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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HID GLOBAL CORPORATION,
Petitioner,

v.

DATAMARS SA,
Patent Owner.

Case IPR2023-01445
Patent No. 11,128,027

**PETITION FOR *INTER PARTES REVIEW*
OF U.S. PATENT NO. 11,128,027**

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All emphasis is added unless otherwise indicated.

LIST OF EXHIBITS

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1001	U.S. Patent No. 11,128,027 to Moraru et al. (“’027 Patent”)
1002	Prosecution History of U.S. Application No. 16/609,260
1003	Declaration of Dr. Joshua Smith, Ph.D. (“Smith”)
1004	Curriculum Vitae of Joshua Smith, Ph.D.
1005	European Patent No. 2405054 B1 to Pachoud et al. (“ <i>Pachoud</i> ”)
1006	German Patent Publication No. DE 202013100682 U1 to ASTRA Gesellschaft für Asset Management mbH & Co. KG.
1007	Certified Translation of German Patent Publication No. DE 202013100682 U1 to ASTRA Gesellschaft für Asset Management mbH & Co. KG. (“ <i>Astra</i> ”)
1008	PCT International Publication No. WO 2017/060652 A1 to Elbaz et al.
1009	Certified Translation of PCT International Publication No. WO 2017/060652 A1 to Elbaz et al. (“ <i>Elbaz</i> ”)
1010	German Patent Publication No. DE 102007016584 A1 to Stobbe et al.
1011	Certified Translation of German Patent Publication No. DE 102007016584 A1 to Stobbe et al. (“ <i>Stobbe</i> ”)
1012	Maxime Guibert et al., <i>Washing Reliability of Painted, Embroidered, and Electro-Textile Wearable RFID Tags</i> , 2017 Progress in Electromagnetics Research Symposium – Fall, pp. 828-831 (2017) (“ <i>Guibert</i> ”)
1013	PCT International Publication No. WO 2013/128299 A1 to Usta (“ <i>Usta</i> ”)

<u>Exhibit</u>	<u>Description</u>
1014	Shuai Shao et al., <i>Broadband Textile-Based Passive UHF RFID Tag Antenna for Elastic Material</i> , IEEE Antennas and Wireless Propagation Letters, vol. 14, pp. 1385-1388 (2015) (“ <i>Shao</i> ”)
1015	Elham Moradi et al., <i>Characterization of Embroidered Dipole-type RFID Tag Antennas</i> , 2012 IEEE International Conference on RFID-Technologies and Applications, pp. 248-253 (2012) (“ <i>Moradi</i> ”)
1016	Aurelian Moraru et al., <i>RFID System with Passive RFID Tags for Textiles</i> , 2017 10th International Symposium on Advanced Topics in Electrical Engineering, pp. 410-415 (2017) (“ <i>Moraru</i> ”)
1017	Certified Translation of Romanian Patent Publication No. RO 133013 A1
1018	PCT International Publication No. WO 2018/231083 A1 to Moraru et al.
1019	Letter to European Patent Office submitted in EP Application No. 17859340.6
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1021	Translator’s Declaration for Certified Translation of DE 202013100682 U1 to ASTRA Gesellschaft für Asset Management mbH & Co. KG.
1022	Translator’s Declaration for Certified Translation of DE 102007016584 A1 to Stobbe et al.
1023	Translator’s Declaration for Certified Translation of WO 2017/060652 A1 to Elbaz et al.
1024	Translator’s Declaration for Certified Translation of Romanian Patent Publication No. RO 133013 A1
1025	Declaration of Kelley Hayes Greenhill Regarding Ex. 1012
1026	Declaration of Kelley Hayes Greenhill Regarding Ex. 1014

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1027	Declaration of Kelley Hayes Greenhill Regarding Ex. 1015
1028	Declaration of Kelley Hayes Greenhill Regarding Ex. 1016

All emphasis is added unless otherwise indicated.

I. Introduction

Petitioner requests review and cancelation of claims 1, 2, 3, and 6 of U.S. Patent No. 11,128,027 (the “’027 patent”) (Ex. 1001).

The ’027 patent claims an RFID tag for use in harsh environments. But RFID tags were routinely used in harsh laundry environments long before the earliest possible date of the ’027 patent. The ’027 patent expressly admits that many of the claimed features—encapsulated transponders, inductive coupling of UHF antennas, electrically insulated antenna conductors, embroidering antenna conductors to a textile support, among other features—were widely adopted at the time of filing. Ex. 1001, 1:44-53, 2:47-52. Any other alleged improvements in the claimed RFID tag, such as continuous electroconductive textile thread (*id.*, 4:57-59), hot-dipping of a second textile substrate (*id.*, 4:61-64), double loops (*id.*, 4:65-5:2), simple loops (*id.*, 5:6-7), or specific temperature ranges (*id.*, 5:28-29) were also well-known and conventional. *See* §§ III.A (Technology Background), VI (Grounds 1-3). Claims 1, 2, 3, and 6 are thus unpatentable.

II. Statement of Precise Relief Requested

Petitioner requests review under 35 U.S.C. § 311 of claims 1, 2, 3, and 6 of the '027 patent and their cancellation in view of the following:

Prior Art References	
Ref. 1:	<i>Pachoud</i> (Ex. 1005), which published February 20, 2013, and is prior art under 35 U.S.C. § 102(a)(1) under any asserted priority date
Ref. 2:	<i>Astra</i> , (Ex. 1006, Ex. 1007), which published May 29, 2013, and is prior art under 35 U.S.C. § 102(a)(1) under any asserted priority date
Ref. 3:	<i>Elbaz</i> (Ex. 1008, Ex. 1009), which published April 13, 2017, and is prior art under 35 U.S.C. § 102(a)(1) under any asserted priority date
Ref. 4:	<i>Stobbe</i> (Ex. 1010, Ex. 1011), which published January 3, 2008, and is prior art under 35 U.S.C. § 102(a)(1) under any asserted priority date
Ref. 5:	<i>Guibert</i> (Ex. 1012), which published November 22, 2017, and is prior art under 35 U.S.C. § 102(a)(1) under the proper priority date of October 29, 2019, or the date of the PCT Application. See § III.D (Priority Date)

Grounds of Unpatentability	
1	Claims 1, 2, 3, and 6 are obvious under 35 U.S.C. § 103 over <i>Pachoud</i> , <i>Astra</i> , and <i>Elbaz</i> .
2	Claims 1 and 6 are obvious under 35 U.S.C. § 103 over <i>Pachoud</i> , <i>Astra</i> , and <i>Guibert</i> .
3	Claims 1, 2, 3, and 6 are obvious under 35 U.S.C. § 103 over <i>Astra</i> , <i>Stobbe</i> , and <i>Elbaz</i> .

III. The '027 Patent

A. Background on Known Technologies

1. RFID technology

Radio-Frequency Identification (“RFID”) is a technology allowing identification of objects using the transmission of radio waves at various frequencies. Ex. 1003 (“Smith”), ¶ 54; Ex. 1013 (“*Usta*”), 1:11-12; Ex. 1014 (“*Shao*”), 1385. An RFID system typically includes RFID tags affixed to corresponding objects to be identified, an RFID reader for communicating with the RFID tag, and a software application running on a host computer:

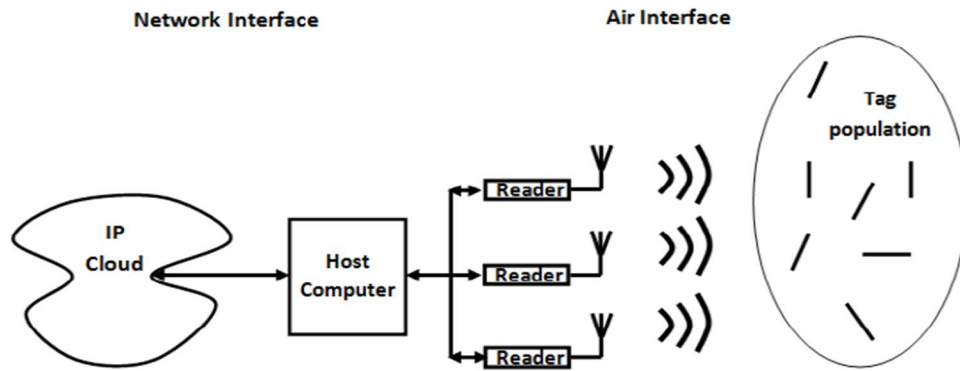


Fig. 1. General structure of a RFID system.

Moraru, Fig. 1, 410; *Moradi*, 248; Smith, ¶ 54.

At the time of the '027 patent, RFID tags included an integrated circuit (or “chip”) for storing identification data (e.g., a unique identification code for the object) and an antenna, electronically or electromagnetically coupled to the chip, for transmitting and receiving radio waves. *Moradi*, 248; Smith, ¶ 55. In “passive” RFID tags at the time, the tag would not have its own power supply. *Usta*, 1:18-26; *Moraru*, 411; *Moradi*, 248; Smith, ¶ 55. Rather, the RFID tag’s antenna collected energy from electromagnetic waves emitted by the reader, thereby activating the chip. *Usta*, 1:18-26; *Moraru*, 411; *Moradi*, 248; Smith, ¶ 55. The properties and performance of these RFID tags, such as the operating frequency and read range, largely depended on the configuration of the antenna. *Moradi*, 248; Smith, ¶ 55.

2. RFID tags for laundry environments

Long before the '027 patent’s earliest claimed priority in 2017, RFID tags were used for textile applications. Smith, ¶ 56. For example, a 2012 paper, *Moradi*,

indicates that RFID tags had been integrated into clothing for purposes of monitoring children, elderly people, athletes, medical patients, or individuals that may require identification. *Moradi*, 248. RFID tags were thus adapted to be light-weight, flexible, and seamlessly integrated within these textile materials. *Id.* These objectives were achieved in part by embroidering conductive threads onto a fabric to form the RFID tag antennas. *Id.*

RFID tags were used for other textile-related applications as well. For example, RFID tags had been integrated into linen products, such as hospital and hotel sheets or blankets, for tracking products in industrial laundry services. *Elbaz*, 3:1-12; *Moraru*, 412; Smith, ¶ 57. These laundry environments presented uniquely harsh conditions, including immersion in water, exposure to high temperatures, exposure to harsh chemicals, and increased mechanical strain. *Moraru*, 412-413; *Pachoud*, [0017]; *Guibert*, § 4; Smith, ¶ 57. To withstand these conditions, RFID tags had been adapted to include encapsulated transponders. *Pachoud*, [0027]; *Moraru*, 415. Because an encapsulation large enough to encompass the entire antenna would be prone to failure under high mechanical stress, generally only the transponders, which included the integrated circuit and small near-field antennas with a limited range, were encapsulated. *Moraru*, 412-413; *Pachoud*, [0017], [0031]; *Stobbe*, [0005]; Ex. 1001, 1:44-59; Smith, ¶ 57. It was known, however, to extend the range of the near-field antennas using separate larger

far-field antennas formed of the electroconductive threads. *Moraru*, 412-413; *Pachoud*, [0037]; *Guibert*, § 4; Ex. 1001, 1:44-59. It was also known to use inductive coupling between the near- and far-field antennas, as physical connections were easily breakable under mechanical strain. *Pachoud*, [0031], [0036]-[0039]; *Guibert*, § 4; Ex. 1001, 1:44-53. Indeed, the '027 patent expressly acknowledges these features were known. Ex. 1001, 1:44-59.

B. Summary of the '027 Patent

The '027 patent discloses an RFID tag for use in harsh industrial laundry environments. Ex. 1001, Abstract, 2:59-61; Smith, ¶ 44. The claimed RFID tag includes an RFID transponder inductively coupled with a UHF-SHF antenna, both of which are placed on a textile substrate. Ex. 1001, 3:14-21.

The antenna comprises an electroconductive yarn or thread embroidered on the textile substrate. *Id.*, 3:22-29; Smith, ¶ 45. This electroconductive thread has a “double loop” that forms a central zone of the antenna, and the transponder inductively couples to the double loop when placed within the central zone. Ex. 1001, 3:14-18, 3:30-34. In some embodiments, the electroconductive thread is also insulated, which allows the loops to be formed by crossing itself without creating an electrical short at crossing points where the antenna overlaps. *Id.*, 3:22-29.

The purported advantages of this tag seemingly arise from the use of insulated electroconductive thread. Smith, ¶ 46. For example, the '027 patent advertises an antenna having: (1) improved mechanical properties as compared to metallic wire, (2) flexibility to achieve geometries to reduce overall size, and (3) construction materials similar to that of the textile substrate. *Id.*, 2:34-46, 4:17-38; Smith, ¶ 46. Indeed, the '027 patent acknowledges encapsulated transponders, inductive coupling with UHF antennas, and insulated antennas embroidered to a textile support were “widely adopted” at the time of filing. Ex. 1001, 1:33-52; 2:47-52.

But the '027 patent ignores that including flexible, insulated electroconductive thread in textile RFID antennas for laundry environments was known and used long before the effective date of the '027 patent. Smith, ¶ 47.

C. Prosecution History

The '027 patent was filed on October 29, 2019, as U.S. Application 16/609,260. Ex. 1001, cover. The '027 patent was allowed after three rejections by the Office. Ex. 1002, 58, 85, 121. The Office first rejected all claims based on a combination of two references (*Hofer* and *Chisolm*). *Id.*, 123-127. The Applicant amended the claims and argued *Hoffer's* RFID antenna was impossible to achieve using continuous conductive textile thread. *Id.*, 112-118. When faced with a second rejection, this time on anticipation grounds, the Applicant attempted to distinguish *Oroku*, again primarily on the basis of a continuous conductive textile

thread. *Id.*, 81-92. The Office rejected the claims a final time as unpatentable over two additional references (*Speich* and *Vicard*) (*Id.*, 85-65), in response to which, Applicant argued *Speich* did not teach a double-loop without electrical contacts at its crossing points. *Id.*, 51-55. The Office allowed the claims in the next action. *Id.*, 19-27. Accordingly, insulated conductive textile thread arranged in a double loop was the basis for the allowance. *Id.*, 4; Smith, ¶ 48-49.

D. Priority Date

The '027 patent claimed priority as a national stage entry of PCT International Application No. PCT/RO2017/000023, filed December 19, 2017 (the “PCT Application”), which claimed priority to Romanian Patent Application No. 201700388, filed June 16, 2017 (the “Romanian Application”). Ex. 1001, cover. But as explained below, these prior applications do not support the claims, and the patent is thus entitled to priority as of the U.S. filing date of October 29, 2019. Smith, ¶ 50-53.

A patent’s claims are not entitled to an earlier priority date merely because the patent owner claims priority. *Dynamic Drinkware, LLC v. National Graphics, Inc.*, 800 F.3d 1375, 1379-1380 (Fed. Cir. 2015) (discussing burdens in *inter partes* review to show entitlement to provisional filing dates). Rather, Datamars bears the burden of proof to establish this entitlement, which includes showing the earlier application fulfills the requirements of written description support under 35 U.S.C.

§ 112(a). 35 U.S.C. § 120; *Dynamic Drinkware*, 800 F.3d at 1379–80; *Paice LLC v. Ford Motor Co.*, 881 F.3d 894, 906 (Fed. Cir. 2018); *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1306–11 (Fed. Cir. 2008). The test for sufficiency of a written description is whether the prior application’s disclosure “reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc); *Augustine Medical, Inc. v. Gaymar Indus., Inc.*, 181 F.3d 1291, 1302–03 (Fed. Cir. 1999).

Datamars cannot meet this burden. None of the claims of the ’027 patent are entitled to a priority date earlier than the U.S. filing date of October 29, 2019, because neither the PCT Application nor the Romanian Application describe “the whole assembly being sealed by hot-dipping of a second textile substrate,” as recited in independent claim 1. Smith, ¶ 50-53; *Dr. Reddy’s Labs. S.A. v. Indivior UK Ltd.*, IPR2019-00329, Paper 49, 82 (P.T.A.B. June 2, 2020) (finding earliest possible priority was filing date of last patent application where no application in priority chain provided written description support) *aff’d Indivior UK Ltd. v. Dr. Reddy’s Labs. SA*, 18 F.4th 1323, 1330 (Fed. Cir. 2021). The term “hot-dipping” never appears in the Romanian Application. *See generally* Ex. 1017. Instead, the claims in the Romanian Application recite a different term entirely—“hot gluing” of a second fabric substrate. Ex. 1017, claim 1; Smith, ¶ 51.

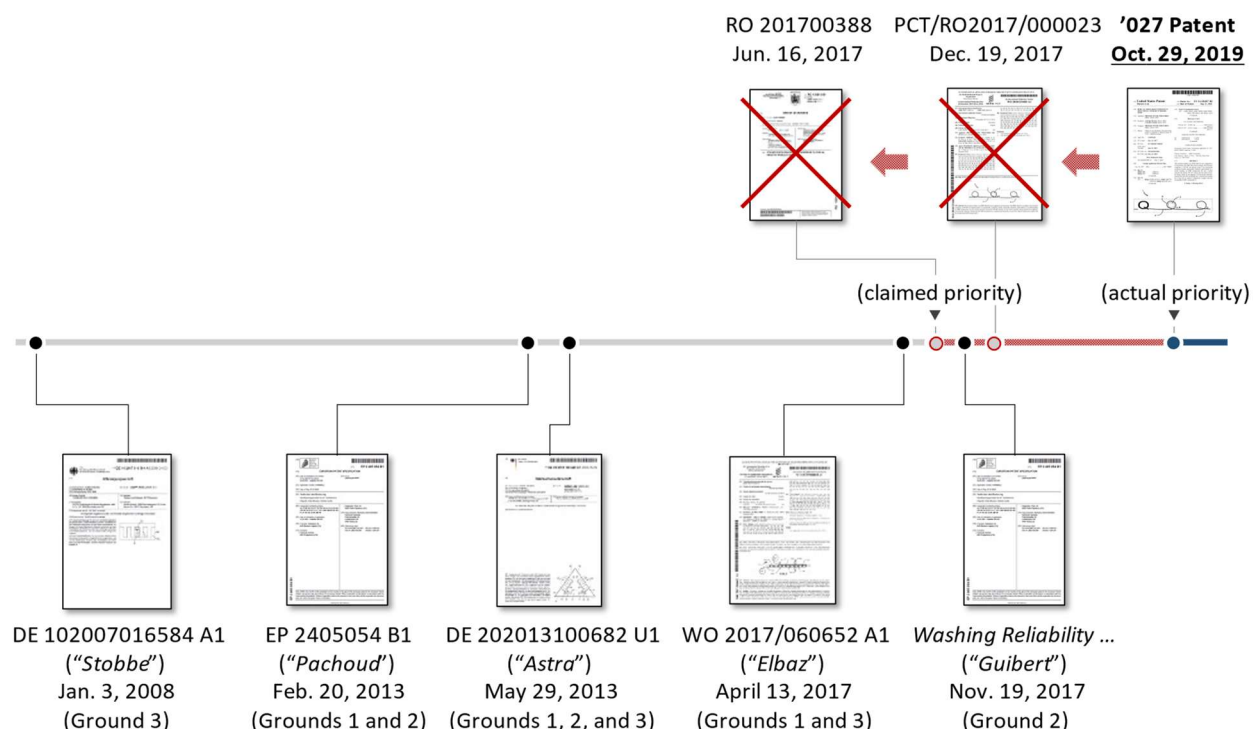
The PCT Application is similarly deficient, a point the patent owner conceded during prosecution of a counterpart application in Europe filed as a national phase entry of the same PCT Application. Ex. 1019, 1. The PCT Application recites hot-dipping of a second textile substrate only in the claims and Abstract. *See generally* Ex. 1018. However, the terms “seal” (or variations thereof) or “hot-dipping” never appear in the body of the specification. *Id.*, 1-5. Nor is a second textile substrate described or illustrated in the drawings. *Id.* Accordingly, the PCT Application does not include sufficient disclosure to show the inventor had possession of the claimed subject matter. Smith, ¶ 52. The patent owner admitted as much, agreeing with the Examiner that “there is no support in the description for these features”:

Basis of amendments:

1. Claim 1 was amended by deleting the expression “***the whole assembly being sealed by hot-dipping of a second textile substrate***”. **Indeed, there is no support in the description for these features.** Also, in Claim 1 was added the feature” and in Ex. 1019, 1 (highlights added).

In view of the admitted lack of written description support for “the whole assembly being sealed by hot-dipping of a second textile substrate,” as recited in independent claim 1, the earliest possible priority date of the ’027 is the U.S. filing date of October 29, 2019. Smith, ¶ 53; *Dr. Reddy*, IPR2019-00329, Paper 49, 82. As

shown in the timeline below, each of *Stobbe*, *Pachoud*, *Astra*, and *Elbaz* were published prior to the filing of the Romanian Application and *Guibert* was published prior to the filing of the PCT Application:



Accordingly, under the actual priority date of October 29, 2019, the claims are unpatentable under each of Grounds 1-3. Even if entitled to the PCT Application priority date, the claims remain unpatentable under all Grounds. The claims also remain unpatentable under each of Grounds 1 and 3 even if entitled to the Romanian Application priority date.

IV. Level of Ordinary Skill

Factors defining the level of ordinary skill include: (1) the types of problems encountered in the art; (2) the prior art solutions to those problems; (3) the rapidity

with which innovations are made; (4) the sophistication of technology; and (5) the educational level of active workers in the field. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995).

Given these factors, a person of ordinary skill in the art (“POSITA”) at the time of the alleged invention of the ’027 patent would have had at least a bachelor’s degree in electrical engineering, or a related field, and at least two years of experience in design, development, and/or testing of RFID tags, and familiarity with electronic textiles, or the equivalent, with additional education substituting for experience and vice versa. Smith, ¶ 53.

V. Claim Construction

The Board construes claims under *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 42.100(b) (2018). Under this standard, terms receive their plain and ordinary meaning as understood by one of ordinary skill in the art, consistent with the disclosure and prosecution history. *Phillips*, 415 F.3d at 1314-19. Claims should only 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, the Board need not construe any term of the '027 patent to resolve the underlying controversy in view of the prior art.¹ See *Toyota Motor Corp. v. Cellport Sys., Inc.*, IPR2015-00633, Paper No. 11, 16 (P.T.A.B. Aug. 14, 2015) (citing cases).

VI. Claims 1, 2, 3, and 6 are Unpatentable Over the Prior Art

The '027 claims recite a combination of well-known prior art elements that perform their known functions to produce predictable results. Smith, ¶ 62. Therefore, claims 1, 2, 3, and 6 are unpatentable under 35 U.S.C. § 103.

A. Ground 1: The Combination of *Pachoud*, *Astra*, and *Elbaz* Renders Obvious Claims 1, 2, 3, and 6

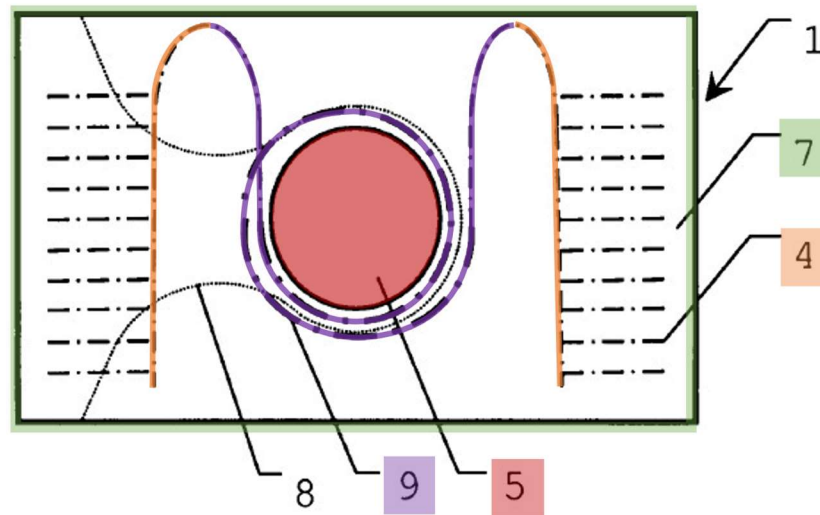
1. Overview of the Ground 1 Combination

a. *Pachoud*

Pachoud discloses an RFID tag for use in harsh professional laundry environments. *Pachoud*, [0021]-[0024]; Smith, ¶ 63.. The RFID tag is formed of an **RFID transponder** inductively coupled with a **UHF-SHF antenna**. *Id.*, [0024], [0026], [0036]. The '027 patent describes aspects of *Pachoud*—but does so incorrectly. Ex. 1001, 2:47-52. While the '027 patent states that *Pachoud*'s antenna is formed of a “metallic wire,” *Pachoud*'s antenna in fact is formed of an

¹ Petitioner reserves the right to raise claim construction arguments in district court. For example, a comparison of the claims to accused products or other prior art may raise controversies absent here. Petitioner also reserves the right to respond to any construction Datamars may advance, express or implied.

electroconductive thread embroidered to a **textile substrate**. Compare Ex. 1001, 2:47-52 with *Pachoud*, [0031], [0069], [0077]-[0078]. To achieve inductive coupling with the **RFID transponder**, the **antenna** includes a **loop-shaped section** surrounding the **transponder**:



Pachoud, Fig. 4b (annotated), [0042], [0065]; Smith, ¶ 63. *Pachoud* further describes fully or partially enclosing the **transponder** and **antenna** to protect the tag from environmental impacts. Smith, ¶ 63; *Pachoud*, [0024], [0026], [0043]-[0045], [0068]-[0070].

b. *Astra*

Astra discloses a “textile information carrier” including a **chip module** and an antenna module including an **antenna conductor**. *Astra*, [0025]. As a POSITA would have understood, this textile information carrier encompasses RFID tags. Smith, ¶ 64. The **antenna conductor** is formed of “one or more electrically

conductive textile threads” that are “fixed completely and continuously on [a textile] carrier 12 by embroidery technology.” *Astra*, [0025]. The chip module (not shown) is inductively coupled to the antenna module via a coupling coil of the antenna conductor, having a plurality of windings:

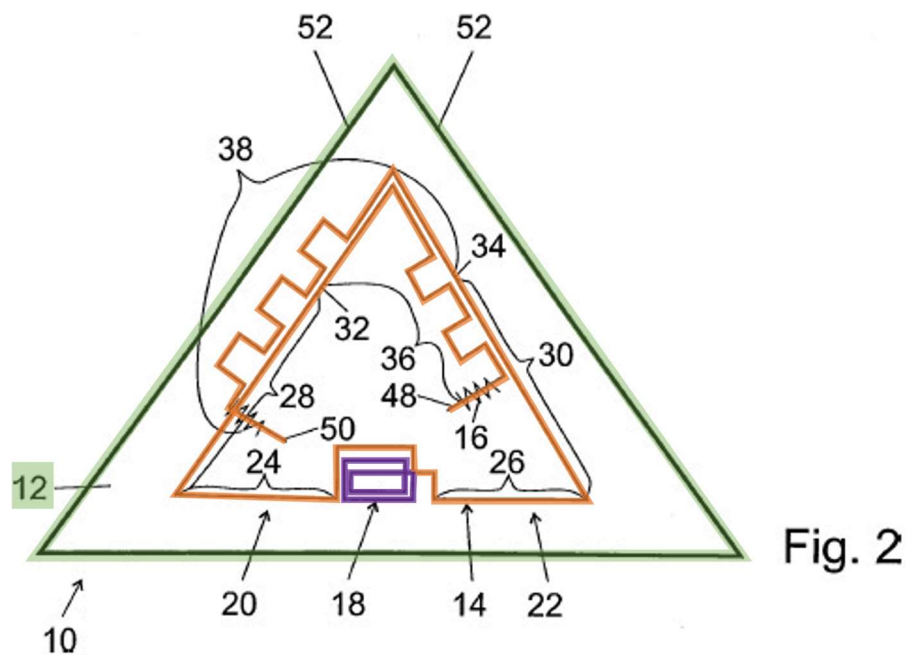
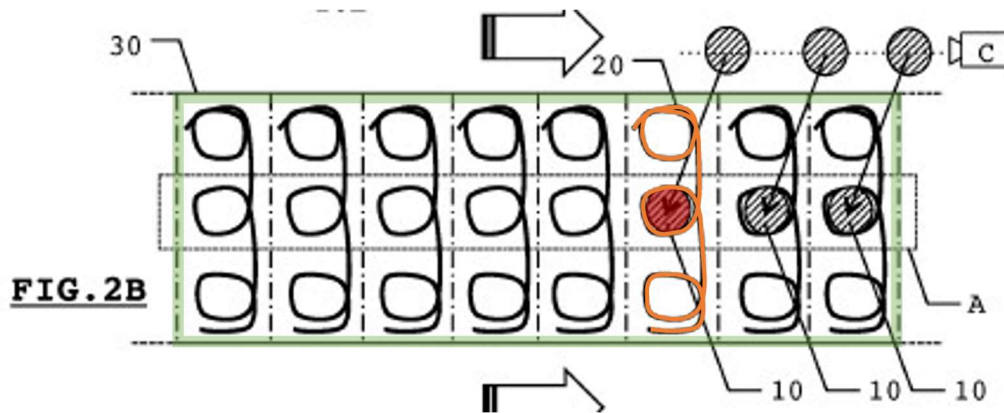


Fig. 2

Id., Fig. 2 (annotated), [0025], [0029]; Smith, ¶ 64.

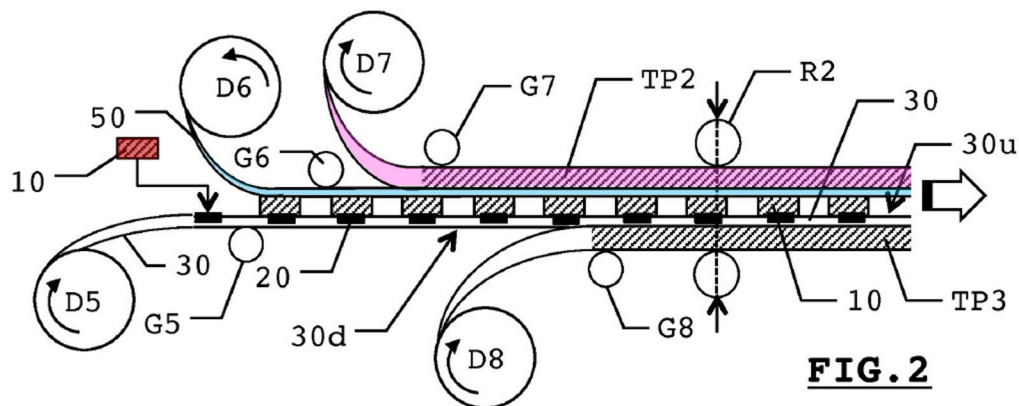
c. *Elbaz*

Elbaz discloses an RFID tag for use in industrial laundry environments. *Elbaz*, 1:10-2:2, 3:1-12, 30:7-15. *Elbaz* describes a method for manufacturing these RFID tags using a support material 30 formed of “cotton, nylon, viscose, a polyester or a synthetic material,” or other materials. *Id.*, 23:17-24:3. *Elbaz*’s tag includes an antenna 20, formed by embroidering or weaving conductive threads onto support 30. *Id.*, 25:3-9. The antenna is formed to include a plurality of loops 20L:



Id., Fig. 2B (annotated), 23:8-25:2. An **RFID module 10** is placed within a central loop of the **antenna** to achieve inductive coupling with the **antenna**. *Elbaz*, 16:13-15, 22:12-23:6, 23:8-25:2, 25:17-26:29, 27:10-28:1; Smith, ¶ 65.

To address the harsh laundry environments, *Elbaz* further discloses applying a **mesh** and **thermoplastic material** over the RFID module and antenna:



Elbaz, Fig. 2 (annotated), 28:11-29:3, 29:12-30:15; Smith, ¶ 66.

d. The Combination of *Pachoud*, *Astra*, and *Elbaz*

Pachoud discloses an RFID tag that includes every feature of independent claim 1 except the claimed double loop. Smith, ¶ 67. But as explained below, this

loop was obvious over *Pachoud*'s teachings that the exact antenna loop configuration could be modified, and further obvious over *Pachoud* in view of *Astra*'s looping structure. Further, to the extent that Patent Owner disagrees that *Pachoud* in view of *Astra* discloses enclosing and hot-dipping the RFID tag (Limitations [1.d.i-ii]), *Elbaz* discloses this approach, and it would have been obvious over *Pachoud* in view of *Astra* and *Elbaz*.

Ground 1 renders obvious claims 1-3 and 6 under the earliest claimed priority date of the '027 patent. Smith, ¶ 68.

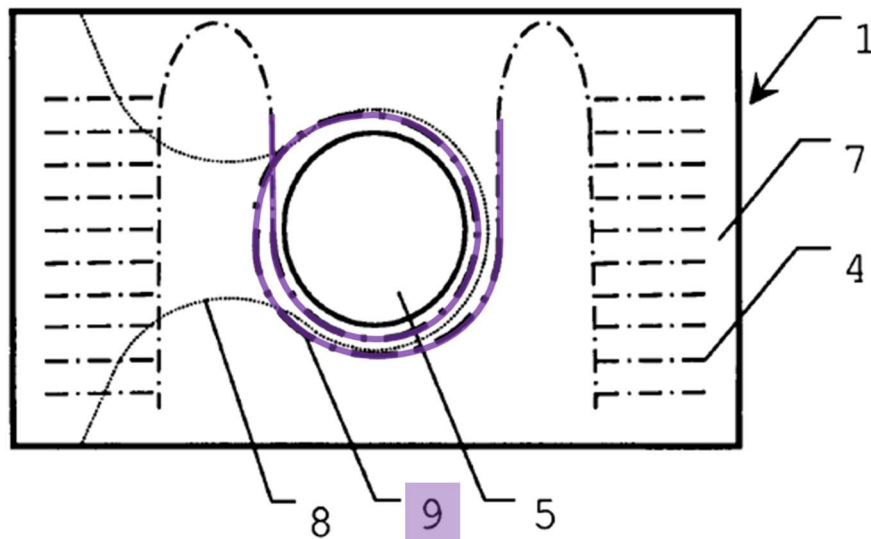
2. Motivation to Combine

A POSITA would have been motivated to combine *Pachoud*, *Astra*, and *Elbaz* and would have had a reasonable expectation of success in doing so. Smith, ¶ 69. These references are analogous to the '027 patent because they are in the same field of endeavor: textile RFID tags for applications in harsh environments. *Id.*; *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004).

The combination of *Pachoud* and *Astra* reflects the combination of familiar elements according to known methods to yield predictable results. Smith, ¶ 70. Both *Pachoud* and *Astra* provide textile-based RFID tags with many common features. *Pachoud*, [0001]; *Astra*, [0025]; Smith, ¶ 70. Both references include a transponder inductively coupled with an antenna formed of electroconductive thread embroidered to a textile substrate. *Pachoud*, [0031], [0069], [0077]-[0078];

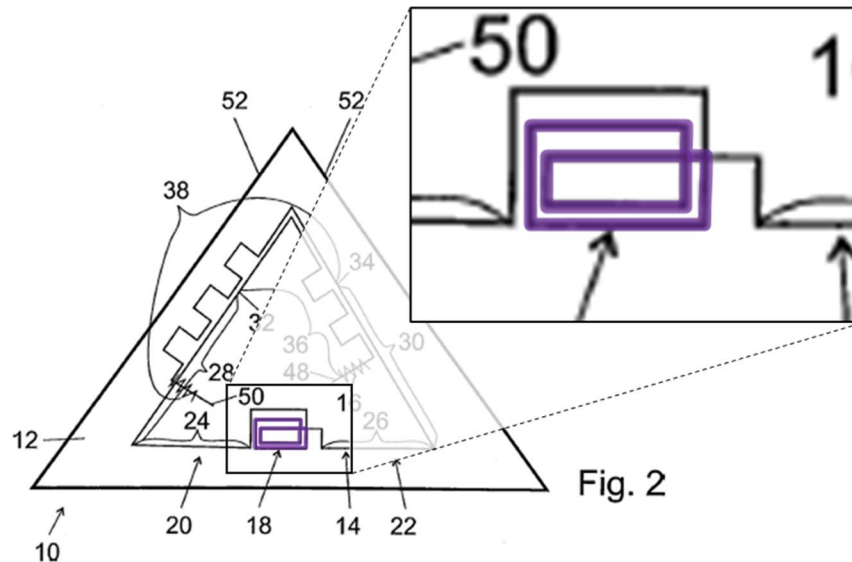
Astra, [0025]; Smith, ¶ 70. And in both references, the inductive coupling occurs through a loop-shaped portion of the antenna surrounding the transponder, as was typical. *Pachoud*, [0042], [0065]; *Astra*, [0018], [0019], [0025]; Smith, ¶ 70. A POSITA would have considered *Pachoud* and *Astra* combinable based on these similarities. Smith, ¶ 70.

Pachoud teaches that the specific arrangement of its loop is flexible—it offers multiple example configurations of its loop-shaped section, indicating it is not limited to any particular configuration. *Pachoud*, [0064], Figs. 4a, 4b, 4c; Smith, ¶ 71. In one exemplary configuration, the **loop-shaped portion** of *Pachoud*'s antenna includes nearly two full loops around the transponder:

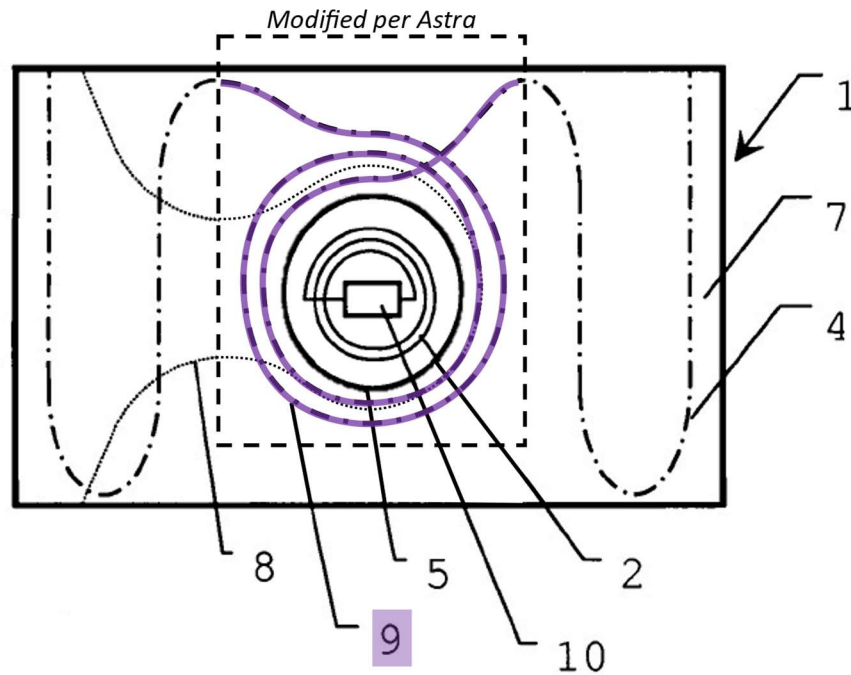


Pachoud, Fig. 4b (annotated).

Astra teaches yet another exemplary configuration, in this case, having at least **two full loops**:



Astra, Fig. 2 (annotated; partially enlarged for detail). It would have been a simple modification to incorporate a **double loop** into the antenna of *Pachoud* in view of *Astra* to achieve a known result—increased inductive coupling between the antenna and RFID transponder. Smith, ¶ 71-72. The combination of *Pachoud* and *Astra* is illustrated below:

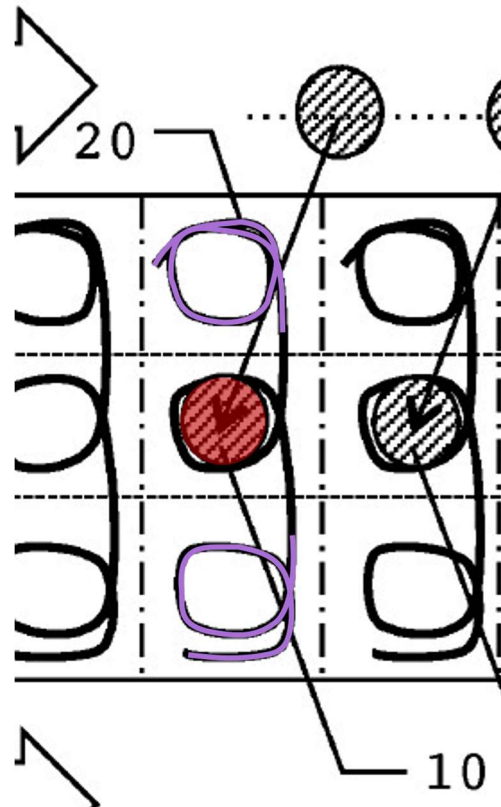


Smith, ¶ 72 (providing a modified Fig. 4a of *Pachoud*).

As a POSITA would have understood, a larger number of loops surrounding the transponder would have increased the inductive coupling between the antenna and RFID transponder. Smith, ¶ 73. *Pachoud* expressly states that looping the antenna around the transponder increased the inductive coupling between the antenna and RFID transponder. *Id.*, [0042] (“In order to ensure a good coupling, ... the far-field antenna encircles the near-field antenna”), [0066], [0071]. And *Pachoud* teaches it would have been straightforward and obvious to implement alternate antenna configurations, such as that disclosed by *Astra*, to increase the inductive coupling. *Id.*, [0005] (antennas “can be designed in many different shapes and sizes to fit the desired form factor and purpose”), [0068] (adapting “the shape and

alignment of the far field antenna ... is a routine task in these fields of the art.”); [0071] (a POSITA “will be capable of designing many other geometrical shapes of one or both of the antennas resulting in a coupling”). *Astra* also confirms that additional loops would have further increased the coupling. Smith, ¶ 73; *Astra*, [0018]-[0019]. Accordingly, combining *Pachoud* and *Astra* would have amounted to application of known techniques to achieve predictable results. Smith, ¶ 73.

A POSITA would have been further motivated to combine *Elbaz*’s single loops in the extremities of the far-field antenna with the antenna of *Pachoud* and *Astra*. Smith, ¶ 74. *Elbaz*, like *Pachoud* and *Astra*, discloses a textile-based RFID tag formed by embroidering or weaving conductive threads onto a textile substrate. *Elbaz*, 1:10-2:2, 3:1-12, 25:3-9, 30:7-15. The conductive antenna 20 includes a **plurality of loops 20L** in the extremities:



Elbaz, Fig. 2b (annotated), 23:8-25:2. As *Pachoud* notes, reducing the size of components is important in laundry applications to mitigate “mechanical interactions and impacts like pressure, bending, folding, hitting, etc.” *Pachoud*, [0028]. And *Pachoud* acknowledges that the specific shape of the far-field antenna is a design choice and is easily adaptable by one of ordinary skill. *Id.*, [0068], [0005].

A POSITA would have been familiar with the principle that end-loading loops increase bandwidth of the antenna while reducing its size and would have implemented *Elbaz*’s approach in *Pachoud-Astra* to realize these benefits. Smith, ¶¶ 75-76 (citing *Shao*, 1386). *Pachoud* explicitly suggests “loop-...antennas”

as an example of such variation, and *Pachoud* already teaches and suggests adopting loop-shaped portions in its design. *Pachoud*, [0042]. A POSITA would have been motivated to incorporate the loops in the extremities of *Elbaz*'s antenna to achieve the known benefit reduced size of the antenna and improved its bandwidth. Smith, ¶ 75-76; *Elbaz*, 23:13-14 (“To reduce its bulk ... [the] antenna, advantageously comprises a plurality of loops 20L.”); *Shao*, 1386 (“end-loading loops improve impedance bandwidth ... [and] reduce[] the overall size of the antenna”).

A POSITA would have further been motivated to apply the fibrous mesh and thermoplastic material from *Elbaz* (*Elbaz*, 28:11-29:3, 37:10-38:3, Fig. 2) either in place of or in addition to the enclosure described in *Pachoud* to better protect the tag in harsh environments (*Pachoud*, [0024], [0026], [0043]-[0045], [0068]-[0070]). Smith, ¶ 77. For example, *Elbaz* states that, among other benefits, its mesh protects the RFID module “against possible shocks or mechanical constraints.” *Elbaz*, 28:11-29:3. The thermoplastic material further keeps the label substantially flat and provides improved resilience that would be encountered in harsh environments. *Id.*, 30:16-31:3. A POSITA would have been motivated to incorporate this sealing process of *Elbaz* to improve resilience of the tag in laundry environments, while retaining flexibility. Smith, ¶ 77.

3. Independent Claim 1

a. [1.pre]: “An RFID tag (1) for use in harsh environments”

To the extent limiting, *Pachoud* discloses or at least renders obvious [1.pre]. The '027 patent admits that “the design of an RFID tag ... protected by the harsh environment of industrial laundries ... has been widely adopted” and thus was known in the art. Ex. 1001, 1:44-53. *Pachoud* discloses “an RFID laundry tag with resistance against harsh external conditions.” *Pachoud*, [0021]. Smith, ¶ 78.

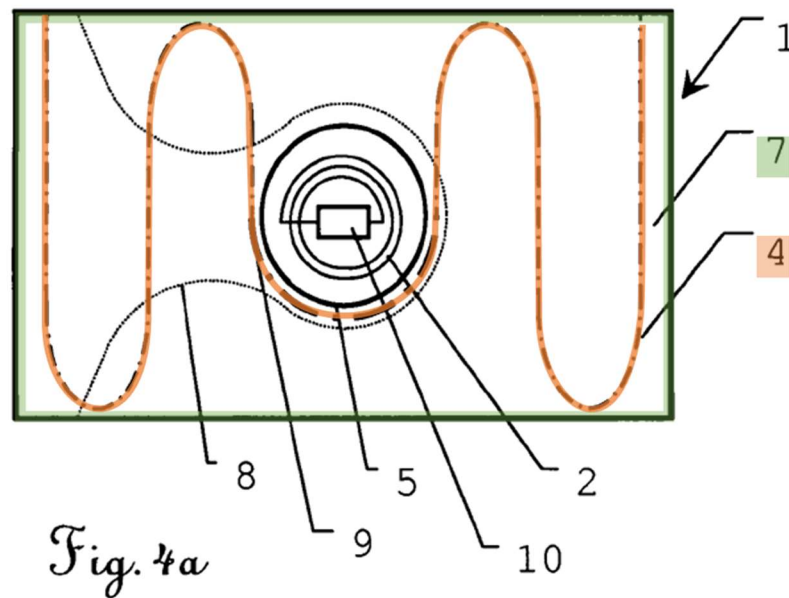
b. [1.a]: “an UHF-SHF antenna (2) made from a continuous electroconductive textile thread, electrically insulated, embroidered on textile substrate”

Pachoud discloses or at least renders obvious [1.a] and *Pachoud* in view of *Astra* also renders obvious [1.a]. Smith, ¶¶ 79-82.

Pachoud discloses *an USF-SHF antenna* because it discloses a “textile item identification tag” including “at least one **far-field antenna**.” *Pachoud*, [0024]. *Pachoud*’s tag is expressly designed for operation in UHF or SHF frequency ranges. *Pachoud*, [0006], [0030], [0050], [0051]; Smith, ¶ 79.

The '027 patent admits *Pachoud*’s antenna is both “electrically insulated” and “attached to a textile support by ... embroidering.” Ex. 1001, 2:47-52. As recognized in the '027 patent, *Pachoud*’s far-field antenna is *made from a continuous electroconductive textile thread, electrically insulated, embroidered on textile*

substrate because it is formed of “a thread that comprises conductive materials,” which a POSITA would have understood is an “electroconductive textile thread.” *Pachoud*, [0031]; Smith, ¶ 80. This **electroconductive thread** is continuously embroidered on a **tag material 7** to form the antenna:



Pachoud, Fig. 4a (annotated), [0040] (“The far-field antenna is comprised in, or attached to, the textile item tag ... [by] couching, **embroidering**, sewing, soutache, weaving or stitching of a yarn ... **comprising a conductive material**”).

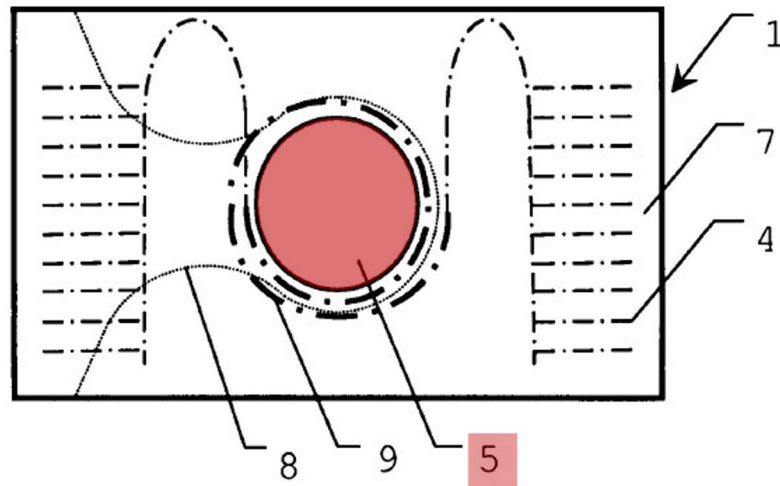
A POSITA would have understood that *Pachoud*’s electroconductive thread is electrically insulated because *Pachoud* discloses a loop-shaped section of the antenna, which includes an intersection point but does not form an electrical connection. *Id.*, [0042], Fig. 4b; § VI.A.3.g (Ground 1, [1.d.ii]); Smith, ¶ 81. Under basic principles of electromagnetics, a POSITA would have recognized that to

achieve inductive coupling with the transponder, the thread would be electrically insulated to avoid a short circuit at this crossing point. Smith, ¶ 81.

To the extent Datamars disputes that *Pachoud*'s antenna intersection is electrically insulated, *Astra* more explicitly discloses an antenna that is electrically insulated and it would have been obvious to insulate *Pachoud*'s antenna. Smith, ¶ 82. *Astra* discloses an antenna conductor formed of an "insulated braid." *Astra*, [0025]. A POSITA would have been motivated to incorporate the electrically insulated conductor *Astra* into *Pachoud* in forming the double loop. § VI.A.2 (Ground 1, Motivation to Combine); Smith, ¶ 82. A POSITA would have recognized the electrically insulated antenna conductor of *Astra* would avoid a short at the intersection point. See § VI.A.3.g (Ground 1, [1.d.ii]).

c. [1.b]: “an RFID transponder (3)”

The '027 patent admits that RFID transponders were known in the art. Ex. 1001, 1:44-53. The '027 patent specifically admits such a responder is disclosed in *Pachoud. Id.* Indeed, *Pachoud* discloses an **RFID transponder 5**:



Pachoud, Fig. 4b (annotated); *see id.*, [0024], [0036], [0050]. *Astra* and *Elbaz* also each disclose an RFID transponder. Smith, ¶ 83; *Astra*, [0025]; *Elbaz*, 16:17-18:2; 20:14-21:1.

d. [1.c.i]: “a substrate of textile material (4) on which the RFID transponder (3) and the UHF-SHF antenna (2) are placed”

Pachoud discloses or at least renders obvious [1.c.i] and *Pachoud* in view of *Astra* and *Elbaz* also renders obvious [1.c.1]. Smith, ¶¶ 84-87.

Pachoud discloses *a substrate of textile material on which the RFID transponder and the UHF-SHF antenna are placed* because *Pachoud*’s RFID tag is formed of a “sheet-like material 7,” which may include “acetate, cotton, nylon,

polyester and combinations thereof, in woven or non-woven form.” *Pachoud*, [0060]-[0061]; Smith, ¶ 84. *Pachoud*’s RFID transponder is placed on the tag material 7. *Pachoud*, [0043], [0059], [0060], [0062] (“The RFID transponder can be directly glued or welded into the tag material 7”), [0068]. So too is the far-field antenna. *Id.*, [0040] (“The far-field antenna is comprised in, or attached to, the textile item tag”).

To the extent Datamars disputes that *Pachoud*’s RFID tag is placed on a substrate of textile material, *Astra* and *Elbaz* each disclose placing an enclosed transponder and antenna on a substrate of textile material. Smith, ¶ 85-86. *Astra* discloses “an antenna module 10 comprising a carrier 12,” which is “a textile material.” *Astra*, [0025]. To form the antenna module, “the antenna conductor 14 is fixed completely and continuously on the carrier 12.” *Id.* The chip module is also arranged on the carrier 12. *Id.* *Elbaz* discloses a support material 30 formed of “cotton, nylon, viscose, a polyester or a synthetic material,” or other materials. *Elbaz*, 23:8-25:2. *Elbaz* includes an antenna 20, formed by embroidering or weaving conductive threads onto support 30. *Id.*, 25:3-9. A radio-identification module 10 is also placed on an upper face of the support 30. *Id.*, 21:12-22:4.

A POSITA would have been motivated to affix *Pachoud*’s transponder to the textile substrate, as described in *Astra* and/or *Elbaz*, to ensure it stays in position relative to the antenna. § VI.A.2 (Motivation to Combine); Smith, ¶ 87.

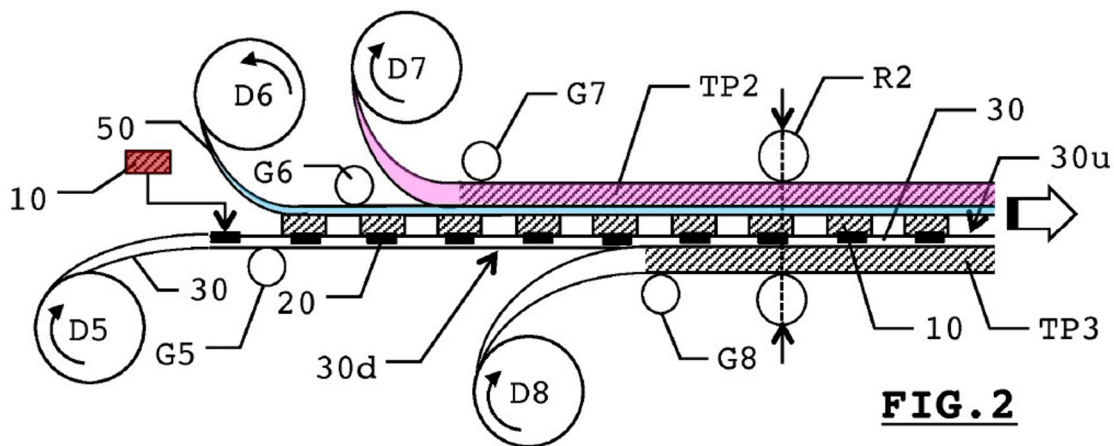
e. [1.c.ii]: “the whole assembly being sealed by hot-dipping of a second textile substrate”

The specification of the '027 patent provides no support for [1.c.ii]. § III.D (Priority Date); Smith, ¶ 88. The Romanian application uses the term “hot gluing of a second substrate,” but as explained this is not the same as hot dipping and thus the priority claim is not valid. Ex. 1017, claim 1; § III.D (Priority Date). To the extent Datamars argues [1.c.ii] covers hot gluing of a second substrate, *Pachoud* discloses or at least renders obvious [1.c.ii], and *Pachoud* in view of *Astra* and *Elbaz* also renders obvious [1.c.ii]. Smith, ¶¶ 88-91.

Pachoud’s entire *assembly is sealed by hot-dipping of a second textile substrate* because *Pachoud* discloses “a pouch-type enclosure (e.g., a strip, sachet or pocket, etc.) for receiving the RFID transponder.” *Pachoud*, [0043]; Smith, ¶ 89. *Pachoud* envisions that its pouch is “formed out of the textile item tag material itself ...[or] another material, e.g. textile.” *Pachoud*, [0043]-[0044]. As explained for Fig. 4c, *Pachoud*’s pouch is formed by gluing the transponder between two sheets of the tag-material 7. *Id.*, [0068], Fig. 4c. And *Pachoud*’s pouch is formed through “a folded web, *heat-sealed*, stitched, ultrasonically sealed, welded, adhesively bonded or otherwise attached along one side to provide a wall.” *Id.*, [0061] (emphasis added). Fully enclosing the RFID transponder and far-field antenna

within the hot-sealed pouch, “can help protect[] it from environmental impacts.” *Id.*, [0044].

Although *Pachoud* does not use the specific term “hot-dipping,” its “heat-sealed” enclosure at least renders obvious sealing the whole assembly by hot-dipping a second textile substrate because it discloses gluing and heat-sealing the pouch enclosure with another textile material. Smith, ¶ 90. To the extent Patent Owner disputes that *Pachoud* does not use the specific term “hot-dipping,” *Elbaz* expressly discloses “hot-dipping.” *Id.* *Elbaz* discloses a method of assembling an RFID tag including an RFID module and a conductive antenna disposed on a dielectric carrier. *Elbaz*, Abstract. After depositing a **radio-identification module 10** on a support material 30, a **fibrous mesh 50** is applied, followed by heat-pressing of a **thermoplastic material TP2**:



Elbaz, Fig. 2 (annotated), 28:11-29:3, 37:10-38:3. A POSITA would have understood *Elbaz*’s application of the mesh via hot-pressing of a thermoplastic

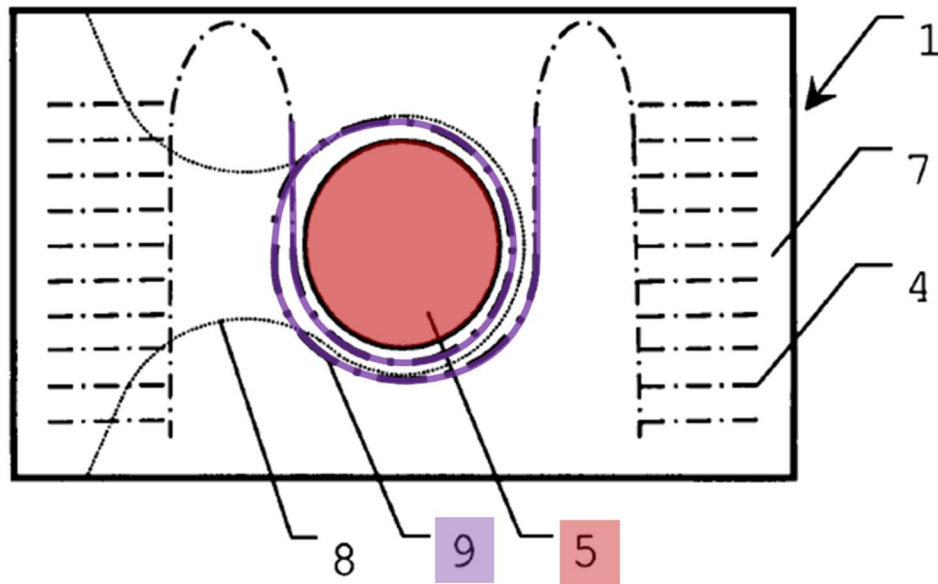
material constitutes “hot-dipping of a second textile substrate” that seals the entire antenna assembly because the mesh is a second substrate applied via a heated thermoplastic material, and is used to seal the antenna assembly. Smith, ¶ 90.

A POSITA would have been motivated to incorporate this sealing process of *Elbaz* to further improve the resilience of the tag in laundry environments, while retaining flexibility. § VI.A.2 (Ground 1, Motivation to Combine); Smith, ¶ 91.

- f. [1.d.i]: “wherein the UHF-SHF antenna (2) has a central zone formed by a double loop (5) by which it inductively couples with the encapsulated RFID transponder (3)”

Pachoud discloses or at least renders obvious [1.d.i] and *Pachoud* in view of *Astra* and *Elbaz* also renders obvious [1.d.i]. Smith, ¶¶ 92-98.

Pachoud at least suggests that its *UHF-SHF antenna has a central zone formed by a double loop by which it inductively couples the encapsulated RFID transponder* because *Pachoud* discloses a central zone formed by a loop for inductive coupling with an RFID transponder. Smith, ¶ 92. *Pachoud*’s far-field antenna “comprises a **loop-shaped section**, and the **RFID transponder** is at least partially surrounded by said **loop-shaped section**,” in order to “ensure a good coupling”:



Pachoud, Fig. 4b (annotated), [0042]; *see also id.*, [0060]. *Pachoud* explicitly states the transponder is encapsulated. *Id.*, [0024], [0033].

Pachoud's loop-shaped portion of Fig. 4b includes at least one complete loop, but suggests others were both possible and advantageous. *Id.*, Fig. 4b, [0042], [0071]; Smith, ¶ 93. Accordingly, *Pachoud* suggests multiple loops and, in view of *Pachoud*'s suggestion, forming a loop-shaped section having two complete loops would have been an obvious design choice.

A POSITA would have understood, the number of loops surrounding the transponder increases the inductive coupling between the antenna and RFID transponder. Smith, ¶ 94; § VI.A.2 (Ground 1, Motivation to Combine). It would thus have thus been obvious to a POSITA to complete the second loop shown in Fig. 4b of *Pachoud* to vary the inductive strength with the transponder. Smith, ¶ 94.

To the extent Patent Owner disputes *Pachoud*'s suggestion of a double loop, *Astra* expressly discloses a double loop. Smith, ¶ 95. *Astra* discloses a "coupling coil (18) ... [with] a plurality of windings." *Astra*, [0029]. *Astra*'s windings, like those of *Pachoud*, are in a **central zone** of the antenna and **inductively couple [the antenna with] the encapsulated RFID transponder**. *Id.*, [0025] (indicating the chip module (RFID transponder) is arranged such "that the coupling loop is inductively coupled to a coupling coil 18 of the antenna conductor 14."). As Fig. 2 shows, this coupling coil expressly includes at least a **double loop**:

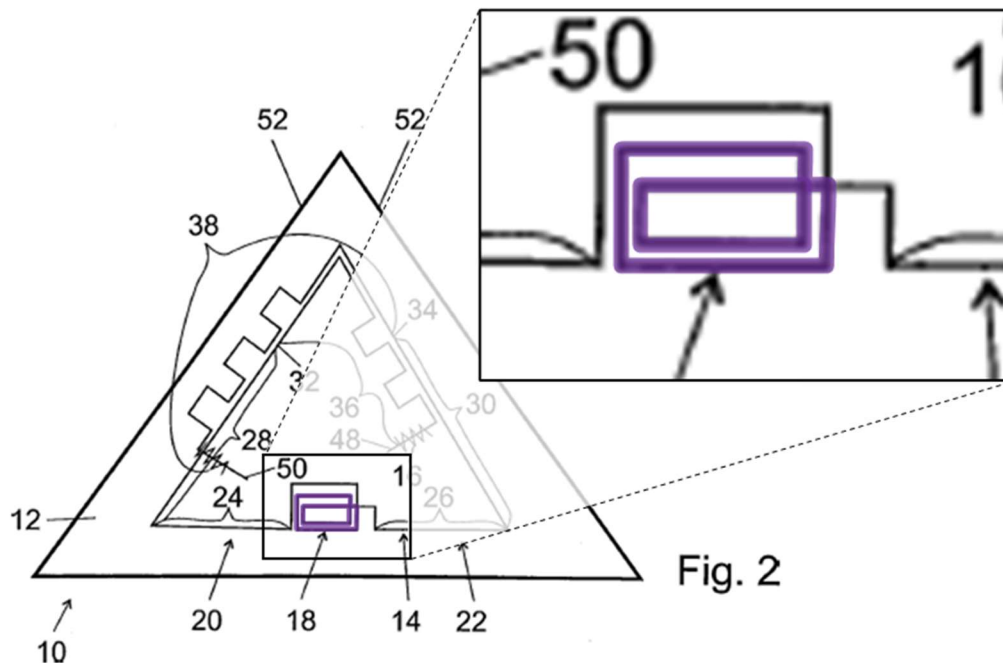
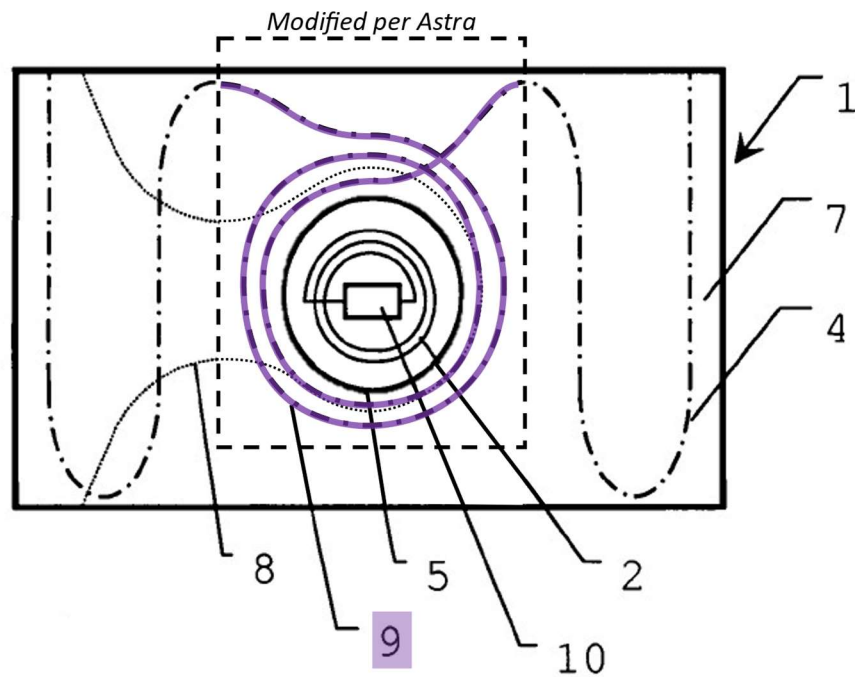


Fig. 2

Id., Fig. 2 (annotated; partially enlarged for detail).

A POSITA would have easily incorporated a double loop into the antenna of *Pachoud* in view of *Astra*, particularly in view of *Pachoud*'s express suggestion. The *Pachoud-Astra* combination is shown in the following combined figure:



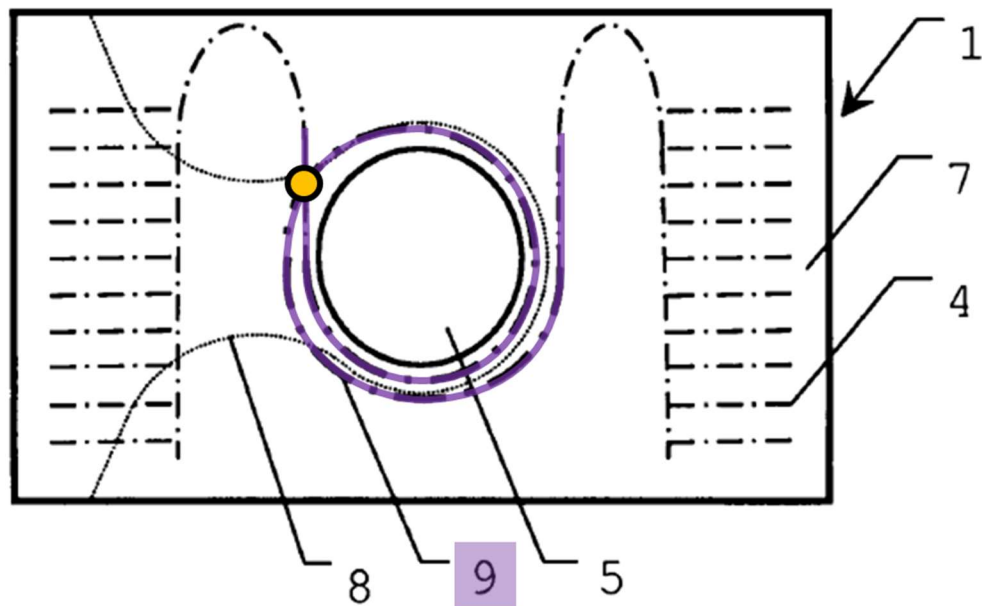
Smith, ¶ 96 (providing a modified Fig. 4a of *Pachoud*); § VI.A.2 (Ground 1, Motivation to Combine).

Although *Astra*'s loop is more than two loops (i.e., 2.5 loops), the combination still at least renders a double loop obvious. Smith, ¶ 97. As explained above, the degree of coupling varies with the amount of looping around the transponder. § VI.A.2 (Ground 1, Motivation to Combine). It would have at least been obvious to try two loops to achieve the desired coupling strength, especially in view of the disclosures of *Astra* and *Pachoud*'s flexible loop configurations. Smith, ¶ 97 (citing *Pachoud*). And the additional partial loops are due at least in part to the relative position of the antenna and chip, which are not necessary when combined with *Pachoud*, as illustrated above. *Id.*, ¶ 98.

g. [1.d.ii]: “wherein the double loop (5) does not have electrical contacts at intersection points (A and B)”

Pachoud discloses or at least renders obvious [1.d.ii] and *Pachoud* in view of *Astra* also renders obvious [1.d.ii]. Smith, ¶¶ 99-101.

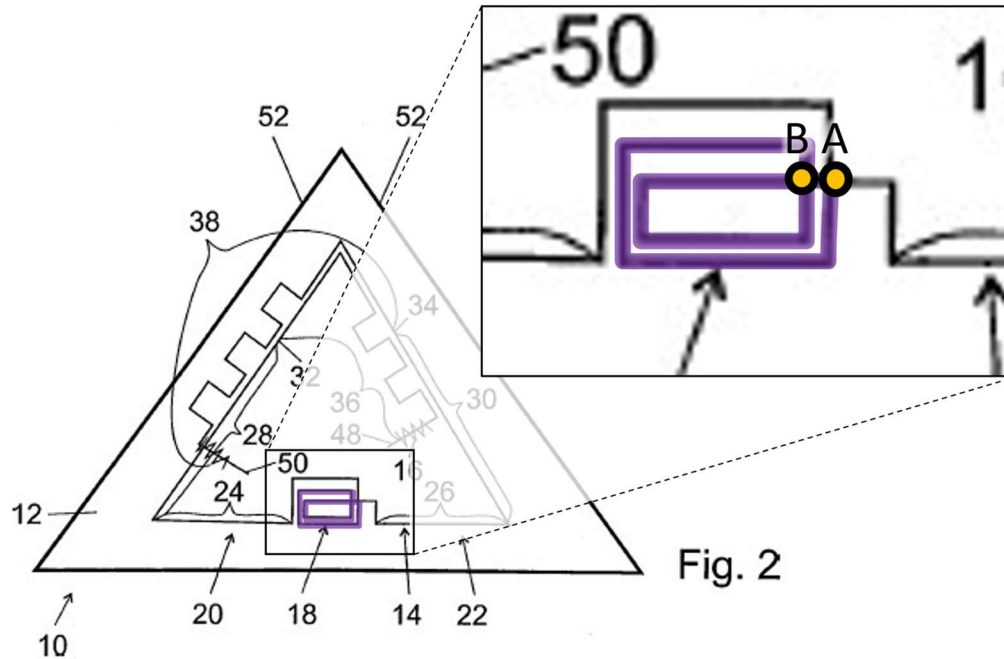
Pachoud discloses a **loop-shaped section 9** of the antenna including at least one complete loop that includes at least one **intersection point**:



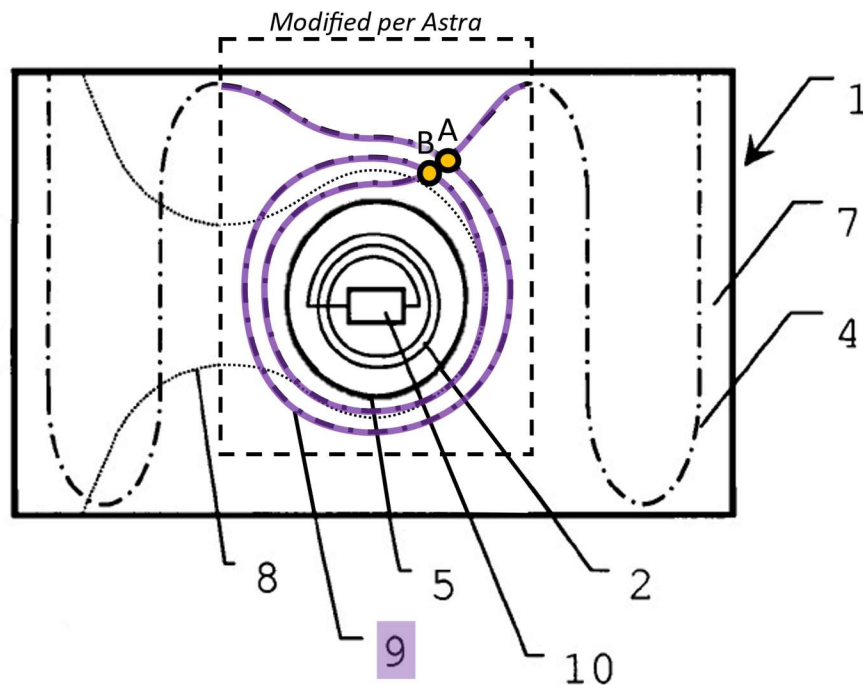
Pachoud, Fig. 4b (annotated); *see also id.*, [0042], [0060].

As explained for [1.d.i], it would have been obvious to increase the number of loops in the loop-shaped portion to increase the connection strength with the RFID transponder. Smith, ¶ 100; § VI.A.3.f (Ground 1, [1.d.i]). As combined, *Pachoud*-

Astra would have *intersection points (A and B)* because the **double loop** of *Astra* includes at least two **intersection points**:



Astra, Fig. 2 (annotated; partially enlarged for detail). The *Pachoud-Astra* combination would likewise include multiple **intersection points** A and B:



Smith, ¶ 100 (illustrating modified Fig. 4a of *Pachoud*).

The combination at least renders obvious ***the double loop (5) does not have electrical contacts at intersection points***. One skilled in the art would have recognized that the electroconductive thread forming the loop-shaped section in *Pachoud* would be insulated. Smith, ¶ 101; § VI.A.3.b (Ground 1, [1.a]). The '027 patent itself admits *Pachoud* includes an insulated antenna. Ex. 1001, 2:47-52. And *Astra* explicitly discloses an electrically insulated antenna conductor. *Astra*, [0025]. A POSITA would have understood that an electrically insulated conductor would prevent electrical contacts at intersection points. Smith, ¶ 101 (citing *Usta*, 5:13-15). This insulation is the only manner described in the '027 patent for achieving electrical isolation at the crossing points. Ex. 1001, 3:22-29. Datamars cannot

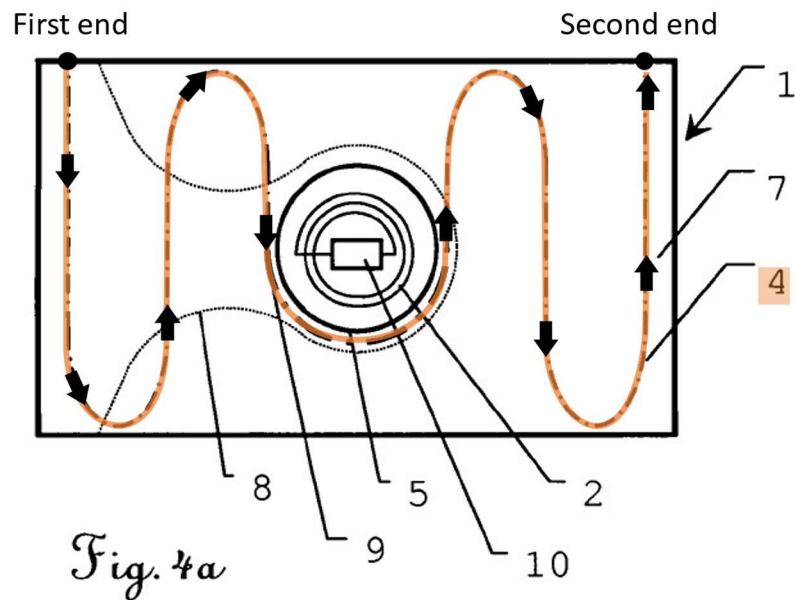
demand more from the prior art than is disclosed in the ‘027 patent. *See In re Epstein*, 32 F.3d 1559, 1568 (Fed. Cir. 1994); *Analog Devices, Inc., v. Xilinx, Inc.*, IPR2020-01625, Paper 43, 25-27 (Apr. 14, 2022) (invalidating claims when “asserted prior art’s level of disclosure is commensurate with the disclosure of the [challenged] patent”).

4. Claim 2

- a. [2.a]: “wherein the UHF-SHF antenna (2) is made of an electroconductive textile thread, electrically insulated, by continuous embroidering, starting from one end to the other”

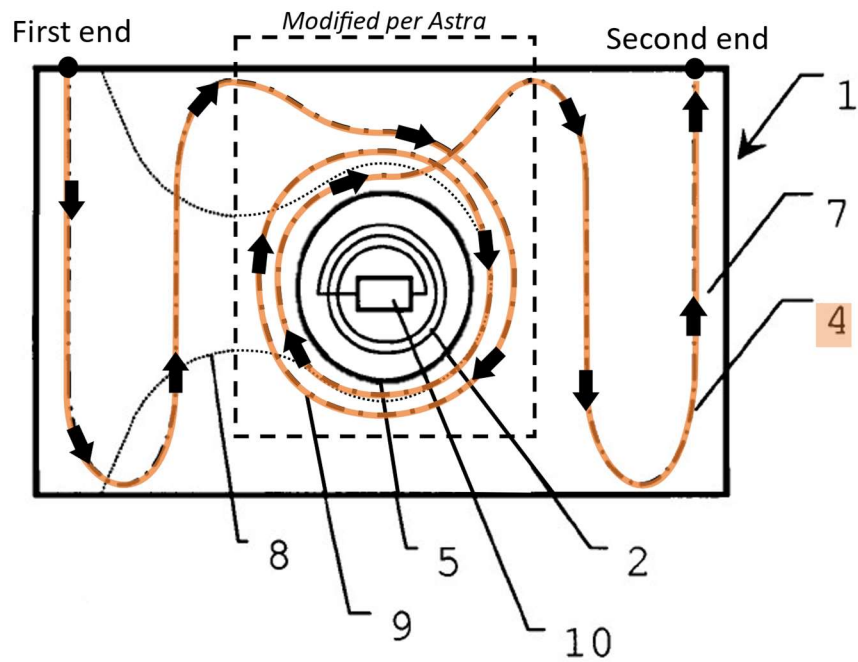
Pachoud discloses or at least renders obvious [2.a] and *Pachoud* in view of *Astra* and *Elbaz* also renders obvious [2.a]. Smith, ¶¶ 102-103.

As explained for [1.a], *Pachoud* alone or in combination with *Astra* discloses or renders obvious a ***UHF-SHF antenna (2) is made of an electroconductive textile thread, electrically insulated, by continuous embroidering*** because the antenna is formed of an electrically insulated electroconductive thread continuously embroidered on a tag material 7. Smith, ¶ 102; § VI.A.3.b (Ground 1, [1.a]). As shown below, the **electroconductive thread** in *Pachoud* is embroidered continuously ***starting from one end to the other***—from a first end to a second end to form the antenna:



Pachoud, Fig. 4a (annotated); Smith, ¶ 102.

Pachoud-Astra likewise includes continuously embroidery from a first end to a second end:



Smith, ¶ 103 (illustrating modified Fig. 4a of *Pachoud*). This continuous embroidery is expressly recited in *Astra*. *Astra*, [0025] (“[T]he antenna conductor 14 is fixed ... ***continuously*** on the carrier 12 by embroidery.”). *Elbaz* likewise discloses [2.a]. *Elbaz*, 11:14-17 (describing a “step of ... embroidering ... or weaving said first antenna on said first support”).

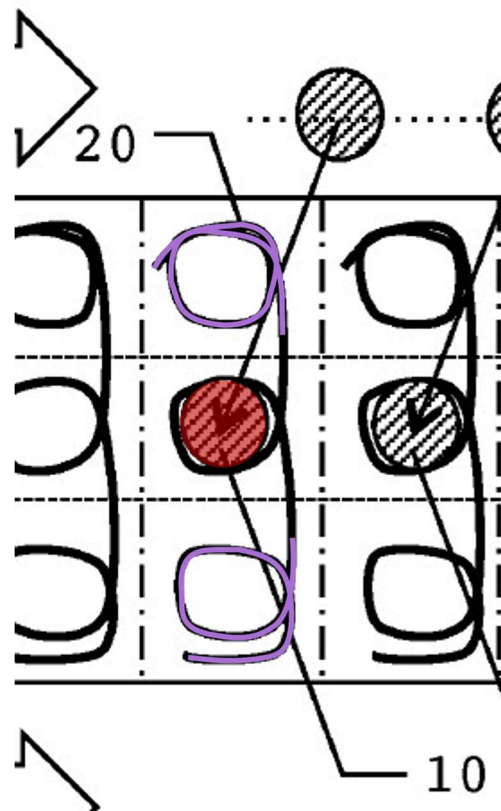
b. [2.b]: “wherein the UHF-SHF antenna (2) ... has simple loops in each extremity”

Pachoud discloses or at least renders obvious [2.b] and *Pachoud* in view of *Astra* and *Elbaz* also renders obvious [2.b]. Smith, ¶¶ 104-106.

As explained for [1.a], *Pachoud* discloses a ***UHF-SHF antenna***. § VI.A.3.b (Ground 1, [1.a]). *Pachoud* also at least suggests its antenna ***has simple loops in each extremity***. Smith, ¶ 104. While the example antennas shown in Figs. 4a-4c and 5 do not explicitly show simple loops in each extremity, incorporating such loops is well within the purview of a POSITA. *Id.* *Pachoud* acknowledges that the specific shape of the far-filed antenna is a design choice and is easily adaptable by one of ordinary skill. *Pachoud*, [0068]. *Pachoud* also notes that antennas “can be designed in many different shapes and sizes to fit the desired form factor and purpose (spectral characteristics, antenna gain, directional characteristics, etc.).” *Id.*, [0005]. As explained above, it was known that end loading loops reduce the size of the antenna and improve its bandwidth. § VI.A.2 (Ground 1, Motivation to Combine).

And *Pachoud* already contemplates adding loops to the antenna. *Pachoud*, [0042], [0065]. It thus would have been an obvious design choice to include simple loops in the extremities in view of *Pachoud* alone.

To the extent *Pachoud* does not expressly disclose that its antenna *has simple loops in each extremity*, *Elbaz* does. Smith, ¶ 105. *Elbaz* discloses a method of assembling an RFID tag including an RFID module and a conductive antenna disposed on a dielectric carrier. *Elbaz*, Abstract, Fig. 2A. The conductive antenna 20 includes a plurality of loops 20L, including a central loop encircling the **RFID module**, as well as **additional loops in the extremities**:



Elbaz, Fig. 2b (annotated), 23:8-25:2.

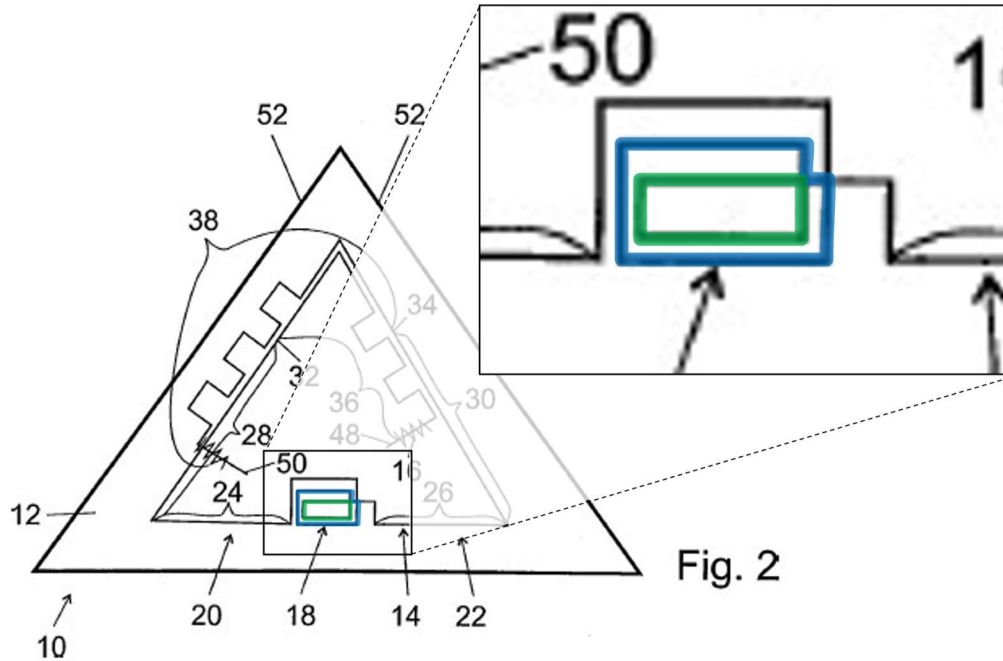
A POSITA would have been motivated to incorporate loops 20L of *Elbaz* into the extremities of *Pachoud-Astra*'s antenna to achieve the known benefit of a reduced size and improved transmission characteristics of the antenna. Smith, ¶ 106.

§ VI.A.2 (Ground 1, Motivation to Combine).

- c. **[2.c]: “wherein the UHF-SHF antenna (2) ... has ... in the central area a double loop (5) consisting of a first loop with a smaller diameter, followed by a second concentric loop with a larger diameter”**

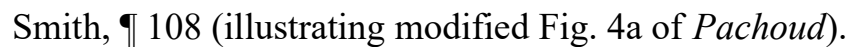
Pachoud discloses or at least renders obvious [2.c] and *Pachoud* in view of *Astra* and *Elbaz* also renders obvious [2.c]. Smith, ¶¶ 107-108.

As explained for [1.d.i], *Pachoud* and *Astra* disclose or render obvious a ***UHF-SHF antenna [that] ... has ... in the central area a double loop***. Smith, ¶ 107; § VI.A.3.f (Ground 1, [1.d.i]). *Astra* further discloses ***a first loop with a smaller diameter, followed by a second concentric loop with a larger diameter***. *Astra* discloses “coupling coil (18) ... [with] a plurality of windings.” *Astra*, [0029]. These windings appear in a central zone of the antenna and are used to couple the chip module (e.g., an RFID transponder) to the antenna. *Id.*, [0025] (indicating the chip module is arranged such “that the coupling loop is inductively coupled to a coupling coil 18 of the antenna conductor 14.”). As Fig. 2 shows, this coupling coil includes a **first loop** with a smaller diameter, followed by a **second concentric loop** with a larger diameter:



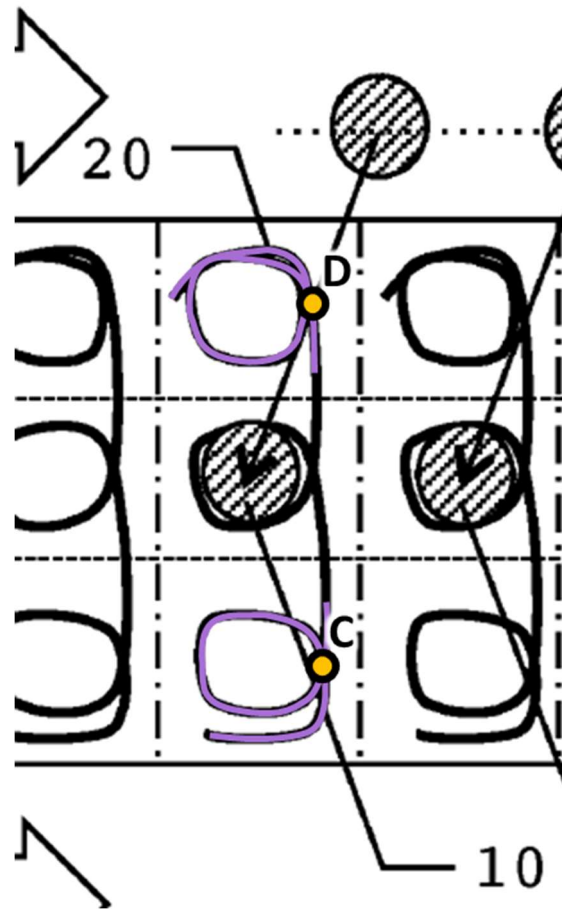
Id., Fig. 2 (annotated; partially enlarged for detail).

The modification of *Pachoud* in view of *Astra* would similarly include a **first loop** with a smaller diameter, followed by a **second concentric loop** with a larger diameter:



a. [3.a]: “wherein the UHF-SHF antenna (2) does not show electrical contacts in the crossing points (C and D) in the construction of simple loops located at the extremities”

As explained for [2.b], it would have been obvious to incorporate *Elbaz's simple loops located at the extremities* into *Pachoud's* antenna. Smith, ¶ 109; § VI.A.4.b (Ground 1, [1.2.b]). Like the loop-shaped portion in *Pachoud* (see § VI.A.3.g (Ground 1, [1.d.ii])), the simple loops in *Elbaz* include **crossing points (C and D) in the construction of the simple loops**, as shown below:



Elbaz, Fig. 2b (annotated), 23:8-25:2. *Pachoud* and *Astra* in view of *Elbaz* modified to include the simple loops would likewise include multiple intersection points C and D. Smith, ¶ 109.

A POSITA would have recognized that the electroconductive thread forming the loop-shaped section in *Pachoud* would be insulated, especially in view of *Astra*. Smith, ¶ 110; § VI.A.3.b (Ground 1, [1.a]). A POSITA would further have recognized that if the conductor forming the *USF-SHF antenna* is insulated, this would prevent electrical contacts at intersection points, and thus the antenna does

not show electrical contacts in the crossing points. Smith, ¶ 110; § VI.A.3.g (Ground 1, [1.d.ii]).

6. Claim 6

a. [6.a]: “wherein the harsh environments include temperatures between 8-90° C”

Pachoud discloses or at least renders obvious [6.a] and *Pachoud* in view of *Astra* and *Elbaz* also renders obvious [6.a]. Smith, ¶¶ 111-112.

Pachoud at least suggests *the harsh environments include temperatures between 8-90° C* because *Pachoud* discloses “an RFID laundry tag with resistance against harsh external conditions such as high temperatures.” *Pachoud*, [0021]. Specifically, *Pachoud* envisions a laundry tag capable of withstanding airdrying-machinery in which “high temperatures of up to 300° Celsius are used.” *Id.*, [0017]. Accordingly, *Pachoud* discloses an RFID tag for use in temperatures up to 300°C, and thus well suited for temperatures up to 90° C. A POSITA would understand *Pachoud*’s tag would likewise be suitable for lower temperatures of 8° C and fluctuations therebetween. Smith, ¶ 111. Indeed, these were standard conditions for textile RFID tags at the time. *Moraru*, 412 (listing “specific industrial laundry environmental factors” including “washing temperatures of up to 90° C” and “high temperature variations – cold/warm (8° C /90° C)”).

Elbaz similarly discloses this limitation. Smith, ¶ 112. *Elbaz* envisions applications of its labels for industrial laundry environments and accordingly define

a minimum melting temperature of its thermoplastic material of 180° C. *Elbaz*, 3:1-12, 30:7-15. By forming an RFID tag that incorporates the fibrous mesh and thermoplastic material from *Elbaz* (*id.*, 28:11-29:3, 37:10-38:3, Fig. 2), the combination would result in an RFID tag configured for use in temperatures between 8-90° C. § VI.A.2 (Ground 1, Motivation to Combine); Smith, ¶ 112.

B. Ground 2: The Combination of *Pachoud*, *Astra*, and *Guibert* Renders Obvious Claims 1 and 6

1. Overview of the Ground 2 Combination

a. *Guibert*

Guibert is a publication exploring the effectiveness of coatings for wearable RFID tag applications. *Guibert*, Abstract. *Guibert* is analogous to the '027 patent because it is in the same field of endeavor: textile RFID tags for applications in harsh environments. Smith, ¶ 113; *In re Bigio*, 381 F.3d at 1325. *Guibert* was presented at the 2017 Progress in Electromagnetics Research Symposium, published by well-known publisher (IEEE), and has ISBN 978-1-5386-1211-8, all confirming public availability. Ex. 1025, 6-10.

The RFID tag of *Guibert* includes an antenna and an integrated circuit, formed by embroidering conductive thread onto a textile substrate:



Guibert, Fig. 1, §1; Smith, ¶ 114. To protect against moisture during washing cycles, *Guibert* discloses applying a stretchable encapsulant onto the embroidered tags using a “dip coating” process at 100 °C. *Guibert*, §2.

Guibert ultimately concludes “washing in a washing machine ... [is] damaging for the tags,” due to mainly to mechanical stress, adding that “further support material [would be] needed around the antenna-IC attachments, in order to make these tags truly washable.” *Id.*, §§4-5. Apart from these mechanical stress issues, *Guibert* found the tested encapsulant to be “a potential protective coating for textile-integrated wireless components” noting it “maintain[ed] ... excellent read ranges” and “was very effectively protecting the tags from moisture.” *Id.*, § 4; Smith ¶ 115.

b. The Combination of *Pachoud*, *Astra*, and *Guibert*

As explained for Ground 1, *Pachoud* discloses an RFID tag that includes every feature of independent claim 1 except the claimed double loop. § VI.A

(Ground 1, Overview). But, as explained for Ground 1, this double loop would have been obvious, especially in view of *Astra*'s looping structure. *Id.*; Smith, ¶ 116.

Ground 1 further relied on *Elbaz* in part and in addition to the disclosures of *Pachoud* and *Astra* for disclosing hot gluing of a second substrate as teaching “hot-dipping” (Limitations [1.d.i-ii]). To the extent that Patent Owner argues this term requires “dipping,” *Guibert* is prior art and discloses hot-dipping. Ground 2 renders obvious claims 1 and 6 under **both** the proper priority date of October 29, 2019, and a priority date as of the filing of the PCT application on December 19, 2017. § III.D (Priority Date); Smith, ¶ 117.

2. Motivation to Combine

As explained for Ground 1, a POSITA would have been motivated to combine *Pachoud* and *Astra*. § VI.A.2 (Ground 1, Motivation to Combine); Smith, ¶ 118.

A POSITA would have also been motivated to combine *Guibert* with *Pachoud* and *Astra*. *Id.* *Pachoud* discloses adapting a textile RFID tag for use in laundry environments. *Pachoud*, [0017]-[0023], [0027]. *Guibert* shares this same goal. *Guibert*, § 1. A POSITA would have implemented the dip-coating technique of *Guibert* in the RFID tag of *Pachoud* to further protect the tag's components. Smith, ¶ 118. Indeed, *Guibert* finds “the tested encapsulant can be considered a potential protective coating for textile-integrated wireless components, as they were able to maintain the excellent read ranges after 1 hour in water.” *Guibert*, §4. *Guibert*

emphasizes that “the protective coating was very effectively protecting the tags from moisture.” *Id.*

While *Guibert* ultimately found “washing in a washing machine ... to be damaging for the tags,” this was due to “mechanical stress” where “the antenna-IC interconnections were found to be easily breakable.” *Guibert*, §5. A POSITA would have recognized such issues would be mitigated in applying the dip coating to *Pachoud*’s already enclosed RFID tag. Smith, ¶ 119. *Pachoud* uses an additional textile material to enclose its tag, which a POSITA would have recognized protects against the mechanical stress found to be detrimental in *Guibert*. *Id.*; *Pachoud*, [0024], [0061], [0068]; § VI.A.3.e (Ground 1, [1.c.ii]). Indeed, *Guibert* envisions this “further support material” around the antenna as a potential solution to the problems its coating encountered. *Guibert*, §4. And the weak antenna-IC interconnection noted in *Guibert* is precisely the issue addressed by inductively coupling the transponder and antenna in *Pachoud*. Smith, ¶ 119; *Pachoud*, [0037]; *Moraru*, 412-413; Ex. 1001, 1:44-53.

Accordingly, a POSITA would have been motivated to dip-coat *Pachoud*’s textile identification tag using *Guibert*’s stretchable encapsulant to further protect the tag from moisture while maintaining excellent read ranges. Smith, ¶ 120; *Guibert*, §4. Combining *Guibert* and *Pachoud* would therefore have been a

straightforward application of known techniques to achieve proven results.

Smith, ¶ 120.

3. Independent Claim 1

a. [1.pre]: “An RFID tag (1) for use in harsh environments”

As explained in Ground 1, *Pachoud* discloses or at least renders obvious [1.pre]. Smith, ¶ 121; § VI.A.3.a (Ground 1, [1.pre]).

b. [1.a]: “an UHF-SHF antenna (2) made from a continuous electroconductive textile thread, electrically insulated, embroidered on textile substrate”

As explained in Ground 1, *Pachoud* discloses or at least renders obvious [1.a] and *Pachoud* in view of *Astra* also renders obvious [1.a]. Smith, ¶ 122; § VI.A.3.b (Ground 1, [1.a]).

c. [1.b]: “an RFID transponder (3)”

As explained in Ground 1, *Pachoud* discloses or at least renders obvious [1.b] and *Pachoud* in view of *Astra* also renders obvious [1.b]. Smith, ¶ 123; § VI.A.3.c (Ground 1, [1.b]). Indeed, the '027 patent acknowledges that RFID transponders were known in the art and admits they are disclosed in *Pachoud* specifically. Ex. 1001, 1:44-53. Similarly, *Pachoud* in view of *Astra* and *Guibert* also renders obvious [1.b]. Smith, ¶ 123. *Guibert* is directed to “wearable RFID tags” that include

components that transmit signals, including an ***RFID transponder***. *See generally Guibert*.

d. [1.c.i]: “a substrate of textile material (4) on which the RFID transponder (3) and the UHF-SHF antenna (2) are placed”

As explained in Ground 1, *Pachoud* discloses or at least renders obvious [1.c.i] and *Pachoud* in view of *Astra* also renders obvious [1.c.i]. § VI.A.3.d (Ground 1, [1.c.i]). For similar reasons, *Pachoud* in view of *Astra* and *Guibert* also renders [1.c.i] obvious. Smith, ¶ 124.

Pachoud discloses placing an RFID transponder and a UHF-SHF antenna on a tag material. *Pachoud*, [0043], [0059], [0060], [0062]. Further, *Astra* discloses placing an enclosed transponder and antenna on a substrate of textile material. Smith, ¶ 124. *Astra* discloses “an antenna module 10 comprising a carrier 12,” which is “a textile material.” *Astra*, [0025]. To form the antenna module, “the antenna conductor 14 is fixed completely and continuously on the carrier 12.” *Id.* The chip module is also arranged on the carrier 12. *Id.*

e. [1.c.ii]: “the whole assembly being sealed by hot-dipping of a second textile substrate”

As explained in Ground 1, *Pachoud* discloses or at least renders obvious [1.c.ii], and *Pachoud* in view of *Astra* also renders obvious [1.c.ii]. Smith, ¶ 126; § VI.A.3.e (Ground 1, [1.c.ii]). For similar reasons, *Pachoud* in view of *Astra* and *Guibert* also renders obvious [1.c.ii]. Smith, ¶ 126.

The specification of the '027 patent provides no support for [1.c.ii]. § III.D (Priority Date). The Romanian application uses the term “hot gluing of a second substrate,” but as explained this is not the same as hot dipping and thus the priority claim is not valid. Ex. 1017, ¶ 127; III.D (Priority Date). But to the extent Patent Owner argues [1.c.ii] covers hot gluing of a second substrate, grounds 1 and 3 each teach this limitation. *See* VI.A.3.e (Ground 1, [1.c.ii]); VI.C.3.e (Ground 3, [1.c.ii]). However, to the extent Patent Owner argues this term requires “dipping,” *Guibert* is prior art and expressly discloses it. Smith, ¶ 127; § III.D.

Guibert discloses a method for fabricating “textile antennas ... for wearable RFID applications.” *Guibert*, Abstract. As with *Pachoud*, the RFID tag of *Guibert* includes an antenna and an integrated circuit formed by embroidering conductive thread onto a textile substrate. *Id.*, §1. To protect against moisture during washing cycles, *Guibert* applies a coating to the RFID tags. *Id.*, §2. In particular, *Guibert* discloses **dip coating** a stretchable encapsulant onto the embroidered tags at the high temperature of 100° C, which is hot-dipping. *Id.*; Smith, ¶ 128.

A POSITA would have been motivated to dip-coat the tag of *Pachoud* and *Astra* in *Guibert*'s stretchable encapsulant to obtain *Guibert*'s noted benefit of “very effective[] protecti[on] ... from moisture,” while “maintain[ing] ... excellent read ranges.” Smith, ¶ 129; § VI.B.2 (Ground 2, Motivation to Combine).

- f. **[1.d.i]: “wherein the UHF-SHF antenna (2) has a central zone formed by a double loop (5) by which it inductively couples with the encapsulated RFID transponder (3)”**

As explained in Ground 1, *Pachoud* discloses or at least renders obvious [1.d.i] and *Pachoud* in view of *Astra* also renders obvious [1.d.i]. Smith, ¶ 130; § VI.A.3.f (Ground 1, [1.d.i]). For similar reasons, *Pachoud* in view of *Astra* and *Guibert* also renders obvious [1.d.i]. Smith, ¶ 130. For example, it would have been obvious over *Pachoud* in view of *Astra* to use a double loop to increase the connection strength with the encapsulated RFID transponder. § VI.A.3.f (Ground 1, [1.d.i]); Smith, ¶ 130.

- g. **[1.d.ii]: “wherein the double loop (5) does not have electrical contacts at intersection points (A and B)”**

As explained in Ground 1, *Pachoud* discloses or at least renders obvious [1.d.ii] and *Pachoud* in view of *Astra* also renders obvious [1.d.ii]. Smith, ¶ 131; § VI.A.3.g (Ground 1, [1.d.ii]). For similar reasons, *Pachoud* in view of *Astra* and *Guibert* also renders obvious [1.d.ii]. Smith, ¶ 131. It would have been obvious over *Pachoud* in view of *Astra* to use a double loop to increase the connection strength with the RFID transponder, and it would further have been obvious to insulate that loop to avoid electrical contacts and shorts at the intersection points. § VI.A.3.g (Ground 1, [1.d.ii]); Smith, ¶ 131.

4. Claim 6

a. [6.a]: “wherein the harsh environments include temperatures between 8-90° C”

As explained in Ground 1, *Pachoud* discloses or at least renders obvious [6.a]. Smith, ¶ 132; § VI.A.6.a (Ground 1, [6.a]). For similar reasons, *Pachoud* in view of *Guibert* also renders obvious [6.a]. Smith, ¶ 132.

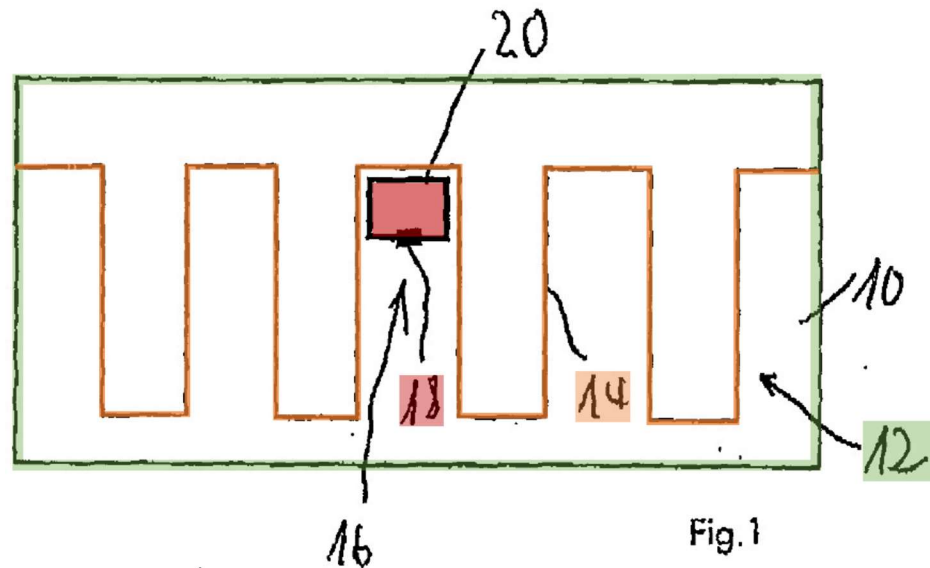
Pachoud’s tag is designed for temperature up to 300° C, which includes temperatures between 8-90° C. *Pachoud*, [0017]. *Guibert*’s tag is designed to undergo laundry conditions that include 40° C and were dried at temperatures up to 160° C during manufacturing and are used for “everyday” applications, which thus spans the range from 8-90° C. *Guibert*, §§2-3; Smith, ¶ 132.

C. Ground 3: The Combination of *Astra*, *Stobbe*, and *Elbaz* Renders Obvious Claims 1, 2, 3, and 6

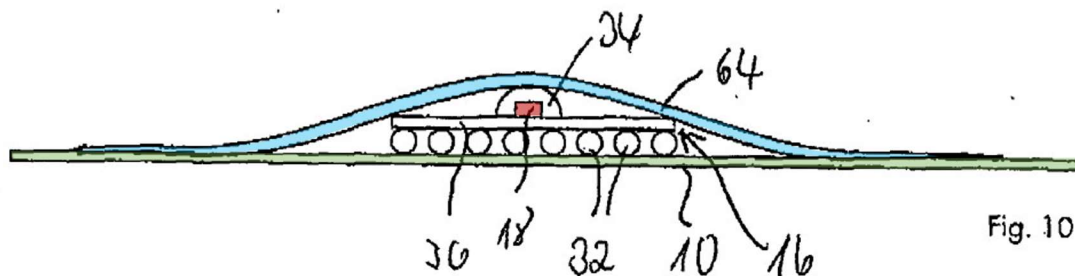
1. Overview of Ground 3

a. *Stobbe*

Stobbe, filed by the same applicant as *Astra*, discloses a “textile information carrier” including a **chip module** and an **antenna** placed on a **textile label**. *Stobbe*, [0009]. As in *Pachoud* and *Astra*, the antenna is connected to the **chip module** via inductive coupling:



Id., Fig. 1 (annotated), [0009]. Whereas *Astra* focuses mainly on improving the form of the antenna module (*Astra*, [0002]-[0003]), *Stobbe* aims to adapt the textile tag when used specifically in harsh laundry environments (*Stobbe*, [0005]-[0006]). Smith, ¶ 133. For example, *Stobbe* discloses applying a **patch** over the **chip module** and **antenna** to form a seal with the **textile label** that can withstand harsh environments:



Stobbe, Fig. 10 (annotated), [0024]; Smith, ¶ 133.

b. The Combination of *Astra*, *Stobbe*, and *Elbaz*

Astra alone discloses or renders obvious each element of the independent claim with the exception of hot-dipping of a second textile substrate. Smith, ¶ 134. However, as explained below, *Stobbe*'s application of a patch applied via adhesive using heat and pressure discloses this element. It would have been obvious to combine *Astra* and *Stobbe*, especially in view of *Astra*'s explicit reference to *Stobbe* as its starting point. Further, to the extent that Patent Owner disagrees that *Astra* in view of *Stobbe* disclose hot-dipping, *Elbaz* discloses this approach, and it would have been obvious over *Astra* in view of *Stobbe* and *Elbaz*.

Ground 3 renders obvious claims 1-3 and 6 under the earliest claimed priority date of the '027 patent. Smith, ¶ 135.

2. Motivation to Combine

A POSITA would have been motivated to combine *Astra*, *Stobbe*, and *Elbaz* and would have had a reasonable expectation of success in doing so. Smith, ¶ 136. The references are analogous to the '027 patent because they are in the same field of endeavor: textile RFID tags for applications in harsh environments. Smith, *Id.*; *In re Bigio*, 381 F.3d at 1325.

The combination of *Astra* and *Stobbe* reflects the combination of familiar elements according to known methods to yield predictable results. Smith, ¶ 137. Both *Astra* and *Stobbe* provide textile RFID tags including a chip module and an

antenna conductor affixed to a textile label. *Astra*, [0025]; *Stobbe*, [0066]. A POSITA in possession of *Astra* would have turned to *Stobbe* for its benefits of further adapting the textile RFID tag for laundry environments. Smith, ¶ 137; *Stobbe*, [0005]-[0006]. Indeed, *Stobbe* is explicitly referenced in *Astra* to disclose a relevant prior art textile device comprising an antenna and chip module, and both list the same applicant. *Astra*, [0002].

A POSITA would have also been motivated to combine the *Elbaz* with *Astra* and *Stobbe*. A stated goal of *Astra* is to provide an antenna module having a compact design. *Astra*, [0003]. A POSITA would have been motivated to incorporate the loops in the extremities of *Elbaz*'s antenna to achieve the known benefits of reduced size and improved bandwidth, thus furthering this goal. Smith, ¶ 138; *see* § VI.A.2 (Ground 1, Motivation to Combine). For example, antenna conductor 14 of *Astra* includes "third sections 36, 38 partially hav[ing] a meander-shaped course." *Astra*, [0031]. This form of meander is precisely the antenna configuration that can be avoided by adding simple loops. Smith, ¶ 139 (citing *Shao*, 1386). *Elbaz* confirms this benefit. *Elbaz*, 23:13-14 ("To reduce its bulk ... [the] antenna[] advantageously comprises a plurality of loops 20L."). Given *Astra*'s insulated antenna, combining *Astra* and *Elbaz* would have amounted to a straightforward application of known techniques to achieve predictable results. Smith, ¶ 138.

A POSITA would have been additionally motivated to combine *Astra* and *Stobbe* with *Elbaz* to improve the ability of its tags to survive harsh environments in laundry processes. Smith, ¶ 139. For example, *Elbaz* states that, among other benefits, its mesh protects the RFID module “against possible shocks or mechanical constraints.” *Elbaz*, 28:21-29:3. The thermoplastic material further keeps the label substantially flat and provides improved resilience for harsh environments. *Id.*, 30:16-31:3. It advantageously provides a minimum melting temperature of its thermoplastic protective coating of 180° C. *Id.*, 30:13-15; Smith, ¶ 139. A POSITA would have been motivated to incorporate this sealing process of *Elbaz* to improve resilience of the tag in laundry environments, while retaining flexibility. Smith, ¶ 139.

3. Independent Claim 1

a. [1.pre]: “An RFID tag (1) for use in harsh environments”

To the extent limiting, *Astra* discloses or at least renders obvious [1.pre] and *Astra* in view of *Stobbe* and *Elbaz* also renders obvious [1.pre]. Smith, ¶¶ 140-141.

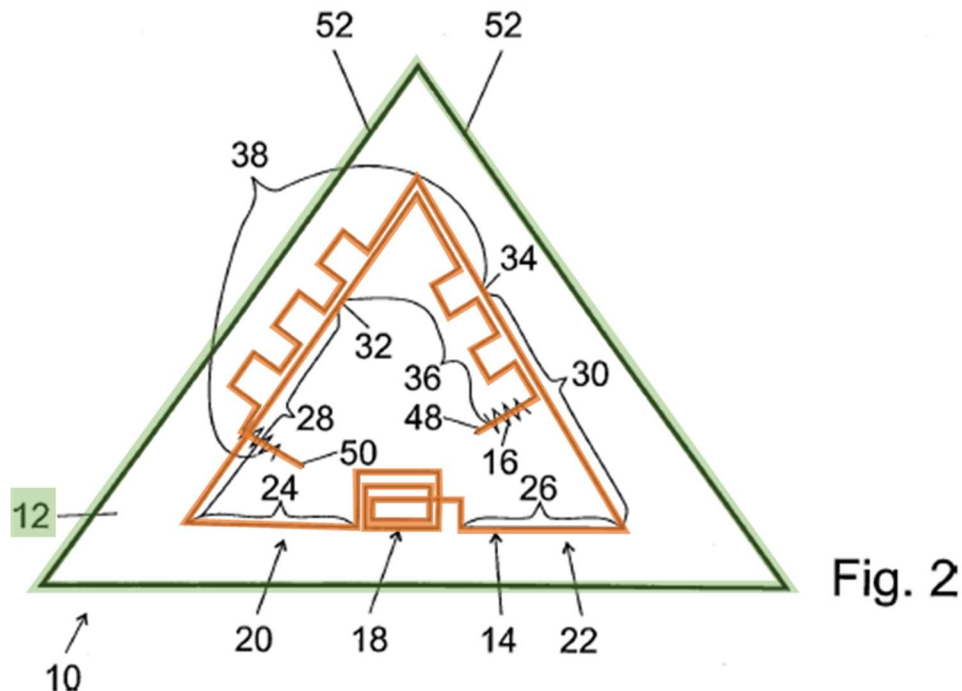
Astra discloses “an antenna module [having] a compact design” with a minimal external interference on its resonance frequency. *Astra*, [0003]. A POSITA would have recognized this antenna would be suitable for harsh environments. Smith, ¶ 140. For example, *Astra* specifically refers to *Stobbe* at the outset and thus envisions use of its antenna module in the same technical field. *Astra*, [0002]. And

Stobbe specifically raises the thermal and chemical influences on textiles during a laundry cycle as a problem to be addressed. *Stobbe*, [0005]. *Elbaz* provides a solution to the problems posed in harsh industrial laundry environments by applying a mesh and thermoplastic material over the RFID module and antenna. *Elbaz*, 3:1-12 (describing a tag and manufacturing process for withstanding “particularly harsh environments and/or conditions encountered in textile cleaning.”), 28:11-29:3, 30:7-15; Smith, ¶ 141. Thus, *Astra* alone or in view of *Stobbe* and *Elbaz* renders obvious this limitation.

b. [1.a]: “an UHF-SHF antenna (2) made from a continuous electroconductive textile thread, electrically insulated, embroidered on textile substrate”

Astra discloses or at least renders obvious [1.a] and *Astra* in view of *Stobbe* and/or *Elbaz* also renders obvious [1.a]. Smith, ¶¶ 142-143.

For example, *Astra*’s antenna module includes an **antenna conductor 14** and a textile **carrier material 12**. *Astra*, [0025]. The **antenna conductor** is “an insulated braid” that may “comprise one or more electrically conductive textile threads” and is “fixed completely and continuously on the **carrier 12** by embroidery technology using embroidery yarn 16”:



Id., Fig. 2 (annotated), [0025].

A POSITA would have recognized that *Astra*'s antenna would have been suitable for use in the UHF-SHF frequency range. Smith, ¶ 143. For example, *Astra* teaches that the shape of the antenna conductor 14 can be varied to achieve different frequencies. *Astra*, [0011], [0017], [0028]. The textile identification tag of *Stobbe*, identified as the starting point for *Astra*'s antenna (*Id.*, [0002]), more specifically discloses applications in the UHF and SHF range. *Stobbe*, [0005]. A POSITA would have understood *Astra*'s chip module thus would have been suitable for the same frequency range. Smith, ¶ 143. And *Elbaz* confirms that such RFID tags are "generally operated on a [UHF] frequency band." *Elbaz*, 1:20-2:2.

c. [1.b]: “an RFID transponder (3)”

Astra discloses or at least renders obvious [1.b] and *Astra* in view of *Elbaz* and *Stobbe* also renders obvious [1.b]. For example, *Astra* discloses a “chip module, which comprises a chip and a coupling loop.” *Astra*, [0025]. While not depicted in Fig. 2 “for reasons of clarity,” *Astra* explains that the chip module is “arranged on the carrier 12 in such a manner that the coupling loop is inductively coupled to a coupling coil 18 of the antenna conductor 14.” *Id.* A POSITA would understand this chip module, comprising a chip and a coupling loop, to be an RFID transponder. Smith, ¶ 144.

To the extent Patent Owner argues *Astra*’s chip module is not an RFID transponder because the specific terms “RFID” and “transponder” are not used, *Elbaz* expressly discloses “a radio-frequency identification module of the RFID type” having “an electronic component connected to a second conductive antenna.” *Elbaz*, 3:14-19. A POSITA would understand this RFID module, including an electronic component and an antenna, to be an RFID transponder. Smith, ¶ 145. Moreover, the ’027 patent admits that RFID tags including RFID transponders are known in the art. Ex. 1001, 1:44-53. Smith, ¶ 146.

d. **[1.c.i]: “a substrate of textile material (4) on which the RFID transponder (3) and the UHF-SHF antenna (2) are placed”**

Astra discloses or at least renders obvious [1.c.i]. Smith, ¶ 147. For example, *Astra* discloses “an antenna module 10 comprising a carrier 12” which “can be a textile material.” *Astra*, [0025]. To form the antenna module, “the antenna conductor 14 is fixed completely and continuously on the carrier 12.” *Id.* The chip module is also arranged on the carrier 12. *Id.*

e. **[1.c.ii]: “the whole assembly being sealed by hot-dipping of a second textile substrate”**

The specification of the '027 patent provides no support for [1.c.ii]. III.D (Priority Date). The Romanian application uses the term “hot gluing of a second substrate,” but as explained this is not the same as hot dipping and thus the priority claim is not valid. Ex. 1017, claim 1; § III.D (Priority Date). To the extent Datamars argues [1.c.ii] covers hot gluing of a second substrate, *Astra* in view of *Stobbe* and/or *Elbaz* renders obvious this limitation. Smith, ¶¶ 148-152.

Stobbe discloses a detection plate 16 including a chip module 16 and an antenna 12. *Stobbe*, [0066]. *Stobbe* explains that the detection plate may be “sealed with a coating ... [to] protect ... against mechanical and chemical influences.” *Stobbe*, [0033]-[0034]. For example, this may include placing a **patch 64**, including a coating and thermal adhesive, over the detection plate. *Id.*, [0078]. The **patch 64** is attached by pressure and heat to a textile label 10 to enclose the detection plate:

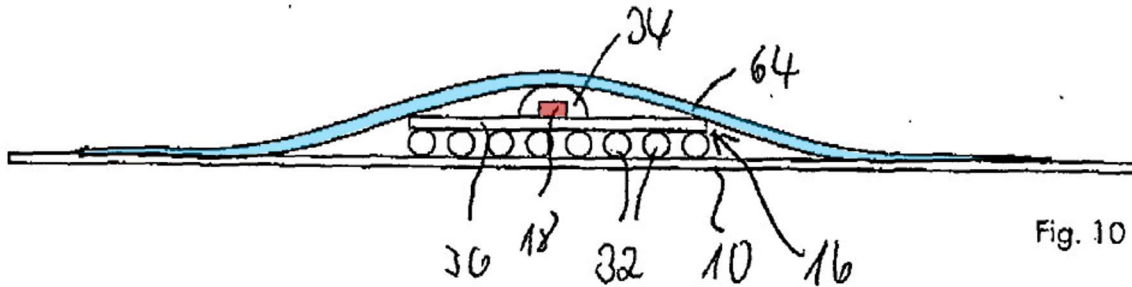


Fig. 10

Id., Fig. 10 (annotated), [0078].

A POSITA would have understood this patch applied via adhesive using heat and pressure to be “seal[ing] by hot-dipping of a second textile substrate” under any interpretation. Smith, ¶ 150. A POSITA would also have been motivated to include the sealing patch of *Stobbe* to outfit the antenna module for laundry applications, as confirmed by the explicit reference to *Stobbe* at the outset of *Astra*. *Id.*; *Astra*, [0002].

To the extent Datamars disputes the teachings of *Stobbe*, *Elbaz* further discloses this element. Smith, ¶ 151. Specifically, *Elbaz* discloses depositing a **radio-identification module 10** on a support material 30, applying a **fibrous mesh 50**, and heat-pressing a **thermoplastic material TP2**:



A POSITA would have recognized the mesh applied via hot-pressing of a thermoplastic material constitutes hot-dipping of a second textile substrate to seal the antenna assembly. Smith, ¶ 152. A POSITA would also have been motivated to incorporate this sealing process of *Elbaz* to improve the resilience of *Astra*'s antenna module in laundry environments. *Id.*, § VI.C.2 (Ground 3, Motivation to Combine).

f. [1.d.i]: “wherein the UHF-SHF antenna (2) has a central zone formed by a double loop (5) by which it inductively couples with the encapsulated RFID transponder (3)”

Astra discloses or at least renders obvious [1.d.i] and *Astra* in view of *Stobbe* and *Elbaz* also renders obvious [1.d.i] . Smith, ¶¶ 153-154.

Astra discloses a central zone formed by a loop for inductive coupling with an RFID transponder. Smith, ¶ 153. In particular, *Astra* discloses a “coupling coil (18) ... [with] a plurality of windings.” *Astra*, [0029]. These windings appear in a central zone of the antenna and are used to couple the chip module (i.e., the RFID

transponder) to the antenna. *Id.*, [0025] (indicating the chip module is arranged such “that the coupling loop is inductively coupled to a coupling coil 18 of the antenna conductor 14.”). As illustrated in Fig. 2, *Astra*’s coupling coil includes a **double loop**:

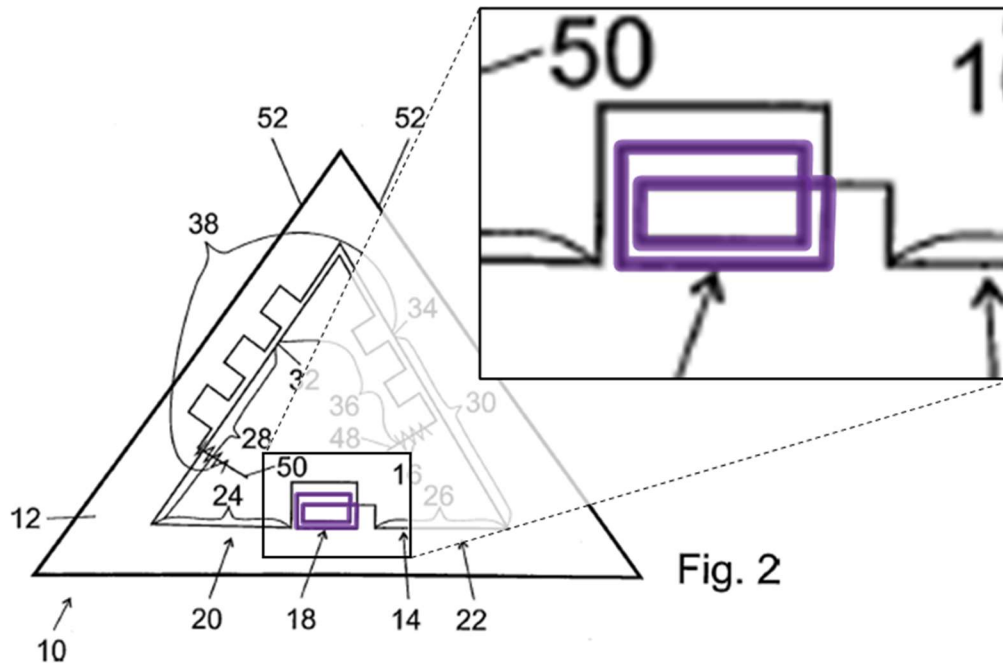


Fig. 2

Id., Fig. 2 (annotated; partially enlarged for detail). *Astra* in view of *Stobbe* and *Elbaz* thus discloses a double loop.

A POSITA would recognize the chip module of *Astra* would be encapsulated. Smith, ¶ 154. However, to the extent Patent Owner argues otherwise, *Stobbe* and *Elbaz* each disclose an encapsulated RFID transponder. The chip module 18 of *Stobbe* (specifically referenced in *Astra*) is coated with a “globtop material[,] provid[ing] protection against mechanical, thermal, and chemical influences.” *Stobbe*, [0070]. Similarly, the RFID module of *Elbaz* includes a protective resin

covering the module's components. *Elbaz*, 10:1-10, 13:10-17, 17:2-18:2, 18:3-9, 22:12-23:6. To the extent not already disclosed in *Astra*, it would have been obvious to encapsulate the RFID transponder as described in *Stobbe* and/or *Elbaz* to protect the transponder against mechanical shocks. Smith, ¶ 154; § VI.C.2 (Ground 2, Motivation to Combine).

To the extent Datamars argues *Astra*'s loop is in fact more than two loops (i.e., 2.5 loops), this is not a meaningful distinction, nor is the claim limited to exactly two full loops. § VI.A.3.f (Ground 1, [1.d.i]); Smith, ¶ 155.

g. [1.d.ii]: “wherein the double loop (5) does not have electrical contacts at intersection points (A and B)”

Astra discloses or at least renders obvious [1.d.ii] and *Astra* in view of *Stobbe* and/or *Elbaz* also renders obvious [1.d.ii]. Smith, ¶ 156.

As explained for Ground 1, forming the double loop of *Astra* introduces multiple **intersection points** A and B:

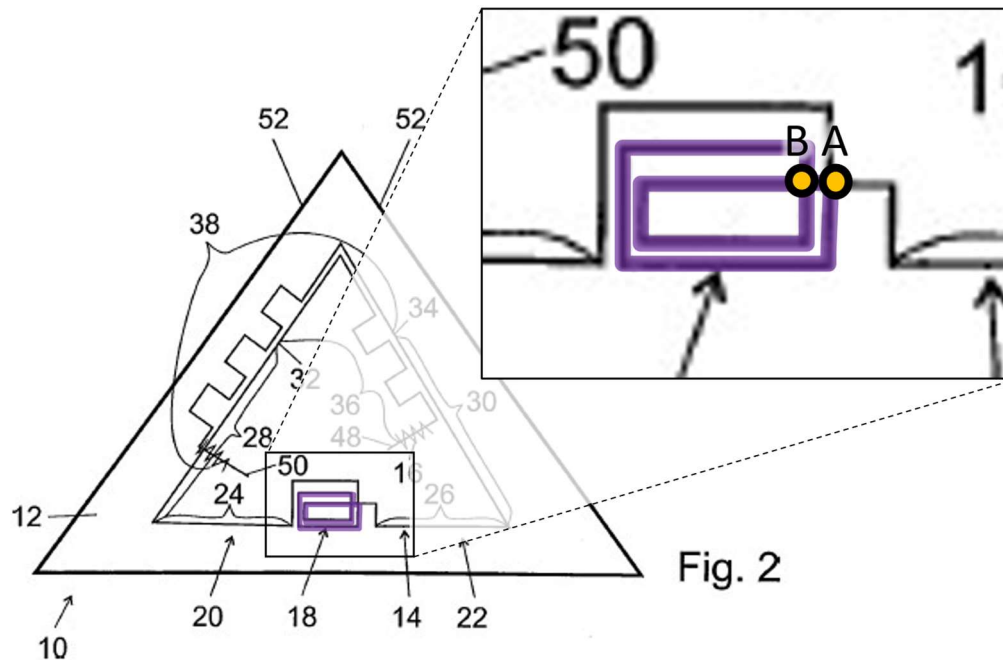


Fig. 2

Astra, Fig. 2 (annotated; partially enlarged for detail). § VI.A.3.g (Ground 1, [1.d.ii]). A POSITA would have recognized that because the antenna conductor 14 is insulated, no electrical contact at intersection points A and B would be present. Smith, ¶ 156; § VI.A.3.g ([Ground 1, [1.d.ii]).

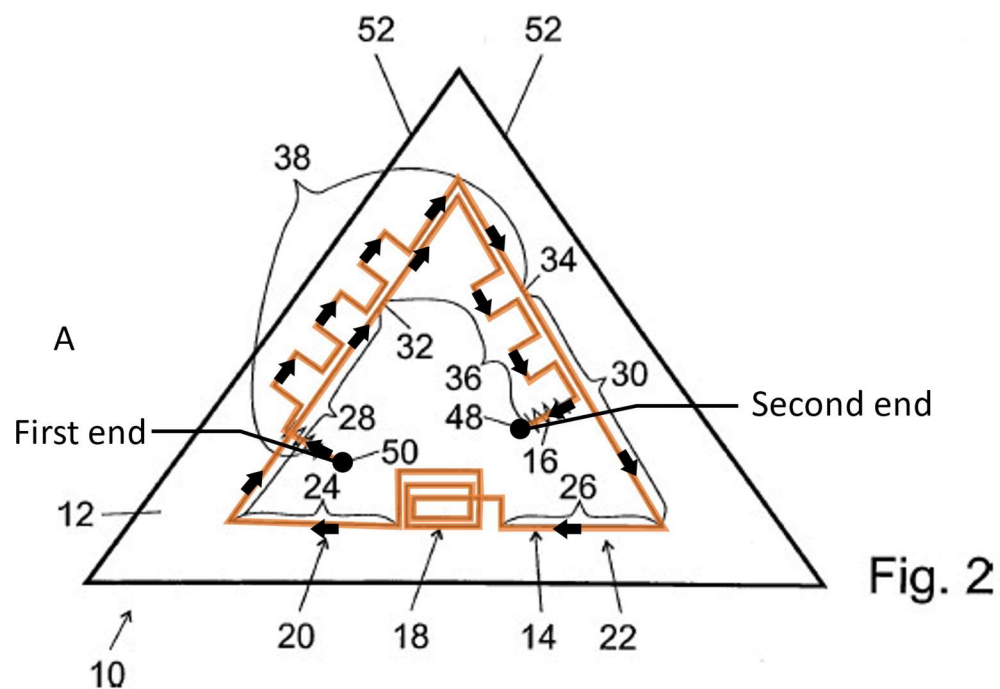
4. Claim 2

- a. **[2.a]: “wherein the UHF-SHF antenna (2) is made of an electroconductive textile thread, electrically insulated, by continuous embroidering, starting from one end to the other”**

Astra discloses or at least renders obvious [2.a] and *Astra* in view of *Stobbe* and *Elbaz* also renders obvious [2.a]. Smith, ¶ 157.

Astra discloses an antenna formed of an “insulated braid ... [of] electrically conductive textile threads ... fixed completely and continuously on the carrier 12 by

embroidery technology using embroidery yarn 16.” *Astra*, Fig. 2, [0025] (noting only a limited portion of the embroidery is shown for clarity). Accordingly, a POSITA would have recognized the antenna conductor 14 disclosed in *Astra* is formed by continuously embroidering the **electroconductive thread** from a first end to a second end of the antenna. Smith, ¶ 157. This arrangement is indicated below:

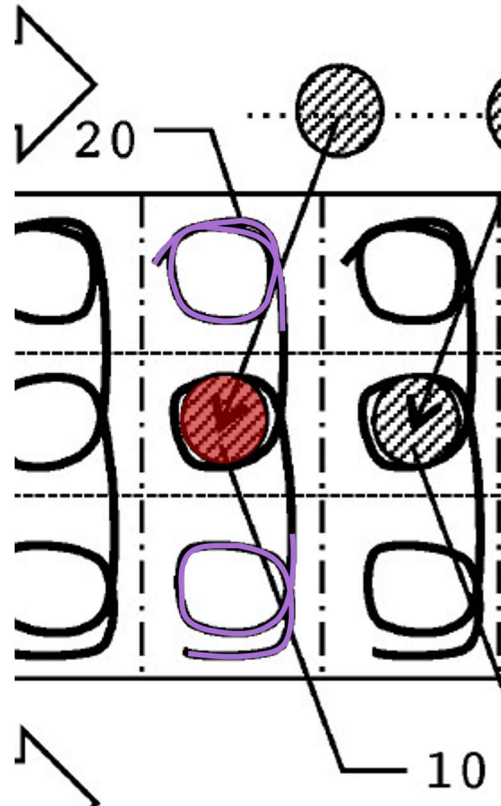


Astra, Fig. 2 (annotated). *Elbaz* likewise discloses [2.a]. *Elbaz*, 11:14-17 (describing a “step of ... embroidering ... or weaving said first antenna on said first support”).

b. [2.b]: “wherein the UHF-SHF antenna (2) ... has simple loops in each extremity”

Astra in view of *Stobbe* and *Elbaz* renders obvious [2.b]. Smith, ¶ 158.

Elbaz discloses a conductive antenna 20 formed by a plurality of loops 20L, including a central loop encircling the **RFID module**, as well as **additional loops in the extremities**:



Elbaz, Fig. 2b (annotated), 23:8-25:2. It would have been obvious to incorporate loops 20L of *Elbaz* into the extremities of *Astra*'s antenna to achieve the known benefits of a reduced antenna size and improved bandwidth. Smith, ¶ 158; § VI.C.2 (Ground 3, Motivation to Combine).

- c. **[2.c]: “wherein the UHF-SHF antenna (2) ... has ... in the central area a double loop (5) consisting of a first loop with a smaller diameter, followed by a second concentric loop with a larger diameter”**

Astra discloses or at least renders obvious [2.c]. Smith, ¶ 159.

As explained for Ground 1, [1.d.1], *Astra* discloses a “coupling coil (18) ... [with] a plurality of windings in a central zone of the antenna. *Astra*, [0025]; see § VI.A.3.f (Ground 1, [1.d.i]). As illustrated in Fig. 2, this coupling coil includes a **first loop** with a smaller diameter, followed by a **second concentric loop** with a larger diameter:

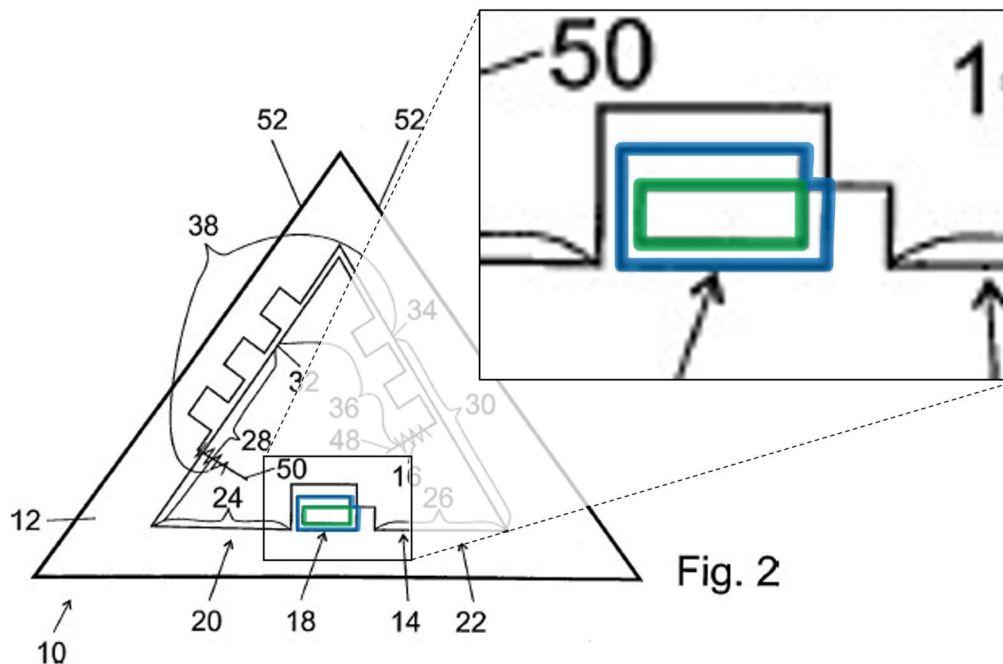


Fig. 2

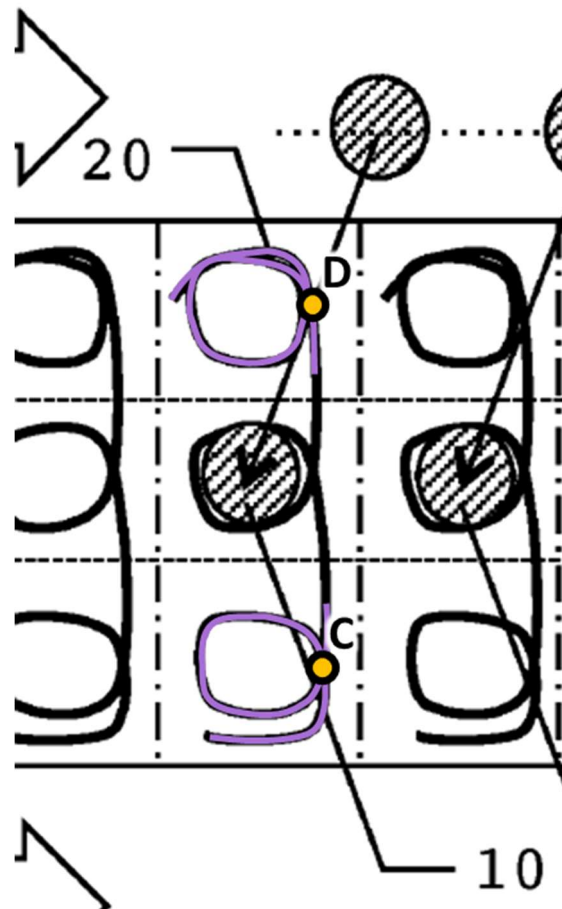
Id., Fig. 2 (annotated; partially enlarged for detail); Smith, ¶ 159.

5. Claim 3

- a. [3.a]: “wherein the UHF-SHF antenna (2) does not show electrical contacts in the crossing points (C and D) in the construction of simple loops located at the extremities”

Astra in view of *Stobbe* and *Elbaz* renders obvious [3.a]. Smith, ¶ 160-161.

As explained for [2.b], it would have been obvious to incorporate *Elbaz*'s ***simple loops located at the extremities*** into *Astra*'s antenna. § VI.C.4.b (Ground 3, [2.b]). Like the loop-shaped portion in *Astra* (see § VI.C.3.g (Ground 3, [1.d.ii])), the simple loops in *Elbaz* include ***crossing points (C and D) in the construction of the simple loops***, as shown below:



Elbaz, Fig. 2b (annotated), 23:8-25:2. *Astra* and *Stobbe* modified to include the simple loops of *Elbaz* would likewise include multiple intersection points C and D. Smith, ¶ 160.

Astra's antenna conductor 14 is formed using an electrically insulated thread. Smith, ¶ 161; § VI.C.3.b (Ground 3, [1.a]). A POSITA would have recognized that this insulation would prevent electrical contacts at intersection points of the simple loops. Smith, ¶ 161; § VI.A.3.g (Ground 3, [1.d.ii]).

6. Claim 6

a. [6.a]: “wherein the harsh environments include temperatures between 8-90° C”

Astra in view of *Stobbe* and *Elbaz* renders obvious [6.a]. Smith, ¶ 162. For example, *Elbaz* discloses its labels would have been used in industrial laundry environments and accordingly defines a minimum melting temperature of its thermoplastic protective coating of 180° C. *Elbaz*, 30:7-15. Accordingly, the antenna module of *Astra* in view of *Stobbe* and *Elbaz* would have included the coating layer of *Elbaz* which would have been suitable for use in temperatures between 8-90° C. Smith, ¶ 162. It would have been obvious to use *Elbaz*'s protective coatings to improve the ability of *Astra* and *Stobbe*'s tags to survive harsh laundry environments. *Id.*; § VI.C.2 (Ground 3, Motivation to Combine).

VII. The Board Should Institute Review

A. 35 U.S.C. § 325(d) Denial Is Improper

The factors in *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17-18 (P.T.A.B. Dec. 15, 2017), favor institution. None of the references used in this Petition were used as the basis for any rejection. Ex. 1002,

58-65; 85-92; 121-128. While *Pachoud* and *Elbaz* were cited by the Applicant in an Information Disclosure Statement (“IDS”), the Examiner merely initialed the references in bulk. *Id.*, 133-135. There is no evidence the Examiner ever considered the particular disclosures cited herein. See *Microsoft Corp. v. Parallel Networks Licensing LLC*, IPR2015-00486, Paper 10, 15-20 (P.T.A.B. July 15, 2015) (granting institution based on references listed in an IDS where “there [was] no evidence that the Examiner considered the particular disclosures cited”). And in any event, neither *Pachoud* nor *Elbaz* were considered in combination with the additional references cited in Grounds 1-3. Ex. 1002, 28-29, 66-67, 93, 129, 133-135.

B. *Fintiv* Denial is Improper

There is no basis for a discretionary denial under *Fintiv* and § 314(a) because the only co-pending proceeding between the parties involving the ’027 patent was only recently filed by Petitioner, has no trial date, and requests a declaratory judgment of noninfringement, not of invalidity. Ex. 1020, 5-7.

VIII. Mandatory Notices

A. Real Party-in-Interest

The real parties-in-interest are HID Global Corporation, HID Textile Services SARL, and HID Global Sdn. Bhd.

B. Related Matters

A declaratory judgment action involving the '027 patent, is pending in the District of Delaware, stylized as *HID Global Corporation v Datamars, Inc. et al.*, No. 1:23-cv-00844-CFC (D. Del. Filed August 4, 2023). Ex. 1020.

C. Lead and Back-Up Counsel, and Service Information

Lead Counsel	Back-up Counsel
Lionel M. Lavenue (Reg. No. 46,859) lionel.lavenue@finnegan.com Finnegan, Henderson, Farabow, Garrett & Dunner, LLP 1875 Explorer Street, Suite 800 Reston, VA 20190-6023 Tel: 571-203-2700 Fax: 202-408-4400	Kara A. Specht (Reg. No. 69,560) kara.Specht@finnegan.com Finnegan, Henderson, Farabow, Garrett & Dunner, LLP 271 17th Street, NW Suite 1400 Atlanta, GA 30363-6209 Tel: 571-203-2700 Fax: 404-653-6444 Luke H. MacDonald (Reg. No. 79,064) luke.macdonald@finnegan.com Finnegan, Henderson, Farabow, Garrett & Dunner, LLP 1875 Explorer St, Suite 800 Reston, VA 20190-6023 Tel: 571-203-2700 Fax: 202-408-4400 Christopher B. Anderson (Reg. No. 77,898) christopher.anderson@finnegan.com Finnegan, Henderson, Farabow, Garrett & Dunner, LLP 1875 Explorer St, Suite 800 Reston, VA 20190-6023 Tel: 571-203-2700 Fax: 202-408-4400

Petitioner consents to electronic service at the following email address:

HID-Datamars-IPR@finnegan.com.

IX. Grounds for Standing

Petitioner certifies the '027 patent is available for *inter partes* review and that Petitioner is not barred or estopped from requesting *inter partes* review of the '027 patent challenging the patent claims on the grounds identified in this petition.

X. Conclusion

Petitioner requests institution of *inter partes* review and cancellation of the challenged claims because they are unpatentable under the foregoing grounds.

Respectfully submitted,

Dated: September 29, 2023

By: /Lionel M. Lavenue/
Lionel M. Lavenue, Reg. No. 46,859
Lead Counsel

CLAIM APPENDIX

- [1.pre] 1. An RFID tag (1) for use in harsh environments comprising:
- [1.a] an UHF-SHF antenna (2) made from a continuous
electroconductive textile thread, electrically insulated,
embroidered on textile substrate,
- [1.b] an RFID transponder (3), and
- [1.c.i] a substrate of textile material (4) on which the RFID
transponder (3) and the UHF-SHF antenna (2) are placed,
- [1.c.ii] the whole assembly being sealed by hot-dipping of a
second textile substrate,
- [1.d.i] wherein the UHF-SHF antenna (2) has a central zone formed by
a double loop (5) by which it inductively couples with
the encapsulated RFID transponder (3),
- [1.d.ii] wherein the double loop (5) does not have electrical
contacts at intersection points (A and B).
- [2.a] 2. The RFID tag (1) of claim 1, wherein the UHF-SHF antenna (2)
is made of an electroconductive textile thread, electrically insulated,
by continuous embroidering, starting from one end to the other, and
- [2.b] has simple loops in each extremity, and

- [2.c] in the central area a double loop (5) consisting of a first loop with a smaller diameter, followed by a second concentric loop with a larger diameter.
- [3.a] 3. The RFID tag (1) of claim 1, wherein the UHF-SHF antenna (2) does not show electrical contacts in the crossing points (C and D) in the construction of simple loops located at the extremities.
4. The RFID tag (1) of claim 1, wherein the UHF-SHF antenna (2) is made by continuous embroidering of the electroconductive textile thread in the form of two open loops disposed in a upper plane in relation to a longitudinal direction and two open loops disposed in a lower plane in relation to the same longitudinal direction.
5. The RFID tag (1) of claim 4, wherein, in the central area, an upper plane loop (P) has a smaller diameter than a loop (Q) from the lower plane, the transponder (3) being fixed and centered on the loop (P) in the upper plane, and the loop (Q) from the lower plane will overlap the loop (P) from the upper plane by bending over said longitudinal direction, so that the double loop (5) is created having the transponder (2) inside it.

- [6.a]** 6. The RFD tag (1) of claim 1, wherein the harsh environments include temperatures between 8-90° C.

37 C.F.R. § 42.24(D) CERTIFICATION

Pursuant to 37 C.F.R. § 42.24(a)(1)(i), Petitioner certifies that this petition complies with the requirements of 37 C.F.R. § 42.24. Excluding parts of this Petition exempted under § 42.24(a), this Petition contains 12,189 words, as measured by the word-processing system used to prepare this paper.

Dated: September 29, 2023

/Lionel M. Lavenue/

Lionel M. Lavenue, Reg. No. 46,859
Lead Counsel

CERTIFICATE OF SERVICE

The undersigned certifies that the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 11,128,027, the associated Power of Attorney, and Exhibits 1001-1028, were served on September 29, 2023, by FedEx Priority Overnight® at the following address of record for the subject patent.

Roy Gross
The Roy Gross Law Firm, LLC
101 Merritt 7
Suite 300
Norwalk, CT 06851

Dated: September 29, 2023

/Lisa C. Hines/

Lisa C. Hines
Senior Litigation Legal Assistant
Finnegan, Henderson, Farabow,
Garrett & Dunner, LLP