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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SMAXTEC INC. and
SMAXTEC ANIMAL CARE GMBH,
Petitioners

v.

ST REPRODUCTIVE TECHNOLOGIES, LLC,
Patent Owner

Case IPR2024-01067
Patent No. 10,231,644

**ST REPRODUCTIVE TECHNOLOGIES, LLC'S
PATENT OWNER RESPONSE**

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<i>Yita LLC v. MacNeil IP LLC</i> , 69 F.4th 1356 (Fed. Cir. 2023), <i>cert. denied</i> , 144 S. Ct. 499 (2023)	13

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EXHIBIT LIST

Exhibit	Description
EX2001	Declaration of Dr. Edwin Kan
EX2002	<i>Curriculum Vitae</i> of Dr. Edwin Kan
EX2003	U.S. Patent Publication No. 2010/0302039 (“Goto”)
EX2004	Disclaimer of Claim 13 of U.S. Patent No. 10,231,644
EX2005	Declaration of Thomas W. Landers, IV in Support of Patent Owner’s Notice of Intent to Designate a Provisionally Recognized PTAB Attorney as Backup Counsel Under 37 C.F.R. § 42.10(c)(2)
EX2006	Declaration of Dr. Edwin Kan in Support of Patent Owner Response
EX2007	Deposition Transcript of Professor Darrin J. Young (April 1, 2025)

I. INTRODUCTION

The '644 Patent is directed to methods of monitoring a ruminant animal using an innovative “bolus” device implanted in the reticulum for measuring and transmitting the animal’s physiological parameters over the course of its lifetime. At the time of the invention, no similar devices existed, particularly devices with the claimed capabilities that were small enough to be administered at birth and that had the battery power to operate over the animal’s entire lifespan. To address these problems, the '644 Patent discloses and claims novel boluses with sensing and transmitting capabilities, including additional innovative features for saving power and reducing the size of the bolus, such as transmitting data at “pre-determined intervals” and using an improved antenna with “a pair of electrically conductive loops.” The claims further address the unique challenges of transmitting data from within an animal’s reticulum by including “matching elements” in the bolus that adjust the electrical properties of the device so that the signal can pass through the animal’s body at the proper frequency.

Petitioners fail to show that any of the challenged claims are unpatentable in view of the primary references, Harvey and Risky, either alone or in combination with secondary references. Harvey, for example, does not disclose a “bolus” containing “sensor” and “radio signal generator” features, as recited in every challenged claim. Petitioners fail to acknowledge this deficiency in Harvey, and

instead point to a combination of different devices discussed in the reference.

Because Petitioners make no showing that that a person of ordinary skill in the art (“POSA”) would or could have connected or combined the distinct embodiments together to arrive at the claimed invention, however, they cannot establish that Harvey anticipates, as they allege. For this and the additional reasons below, all grounds based on Harvey should be rejected.

Petitioners’ Risky-based grounds—which only challenge claims 5 and 6—fare no better. For example, the challenged claims require generating a signal to carry “encoded physiological data” at “pre-determined intervals,” but Petitioners rely on embodiments in Risky that either transmit data at varying undetermined intervals or fail to carry physiological data altogether. Moreover, for several limitations, Petitioners elected to rely on inherency to fill admitted gaps in their anticipation theory, rather than identify additional prior art and the requisite support for an obviousness ground. In each instance, however, Patent Owner’s expert—Dr. Edwin Kan, a Cornell electrical and computer engineering professor with expertise in radiofrequency devices—provides well-supported testimony that the limitation is not “necessarily present,” as is required to support anticipation by inherency. Under a proper invalidity analysis, therefore, Risky fails to expressly or inherently disclose each limitation and does not anticipate any of the claims.

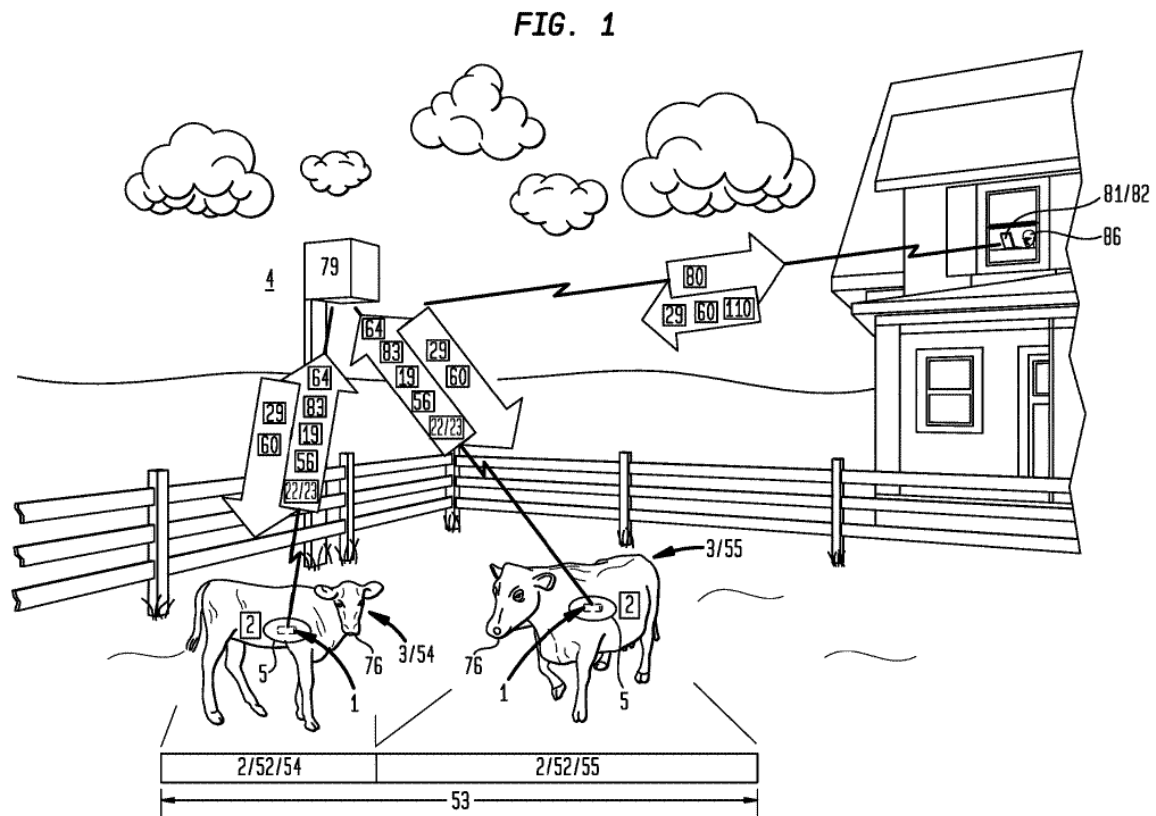
For these and the additional reasons below, Petitioners fail to show that any challenged claim is anticipated or obvious, and the Board should issue a Final Written Decision upholding the patentability of the claims.

II. BACKGROUND

A. The '644 Patent

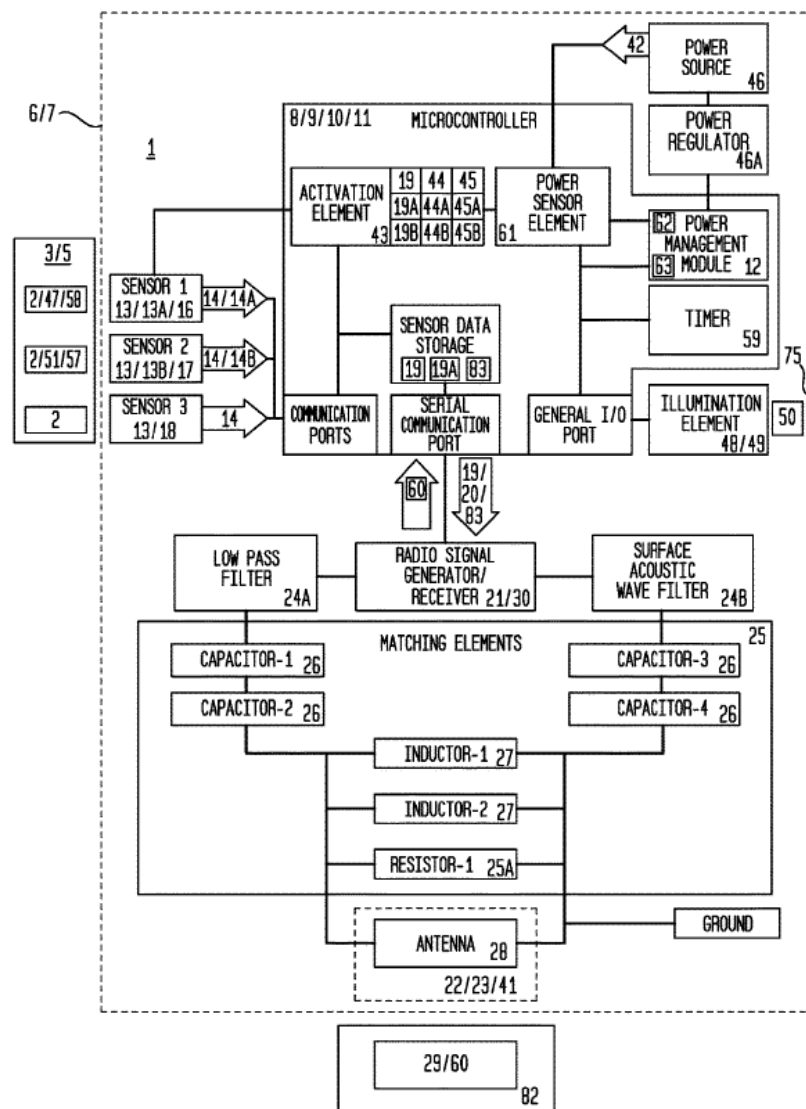
The '644 Patent is directed to methods of monitoring a ruminant animal using a bolus installed in the animal's reticulum. EX1001, Abstract, 1:5-7, claim 5; EX2006, ¶¶30-31, 34. Conventional boluses did not have “a configuration capable of oral administration at birth” or “an operational lifespan long enough to monitor useful physiological parameters over the remaining productive lifespan of the ruminant animal.” EX1001, 1:18-25. To address such problems, the inventors developed a bolus with power-saving features. EX1001, 1:41-45, 1:59-66, 7:66-8:12; EX2006, ¶¶32-33, 35, 38, 44-45.

Figure 1 of the patent depicts an example of the claimed methods, including a bolus (1) in the reticulum of an animal that communicates with an animal management system:



EX1001, Fig. 1, 2:23-26, 2:64-3:16, 7:66-8:3, Abstract.

Figure 2 depicts a block diagram of an embodiment of the bolus (1), which contains sensors (13), a microcontroller (8), and a radio signal generator (21), as shown below:



EX1001, Fig. 2, 2:27-29. The sensors generate signals that vary based on changes in the animal's physiological parameters, such as temperature, and the disclosed microcontroller transforms the sensed parameters into encoded physiological data. EX1001, Abstract, 3:8-16, 3:58-4:6, 4:24-33, 10:44-11:27. The encoded data is stored in memory and then transmitted. EX1001, 15:7-10, claims 5, 9; EX2006, ¶34.

The bolus also contains a power management module that “functions to regulate energy use by the bolus (1) to extend the operational life of the bolus.” EX1001, 7:56-65. “Because the majority of energy (42) used by the bolus (1) is in operation of the radio signal generator,” this module can configure the radio signal generator to transmit data at set pre-determined intervals, *e.g.*, every 24 hours. EX1001, 9:63-10:3, 10:31-43, 11:16-27, claim 5; EX2006, ¶¶33-34.

The patent further describes additional features that enhance the performance of the bolus. For example, the bolus may include an antenna with two electrically conductive loops connected to the radio signal generator to transmit the radio signals. EX1001, 6:62-7:20; claims 9-10. This can address “uncontrollable changes in the orientation of the bolus and...antenna in the reticulorumen of the ruminant animal.” EX1001, 1:25-31; *see id.* at 2:10-16, 7:32-33, Figs. 4-13; EX2006, ¶¶36-37. The bolus may further include specific “matching elements” that compensate for a shift in the antenna’s “center frequency” caused by the effects of the “mass of the ruminant animal.” EX1001, 5:4-6:40; Fig. 2; claim 7; EX2006, ¶¶39-43.

B. Challenged Claims

Petitioners challenge claims 5-7, 9, 10, and 13, among which claims 5, 9, and 13 are independent. App’x A. Claim 13 has been disclaimed by Patent Owner. EX2004.

C. The Asserted Art

1. Risky

Risky (EX1005) is a U.S. patent publication that was presented to the Patent Office during prosecution of the '644 Patent and considered by the Examiner. *See* Pet., 13. Risky generally relates to systems and methods for monitoring a health condition of an animal. EX1005, Abstract, [0001], Figs. 1, 2. Risky describes transmitting messages using a processor that sets a “transmission frequency” that depends on specific triggering “events,” such as “changing animal health conditions” or a change in the animal’s “location,” or in reply to a “ping.” EX1005, [0043], [0048]-[0049]; [0052]. Risky explains that it is configured in this manner—*i.e.*, to change the frequency of transmission based on events instead of at specified pre-determined intervals—so that changes in the animal’s health or location may be recognized sooner. EX1005, [0048], [0142]; EX2006, ¶¶55-59.

2. Harvey

By Petitioners’ own characterization, Harvey (EX1004) is substantially the same as the Risky reference already considered by the Patent Office, although it is even further afield from the claimed invention. *See, e.g.*, Pet., 41. Harvey is generally directed to a “subject management system” using various implementations of an “intelligent active tag” (“IAT”) that is “attached to a monitored subject.” EX1004, Abstract, 1:1-2, 2:16-26, Figs. 1-3B; EX2006, ¶¶60-

62. Figure 1 illustrates the subject management system, depicting an IAT (*e.g.*, 1110) attached to the ear of an animal (*e.g.*, 1010), as shown below:

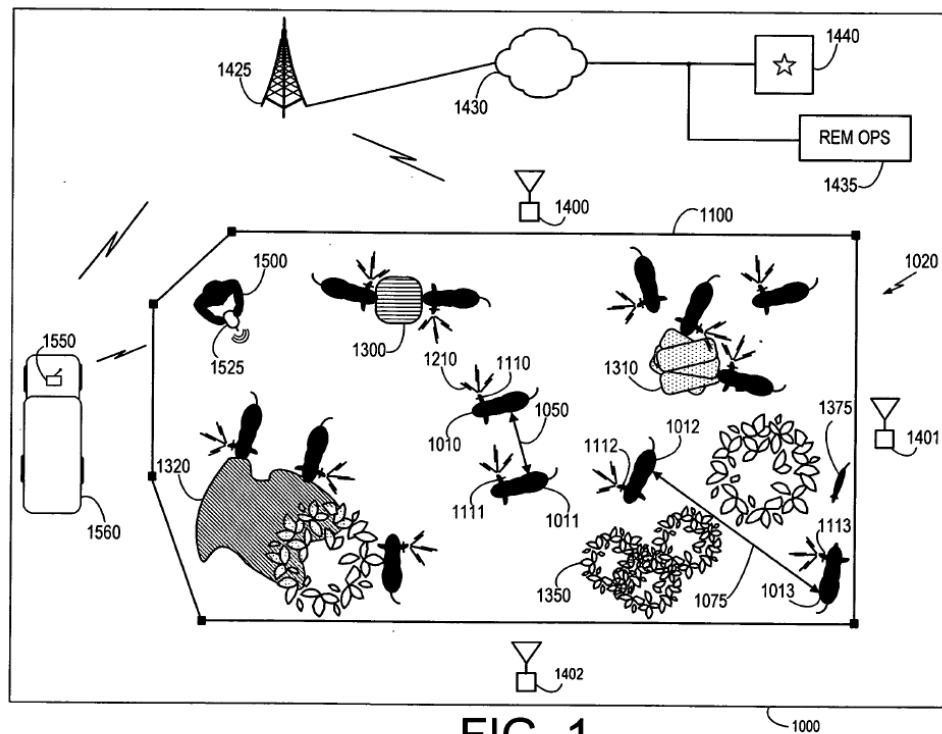


FIG. 1

EX1004, Fig. 1, 6:11-12; *see, e.g., id.*, 8:5-7, 11:8-10, Fig. 3A; EX2006, ¶62.

One of Harvey’s ear tag embodiments is a so-called “intelligent transponder” named “XPDR 5000,” which Petitioners rely on for various claim elements. *See* Pet., 18-27; EX1004, 22:29-30. Figure 5 is reproduced below and depicts a block diagram of that embodiment:

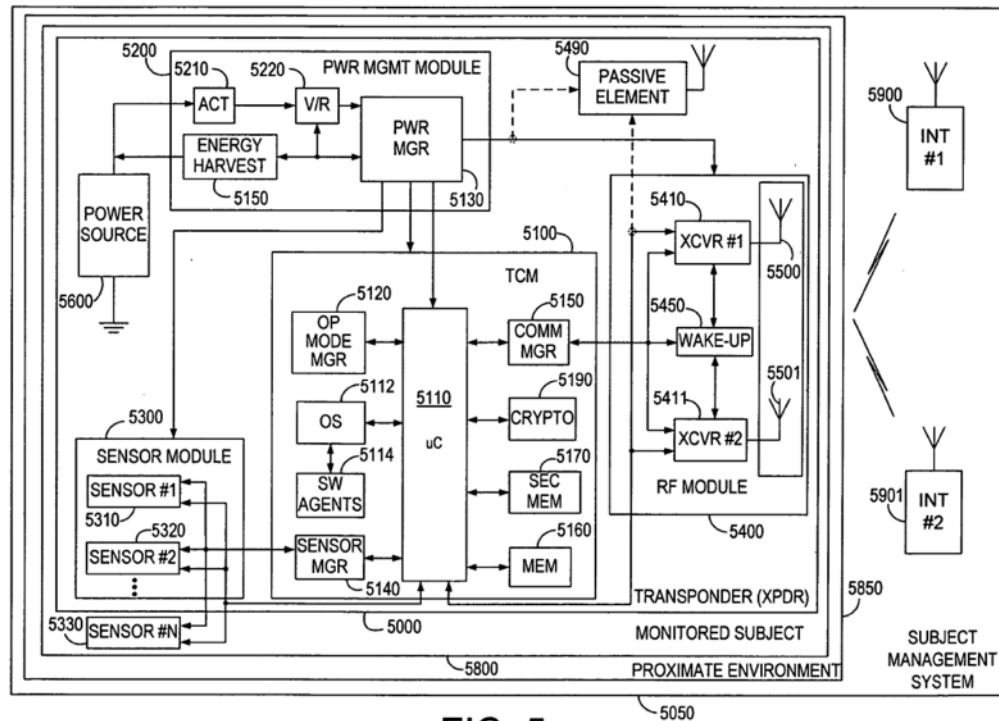


FIG. 5

EX1004, Fig. 5, 6:25-26, 22:29-30; EX2006, ¶¶63.

Petitioners further rely on Harvey’s separate embodiment of an “IAT” that purportedly “may be restrained or moveable within monitored subject 1010, for example, as a digestive tract bolus device.” EX1004, 11:10-14. However, Harvey does not describe the “bolus” in any detail or suggest that it could or would be used in connection with other disclosures in Harvey, including XPDR 5000. EX2006, ¶¶64-69.

3. *Rettedal*

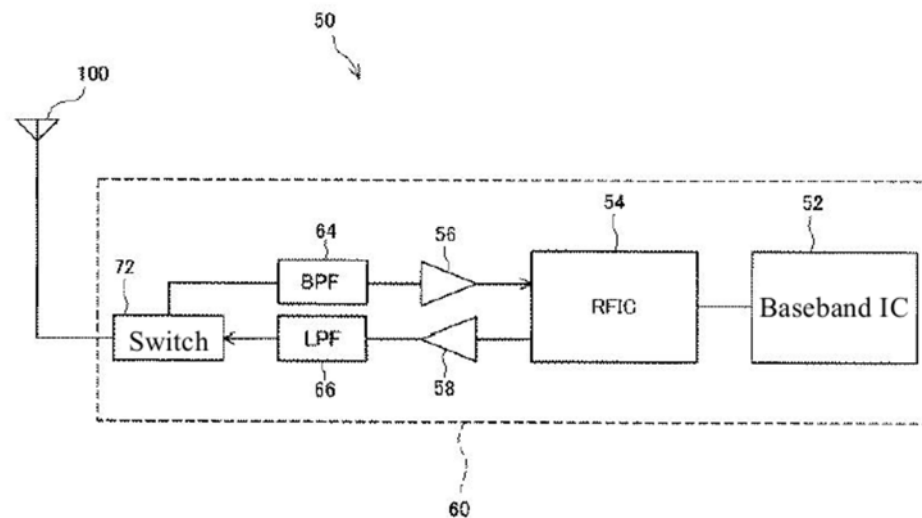
Rettedal (EX1006) is a U.S. patent publication that was presented to the Patent Office during prosecution of the ’644 Patent and considered by the

Examiner. *See* Pet., 14. Petitioners contend that Harvey in combination with Rettedal renders obvious claim 7 (Ground 4). Petitioners rely on Rettedal for only the “matching elements” limitation in claim 7. Pet., 48-49. Otherwise, Petitioners rely solely on Harvey for the elements of claims 5-6, from which claim 7 depends, and they do not contend that Rettedal addresses Harvey’s deficiencies, presumably because Rettedal likewise fails to disclose or describe the elements of claim 5 missing from Harvey. EX2006, ¶¶70-72. As explained in Section V.D below, Rettedal’s alleged “match element” is distinguishable from the claimed invention, and a POSA would not have had a reason to incorporate it into a method arranged as claimed or a reasonable expectation of success in doing so.

4. Kunda

Kunda (EX1007) is a Japanese patent application publication that describes fitting a loop antenna to two integrated circuits, where impedance matching in the signal chain is critical to avoid antenna reflection and severe self-jamming to the RFIC. *See* EX1007, [0024], Fig. 1 (baseband IC 52 and RFIC 54).

Figure 1



EX1007, Fig. 1. Kunda's disclosure is directed to general communication circuits having a transmitter and receiver, such as for use in mobile phones. *See id.*; EX1007, [0001]-[0002], [0024]. It does not disclose or otherwise suggest that its teachings are useful in the context of a bolus or animal monitoring. EX2006, ¶¶73-75. As explained in V.E below, a POSA would not have had a reason to combine Kunda's antenna with Harvey to arrive at the claims and would not have a reasonable expectation of success in doing so.

III. PERSON OF ORDINARY SKILL IN THE ART

For the purposes of institution, the Board determined that a POSA of the '644 Patent would have had a bachelor's degree in electrical engineering or a related or equivalent field, and three years of experience researching, developing, designing, and/or evaluating sensor systems for humans or other animals. Paper 7, 11-12. Based on the specific arguments and art raised in the Petition, Patent

Owner does not contest the Board's determination as to the level of skill in the art for purposes of this proceeding. EX2006, ¶¶19-20.

IV. CLAIM CONSTRUCTION

In IPR proceedings, claim terms are given their “ordinary and customary” meanings from the perspective of a POSA and in view of the intrinsic record. *See* 37 C.F.R. § 42.100(b). Petitioners have not asked for any special constructions for any claim terms. Nor have they argued that the patentees have defined any terms. For these proceedings, Patent Owner does not believe that any claim term or phrase requires a construction.

V. PETITIONERS FAIL TO ESTABLISH THAT ANY CHALLENGED CLAIM IS UNPATENTABLE

A. Ground 1: Harvey Does Not Anticipate Claims 5 or 6

Harvey fails to expressly disclose all elements of claim 5 or 6 as arranged in the claims, and Petitioners' efforts to overcome this fundamental shortcoming are insufficient to establish anticipation. EX2006, ¶¶93-144. First, Petitioners rely on disconnected teachings in Harvey relating to distinct embodiments, but mixing and matching disparate teachings within a single reference without more cannot meet the standard for anticipation. *See Net MoneyIn, Inc. v. Verisign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). Second, Petitioners repeatedly gloss over missing claim limitations by asserting they are inherent to the methods and systems in Harvey. But in each case, as supported by Dr. Kan and testimony from Petitioners'

expert, the undisclosed elements are not “necessarily present” in Harvey as required for inherency, and Petitioners make no effort to show how or why a POSA would have believed otherwise.

1. *Harvey Fails to Disclose “Sensors Contained in a Bolus” and “a Radio Signal Generator Located Within Said Bolus”*

The Board correctly determined at the institution stage that Petitioners fail to establish that Harvey discloses a “bolus” arranged as claimed and the Board should maintain that position in the Final Written Decision. The claimed bolus must contain both a “sensor” (element 5[A]) and a “radio signal generator” (element 5[E]). As discussed below, Petitioners point to a particular “intelligent active tag” or “IAT” in Harvey to satisfy the “bolus” limitation, but rely on a separate “intelligent transponder” embodiment identified as “XPDR 5000” for the sensor and radio signal functionality. The Petition never connects the disparate teachings of a “bolus” and “XPDR 5000” and fails to provide any evidence that a POSA would interpret Harvey to teach a single method or system that includes both features. Because Petitioners are strictly limited to the arguments made in the Petition, their anticipation ground based on Harvey must be rejected. *See Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369-70 (Fed. Cir. 2016) (acknowledging “strict” requirement that petitioners must “make their case in their petition” and affirming Board’s refusal to consider new reply argument); *Yita LLC v. MacNeil IP LLC*, 69 F.4th 1356, 1367 (Fed. Cir. 2023), *cert.*

denied, 144 S. Ct. 499 (2023) (affirming portion of PTAB decision declining to consider new argument because petitioner “could have presented its reply argument in its petition but chose not to”) (brackets and quotes omitted).

For the “bolus” limitation in every challenged claim, Petitioners rely on a conclusory statement in Harvey’s discussion of a particular “IAT” embodiment. Specifically, Harvey states that, in one implementation, “IAT...may be...a digestive tract bolus device” and in “ruminant monitored subjects such as cattle, a digestive tract bolus tag may be retained indefinitely within the animal.” EX1004, 11:10-14; Pet. 17. Harvey never discloses or otherwise suggests that this particular “IAT” incorporates a “sensor” or “radio signal generator” as claimed. EX2006, ¶¶94-98.

For the claimed “sensor” and “radio signal generator,” Petitioners rely on a separate “XPDR 5000” embodiment depicted in Figure 5 of Harvey. EX1004, 22:29-30 (“FIG. 5 illustrates an example embodiment of intelligent transponder (XPDR) 5000...”). First, Petitioners cite to alleged “sensors” that Harvey describes as optional components of XPDR 5000. Pet., 17-19. For example, Petitioners point to a “thermal sensor” that allegedly “provide[s] a sensed thermal parametric signal [or] a sensed thermal gradient parametric signal.” *Id.* (quoting EX1004, 40:25-37) (first bracket added). But Harvey expressly describes that sensor as “SENSOR #1 5310” that can be incorporated into “XPDR 5000.”

EX1004, 40:28-33; *see also, e.g., id.*, 37:1 (“XPDR 5000 also can employ SDM 5300 to perform a predetermined sensing operation...”), 41:1-6 (identifying “examples of sensors, which may be used with XPDR 5000”). Second, for the alleged “radio signal generator,” Petitioners rely on “RF module 5400 which includes RF transceivers 5410 and 5411, depicted in Fig. 5.” Pet. 23-24. But these components are also expressly described and depicted as part of XPDR 5000. EX1004, 29:17-18 (“XPDR 5000 can include...RF module (RFM) 5400.”); Fig. 5.

Petitioners make no effort to connect the distinct XPDR 5000 embodiment to the alleged “bolus” embodiment in Harvey, or explain why they would be combined. Instead, Petitioners make conclusory assertions that “Harvey’s bolus includes a transponder containing multiple sensors” and that the “transponder within Harvey’s cattle bolus includes RF module 5400,” without citing any evidence from Harvey or their expert to connect the alleged “sensors” and “RF module” to a “bolus.” *See* Pet. 17-19, 23-25. Thus, as the Board recognized, the Petition fails to establish that Harvey “clearly and unequivocally disclos[es] the claimed bolus without need for combining various disclosures not directly related to each other by the teachings of the cited reference,” as required for anticipation. *Id.*, 23 (citing *Net MoneyIN*, 545 F.3d at 1371; *In re Arkley*, 455 F.2d 586, 587 (CCPA 1972)); *id.*, 26 (“Petitioner does not expressly connect Harvey’s digestive tract bolus device to XPRD 5000, at least to meet the anticipation standard.”).

Petitioners could not have connected Harvey's "bolus" to the alleged "sensors" or "radio signal generator" even if they had tried because Harvey fails to provide any reason for connecting its single bolus embodiment to any other embodiment. After the single, conclusory mention of a "bolus" that "may be...a digestive tract bolus," Harvey never again mentions or describes a bolus in connection with any embodiment or component, and instead focuses solely on an implementation of "ear tags" attached to the ear of cattle, which have different design requirements than a bolus. See EX1004, 11:4-14, 22:29-30, Fig. 1; EX2006, ¶¶97 ("For example, an internal bolus and external ear tag require very different antennae, batteries, and communication protocols."), 99-102. Harvey's very general reference to a bolus with "no guidance" on how to implement the configuration cannot establish anticipation. See *Minnesota Mining & Manufacturing Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 1572 (Fed. Cir. 1992) (affirming no anticipation where reference provided "no guidance as to how to construct" the claimed device).

With respect to the XPDR 5000 embodiment that Petitioners rely on, Harvey consistently describes it as an external ear tag device, and thus a POSA would interpret that embodiment as limited to an ear tag. Harvey introduces the XPDR 5000 embodiment as "a constituent element of multi-modal intelligent active tag 2000" that can be "coupled to monitored subject 5800, for example, by intimate

affixment, as described relative to FIG. 3.” EX1004, 22:30-33; *id.*, 40:28-30 (“XPDR 5000 may be proximately affixed to monitored subject 5800, having sufficient contact with the body...”). Figures 3A-B of Harvey illustrate “tag 2000” as an “intimate affixment to a surface of cattle ear 3000.” EX1004, 19:13-14. Harvey clarifies that the XPDR 5000 is not used in a bolus configuration by expressing the benefits of affixing the tag *externally* to an ear, as shown in Fig. 3A:

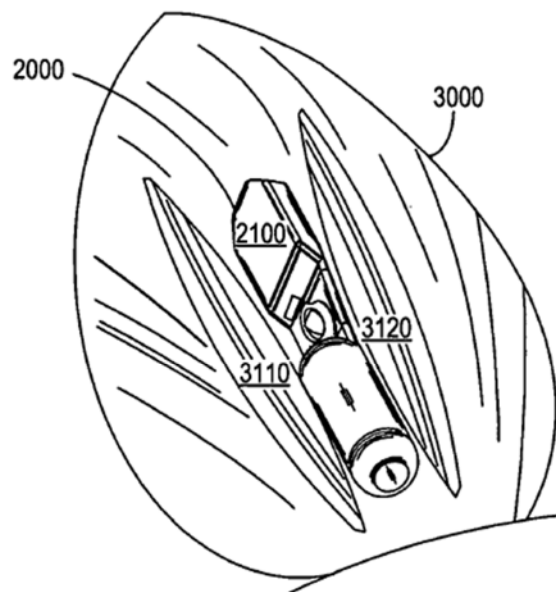


FIG. 3A

EX1004, Fig. 3A, 8:19-20, 19:16-17; EX2006, ¶103. For example, Harvey explains that the tag placement should be in “a region affording visibility of the tag while avoiding permanent physical injury to the subject.” EX1004, 19:19-21. An internal bolus, of course, would not “afford visibility” because it is located within the reticulum of the animal. See EX1001, Abstract, 1:5-7; EX2006, ¶103.

The remaining figures and descriptions in Harvey likewise illustrate that XPDR 5000 is an external tag, as opposed to a bolus. Figure 1, for example, depicts all tags as affixed to the ears of cattle (*e.g.*, 1010-1113), and Figure 2 illustrates three possible “form factors” of tag 2000, each including an “affixment fitting” so the tag “may be affixed to the ear.” EX1004, 17:31-33, 18:3-17, Figs. 2A-2C (affixment fitting 2120, 2220, 2320).

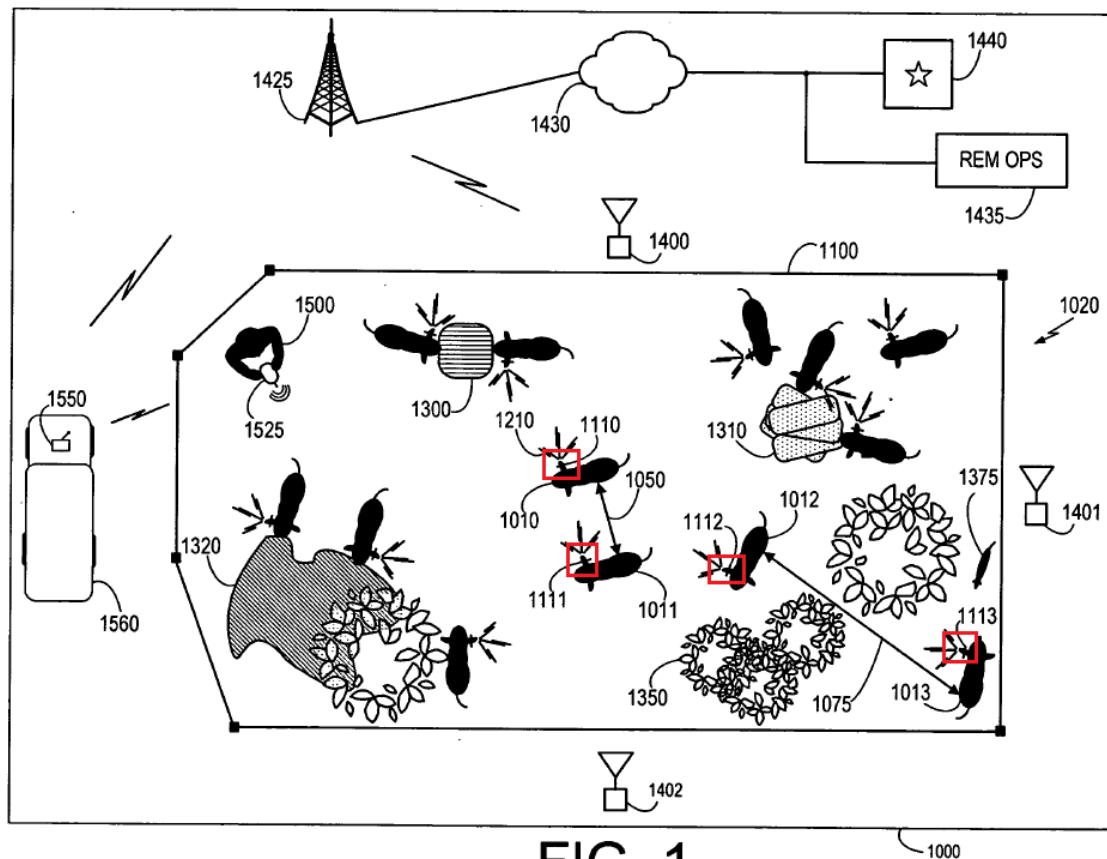
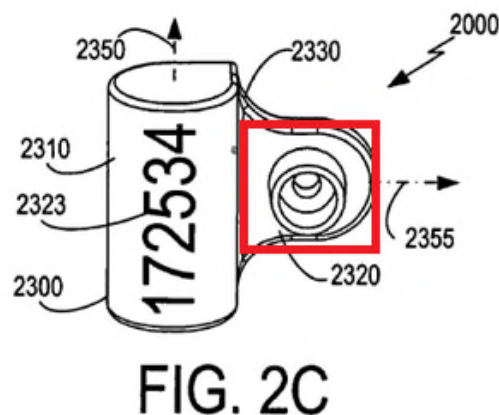
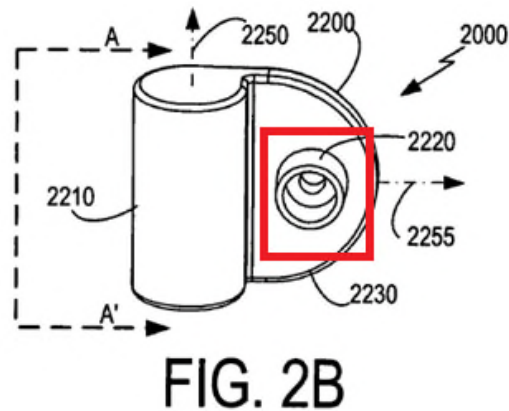
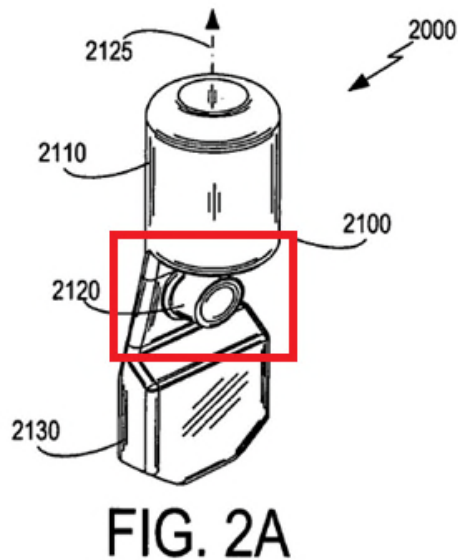


FIG. 1

EX1004, Fig. 1 (annotated).



EX1004, Figs. 2A-2C (annotated), 17:29-30; EX2006, ¶¶104-05.

That XPDR 5000 is never described or depicted as a bolus is not surprising because a POSA would not understand it to be capable of use in a bolus. For example, Harvey explains that XPDR 5000 can include “a biopotential sensor... including one or more of EEG (electroencephalogram), ECG (electrocardiogram), and EMG (electromyogram) waves.” EX1004, 41:1-6; EX2006, ¶106. As Dr. Kan testifies, a POSA would understand that these sensors measure physiological

parameters from the **exterior** of an animal because they all require direct contact with designated skin electrodes to extract “differential voltage potentials.”

EX2006, ¶¶84, 106. This is not possible or practical in a bolus residing inside the animal’s reticulum. EX2006, ¶106. Additionally, Harvey discloses that XPDR 5000 may sense a “vocalized” or “ambient sound,” indicating that the sensors in this transponder are being used in a device attached outside of the animal’s body. EX1004, 40:19-20; EX2006, ¶107. A POSA would therefore understand that Harvey’s sensors are contained in a device affixed to the exterior of an animal, such as an ear tag, and not an internal device such as a bolus. EX2006, ¶107.

In sum, Harvey cannot anticipate claims 5 or 6 because Petitioners fail to connect Harvey’s alleged bolus embodiment to the XPDR 5000 embodiment that allegedly contains sensors and a radio signal generator. Nor can they. A POSA would have understood that Harvey is describing two distinct embodiments and that XPDR 5000 is limited to an external ear tag that is not suitable for an internal bolus. EX2006, ¶108.

2. Harvey Fails to Disclose “Encoding” a “Sensor Signal” as “Encoded Physiological Data”

Petitioners fail to show that Harvey discloses “encoding said sensor signal from said one or more sensors as encoded physiological data corresponding to said one or more physiological parameters of said ruminant animal,” as required by element 5[C]. Because Harvey provides no express disclosure of encoding sensors

signals into encoded physiological data, Petitioners rely entirely on inherency to demonstrate this element and chose not to address this limitation in their obviousness grounds. See §§V.C-E below. Inherency requires Petitioners to establish that such encoding is “necessarily present” in Harvey, which they fail to do. *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) (“To establish inherency, the extrinsic evidence ‘must make clear that the missing descriptive matter is necessarily present in the thing described in the reference....’ The mere fact that a certain thing may result from a given set of circumstances is not sufficient.”).

In the Institution Decision, the Board correctly recognized that Harvey does not expressly disclose encoding digital data, acknowledging that, at best, “there is a reasonable likelihood that Harvey necessarily requires the analog signals to be encoded into digital form to be stored in memory and to be wirelessly transmitted using a digital protocol.” Paper 7, 25. However, as both experts recognize, analog signals are *not* necessarily encoded into “digital form” because analog data could be stored and transmitted in analog form—such as by using analog EEPROM storage and a nondigital wireless protocol—and Harvey does not rule out those possibilities. EX2006, ¶¶85-92, 110-11, 114-17; EX2007, 180:20-181:2 (Petitioners’ expert testifying that “there are analog-based modulation form[s] to transmit analog information. That’s in the textbook.”), 191:8-193:15 (recognizing “magnetic storage” that can store “magnetic signals,” which “can be in analog

form”), 198:6-203:17 (recognizing “capacitive storage” that can store “charge,” which “can be in the analog form”), 214:6-17 (testifying that “EEPROM can be configured to store the charge”), 214:19-217:7-17 (recognizing “floating gate MOSFET EEPROM” that stores analog charge), 276:10-15 (agreeing that “nondigital wireless communication protocols exist”). Petitioners therefore cannot satisfy the high burden of establishing inherency because encoding analog data into digital form for storage or transmission is not necessarily present in Harvey.

Petitioners further argue that the alleged inherent encoding “would occur in an analog-to-digital converter (‘ADC’) within the sensor module 5300, the sensor manager 5140, or one or more of the sensors themselves,” but an ADC is not expressly disclosed or necessarily present in Harvey. Pet., 21; *see also* Paper 7, 25 (Board recognizing at Institution stage that “Harvey does not expressly disclose an ADC”). Indeed, the terms “analog” signals, “digital” signals, “analog-to-digital converter,” or “ADC” are never mentioned in Harvey, and Harvey never otherwise suggests using an ADC. EX2006, ¶¶113, 118, 121, 125-26. As Dr. Kan explains, this lack of disclosure makes sense because digitization of data is not inherent to Harvey’s systems, and thus there is no need for an ADC to convert analog information to a digital form. EX2006, ¶¶122-26.

3. *Harvey Fails to Disclose “Storing Said Encoded Physiological Data”*

Even if the Board were to determine that Harvey inherently discloses element 5[C] because physiological data is digitally “transmitted” in Harvey, it nonetheless fails to teach “*storing* said encoded physiological data” as required by element 5[D]. For that element, Petitioners rely on “memory 5160 and secure memory (SECMEM) 5170” illustrated in Figure 5. *See* Pet., 22-23. However, Petitioners fail to establish that these components store “encoded” physiological data, and Harvey does not rule out the possibility of storing sensor data in a non-encoded form, such as analog. EX2006, ¶¶114-17, 119-22; *see* §V.A.3.

Moreover, even if the alleged transmitted physiological data in Harvey were necessarily “encoded”—which Petitioners fail to establish (*see* §V.B.2))—Harvey never states that such data was encoded when it was stored. Nor would it need to be. As Dr. Kan testifies, it is possible for physiological data to be encoded after storage and before or during transmission. EX2006, ¶¶123-24, 127-28.

4. *Harvey Fails to Disclose Activating a “Radio Signal Generator” at “Pre-Determined Intervals” to “Carry Said Encoded Physiological Data”*

Harvey also fails to disclose “activating said radio signal generator at pre-determined intervals to generate a radio signal to carry said encoded physiological data,” as required by element 5[F]. This claim element requires that the radio signal generator be activated to generate a radio signal at “pre-determined

intervals,” which is a set and known period of time as explained in the ’644 Patent. EX1001, 10:31-43, 11:16-20 (consistently identifying intervals between transmission as periods of time, such as “twenty four hours,” a certain “time period,” and a “period of time”). This is distinct from transmitting at an undetermined period of time, such as activating the radio at random times or in response to a triggering event, such as a change in environmental conditions. The claim further requires that the specific radio signal generated at pre-determined intervals also “carries” the “encoded physiological data” of the animal, as opposed to providing mere identification information or pings. EX1004, 4:39-41, 10:31-43, 11:16-27, claim 5; EX2006, ¶129.

Despite describing numerous transmission operations, Harvey never contemplates an embodiment where a radio signal is both generated at “pre-determined intervals” and also carries “encoded physiological data.” Accordingly, Petitioners again rely on separate embodiments to address each requirement. EX2006, ¶130. For an alleged “pre-determined interval,” Petitioners cite Harvey’s discussion of a “collision avoidance protocol” in which “XPDR 5000 may initiate communication” by transmitting a message at a “selected periodic tag transmission interval of about 2 seconds.” EX1004, 26:6-11; Pet., 26. And for the “encoded physiological data” requirement, Petitioners cite various descriptions of “IAT

messages” in Harvey that allegedly carry “subject data,” none of which are part of Harvey’s discussion of a “period tag transmission.” Pet., 25-26.

A POSA would not understand Harvey to teach a combination where a radio signal is both generated at “pre-determined intervals” and also carries “physiological data” as claimed. As Dr. Kan testifies, a POSA would understand the “periodic tag transmission” in Harvey’s collision avoidance protocol to be a “ping” that determines if the channel is clear *before* sending any physiological data. EX2006, ¶¶131-34. In Harvey, a “ping” is a specific type of message that may include a TID or an SID to identify the animal, but not encoded physiological data. EX1004, 25:2-6 (explaining that an “outbound message” in a “ping operation” may include tag identifier (“TID”) or subject identifier (“SID”) information); EX2006, ¶135. The reason for sending a ping in Harvey is to “initiate[] communication by transmitting an outbound IAT message to INT 5900, which may identify XPDR 5000 to INT 5900.” EX1004, 25:2-6; EX2006, ¶136. A POSA would understand that such a ping can be used to avoid communication contention and collision due to multiple transponders initiating transmit operations to the same interrogator at the same time. EX2006, ¶¶136-37; EX1004, 25:30-26:6, 27:6-8. That is precisely the purpose of the “periodic tag transmission interval” in Harvey’s “collision avoidance protocol.” In that protocol, XPDR 5000 “*initiate[s] communication* by transmitting an outbound IAT message to INT

5900” to avoid losing data due to collision with other transponders. EX1004, 25:30-26:11 (emphasis added); EX2006, ¶¶136-37.

A POSA would further understand that it would not make sense to “initiate communication” using a message that contains physiological data. As Dr. Kan testifies, the purpose of initiating communication in a collision avoidance protocol is to confirm whether a channel is clear, not to send animal data. EX2006, ¶138. Critically, *only* if a ping is acknowledged at an undetermined time does Harvey actually transmit additional information about the animal. *Id.* Sending physiological data with the initial communication message—which may not reach the receiver due to collision—would risk losing that data. EX2006, ¶138; EX1004, 25:32-33. Thus, when read in view of Harvey as a whole, a POSA would interpret the alleged “periodic” message in the collision protocol as a transponder ping, and any alleged physiological data would be sent later at an undetermined time.

Harvey itself bolsters Dr. Kan’s conclusion that the “periodic tag transmission interval” would not include physiological data by explaining that the periodic interval is “about 2 seconds,” which would not make sense under Petitioners’ interpretation of Harvey. EX1004, 26:8-11; EX2006, ¶¶139-40. According to Petitioners, Harvey was directed to a way for “extending the operational life of a bolus” and described “boluses which save energy by controlling the operation of a radio signal generator that transmits sensor data.”

Pet., 3, 40. If that were an accurate interpretation of Harvey’s disclosure and purpose, it would make no sense that Harvey discloses a “bolus” configuration that transmits physiological data every two seconds to a receiver, consuming a significant amount of energy in the process. EX2006, ¶140. For example, a two-second transmission interval would mean that around 43,200 outbound messages of encoded physiological data are being transmitted per day, which would quickly drain the battery and diminish the operational lifespan of the bolus. *Id.* Indeed, a POSA would understand that operating Harvey’s device in this manner would render it unfit for its overall purpose of monitoring animal characteristics because it would drain the battery too rapidly. *Id.*; see *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984) (reversing unpatentability determination where proposed combination rendered device “inoperable for its intended purpose”).

The Board recognized that Petitioners rely on “various alternative disclosures” that do not expressly describe carrying “physiological data” at “pre-determined intervals” in a single method or system. See Paper 7, 28. However, the Board relied on *Blue Calypso, LLC v. Groupon, Inc.* for purposes of institution in determining that Harvey “explicitly contemplates the combination of the disclosed functionalities.” Paper 7, 28 (quoting 815 F.3d 1331, 1343 (Fed. Cir. 2016)). That preliminary determination and application of *Blue Calypso* was incorrect.

Petitioners fail to establish that Harvey’s “alternative disclosures” anticipate the claimed combination under Federal Circuit law because (1) Harvey does not explicitly state that the alleged physiological data can be combined with the “periodic tag transmission” embodiment, and (2) Petitioners fail to explain why a POSA would interpret Harvey to teach or enable that combination. The Petition’s failure to address “[b]oth of these key factors” distinguishes it from the petition in the *Blue Calypso* case cited by the Board. See 815 F.3d at 1343 (contrasting *Net MoneyIN*, 545 F.3d 1359, where there was no anticipation because “[b]oth of these key factors were absent”).

Unlike Harvey, the asserted reference in *Blue Calypso* “explicitly contemplate[d]” the claimed combination because it stated that the claimed functionalities “may be produced in a single computer system having...elements or means combining the performance of any of the functions or steps disclosed or claimed.” 815 F.3d at 1343. Petitioners point to no such disclosure in Harvey. Nor is there one. Dr. Kan reviewed Harvey in its entirety and found that it discloses hundreds of embodiments without explaining how or why they would be combined. See EX2006, ¶134.

Unlike the grounds presented here, the petitioner’s expert in *Blue Calypso* explained why a POSA “would read the reference as disclosing the ability to combine the tools to arrive at the invention.” 815 F.3d at 1343. Dr. Young does

not acknowledge that Harvey discusses a “periodic” or “preselected tag transmission interval” only in the context of a “collision avoidance” embodiment, let alone explain why a POSA would understand the “messages” in that embodiment to include the alleged “subject data” described in other embodiments. See EX1002, ¶¶71-72 (citing the “collision avoidance” paragraph and testifying that an “IAT transponder can transmit outbound IAT messages in a ‘periodic’ manner” without explaining why a POSA would understand those messages to include the alleged physiological data); see also *Netflix, Inc. v. Realtime Adaptive Streaming LLC*, IPR2018-01227, Paper 39 (PTAB Jan. 30, 2020) (rejecting anticipation ground that relied on multiple embodiments when there was “no expert testimony supporting Petitioner’s position that the teachings are combinable”).

In an attempt to remedy Harvey’s failure to disclose the specific combination of steps in element 5[D], Petitioners add three unsubstantiated catch-all arguments in the final paragraph of this section of the Petition. Pet., 26. Petitioners provide no explanation as to how the information presented demonstrates anticipation. First, Petitioners and their expert make an unsupported inherency argument based on the conclusory assertion that the RF module and RF transceivers are “necessarily activated at the beginning of each transmission interval in order to transmit the IAT message containing the encoded physiological data.” Pet., 26

(emphasis added). But this is not true because, for example, the RF module and transceivers could be configured to transmit a “ping” or identification message at each interval, as opposed to encoded physiological data. EX2006, ¶141.

Moreover, even if physiological data were transmitted at each interval, it is not necessarily “encoded.” See §§V.A.2 above. And Petitioners fail to cite any evidence to show that Harvey’s system necessarily activates the RF module and transceivers at each transmission interval to transmit encoded physiological data, as required to prove inherency. See *In re Robertson*, 169 F.3d at 745. Petitioners therefore fail to establish that Harvey discloses the claimed steps inherently.

Second, Petitioners assert that Harvey’s “IAT transponder may be assigned its ‘selected tag transmission interval’ during manufacture or by self-assignment,” which would not teach or suggest a pre-determined interval. See Pet., 26 (citing EX1004, 27:14-21). Petitioners simply make that assertion without explaining how or why it is relevant to the claim. It is not relevant. That Harvey provides different ways to assign a tag transmission interval is immaterial to whether those intervals are “pre-determined.” EX2006, ¶142. The cited paragraph provides no additional context or information related to the IAT transponder or the purported interval, such as the type of information being transmitted or the period of time between intervals. *Id.*

Finally, Petitioners string-cite additional portions of Harvey in an attempt to show disclosure of “pre-determined intervals,” but these purported disclosures fail to describe transmission intervals, the transmission of encoded physiological data, or even the same embodiments in some instances. For example, Petitioners cite Harvey at 28:22-27, which describes a “predetermined transponder operation” mode. Pet., 26. The word “predetermined” in that context is describing the overall “operational mode” of XPDR 5000 itself, and it does not refer to or mention any transmission interval or transmitter. EX2006, ¶143. Petitioners also cite Harvey at 65:32-66:2; however, that citation describes the transmission of a “REGISTRATION message,” and not the transmission of encoded physiological data. Pet., 26; EX2006, ¶143. Moreover, that citation relates to XPDR 7020, which is a different embodiment of transponder that is separate from the XPDR 5000 embodiment relied on by Petitioners elsewhere. EX1004, 65:32-66:2. Petitioners’ reliance on separate embodiments without connecting them cannot establish anticipation of the challenged claim elements as arranged in the claim. *See Net MoneyIN*, 545 F.3d at 1369-1371.

B. Ground 2: Risky Fails to Anticipate Claim 5 or 6

Risky does not disclose all elements of claims 5 or 6 as arranged in the claims, and Petitioners fail to explain how or why a POSA would have understood the elements to be inherent. EX2006, ¶¶145-74. Because express disclosure or

inherency are required to establish anticipation, Petitioners have not met their burden to show unpatentability under Ground 2.

1. *Riskey Fails to Disclose “Encoding Said Sensor Signal from Said One or More Sensors as Encoded Physiological Data”*

Petitioners incorrectly contend that element 5[C]—which requires “encoding said sensor signal from said one or more sensors as encoded physiological data corresponding to said one or more physiological parameters of said ruminant animal”—is inherently disclosed because Riskey discusses (1) memory storage, (2) organization of data into a “data structure,” and (3) wireless data transmission. According to Petitioners, each of these features require encoding sensor data because they allegedly must “involve digital information.” Pet., 32. They do not. Rather, these features in Riskey can use sensor data in a non-digital format, such as analog, and thus the claimed “encoding” step is not necessarily present. Petitioners therefore fail to meet the high standard of proof for establishing that Riskey inherently discloses element 5[C].

a) Riskey’s “Storage in Memory” Does Not Require Encoding a Sensor Signal

Conceding that Riskey fails to *expressly* disclose encoding physiological data, Petitioners argue that Riskey’s sensor signals “necessarily” comprise encoded digital information because they are “stored in the transponder’s memory,” but that is not true. *See* Pet. 32-33. Sensor signals can be stored in a transponder’s

memory in non-digital forms, such as analog or raw electrical signals. EX2006, ¶¶76-84, 146. A POSA would recognize that various types of memory are capable of retaining such non-digital information, such as capacitive storage, magnetic storage, and analog EEPROM. EX2006, ¶¶85-89, 146; EX2007, 191:8-193:15 (Petitioners' expert recognizing analog "magnetic storage"), 198:6-203:17 (recognizing analog "capacitive storage"), 214:6-217:7-17 (recognizing analog "EEPROM"). Risky does not limit its transponder to any particular storage type and does not rule out the possibility of storing sensor information in non-digital form. *See, e.g.*, EX1005, [0041] (referring to "memory unit 250" without specifying storage type), [0043] (same), [0044] (same), [0049] (same); EX2006, ¶146.

To support its inherency argument, Petitioners cite to their discussion of element 5[D]—which requires "storing said encoded physiological data"—but that discussion fails to show that the stored sensor data is necessarily digital. There, Petitioners rely on Risky's depiction of a "memory unit 250" in Figure 2, which allegedly can comprise "EEPROM" memory. Pet., 34 (citing EX1005, [0043]-[0044], [0049], [0052]). However, as both experts recognize, "EEPROM" does not necessarily store encoded data in a digital format. EX2006, ¶¶86, 146-47; EX2007, 214:6-217:7-17. For example, Risky's reference to "EEPROM" would

be understood to include analog EEPROM or floating-gate MOSFET that stores analog charge, not encoded data. EX2006, ¶¶86, 146-47.

Moreover, even if EEPROM stored digital data, the “memory unit” that Petitioners rely on is not limited to EEPROM and could store data using other types of analog memory. As Dr. Kan testifies, a POSA would not understand Risky’s “memory unit 250” to be limited to any particular type of storage. EX2006, ¶¶146-47 (testifying that Figure 2 depicts “Read Only 254” as a distinct component within “Memory Unit 250,” which is not limited to a type of storage); *see also* EX1005, [0004], [0028], [0058] (discussing Fig. 2 without specifying memory type). A POSA would further understand that Risky’s brief discussion of read-only memory, such as EEPROM, is narrowly limited to a specific embodiment in which “UBID”—not sensor signals corresponding to physiological data—is stored in “read-only storage 254” for a specific purpose. EX1005, [0052] (defining “UBID” as “a unique bolus identifier value”); EX2006, ¶147. As Risky explains, “[i]n *one embodiment*, the bolus memory unit 250 may comprise read-only storage 254.” *Id.* (emphasis added). “*In this embodiment*, a unique bolus identifier value (UBID) may be stored within the read-only storage” specifically to “provide a tamper-proof identifier to uniquely identify a particular bolus.” *Id.* (emphasis added). UBID is not the sensed physiological data required to be

encoded in claim 5, and a POSA would not understand Risky to require such data to be stored in EEPROM or any specific type of memory. EX2006, ¶¶147-48.

b) Risky’s “Data Structure” Does Not Require Encoding a Sensor Signal

Petitioners further contend that Risky inherently discloses digital encoding because sensor readings are allegedly organized into a so-called “Animal Information Data Structure,” but they fail to cite any support for that contention. See Pet., 32. As Dr. Kan testifies, the physiological data in Risky’s “data structures” are not necessarily digital or encoded. EX2006, ¶149 (noting that the terms “digital,” “encode,” or “encoding” are never mentioned in Risky). Indeed, Risky states unequivocally that “[o]ne skilled in the art would recognize that the animal information data structure 310 of this disclosure should be stored and/or managed *using any data storage and/or management technique known in the art*” and that “this disclosure should not be read as limited to *any particular data storage and/or management technique.*” EX1005, [0061] (emphases added). Thus, a POSA would understand, for example, that analog sensor data can be stored and used in Risky’s “data structure” without necessitating digital conversion. EX2006, ¶149; see §V.B.1(b).

c) Riskey's Data "Transmission" Does Not Require Encoding a Sensor Signal

Petitioners also argue that Riskey's transponder necessarily transmits digital data because it communicates wirelessly using a "digital protocol," but Riskey never mentions a "digital protocol," and nothing otherwise requires Riskey's transmitted signals to be in digital form. For example, Figure 2 of Riskey depicts a "communications unit 230" that includes an "active data transmitter 232" and a "data receiver 234," but these generic components do not inherently require digital transmission. EX1005, Fig. 2; EX2006, ¶¶150-51. Similarly, Riskey's specification never describes or suggests transmitting data in digital form. For example, Riskey describes a bolus that "may comprise a data transmitter in wireless communication with a base station," with no suggestion that the "wireless communication" must be digital. EX1005, Abstract; *see also* [0021], [0023], [0037], [0037] (describing "transmitters" and "receivers" without specifying a format); EX2006, ¶151. As Dr. Kan explains, such general descriptions of "transmission" in Riskey do not rule out the possibility of transmitting the data in analog form. EX2006, ¶¶151, 154-55. Petitioners' expert, when not taking the evasive position that "anything is possible," specifically agreed with Dr. Kan that that transmitting data in the analog form is possible. EX2007, 180:20-181:2 (testifying that "analog-based modulation form[s] to transmit analog information" are "in the textbook"), 276:10-15 (agreeing that "nondigital wireless

communication protocols exist”); 56:6-58:9 (repeatedly testifying that “anything is possible” when asked if it is possible to transmit information in its analog form).

Petitioners also cite Risky’s discussion of “polling sensors” used in conjunction with a wireless transmitter, but polling also does not require that the sensor data be digitized or encoded before transmission. For example, Risky states that “processor 240 may transmit sensor measurements obtained by polling sensors 220 via data transmitter 232.” EX1005, [0049]. Those transmissions can occur in analog form without encoding the polled data. EX2006, ¶152.

Risky’s references to “media access control” and “unique animal identifier” cited by Petitioners also do not require digitization or encoding of sensor data. Risky discusses messages transmitted via data “transmitter 232” that “may comprise a media access control (MAC) value,” but the presence of a MAC address—even if it were digital—does not mean that the *entire* transmitted signal is digital. EX1005, [0050]; EX2006, ¶153. As Dr. Kan testifies, even a system that transmits a digital MAC address could transmit the sensor signal in analog form. EX2006, ¶153. Likewise, Risky’s reference to “a unique animal identifier (UAID)” that “may be transmitted with some or all of the messages originating from a particular bolus” does not necessitate encoding the sensor signals. EX1005, [0051]; EX2006, ¶153. Such identifiers serve only to associate a bolus with an animal—they do not inherently require sensor data to be digitized. EX2006, ¶153.

d) An “ADC” Is Not Necessarily Present in Risky

As a purported “example” of how Risky encodes data, Petitioners contend that an “ADC” must be used to convert analog sensor signals into digital form, such as “PCM-encoded data,” but neither an ADC nor PCM-encoded data is expressly disclosed or inherently required by Risky. Risky never mentions “ADC,” “PCM,” or “converting” data, and none of the systems it describes necessarily requires these features. EX2006, ¶156. As support for this “example,” Petitioners cite paragraphs 41, 43, and 44 of Risky. Pet., 33. But those paragraphs merely describe the “memory unit” and “polling” of sensors discussed above, which do not require sensor signals be encoded, let alone with ADC. EX2006, ¶156. Because ADC is not expressly disclosed or necessarily present in Risky, Petitioners’ reliance on ADC cannot establish inherency of the “encoding” step in claim 5.

* * *

In sum, Petitioners’ argument for element 5[C] relies on incorrect assumptions about the necessity of encoding information into a digital format. But Risky’s memory storage, data structuring, and data transmission do not inherently require digital encoding, and ADC is not necessarily present in Risky. Accordingly, Petitioners have failed to establish that Risky anticipates claim 5 or 6.

2. *Riskey Fails to Disclose “Storing Said Encoded Physiological Data”*

Even if the Board were to determine that Riskey inherently discloses element 5[C] because physiological data is “transmitted” in Riskey, it nonetheless fails to teach “storing said encoded physiological data” as required by element 5[D]. For element 5[D], Petitioners rely on the same “memory unit” in Riskey addressed above, which does not expressly or inherently require “physiological data” to be encoded when it is stored. *See* §§V.B.1(a)-(b), (d); Pet. 32-35. Moreover, even if the alleged transmitted physiological data in Riskey were “encoded”—which Petitioners fail to establish (*see* §V.B.1(c))—Riskey never teaches or suggests that such data was encoded *when it was stored*. Nor would it need to be. As Dr. Kan testifies, it is possible for physiological data to be encoded after storage and before or during transmission, such as to save power. EX2006, ¶157. Petitioners therefore fail to establish that Riskey expressly or inherently discloses element 5[D], and thus it does not anticipate claim 5 or 6.

3. *Riskey Fails to Disclose “Activating a Radio Signal Generator” at “Pre-determined Intervals” to “Carry Said Encoded Physiological Data”*

Petitioners fail to establish that Riskey discloses “activating said radio signal generator at pre-determined intervals to generate a radio signal to carry said encoded physiological data,” as required by element 5[F]. For this element, Petitioners rely on two embodiments in Riskey that discuss a transmission interval

or frequency—(i) “burst” mode and (ii) “on-line” mode—neither of which would be understood by a POSA as carrying “physiological data” at “pre-determined intervals.” *See* Pet., 36-37. In “burst” mode, sensor data is polled and then stored in a “memory” unit to be transmitted in “bursts,” rather than instantaneously.

EX1005, [0049]. Petitioners rely on Risky’s reference to a “transmission interval” determined by a processor used in burst mode. But a POSA would understand that the alleged “interval” is not “pre-determined” and instead varies based on changes in the animal’s health conditions and triggering events determined by the processor. The purported “interval” in the “on-line” mode is similarly unavailing because it relates to transmissions of bolus identifiers, not the encoded physiological data required by claim 5. EX1005, [0053]-[0055]. A POSA would understand that any physiological data transmitted in on-line mode would be sent in response to a reply message at an undetermined time.

In view of Risky’s disclosure as a whole, a POSA would understand Risky’s “burst mode” to transmit any alleged “physiological data” at varying intervals based on triggering events, not at “pre-determined intervals” as claimed. In paragraph 49, Risky states that, in burst mode, “machine readable instructions 252 may specify a transmission inter[v]al, wherein processor 240 may transmit an animal characteristics message...at each transmission interval.” EX1005, [0049]. Risky does not explain how those “machine readable instructions 252” implement

the intervals, so Dr. Kan looked to the disclosure as a whole for additional context. EX2006, ¶158. In doing so, Dr. Kan determined that transmission intervals set by machine readable instructions 252—including in “burst mode”—are not pre-determined, but rather they vary based on triggering events that affect the transmission delay. EX2006, ¶¶158-60. For example, Risky explains that machine-readable instructions 252 may define “conditions” under which processor 240 changes sensor sampling frequency, polling frequency, or transmission frequency, *e.g.*, based on a threshold animal temperature, health condition, or location. EX1004, [0048]; EX2006, ¶¶160-61. The instructions may apply changes to “increase a polling and/or transmission frequency when the animal is in the vicinity of a calving pen and/or hospital pen” and “decrease the polling and/or transmission frequency when the animal is moved out of the pen.” EX1004, [0048]; EX2006, ¶161. Such changes—which a POSA would understand apply to the same “instructions 252” in burst mode—increase or decrease the transmission interval in real-time, meaning they are not pre-determined as claimed. EX2006, ¶161.

A POSA also would not interpret Risky’s “on-line” mode as activating the transmitter at “pre-determined intervals” to carry an animal’s “physiological data.” According to Petitioners, in Risky’s “on-line” mode, “the transmitter is activated at a predetermined ‘transmission frequency’—*i.e.*, transmission interval—specified

by the device's machine readable instructions." Pet., 37. However, Petitioners completely overlook that "transmission" alone does not meet the claims. The relevant signal sent at pre-determined intervals must carry the animal's physiological data. EX2006, ¶162. But based on a reading of Risky as a whole, a POSA would not understand Risky's "on-line" mode to operate in that manner. *Id.* Rather, in on-line mode, Risky's processor requires a complex communication unit, which comprises the transmitter, to transmit a "discovery message" (or "ping") at a "set interval" to a base station or transceiver. EX1005, [0037], [0053]; EX2006, ¶162. The ping is a "simple message" including "unique identifiers associated with a particular bolus" and does not include "encoded physiological data" as required by the claim. *Id.*, [0053]. Risky's device may be configured for "on-line" mode, and the transmitter in turn may be activated to transmit animal characteristics messages, only "[u]pon receipt of a reply message" from the base state or transceiver. *Id.* In other words, the transmitter is activated based on threshold conditions that must be met first, and it is not activated at a pre-determined interval of time. EX2006, ¶162.

Dr. Kan further explains that a POSA would have understood that an animal monitoring method that transmits physiological data at "pre-determined intervals" operates in a different way, and serves a completely different purpose, than Risky's "burst" or "on-line" modes. The goal of the '644 Patent was to use less

power so that the bolus can be administered to an animal at birth and operate over the entire lifespan of the animal. EX2006, ¶¶163-64; *see* §II.A above. The claimed “pre-determined interval” method is an effective way to accomplish that goal by transmitting physiological data *only* at certain times to save power and allow for a smaller battery, which in turn allows for a smaller bolus that can be administered at birth. EX2006, 164. Risky’s “burst mode,” on the other hand, is not implemented to save power or reduce the size of the bolus. EX2006, ¶164. The goal of burst mode is to gather data in the bolus until a triggering event occurs, and only then send the data when instructed by a processor, which allows the system to recognize changes in the animal as soon as possible. *Id.* Modifying Risky’s burst mode such that it transmits physiological data only at a constant pre-determined interval, regardless of triggering events, would defeat that purpose. *Id.*

Likewise, modifying Risky’s “on-line” mode to transmit physiological data at pre-determined intervals would defeat the purpose of that mode. As Dr. Kan explains, in on-line mode, the bolus is always “on-line” so that it can “listen” for a reply message from the reader in response to a ping and then send the data. EX2006, ¶165. The entire purpose of this mode is for data to be sent and received *any time* the bolus and reader are in communication, so that the system accumulates as much data as possible. *Id.* Saving power is not a factor. *Id.*

Indeed, a bolus employing Risky's "on-line" mode would be understood to use substantially more power than with the claimed method. *Id.*

Respectfully, at the institution stage, the Board appears to have misinterpreted Patent Owner's argument regarding Risky's failure to employ a "pre-determined interval" in the "burst" and "on-line" modes as relating to different embodiments from the modes cited by Petitioners. But Patent Owner's argument regarding "burst" and "on-line" modes does not rely on different disclosures. Instead, as explained above, Patent Owner's expert relied on the overall teachings of "burst" mode, "on-line" mode, and "machine readable instructions" as described in Risky to interpret the relevant disclosures from the perspective of a POSA, including how a POSA would interpret the operation of the two modes that Petitioners rely on. This is proper. *See Wasica Fin. GmbH v. Cont'l Auto. Sys., Inc.*, 853 F.3d 1272, 1284 (Fed. Cir. 2017) ("Anticipation is an inquiry viewed from the perspective of one skilled in the art."); *Dayco Prods., Inc. v. Total Containment, Inc.*, 329 F.3d 1358, 1368-69 (Fed. Cir. 2003) (holding that district court "improperly dismissed" expert testimony on what prior art reference failed to disclose because anticipation is based on what a POSA would "understand or infer" from the reference's teachings).

4. *Riskey Fails to Disclose “Generating a Sensor Signal from One or More Sensors” That “Varies Based on a Corresponding Change” in “Physiological Parameters”*

Petitioners concede that Riskey does not expressly disclose using a sensor that generates a signal that “varies based on a corresponding change” in a physiological parameter, relying solely on inherency. However, as shown below, Riskey’s alleged sensors do not necessarily generate signals that vary as claimed. Because inherency requires the limitation to be necessarily present, Petitioners’ sole basis for anticipation under Ground 2 fails.

a) The Claimed Sensor Must Generate a Signal That Varies When the Physiological Parameter Changes

A POSA would understand claim 5 to require a sensor that generates a signal that varies in direct response to any changes in a physiological parameter in an animal. Claim 5 recites “generating a sensor signal from one or more sensors” and further states that “said sensor signal varies based on a corresponding change” in physiological parameters. Thus, the signal that “varies” must be the same signal that was generated by the claimed “one or more sensors.” A POSA would understand this to require a sensor that generates a signal that directly corresponds to changes in a physiological parameter inside the animal. EX2006, ¶167.

b) Riskey Does Not Expressly or Inherently Disclose a Signal That Varies as Claimed

Petitioners’ circular premise that “[t]o distinguish different temperature readings over time, the sensor signal [in Riskey] must necessarily vary with changes in the temperature” cannot establish inherency because Riskey does not disclose “distinguish[ing] different temperature readings over time.” Petitioners’ only cited support for this assumption—paragraphs 35 and 44 of Riskey—does not even contemplate distinguishing between two sensor signals. Pet., 31; EX1002, ¶84; *see also* EX2006, ¶170. In particular, paragraph 35 is limited to the types of available sensors, not the nature of any signal they generate. EX2006, ¶ 171. And paragraph 44 describes an optional architecture in which the sensor contains a memory storage location and the processors later polls that location. EX2006, ¶172. Petitioners assume that because distinguishing two measured values requires two sensor signals that the sensor signal necessarily varies, but Petitioners cannot rely on an assumption that is not disclosed in Riskey to demonstrate what is *necessarily present* in Riskey. *EIS GmbH v. Novoluto GmbH*, IPR2019-01302, Paper 50 at 57 (PTAB June 14, 2021), *aff’d*, 2023 WL 2472639 (Fed. Cir. Mar. 13, 2023) (finding no inherency because inherency argument relied on an assumption that was not taught or required by the reference). Moreover, as Dr. Kan testifies, Riskey is silent with respect to how a sensor signal is generated, processed, or output, let alone how a generated signal would vary based on a corresponding

change in the measured physiological parameter. EX2006, ¶¶170, 173-74.

Because Risky’s described system does not necessarily “distinguish” between two measured values, Petitioners’ reliance on this undisclosed, hypothetical premise is thus insufficient to establish that the sensor signal necessarily “varies based on a corresponding change in one or more physiological parameters” as claimed.

C. Harvey in Combination with Risky Fails to Render Obvious Claim 5 or 6

Ground 3 fails for multiple reasons. First, Petitioners engage in an improper obviousness analysis by arguing that each reference would provide any elements missing from the other, without specifying a primary reference, single missing element, or specific combination. Pet., 42. Second, even if Petitioners did put forth a proper obviousness analysis, they fail to articulate a legally relevant reason to combine the references with a reasonable expectation of success. And third, both Harvey and Risky fail to disclose several common elements—such as the “encoding,” “storing,” and “activating” steps—and no combination of the two references would resolve those deficiencies.

1. Ground 3 Is an Improper “Obviousness” Challenge

The Board correctly determined in the Institution Decision that Petitioners fail to “engage in a proper obviousness analysis” in Ground 3, and should maintain that position in rejecting Ground 3 in the Final Written Decision. Paper 7, 31. As the Board stated, “Petitioner must explain with particularity how the prior art

would have rendered the challenged claims unpatentable.” *Id.* (citing 35 U.S.C. § 312(a)(3)). This requires explaining “what reference is the primary versus secondary reference, what elements are missing from the primary reference, what elements should be added from the secondary reference to reach the claimed invention, or why those particular elements would be obvious to add.” *Id.* (quoting *Sisvel Int’l S.A. v. Sierra Wireless, Inc.*, 82 F.4th 1355, 1364 (Fed. Cir. 2023)).

Petitioners fail to do any of that. EX2006, ¶¶175-77. Instead, they offer the following generic statement:

To the extent Patent Owner alleges that either Harvey or Risky fails to teach any claim element, that element is provided by the other reference. Further, to the extent the teachings of Harvey are substantively different than Risky for any given claim element, it would have been at least obvious to try Risky’s implementation of that element in Harvey, or vice versa, given the overall similarity in their purpose, design and operation.

Pet., 42. In other words, the Petition “invites the Board to review Patent Owner’s ...response and predict Petitioner’s reply,” which is not appropriate “[g]iven that it is Petitioner’s burden from the onset to show with particularity why the patent it challenges is unpatentable.” See Paper 7, 31 (declining to “fashion an obviousness argument for Petitioner”).

To the extent Petitioners argue that their heading in Ground 3 suggests Harvey is the “primary reference” in compliance with *Sisvel*, the Petition still fails to identify (1) any specific element missing in Harvey, (2) the teachings in Risky that should be combined with Harvey for such element, or (3) how and why a POSA would have modified Harvey in view of Risky to achieve claim 5 or 6. Indeed, Petitioners never articulate a difference between the asserted art and the challenged claims, nor do they provide a reason to modify the references in combination with each other. *See* Pet., 38-42; EX2006, ¶¶176-77; *see also Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966) (explaining that identifying “differences between the prior art and the claims” is one of the “basic factual inquiries” in an obviousness analysis). The Board regularly rejects such obviousness challenges. *See, e.g., St. Jude Med., LLC v. Snyder's Heart Valve LLC*, IPR2018-00105, Paper 59, 36-38 (PTAB May 2, 2019) (rejecting obviousness ground that did “not identify any differences between the claimed subject matter and Leonhardt that the teachings of Andersen would satisfy”), *aff'd*, 977 F.3d 1232 (Fed. Cir. 2020); *Markforged Inc. v. Continuous Composites, Inc.*, IPR2022-00679, Paper 24, 28-29 (rejecting purported reason to combine that did “not elaborate on how or why the skilled artisan would have combined the teachings of these references to arrive at the claimed subject matter”).

2. A POSA Would Not Have Had a Reason to Combine Harvey and Risky or a Reasonable Expectation of Success

Even if its “obviousness” challenge were proper, Petitioners fail to identify any legally relevant reason why a POSA would have taken any disclosure from Risky and added it into Harvey’s system, or vice versa, rendering Ground 3 meaningless for additional reasons. It is not enough that Risky and Harvey are the “same kind of device used for the same purpose,” as Petitioners allege. Pet., 41-42. Simply identifying the similarities between the references is not itself a reason to combine them. *See Sisvel*, 82 F.4th at 1364 (agreeing that petitioner’s “reasons to combine were merely assertions that the references were analogous art, which, without more, is an insufficient articulation for motivation to combine”); *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1379 (Fed. Cir. 2016) (finding no reason to combine where petitioner “attempted to provide the motivation to combine merely by noting surface similarities between the references”). Rather, Petitioners must articulate a specific reason to use parts of one reference with the other reference. *See Virtek Vision Int’l ULC v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 888 (Fed. Cir. 2024) (rejecting obviousness ground for failure to articulate “any reason to substitute one for another or any advantages that would flow from doing so”); *Magnum*, 829 F.3d at 1378 (requiring “specific reasoning, based on evidence of record, to support the legal conclusion of obviousness”). But

Petitioners never provide any specific reason to support combining any part of Risky into Harvey, or vice versa.

Not only does Petitioners' obviousness analysis fail to articulate a reason to combine, it actually provides a reason why a POSA would *not* combine Harvey and Risky. According to Petitioners, both Harvey and Risky "came up with the same solution" to the "same problem." Pet., 40-42. If that were true, a POSA would have no reason to combine the references because they do not teach anything new to each other. EX2006, ¶178. In other words, a POSA would not modify Harvey based on Risky to solve any problem because, as Petitioners contend, Harvey already solved the same problem as Risky and in the same way—and vice versa. *Id.* In short, a POSA would have understood that each reference adds nothing new to the other reference and, therefore, would not have sought to combine them. EX2006, ¶178. Given the redundancy in Harvey and Risky's purported solution to the same problem, there would have been no motivation for a POSA to modify either reference in view of the other. *See Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1369 (Fed. Cir. 2012) (determining POSA had no reason to combine two references because they "independently accomplish similar functions"); *S.-Tek Sys., LLC v. Engineered Corrosion Sols., LLC*, 748 F. App'x 1003, 1006-07 (Fed. Cir. 2018) (affirming

Board’s determination that a POSA “would not have been motivated” to combine two references “given the redundant functions”); EX2006, ¶¶178, 180.

Petitioners also fail to explain *how* a POSA would have combined any teaching from Risky and Harvey to arrive at the claims with a reasonable expectation of success. Instead, Petitioners merely quote the standard from *KSR* without explaining how that standard is met. *See* Pet., 41. Neither Petitioners nor their expert provides any evidence or an adequate explanation to support why a POSA would have had reasonable success in modifying these references in view of each other, much less explain what the modification would have been or how it would have met the claims. *See* Pet., 41; EX1002, ¶100; *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1193-94 (Fed. Cir. 2014); EX2006, ¶179. Nor can they because Petitioners do not even attempt to articulate which claim elements are missing from the claims or propose which elements would be incorporated from one reference into the other. *Graham*, 383 U.S. at 17; *Sisvel*, 82 F.4th at 1364. Petitioners’ arguments and evidence are therefore insufficient to render a claim obvious because the reason to combine and reasonable expectation of success must be supported by reasoned explanation and evidence, not conclusory statements. *See id.*; *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007); *Magnum*, 829 F.3d at 1378; *Intelligent Bio-Sys.*, 821 F.3d at 1367-68.

3. *Petitioners' Purported Combination Fails to Meet All Elements of the Challenged Claims*

In addition to failing to provide a reason to combine Harvey and Risky with a reasonable expectation of success, Petitioners fail to show that any specific combination of the references discloses all of the claimed elements or renders them obvious. The only element specifically addressed in Ground 3 is the requirement that boluses be “orally administered,” but Petitioners never explain how the combination of Harvey and Risky somehow renders that requirement obvious. In any event, the alleged obviousness of “oral administration” does not address any of the deficiencies Patent Owner has identified in Harvey and Risky. As discussed above in Grounds 1 and 2, neither Risky nor Harvey discloses activating a radio signal generator at “pre-determined intervals” to carry “physiological data” or the “encoding” or “storing” steps. See §§V.A.2-4, V.B.1-3. Accordingly, no combination of those references would address the deficiencies Patent Owner has identified, and nothing in Ground 3 suggests otherwise. EX2006, ¶¶181-84. Similarly, Petitioners do not argue that a POSA would have used the teachings in Risky to add a bolus or encoding functionality to Harvey’s ear tags to address the deficiencies Patent Owner identified in Sections V.A.1-4. Even under the most generous reading of Ground 3, Petitioners do not identify an obviousness combination *at all*. Accordingly, Petitioners’ Ground 3 adds nothing to Grounds 1 and 2 and cannot form a basis for finding a claim unpatentable. See *MG FreeSites*

Ltd. v. Scorpcast, LLC, IPR2021-00510, Paper 38, 70 (PTAB Aug. 3, 2022)

(rejecting obviousness ground where secondary reference “does not cure the deficiencies” identified in anticipation ground for primary reference).

D. Ground 4: Petitioners Fail to Show That Harvey in View of Rettedal Renders Obvious Claim 7

1. *The Alleged Combination Fails to Disclose or Suggest the Invention of Claim 7*

Ground 4 fails at the outset for many of the same reasons as Ground 1, as well as the additional reasons provided below. Claim 7 depends from claim 6, which depends from claim 5. EX1001, claims 5-7. As discussed for Ground 1, Harvey fails to disclose many of the elements recited in claim 5, including at least a “bolus” arranged as claimed, as well as the claimed “encoding,” “storing,” and “activating” steps. See §§V.A1-4. Petitioners rely solely on Harvey for these elements in Ground 4, and they do not contend that Rettedal addresses Harvey’s deficiencies. See Pet., 47-49; EX2006, ¶¶186-87. Instead, they rely on Rettedal only for its purported disclosure of the “matching elements” recited in claim 7. *Id.*

Regarding the claimed “bolus,” the Board determined in the Institution Decision that Petitioners failed to establish anticipation at least because they did not connect Harvey’s “bolus” embodiment to its separate “XPDR 5000” embodiment that allegedly includes a “sensor” and “radio signal generator.” See §V.A.1 above. Despite that deficiency, the Board did not dismiss Petitioners’

obviousness ground based on Harvey and Rettedal because “unlike its anticipation argument over Harvey, Petitioner challenges claim 7 as obvious over the combination of Harvey and Rettedal, both of which teach or suggest a bolus device.” Paper 7, 35-36. But the mere fact that Rettedal discloses a bolus is insufficient to establish obviousness. It is Petitioners’ burden to show by a preponderance of the evidence that a POSA would have reason to combine the references to arrive at the claimed invention, including a reason to combine multiple embodiments within a reference. *See In re Stepan Co.*, 868 F.3d 1342, 1346 n.1 (Fed. Cir. 2017) (explaining that “combining multiple embodiments from a single reference” requires “a motivation to make the combination and a reasonable expectation that such a combination would be successful”). But Petitioners make no effort to address the “sensor” and “radio signal generator” missing from Harvey’s bolus embodiment, nor do they explain why or how a POSA would have combined Harvey’s “bolus” with its separate “XPDR 5000” embodiment to include those elements. Indeed, Petitioners never even acknowledge that Harvey’s bolus and XPDR 5000 are different embodiments—and do not rely on Rettedal for those elements—and thus fail to propose a combination that could conceivably meet the claims. Thus, Ground 4 necessarily fails for the same reasons as Ground 1, as well as for the additional reasons below.

a) The Claimed “Matching Elements” Adjust the “Center Frequency” of the Antenna to a Desired Frequency

Petitioners’ obviousness ground based on Harvey and Rettedal also fails because Rettedal does not disclose or suggest the specific “matching elements” recited in claim 7. Claim 7 requires “matching elements” that “adjust[] said frequency of said radio signal to compensate for a change in said frequency of said radio signal due to passing through a mass of said ruminant animal.” A POSA would understand that the “change” in frequency is a shift in the resonant frequency (or “center frequency”) of the antenna caused by the animal mass, which creates a mismatch between the center frequency and the frequency of the signal delivered by the radio signal generator. EX2006, ¶188. The claimed “matching elements” therefore adjust the antenna’s center frequency to match the radio signal generator’s output frequency. EX2006, ¶¶188-91.

The specification provides an example of the claimed “matching elements” consistent with this understanding. As the patent explains, the matching elements “function to match the input impedance” of the antenna to the “output impedance” of the radio signal generator “to maximize the power transfer or minimize signal reflection.” EX1001, 5:4-16; EX2009, ¶¶189-90 (explaining that “gain” refers to the efficiency of the signal transmitted from the antenna). “Signal reflection” refers to a portion of the signal that is returned from the antenna—and therefore not transmitted—when the antenna’s resonant frequency, or “center frequency,”

does not match the output frequency of the radio signal generator. EX2006, ¶190. When the bolus is placed within an animal, the impedance of the antenna increases, causing its center frequency to shift downward. EX2006, ¶190; EX1001, 6:27-32 (explaining that because the bolus components “operate within the mass of a ruminant animal (3), it has been discovered that the center frequency...is shifted lower and may not have the maximum gain.”). The “matching elements” compensate for this shift by using a “resonant circuit” comprising “an array of inductors (27) and capacitors (26) used in series or in parallel to balance the circuit impedance.” EX1001, 5:39–45; *id.*, 5:16-20 (“The passive capacitors (26) and inductors (27)...are used to mitigate these differences [in impedance] and rebalance the impedance for a given radio signal frequency (23).”). These passive components are configured to “purposefully shift the center frequency” of the antenna “upward and allow[] the radio signal frequency (23) to be re-tuned to a desired radio signal frequency.” EX1001, 6:33–40; EX2006, ¶190.

b) Rettedal Fails to Disclose the Claimed “Matching Elements”

Rettedal’s alleged “network frequency match element” relied on by Petitioners does not meet the “matching elements” limitation because it does not adjust the center frequency of the antenna as claimed. Rather, Rettedal’s match element is expressly configured to “deliver a particular first radio frequency signal...*to the antenna.*” EX1006, [0064] (emphasis added); EX2006, ¶192. For

example, it purportedly “can detune a 433 MHz first radio frequency signal (13) **to generate a signal** of between about 418 MHz and about 425 MHz.” *Id.* (emphasis added). As Dr. Kan testifies, a POSA would understand Rettedal’s design to reflect a different approach to addressing the effects of the animal mass on the system. Rather than raising the antenna’s center frequency, Rettedal’s match element attempts to lower the oscillator’s generated frequency, presumably to more closely match the expected center frequency of the antenna—but the center frequency itself is not adjusted. EX2006, ¶192; EX1006, [0064], Fig. 6. The structure of Rettedal’s system reflects this design choice. Instead of employing a passive “resonant circuit” with inductors to balance impedances and adjust the center frequency, Rettedal states that its “match element” is controlled by a “processor element” to actively change the radio signal delivered to the antenna using “capacitors and resistors in combination.” EX1006, [0064]; EX2006, ¶¶193-94. Rettedal never mentions, for example, resonant circuits, inductors, or impedance-balancing. EX2006, ¶194.

2. A POSA Would Not Have Had a Reason to Combine Harvey and Rettedal or a Reasonable Expectation of Success

Petitioners’ purported reason to combine Harvey and Rettedal fails at the outset because the alleged “problem” solved by Rettedal does not apply to the ear tag device in Harvey that Petitioners rely on. Petitioners contend that “Harvey’s implanted bolus” would experience the same “problem” as Rettedal “since it is

surrounded by the animal’s mass.” *See* Pet., 46. However, the XPDR 5000 embodiment in Harvey that Petitioners rely on is *not* an implanted bolus—it is an external ear tag. *See* §V.A.1 above; Pet. 47-48 (citing to Grounds 1 and 3, which rely on XPDR 5000). Because XPDR 5000 is external to the animal, there is no reason to use Rettedal’s “match element” to adjust for the animal’s mass and thus no reason to make the proposed combination. EX2006, ¶195. Moreover, Petitioners fail to propose *any* combination where XPDR 5000 is reconfigured as a bolus and thus fail to articulate any rational basis for combining or modifying Harvey’s various embodiments with Rettedal to arrive at the claims. *See Graham*, 383 U.S. at 17; *Sisvel*, 82 F.4th at 1364; *KSR*, 550 U.S. at 418.

Additionally, because XPDR 5000 is an ear tag, a POSA would not have had a reasonable expectation of success in combining it with Rettedal to arrive at the claims. For example, the electrical sensors used in XPDR 5000 measure alleged physiological data from the ***exterior*** of an animal and are not possible or practical in the claimed bolus. EX2006, ¶196. Because Petitioners fail to address these issues or otherwise explain *how* a POSA could reconfigure Harvey’s ear tag into a bolus, they fail to establish reasonable expectation of success.

Even if Petitioners had explained why or how XPDR 5000 could be reconfigured as a bolus, they nonetheless fail to establish a reasonable expectation of success in incorporating Rettedal’s “match element” into a bolus and arrive at

the claimed invention. In the Institution Decision, the Board stated that “Petitioner cites both testimonial and documentary evidence to support a reasonable expectation of success, including evidence provided by the cited prior art itself,” but Petitioners’ respectfully contend that the cited evidence is insufficient at this stage. See Paper 7, 34. Petitioners’ testimonial evidence is limited to a conclusory statement from its expert that merely parrots the Petition, without any explanation or support. See EX1002, ¶109 (“Furthermore, the technology and operation of such components was well-understood in the relevant time period such that the combination of Harvey and Rettedal would have had a high likelihood of success.”); *TQ Delta, LLC v. Cisco Sys.*, 942 F.3d 1352, 1359 (Fed. Cir. 2019) (“[C]onclusory expert testimony is inadequate to support an obviousness determination.”). And they do not point to anything in Rettedal itself to support that the components of its “network frequency match element” were “well-understood.” Pet., 43-47. To the contrary, Rettedal describes its match element as part of an “invention.” EX1006, [0011]; see also EX2006, ¶197 (testifying that at the time of the invention, a POSA would not have been familiar with a device that can generate or deliver a radio signal to an antenna at a specific frequency to compensate for signal demodulation as described in Rettedal).

Rettedal also cannot establish a reasonable expectation of success because it does not provide details on how its “match element” could operate in the claimed

manner. For example, unlike the '644 Patent, Rettedal does not teach the use of a “resonant circuit” to “increase the inductance and capacitance values to purposefully shift the center frequency upward.” EX1001, 6:33-40; EX2006, ¶198. Rettedal merely states that its “match element” is controlled by a processor and “can include capacitors and resistors in combination to deliver a particular first radio frequency signal.” EX1006, [0064]; *see also id.*, [0011], Fig. 6; EX2007, 106:1-8 (agreeing that a POSA would understand that “[i]f you have just a resistor and a capacitor, you may not be able to form a resonant circuit”).

E. Ground 5: Petitioners Fail to Show That Harvey in view of Kunda Renders Obvious Claims 9-10

1. *The Alleged Combination Fails to Disclose or Suggest the Invention of Claims 9-10*

The combination of Harvey and Kunda cannot render claims 9-10 obvious because it lacks several key claim limitations. Petitioners rely on Kunda for its purported disclosure of “an antenna having a pair of electrically conductive loops,” as recited in element 9[G]. *See* Pet., 56-61. For every other claim element, Petitioners rely on Harvey. But as discussed in Grounds 1 and 4, Harvey fails to disclose several elements recited in claim 5, which are also present in claims 9-10, such as a “bolus” that contains a “sensor” and “radio signal generator” or the claimed “encoding” and “storing” steps. *See* §§V.A1-4; EX2006, ¶¶200-03. Petitioners do not allege that the combination of Harvey and Kunda somehow

addresses these deficiencies. EX2006, ¶¶200-02. Accordingly, Ground 5 fails at the outset.

Similar to its proposed combination in Ground 4, Petitioners' combination of Harvey and Kunda in Ground 5 does not address the deficiency in Petitioners' "bolus" argument in Harvey's anticipation ground. See §V.A.1 above. In the Institution Decision, the Board acknowledged this deficiency but did not dismiss Ground 5 because it was persuaded that "it would have been obvious to...modify Harvey's digestive tract bolus device with a smaller antenna." Paper 7, 41. But even if Harvey's bolus were modified to include a smaller antenna, Petitioners' obviousness ground would still be deficient because it fails to explain why a POSA would or could have modified Harvey's bolus embodiment to include the alleged "sensor" and "radio signal generator" from the XPDR 5000 embodiment to arrive at the claims. See *Stepan Co.*, 868 F.3d at 1346 n.1. Petitioners do not even acknowledge the separate embodiments—and do not rely on Kunda for the "bolus" elements—and thus fail to propose a combination that could include every element of the claims.

2. *A POSA Would Not Have Had Reason to Combine Kunda with Harvey*

Ground 5 also fails because Petitioners' alleged reason to combine does not apply to Harvey's "bolus." Petitioners argue that a POSA would have been motivated to combine Harvey and Kunda because "Kunda addresses the same size

considerations” as Harvey, alleging that “Harvey sought to create a bolus that would fit within the digestive tract of a monitored animal” and had the “goal of providing a ‘miniature transponder.’” Pet., 50. But Harvey never mentions or suggests a concern related to the size of any bolus or that its “bolus” does not fit within a digestive tract. EX2006, ¶¶204-05. Petitioners cite Harvey at 18:15-17 for its disclosure of a “more compact form factor,” but that disclosure is specifically describing that “housing 2300 may have a more compact form factor.” *Id.*; see §V.A.1. Harvey’s only embodiment of housing 2300 is in Figure 2(c), which depicts the housing with “affixment fitting 2320,” as shown below:

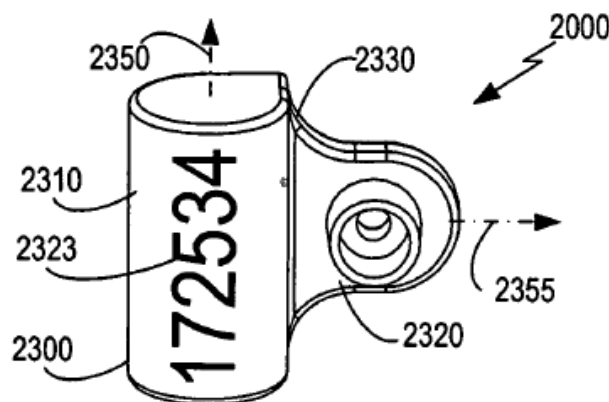


FIG. 2C

EX1004, Fig. 2C. A POSA would have understood this housing was for an exterior ear tag, where decreasing the size can reduce the burden on the animal and decrease the risk of having the ear tag pulled away. *Id.*; EX2006, ¶205 (“For example, ‘affixment fitting 2320’ is a pin hole, which is used to pin the tag to

animal's skin, which would not make sense in a bolus."); *see also* EX1004, Fig. 3A, 19:13-16. In short, Harvey's "compact form factor" does not apply to a bolus and does not address concerns related to a bolus.

Moreover, Kunda provides an express reason not to use its antenna in Harvey's devices, including if a POSA were seeking to reduce their size. Harvey teaches that the antennas in its devices should be "embedded in a printed circuit board." EX1004, 45:12-15; EX2006, ¶206. Kunda, on the other hand, explains that "if the antenna is placed *close to a printed circuit board* or housing *in order to reduce the size* of the communication device, that will diminish the characteristics of the antenna." EX1007, [0005] (emphasis added). As Dr. Kan testifies, a POSA would understand that Harvey teaches placing antennas within the device close to a printed circuit board, which would apply even if Kunda's alleged "double loop antenna" were somehow employed in the device to reduce size. EX2006, ¶206. Kunda's warning that such a design would "diminish the characteristics of the antenna" would discourage a POSA from using Kunda's antennas in Harvey's design. *Id.*

3. *A POSA Would Not Have Had a Reasonable Expectation of Success in Combining Kunda's Antenna with a Bolus*

Even if there were a reason to combine Harvey and Kunda, a POSA would not have had a reasonable expectation of success in combining the two references to arrive at the invention because Kunda's antenna is unfit for use inside of an

animal. Petitioners contend that Kunda's antenna addresses the same interference, bandwidth, and performance problems solved by the '644 Patent. *See* Pet., 50-52; EX1001, 7:20-33. Kunda, however, does not describe an antenna capable of counteracting the unique electrical problems experienced when used in a bolus located *inside of an animal*. EX2006, ¶207. Specifically, Kunda discloses fitting a loop antenna to two integrated circuits, where impedance matching in the signal chain is critical to avoid antenna reflection and severe self-jamming to the radio-frequency integration circuits. *See* EX1007, [0024], Fig. 1 (baseband IC 52 and RFIC 54); EX2006, ¶207. Kunda describes using this antenna in a general communication integrated circuit with a transmitter and receiver, such as in mobile phones, where antenna reflection is the key design criteria. *See id.*; EX1007, [0001]-[0002]; EX2006, ¶207.

But the key design criteria for an antenna within an animal's reticulum are unique, and different from Kunda's antenna, and Petitioners fail to explain how a POSA would have modified Kunda's antenna to meet those criteria and successfully arrive at the claims. For example, Kunda's antenna fails to account for impedance mismatching and antenna detuning caused by factors unique to a bolus, such as the properties of body tissue and complex food mixtures. EX2006, ¶208. A POSA would have understood that failing to account for those issues would likely result in significant performance loss, reduced battery life,

attenuation, and polarization loss. *Id.* Petitioners also fail to address how to modify Kunda's antenna to have the appropriate size, shape, weight, material, and operating bandwidth to successfully incorporate it into a bolus configuration. EX2006, ¶¶209-11; EX2007, 81:19-82:22 (testifying that an "internal monitoring device" may need "a biocompatible coating just to avoid undesirable tissue interaction" and that "the location, size, you know, weight, like, can be a critical consideration"), 84:11-86:14 (testifying that "you would need to design your...radiofrequency generator ...with a corresponding frequency shift" caused by "tak[ing] a device from outside the body to inside the body"). By not addressing the design criteria relevant to a bolus, Petitioners fail to establish that a POSA would have had a reasonable expectation of success in combining Harvey and Kunda to arrive at the claims.

F. Grounds 6 and 7 are Moot

Solely to simplify these proceedings, Patent Owner has disclaimed claim 13 of the '644 Patent (*see* EX2004), leaving claims 5-7, 9, and 10 as the remaining challenged claims. As a matter of law, claim 13 is therefore treated as if it never existed, rendering Grounds 6 and 7 moot. *See Genetics Inst., LLC v. Novartis Vaccines & Diagnostics, Inc.*, 655 F.3d 1291, 1299 (Fed. Cir. 2011). Patent Owner does not concede the merits of Petitioners' challenges to claim 13, and Patent Owner's decision to disclaim claim 13 is not an admission of any kind regarding

the grounds in the Petition. *See, e.g., Raytheon Techs. Corp. v. Gen. Elec. Co.*, 993 F.3d 1374, 1379 n.4 (Fed. Cir. 2021).

VI. CONCLUSION

Accordingly, the Board should uphold the patentability of all Challenged Claims.

Dated: April 15, 2025

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing ST Reproductive Technologies, LLC's Patent Owner Response was served on counsel of record on April 15, 2025 by filing this document through the Patent Trial and Appeal Case Tracking System (P-TACTS), as well as delivering a copy via electronic mail to counsel of record for the Petitioners at the following addresses:

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CERTIFICATE OF COMPLIANCE PURSUANT TO 37 C.F.R. § 42.24

This paper complies with the type-volume limitation of 37 C.F.R. § 42.24. The paper contains 13,758 words, excluding the parts of the paper exempted by § 42.24(a).

This paper also complies with the typeface requirements of 37 C.F.R. § 42.6(a)(ii) and the type style requirements of §42.6(a)(iii)&(iv).

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APPENDIX A: CLAIM LISTING

Challenged claims 5-7, 9, and 10 are reproduced below with shorthand identifiers for each claim element listed in the left column.

Claim	Claim Language
5[Pre]	5. A method of monitoring physiological parameters of a ruminant animal, comprising:
5[A]	generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal,
5[B]	said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal;
5[C]	encoding said sensor signal from said one or more sensors as encoded physiological data corresponding to said one or more physiological parameters of said ruminant animal; and
5[D]	storing said encoded physiological data in a non-transitory computer readable media,
5[E]	enabling a radio signal generator located within said bolus;
5[F]	activating said radio signal generator at pre-determined intervals to generate a radio signal to carry said encoded physiological data; and
5[G]	generating said radio signal having a frequency of between about 700 MHz to about 1 GHz.
6	The method of claim 5, wherein said frequency is selected from the group consisting of: between about 700 MHz to about 800 MHz, 750 MHz to about 850 MHz, about 800 MHz to about 900 MHz, 850 MHz to about 950 MHz, 900 MHz to about 1 GHz.
7	The method of claim 6, wherein said bolus further comprises matching elements which adjusts said frequency of said radio signal

	to compensate for a change in said frequency of said radio signal due to passing through a mass of said ruminant animal.
9[Pre]	9. A method of monitoring physiological parameters of a ruminant animal, comprising:
9[A]	generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal,
9[B]	said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal;
9[C]	encoding said sensor signal from said one or more sensors as encoded physiological data corresponding to said one or more physiological parameters of said ruminant animal;
9[D]	storing said encoded physiological data in a non-transitory computer readable media;
9[E]	enabling a radio signal generator located within said bolus;
9[F]	activating said radio signal generator to generate a radio signal to carry said encoded physiological data; and
9[G]	transmitting said radio signal with an antenna having a pair of electrically conductive loops disposed a distance apart and further comprising transmitting said radio signal through said antenna.
10	The method of claim 9, wherein said pair of electrically conductive loops each comprise a loop of conductive sheet material having an inner annular edge and an outer annular edge which join opposed loop faces.