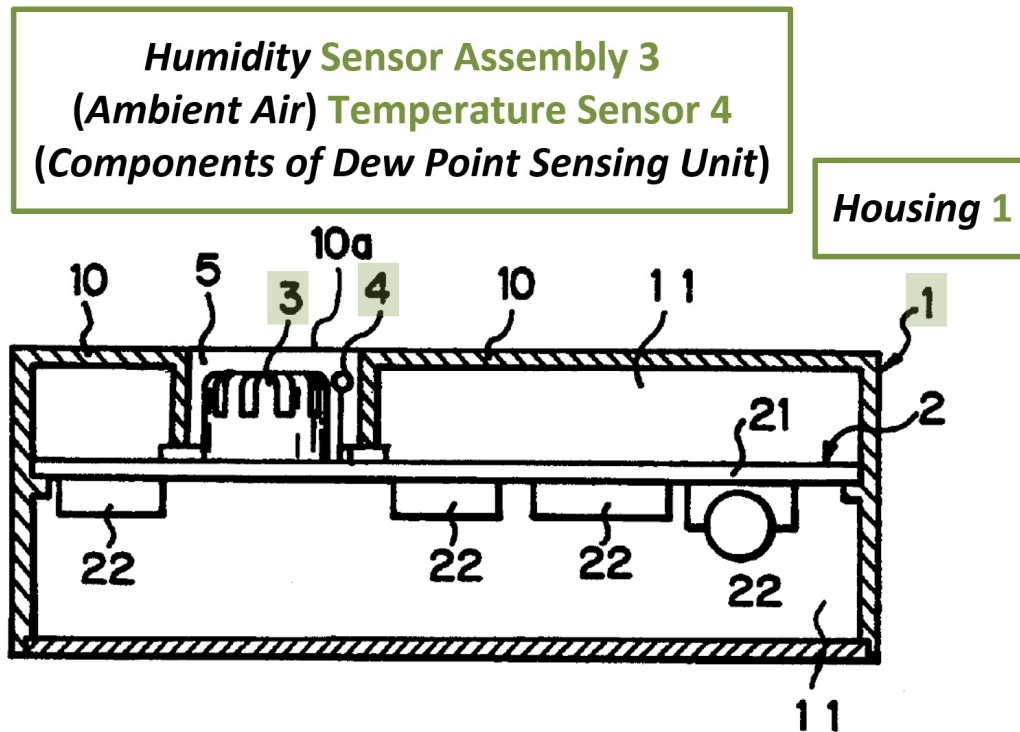
See Element[1.c], Ground 1B (the combination of teachings from Carter and Beatenbough). EX1003, ¶224.

Element[1.d]: housing means...

The Carter-Beatenbough-Kotani Combination renders obvious Element[1.d]. EX1003, ¶225–234.

The analysis above at Element[1.d], Ground 1A, incorporated fully here, addresses the functional and structural aspects of the claimed ***housing means*** concerning the ***frame temperature sensing unit*** and its ***temperature sensor*** based on Carter’s teachings. As for the aspects of the claimed ***housing means*** pertaining to the ***dew point sensing unit***, the Combination incorporates Kotani’s teachings

regarding a *housing* 1 for *locating* the humidity sensor assembly 3 and the temperature sensor 4 (independently or collectively, *dew point sensing components*, per Element[1.b]) within a sensor room 5. EX1008, 2:29–3:50, Figures 1–2B; *supra*, §V.D.2 (motivation-to-combine).



EX1008, Figure 2B (annotated). Additionally, it would have been apparent or obvious to a POSITA that Kotani's *housing* also *includes* the claimed *structure establishing thermal isolation of the sensing units*. EX1003, ¶227.

To start, and for at least the following three reasons (taken individually or collectively), it would have been apparent or obvious to a POSITA from Kotani's

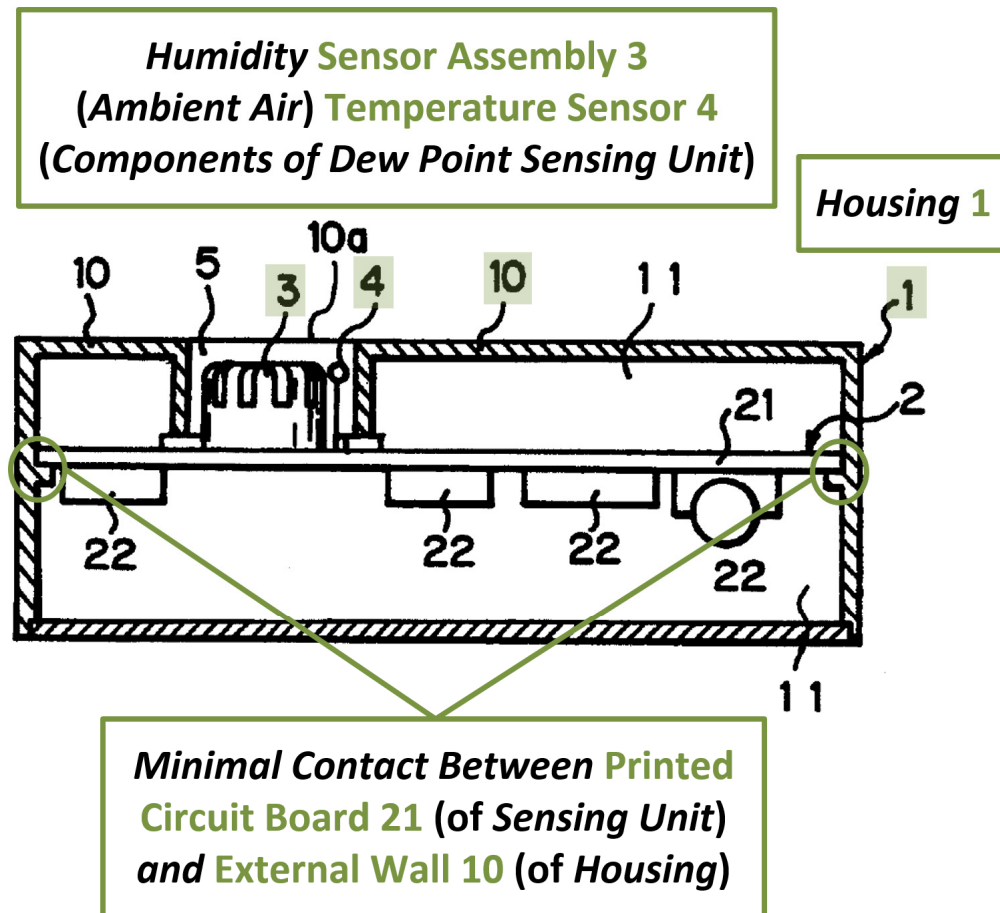
disclosure that the *structure* of the *housing* has *minimized heat transfer contacts* with the *dew point sensing unit*. EX1003, ¶¶228–231.

First, Kotani suggests as much by emphasizing that the “sensor room” within which the humidity sensor assembly and temperature sensor are situated is “thermally separated” or “isolated” from the remainder of the housing to promote “accurate[]” measurements. EX1008, 1:34–62, 5:39–44, 5:53–6:18; *see also* 2:35–54, 3:14–50. As a POSITA would have known, the accuracy of humidity and temperature readings is diminished by inadvertent heat transfer—i.e., heat transfer between the sensing elements and a source other than the subject of the measurement. EX1003, ¶229, ¶¶42–49. Here, where the subject of the measurement is ambient air, achieving the benefit of “accurate[]” sensor readings, as Kotani expressly promotes, would naturally entail *minimizing heat transfer contacts between the dew point sensing unit and* other heat sources/sinks, including the *housing*. EX1003, ¶229.

Second, even without Kotani’s teaching to promote sensor accuracy, doing so was a known design goal that a POSITA would have sought to achieve in the normal course of considering a control system like that of the Carter-Beatenbough-Kotani Combination, which relies on sensor readings to efficiently operate heating elements in a manner that prevents condensation. EX1003, ¶230. Motivated by the benefit of promoting sensor accuracy, the POSITA would have employed the known

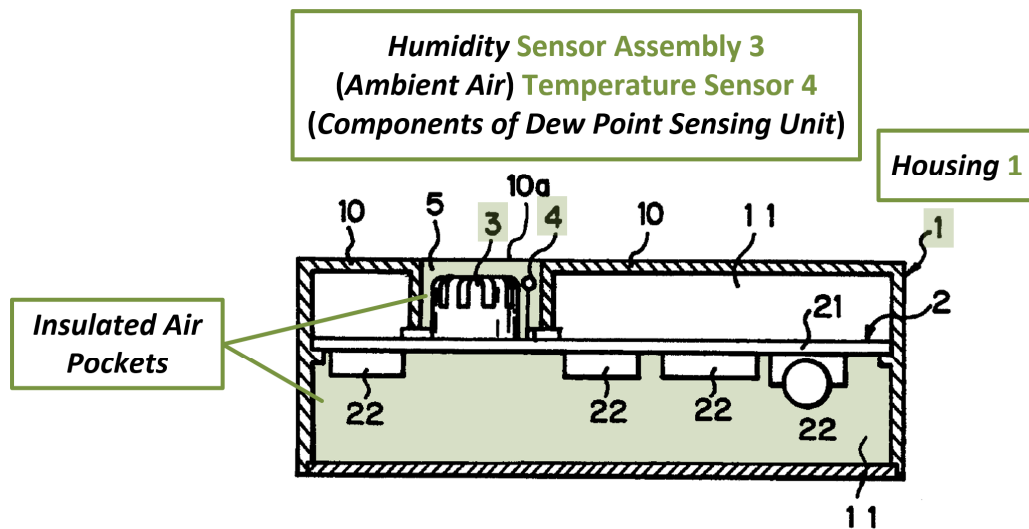
technique of *minimizing heat transfer contacts between the dew point sensing unit and their housing* enclosure. *Id.*

Third, Kotani's Figures 1–2B (below) illustrate an arrangement where there is *minimal heat transfer contact between the dew point sensing unit and the housing*. EX1003, ¶231. Specifically, these figures show that the only contact between the housing's outer wall and the dew point sensing unit is a *minimal* engagement along the periphery of the PCB. *Id.*



EX1008, Figure 1 (annotated); see also Figures 2A–2B.

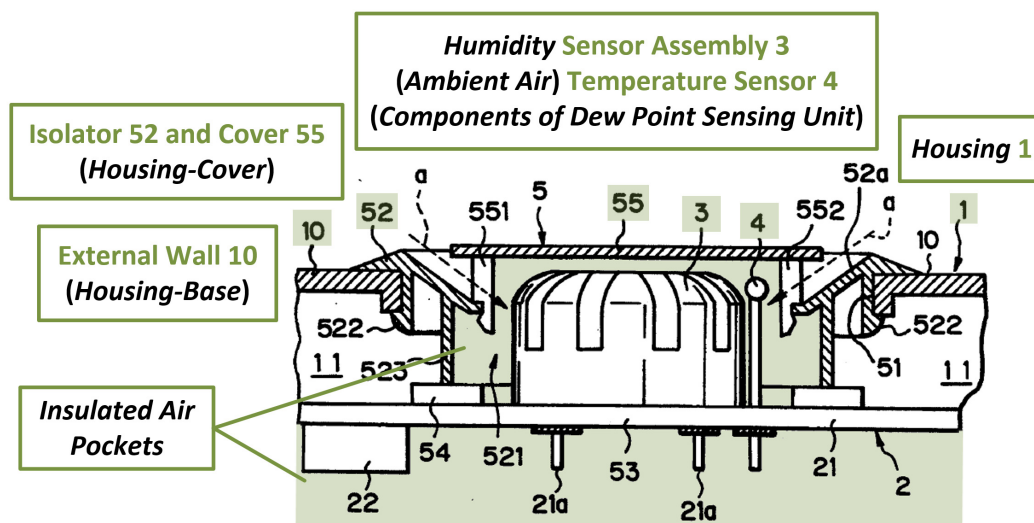
Additionally, it would have been apparent or obvious that the *structure* of Kotani's *housing locates the at least one dew point sensing component* (including humidity sensor assembly 3 and/or temperature sensor 4 and the supporting PCB carrier) *amid insulated air pockets formed by the structure of the housing*. EX1003, ¶232. To wit, Kotani explains that these components are mounted *amid insulated air pockets formed by the structure of the housing*—namely, the “sensor room 5” and the “inner space 11 of the housing 1,” which are sealed from one another. EX1008, 2:35–3:50, Figures 1–2B; EX1003, ¶232; EX1001, 7:25–28 (“insulating air gap”).



EX1008, Figure 1 (annotated); *see also* Figures 2A–2B.

Having established that Kotani teaches or renders obvious the recited *locating* function of the claimed *housing means*, this analysis will now address Kotani's teachings with respect to the '181 patent's corresponding structure outlined above at

§IV.B. As shown below and discussed above, Kotani’s ***housing*** likewise includes a base (external housing wall 10) and a mated cover (isolator 52 and cover 55) that together form ***insulated air pockets*** receiving temperature and dew point sensing components. EX1008, 2:35–3:50, Figures 1–2B; EX1003, ¶234.



EX1008, Figure 2A (annotated). Thus, in comparison to the '181 patent, Kotani teaches a ***housing*** solution that accomplishes the claimed ***locating*** function in the same/substantially the same way—i.e., via a mated base and cover—to achieve the same/substantially the same result—i.e., receiving the sensing components within air pockets. EX1003, ¶234; *Odetics*, 185 F.3d at 1267.

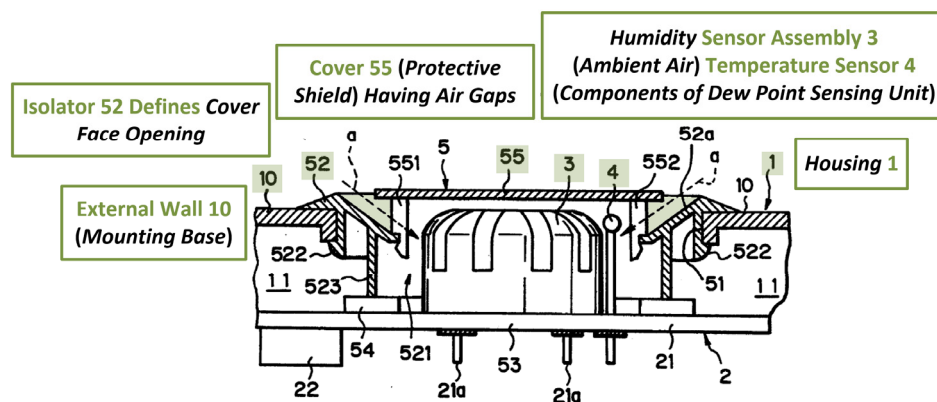
(b) Claims 2–3

See Claims 2–3 of Ground 1A (Carter’s teachings). EX1003, ¶235.

(c) Claim 4

Element[4]:

The Carter-Beatenbough-Kotani Combination renders obvious Element[4]. As discussed at Element[1.d], Kotani teaches a *housing* having a *mounting base* (external housing wall 10) and a mated *cover* (isolator 52 and cover 55) that together *create air pockets* within which *components* of the *dew point sensing unit* (including humidity sensor assembly 3 and/or temperature sensor 4 and the supporting PCB carrier, per Element[1.b]) reside. Kotani's Figure 2A shows that the *cover includes a cover face opening* (defined by isolator 52) *therethrough for receiving the dew point sensing components therein, the cover face opening including a protective shield* (cover 55) *thereover having air gaps therearound allowing air flow between the protective shield and the cover and thus over the at least one dew point sensing component*. EX1003, ¶236.

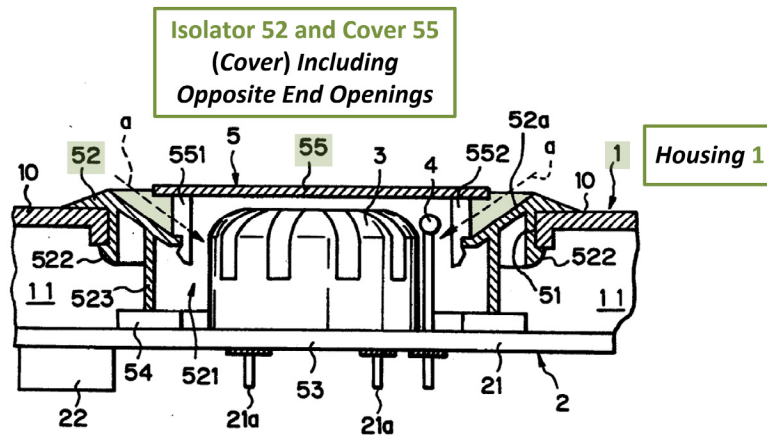


EX1008, Figure 2A (annotated); see also 2:35–3:50, Figures 1–2B.

(d) Claim 5

Element[5]:

The Carter-Beatenbough-Kotani Combination renders obvious Element[5]. Kotani's Figure 2A shows that the *cover includes opposite end openings to establish ambient air flow through the dew point sensing unit housing*. EX1003, ¶237; *supra*, Elements[1.d], [4].



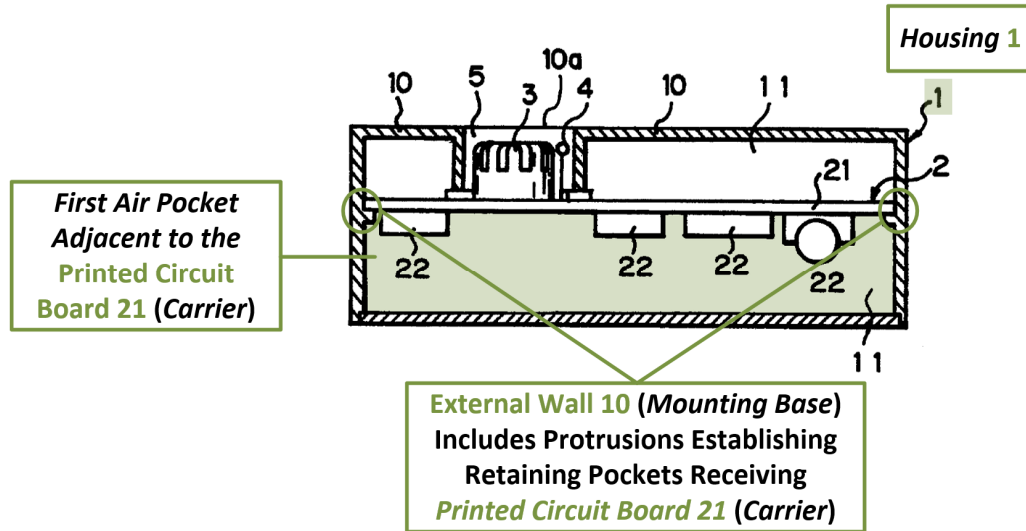
EX1008, Figure 2A (annotated); *see also* 2:35–3:50, Figures 1–2B.

(e) Claim 6

Element[6]:

The Carter-Beatenbough-Kotani Combination renders obvious Element[6]. As discussed above at Elements[1.d], [4], Kotani's *dew point sensing unit housing* provides a contact interface between the PCB (*carrier*, per Element[1.b]) and the housing's outer wall (*mounting base*). Kotani's Figure 1 shows this *mounting base* provides *protrusions establishing retaining pockets receiving the carrier* (PCB) of

the dew point sensing unit (including sensors 3, 4) at outer edges of the carrier (PCB) and further establishing a first one of the air pockets. EX1003, ¶238–239.



EX1008, Figure 1 (annotated).

Notably, Patent Owner points to a similar perimeter wall circumscribing a printed circuit board as the claimed *protrusions* of Element[6] in its district court infringement allegations against Petitioner. See EX1037, p.121.

E. GROUND 1E: Claims 8–13 Are Obvious Over Carter, Beatenbough, and Gatling

1. Obviousness Analysis

(a) Claim 8

Element[8.pre]: A system for condensation control...

The Carter-Beatenbough-Gatling Combination renders obvious Element[8.pre]. EX1003, ¶¶240–241. As discussed above at Element[1.pre] of Ground 1B, the combined teachings of Beatenbough and Carter provide *a system*

for condensation control at a refrigerated display case having at least one door, a frame and at least one frame/door heater. Beatenbough further suggests the notion of expanding the *condensation control system* to more than one display case unit. See EX1006, 2:49–58 (display case units include a bank of multiple doors and a control device), 3:15–26 (discussing relay connections to “individual units”).

Gatling further complements Beatenbough and Carter in this respect by expressly teaching the notion of controlling “a plurality of refrigeration cases 22 in a grocery store floor space,” where “[e]ach refrigeration case 22 is arranged in separate circuits consisting of a plurality of refrigeration cases 22 that operate within a similar temperature range.” EX1007, 2:59–3:15, Figures 1, 5–7. A POSITA would have been motivated to expand the *condensation control system* of Carter-Beatenbough across *an array of refrigerated display cases*, as taught by Gatling, for the beneficial purpose of accommodating mid-sized and large commercial applications, which typically employ more than one refrigerated display case for presenting low-temperature perishable food products to consumers. EX1003, ¶241; EX1007, 2:59–3:15.

Element[8.a]: sensing and control apparatus...

The Carter-Beatenbough-Gatling Combination renders obvious Element[8.a]. As discussed above at Elements[1.a]–[1.c] of Ground 1B, the combined teachings of Carter and Beatenbough provide *sensing and control apparatus configured for*

location a display case. More, consistent with Gatling’s incorporated teachings for controlling an *array of display cases*, it would have been apparent or obvious to a POSITA for *each display case in the array* to have its own local *sensing and control apparatus*. EX1007, 3:40–4:5 (“separate case controllers”), 4:66–5:15 (“each refrigeration case” has its own temperature sensing probe), 6:15–24, 6:41–61, 8:1–7. Indeed, a POSITA would have been motivated to use independent local *sensing and control apparatus* to accommodate the unique aspects of the frame/door temperatures and surrounding environment at *each display case*. EX1003, ¶242; EX1007, 2:59–3:15.

Element[8.b]: said apparatus including a frame temperature sensing unit...

See Element[1.a], Ground 1A (Carter’s teachings). EX1003, ¶243.

Element[8.c]: said apparatus including...a dew point sensing unit...

See Element[1.b], Ground 1A (Carter’s teachings). EX1003, ¶244.

Element[8.d]: said apparatus including...an internal case temperature sensing unit...

See Element[17], Ground 1C (Gatling’s teachings). EX1003, ¶245.

Element[8.e.i]: said apparatus including...processing means...

See Elements[1.c] and [14.c], Ground 1A (Carter’s teachings) and Elements[1.c] and [14.c], Ground 1B (Carter’s teachings as supplemented by Beatenbough). EX1003, ¶246.

Element[8.e.ii] processing means...connected...for storing data...

See Element[18], Ground 1A (Carter’s teachings) and Element[18], Ground 1C (Gatling’s teachings). EX1003, ¶247.

Element[8.f]: a communication control unit...

See Elements[19]–[20], Ground 1C (discussing teachings regarding ***a communication control unit*** in the form of a wireless transceiver for transmitting data from the case and facilitating remote updating/configuring/programming). EX1003, ¶248.

(b) Claim 9

Element[9]:

See Element[19], Ground 1C (Gatling’s teachings). EX1003, ¶249.

(c) Claim 10

Element[10]:

The Carter-Beatenbough-Gatling Combination renders obvious Element[10]. Carter and Beatenbough each disclose that the controller/processor (***processing means***) is ***separately housed*** from the sensors. See EX1004, 4:36–43, Figure 1; EX1006, 2:49–53, Figure 1. More, as discussed at Element[1.c] of Ground 1A, it would have been apparent or obvious to implement the claimed ***processing means*** as a “microprocesor,” which suggests or renders obvious a small form factor that is ***mountable between standard door frame mullions***. EX1003, ¶250.

(d) **Claim 11**

Element[11]:

See Element[20], Ground 1C (discussing prior art teachings on remote updating/configuration/programming). EX1003, ¶251 (obvious to provide an *interface* to facilitate the remote updating/configuring/programming).

(e) **Claim 12**

Element[12]:

See Element[1.d], Ground 1A (Carter’s teachings). EX1003, ¶252.

(f) **Claim 13**

Element[13]:

See Element[1.d], Ground 1A (Carter’s teachings). EX1003, ¶253.

VI. ANALYSIS ON DISCRETION

A. 35 U.S.C. §325(d)—*Advanced Bionics*

The asserted combinations in this Petition are materially different from the art references considered during prosecution of the ’181 patent. Carter, King, Gatling, and Kotani were never considered during prosecution. These new references provide the features erroneously deemed missing from the prior art by the Examiner.

B. 35 U.S.C. §314(a)—*Fintiv*

Fintiv Factors 1–5 favor institution because the parallel district court litigation is stayed and there is no scheduled trial date. See EX1038. *Fintiv* Factor 6 favors institution in view of this Petition’s compelling merits.

VII. FEES—37 C.F.R. §42.103

Petitioner authorizes the Patent and Trademark Office to charge any fees to Deposit Account No. 06-1050.

VIII. MANDATORY NOTICES—37 C.F.R §42.8(a)(1)

A. Real Party-In-Interest—37 C.F.R. §42.8(b)(1)

Anthony Inc. is the petitioner and the real party-in-interest. Additional parties that may constitute real parties-in-interest, though Petitioner does not concede as much, are Dover Corporation and Hillphoenix, Inc.

B. Related Matters—37 C.F.R. §42.8(b)(2)

Petitioner is not aware of any disclaimers, reexamination certificates or petitions for *inter partes* review for the '181 patent. The '181 patent is the subject of the following co-pending civil action: *ControlTec, LLC v. Anthony, Inc. et al.* 1:24-cv-00883 (DDE) (pending).

C. Lead and Back-Up Counsel—37 C.F.R. §42.8(b)(3)

Petitioner provides the following designation of counsel.

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D. Service Information

Please address all correspondence and service to the address listed above.

Petitioner consents to electronic service by email at IPR43789-0259IP1@fr.com.

Respectfully submitted,

Dated: January 30, 2025

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CERTIFICATION UNDER 37 CFR §42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,452 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated: January 30, 2025

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on January 30, 2025, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were provided by Federal Express to the Patent Owner by serving the correspondence address of record as follows:

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