

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESTO, INC., a/k/a TESTO NORTH AMERICA, AND TESTO SE & CO. KGaA

Petitioners

v.

PARKER INTANGIBLES LLC,

Patent Owner

Patent No. 10,281,183
§ 371 (c)(1) Date February 23, 2016
Filing Date January 19, 2015
Priority Date January 20, 2014

Inter Partes Review No. IPR2023-00685

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EXHIBITS

Exhibit	Description
Ex. 1001	U.S. Patent No. 10,281,183 to Parker <i>et al.</i> (the '183 Patent)
Ex. 1002	Declaration of James Parker
Ex. 1003	<i>Curriculum vitae</i> of James Parker
Ex. 1004	Prosecution History of U.S. Patent No. 10,281,183
Ex. 1005	“Wireless Full System Analysis in Real Time” brochure for “Fieldpiece HG3” (Fieldpiece-B)
Ex. 1006	CN 101339078 (CN '078)
Ex. 1007	English Translation of CN 101339078
Ex. 1008	U.S. Patent No. 6,779,919 (Staniforth)
Ex. 1009	CN 102435332 (CN '332)
Ex. 1010	English Translation of CN 102435332
Ex. 1011	EP 2 309 212 (Peirs)
Ex. 1012	“HVAC Guide System Analyzer Model HG3 Field Manual” (“Fieldpiece-M”)
Ex. 1013	U.S. Pre-Grant Publication No. 2013/0245965 (Kane)
Ex. 1014	International Search Report and Written Opinion of PCT/US2015/011900
Ex. 1015	Affidavit of Nathaniel E Frank White

Exhibit	Description
Ex. 1016	Declaration of Lee Hsu
Ex. 1017	Screenshots of the Internet Archive's Wayback Machine Archive for Fieldpiece-B HTML: https://web.archive.org/web/20110619232109/http://fieldpiece.com/PDF/Flyers/HG3_Brochure_v11.pdf
Ex. 1018	Screenshots of the Internet Archive's Wayback Machine Archive for Fieldpiece-M HTML: https://web.archive.org/web/20110619232012/http://fieldpiece.com/PDF/Manuals/HVAC-Guide3-manual-v17.pdf
Ex. 1019	Screenshots of the Internet Archive's Wayback Machine Archive for Fieldpiece Instruments, Inc. website for "Wireless HVAC Guide System Analyzer - HG3" HTML: https://web.archive.org/web/20110619205521/http://fieldpiece.com/hvac-guide-system-analyzer/hg3
Ex. 1020	Screenshots of the Internet Archive's Wayback Machine Archive for Fieldpiece Instruments, Inc. website for "HVAC Guide® System Analyzer" HTML: https://web.archive.org/web/20110619183944/http://fieldpiece.com/hvac-guide-system-analyzer

I. Summary

Through counsel, TESTO, INC., a/k/a TESTO NORTH AMERICA, AND TESTO SE & CO. KGaA (“Petitioners”) hereby request *inter partes* review of claim 1 and 12 (“the Challenged Claims”) of U.S. Patent No. 10,281,183 (the “’183 Patent”), assigned to PARKER INTANGIBLES LLC (“Patent Owner”).

The alleged invention relates to an HVACR sensor system that includes two temperature sensors 26, 28, two pressure sensors 22, 24, and a portable electronic device 30. Ex. 1001, 4:38–5:10. However, as outlined herein, the Challenged Claims do nothing more than combine known analogous prior art in a readily apparent manner. As set forth herein, the Challenged Claims are therefore unpatentable for the reasons provided herein.

A. Real Parties-in-Interest Under 37 C.F.R. § 42.8(b)(1)

The real parties-in-interest are Testo, Inc., a/k/a Testo North America, and Testo SE & Co. KGaA. No other entity is controlling, directing, or funding the submission of this petition and any proceeding initiated as a result therefrom.

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

The ’183 Patent is asserted against Petitioners in PARKER-HANNIFIN CORP., and PARKER INTANGIBLES LLC v. TESTO, INC., a/k/a TESTO NORTH AMERICA, AND TESTO SE & CO. KGaA, Civil Action No.:22-cv-

00135 (E.D.Pa.) (the “Litigation”). Parker-Hannifin Corp. and Patent Owner also assert U.S. Patent No. 10,739,051 against Petitioners in that case. The Litigation is stayed pending mediation.

Petitioners are unaware of any other proceedings involving the ’183 Patent.

C. Fees

This petition is accompanied by a fee payment of \$41,500, which includes the \$19,000 *inter partes* review request fee, and the \$22,500 *inter partes* review post-institution fee. Please charge any additional fees to Volpe Koenig’s Deposit Account 22-0493.

D. Designation of Lead and Backup Counsel Under 37 C.F.R. § 42.8(b)(3)

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E. Service Information Under 37 C.F.R. § 42.8(b)(4)

Please address all correspondence to counsel at the addresses above.

Petitioners consent to service by email.

F. Powers of Attorney

Powers of attorney with designation of counsel are filed herewith per 37 C.F.R. § 42.10(b).

G. Standing

Petitioners certify that the '183 Patent is available for *inter partes* review and that Petitioners are not barred or estopped from requesting an *inter partes* review challenging the patent claims on the grounds identified herein.

II. Statement Relief Requested

A. Claims for Which Relief is Requested

Petitioners request *inter partes* review under 35 U.S.C. § 311 and 37 C.F.R. § 42.104(b) of claims 1 and 12 of the '183 patent, and the cancellation of those claims as unpatentable due to being obvious under 35 U.S.C. §103 over one or more of the

following prior art references. Each asserted reference identified in the table below is prior art to the '183 Patent under at least the post-AIA statute indicated below.

Prior Art References
“Wireless Full System Analysis in Real Time” brochure for “The Fieldpiece HG3” (Fieldpiece-B) (Ex. 1005), publicly available June 19, 2011 (Ex. 1005)
CN 101339078 (CN '078) (Ex. 1006; English Translation, Ex. 1007), published January 7, 2009
U.S. Patent No. 6,779,919 (Staniforth) (Ex. 1008)
CN 102435332 (CN '332) (Ex. 1009, English Translation, Ex. 1010), published May 2, 2012
EP 2 309 212 (Peirs) (Ex. 1011), published April 13, 2011
“HVAC Guide System Analyzer Model HG3 Field Manual” (Fieldpiece-M) (Ex. 2012), publicly available June 19, 2011
U.S. Pre-Grant Publication No. 2013/0245965 (Kane) (Ex. 1013), published September 19, 2013

Each reference in the above table was published or publicly available more than one year prior to the earliest possible effective filing date for the '183 Patent of January 20, 2014, and is available prior art under 35 U.S.C. §§ 102 and 103.

B. Statutory Grounds

Claims 1 and 12 are unpatentable under post-AIA 35 U.S.C. §103 based on the following grounds:

Grounds of Unpatentability	
1	Fieldpiece-B renders claims 1 and 12 unpatentable under 35 U.S.C. § 103.
2	Fieldpiece-B in combination with CN '078 renders claims 1 and 12 unpatentable under 35 U.S.C. § 103.
3	Fieldpiece-B in combination with CN '078 and Staniforth renders claims 1 and 12 unpatentable under 35 U.S.C. § 103.
4	Fieldpiece-B in combination with CN '332 renders claims 1 and 12 unpatentable under 35 U.S.C. § 103.
5	Fieldpiece-B in combination with of CN '332 and Staniforth renders claims 1 and 12 unpatentable under 35 U.S.C. § 103.
6	Fieldpiece-B in combination with Peirs renders claims 1 and 12 unpatentable under 35 U.S.C. § 103.
7	Fieldpiece-B in combination with Peirs and Staniforth renders claims 1 and 12 unpatentable under 35 U.S.C. § 103.

Grounds of Unpatentability	
8	Fieldpiece-M renders claims 1 and 12 unpatentable under 35 U.S.C. § 103.
9	Fieldpiece-M in combination with CN '078 and Staniforth renders claims 1 and 12 unpatentable under 35 U.S.C. § 103.
10	Kane anticipates claims 1 and 12 under 35 U.S.C. § 103.
11	Kane in combination with Staniforth renders claims 1 and 12 unpatentable under 35 U.S.C. § 103.
12	Kane in combination with Staniforth and CN '078 renders claims 1 and 12 unpatentable under 35 U.S.C. § 103.

III. The '183 Patent

A. Priority Date and Family

The '183 Patent issued from U.S. Application No. 14/913,834 (the "'834 Application), which was a U.S. national stage application of PCT/US2015/011900, which was filed January 19, 2015, and claimed the benefit of U.S. Provisional Application No. 61/929,363, filed January 20, 2014. The earliest possible effective filing date is January 20, 2014.

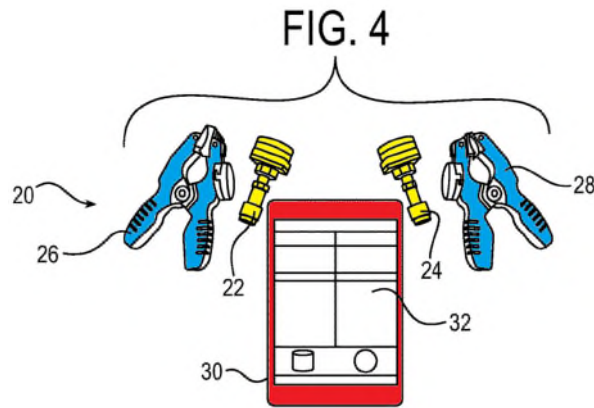
U.S. Patent 10,739,051 issued from U.S. Application No. 16/357,511, which was a continuation of the '834 Application.

B. Background

The '183 Patent “is directed to enhanced sensor systems for refrigeration units for monitoring and collecting system conditions, such as superheat and subcooling.” Ex. 1001, 1:12–14. Refrigeration units are “heating, ventilation, air conditioning and refrigeration (HVACR) systems.” *Id.*, 1:18–21. The '183 Patent describes a particular prior art system and illustrates it in FIGS. 1, 2, and 3. *Id.*, 1:18–2:30. The prior art system described had two pressure gauges and two temperatures sensors. *Id.*, 1:32–35 and 48–50. A technician would have to read the temperature and pressure readings, and then manually calculate superheat and subcool. *Id.*, 1:50–52.

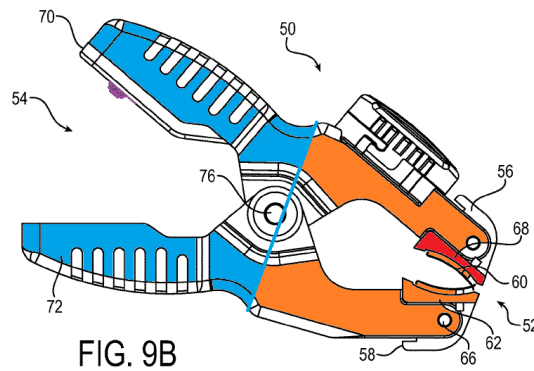
The '183 describes alleged problems in the prior system: the length of hoses on the pressure gauges would be filled with refrigerant that had to be reclaimed to avoid environmental damage. Ex. 1001, 1:56–63. Also to avoid cross-contamination and damage to HVACR systems having different refrigerants, a technician would have to carry multiple gauge sets. *Id.*, 2:2:1–17. The hoses were bulky and inconvenient to transport, weighty and difficult to manage — especially on ladders and roofs. *Id.*, 2:18–24. Also, the system required the technician to stand next to gauges to read them, or two technicians with two way radios to report measurements

to each other. *Id.*, 2:24–30. Finally, the short distance between gauge sets was a problem. *Id.* FIG. 4 illustrates the alleged solution:



The alleged invention includes two temperature sensors 26, 28 (Blue), two pressure sensors 22, 24 (Yellow), and a portable electronic device 30 (Red). Ex. 1001, 4:56–5:10. Both temperature sensors and both the pressure sensors are referred to as “hoseless” sensors. *Id.*, 4:56–61. “The pressure and temperature sensors transmit pressure and temperature data to the portable electronic device preferably by a wireless communication.” *Id.*, 6:6–8. The portable electronic device “may calculate system conditions based on sensor parameters measured by the plurality of hoseless sensors.” Ex. 1001, 4:67–5:2.

FIGS. 9B illustrates a preferred temperature sensor:



The Challenged Claims relate to “a sensor system for a refrigerant unit” (claim 1) and a “temperature sensor” (claim 12). Ex. 1001, 11:65 and 13:1.

To overcome the alleged problems of the prior art, including the “close distance requirements of conventional analog gauge sets,” the ’183 Patent proposed a “hoseless” system where individual sensors are installed, and “[s]ensor information may be transmitted wirelessly to a portable electronic device, ...” *Id.*, 2:36–40.

As demonstrated herein, this proposed solution was well known in the prior art.

IV. Level of Ordinary Skill

One of ordinary skill in the art, that is, a person of ordinary skill in the art (POSITA), of the ’183 Patent would have (A) a bachelor’s or equivalent degree in electrical or electronic engineering, industrial engineering, or mechanical engineering, or (B) at least a two (2) year associate’s degree in electrical or electronic engineering, industrial engineering, or mechanical engineering, or an equivalent

field, and two (2) years of practical experience in an industry relating to HVAC service and repair. Declaration of James Parker, ¶49 (Ex. 1002, “Parker”).

V. Claim Construction

The Board construes claims in accordance with 37 C.F.R. § 42.200(b) and *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*). 37 C.F.R. § 42.200(b). Claims only need to be construed to the extent necessary to resolve a controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Here, no terms need construction because the claims read on the prior art identified below under any construction consistent with Phillips.

VII. The Board Should Not Exercise Discretion to Deny Institution

A. The *Fintiv* Factors Favor Institution

The '183 Patent has been asserted against Petitioners in *Parker-Hannifin Corporation et al v. Testo, Inc., a/k/a Testo North America, and Testo SE & Co. KGaA*, Case No. 2-22-cv-00135 (E.D. Pa.) (the “Litigation”). The Patent Owner is a party to that action. The most relevant *Fintiv* factors demonstrate that the Board should not deny institution of this Petition under 35 U.S.C. §314(a) and *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential).

There has been little activity in the Litigation. The case was referred to private mediation on August 1, 2022, effectively staying the case. The last activity in the

case was the filing of a Stipulated Protective Order on September 9, 2022 to facilitate the mediation. *See Parker-Hannifin*, No. 2-22-cv-00135, Dkt. 22 (Sept. 9, 2022).

The Litigation is still at the pleadings stage. Petitioners answered the Complaint and filed two counterclaims, and the Plaintiff moved to dismiss Petitioners' counterclaims for failure to state a claim under Fed. R. Civ. P. 12(b)(6). The Court has not ruled on that motion. There has been no Scheduling Order issued in the case. Discovery has not commenced, although the parties did informally exchange some information during the mediation process. No trial date has been set. No infringement contentions have been served. In such circumstances, it is respectfully submitted that the Board should not exercise its discretion and deny institution under 35 U.S.C. § 315(b). *See Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation*, June 21, 2022.

Further, the merits of this Petition are strong. Fieldpiece-B and Fieldpiece-M themselves show nearly every element of the Challenged Claims. In combination with the secondary references, as outlined herein, the Challenged Claims are clearly unpatentable. *See Commscope Techs. LLC v. Dali Wireless, Inc.*, IPR2022-01242, Paper 23 at 4-5 (PTAB Feb. 27, 2023).

Accordingly, the *Fintiv* factors favor institution of this IPR.

B. The *Becton Dickson* Factors Favor Institution

The factors in *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, 2017 WL 6405100, Paper 8 at 17-18 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first para), favor institution.

1. Kane

a. Relevant Prosecution History

Kane was considered during the prosecution of the ‘183 Patent. However, the Examiner failed to consider critical disclosure from Kane, and therefore, committed an error in its consideration.

During prosecution of the ‘843 Application, Kane was raised in a May 25, 2018 Final Office Action as a basis for rejecting certain pending claims. Ex. 1004, May 25, 2018 Action, at 3-4. The Examiner equated two pressure sensors and the two temperature sensors recited in the then-pending claims to “the plurality of sensors (220, 222, 232 and 234 and senders 212 and 218)” in Kane FIG. 2 and stated that there were “no physical connections” between Kane’s sensors and Kane’s portable electronic device 120. *Id.* The elements 220, 222, 232 and 234 are “connections” to sensors, which include two temperature sensors and two pressure sensors. Ex. 1014, ¶¶[0037].

An Examiner Interview was conducted on July 26, 2018, and the Applicant argued that the connections between “sensor” and “sender unit” were wired, while

the Examiner disagreed and cited to FIGS. 2 and 3 of Kane. Ex. 1004, August 2, 2014 Interview Summary. The Examiner stated that “[i]n figure 2, Kane discloses the sensors and sender units 204 wirelessly connected to the main unit 120 without any physical connection.” *Id.*

Applicant filed a July 31, 2018 Reply arguing in connection with FIG. 2 “the sensors 202 are wired to sender units 212-218, which in turn may be wirelessly connected to a main measuring unit 120.” Ex. 1004, July 31, 2018 Reply, at 6. Even though the “sender units” send data wirelessly to the portable electronic device, Applicant argued that the alleged wireless connection from sensors to sender units “still requires some wired connections among the sensors, particularly between the sensors and the sending units.” *Id.* at 7. With respect to the Examiner’s Interview comments over FIG. 3, Applicant argued that FIG. 3 did not show “sensors 202” so there was no way to conclude they did not include wired connections to “sender units 302,” rather than being integrally combined with them. *Id.*, at 7-8.

The rejection was overcome, and Kane became a *secondary* reference in a subsequent September 6, 2018 Final Office Action. Ex. 1004, September 6, 2018 Final Office Action, at 4. The subsequent rejection was also overcome (Ex. 1004, November 1, 2018 Reply), and the application was allowed. Ex. 1004, February 13, 2019, Notice of Allowance.

b. The USPTO's Material Error in Considering Kane

The Examiner never raised, and Applicant never discussed, Kane embodiments described under FIGS. 4–9, in particular FIGS. 4 and 9. As set forth herein in Section VIII.E., these embodiments explicitly disclose wireless temperature and pressure sensors that send data wirelessly to a portable electronic device. Ex. 1013, ¶¶[0042], [0043], [0057], [0063]–[0067]. Ex. 1002, ¶¶306, 317, 320–321. The Examiner erred in consideration of Kane, and Applicant did not correct the error.

Whether or not Kane discloses wireless temperature and pressure sensors that send data wirelessly to a portable electronic device (which it does) was critical and material to the patentability of the '183 Patent. Here, the examiner materially erred in overlooking FIGS. 4-9 of Kane and their related disclosure. See Ex. 1013, ¶¶[0042], [0043], [0057], [0063]–[0066].

c. The Becton Dickinson Factors Favor Instituting on the Kane Grounds

In this instance, it is respectfully submitted that BD Factors (c), (e), and (f) (related to whether the petitioners have demonstrated that the Patent Office erred in a manner material to the patentability of the challenged claims) weigh heavily against exercising the Board's discretion to deny institution under 35 U.S.C. § 325(d). The Examiner erred, assisted by the Applicant's arguments, in failing to

discern that Kane did in fact explicitly disclose wireless temperature and pressure sensors that send data wirelessly to a portable electronic device. Thus, BD Factors (c) and (e) are satisfied. Further, Petitioners' expert has interpreted Kane and readily identified the wireless disclosure of Kane. Ex. 1002, ¶¶306, 317, 320–321. Under *Becton, Dickinson* factor (f), the Examiner's misinterpretation of Kane and withdrawal of reliance on Kane was without the benefit of expert testimony interpreting FIGS. 4–9.

This situation is similar to *Medacta USA, Inc. v. RSB Spine, LLC*, IPR Case No. 2020-00264, Paper 24 (PTAB May 22, 2020). In that matter, the Board found that the examiner “erred in a manner material to the patentability of the challenged claims” by overlooking certain aspects of the prior art references. *Id.* at 16–18.

The Board should not exercise discretion as to any of the Kane grounds under § 325(d). In addition, the Kane grounds should be instituted at least because the Grounds 1-5, 8, and 9 (discussed below) are “not affected by § 325(d).” *See, e.g., Dril-Quip, Inc. v. FMC Techs., Inc.*, PGR2021-00049, 2021 WL 3413510, Paper 10 at 12 (PTAB Aug. 4, 2021).

Finally, Kane is applied herein in combination with prior art that was not considered during prosecution of the '183 Patent, namely, Staniforth and CN '078.

2. Peirs

a. Relevant Prosecution History

Peirs was cited in an information disclosure statement (IDS) filed with the application (Ex. 1014, December 11, 2017 List of References Cited), and in the international search report and written opinion of PCT/US2015/011900 (Ex. 1014). The written opinion did not discuss Peirs, and the U.S. examiner signed the IDS without comment. Peirs was not the subject of a rejection.

b. The USPTO Did Not Consider or Apply Peirs

Simply signing an IDS, with no indication of whether or how the Examiner considered or applied it, does not favor denial of institution. *See Roku, Inc. v. Universal Electronics, Inc.*, IPR2019-01615, 2020 WL 1903093, Paper 12, at 12-13 (PTAB April 17, 2020) (declining to exercise discretion under section 325(d) after “determin[ing] that the Examiner erred by overlooking the specific teachings” of a reference cited in an IDS); *Intex Recreation Corp. v. Team Worldwide Corp.*, IPR2018-00871, 2018 WL 4404107, Paper 14 at 13 (PTAB Sept. 14, 2018) (“Cursory consideration of later-relied-upon prior art,” by simply initialing an IDS, “weighs against exercising discretion to deny under § 325(d)”).

3. The BD Factors Favor Instituting on Grounds 1-5, 8, and 9

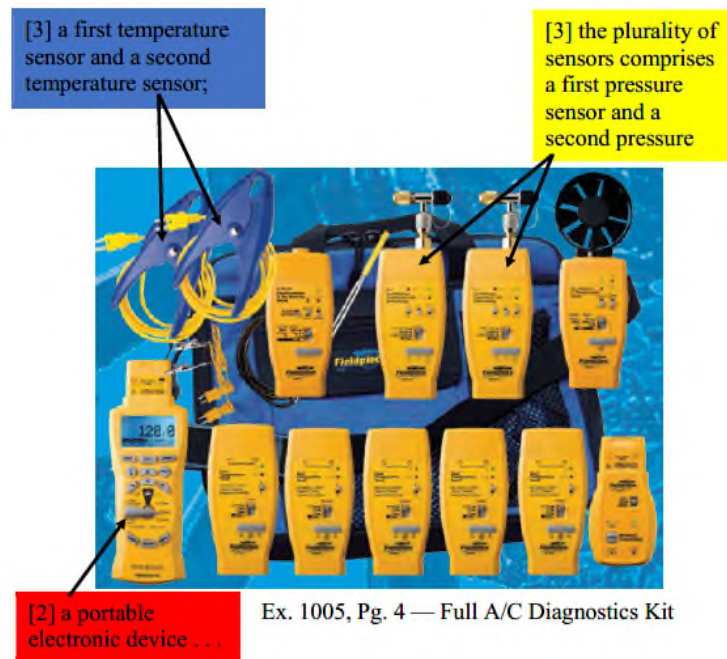
None of the references in Grounds 1–5, 8, and 9 were submitted or considered during prosecution of the '183 Patent or any of its related applications. Accordingly, the art and arguments in Grounds 1–5, 8, and 9, including Mr. Parker's expert testimony, are materially different, non-cumulative, and do not overlap with any arguments made during prosecution.

Accordingly, the Board should not exercise discretion as to the Ground 1–5, 8, and 9 under § 325(d).

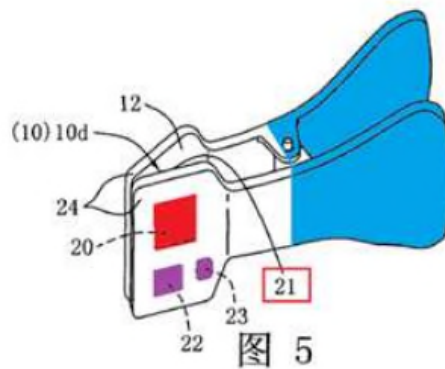
VII. The Prior Art Is Analogous and Relevant to the Field of the '183 Patent

The prior art relied upon in this IPR Petition is analogous to, and in the same field of endeavor as, the '183 Patent as follows:

Fieldpiece-B discloses sensors and a portable electronic device for HVACR monitoring, Ex. 1004, Pg. 4, and is directed to solving the same need for “improved sensors systems” as the '183 Patent. See Ex. 1002, ¶¶56, 85, 94. Two temperature sensors and two pressures sensors transmit their sensor information wirelessly to the portable electronic device. *Id.*, Pg. 1. See the below annotated image from Pg. 4 of Ex. 1005:

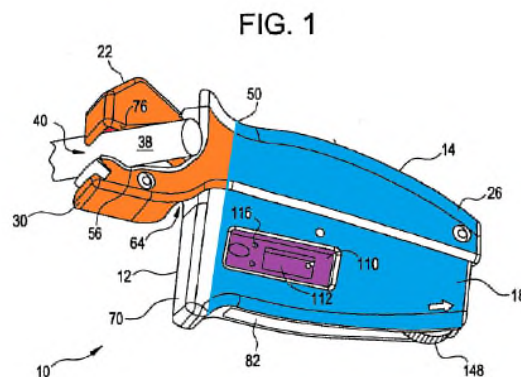


CN '078 discloses a temperature sensor that wirelessly transmits sensor information to a remote computer. Ex. 1007, Pg. 6, and is analogous art to Fieldpiece-B and the '183 Patent, since it is reasonably pertinent to a problem described in the '183 Patent, for example, “an improved sensor system for refrigeration units for monitoring and collecting system conditions,” and the proposed solution of “wireless” transmission of sensor data to a remote device. Ex. 1001, 2:34–40; Ex. 1002, ¶¶93–94. See the below annotated FIG. 5 from CN '078:



Ex. 1006, FIG. 5

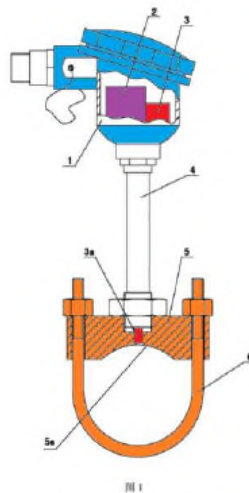
Staniforth is analogous to the ‘183 Patent and is reasonably pertinent to the problem of providing improved sensor systems, in particular, improved temperature sensor clamps as it provides “[a] probe for measuring a surface temperature of a pipe [that] includes an active clamp assembly and a passive clamp assembly...” Ex. 1008, 1:44–46, Abstract; Ex. 1002, ¶¶114, 116. See the below annotated FIG. 1 from Staniforth:



Ex. 1008, FIG. 1

CN ’332 is analogous art to Fieldpiece-B and is reasonably pertinent to a problem described in the ’183 Patent, for example, “an improved sensor system for

refrigeration units for monitoring and collecting system conditions,” and the proposed solution of “wireless” transmission of sensor data to a remote device. Ex. 1001, 2:34–41; Ex. 1002, ¶¶137–138. In particular, CN ’332 discloses a wireless temperature sensor Ex. 1010, ¶[0009]–[0010]. See Ex. 1009, FIG. 1:



Ex 1009, FIG. 1

Peirs is in the same field of endeavor as and reasonably pertinent to the problem described in the ‘183 Patent in that it discloses “improved monitoring equipment for heat pump or refrigerating systems” that includes two wireless pressure sensors (Yellow), two wireless temperature sensors, with one depicted below (Blue), and a portable electronic device (Red). Ex. 1011, ¶¶[0001], [0038], [0039], [0042]; Ex. 1002, ¶¶183–184. See the below annotated FIG. 1 from Peirs:

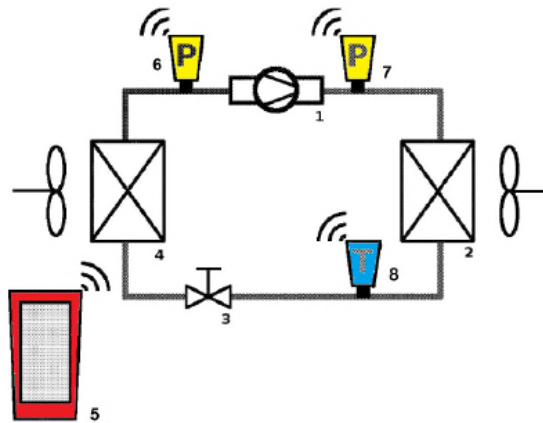


FIG 1

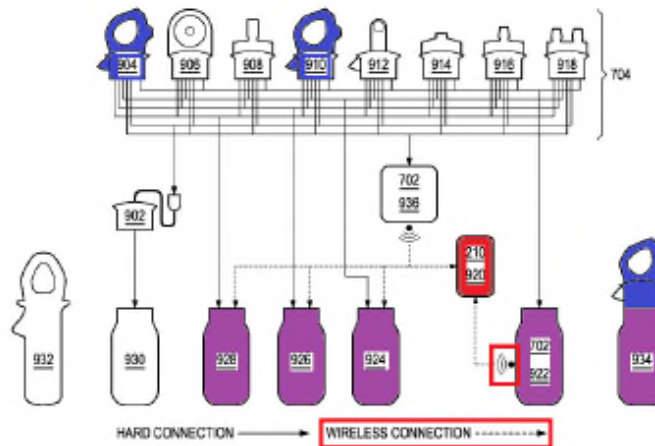
Ex. 1011, FIG. 1

The second wireless temperature sensor is described at Ex. 1011, ¶[0039].

Fieldpiece-M discloses a sensor system for HVACR, and is from the same field of endeavor and directed to solving problems similar to the problems addressed by the ‘183 Patent, namely, a “need in the art for an improved sensor system for refrigeration units for monitoring and collecting system conditions such as superheat and subcooling.”. Ex. 1012, Pgs. 1 and 10; Ex. 1002, ¶228.

Kane is analogous to and in the same field of endeavor as the ‘183 Patent and discloses “servicing and testing equipment used in the heating, ventilating, air conditioning, and refrigeration (HVAC/R) field,” Ex. 1014, ¶[0002]; Ex. 1002, ¶¶304–306. The equipment includes temperature and pressure sensors, and a portable electronic device. Ex. 1014, [0023], [0042], [0043], [0063]–[0067]; Ex. 1002, ¶¶305–306. The sensors can wirelessly transmit sensor measurements to the

portable electronic device. *Id.* See the below annotated FIG. 9 from Kane including “WIRELESS CONNECTION”:



Ex. 1013, FIG. 9

As shown, the '183 Patent alleged solution where “individual sensors are installed, and “[s]ensor information may be transmitted wirelessly to a portable electronic device ...” was widely known well before January 20, 2014.

VIII. The Challenged Claims Are Unpatentable

A. Ground 1: Fieldpiece-B Renders Claims 1 and 12 Unpatentable

1. Independent Claim 1

a. [Preamble] “A sensor system for a refrigerant unit comprising:”

Fieldpiece-B discloses a “Full A/C Diagnostic Kit.” (“Kit”) Ex. 1005, Pg. 4. As the name says, the Kit is a sensor system for a refrigerant unit. Ex. 1005, Pg. 4; Ex. 1002 ¶¶56. Fieldpiece-B discloses the preamble. *Id.*

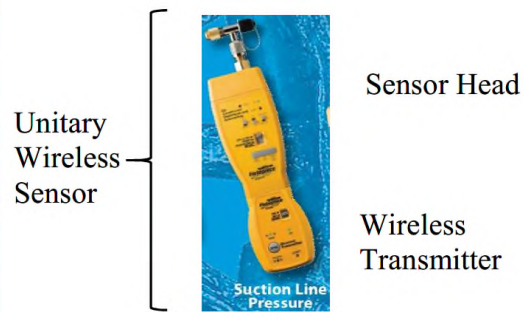
Fieldpiece-B was downloaded from active links at the Internet Archive “Wayback Machine,” from web pages captured June 19, 2011. *See* Exs. 1015-1017, 1019-1020. Fieldpiece-B was publicly available at least as of that date at the links indicated. The authenticity of the records relied on herein is established by the Affidavit of Nathaniel E. Frank-Wright, dated February 19, 2023 (Ex. 1015).

b. [1] “a plurality of sensors for sensing system parameters of the refrigerant unit; and”

The Kit includes nine accessory heads, and nine wireless transmitters. Ex. 1005, Pg. 4. Each wireless transmitter is attached to an accessory head to create a unitary wireless transmitter. Ex. 1005, Pg. 3. Ex. 1002, ¶¶58–59. An image of the Kit is copied below, left, alongside a pressure sensor. Ex. 1005, Pg. 1:



Ex. 1005, Pg. 4 – Full A/C Diagnostics Kit



Ex. 1005, Pg. 1

Fieldpiece-B discloses element **[1]**. Ex. 1002, ¶¶57–61.

- c. ***[2] “portable electronic device configured to receive the system parameters from the plurality of sensors and to calculate system conditions for the refrigerant based on the system parameters; wherein:”***

The Kit discloses the WIRELESS HG3 System Analyzer, Ex. 1005, Pg. 2.

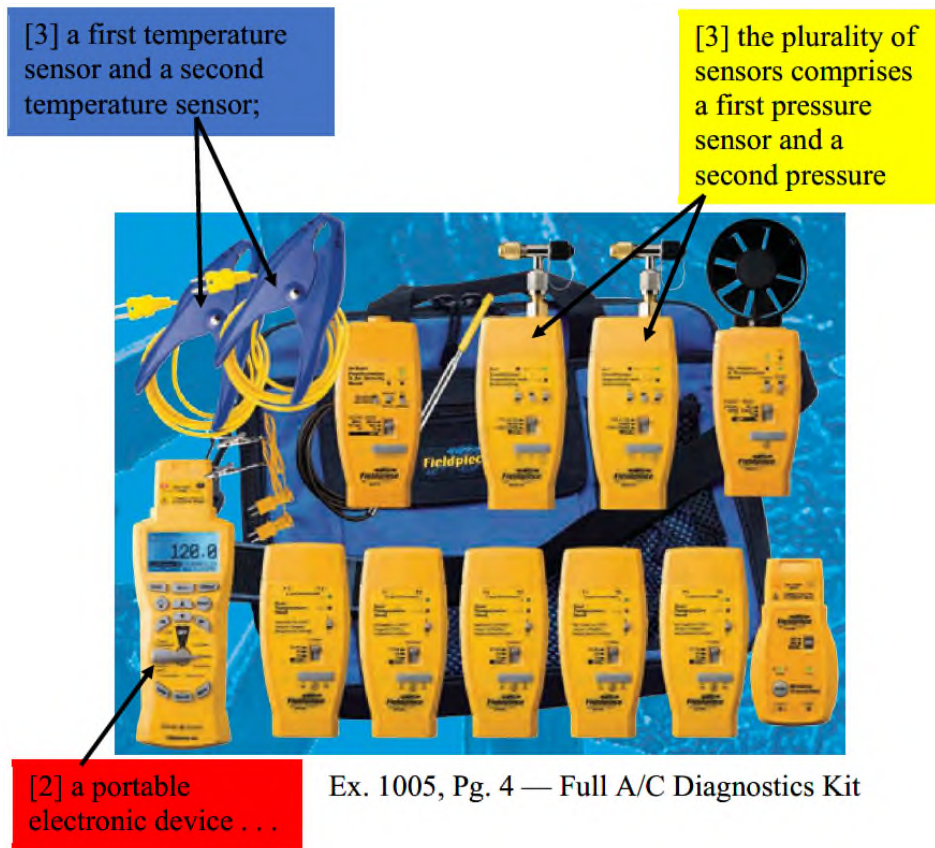
Fieldpiece-B, Pg. 2, with annotations, is copied below.



The WIRELESS HG3 System Analyzer receives system parameters (input sensor information) and uses the parameters to calculate numerous system conditions, including subcooling and superheat. Ex. 1005, Pg. 2; Ex. 1002, ¶¶62–65. Fieldpiece-B discloses element [2]. Ex. 1002, ¶¶65.

- d. [3] “the plurality of sensors comprises a first pressure sensor and a second pressure sensor, and a first temperature sensor and a second temperature sensor;”

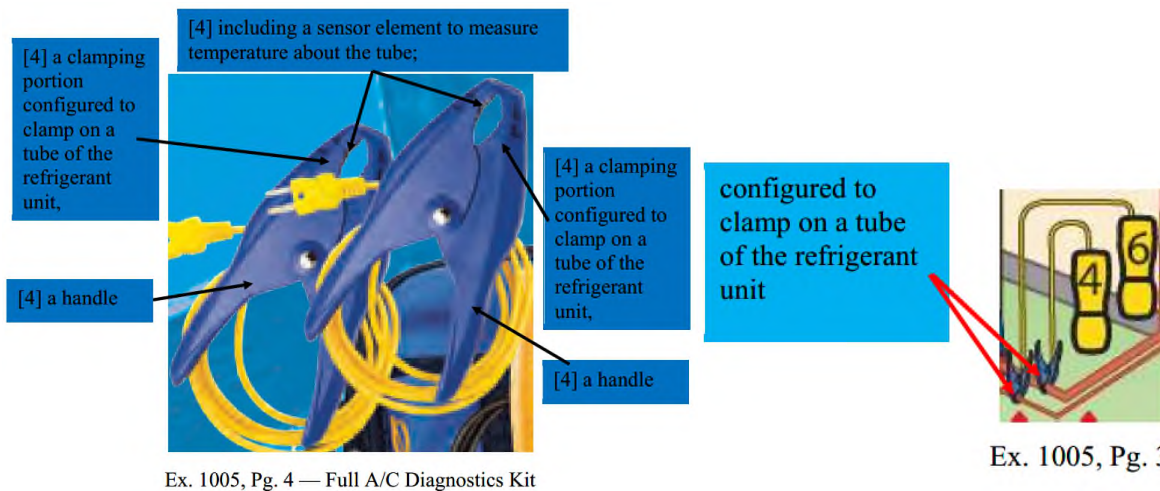
Fieldpiece-B at Pg. 4, with annotations, is copied below.



The Kit includes two pressure sensors and two temperature sensors. See also Ex. 1005, Pg. 4; Ex. 1002, ¶¶66–67. Fieldpiece-B discloses element [3]. Ex. 1002, ¶67.

- e. ***[4] “the first and second temperature sensors each comprises a temperature sensor clamp having a clamping portion configured to clamp on a tube of the refrigerant unit, the clamping portion including a sensor element to measure temperature about the tube;”***

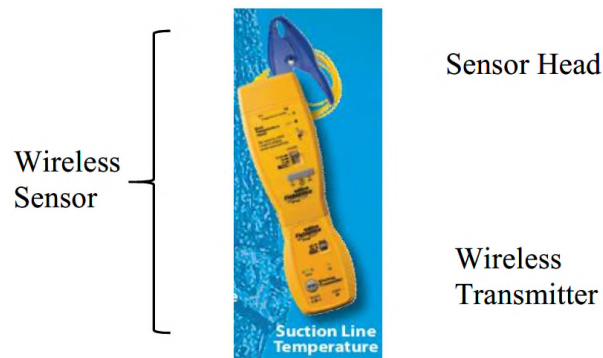
An enlarged portion of Fieldpiece-B at Pg. 4, with annotations, is copied below on the left. An image of a temperature sensor clamp clamping a tube of a refrigerant unit is on the right.



Each temperature sensor in the kit includes a “clamping portion configured to clamp on a tube of a refrigerant unit,” and each clamping porting includes a “sensor element to measure temperature about the tube.” Ex. 1005, Pgs. 3 and 4; Ex. 1002, ¶¶68–70. Fieldpiece-B discloses element [4]. Ex. 1002, ¶70.

- f. [5] “each temperature sensor clamp further comprises a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element; and”*

As set forth for element [4], each temperature sensor clamp further comprises a handle. See one of the two The Fieldpiece temperatures sensors assembled with its sensor head and wireless transmitter:



Ex. 1005, Pg. 1

Ex. 1002, ¶73. The temperature sensor clamp necessarily comprises integrated electronics in connection with the sensor element in order carry the sensed temperature data to the wireless transmitter. Ex. 1002, ¶73.

Fieldpiece-B teaches that one can “simply slide any Fieldpiece Accessory Head onto” a wireless transmitter. Ex. 1005, Pg. 3. It also teaches the portable electronic device receiving sensor signals from “100’ Away.” *Id.*, Pg. 3.

A POSITA would have been motivated to “slide;” *i.e.*, integrate, small wireless transmitters into the handles of each temperature sensor clamp and in

electrical connection with each respective sensor element given the teaching in Fieldpiece-B and background knowledge in the art. Ex. 1002, ¶76.

Fieldpiece-B teaches element [5]. Ex. 1002, ¶¶71–77.

- g. [6] “there are no external physical connections among the plurality of sensors and the portable electronic device.”***

The Full A/C Diagnostics Kit and Includes nine ET2W wireless transmitters and nine accessory heads. Ex. 1005, Pg. 4. Every one of nine accessory heads can be modified by attachment to its own wireless transmitter. Ex. 1002, ¶78.



Ex. 1005, Pgs. 1–2

As set forth in element [5], a POSITA would have modified each temperature sensor clamp to include integrated wireless transmitters in electrical connection with

the respective sensor element. Each pressure sensor in Fieldpiece-B is disclosed as an integrated, unitary wireless sensor, and the portable electronic device receives data from each sensor wirelessly. Fieldpiece-B discloses no external physical connection between any sensor and the portable electronic device. Ex. 1002, ¶¶80-83.

The two pressure sensors of the Kit have no external physical connections. Ex. 1005, Pg. 1, 4. Ex. 1002, ¶81. The portable electronic device has no external physical connection. Ex. 1005, Pgs. 2, 4. Ex. 1002, ¶82. As in [5] above, each temperature sensor modified under the teachings of Fieldpiece-B and background knowledge would have no “external physical connection.” Ex. 1002, ¶¶76, 80. Fieldpiece-B teaches that none of the pressure sensors, temperature sensors, or portable electronic device includes an external physical connection.

Fieldpiece-B teaches “there are no external physical connections among the plurality of sensors and the portable electronic device.” Ex. 1002, ¶84.

CONCLUSION:

A POSITA would understand that Fieldpiece-B teaches incorporation of wireless technology in HVACR sensors configured to transmit data to a remote, portable electronic device used for analysis of HVACR systems, and that Fieldpiece-B temperature sensor could be improved by placing wireless technology and integrated electronics in the temperature sensor clamp handles of Fieldpiece-B in

order to enhance usability of the assembled sensor system components. Ex. 1002, ¶85.

A POSITA would have been motivated to combine HVACR sensors and wireless technology in order to reduce the bulk, number, and arrangement of components required in the field. Instead of two temperature sensor clamps, and their respective tethered headpiece-wireless transmitter units of Fieldpiece-B, the modification would result in two wireless temperature sensor clamps requiring less bulk and weight, and being more convenient to simply clamp in place and remove at will. A POSTIA would also have been motivated to make the combination of wireless sensors and a wireless remote computer in order to eliminate distance constraints imposed by cables or hoses connecting sensors to each other, or to the remote computer collecting sensed data. A POSITA would have understood that without such distance constraints, a greater number of sensors could be deployed at remote locations, while facilitating rapid and efficient data collection from every sensor at the same time, and without the need for a technician to physically approach, read, and record data from each sensor. A POSTIA would also have known based on the state of the art at the time that wireless communication was predictably effective, and would have expected success at the combination of wireless technology in HVACR sensors and remote computers. Ex. 1002, ¶86.

Claim 1 is obvious over Fieldpiece-B. Ex. 1002, ¶87.

2. Independent Claim 12

- a. *[Preamble] “A temperature sensor clamp for sensing temperature in a refrigerant unit, the temperature sensor clamp comprising:”***

Fieldpiece-B discloses such a clamp in the Kit. See also Ex. 1002, ¶88.

- b. *[1] “a clamping portion configured to clamp on a tube of the refrigerant unit, the clamping portion including a sensor element to measure temperature about the tube, and”***

Fieldpiece-B disclose this element for at least the same reasons as in claim 1, element [4] in this Ground. See also Ex. 1002, ¶89.

- c. *[2] “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element;”***

Fieldpiece-B discloses this element for at least the same reasons as in claim 1, element [5] in this Ground. See also Ex. 1002, ¶90.

- d. *[3] “wherein the temperature sensor clamp has no external physical electrical or fluidic connections.”***

Fieldpiece-B teaches this element for at least the same reasons as in claim 1, element [6] in this Ground. See also Ex. 1002, ¶91.

CONCLUSION: For at least the same reasons noted above at VII.A.1. Summary and Conclusion above, Claim 12 is obvious over Fieldpiece-B. See also Ex. 1002, ¶92.

B. Ground 2: Fieldpiece-B In Combination With CN '078 Renders Claims 1 and 12 Unpatentable

CN'078 is directed to a device comprising a temperature sensor that wirelessly transmits temperature data to a computer, which then analyzes the temperature data. Ex. 1007, Abstract. Ex. 1002, ¶93.

Fieldpiece-B is analogous art to and in the same field as the '183 Patent since both relate to sensor systems that remotely transmit temperature and pressure data for refrigeration units. See Ex. 1005, Pg. and Ex. 1001, 1:12–14. Ex. 1002, ¶94. CN '078 is analogous art to the Fieldpiece-B and the '183 Patent, since it is reasonably pertinent to a problem described in the '183 Patent, for example, “an improved sensor system for refrigeration units for monitoring and collecting system conditions,” and the proposed solution of “wireless” transmission of sensor data to a remote device. Ex. 1002, ¶94.

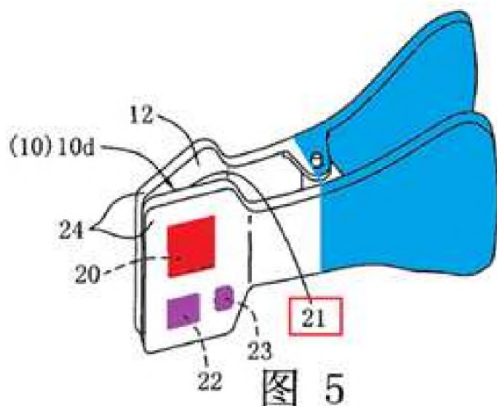
1. Independent Claim 1

Fieldpiece-B discloses the preamble and elements [1], [2], [3], and [4] of claim 1. See Section VIII.A.1.a.-e. Fieldpiece-B also discloses two pressure sensors,

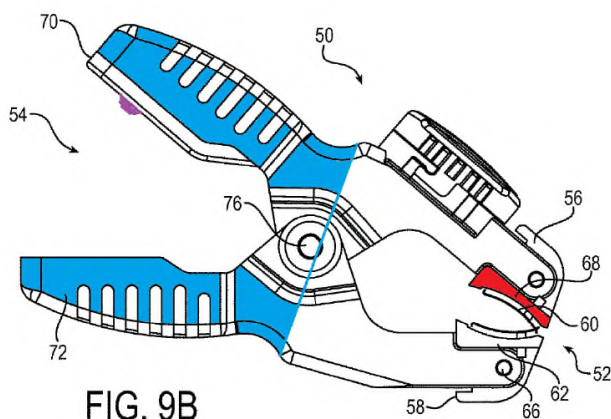
two temperature sensor clamps having a handle, and a portable electronic device with “no external physical connections among the plurality of sensors and the portable electronic device.” *Id.* If it is suggested that Fieldpiece-B does not disclose [5] “the integrated electronics are incorporated into the handle” and [6] whether the temperature sensors have “no external physical connections”, these are disclosed by CN’078.

- a. ***Claim 1, [5] “each temperature sensor clamp further comprises a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element; and”***

Compare CN ’078, FIG. 5 to a preferred temperature sensor clamp in the ’183 Patent. Both have a handle (Blue), a sensor element (Red), and integrated electronics (Purple).



Ex. 1006, FIG. 5



Ex. 1001, FIG. 9B

CN '078 also discloses temperature sensor 20 (Red) having a sensing surface 21. Ex. 1007, Pg. 6. Further, “a temperature sensor 20 starts sensing and converts the measured sensed values into electrical signals, the electrical signals are transmitted through a wireless transmitter 22 to a wireless receiver 31, the wireless receiver 31 transmits the electrical signals received to a computer device 30, and the computer device 30 analyzes and determines the electrical signals received.” Ex. 1007, Pg. 5. The wireless transmitter 22 is an integrated electronic, and is in electrical connection with the sensor element. Ex. 1002, ¶101. Moving the integrated electronics a little farther away on the same arm of the CN '078 clamp would have been an obvious design choice that would have been readily adopted by a POSITA. Ex. 1002, ¶102. A POSITA would have been motivated to modify Fieldpiece-B temperature sensor clamps by the teachings of CN '078 with a high expectation of success. See Ex. 1002, ¶¶106, and Ground 1, Claim 1, element [5].

Fieldpiece-B in view of CN '078 teaches element [5]. Ex. 1002, ¶¶96–103.

b. claim 1, [6] “there are no external physical connections among the plurality of sensors and the portable electronic device.”

See Section VIII.A.1.g, for element [6] regarding the pressure sensors and portable electronic device. The temperature sensors taught by Fieldpiece-B in view

of CN '078 would have no physical connections to the portable electronic device. Ex. 1002, ¶¶104-105.

Fieldpiece-B in view of CN '078 teaches element **[6]**.

SUMMARY and CONCLUSION:

A POSITA would have been motivated to combined Fieldpiece-B and CN '078 to arrive at improved, wireless temperature clamps. Further, the POSITA would have expected success at the combination since both Fieldpiece-B and CN '078 teach success at incorporation of wireless technology in the elements of a sensor system. Further, a POSITA would have expected success at the combination since both Fieldpiece-B and CN '078 teach success at incorporation of wireless technology in the elements of a sensor system. Ex. 1002, ¶¶106-107.

Fieldpiece-B in view of CN '078 renders claim 1 obvious. Ex. 1002, ¶108.

2. Independent Claim 12

See Section VIII.A.2.a.-b. Fieldpiece-B discloses the preamble and element **[1]**.

- a. [2] “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element;”**

See Section VIII.B.1.a. Fieldpiece-B in view of CN '078 teaches this element.

b. [3] “wherein the temperature sensor clamp has no external physical electrical or fluidic connections.”

See Section VIII.B.1.b. Fieldpiece-B in view of CN ’078 teaches this element.

SUMMARY and CONCLUSION: The Claim 1 Summary and Conclusion applies equally to Claim 12. Fieldpiece-B renders claim 12 obvious. See also Ex. 1002, ¶113.

C. Ground 3: Fieldpiece-B In View Of CN ’078 and Staniforth Renders Claims 1 And 12 Unpatentable

Staniforth teaches “a probe for measuring the surface temperature of a pipe which comprises an active clamp assembly and a passive clamp assembly.” Ex. 1008, 1:44–46. The probe has electronics incorporated in its handle that connect a thermistor to a display panel, and the display has integrated control buttons. *Id.*, 4:30–49. A POSITA would have relied upon the combined teachings of Fieldpiece-B, CN ’078, and Staniforth when considering “an improved sensor system for refrigeration units for monitoring and collecting system conditions,” as all of these references relate to sensors used to collect temperature data. Ex. 1002, ¶¶116-117.

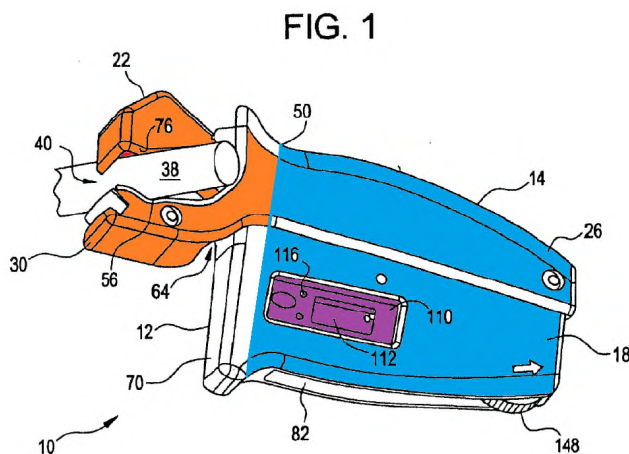
1. Independent Claim 1

Sections VIII.B.1. and VIII.B.1.a.–b. (applying Fieldpiece-B in view of CN ’078 to claim 1) are incorporated by reference.

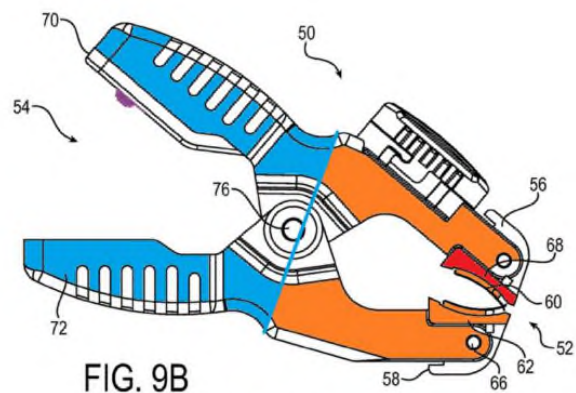
To the extent that it is suggested that either Fieldpiece-B or CN '078 does not disclose element [5], Staniforth does. Ex. 1002, ¶¶120.

- a. ***Claim 1, [5] “each temperature sensor clamp further comprises a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element; and”***

See Ground 2. The only element where the knowledge of a POSITA was relied on to fill a gap was the movement of integrated electronics into the temperature sensor clamp handles. Staniforth discloses this:



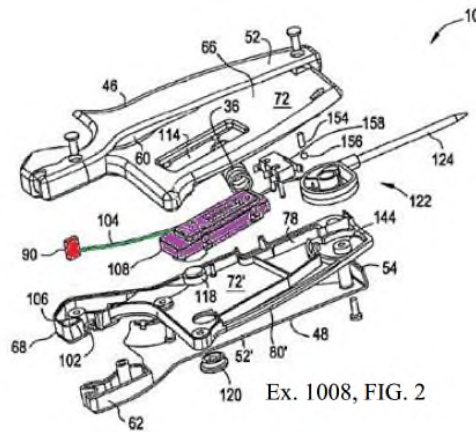
Ex. 1008, FIG. 1



Ex. 1001, FIG. 9B

Staniforth discloses upper and lower jaws 22, 30 (Orange) that clamp a pipe 38. Ex. 1008, 3:15–25. This is the same configuration shown in the '183 Patent at FIG. 9B. See above and Ex. 1002, ¶122. Temperature sensor assembly 90 (Red) is “in recess 102 in the clamping surface 76 of the upper jaw 22, with the signal-

carrying conductor 104 [Green] extending through opening 106 in clamping surface 76.” See Ex. 1008, 4:8–11, and FIGS. 1 (above) and 2 (below):



See Ex. 1002, ¶123.

Staniforth, in combination with Fieldpiece-B and CN '078, teaches “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element.” Ex. 1002, ¶¶125–127.

SUMMARY and CONCLUSION: A POSITA would have relied upon and combined the teachings of Fieldpiece-B, CN '078 and Staniforth based on the relatedness of the technology, the motivation to have improved functionality and usability, to reduce size and/or components, and would have expected a reasonable expectation of success in such a combination. Ex. 1002, ¶¶116-117, 128-129.

Fieldpiece-B in view of CN '078 and Staniforth renders claim 1 obvious. Ex. 1002, ¶130.

2. Independent Claim 12

See Section VIII.A.2.a.-b. Fieldpiece-B discloses the preamble and element [1].

- a. Claim 12, [2] “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element;”**

See Section VIII.C.1.a. Staniforth discloses this element.

- b. Claim 12, [3] “wherein the temperature sensor clamp has no external physical electrical or fluidic connections.”**

See Sections VIII.A.1.g. and VIII.b.1.b. Fieldpiece-B in view of CN '078 and Staniforth teaches this element.

SUMMARY and CONCLUSION: The Claim 1 Summary and Conclusion applies equally to Claim 12. Fieldpiece-B in view of CN '078 and Staniforth renders claim 12 obvious. Ex. 1002, ¶¶134-136.

D. Ground 4: Fieldpiece-B In View Of CN '332 Renders Claims 1 and 12 Unpatentable

CN '332 is directed to “pipe temperature [measurement] device,” with a temperature transducer.” Ex. 1010, ¶¶[0003] and [0009]. The temperature transducer includes a temperature-sensing probe in a clamping portion, and the temperature

transducer is connected to a data processing device that “may be a digital display and may also have a wireless transmission function.” *Id.*, ¶¶[0009]-[0010]. CN ’332 is an analogous prior art reference disclosing a wireless temperature sensor clamp. A POSITA would have relied upon the combined teachings of Fieldpiece-B and CN ’332 when considering “an improved sensor system for refrigeration units for monitoring and collecting system conditions.” Ex. 1002, ¶138.

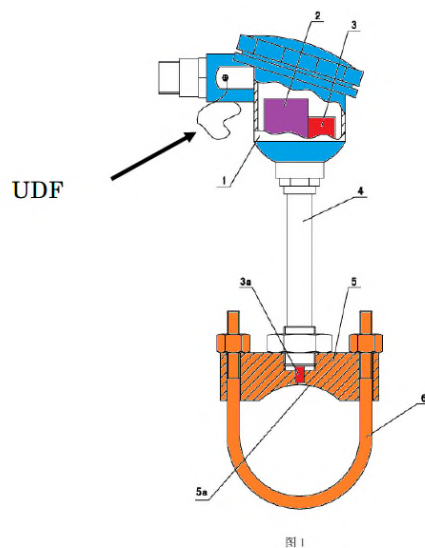
A POSITA would have relied upon and combined the teachings of Fieldpiece-B and CN ’332 based on the relatedness of the technology, the motivation to have improved functionality and usability, to reduce size and/or components, and due to a reasonable expectation of success in such a combination. Ex. 1002, ¶¶158-159.

1. Independent Claim 1

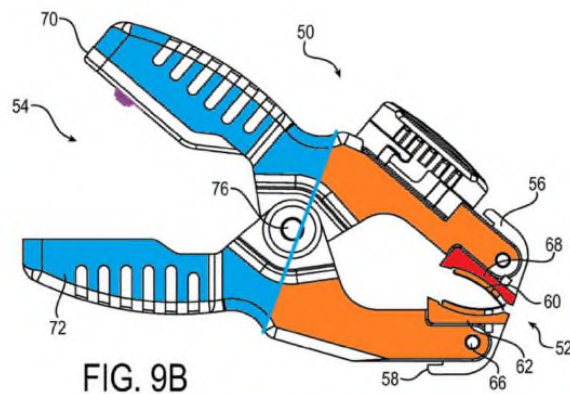
Fieldpiece-B discloses the preamble and elements [1], [2], [3], and [4] of claim 1. See Section VIII.A.1.a.-e. Fieldpiece-B also discloses two pressure sensors, two temperature sensor clamps having a handle, and a portable electronic device with “no external physical connections among the plurality of sensors and the portable electronic device.” *Id.* The only portions of claim 1 that Fieldpiece-B may not explicitly disclose are [5] “the integrated electronics are incorporated into the handle” and [6] whether the temperature sensors have “no external physical connections.”

- a. ***Claim 1, [5] “each temperature sensor clamp further comprises a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element; and”***

CN '332 discloses Example 1 of a pipe temperature measurement device; *i.e.*, a temperature sensor. Ex. 1010, ¶[0009] and Ex. 1009, FIG. 1:



Ex 1009, FIG. 1



Ex. 1001, FIG. 9B

The CN '332 temperature sensor has identical elements but a different shape compared to the '183 Patent FIG. 9B. Ex. 1002, ¶141. The CN '332 clamping portion with a clamp 6 (Orange), and heat conduction base 5 (Orange), having cylindrical surface 5a, linked to the clamp 6. Ex. 1010, ¶[0009]. These elements are configured to clamp around a pipe. *Id.*, ¶[0012]. The temperature sensor also includes a temperature-sensing probe 3a (Red) that obtains the temperature of the outer surface of the pipe. Ex. 1010, ¶¶[0009] and [0012]. Shell 1 (Blue) contains temperature

transducer 3 (Red) and temperature data processing device 2 (Purple), which are connected to each other. *Id.* ¶[0009]. The temperature transducer 3a (Red) is part of temperature-sensing probe 3 (Red), and is connected to the portion of temperature-sensing probe 3 (Red) in shell 1 (Blue) through supporting pole 4. “temperature data processing device in the example may be a digital display and may also have a wireless transmission function.” Ex. 1010, ¶[0010]. A POSITA would have considered shell 1 to be a handle. Ex. 1002, ¶144. The sensor element 3a is in electrical connection with the integrated electronics 2 in shell 1, the handle, *via* temperature transducer 3. Ex. 1002, ¶¶142, 145-146. Fieldpiece Brochure in combination with CN ’332 teaches element [5]. Ex. 1002, ¶147.

b. Claim 1, [6] “there are no external physical connections among the plurality of sensors and the portable electronic device.”

See Section VIII.A.1.g. regarding the pressure sensors and portable electronic device. The temperature sensors taught by Fieldpiece-B in view of CN ’332 would have wireless function in the handles, no connections to the portable electronic device, and no external physical connections. Ex. 1002, ¶¶148-157.

FIG. 1 of CN ’332 includes an undescribed feature, indicated by UDF, above. It is unclear what this element is. Ex. 1002, ¶151. However, this is not an “external physical connection.” *Id.*, ¶¶152-153.

Fieldpiece-B in view of CN '332 teaches element [6].

SUMMARY and CONCLUSION:

A POSITA would have been motivated to combine Fieldpiece-B and CN '332 to arrive at improved, wireless temperature clamps, with improved functionality and usability, to reduce size and/or components, and would have expected success at the combination since both Fieldpiece-B and CN '332 teach success at incorporation of wireless technology in sensors. Ex. 1002, ¶¶158-159.

Fieldpiece-B in view of CN '332 renders claim 1 obvious. Ex. 1002, ¶160.

2. Independent Claim 12

See Section VIII.A.2.a.-b. Fieldpiece-B discloses the preamble and element [1].

- a. Claim 12, [2] “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element;”*

See Section VIII.D.1.a. CN'332 discloses this element. Ex. 1002, ¶163.

- b. Claim 12, [3] “wherein the temperature sensor clamp has no external physical electrical or fluidic connections.”*

See VIII.A.1.g, element [6]. Fieldpiece-B in view of CN '332 teaches this element. Ex. 1002, ¶164.

SUMMARY and CONCLUSION:

The Claim 1 Summary and Conclusion applies equally to Claim 12. Fieldpiece-B in view of CN '332 renders claim 12 obvious. Ex. 1002, ¶165.

E. Ground 5: Fieldpiece-B In View Of CN '332 And Staniforth Renders Claims 1 And 12 Unpatentable

Section VIII.D. discusses the combination of Fieldpiece-B and CN '332 and is incorporated by reference. Staniforth is discussed in Section VIII.C, also incorporated by reference.

Staniforth is also analogous prior art to the '183 Patent and Fieldpiece-B since it is reasonably pertinent to the problem providing improved sensor systems, in particular, improved temperature sensor clamps. Ex. 1002, ¶167. A POSITA would have relied on Fieldpiece-B, CN '332, and Staniforth when considering the need identified in the '183 Patent: “an improved sensor system for refrigeration units for monitoring and collecting system conditions.” Ex. 1001, 2:34-36; Ex. 1002, ¶168.

1. Independent Claim 1

Sections VIII.A.1.a.-e. and g., VIII.D.1, and VIII.D.1.a. and b. (applying Fieldpiece-B and CN '332 to the claim 1 **[preamble]** and elements **[1], [2], [3], [4],** and **[6]**) are incorporated by reference.

To the extent that it is suggested that Fieldpiece-B in view of CN '332 does not teach element [5], Staniforth, discloses this element.

- a. ***[5] “each temperature sensor clamp further comprises a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element; and”***

The discussion of Staniforth in Sections VIII.C., VIII.C.1., and VIII.C.1.a. are incorporated by reference and applied to the combination of Fieldpiece-B and CN ’332. Staniforth discloses integrated electronics incorporated into the handle of a temperature sensor clamp and in electrical connection with a sensor element. Ex. 1008, 4:30–49; Ex. 1002, ¶¶170-171.

SUMMARY and CONCLUSION:

A POSITA would have combined Fieldpiece-B, CN ’332, and Staniforth to arrive at improved, wireless temperature clamps, with improved functionality and usability, to reduce size and/or components, and would have expected success at the combination since Fieldpiece-B and CN ’332 teach success at incorporation of wireless technology in sensors, and Staniforth teaches integrated electronics in a sensor clamp handle to provide improved functionality. Ex. 1002, ¶¶173-174.

Fieldpiece-B in view of CN ’332 and Staniforth renders claim 1 obvious. Ex. 1002, ¶¶175.

2. Independent Claim 12

The **[preamble]** and elements **[1]**, **[2]**, and **[3]** are discussed in Sections VIII.A.1, 2, 3, and 4 which are incorporated by reference. Fieldpiece-B discloses the **[preamble]** and element **[1]**.

- a. [2] “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element;”*

See Section VIII.E.1.a. Staniforth discloses this element. Ex. 1002, ¶178.

- b. [3] “wherein the temperature sensor clamp has no external physical electrical or fluidic connections.”*

See VIII.A.1.g and VIII.D.1.b., element **[6]**. Fieldpiece-B in view of CN '332 and Staniforth teaches this element.

SUMMARY and CONCLUSION:

The Claim 1 Summary and Conclusion applies equally to Claim 12. Fieldpiece-B in view of CN '332 and Staniforth renders claims 1 and 12 obvious. Ex. 1002, ¶¶179-181.

E. Ground 6: Fieldpiece-B In Combination With Peirs Renders Claims 1 And 12 Unpatentable

Peirs relates to “relates to improved monitoring equipment for heat pump or refrigerating systems,” Ex. 1011, [0001], and is in the same field of endeavor as the '183 Patent, namely “enhanced sensor systems for refrigeration units for monitoring

and collecting system conditions, such as superheat and subcooling.” Ex. 1001, 1:12-14. Ex. 1002, ¶183. A POSITA would have consulted and combined Fieldpiece-B and Peirs when considering the need identified in the ’183 Patent: “improved sensor system for refrigeration units for monitoring and collecting system conditions such as superheat and subcooling.” Ex. 1001, 2:34-36. Ex. 1002, ¶184.

1. Independent Claim 1

Fieldpiece-B discloses the preamble and elements [1], [2], [3], and [4] of claim 1. See Section VIII.A.1.a.-e. To the extent that it is suggested that Fieldpiece-B does not include [5] “the integrated electronics are incorporated into the handle” and [6] the temperature sensors have “no external physical connections”, these are in Peirs.

- a. [5] “each temperature sensor clamp further comprises a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element; and”**

Peirs (Ex. 1011) FIG. 1 is compared to the ’183 Patent (Ex. 1001) FIG. 4 below:

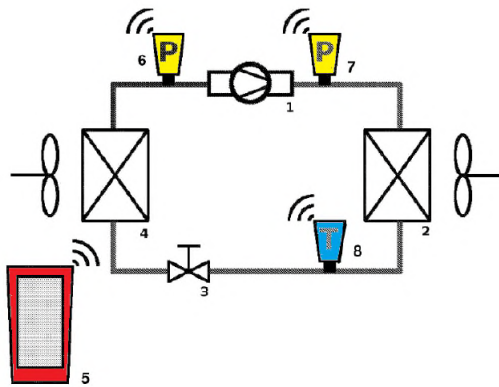


FIG 1
Ex. 1011, FIG. 1

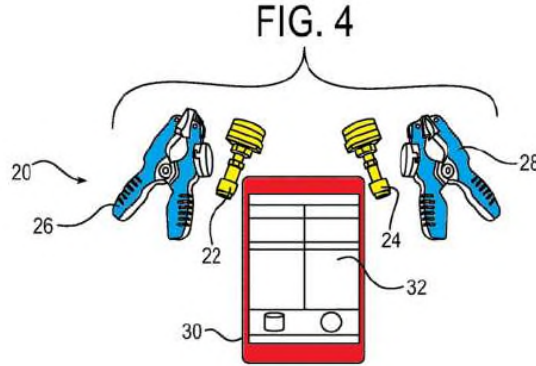


FIG. 4
Ex. 1001, FIG. 4

Peirs discloses two wirelessly communicating pressure sensors (Yellow). Ex. 1011, Abstract, ¶¶[0037], [0038], [0040] and FIG. 1. Peirs also discloses a wireless temperature sensor in FIG. 1, and describes second wireless temperature sensor in text. *Id.* Peirs also discloses receiving unit 5 that is a “handheld console able to communicate with at least 10 sensors,” lacks external physical connections, and is not physically connected to any of the sensors. Ex. 1011, FIG. 1 and ¶¶[0038] and [0042]. Receiving unit also runs calculations and displays data. *Id.*, ¶[0042]. See Ex. 1002, ¶¶187-188.

Wirelessly communicating temperature and pressure sensors were routine prior to January 20, 2014 for a POSITA, and a POSITA would have been motivated to modify the temperature sensor clamps of Fieldpiece-B to include integrated wireless transmitters in the handles, and in electrical connection with the sensor element. Ex. 1002; ¶¶189-190.

Fieldpiece-B in view of Peirs teaches element [5]. Ex. 1002; ¶190.

b. [6] “there are no external physical connections among the plurality of sensors and the portable electronic device.”

See Section VIII.A.1.g, element [6] regarding the pressure sensors and portable electronic device. The temperature sensors taught by Fieldpiece-B in view of Peirs would have no connections to the portable electronic device, and no external physical connections. Ex. 1002, ¶¶192-196. Fieldpiece-B in view of Peirs teaches element [6]. Ex. 1002, ¶197.

SUMMARY and CONCLUSION:

A POSITA would have combined Fieldpiece-B and Peirs to arrive at improved, wireless temperature clamps, with improved functionality and usability, to reduce size and/or components, and would have expected success at the combination since Fieldpiece-B and Peirs teach success at incorporation of wireless technology in sensors. Ex. 1002, ¶¶198-199. Fieldpiece-B in view of Peirs renders claim 1 obvious. Ex. 1002, ¶200.

2. Independent Claim 12

See VIII.A.2.a.-b.. Fieldpiece-B discloses the **[preamble]** and element **[1]**.

- a. [2] “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element;”**

See Section VIII.E.1.a. Fieldpiece-B in view of Peirs teaches element [2]. Ex. 1002, ¶203.

- b. [3] “wherein the temperature sensor clamp has no external physical electrical or fluidic connections.”**

See Section VIII.E.1.b. Fieldpiece-B in view of Peirs teaches element [3]. Ex. 1002, ¶204.

SUMMARY and CONCLUSION: The Claim 1 Summary and Conclusion applies equally to claim 12. Fieldpiece-B in view of Peirs renders claim 12 obvious. Ex. 1002, ¶¶205-207.

F. Ground 7: Fieldpiece-B In Combination With Peirs And Staniforth Renders Claims 1 And 12 Unpatentable

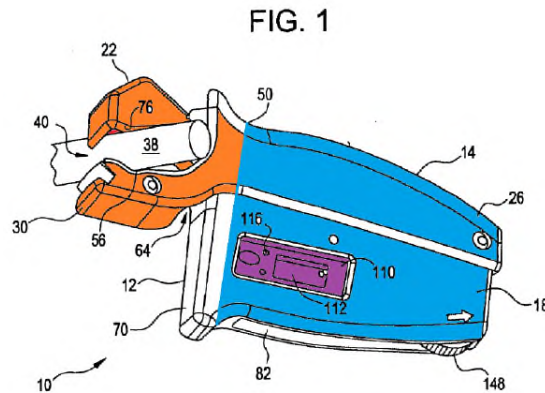
Fieldpiece-B, Peirs, and Staniforth are all in the same field of endeavor for the reasons noted above. A POSITA would have consulted and combined Fieldpiece-B, Peirs, and Staniforth when considering the need identified in the '183 Patent: “an improved sensor system for refrigeration units for monitoring and collecting system conditions.” Ex. 1001, 2:34-36. See Ex. 1002, ¶¶209-210.

1. Independent Claim 1

Fieldpiece-B discloses the **[preamble]** and elements **[1]**, **[2]**, **[3]**, and **[4]** of claim 1. See Section VIII.A.1.a.-e. To the extent that it is suggested that Fieldpiece-B does not include **[5]** “the integrated electronics are incorporated into the handle” and **[6]** the temperature sensors have “no external physical connections”, these are in Peirs. See Section VIII.E.1.a.-b. If it is suggested Fieldpiece-B in view of Peirs does not teach any of element **[4]**, **[5]**, and **[6]**, Staniforth, discloses or teaches these elements.

- a. [4] the first and second temperature sensors each comprises a temperature sensor clamp having a clamping portion configured to clamp on a tube of the refrigerant unit, the clamping portion including a sensor element to measure temperature about the tube;*

Staniforth discloses upper and lower jaws 22, 30 (Orange) that clamp a pipe 38. Ex. 1009, 3:15–25. Also, a temperature sensor assembly 90 is located on the clamping surface 76 of the upper jaw 22. Id. 4:8–11. See annotated FIG. 1 from Staniforth:



In combination with the two wireless temperature sensors of Peirs, Staniforth teaches element [4]. Ex. 1002, ¶¶213-215.

- b. [5] each temperature sensor clamp further comprises a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element; and**

Staniforth discloses “integrated electronics” and a “handle.” See Section VIII.C.1.a., Ex. 1002, ¶¶216-217.

- c. [6] there are no external physical connections among the plurality of sensors and the portable electronic device.**

The two wireless temperature sensor clamps taught by the combination of Fieldpiece-B, Staniforth and Peirs would have “no external physical connections”, as all three references disclose wireless sensors. Ex. 1002, ¶¶218-221.

SUMMARY and CONCLUSION:

A POSITA would have combined Fieldpiece-B, Staniforth, and Peirs to arrive at improved, wireless temperature clamps, with improved functionality and usability, to reduce size and/or components, and would have expected success at the combination since Fieldpiece-B and Peirs teach success at incorporation of wireless technology in sensors, and Staniforth teaches integrated electronics in a sensor clamp handle to provide improved functionality. Ex. 1002, ¶222.

Fieldpiece-B in view of Peirs and Staniforth renders claim 1 obvious. Ex. 1002, ¶223.

2. Independent Claim 12

See Section VIII.A.2.a.-b. Fieldpiece-B discloses the **[preamble]** and element **[1]**. Ex. 1002, ¶224.

- a. [2] “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element;”**

See Section VIII.F.1.b. Staniforth discloses this element. Staniforth combined with Peirs also discloses this element. Ex. 1002, ¶225.

- b. [3] “wherein the temperature sensor clamp has no external physical electrical or fluidic connections.”**

See Section VIII.F.1.c. Fieldpiece-B in view of Peirs and Staniforth teaches this element.

SUMMARY and CONCLUSION: The claim 1 Summary and Conclusion applies equally to claim 12. Fieldpiece-B in view of Peirs and Staniforth renders claim 12 obvious. Ex. 1002, ¶¶226-227.

G. Ground 8: Fieldpiece-M Renders Claims 1 and 12 Unpatentable.

Fieldpiece-M is from the same field of endeavor as the '183 Patent, namely sensor systems for HVACR, and are directed to solving problems similar to the problems addressed by the '183 Patent, namely, a “need in the art for an improved sensor system for refrigeration units for monitoring and collecting system conditions such as superheat and subcooling.” Ex. 1001, 2:34–36. Ex. 1002, ¶228.

Fieldpiece-M was downloaded from active links at the Internet Archive “Wayback Machine,” from web pages captured June 19, 2011. *See* Exs. 1015-1016, 1018-1020. Fieldpiece-M was publicly available at least as of that date at the links indicated. The authenticity of the records relied on herein is established by the Affidavit of Nathaniel E. Frank-Wright, dated February 19, 2023 (Ex. 1015).

1. Independent Claim 1

a. [Preamble] “A sensor system for a refrigerant unit comprising:”

Fieldpiece-M discloses a sensor system for a refrigerant unit. Ex. 1012, Pgs. 12–13.

b. [1] “a plurality of sensors for sensing system parameters of the refrigerant unit; and”

Fieldpiece-M discloses recording 13 system parameters “at the same time,” and, thus, discloses at least 13 sensors. Ex. 1012, Pg. 12; Ex. 1002, ¶¶230-232. Fieldpiece-M discloses element [1].

c. [2] “a portable electronic device configured to receive the system parameters from the plurality of sensors and to calculate system conditions for the refrigerant based on the system parameters; wherein:”

Fieldpiece-M discloses the “HVAC GUIDE System Analyzer,” also referred to as the “New HG3 model” or “HG3.” that calculates system conditions based the receive system parameters. The system conditions calculated include superheat and subcool. *Id.*, Pgs. 22–33; Ex. 1002, ¶233-234. Fieldpiece-M discloses element [2]. Ex. 1002, ¶235.

d. [3] “the plurality of sensors comprises a first pressure sensor and a second pressure sensor, and a first temperature sensor and a second temperature sensor;”

Fieldpiece-M discloses detecting suction line temperature and pressure with a first temperature sensor and a first pressure sensor for obtaining the system parameters for superheat analysis; and detecting liquid line temperature and pressure with a second temperature sensor and a second pressure sensor for obtaining the

system parameters for subcooling analysis. Ex. 1012, Pgs. 23, 29. Fieldpiece-M discloses element [3]. Ex. 1002, ¶¶236-240.

- e. [4] “the first and second temperature sensors each comprises a temperature sensor clamp having a clamping portion configured to clamp on a tube of the refrigerant unit, the clamping portion including a sensor element to measure temperature about the tube;”*

Fieldpiece-M discloses “ATH4: Temperature with thermocouples (includes wet bulb and dry bulb thermocouples). Accepts an K-Type thermocouples. Ex. 1012, Pg. 72. Then Fieldpiece-M discloses “ATC1: Pipe Clamp thermocouple” and “ATC1R: Pipe clamp thermocouples.” *Id.*, Pg. 73. Fieldpiece-M also illustrates temperature sensor clamps having a clamping portion:



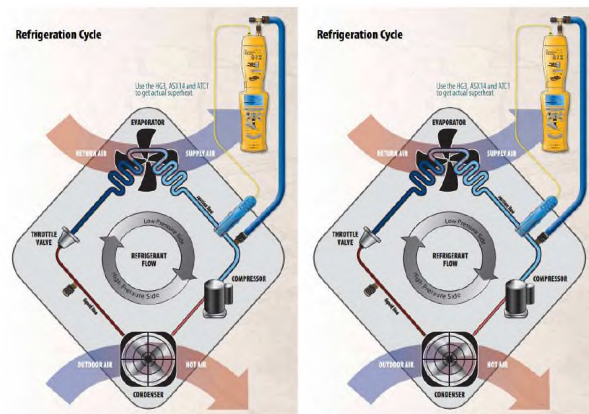
Ex. 1012, Pgs. 15, 23, 29

Fieldpiece-M discloses temperature sensor clamps having a clamping portion. Each has a handle. The portion of the temperature sensor clamps engaging either the refrigerant line (suction line or liquid line, above) necessarily includes a sensor element to measure temperature about the tube illustrated. Ex. 1002, ¶¶241–244.

Fieldpiece-M discloses element [4]. Ex. 1002, ¶245.

- f. [5] “each temperature sensor clamp further comprises a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element; and”*

Fieldpiece-M illustrates Superheat and Subcooling arrangements:

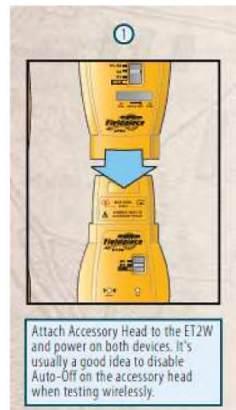


Ex. 1012, Pgs. 23, 29

Each temperature sensor clamp is connected to a wireless transmitter to transmit sensed temperature data. Ex. 1012, Pgs. 23, 29; Ex. 1002, ¶246. Integrated electronics are necessarily present to convert sensed temperature to electrical signal. Ex. 1002, ¶¶247-248. Fieldpiece-M teaches element [5]. Ex. 1002, ¶249.

- g. [6] “there are no external physical connections among the plurality of sensors and the portable electronic device.”*

Fieldpiece-M discloses creating a unitary, integrated sensor by combining any sensor head with a wireless transmitter. Ex. 1012, ¶¶251–252.



Ex. 1012, Pg. 12

The HG3, portable electronic device, can receive up to 12 wireless signals at one time. See Wireless Testing Section (Pages 12-13).” Ex. 1012, Pg. 10. Ex. 1002, ¶¶251-254. The wireless system taught has no connection from the temperature and pressure sensors to the HG3. Nor do any of the temperature or pressure sensors or the HG3 have any external, physical connection. Ex. 1002, ¶255. Fieldpiece-M teaches element [6]. Ex. 1002, ¶256.

SUMMARY and CONCLUSION:

A POSITA would appreciate that the Fieldpiece-M teaches incorporation of wireless technology in HVACR sensors to transmit data to a remote, portable electronic device used for analysis of HVACR systems, and would further recognize that the temperature sensors could be improved by placing wireless technology and integrated electronics in the temperature sensor clamp handles to enhance usability of the assembled sensor system components. A POSITA would have found it obvious to make such a modification. Ex. 1002, ¶¶257-258.

Fieldpiece-M renders claim 1 obvious. Ex. 1002, ¶259.

2. Independent Claim 12

- a. ***[Preamble] “A temperature sensor clamp for sensing temperature in a refrigerant unit, the temperature sensor clamp comprising:”***

See Section VIII.G.1.d. Fieldpiece-M discloses this preamble. Ex. 1002, ¶260.

- b. ***[1] “a clamping portion configured to clamp on a tube of the refrigerant unit, the clamping portion including a sensor element to measure temperature about the tube, and”***

See Section VIII.G.1.e. Fieldpiece-M discloses this element. Ex. 1002, ¶261.

- c. ***[2] “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element;”***

See Section VIII.G.1.f. Fieldpiece-M discloses this element. Ex. 1002, ¶262.

- d. ***[3] “wherein the temperature sensor clamp has no external physical electrical or fluidic connections.”***

See Section VIII.G.1.g. Fieldpiece-M discloses this element. Ex. 1002, ¶263.

SUMMARY and CONCLUSION: The Summary and Conclusion for Claim 1 applies equally to Claim 12. Fieldpiece-M renders claim 12 obvious. Ex. 1002, ¶¶264-266.

H. Ground 9: Fieldpiece-M In Combination With CN '078 And Staniforth Renders Claims 1 And 12 Unpatentable.

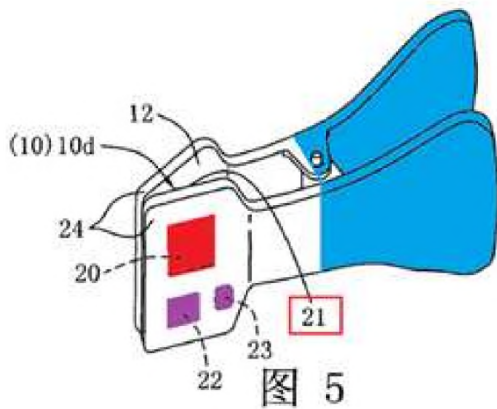
Fieldpiece-M is analogous to and is in the same field of endeavor as the '183 Patent since both relate to sensor systems for HVACR. Ex. 1002, ¶269. CN '078 is directed to a device comprising a temperature sensor in the form of a temperature sensor clamp that wirelessly transmits temperature data to a computer, which then analyzes the temperature data. Ex. 1007, Abstract, Ex. 1006, FIG. 5. Ex. 1002, 268. CN '078 is analogous art to Fieldpiece-M and the '183 Patent, since it is reasonably pertinent to a problem described in the '183 Patent, for example, “an improved sensor system for refrigeration units for monitoring and collecting system conditions,” and the proposed solution of “wireless” transmission of sensor data to a remote device. Ex. 1001, 2:34–41. Ex. 1002, ¶270. Staniforth relates to “a probe for measuring the surface temperature of a pipe which comprises an active clamp assembly and a passive clamp assembly.” Ex. 1008, 1:43–45. The probe includes a “clamp temperature sensor assembly . . . in the upper jaw and an electronics module is carried in the lower handle. The electronics module is in communication with the clamp temperature sensor assembly and has a display panel.” *Id.*, 1:50–55. Staniforth is analogous since it is reasonably pertinent to the problem of providing improved sensor systems, in particular, improved temperature sensor clamps See Ex. 1002, ¶¶267-271.

1. Independent Claim 1

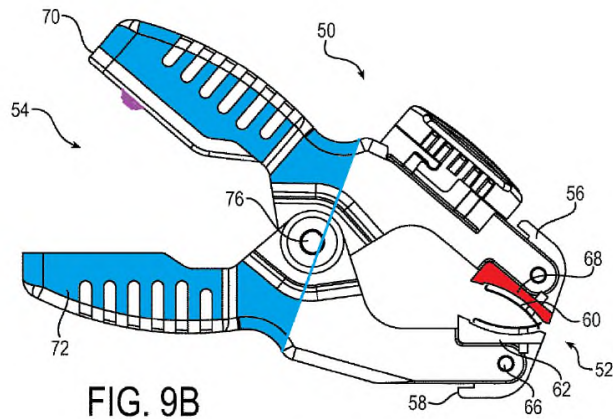
Fieldpiece-M discloses the claim 1 **[preamble]** and elements **[1]–[6]**. See Section VIII.G.1.a.-g. Fieldpiece-M also discloses two pressure sensors, two temperature sensor clamps having a handle, and a portable electronic device with “no external physical connections among the plurality of sensors and the portable electronic device.” *Id.* If it is suggested that Fieldpiece-M does not disclose **[5]** “the integrated electronics are incorporated into the handle” or **[6]** whether the temperature sensors have “no external physical connections”, these are disclosed by CN’078 and Staniforth.

- a. [5] “each temperature sensor clamp further comprises a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element; and”**

CN ’078, FIG. 5 is compared to a preferred temperature sensor clamp in the ’183 Patent. Both have a handle (Blue), a sensor element (Red), and integrated electronics (Purple).



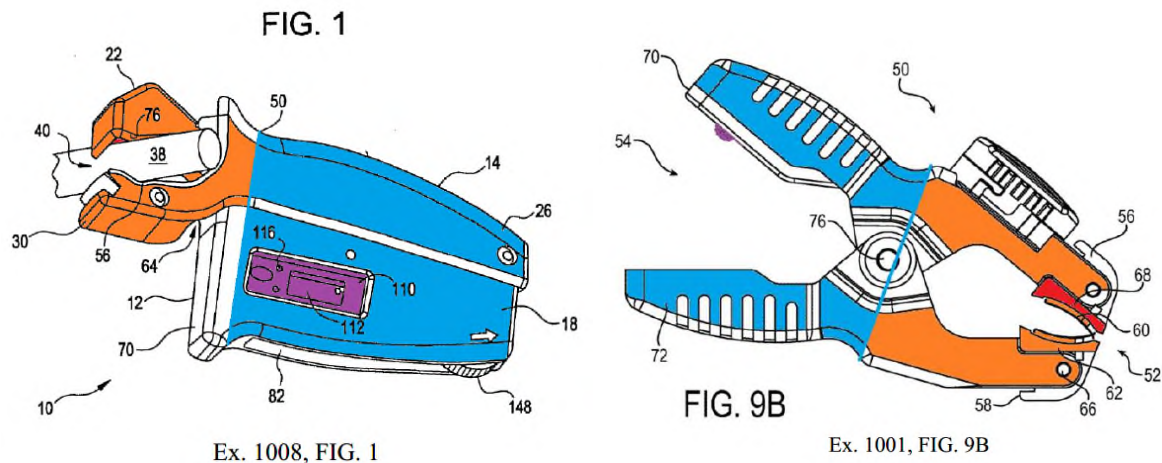
Ex. 1006, FIG. 5



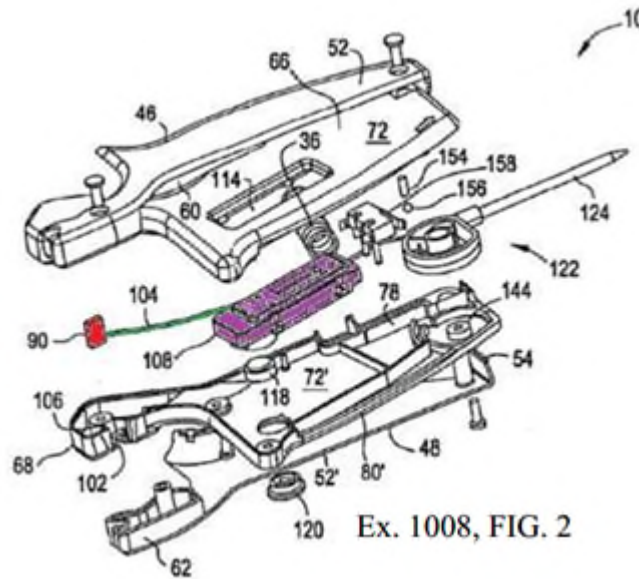
Ex. 1001, FIG. 9B

CN '078 also discloses temperature sensor 20 (Red) having a sensing surface 21. Ex. 1007, Pg. 6. Further, “a temperature sensor 20 starts sensing and converts the measured sensed values into electrical signals, the electrical signals are transmitted through a wireless transmitter 22 to a wireless receiver 31, the wireless receiver 31 transmits the electrical signals received to a computer device 30, and the computer device 30 analyzes and determines the electrical signals received.” Ex. 1007, Pg. 5. The wireless transmitter 22 is an integrated electronic, and is in electrical connection with the sensor element. Ex. 1002, ¶280. Moving the integrated electronics a little farther away on the same arm of the CN '078 clamp would have been an obvious design choice that would have been readily adopted by a POSITA. Ex. 1002, ¶281. A POSITA would have been motivated to modify Fieldpiece-M temperature sensor clamps by the teachings of CN '078 with a high expectation of success. See Ex. 1002, ¶293, and Section VIII.B.1.a.

Further as to Staniforth, FIG. 1 is compared to FIG. 9B of the '183 Patent
are annotated and reproduced below for reference:



Staniforth discloses upper and lower jaws 22, 30 (Orange) that clamp a pipe 38. Ex. 1008, 3:15–25. This is the same configuration shown in the '183 Patent at FIG. 9B. Ex. 1002, ¶287. A temperature sensor assembly 90 (Red) is “in recess 102 in the clamping surface 76 of the upper jaw 22, with the signal-carrying conductor 104 [green] extending through opening 106 in clamping surface 76.” See Ex. 1008, 4:8–11, and FIGS. 1 (above) and 2 (below):



The clamping surface 76 (Red) is just visible in FIG. 1 and shows the location of the temperature sensor assembly 90 in the assembled temperature probe. Ex. 1002, ¶289. Staniforth also discloses upper handle 26 and lower handle 18 (Blue), and an electronics module 108, that is “integrated electronics” (Purple) within lower handle 18 and within display panel 110. Ex. 1008, 3:5–24. The electronics module includes display panel 110, LCD display 112, and control buttons 116. *Id.*, 4:30–49. The temperature sensor assembly 90 is connected via signal-carrying conductor 104 (Green) with the electronics module 108 (Purple) within lower handle 18. Ex. 1008, 4:30–34. Ex. 1002, ¶¶289-291.

The combination of Staniforth with Fieldpiece-M and CN '078 specifically discloses moving integrated electronics to the handle of the temperature sensor taught by the combination of Fieldpiece-M and CN '078. Ex. 1002, ¶¶292.

Fieldpiece-M in view of CN '078 and Staniforth teaches element [5].

- b. [6] “there are no external physical connections among the plurality of sensors and the portable electronic device.”**

See Section VIII.G.1.g, for element [6] regarding the pressure sensors and portable electronic device. The temperature sensors taught by Fieldpiece-M in view of CN '078 would have no connections to the portable electronic device, and no external physical connections. Ex. 1002, ¶¶283-284.

Fieldpiece-M in view of CN '078 teaches element [6].

SUMMARY and CONCLUSION:

A POSITA would have combined Fieldpiece-M, CN '078, and Staniforth to arrive at improved, wireless temperature clamps, with improved functionality and usability, to reduce size and/or components, and would have expected success at the combination since Fieldpiece-M and CN '078 teach success at incorporation of wireless technology in sensors, and Staniforth teaches integrated electronics in a sensor clamp handle to provide improved functionality. Ex. 1002, ¶¶293-294.

Fieldpiece-M in combination with CN '078 and Staniforth renders claim 1 obvious. Ex. 1002, ¶295.

2. Independent Claim 12

See Section VIII.G.2.a.-b. Fieldpiece-M discloses the **[preamble]** and element **[1]**.

- a. [2] “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element;”**

See Section VIII.H.1.a. Fieldpiece-M in view of CN '078 and Staniforth teaches this element.

- b. [3] “wherein the temperature sensor clamp has no external physical electrical or fluidic connections.”**

See Section VIII.H.1.b. Fieldpiece-M in view of CN '078 teaches this element.

SUMMARY and CONCLUSION: The Summary and Conclusion for Claim 1 applies equally to Claim 12. Fieldpiece-M in combination with CN '078 and Staniforth renders claim 12 obvious. Ex. 1002, ¶¶301-303.

I. Ground 10: Kane Anticipates Claims 1 And 12

Kane is analogous to the '183 Patent as it is in the same field of endeavor as the '183 Patent; both relate to sensor systems for refrigeration units. See Ex. 1013, [0002] and Ex. 1001, 1:12-14. Ex. 1002, ¶¶304-305.

1. Independent Claim 1

a. [Preamble] “A sensor system for a refrigerant unit comprising:”

Kane discloses “servicing and testing equipment used in the heating, ventilating, air conditioning, and refrigeration (HVAC/R) field and, more particularly to handheld test and measurement devices useful for HVAC/R technicians for the performance of their vocation.” Ex. 1013, ¶[0002]. Kane discloses this preamble. Ex. 1002, ¶307.

b. [1] “a plurality of sensors for sensing system parameters of the refrigerant unit; and”

Kane discloses two temperature sensors and two pressure sensors for sensing system parameters of the refrigerant unit. Kane, ¶¶[0042]–[0043]. Ex. 1002, ¶¶308–309.

c. [2] “a portable electronic device configured to receive the system parameters from the plurality of sensors and to calculate system conditions for the refrigerant based on the system parameters; wherein;”

Kane discloses a main unit 120 that “comprises: a handheld-sized instrument with means for receiving a plurality of (ex. 1 through n) inputs 122 . . . via wireless communications with sensor . . . units” Ex. 1013, ¶[0023], underline added. The main unit can display the sensor inputs 122, or “[provide] the user/technician with real-time display of the (computed/calculated/estimated) output values (such

as, for example, superheat, subcool, combustion efficiency, etc.) as those output values change in response to dynamically changing sensor input values.” Ex. 1013, ¶[0049].

Kane disclose element [2]. Ex. 1002, ¶¶310-312.

- d. [3] “the plurality of sensors comprises a first pressure sensor and a second pressure sensor, and a first temperature sensor and a second temperature sensor;”**

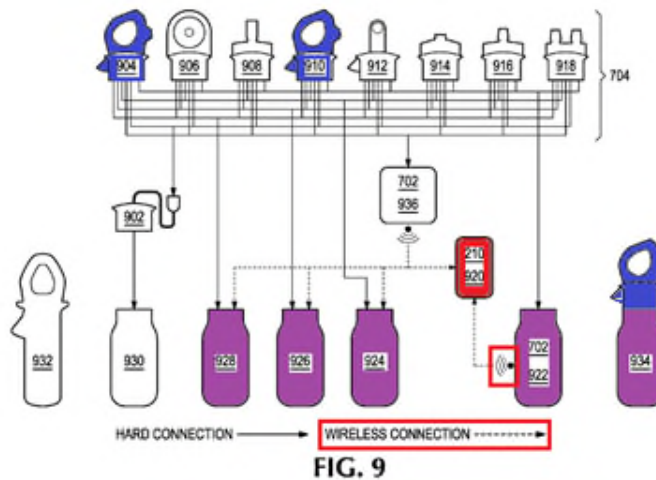
See element [1] of this claim. Kane discloses element [3].

- e. [4] “the first and second temperature sensors each comprises a temperature sensor clamp having a clamping portion configured to clamp on a tube of the refrigerant unit, the clamping portion including a sensor element to measure temperature about the tube;”**

Kane discloses “The . . . temperature sensors . . . 418 [is] preferably equipped with . . . pipe engaging sensor clamps for quality transducer contact for measuring refrigerant (line) temperature.” Ex. 1013, ¶[0042]. Further, Kane states that both of temperature sensors 418, 428 can have these features. Ex. 1013, ¶[0043]. Temperature sensors 418, 428 are “pipe engaging sensor clamps for quality transducer contact for measuring refrigerant (line) temperature.” Ex. 1002, ¶315.

Further, the embodiment of Fig. 9 of Kane discloses many “sensors 704 [that] comprise any one or more attachment heads 904, 906, 908, 910, 912, 914, 916, 918,

or another sensor attachment head not shown, each of which preferably interconnects with the sensor interface 702.” Ex. 1013, ¶[0063]. See FIG. 9:



Ex. 1002, ¶320.

Kane discloses element [4]. Ex. 1002, ¶¶319, 325.

- f. [5] “each temperature sensor clamp further comprises a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element; and”*

Kane discloses that the meter 934 has a “clamp-on type head 904.” Ex. 1013, [0065]. See above. Meter 34 is the integral combination of base unit 922 and sensor head 904. *Id.* As illustrated, base unit 922 includes wireless technology; *i.e.*, integrated electronics. Ex. 1013, [0065]. Ex. 1002, ¶321. Any of the wireless base units 922, 924, 926, 928 may be attached to a sensor attachment head 704, and “sensor kits 704 are as in FIG. 4,” including kit 404, which includes two temperature

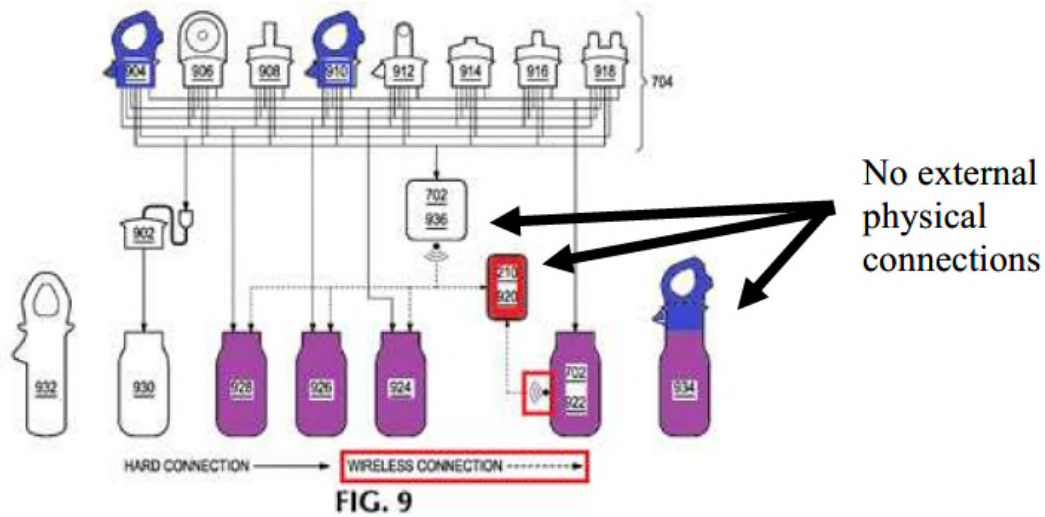
sensors. Ex. 1013, ¶¶[0042], [0043], [0057], [0063]-[0066]. Ex. 1002, ¶322. A POSITA would hold the base unit 922, 924, 926, or 928 as a handle. Ex. 1002, ¶323.

Further “integrated electronics” are necessarily present to convert temperature sensed to data that is wirelessly transmissible. Ex. 1002, ¶324. Kane at least describes wireless transmission from a sender unit to the main unit 120, while the sensors are each connected to a sender unit. Ex. 1013, [0065]. Kane discloses element [5]. Ex. 1002, ¶326.

g. [6] “there are no external physical connections among the plurality of sensors and the portable electronic device.”

Kane discloses an option for pressure sensors 416 and 426, and temperature sensors 418 and 428 to be wireless: “The AC/R kit 404 may include a combination of wired and wireless sensors” Ex. 1013, [0042] and [0043]. In addition, the embodiment of FIG. 9 contemplates these pressure sensors as options for its wireless sensors. *Id.*, [0042], [0043], [0057], [0063]-[0066]. Ex. 1002, ¶327.

One assembled sensor in FIG. 9 is labeled with “no external physical connections” below:



Any of the wireless base units 922, 924, 926, 928 may be attached to a sensor attachment head 704, and “sensor kits 704 are as in FIG. 4,” including kit 404, which includes two temperature sensors. Ex. 1013, ¶¶[0042], [0043], [0057], [0063]-[0066]. As such, four wireless units like the assembled unit in FIG. 9 would be created, and would include two wireless pressure sensors and two wireless pressure sensors. Ex. 1002, ¶329. Further, main unit 120 receives data wirelessly. Ex. 1013, ¶23. Ex. 1002, ¶329.

FIG. 9 illustrates that the wireless sensors communicate wirelessly with “Blue Tooth enabled device 920 (or smartphone 210)” (Red), which operates as user interface 708. Ex. 1013, ¶¶[0065], [0068]. Ex. 1002, ¶¶330-331.

Kane in discloses element [6]. Ex. 1002, ¶333.

SUMMARY and CONCLUSION:

Kane is from the same field of endeavor and analogous to the ‘183 Patent and discloses all of the elements of claim 1 as noted above.

Kane anticipates claim 1. Ex. 1002, ¶334.

2. Independent Claim 12

- a. [Preamble] “A temperature sensor clamp for sensing temperature in a refrigerant unit, the temperature sensor clamp comprising:”**

See Section VII.I.1.d. Kane discloses this preamble. Ex. 1002, ¶¶335.

- b. [1] “a clamping portion configured to clamp on a tube of the refrigerant unit, the clamping portion including a sensor element to measure temperature about the tube, and”**

See Section VIII.I.1.e. Kane discloses element [1]. Ex. 1002, ¶336.

- c. [2] “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element;”**

See Section VII.I.1.f. Kane discloses element [2]. Ex. 1002, ¶337.

- d. [3] “wherein the temperature sensor clamp has no external physical electrical or fluidic connections.”**

See Section VIII.I.1.g. Kane discloses element [3]. 1002, ¶338.

SUMMARY and CONCLUSION: The Summary and Conclusion for Claim 1 applies equally to Claim 12. Kane anticipates claim 12. Ex. 1002, ¶339.

**J. Ground 11: Kane In Combination With Staniforth Renders
Claims 1 And 12 Unpatentable**

Staniforth teaches “a probe for measuring the surface temperature of a pipe which comprises an active clamp assembly and a passive clamp assembly.” Ex. 1008, 1:44–46. The probe has electronics incorporated in its handle that connect a thermistor to a display panel, and the display has integrated control buttons. *Id.*, 4:30–49. Kane is in the same field of endeavor as the ‘183 Patent. A POSITA would have relied upon the combined teachings of Kane and Staniforth when considering “an improved sensor system for refrigeration units for monitoring and collecting system conditions,” as these references relate to sensors used to collect temperature data. Ex. 1002, ¶¶340-342.

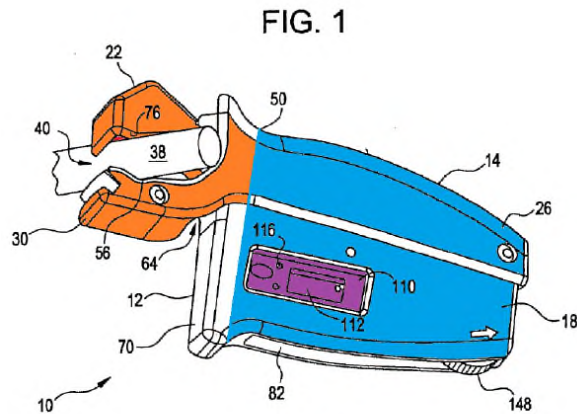
1. Independent Claim 1

Kane discloses the [preamble] and elements [1]–[4] and [6]. See Section VIII.I.1.a.-e. and g. Ex. 1002, ¶¶307–325, 327–333.

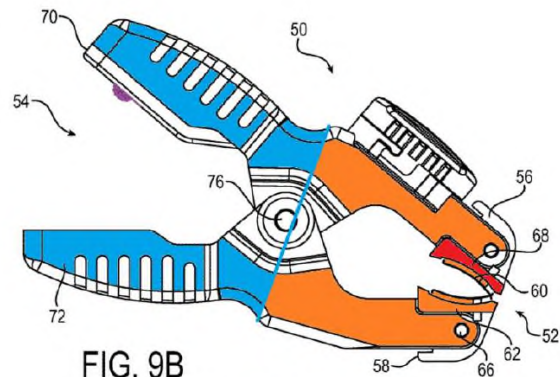
- a. [5] “each temperature sensor clamp further comprises a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element; and”**

Kane discloses this element. See Section VIII.I.1.f. To the extent that it is argued that Kane does not disclose element [5], Staniforth teaches a temperature

sensor clamp having “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element.” FIG. 1 of Staniforth as compared to FIG. 9B of the ’183 Patent are annotated and reproduced below for reference:

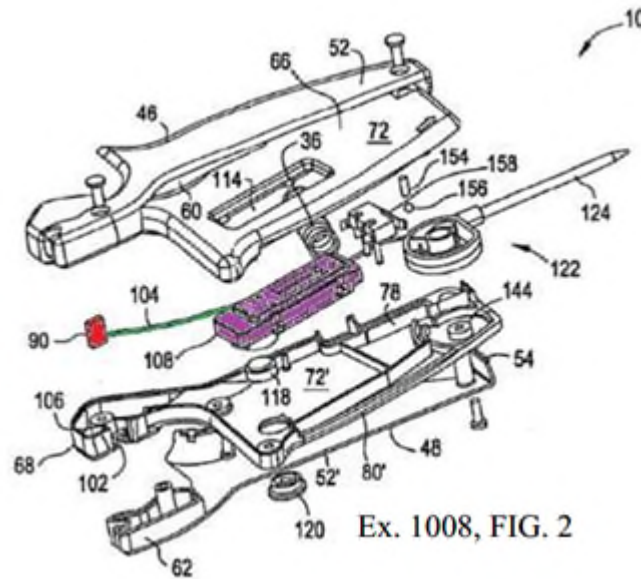


Ex. 1008, FIG. 1



Ex. 1001, FIG. 9B

Staniforth discloses upper and lower jaws 22, 30 (Orange) that clamp a pipe 38. Ex. 1008, 3:15–25. This is the same configuration shown in the ’183 Patent at FIG. 9B. A temperature sensor assembly 90 (Red) is “in recess 102 in the clamping surface 76 of the upper jaw 22, with the signal-carrying conductor 104 [green] extending through opening 106 in clamping surface 76.” See Ex. 1008, 4:8–11, and FIGS. 1 (above) and 2 (below):



Ex. 1002, ¶¶344-345.

Staniforth also discloses upper handle 26 and lower handle 18 (Blue), and an electronics module 108, that is “integrated electronics” (Purple) within lower handle 18 and within display panel 110. Ex. 1008, 3:5–24. The electronics module includes display panel 110, LCD display 112, and control buttons 116. *Id.*, 4:30–49. Further, the temperature sensor assembly 90 is connected via signal-carrying conductor 104 (Green) with the electronics module 108 (Purple) within lower handle 18. Ex. 1008, 4:30–34. Ex. 1002, ¶¶346-350.

SUMMARY and CONCLUSION:

A POSITA would have been motivated to combine Kane and Staniforth to arrive at improved, wireless temperature clamps based on the relatedness of the technology, the motivation to have improved functionality and usability, to reduce

size and/or components, and due to a reasonable expectation of success in such a combination. Ex. 1002, ¶¶350-353.

Kane in view of Staniforth teach element [5], thus rendering claim 1 obvious. Ex. 1002, ¶354.

2. Independent Claim 12

- a. [Preamble] “A temperature sensor clamp for sensing temperature in a refrigerant unit, the temperature sensor clamp comprising:”**

See Section VIII.I.1.d. Kane discloses this preamble. Ex. 1002, ¶355.

- b. [1] “a clamping portion configured to clamp on a tube of the refrigerant unit, the clamping portion including a sensor element to measure temperature about the tube, and”**

See Section VIII.I.1.e. Kane discloses element [1]. Alternatively, Kane in view of Staniforth teaches element per Section VIII.J.1.a. Ex. 1002, ¶356

- c. [2] “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element;”**

See Section VIII.I.1.f. Kane discloses element [2]. Alternatively, Kane in view of Staniforth teaches element [2]. Ex. 1002, ¶357.

d. [3] “wherein the temperature sensor clamp has no external physical electrical or fluidic connections.”

See Section VIII.I.1.g. Kane discloses element [3]. Alternatively, Kane in view of Staniforth teaches element [3]. Ex. 1002, ¶358.

SUMMARY and CONCLUSION: The Summary and Conclusion for Claim 1 applies equally to Claim 12. Kane in view of Staniforth renders claim 12 obvious. Ex. 1002, ¶¶359-362.

K. Ground 12: Kane In Combination With Staniforth and CN ‘078 Renders Claims 1 And 12 Unpatentable

Kane relates to “servicing and testing equipment used in the heating, ventilating, air conditioning, and refrigeration (HVAC/R) field and provides handheld test and measurement devices useful for HVAC/R technicians for the performance of their vocation.” Ex. 1013, [0002]. CN ‘078 is directed to a device comprising a temperature sensor that wirelessly transmits temperature data to a computer, which then analyzes the temperature data. Ex. 1007, Abstract. Staniforth relates to “a probe for measuring the surface temperature of a pipe which comprises an active clamp assembly and a passive clamp assembly.” Ex. 1008, 1:43–45.

Kane is analogous to the ‘183 Patent as it is in the same field of endeavor as the ‘183 Patent. Ex. 1002, ¶366. CN ‘078 and Staniforth are also analogous art to Kane and the ‘183 Patent, since they are all reasonably pertinent to a problem

described in the '183 Patent, namely “an improved sensor system for refrigeration units for monitoring and collecting system conditions,” and the proposed solution of “wireless” transmission of sensor data to a remote device. Ex. 1001, 2:34-41. Ex. 1002, ¶¶363–366.

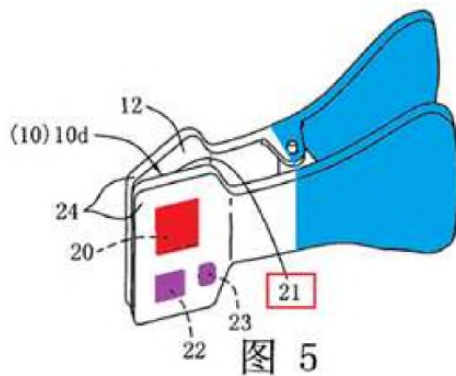
1. Independent Claim 1

Kane discloses the preamble and elements [1]-[4] and [6]. See Section VIII.I.1.a.-e. and g.

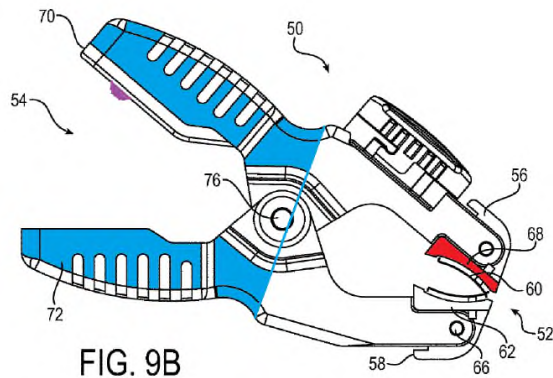
- a. ***[5] “each temperature sensor clamp further comprises a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element; and”***

Kane discloses this element. See Section VIII.I.1.f. and Ex. 1002, ¶326. Staniforth in combination with Kane also discloses this element. See Section VIII.J.1.a. and Ex. 1002, ¶379. To the extent that this combination is insufficient, CN'078 in combination with Kane and Staniforth discloses this element. Ex. 1002, ¶380.

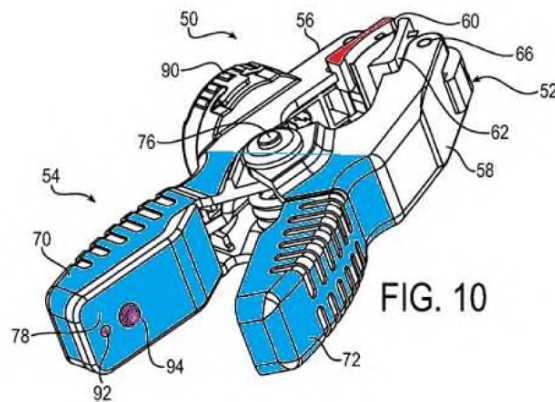
381. Below is a color-coded comparison of the temperature sensor clamp of CN '078 at FIG. 5 to the temperatures sensor clamp of the '183 Patent at FIGS. 9B and 10:



Ex. 1006, FIG. 5



Ex. 1001, FIG. 9B



Ex. 1001, FIG. 10

The '183 Patent describes integrated electronics (Purple). Ex. 1001, 9:55–61. Further, the integrated electronics are described in “electrical connection” to the sensor 68 (Red). *Id.* The 183 Patent also states that the “integrated electronics may include . . . wireless interface pair button.” *Id.* Ex. 1002, ¶382.

CN '078 discloses a temperature sensing device having integrated electronics including a “wireless transmitter 22” (Purple) and an “alarm 23” (Purple) Ex. 1007, Pg. 6. and a clamp: “a clamping portion 24, as shown in Fig. 5, [that] directly clamps and is fixed on” the item being monitored. Ex. 1007, Pg. 6 and Ex. 1006, FIG. 5,

copied above. The device of CN '078 also has a “handle.” See Ex. 1006, FIG. 5, as reproduced above. Ex. 1002, ¶¶383-384.

CN '078 also discloses temperature sensor 20 (Red) having a sensing surface 21. Ex. 1007, Pg. 6. See the CN '078 FIG. 5 reproduced above. Further, “a temperature sensor 20 starts sensing and converts the measured sensed values into electrical signals, the electrical signals are transmitted through a wireless transmitter 22 to a wireless receiver 31, the wireless receiver 31 transmits the electrical signals received to a computer device 30, and the computer device 30 analyzes and determines the electrical signals received.” Ex. 1007, Pg. 5. A POSITA would have understood that the “wireless transmitter 22” would be considered an integrated electronic component of the clamp, and is in electrical connection with the sensor element. Ex. 1002, ¶385.

A POSITA would have moved the integrated electronics a little closer or a little farther away from the sensor element in the same clamp arm part, as illustrated in CN '078, as this has no effect on function and is an obvious design choice a POSITA would have readily adopted, as shown by Staniforth. Ex. 1002, ¶386.

The combination of Kane with Staniforth and CN '078 specifically teaches moving integrated electronics to the handle of the temperature sensor taught by the combination of Kane and CN '078, and therefore disclose [5]. Ex. 1002, ¶387.

- b. [6] “there are no external physical connections among the plurality of sensors and the portable electronic device.”**

See VIII.I.1.g. Kane teaches this element. Ex. 1002, ¶¶389-391. CN ‘078 also specifically discloses a temperature sensor clamp with no external physical connections as required by claim 1. See above regarding element [5] and Ex. 1002, ¶385.

SUMMARY and CONCLUSION:

A POSITA would have combined Kane, Staniforth, and CN ‘078 to arrive at improved, wireless temperature clamps, with improved functionality and usability, to reduce size and/or components, and would have expected success at the combination since Kane and CN ‘078 teach success at incorporation of wireless technology in sensors, and Staniforth teaches integrated electronics in a sensor clamp handle to provide improved functionality. Ex. 1002, ¶¶393-394.

Kane in combination with Staniforth and CN ‘078 renders claim 1 obvious. Ex. 1002, ¶395.

2. Independent Claim 12.

- a. [Preamble] “A temperature sensor clamp for sensing temperature in a refrigerant unit, the temperature sensor clamp comprising:”**

See Section VIII.I.1.d.. Kane discloses this preamble. Ex. 1002, ¶396.

- b. [1] “a clamping portion configured to clamp on a tube of the refrigerant unit, the clamping portion including a sensor element to measure temperature about the tube, and”**

See Section VIII.I.1.e. Kane discloses element [1]. Ex. 1002, ¶397. In the alternative, Kane in view of CN '078 teaches this element.

- c. [2] “a handle and integrated electronics, and the integrated electronics are incorporated into the handle and in electrical connection with the sensor element;”**

See Section VIII.K.1.a. Kane in view of CN '078 and Staniforth teaches element [2]. Ex. 1002, ¶398.

- d. [3] “wherein the temperature sensor clamp has no external physical electrical or fluidic connections.”**

See Section VIII.I.1.g. Kane teaches element [3]. Ex. 1002, ¶399.

SUMMARY and CONCLUSION: The Summary and Conclusion for Claim 1 applies equally to Claim 12. Kane in view of Staniforth and CN '078 renders claim 12 obvious. Ex. 1002, ¶¶400-402.

IX. Conclusion

In view of the foregoing, Petitioners submit that there is a reasonable likelihood that Petitioners will prevail with respect to claims 1 and 12 of the '183 Patent. Accordingly, Petitioners request that the Board grant this petition and initiate an *inter partes* review.

Dated: March 6, 2023

By: /Michael F. Snyder/
Michael F. Snyder
USPTO Reg. No. 58,347

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), the undersigned hereby certifies that the foregoing Petition complies with the type-volume limits of 37 C.F.R. § 42.24(a)(1) because it contains 13,301 words, excluding parts of this Petition exempted under § 42.24(a), as measured by the word-processing system used to prepare this paper.

Dated: March 6, 2023

By: Michael F. Snyder/
Michael F. Snyder
USPTO Reg. No. 58,347

CERTIFICATE OF SERVICE

The undersigned certifies that the foregoing Petition for *Inter Partes* Review, the associated Powers of Attorney, and Exhibits 1001 through 1020 were served on March 6, 2023, on counsel of record for the subject patent and Litigation counsel via UPS Overnight delivery at the addresses below.

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Dated: March 6, 2023

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