

Petition for *Inter Partes* Review of U.S. Patent No. 10,231,644

**UNITED STATES PATENT AND TRADEMARK OFFICE**

---

**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

---

SMAXTEC INC. AND  
SMAXTEC ANIMAL CARE GMBH,

v.

ST REPRODUCTIVE TECHNOLOGIES, LLC,  
Patent Owner.

---

IPR2024-01067

Patent 10,231,644

---

**PETITION FOR INTER PARTES REVIEW**

**TABLE OF CONTENTS**

|                                                                                                                     |      |
|---------------------------------------------------------------------------------------------------------------------|------|
| Table of Exhibits .....                                                                                             | viii |
| A. Real Parties-in-Interest (37 C.F.R. §42.8(b)(1)) .....                                                           | x    |
| B. Related Matters (37 C.F.R. §42.8(b)(2)) .....                                                                    | x    |
| 1. U.S. District Court for the Western District of Wisconsin .....                                                  | x    |
| 2. Patent Trial and Appeal Board .....                                                                              | x    |
| C. Lead and Backup Counsel and Service Information (37 C.F.R. §§42.8(b)(3) and (b)(4)) .....                        | xi   |
| I. Introduction.....                                                                                                | 1    |
| II. CERTIFICATION OF GROUNDS FOR STANDING UNDER 37 c.f.r. § 42.104(a) .....                                         | 1    |
| III. identification OF RELIEF REQUESTED and grounds for CHALLENGE under 37 c.f.r. §§ 42.22(a)(1) and 42.104(b)..... | 1    |
| IV. Background of the technology.....                                                                               | 2    |
| V. Person of Ordinary Skill in the Art.....                                                                         | 5    |
| VI. The '644 Patent.....                                                                                            | 5    |
| A. Summary of the Specification .....                                                                               | 5    |
| B. Claims .....                                                                                                     | 8    |
| C. Summary of the Prosecution History .....                                                                         | 9    |
| VII. Claim Construction.....                                                                                        | 10   |
| VIII. Overview of the Prior Art.....                                                                                | 10   |

|     |                                                                                                                                                                                                                                                                           |    |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| A.  | Harvey .....                                                                                                                                                                                                                                                              | 10 |
| B.  | Riskey .....                                                                                                                                                                                                                                                              | 12 |
| C.  | Rettedal.....                                                                                                                                                                                                                                                             | 13 |
| D.  | Kunda.....                                                                                                                                                                                                                                                                | 14 |
| IX. | Specific Grounds for Invalidity .....                                                                                                                                                                                                                                     | 16 |
| A.  | Ground 1: Claims 5 and 6 are Anticipated Under § 102 by Harvey .....                                                                                                                                                                                                      | 16 |
| 1.  | Claim 5 .....                                                                                                                                                                                                                                                             | 16 |
| 2.  | Claim 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.” .....              | 27 |
| B.  | Ground 2: Claims 5 and 6 are Anticipated Under § 102 by Riskey.....                                                                                                                                                                                                       | 27 |
| 1.  | Claim 5 .....                                                                                                                                                                                                                                                             | 27 |
| 2.  | Claim 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.” .....              | 38 |
| C.  | Ground 3: Claims 5 and 6 are Rendered Obvious Under § 103 by Harvey in view of Riskey.....                                                                                                                                                                                | 38 |
| 1.  | A POSA Would have Been Motivated to Combine Harvey and Riskey .....                                                                                                                                                                                                       | 38 |
| 2.  | The Combination of Harvey and Riskey Meets All Elements of Claims 5 and 6.....                                                                                                                                                                                            | 42 |
| D.  | Ground 4: Claim 7 is Rendered Obvious Under § 103 by Harvey in view of Rettedal.....                                                                                                                                                                                      | 43 |
| 1.  | A POSA Would have Been Motivated to Combine Harvey and Rettedal.....                                                                                                                                                                                                      | 43 |
| 2.  | The Combination of Harvey and Rettedal Meets All Elements of Claim 7 .....                                                                                                                                                                                                | 47 |
| 3.  | Claim 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.” ..... | 48 |

|     |                                                                                                                                                                                                                                     |    |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| E.  | Ground 5: Claims 9 and 10 are Rendered Obvious Under § 103 by Harvey in view of Kunda .....                                                                                                                                         | 49 |
| 1.  | A POSA Would have Been Motivated to Combine Harvey and Kunda .....                                                                                                                                                                  | 49 |
| 2.  | The Combination of Harvey and Kunda Meets All Elements of Claims 9 and 10 .....                                                                                                                                                     | 55 |
| 3.  | Claim 9 .....                                                                                                                                                                                                                       | 55 |
| 4.  | Claim 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.” ..... | 61 |
| A.  | Ground 6: Claim 13 is Anticipated Under § 102 by Risky .....                                                                                                                                                                        | 66 |
| 1.  | Claim 13 .....                                                                                                                                                                                                                      | 66 |
| B.  | Ground 7: Claim 13 is Rendered Obvious Under § 103 by Risky .....                                                                                                                                                                   | 71 |
| 1.  | A POSA Would have Been Motivated to Store Risky’s Computer Code in Risky’s Non-Transitory Computer Readable Media .....                                                                                                             | 71 |
| 2.  | Risky Meets All Elements of Claim 13 .....                                                                                                                                                                                          | 74 |
| C.  | No Relevant Secondary Considerations .....                                                                                                                                                                                          | 75 |
| X.  | Discretionary Denial IS Not Warranted .....                                                                                                                                                                                         | 75 |
| A.  | Section 325(b) .....                                                                                                                                                                                                                | 75 |
| 1.  | <i>Advanced Bionics</i> Part One .....                                                                                                                                                                                              | 75 |
| 2.  | <i>Advanced Bionics</i> Part Two .....                                                                                                                                                                                              | 76 |
| B.  | Section 314(a) .....                                                                                                                                                                                                                | 77 |
| 1.  | Stay Potential .....                                                                                                                                                                                                                | 77 |
| 2.  | Trial Timing and Diligence .....                                                                                                                                                                                                    | 78 |
| 3.  | Litigation Investment .....                                                                                                                                                                                                         | 78 |
| 4.  | Issue Overlap .....                                                                                                                                                                                                                 | 79 |
| 5.  | Litigation Parties .....                                                                                                                                                                                                            | 79 |
| 6.  | Merits .....                                                                                                                                                                                                                        | 79 |
| XI. | Conclusion .....                                                                                                                                                                                                                    | 79 |

|                            |    |
|----------------------------|----|
| XII. PAYMENT OF FEES ..... | 80 |
|----------------------------|----|

**TABLE OF AUTHORITIES**

|                                                                                                                             | <b>Page(s)</b> |
|-----------------------------------------------------------------------------------------------------------------------------|----------------|
| <i>Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH,</i><br>IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020)..... | 75             |
| <i>Amazon.com, Inc. v. M2M Sols. LLC,</i><br>IPR2019-01205, Paper 14 (PTAB Jan. 27, 2020) .....                             | 77             |
| <i>Amperex Tech. v. Maxell,</i><br>IPR2021-01442, Paper 16 (PTAB Apr. 12, 2022) .....                                       | 78             |
| <i>Apple v. Fintiv,</i><br>IPR2020-00019, Paper 11 (Mar. 20, 2020) .....                                                    | 77, 78, 79     |
| <i>Apple v. Seven Networks,</i><br>IPR2020-00156, Paper 10 (PTAB June 15, 2020) .....                                       | 79             |
| <i>Ball Aerosol and Specialty Container, Inc. v. Ltd. Brands, Inc.,</i><br>555 F.3d 984 (Fed. Cir. 2009) .....              | 40, 46         |
| <i>Becton, Dickinson &amp; Co. v. B. Braun Melsungen AG,</i><br>IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017) .....           | 75             |
| <i>Google v. Parus Holdings,</i><br>IPR2020-00846, Paper 9 (PTAB Oct. 21, 2020).....                                        | 79             |
| <i>KSR Intern. Co. v. Teleflex Inc.,</i><br>550 U.S. 398 (2007).....                                                        | <i>passim</i>  |
| <i>Microsoft Corp. v. SurfCast, Inc.,</i><br>IPR2022-00590, Paper 9 (PTAB Oct. 7, 2022).....                                | 77             |
| <i>Sakraida v. Ag Pro, Inc.,</i><br>425 U.S. 273 (1976).....                                                                | 41             |

|                                                                                                                            |    |
|----------------------------------------------------------------------------------------------------------------------------|----|
| <i>Sand Revolution II v. Continental Intermodal Group–Trucking</i> ,<br>IPR2019-01393, Paper 24 (PTAB June 16, 2020) ..... | 77 |
| <i>SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp.</i> ,<br>225 F.3d 1349 (Fed. Cir. 2000) .....                           | 71 |
| <i>St. Jude Medical, LLC v. Snyders Heart Valve LLC</i> ,<br>IPR2018-00105, Paper 15 (PTAB May 3, 2018) .....              | 76 |

**TABLE OF EXHIBITS**

| <b>Exhibit No.</b> | <b>Description</b>                                                                                   |
|--------------------|------------------------------------------------------------------------------------------------------|
| <b>1001</b>        | U.S. Patent No. 10,231,644                                                                           |
| <b>1002</b>        | Declaration of Professor Darrin J. Young                                                             |
| <b>1003</b>        | CV of Professor Darrin J. Young                                                                      |
| <b>1004</b>        | Int'l Appln. No. PCT/US2007/020918, Pub. No. WO 2008/108816 ("Harvey")                               |
| <b>1005</b>        | U.S. Patent Appln. Pub. No. 2009/0187392 ("Riskey")                                                  |
| <b>1006</b>        | U.S. Patent Appln. Pub. No. 2013/0197323 ("Rettedal")                                                |
| <b>1007</b>        | Japanese Patent Appln. No. 2004-215061 A ("Kunda")                                                   |
| <b>1008</b>        | U.S. Patent No. 6,371,927 B1 ("Brune")                                                               |
| <b>1009</b>        | U.S. Patent Appln. Pub. No. 2009/0030279 A1 ("Zander")                                               |
| <b>1010</b>        | U.S. Patent No. 10,231,644 Prosecution History                                                       |
| <b>1011</b>        | U.S. Patent No. 5,482,008 ("Stafford")                                                               |
| <b>1012</b>        | U.S. Patent No. 8,640,712 B2 ("Ardrey, Jr.")                                                         |
| <b>1013</b>        | "RUM_023 Administration of a Rumen Bolus", UQ Animal Ethics Committee – Standard Operating Procedure |
| <b>1014</b>        | U.S. Patent 9,413,585 B2 ("Schulzrinne")                                                             |
| <b>1015</b>        | U.S. Patent 10,594,335 ("Zrilic")                                                                    |
| <b>1016</b>        | U.S. Patent Appln. Pub. No. 2023/0274893 A1 ("Andree")                                               |

| <b>Exhibit No.</b> | <b>Description</b>                                                                             |
|--------------------|------------------------------------------------------------------------------------------------|
| <b>1017</b>        | 2024-05-15 Preliminary Pretrial Conference Order (D.I. 034)                                    |
| <b>1018</b>        | 2024-04-23 Plaintiff's First Amended Complaint (D.I. 025)                                      |
| <b>1019</b>        | U.S. Patent Appln. Pub. No. 2003/0096637 A1 ("Keller")                                         |
| <b>1020</b>        | Excerpt of Oxford Advanced Learner's Dictionary of Current English, 9 <sup>th</sup> ed. (2015) |
| <b>1021</b>        | U.S. Patent No. 11,755,484 B2 ("Gray")                                                         |
| <b>1022</b>        | Int'l Appln. No. PCT/AU88/00225, Pub. No. WO 89/00024 ("Platt")                                |
| <b>1023</b>        | U.S. Appln. Pub. No. 2015/0277885 ("Kimoto")                                                   |

**MANDATORY NOTICES UNDER 37 C.F.R. §42.8**

Pursuant to 37 C.F.R. §42.8, Petitioner states as follows:

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

The real parties-in-interest are smaXtec Inc. and smaXtec Animal Care GmbH.

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

**1. U.S. District Court for the Western District of Wisconsin**

The following pending district court litigation may affect or be affected by this proceeding: *ST Reproductive Technologies, LLC d/b/a/ STinsight v. smaXtec Inc., et al.*, No. 24-cv-00037-JDP (W.D. Wis.), filed January 18, 2024 (“the Wisconsin Litigation”). Petitioner was served with the original complaint on February 2, 2024. Plaintiff filed a First Amended Complaint on April 23, 2024 (“the First Amended Complaint”). The First Amended Complaint alleges, among other things, that Petitioner has infringed certain claims of the ’644 Patent and two other patents, U.S. Patent Nos. 8,823,515 (“the ’515 Patent”) and 9,844,206 (“the ’206 Patent”). The ’206 Patent is a continuation of the ’515 Patent. However, neither of them has any priority application in common with, or is otherwise related to, the ’644 Patent.

**2. Patent Trial and Appeal Board**

Petitioner has filed the following *Inter Partes* Review Petitions:

- IPR2024-00885 ('515 Patent), Petition filed May 2, 2024; and
- IPR2024-00875 ('206 Patent), Petition filed May 2, 2024.

Although neither of the '515 and '206 Patents is in the same family as the '644 Patent, Cases IPR2024-00885 and IPR2024-00875 may affect indirectly or may be affected indirectly by the decision in this proceeding due to the involvement of all three patents in the Wisconsin Litigation.

**C. Lead and Backup Counsel and Service Information (37 C.F.R. §§42.8(b)(3) and (b)(4))**

| <b>Lead Counsel</b>                                                                                                                                                                 | <b>Backup Counsel</b>                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Jeffrey B. Plies, Reg. No. 46,999<br>Dechert LLP<br>300 West 6th Street, Suite 1850<br>Austin, Texas 78701<br>jeffrey.plies@dechert.com<br>Tel (512) 394-3012<br>Fax (512) 394-3001 | Michael A. Fisher, Reg. No. 42,536<br>Dechert LLP<br>Cira Centre<br>2929 Arch Street<br>Philadelphia, PA 19104-2808<br>michael.fisher@dechert.com<br>Tel (215) 994-2079<br>Fax (215) 655-2279 |

Please send all correspondence to lead counsel at the address above. Petitioner consents to service by e-mail sent to all of the following addresses: jeffrey.plies@dechert.com, michael.fisher@dechert.com, and smaXtec-IPRS@dechert.com.

**I. INTRODUCTION**

smaXtec Inc. and smaXtec Animal Care GmbH (collectively “smaXtec” or “Petitioner”) requests *inter partes* review (“IPR”) and cancellation of Claims 5-7, 9, 10, and 13 (“the Challenged Claims”) of U.S. Patent No. 10,231,644 (“the ’644 Patent”) (Ex. 1001). IPR of the Challenged Claims should be instituted and the claims found unpatentable.

**II. CERTIFICATION OF GROUNDS FOR STANDING UNDER 37 C.F.R. § 42.104(a)**

Petitioner certifies that the ’644 Patent is available for IPR and Petitioner is not barred or estopped from requesting IPR of the Challenged Claims.

**III. IDENTIFICATION OF RELIEF REQUESTED AND GROUNDS FOR CHALLENGE UNDER 37 C.F.R. §§ 42.22(a)(1) AND 42.104(b)**

Petitioner requests review and cancellation of Claims 5-7, 9, 10, and 13 of the ’644 Patent on the following grounds:

| Ground | Claims | Basis           | Prior Art                                                                                  |
|--------|--------|-----------------|--------------------------------------------------------------------------------------------|
| 1      | 5, 6   | 35 U.S.C. § 102 | Int’l Appln. No.<br>PCT/US2007/020918, Pub. No.<br>WO 2008/108816 (“Harvey”) (Ex.<br>1004) |
| 2      | 5, 6   | 35 U.S.C. § 102 | U.S. Patent Appln. Pub. No.<br>2009/0187392 (“Riskey”) (Ex.<br>1005)                       |
| 3      | 5, 6   | 35 U.S.C. § 103 | Harvey in view of Riskey                                                                   |

|   |       |                 |                                                                                      |
|---|-------|-----------------|--------------------------------------------------------------------------------------|
| 4 | 7     | 35 U.S.C. § 103 | Harvey in view of U.S. Patent Appln. Pub. No. 2013/0197323 (“Rettedal”) (Ex. 1006)   |
| 5 | 9, 10 | 35 U.S.C. § 103 | Harvey in view of Japanese Patent Application No. 2004-215061 A (“Kunda”) (Ex. 1007) |
| 6 | 13    | 35 U.S.C. § 102 | Risky                                                                                |
| 7 | 13    | 35 U.S.C. § 103 | Risky                                                                                |

For purposes of the district court litigation, Petitioner reserves the right to argue that one or more of the terms in the claims of the ’644 Patent are indefinite or require construction.

#### **IV. BACKGROUND OF THE TECHNOLOGY**

The ’644 Patent relates to a bolus which measures an animal’s physiological parameters and wirelessly transmits the measurements to an animal monitoring system. Ex. 1001, Title, Abstract, 1:1-7, 2:64-3:1, 3:58-4:61, 8:28-34, 8:62-64, 10:9-11:27, 14:9-13, 17:56-18:20, Figs. 2-5. The ’644 Patent purports to solve problems with prior-art boluses, including that their operational lifespan is too short, and that the orientation of the bolus antenna may adversely affect radio signal transmission, resulting in loss of data. *Id.* 1:21-30.

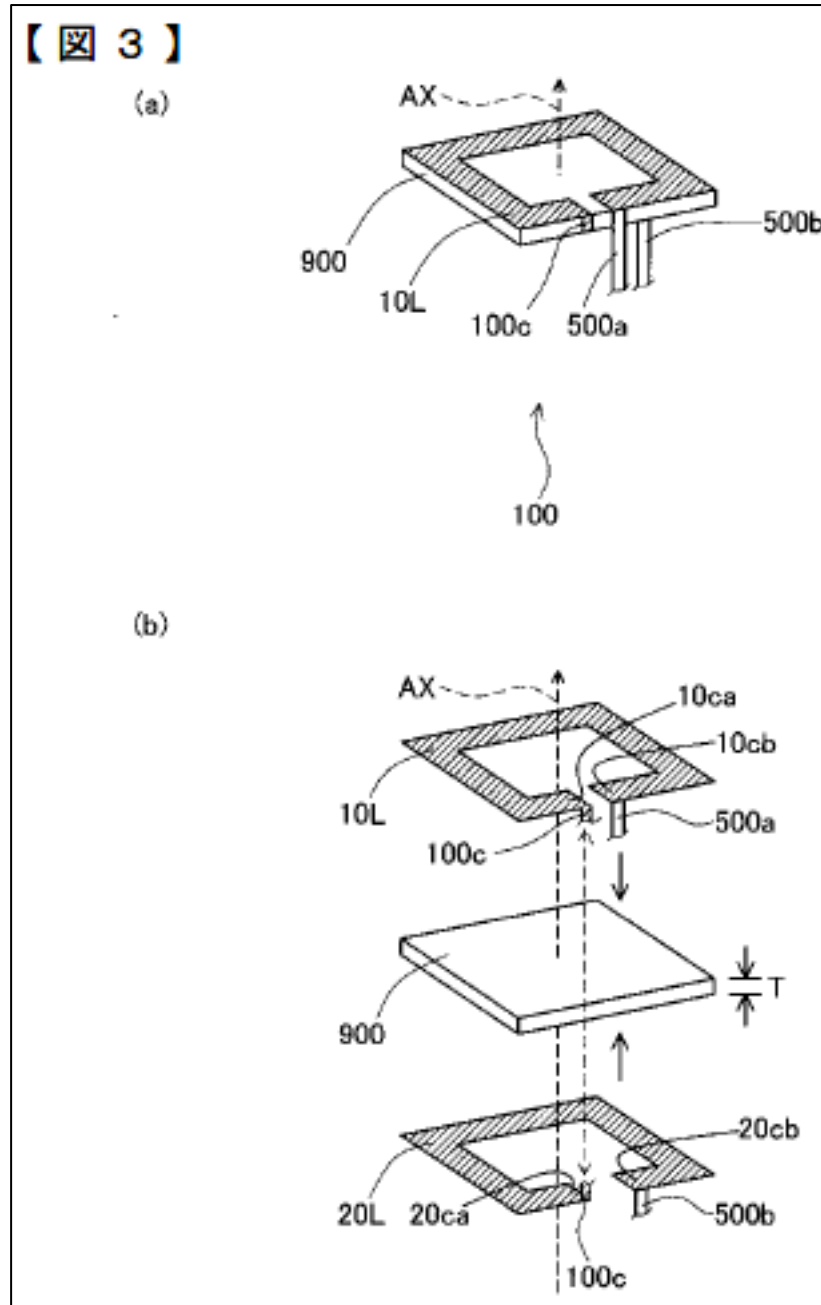
The alleged inventions of the ’644 Patent enable: (1) conserving energy to increase the lifespan of the bolus by (a) controlling operation of the radio signal

generator, and (b) enabling and disabling the sensors at certain times; and (2) improving consistency of signal transmission by employing an antenna having two electrically conductive loops. *Id.* 1:41-2:9, 6:41-7:33, 7:48-8:27, 10:4-9, 10:21-43, 11:51-63, Figs. 6-13; *see also* Ex. 1002, ¶ 30.

These purported innovations were not new, but existed in the prior art. For example, without limitation, Harvey, Risky, and Rettedal all describe boluses which save energy by controlling the operation of a radio signal generator that transmits sensor data. *See, e.g.*, Ex. 1004, 27:22-28:5 (“XPDR 5000 can reduce overall transponder power consumption by performing a predetermined power management operation...”), 68:25-29; Ex. 1005, [0049] (controlling radio transmission to “reduce the power consumed by bolus”), [0055]; Ex. 1006, Abstract (controlling radio transmission), [0061]-[0062].

Risky further describes reducing bolus power consumption by deactivating the sensors and re-activating them only when measurements are required. Ex. 1005, [0042] (Sensors “deactivated in order to reduce the power consumed by bolus,” then “re-activated.”), [0056]; *see also* Ex. 1002, ¶ 32.

Double-loop antennas were also common in 2015. For example, Kunda depicts such an antenna for 900 MHz operation, comprising electrically conductive loops 10L and 20L separated by a dielectric substrate 900:



Ex. 1007, Figs. 3(a), 3(b); *see also id.* [0001], [0023]-[0024] (using illustrated antenna to transmit/receive in 900-MHz band); Ex. 1002, ¶ 33.

## V. PERSON OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSA”) as of the claimed priority date would have had at least a bachelor’s degree in electrical engineering or a related or equivalent field, and three or more years of experience researching, developing, designing and/or evaluating sensor systems for humans or other animals. However, additional years of education in the above-referenced fields may compensate for fewer years of experience. Ex. 1002, ¶ 35.

## VI. THE ’644 PATENT

### A. Summary of the Specification

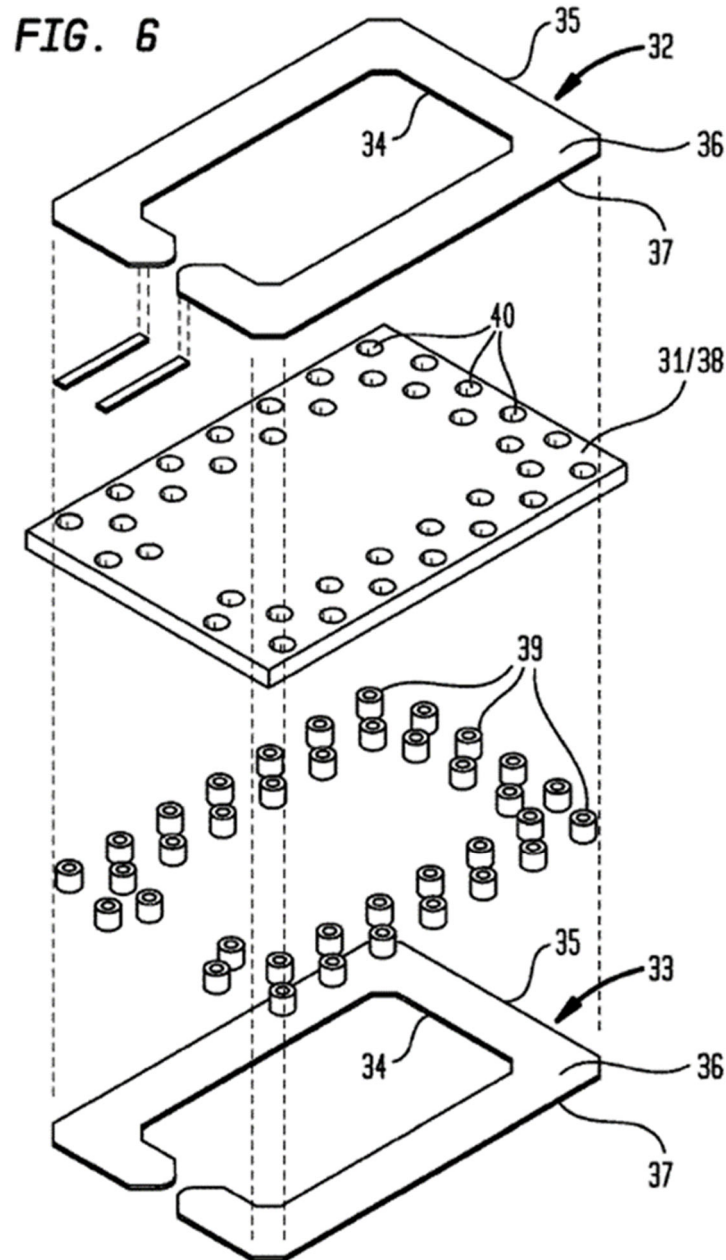
The ’644 Patent describes a bolus which is orally administered to a ruminant animal and remains in the animal’s reticulorumen over the animal’s productive lifespan. Ex. 1001, Abstract, 1:1-7, 1:34-40, 7:66-8:12. The bolus has sensors which measure, *e.g.*, the animal’s movement, temperature, and/or sounds. *Id.* 3:58-4:39, 8:28-34, 8:62-64, Figs. 2, 4, 5. The bolus transforms the sensor measurements into encoded physiological data and transmits the encoded data wirelessly to an animal monitoring system using a radio-frequency (“RF”) signal produced by a radio signal generator. *Id.* 4:24-61, 10:9-11:27, 14:9-13, 17:56-18:20, Figs. 2, 3. The radio signal generator can operate between about 700 MHz-1 GHz. *Id.* 4:53-61.

The bolus is powered by a battery which cannot be recharged; thus the device’s operational lifespan depends on battery capacity and the current needed to

power the bolus's circuitry. *Id.* 7:34-50, Figs. 2, 4, 5. The bolus contains a microcontroller which has a processor in communication with a memory element storing computer code. *Id.* 3:8-16, 4:24-26, Figs. 2, 4, 5. The computer code can be re-programmed based on programming data received by the bolus via a radio signal. *Id.* 1:59-66, 11:28-33, 11:64-12:13, 16:51-58.

To conserve energy and thus extend the bolus's operational life, the computer code includes a power management module which regulates energy use. *Id.* 3:8-16, 7:56-65, Figs. 2, 4, 5. For example, the power management module can enable or disable the sensors depending on how frequently readings are needed. *Id.* 10:4-31, 10:55-11:27, 11:60-63. In addition, (1) the majority of energy used by the bolus is for operating the radio signal generator, and (2) the limited amount of data needed to monitor an animal can be transmitted using short—*e.g.*, a few milliseconds—transmission bursts separated by substantial—*e.g.*, 24-hour—time periods. *Id.* 10:26-38. In addition, the usefulness of an animal's physiological data differs during different life stages. *Id.* 10:4-16. Therefore, the power management module further saves energy by (1) reconfiguring the time between transmission bursts, and (2) controlling how long the transmitter is turned on during a transmission, depending on the animal's life stage. *Id.* 1:59-66, 10:37-43, 11:18-27, 11:51-60; *see also id.* 1:41-53, 7:48-8:27, 10:21-26.

The bolus described in the '644 patent includes an antenna having two electrically conductive loops 32 and 33 separated by an insulating substrate 31:



*Id.* 6:33-7:33, Figs. 6-13. Such an antenna does not rely on a winding around a magnetic core to transmit the radio signal; thus, it improves transmission by avoiding

the interference that such a core can cause. *Id.* 6:51-61. The bolus includes matching elements—inductors and capacitors—to match the impedance between the radio signal generator and the antenna. *Id.* 5:4-10, 6:12-17, Figs. 2, 4, 5; *see also* Ex. 1002, ¶ 39.

## **B. Claims**

The '644 Patent has 19 claims, of which Claims 5-7, 9, 10, and 13 are challenged in this Petition. Claims 5, 9, and 13 are independent. Each Challenged Claim refers to monitoring physiological parameters of a ruminant animal using a bolus administered to the animal, a technique which the '644 Patent acknowledges was known in the prior art, since it is described in the patent's Background section. *Id.* 1:16-30, 21:28-34, 22:14-20, 22:45-47. Challenged Claims 5-7, 9, and 10 further refer to encoding the physiological data and generating a radio signal to carry the encoded physiological data, which the '644 Patent also admits was known in the prior art. *Id.* 1:28-30, 21:35-45, 22:21-30. Additional limitations of the independent Challenged Claims include, without limitation:

- Claim 5:
  - activating the radio signal generator at pre-determined intervals to generate a radio signal to carry the encoded physiological data, and

- the radio signal having a frequency of between about 700 MHz-1 GHz;
- Claim 9: an antenna having a pair of electrically conductive loops disposed a distance apart; and
- Claim 13:
  - enabling or disabling one or more sensors in said bolus by execution of a computer code, and
  - re-programming said computer code based on a radio signal.

*Id.* 21:43-47, 22:31-33, 22:48-49, 22:58-60.

### **C. Summary of the Prosecution History**

U.S. Patent Appln. No. 14/738,789 (“the ’789 Application”), which matured into the ’644 Patent, was filed on June 12, 2015. During prosecution, the USPTO rejected the pending claims several times over U.S. Patent No. 6,371,927 (“Brune,” Ex.1008) and/or U.S. Patent Publication No. 2009/0030279 (“Zander,” Ex. 1009) and for other, non-prior-art-related grounds. Ex. 1010 at 189-99, 427-39, 493-502. Each time, the Applicant responded by amending, adding, and/or canceling claims. *Id.* 310-14, 475-81, 551-56. The PTO issued a Notice of Allowance on November 7, 2018 and issued the ’644 Patent on March 19, 2019. *Id.* 562-63, 600.

Brune and Zander were the only prior-art references substantively discussed during prosecution. Although the Applicant filed IDSs disclosing Risky and

Rettedal, among others, and although the examiner complied with the formality of signing those IDSs with the footnote “ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH,” Ex. 1010 at 163, 174, 203, 205, there is no evidence that the PTO substantially considered Risky, Rettedal, or any references other than Brune and Zander.

## **VII. CLAIM CONSTRUCTION**

Petitioner does not currently seek construction of any terms.

## **VIII. OVERVIEW OF THE PRIOR ART**

Petitioner asserts seven grounds for invalidity based on the following four prior art references:

### **A. Harvey**

Harvey describes a management system for cattle or other ruminants, in which each animal (“monitored subject”) is provided with an “intelligent active tag” (“IAT”) containing one or more RF-enabled, battery-powered transponders (“XPDRs”). Ex. 1004, 1:16-19, 2:16-26, 3:3-6, 7:26-29, 11:10-14, 13:22-23, 17:29-33, 22:29-32, 45:21-33 (battery-powered), 60:31 (monitored subject is an animal). Although one embodiment is an ear tag, the IAT can also be a digestive tract bolus remaining indefinitely within the animal. *Id.* 11:10-14. Harvey illustrates the IAT and its embedded transponder in, *e.g.*, Figs. 1, 2A-2C, 4, 5, and 7, and explains that the descriptions in the specification apply equally to the devices illustrated in any

and all of those drawings. *Id.* 48:31-33 (“Like XPDR 5000 in FIG. 5, XPDR 7020 [illustrated in Fig. 7] may be included in an embodiment of an intelligent active tag, such as IAT 1110 in FIG. 1, and may be additionally described with respect to tag 2000 in FIGS. 2A-2C and FIG. 4.”), 57:19-26 (software in INT 7100 illustrated in Fig. 7 receives data and alerts from transponder 5000 illustrated in Fig. 5), 70:22-23 (“XPDR 5000 may be a constituent of an intelligent active tag, such as IAT 1110 in FIG.1, and tag 2000 in FIG. 2C and FIG. 3B.”). Thus, *e.g.*, the transponders 4300 in Fig. 4, 5000 in Fig. 5, and 7020 and 7021 in Fig. 7 are interchangeable examples of the same device. Ex. 1002, ¶ 43.

Harvey’s transponder has sensors for monitoring physiological parameters of the animal, including, *e.g.*, body temperature, heart rate, respiration, humidity, hydration state, and electroencephalogram (“EEG”), electrocardiogram (“ECG”) or electromyogram (“EMG”) waves. Ex. 1004, 2:27-30, 2:35-3:2, 11:15-17, 37:35-38:31, 39:15-41:28, 65:1-16, 71:17-20, 73:6-8, 75:18-22, 75:18-22. The transponder also includes a transceiver with an antenna configured to transmit wireless signals to one or more fixed or hand-held monitoring transceivers. *Id.* 2:30-32, 8:21-23, 15:24-26, 16:28-36, 23:11-21, 24:14-25. The wireless signals carry messages containing the physiological measurements made by the sensors in the transponder. *Id.* 2:27-32, 3:18-20, 17:21-22. Communications are performed within a selected frequency band which can be, *e.g.*, 850-950 MHz. *Id.* 43:4-6, 55:14-18.

Harvey was not before the examiner during prosecution of the '644 Patent.

**B. Riskey**

Riskey describes an ingestible bolus containing sensors for monitoring physiological parameters of a bovine or other ruminant animal. Ex. 1005, Abstract (“An ingestible bolus may be disposed within the stomach of an animal. The bolus may comprise one or more sensors to monitor one or more internal and/or external animal characteristics.”), [0016]-[0017]. The “[m]onitored animal characteristics may include physiological characteristics, such as animal temperature, stomach pH, blood pH, heart rate, respiration, stomach or rumen contractions, and the like.” *Id.* [0025]; *see also id.* [0033], [0035], [0063], [0067]-[0068], [0075]-[0081], [0086]-[0087], [0116], Figs. 1-8. The measurement information from the sensors is stored in an on-board memory within the bolus and transmitted wirelessly to a base station at periodic intervals via an RF signal. *Id.* Abstract (“The bolus may comprise a data transmitter in wireless communication with a base station.”), [0019], [0021], [0037], [0044] (“Sensor 220 may store such measurements on an internal sensor storage location or on memory unit 250.”), [0049]-[0050] (“[P]rocessor 240 may transmit an animal characteristics message comprising some or all of the measurements stored in memory unit 250 at each transmission interval.”), [0055]-[0056], [0059], Fig. 2.

Riskey appears in the prosecution history of the '644 Patent in a September 23, 2015 IDS initialed by the examiner. Ex. 1010 at 174, 203. However, the examiner never substantively discussed or even addressed Risky during prosecution. For example, Risky does not appear in any office action or other correspondence with the PTO except the above-referenced IDS.

### C. Rettedal

Rettedal describes a bolus which is orally administered to a ruminant animal and remains in the animal's stomach—*e.g.*, reticulum. Ex. 1006, Abstract (“An animal monitoring device configured as a bolus for oral administration to reside in an animal's stomach.”), [0002], [0003], [0022] (bolus “can be orally administered to reside in a reticulum...of the animal..., including ruminant animals such as cows, deer sheep, or the like”), [0025], [0037], [0046], [0051]-[0053], Claim 69, Fig. 1. The bolus has sensors which measure, *e.g.*, the animal's temperature, stomach pH, heart rate, and other physiological parameters. *Id.* Abstract, [0002], [0003], [0022], [0023], [0023], [0061]-[0062] (sensors measure “physiological characteristics of the animal...such as temperature, pH, conductivity of a fluid, heart rate, blood pressure, partial pressures of dissolved gases, or the like”), Claims 69, 76, 77, Figs. 4-6.

Rettedal's bolus uses a radio signal generator to transmit the physiological measurements wirelessly to a base station. *Id.* [0003] (temperature measurements “transmitted by radio-frequency to a radio-frequency receiver.”), [0024], [0044],

[0046], [0051], Claims 69, 79-81, Figs. 1, 4-6. The radio signal generator can operate at, *e.g.*, 800 or 900 MHz. *Id.* [0062]-[0063], Claim 81.

Rettedal's bolus also includes an antenna for transmitting the radio signals, and a matching circuit 118 connected to the antenna. *Id.* [0011], [0051], [0064], [0066], Fig. 6. The matching circuit adjusts the frequency of the radio signal to compensate for the effect of the mass of the animal on the radio signal. *Id.* [0011], [0064] (matching circuit “detune[s]” the RF signal to “compensate for demodulation of the...signal...due to interaction with the mass of animal (3)”); Ex. 1002, ¶ 51.

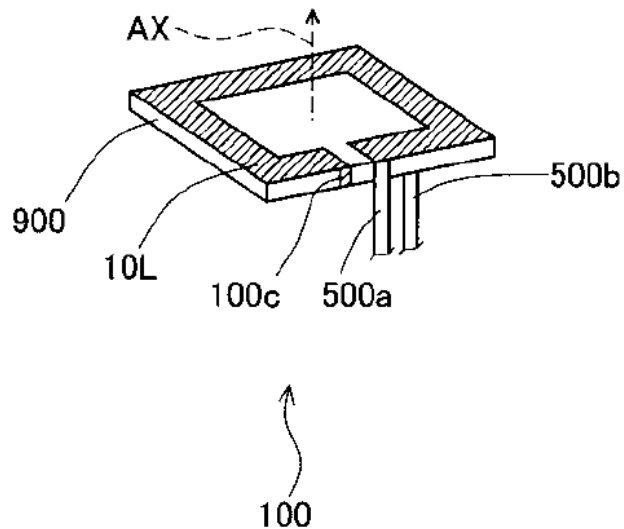
Similarly to Risky, Rettedal appears in the prosecution history of the '644 Patent in a June 12, 2015 IDS initialed by the examiner, Ex. 1010 at 163, 205, but was never substantively discussed or addressed during prosecution. Rettedal does not appear in any PTO correspondence except the above-referenced IDS.

#### **D. Kunda**

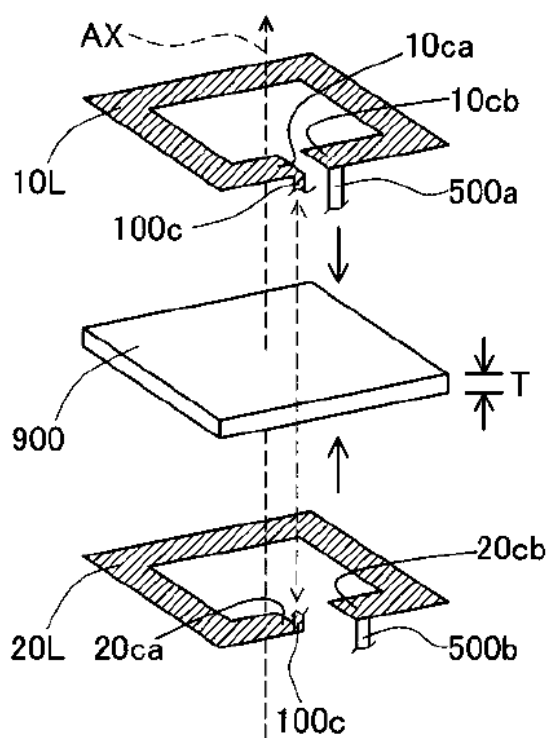
Kunda describes radio-communication antennas for use in wireless networks, portable wireless communication devices, and Bluetooth applications. Ex. 1007, [0001]-[0002], [0023]. Kunda teaches exemplary antennas which each comprises a pair of electrically conductive loops disposed on either side of a dielectric substrate—*e.g.*, loops 10L and 20L and substrate 900 depicted in Figs. 3(a) and 3(b):

【図 3】

(a)



(b)



*See also id.* Summary, Claims 1-7, [0007]-[0021] (two-loop antenna used for radio communication), [0028]-[0066], [0072]-[0078], Figs. 1, 2, 4, 6-8, 11; Ex. 1002, ¶ 53.

Kunda was not before the examiner during prosecution.

## IX. SPECIFIC GROUNDS FOR INVALIDITY

### A. Ground 1: Claims 5 and 6 are Anticipated Under § 102 by Harvey

#### 1. Claim 5

##### a. 5[Pre]: “A method of monitoring physiological parameters of a ruminant animal, comprising:”

Regardless of whether the preamble of Claim 1 is limiting, it is taught by Harvey. Harvey teaches a method of monitoring physiological parameters—*e.g.*, body temperature, heart rate, respiration, humidity, hydration state, and EEG, ECG or EMG waves—of one or more ruminant animals, *e.g.*, cattle. Ex. 1004, 1:16-19 (invention relates to “livestock management system”), 7:26-29 (“monitored subjects [are] cattle”), 11:10-14 (“In ruminant monitored subjects such as cattle, a digestive tract bolus tag may be retained indefinitely within the animal.”), 13:22-23, 37:35-38:18 (measuring “biological property” of animal), 38:25-31, 39:15-36, 40:17-20, 40:25-41:28, 71:17-20, 73:6-8, 74:6-7, 75:18-22; *see* Ex. 1002, ¶¶ 55.

- b. **5[A]: “generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal”**

Harvey teaches generating sensor signals from sensors contained in a bolus orally administered to a ruminant animal. Harvey states: “IAT...may be...a digestive tract bolus device....In ruminant monitored subjects such as cattle, a digestive tract bolus tag may be retained indefinitely within the animal.” Ex. 1004 11:10-14. A POSA would interpret Harvey’s reference to a “digestive tract bolus device” as meaning an orally administered device, since that is how the term “bolus” is used in ruminant agriculture. *See, e.g.*, Ex. 1011, 3:21-22 (describing “bolus” as “a body which can be administered orally to a ruminant animal”); Ex. 1012, 1:17-19 (describing device “commonly referred to as a bolus, which is ingestible by animals”); Ex. 1013 (describing “safe administration of a rumen bolus” to a ruminant animal, consisting of oral administration). Indeed, the background (prior art) section of the ’644 Patent acknowledges that “oral[]” administration is the “conventional” way to deliver a bolus to a ruminant animal. Ex. 1001, 1:18-20; Ex. 1002, ¶ 56. A POSA would understand the term “bolus” to refer to a device orally consumed by the animal. Ex. 1002, ¶ 56. Thus, oral administration is necessarily present—and thus inherent—in Harvey’s disclosure of a digestive tract bolus tag that may be retained indefinitely in a ruminant animal. *Id.*

Harvey's bolus includes a transponder containing multiple sensors, as illustrated in Fig. 5:

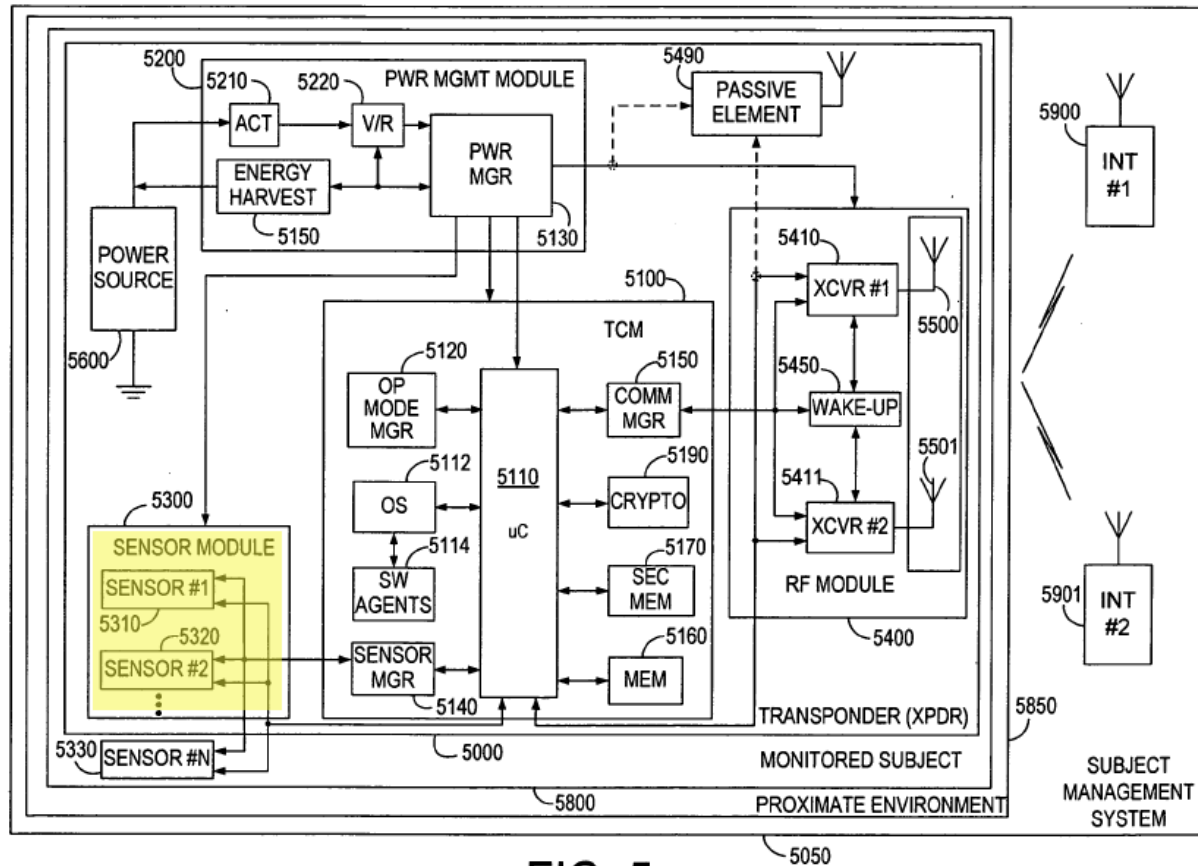


FIG. 5

Examples of signal-producing sensors in Harvey's bolus include a body-temperature sensor, a heart-rate sensor, an accelerometer, a humidity sensor, and/or electrical sensors to measure EEG, ECG, or EMG waves. Ex. 1004, 38:25-31 (sensors measure animal's "corpus temperature...or...cardiac pulse rate"), 40:25-37 (thermal sensor measures animal's "body temperature [to] provide a sensed thermal parametric signal [or] a sensed thermal gradient parametric signal"), 39:15-36, 40:17-20, 41:1-6. These sensors generate signals. See, e.g., 37:35-38:18

(transponder “transform[s] the sensed physical quantity representation to a sensed data signal”; “A sensor can be a transducer configured to sense a measurable physical property of a physical system, and to produce a measurand representative of an attribute of the measurable physical property. A measurable physical property may be a mechanical, an electrical, a chemical, an optical, or a biological property.”), 41:24-25 (“Sensor manager 5140” receives input signals from sensors), 71:17-21, 73:6-8, 74:6-7, 75:18-22, Fig. 5, Fig. 12 (sensing and storing physical quantity, steps S12420, S12430). Thus, a POSA would understand that that the sensors in the orally administered bolus generate sensor signals. Ex. 1002, ¶¶ 58.

c. **5[B]: “said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal”**

As discussed *supra* Element 5[A], Harvey teaches numerous sensor signals representing physiological parameters of a ruminant animal. Each sensor signal varies based on a corresponding change in the physiological parameter that the signal represents. For example, Harvey states that the disclosed transponder can store “subject dynamic information,” including “a sensed physiological parameter” of the animal, and that “a sensor can be a transducer configured to sense a measurable physical property...and to produce a measurand representative of an attribute of the measurable physical property....,” wherein said attribute may be “dynamic, or substantially dynamic in nature.” Ex. 1004, 11:20-24, 38:2-6. A POSA would

understand that storing a “dynamic” physiological parameter includes storing changes in that parameter; thus, the sensor signal must vary based on changes in the parameter. Ex. 1002, ¶ 59. Indeed, Harvey’s “subject dynamic information” can include “a change in...a [physiological] parameter....” Ex. 1004, 11:20-24.

Moreover, to represent a changing physiological parameter—*e.g.*, temperature or heart rate as described in Harvey—the sensor signal must necessarily vary with changes in that parameter. Ex. 1002, ¶¶ 59, 60. Thus, even if Harvey did not expressly indicate that the sensor signals vary with changes in the animal’s physiological parameters—which it does—signal variation is inherent in any signal representing a changing parameter. *Id.*

d. **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”**

A POSA would recognize that the sensors described in Harvey—*see supra* § IX.A.1.d—produce signals which start out in analog form since the signals (*e.g.*, voltages) correspond to physical phenomena that vary continuously. Ex. 1022, Fig. 1, 1:31-2:13, 4:22-5:6 (physiological parameters such as ECG, temperature, and heart rate are sensed in analog form and must be converted to digital); Ex. 1002, ¶ 62. The sensor measurements are then: (1) sent into the transponder’s microcontroller 5110, which is a digital device and thus processes information

digitally, *see* Ex. 1004, 29:21-28, 39:4-5 (sensors “provide sensed data to uC 5110”), Fig. 5; (2) stored in the transponder’s memory, *see infra* Element 5[D]; and (3) transmitted wirelessly using one or more digital protocols such as, *e.g.*, Bluetooth, Zigbee, IEEE 802 (*e.g.*, 802.15.1, 802.15.3, 802.15.4, 802.15.4a, 802.11a, 802.11b, 802.11g, 802.11n, 802.16b), WiFi, 3G, or 4G, *see* Ex. 1004, 10:3-11:3, 24:20-23, 42:36-43:20. Since storage in memory and transmission by a digital protocol involve digital information, not analog signals, Harvey necessarily requires the analog signals to be encoded into digital form as physiological data corresponding to the measured physiological parameters.

That 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. A POSA would understand that an ADC is necessarily present to produce the digital signals. Ex. 1002, ¶ 63. A POSA would further understand that converting an analog signal to digital form comprises encoding the analog signal, and that the resulting digital representation of the analog signal comprises encoded data. For example, without limitation, ADCs commonly convert analog signals into digital signals using pulse-code modulation (“PCM”), which is a form of digital encoding. *See, e.g.*, Ex. 1014, 9:17-20 (describing “PCM encoder and decoder that performs analog-to-digital (A/D) and digital-to-analog (D/A) conversion”); Ex. 1015, 1:49-60 (describing prevalence of PCM encoding in analog-to-digital

conversion); *see also* Ex. 1020, 3 (“encode...(computing) to change information into a form that can be processed by a computer”); Ex. 1002. ¶ 63.

e. **5[D]: “storing said encoded physiological data in a non-transitory computer readable media”**

Harvey’s transponder includes computer readable media—memory 5160 and secure memory (SECMEM) 5170—as illustrated in Fig. 5:

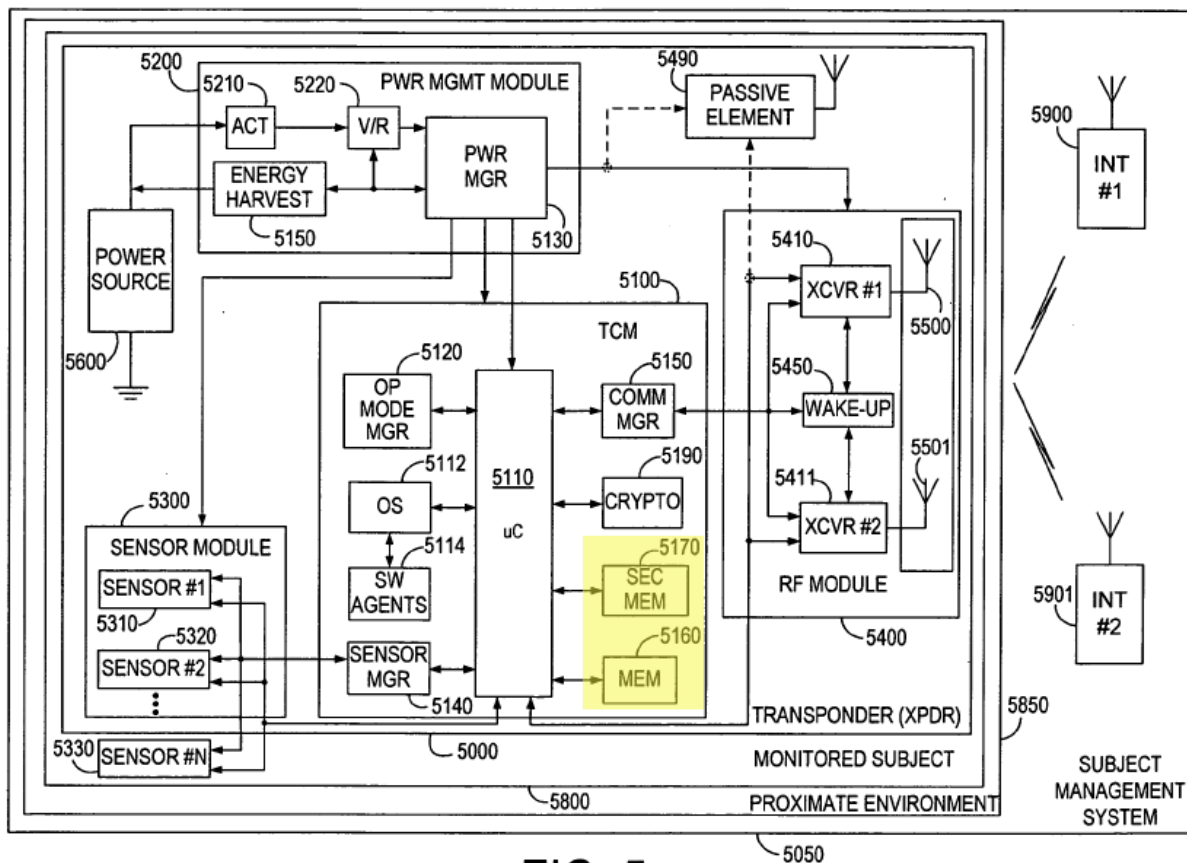


FIG. 5

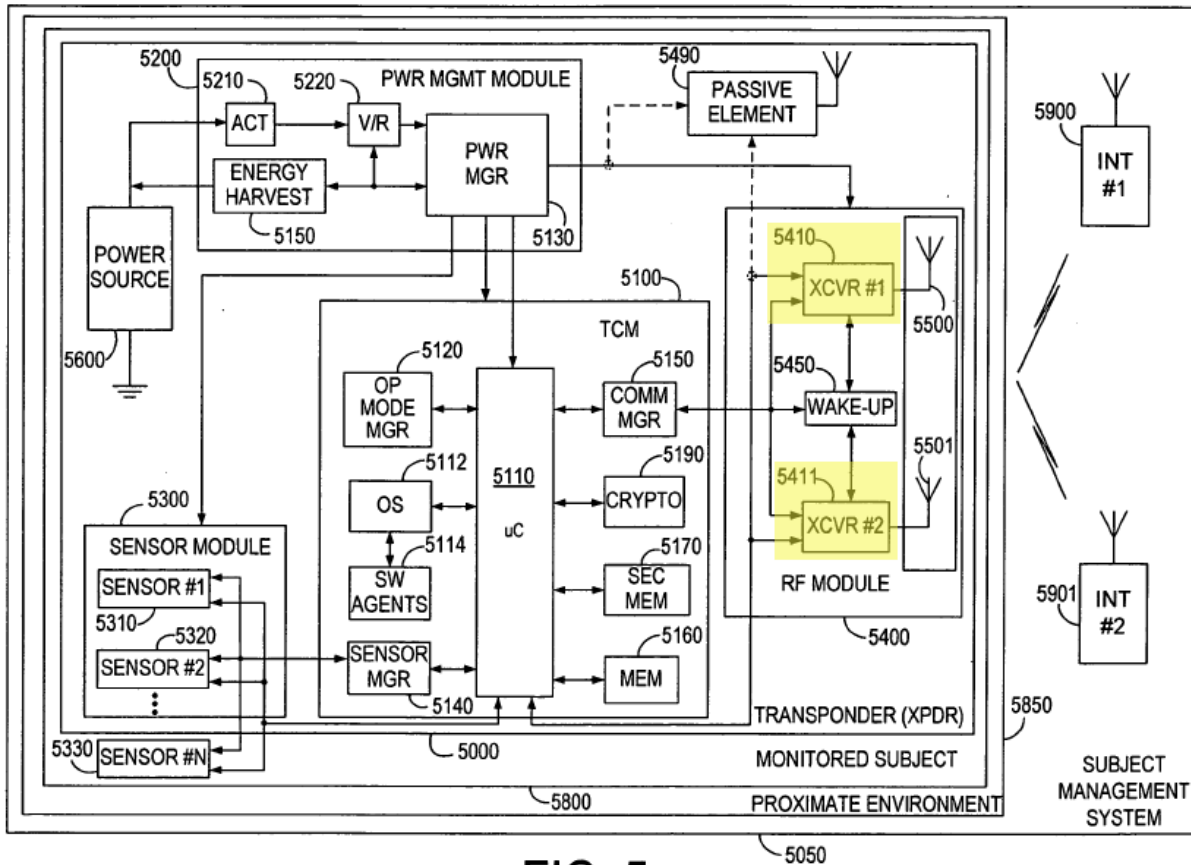
Each of memories 5160 and 5170 comprises “non-volatile” memory—which a POSA would understand is non-transitory computer readable media. Ex. 1004, 29:16-24 (The transponder includes “transponder controller module (TCM) 5100,”

which includes “memory (MEM) 5160....MEM 5160 may include...non-volatile memory....”), 30:6-9 (“TCM 5100 also may include secure non-volatile memory (SECMEM) 5170....”). Ex. 1002, ¶ 65.

The transponder stores the encoded animal physiological data in non-volatile (*i.e.*, non-transitory) memory 5160 and/or 5170. *Id.* 11:20-24 (“IAT...may...store subject dynamic information as subject data[, *e.g.*,] a monitored subject vital sign, a sensed physiological parameter,...or a change in one or more of a sign, a parameter, a motion, or a condition.”), 14:1-3, 30:9 (“SECMEM 5170 may store subject data securely.”), 33:32-34:5 (“[P]ulled data may be buffered in MEM 5160, SECMEM 5170, or both. Pulled data may include...a...sensed physical quantity representation...”), 34:12-17 (storing “sensed physical quantities [in] MEM 5160”), 71:17-21, Fig. 5; Ex. 1002, ¶ 66.

f. **5[E]: “enabling a radio signal generator located within said bolus”**

The transponder within Harvey’s cattle bolus includes RF module 5400 which includes RF transceivers 5410 and 5411, depicted in Fig. 5:



See also Ex. 1004, 29:17-18 (transponder includes RF module (“RFM”) 5400), 42:3-11 (RF module 5400 includes RF transceivers 5410 and 5411), 43:4-44:2, Fig. 5. Each RF transceiver generates radio signals and thus is a radio signal generator, as is the entire RF module. *Id.*; see also *id.*, 45:8-15 (antennas 5500 and 5501 transmit the generated radio signals), Fig. 5; see also *id.* 2:30-32, 23:11-21, 24:14-25 (circuitry for wireless transmission), 50:28-32, 51:18-20 (interrogator 7100 receives message from transponder 7020 or 7021), 51:36-52:19, 56:18-26 (receiving radio signals from transponders 7020 and 7021), Fig. 7.

Harvey further discloses a power management module (“PMM”) 5200 which supplies power to RF module 5400, causing communication manager 5150 to transmit the sensed subject parameters using RF module 5400. *Id.* 32:7-17, Fig. 5; *see also id.* 32:21-34. A POSA would understand that supplying power to an RF module having RF transceivers enables those transceivers. Ex. 1002, ¶ 70. Furthermore, every time Harvey’s bolus activates RF transceivers 5410 and 5411—*e.g.*, when they begin to transmit subject data, *infra* Element 5[F]—it is necessarily enabling a radio signal generator. *Id.*

Thus, Harvey teaches enabling a radio signal generator located within the bolus. Ex. 1002, ¶¶ 67-70.

g. **5[F]: “activating said radio signal generator at pre-determined intervals to generate a radio signal to carry said encoded physiological data”**

Harvey teaches activating the radio signal generator at predetermined intervals to generate the outgoing radio signal carrying encoded physiological data about the monitored animal.

In Harvey, wirelessly transmitted IAT messages carry the stored and encoded “subject data,” including sensed animal physiological data. Ex. 1004, 14:1-3 (“IAT 1110 may transmit an outbound IAT message including subject data, which may be stored subject data ....”), 3:18-20, 14:7-9, 15:24-26, 17:18-22, 25:8-11, 33:32-34:5, 65:1-16, 66:3-5, 72:4-73:8, 75:18-22, Fig. 7; Ex. 1002, ¶ 71. The transmitted subject

data includes the sensed physiological parameters of the monitored animal. Ex. 1004, 11:20-22 (“IAT 1110 also may be configured to store subject dynamic information as subject data ... includ[ing] a monitored vital sign, a sensed physiological parameter ...”), 11:15-18, 12:30-35, 44:28-32. A POSA would understand that it would make no sense for the orally-administered bolus to take sensor measurements but not transmit them. Ex. 1002, ¶ 71.

The IAT transponder can transmit outbound messages in a “periodic” manner using a “preselected tag transmission interval” such as every two seconds. Ex. 1004, 26:6-11. The IAT transponder may be assigned its “selected tag transmission interval” during manufacture or by self-assignment. *Id.* 27:14-21; *see also id.* 28:22-27, 32:12-19, 65:32-66:2, 66:19-22, Fig. 9.

A POSA would understand that Harvey’s RFM and RF transceivers (which are radio signal generators) are necessarily activated at the beginning of each transmission interval in order to transmit the IAT message containing the encoded physiological data. Ex. 1002, ¶ 74.

- h. **5[G]: “generating said radio signal having a frequency of between about 700 MHz to about 1 GHz”**

The transceivers in Harvey’s transponder can generate a radio signal having a frequency “between about 850 MHz to about 950 MHz,” Ex. 1004, 43:4-6, which is between 700 MHz and 1 GHz. *Id.* 55:14-18; *see also* Ex. 1001, 19:45-47 (“The

recitation of numerical ranges by endpoints includes all the numeric values subsumed within that range.”); Ex. 1002, ¶ 75.

2. **Claim 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.”**

The transceivers in Harvey’s transponder can operate in the 850-950 MHz frequency range. *See supra* Element 5[G]. Thus, they meet this Markush limitation, which includes that range. *See* Ex. 1001, 19:45-47 (A numerical range includes all values within that range.); Ex. 1002, ¶ 76.

**B. Ground 2: Claims 5 and 6 are Anticipated Under § 102 by Risky**

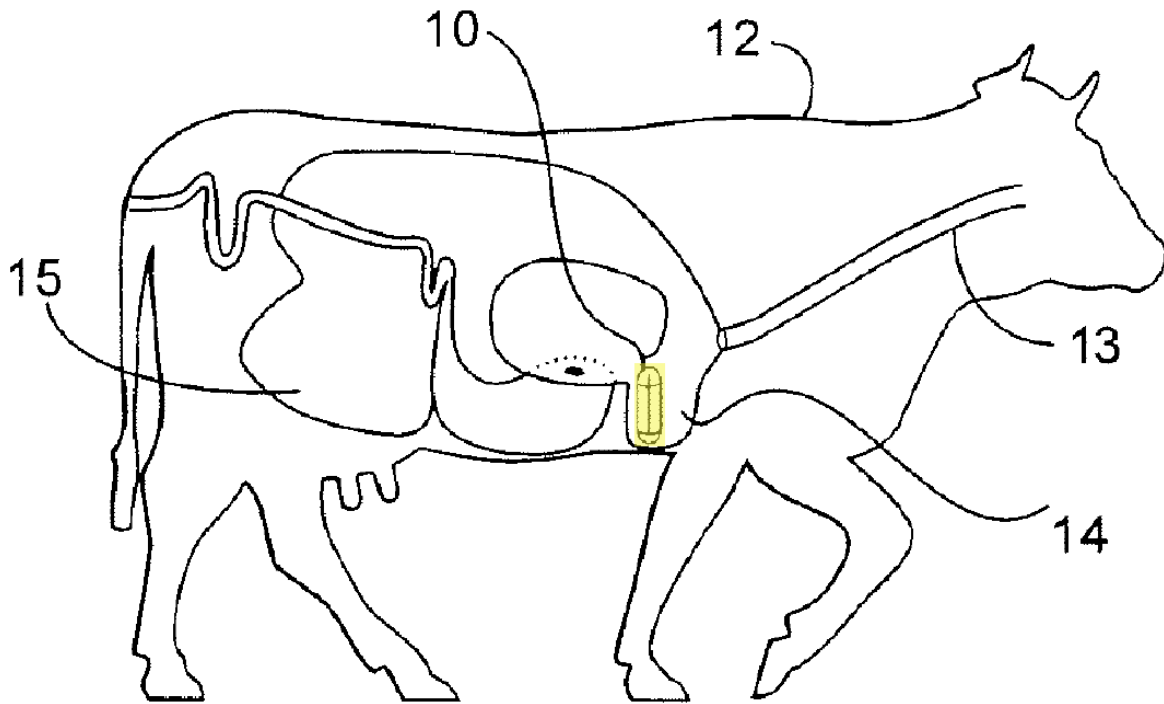
1. **Claim 5**

- a. **5[Pre]: “A method of monitoring physiological parameters of a ruminant animal, comprising:”**

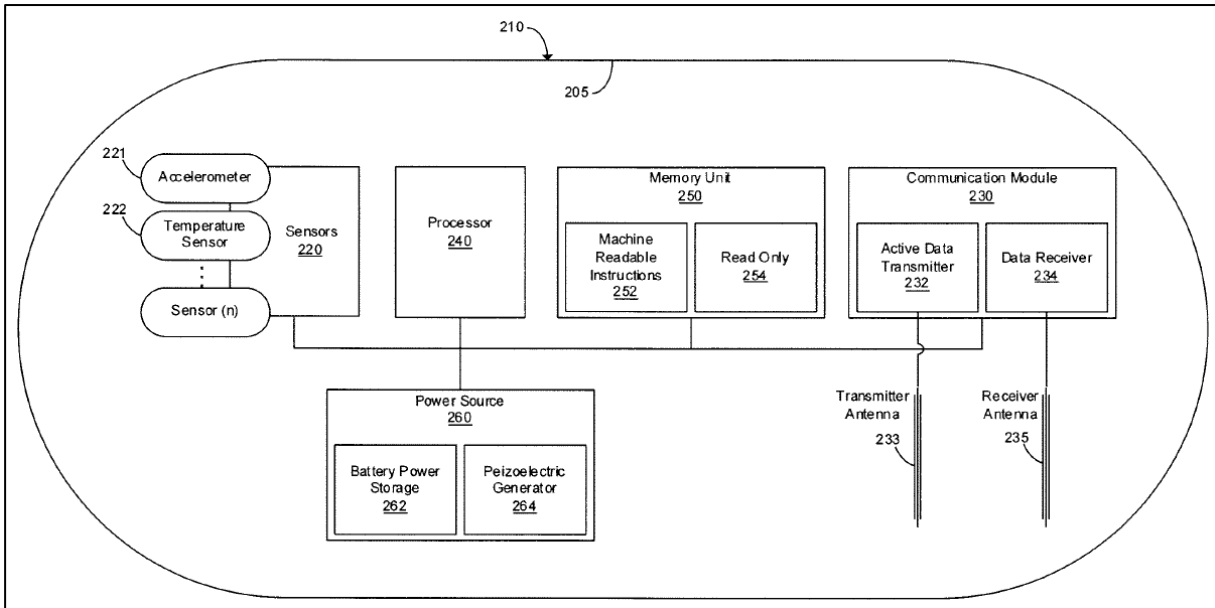
Regardless of whether the preamble of Claim 1 is limiting, it is taught by Risky. Risky, whose bolus is for monitoring a cow (a ruminant), Ex. 1005 [0068], states: “Monitored animal characteristics may include physiological characteristics, such as animal temperature, stomach pH, blood pH, heart rate, respiration, stomach or rumen contractions, and the like.” *Id.* [0025]; *see also id.* [0035] (similar), Abstract, [0007]-[00011], [0033], [0063], [0067]-[0068], [0075]-[0081], [0086]-[0087], [0116], Figs. 1-8; Ex. 1002, ¶¶ 77.

- b. **5[A]: “generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal”**

Riskey describes and illustrates a bolus (item 10, 20, 200, or 410) that sits in a stomach (*e.g.*, the rumen or reticulum) of a ruminant animal such as a cow:



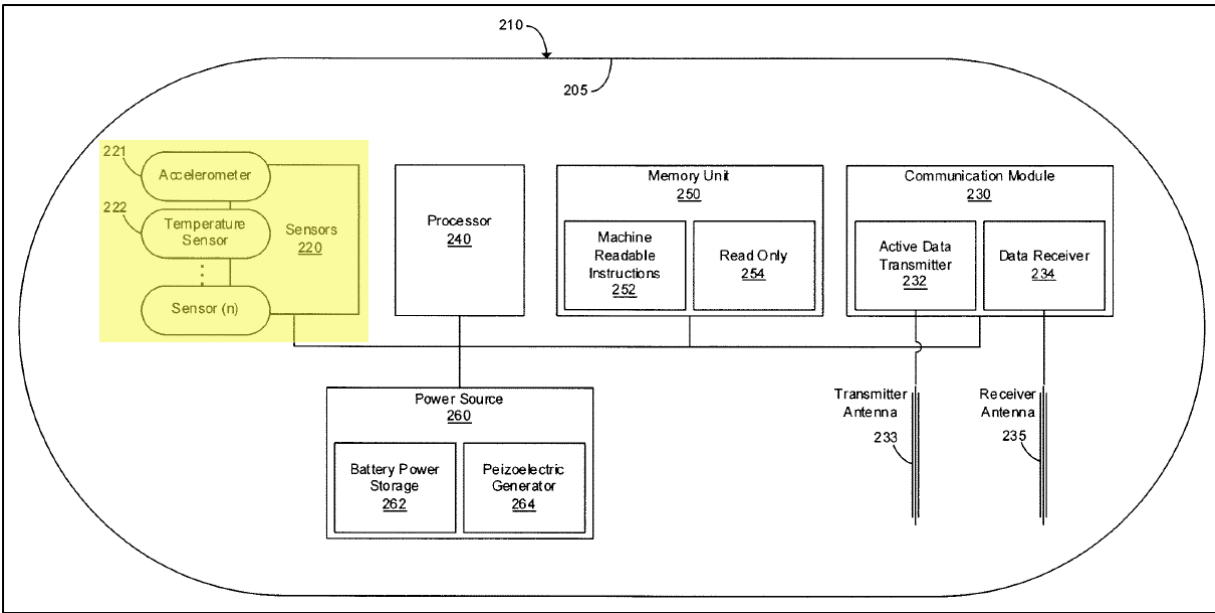
Ex. 1005, Fig. 1.



*Id.* Fig. 2.

The bolus is ingested via the animal’s esophagus, which requires that it be orally administered to the animal. Ex. 1005, Abstract (“An ingestible bolus may be disposed within the stomach of an animal.”), [0016]-[0017] (“In FIG. 1, an ingestible bolus 10, 20 may be disposed within the body of an animal....Bolus 10, 20 may be configured to be ingested via the esophagus 13, 23 of a ruminant animal...such as a bovine[ and] to remain within the stomach of a bovine....”), [0101] (“The bolus may be disposed within the stomach (e.g., rumen and/or reticulum of a ruminant animal).”); Ex. 1002, ¶ 79.

Riskey’s bolus 210 contains sensors 220—*e.g.*, Accelerometer 221, Temperature Sensor 222, and other sensors—for monitoring the animal’s internal characteristics:



*Id.* Fig. 2; *see also* Abstract (“The bolus may comprise one or more sensors to monitor one or more internal and/or external animal characteristics.”), [0029].

The sensors generate sensor signals representing, *e.g.*, “animal temperature, stomach pH, blood pH, heart rate, respiration, [and/or] stomach or rumen contractions....” *Id.* [0025]; *see also id.* [0035], [0063], [0067]-[0068], [0075]-[0081], [0086]-[0087], [0116], Figs. 1-8. Furthermore, sensor signals are necessarily present, and thus inherent, in Risky. For example, a POSA would understand that the sensors must communicate with the other components in the bolus using sensor signals conveying the sensor measurements/readings. Additionally, the sensors in Risky’s bolus store their measurements in memory unit 250, *infra* Element 5[D], which would not be possible if the sensors did not produce signals representing the measurements. *See* Ex. 1002, ¶¶ 82.

- c. **5[B]: “said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal”**

As discussed *supra* Element 5[A], Risky teaches numerous sensor signals representing various physiological parameters of a ruminant animal, including temperature, heart rate, respiration, etc. A POSA would understand that these sensors necessarily generate signals representing the physiological parameters they measure and must use those signals to convey those measurements to the other bolus components. *See, e.g.*, Ex. 1005, Fig. 2 (sensors 220 electrically connected to processor 240, memory unit 250 and communication module 230); [0039], [0043], [0044]; Ex. 1002, ¶ 83.

A POSA would further understand that an animal’s temperature, heart rate, etc., will change over time. Ex. 1005 [0044] (sensor measures “animal characteristics over time”). To distinguish different temperature readings over time, the sensor signal must necessarily vary with changes in the temperature. Indeed, Risky discloses specific thermal sensors which produce signals that vary with temperature. *See, e.g., id.* [0035] (thermistor or thermocouple). Ex. 1002, ¶ 84. A POSA would further understand that signal variation is inherent in any signal representing a changing parameter such as those disclosed in Risky, and therefore signal variation is inherent for a sensor measuring such changing parameters. *Id.*

- d. **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”**

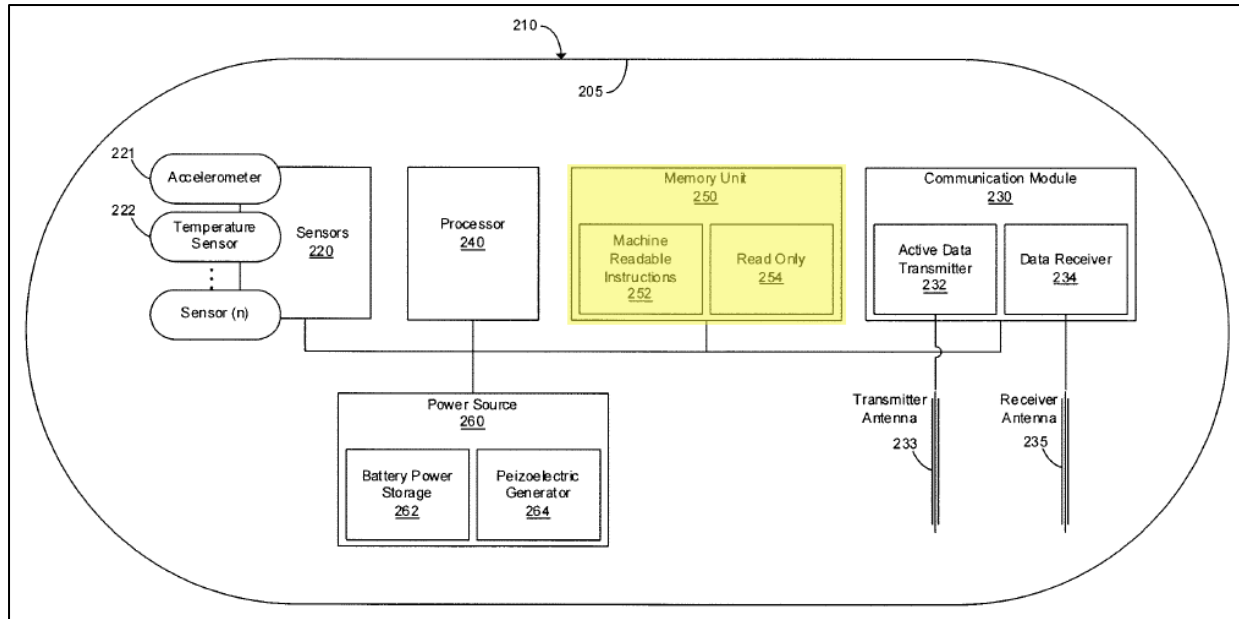
A POSA would recognize that the signals coming from the sensors described in Risky—*e.g.*, the temperature sensor, *supra* § IX.B.b—start out in analog form, since the signals (which are, *e.g.*, voltages) correspond to physical phenomena that vary continuously. Ex. 1022 at Fig. 1, 1:31-2:13, 4:22-5:6 (physiological parameters such as ECG, temperature, and heart rate are sensed in analog form and must be converted to digital); Ex. 1002, ¶ 86. Yet, the measurements are: (1) stored in the transponder’s memory, *see infra* Element 5[D]; (2) organized into an “Animal Information Data Structure”; and (3) transmitted wirelessly as data—*i.e.*, digital information, *see* Ex. 1005, Abstract (“The bolus may comprise a data transmitter in wireless communication with a base station.”), [0021], [0023], [0037], [0049]-[0051], [0058], Fig. 2 (“Active Data Transmitter 232”).

Since storage in memory, organization into a data structure, and transmission by a digital protocol all involve digital information, not analog signals, Risky necessarily requires the analog signals representing the animal’s physiological parameters to be encoded into digital form as physiological data corresponding to the measured physiological parameters. Ex. 1002, ¶ 86.

For example, as discussed *supra* Ground 1, Element 5[C], encoding of analog signals into digital signals would occur in an ADC within the bolus—*e.g.*, within processor 240 or one or more of the sensors themselves. *See, e.g.*, Ex. 1005 [0041] (“[M]achine readable instructions 252 may configure processor 240 to apply calibration data stored within memory unit 250 to readings returned by sensors 220.”), [0043]-[0044] (“[P]olling a sensor may comprise causing processor 240 to read the current sensor value from a sensor 220. In another embodiment, one or more sensors 220 may be configured to store sensor measurements on memory unit 250.”), Fig. 2. A POSA would understand that an ADC is necessarily present to produce the digital signals, that converting an analog signal to digital form comprises encoding the analog signal, and that the resulting digital representation of the analog signal comprises encoded data—*e.g.*, without limitation, PCM-encoded data. *See supra* Ground 1, Element 5[C]; Ex. 1020, 3; Ex. 1002. ¶ 87.

- e. **5[D]: “storing said encoded physiological data in a non-transitory computer readable media”**

Riskey’s bolus contains a memory unit 250:



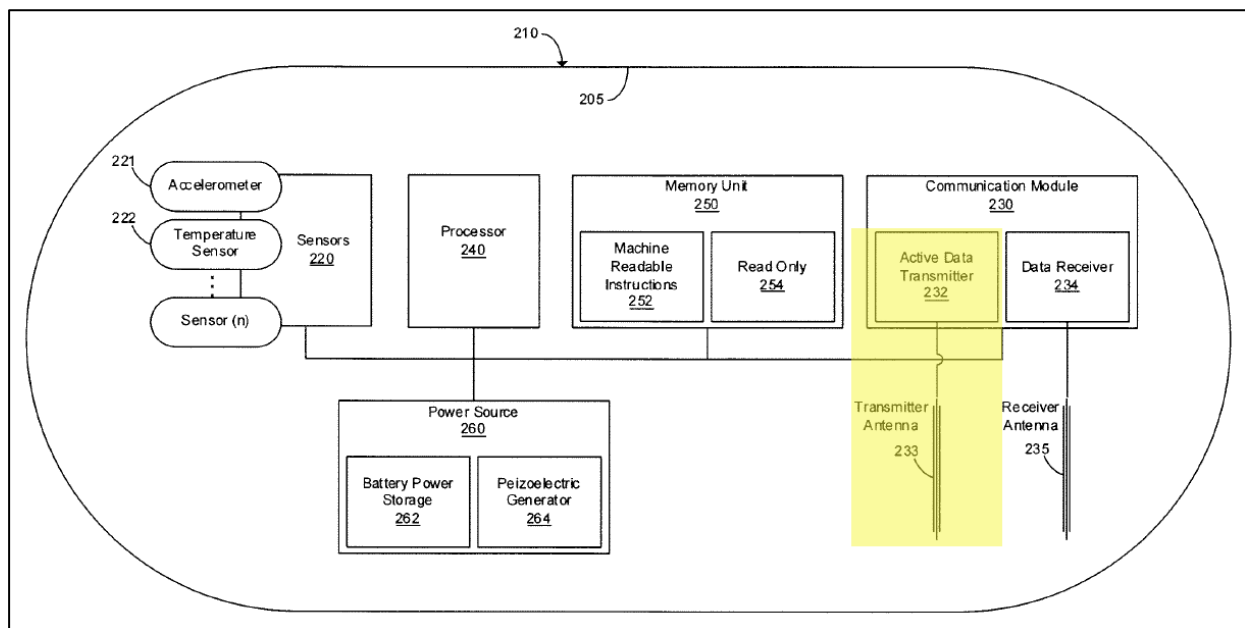
*Id.* Fig. 2.

Riskey teaches storing the encoded physiological data within memory unit 250, which can comprise an Electrically Erasable Programmable Read-Only Memory (“EEPROM”). Ex. 1005, [0043]-[0044] (“[P]rocessor 240 may poll sensor 220 by reading a sensor 220 storage location....Sensor 220 may store such measurements...on memory unit 250. The processor 240 may poll such a sensor by reading memory 250....”), [0049] (processor stores sensor readings in memory 250), [0052] (“[M]emory unit 250 may comprise read-only storage 254[, which] may be ...Electrically Erasable Programmable Read-Only Memory (EEPROM)...”), Fig. 2. A POSA would know that an EEPROM is a non-transitory computer readable media. Ex. 1002, ¶ 89 (citing Ex. 1021, 30:32-35; Ex. 1023, [0066]). In addition, a POSA would understand that, when Riskey refers to storing sensor samples in memory unit

250, Ex. 1005, [0043]-[0044], it is referring to non-transitory memory such as the above-referenced EEPROM, because Risky's memory unit 250 does not contain any transitory memory. *Id.* Fig. 2; *see also* Ex. 1002, ¶ 90.

f. **5[E]: “enabling a radio signal generator located within said bolus”**

Risky's cattle bolus enables a radio signal generator—data transmitter 232—to transmit radio signals to a base station via a connected antenna 233:



Ex. 1005, Fig. 2; *see also id.* Abstract (“The bolus may comprise a data transmitter in wireless communication with a base station.”), [0019] (“Bolus 10, 20 may comprise wireless communications means to allow bolus 10 to be in wireless communication with base station 40.”), [0021] (“The wireless communication means of bolus 10, 20 may comprise a wireless transmitter ... operating at 900 MHz or some other suitable radio frequency (RF).”), [0037], [0049]-[0050], [0055],

[0056] (“data transmitter 232 of bolus 210 may be considered to be an active transmitter since bolus 210 may actively transmit animal characteristic messages....”), [0059], Fig. 2 (Active Data Transmitter 232). Every time Risky’s bolus activates its data transmitter 232 to transmit data—*e.g.*, at the beginning of each “transmission interval,” *see infra* Element 5[F]—it is necessarily enabling a radio signal generator; *see also id.* [0049] (“burst” mode transmission), Ex. 1002, ¶ 91.

g.     **5[F]: “activating said radio signal generator at predetermined intervals to generate a radio signal to carry said encoded physiological data”**

Risky teaches activating the radio signal generator at predetermined intervals to generate the outgoing radio signal carrying encoded physiological data about the monitored animal. For example, in “burst” mode, the transmitter is activated at predetermined, periodic intervals. Ex. 1005, [0049] (“[P]rocessor 240 may transmit sensor measurements obtained by polling sensors 220 via data transmitter 232....[P]rocessor 240 may not immediately transmit the sensor readings polled from sensors 220, but instead store them on memory unit 250....[M]achine readable instructions 252 may specify a transmission interval, wherein processor 240 may transmit an animal characteristics message comprising some or all of the measurements stored in memory unit 250 at each transmission interval. This

operational mode may be referred to as ‘burst’ mode since sensor 220 readings are transmitted as periodic bursts rather than when sensor polling takes place.”).

As another example, Risky’s bolus also has an “on-line” mode in which the transmitter is activated at a predetermined “transmission frequency”—*i.e.*, transmission interval—specified by the device’s machine readable instructions. *Id.* [0055] (“In ‘on-line’ mode, bolus 210 may transmit animal characteristics messages at the ‘online’ transmission frequency specified by machine readable instructions 252 ... at a periodic transmission interval.”); *see also id.* [0059] (“bolus “periodically” transmits animal measurements). Ex. 1002, ¶¶ 92-93.

h. **5[G]: “generating said radio signal having a frequency of between about 700 MHz to about 1 GHz”**

The transmitter in Risky’s bolus generates radio signals at 900 MHz, which is within the claimed frequency range. Ex. 1005, [0021] (“The wireless communication means of bolus 10, 20 may comprise a wireless transmitter and/or receiver operating at 900 MHz...”), [0023] (transponder communicates “within an RF frequency range (e.g., 900 MHz).”), [0037]; *see also* Ex. 1001, 19:45-47 (numerical range includes all values within the range); Ex. 1002, ¶ 94.

2. **Claim 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.”**

The transceivers in Risky’s bolus can operate in the 850-950 MHz frequency range. *See supra* Element 5[G]. Thus, they meet this Markush limitation. *See* Ex. 1001, 19:45-47 (numerical range includes all values within the range); Ex. 1002, ¶ 95.

**C. Ground 3: Claims 5 and 6 are Rendered Obvious Under § 103 by Harvey in view of Risky**

1. **A POSA Would have Been Motivated to Combine Harvey and Risky**

The teachings of Harvey and Risky provide substantial motivation to combine them. First, the devices described in Harvey and Risky are the same type of apparatus used for the same purpose. Each is an electronic bolus with sensors, configured to reside in the stomach of a ruminant animal and measure the animal’s physiological parameters. Ex. 1004, 1:16-19, 7:26-29, 11:10-14, 11:20-24, 13:22-23, 37:35-38:18, 38:2-6, 38:25-31, 39:15-36, 40:17-20, 40:25-41:28, 71:17-21, 73:6-8, 74:6-7, 75:18-22, Figs. 5, 12; Ex. 1005, Abstract, [0007]-[00011], [0016]-[0017], [0025], [0029], [0033], [0035], [0063], [0067]-[0068], [0075]-[0081], [0086]-[0087], [0101], [0116], Figs. 1-8. Each wirelessly transmits those parameters to a monitoring station so that the health and breeding status (*e.g.*, estrus) of each

animal can be monitored. Ex. 1004, 2:30-32, 11:20-30, 23:11-21, 24:14-25, 29:17-18, 42:3-11, 43:4-44:2, 45:8-15, 50:28-32, 51:18-20, 51:36-52:19, 56:18-26, 60:36-37, Figs. 5, 7; Ex. 1005, Abstract, [0019], [0021], [0037], [0049]-[0050], [0055], [0056], [0059], [0062], [0067]-[0068], [0071], [0075], [0081], [0089], [0089], [0091], [0104]-[0105], [0121]-[0122], [0133]-[0135], [0142], [0144], Claim 17, Figs. 2, 3a.

The motivation to combine Harvey and Risky is further enhanced by the other similarities and common features of their devices, *e.g.*:

1. Radio communications in the 700 MHz-1 GHz band, specifically around 900 MHz. Ex. 1004, 10:3-8, 43:4-6, 55:1-18; Ex. 1005, [0021], [0023], [0037].
2. Activating the radio signal generator only at pre-determined intervals. Ex. 1004, 26:21-32 (“preselected tag transmission interval”), 27:14-21, 65:32-66:36, Fig. 9; Ex. 1005, [0049] (sensor readings transmitted at specified transmission interval), [0055] (“periodic transmission interval”), [0059].
3. Enabling sensors only when needed, and disabling them at other times to conserve battery power. Ex. 1004, 32:12-15 (supplying power to sensor module SDM 5300 (which includes sensors 5310, 5320, etc.) to sense a selected parameter, and then terminating power to sensor

module), 32:17-19 (purpose is to reduce power consumption and prolong battery life), Fig. 5; Ex. 1005, [0042] (deactivating and re-activating sensors to conserve power), [0056], [0145].

Moreover, “any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *KSR Intern. Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007). Motivation to combine is particularly strong where “there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions.” *Id.* 421. This is especially true where the cited references teach (1) “all the limitations of [the challenged] claims,” and (2) the same “known problem” addressed by the challenged patent. *Ball Aerosol and Specialty Container, Inc. v. Ltd. Brands, Inc.*, 555 F.3d 984, 993 (Fed. Cir. 2009).

The '644 Patent sought to solve the problem of extending the operational life of a bolus having limited battery capacity by regulating energy use—*e.g.*, by controlling the operation of the radio signal generator. Ex. 1001, 1:21-25, 7:56-65, 10:31-43, 10:55-61, 11:16-27, 11:51-60; *see also id.* 7:44-55, 7:66-8:12. Harvey and Risky both recognized and solved that same problem—extending the operational life of a bolus. *See* Ex. 1004, at 27:22-24 (reducing power consumption by performing “predetermined power management operation”), 68:24-29 (removing power from inactive transponder circuitry to reduce energy consumption). *See* Ex.

1005, [0042] (deactivating sensors to reduce power consumption), [0144] (reducing sensor monitoring frequency to reduce power consumption); Ex. 1002, ¶¶ 96-98.

In addition, “when a patent ‘simply arranges old elements with each performing the same function it had been known to perform’ and yields no more than one would expect from such an arrangement, the combination is obvious.” *KSR*, 550 U.S. at 417; (quoting *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976)). Every element of Claims 5 and 6 appears in both Harvey and Risky. *See supra* Grounds 1, 2. Those elements are standard method steps using well-known, off-the-shelf sensors and wireless communication components that would be familiar to any POSA. Ex. 1002, ¶ 99. There is nothing unpredictable about the claimed use of those components in a bolus residing in the stomach of a ruminant animal. *Id.*; *see KSR*, 550 U.S. at 417 (To determine obviousness, “a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.”). Furthermore, the technology and operation of such components was well-understood in the relevant time period such that the combination of Harvey and Risky would have had a high likelihood of success. Ex. 1002, ¶ 99.

Thus, since Harvey and Risky teach the same kind of device used for the same purpose, since the problem identified in the ’644 Patent was recognized by Harvey and Risky, since both references came up with the same solution to the

problem, since the combination of elements in Claims 5 and 6 is nothing more than “the predictable use of prior art elements according to their established functions,” and since the combination of Harvey and Risky would have had a high likelihood of success, a POSA would have been motivated to combine Harvey and Risky.

2. **The Combination of Harvey and Risky Meets All Elements of Claims 5 and 6**

The Preambles and every element of Claims 5 and 6 is taught by each of Harvey and Risky, *see supra* Grounds 1, 2. 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.

Furthermore, to the extent Patent Owner contends that either Harvey or Risky does not disclose oral administration of their boluses—which they do—or that oral administration of a bolus is not inherent in Harvey and Risky—which it is, *see* Grounds 1 and 2, Element 5[A]—that limitation would have been obvious to a POSA, since oral ingestion is how boluses are administered in ruminant agriculture. *See, e.g.*, Ex. 1011, 3:21-22 (describing a “bolus” as “a body which can be administered orally to a ruminant animal”); Ex. 1012, 1:17-19 (describing device

“commonly referred to as a bolus, which is ingestible by animals”); Ex. 1013 (describing “safe administration of a rumen bolus” to a ruminant animal, which consists of oral administration); Ex. 1001, 1:18-20 (“Conventional boluses” are “orally administered to reside in the reticulorumen” of a ruminant animal.); Ex. 1002, ¶ 102.

Since a POSA would have been motivated to combine Harvey and Risky, *supra* § IX.C.1, and since the combination meets all elements of Claims 5 and 6, those claims are obvious over the combination. Ex. 1002, ¶ 103.

**D. Ground 4: Claim 7 is Rendered Obvious Under § 103 by Harvey in view of Rettedal**

**1. A POSA Would have Been Motivated to Combine Harvey and Rettedal**

Claim 7 recites that “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.” The teachings of Harvey and Rettedal provide substantial motivation to combine these references and to add the matching elements disclosed in Rettedal to Harvey’s bolus.

The devices described in Harvey and Rettedal are the same type of apparatus used for the same purpose. Each is an electronic bolus with an array of sensors, configured to reside in the stomach of a ruminant animal and measure the animal’s

physiological parameters. Ex. 1004, 1:16-19, 7:26-29, 11:10-14, 11:20-24, 13:22-23, 37:35-38:18, 38:2-6, 38:25-31, 39:15-36, 40:17-20, 40:25-41:28, 71:17-21, 73:6-8, 74:6-7, 75:18-22, Figs. 5, 12; Ex. 1006, Abstract (bolus “reside[s] in an animal’s stomach [and] can...include sensors to detect physiological and non-physiological animal characteristics such as temperature”), [0002], [0003], [0022] (bolus for “monitor[ing] one or more sensed physiological...parameters of an animal...can be orally administered to reside in a reticulum (5) of the animal (3), including ruminant animals”), [0023], [0025], [0037], [0046], [0051]-[0053], [0061]-[0062], Claims 69, 76, 77, Figs. 1, 4-6. Each wirelessly transmits those parameters to a monitoring station so that each animal can be monitored. Ex. 1004, 2:30-32, 11:20-30, 23:11-21, 24:14-25, 29:17-18, 42:3-11, 43:4-44:2, 45:8-15, 50:28-32, 51:18-20, 51:36-52:19, 56:18-26, 60:36-37, Figs. 5, 7; Ex. 1006, [0003] (temperature measurements “transmitted by radio-frequency to a radio-frequency receiver.”), [0024], [0044], [0046], [0051], Claims 69, 79-81, Figs. 1, 4-6.

The motivation to combine Harvey and Rettedal is further enhanced by other similarities and common features of their devices, *e.g.*:

1. Radio communications in the 700 MHz-1 GHz band, *e.g.* 900 MHz.

Ex. 1004, 10:3-8, 43:4-6 (850-950 MHz), 55:1-18; Ex. 1006, [0062]-[0063] (“about 900 MHz”), Claim 81.

2. Activating the radio signal generator intermittently. Ex. 1004, 26:21-32, 27:14-21 (radio signal generator activated only during “selected tag transmission interval”), 65:32-66:36, Fig. 9; Ex. 1006, Abstract (“The animal monitoring device intermittently transmits...sensed animal characteristic information to a receiver....”).

Furthermore, motivation to add matching elements to Harvey’s bolus is expressly provided by Rettedal itself. In discussing how to improve upon prior-art animal-monitoring boluses (which would include Harvey’s bolus), Rettedal states: “Another broad object of the invention of the invention can be to provide a network frequency match element which functions as part of the animal monitoring device to compensate for the mass of the animal such that the radiofrequency signal generated by the animal monitoring device antenna located inside the animal can be received by the radio frequency reader antenna located outside of the animal.” Ex. 1006, [0011]; *see also id.* [0064] (“The network frequency match element (118) can include capacitors and resistors in combination to deliver a particular first radio frequency signal...to the antenna (90) [and to] compensate for demodulation of the radio frequency signal (13) due to interaction with the mass of animal”), Fig. 6.

Motivation to combine is particularly strong where, as here, “there is a design need or market pressure to solve a problem and...a finite number of identified, predictable solutions.” *KSR*, 550 U.S. at 421. This is especially true where the cited

references teach (1) “all the limitations of [the challenged] claims,” and (2) the same “known problem” addressed by the challenged patent. *Ball Aerosol*, 555 F.3d at 993. A problem that the ’644 Patent sought to solve was that the center frequency of a radio signal generator operating within the mass of an animal tends to be shifted to a lower frequency than that of the same generator operating in normal atmospheric air. Ex. 1001, 6:25-32. A POSA would have understood, at least from Rettedal, that Harvey’s implanted bolus would experience this same problem since it is surrounded by the animal’s mass. Ex. 1002, ¶¶ 105-108. Rettedal provided a solution to that same problem: using a network frequency match element 118 which detunes the generated signal to produce an RF signal at the desired frequency. Ex. 1006, [0064] (Network frequency match element 118 “detune[s]” a “first radio frequency signal” to generate a signal at the desired frequency: “The detuned signal can compensate for demodulation of the radio frequency signal (13) due to interaction with the mass of animal (3).”). Thus, a POSA would have been motivated to apply that solution to Harvey’s bolus. Ex. 1002, ¶ 108.

In addition, Claim 7—which is met in its entirety by the combination of Harvey and Rettedal, *see infra* § IX.D.3—“‘simply arranges old elements with each performing the same function it had been known to perform’ and yields no more than one would expect from such an arrangement, [such that] the combination is obvious.” *KSR*, 550 U.S. at 417. Claim 7 consists of standard, predictable method

steps using a bolus containing well-known, off-the-shelf sensors and radio communication components that would be familiar to any POSA. Ex. 1002, ¶ 109; *see KSR*, 550 U.S. at 417 (To determine obviousness, “a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.”). 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. Ex. 1002, ¶ 109.

Thus, since Harvey and Rettedal teach the same kind of device used for the same purpose, since Rettedal expressly states a motivation to combine its matching elements with prior-art boluses such as Harvey’s, since the problem identified in the ’644 Patent was recognized and solved by Rettedal, since the combination of elements in Claim 7 is nothing more than “the predictable use of prior art elements according to their established functions,” and since the combination of Harvey and Rettedal would have had a high likelihood of success, a POSA would have been motivated to combine Harvey and Rettedal.

2. **The Combination of Harvey and Rettedal Meets All Elements of Claim 7**

Every element in each of Claims 5 and 6, from which Claim 7 depends is taught by Harvey, *see* Ground 1, above. To the extent Patent Owner contends that

oral administration of boluses or other claim elements are not disclosed or inherent in Harvey—which they are, *see* Ground 1—those limitations would have been obvious to a POSA. *See* Ground 3. All additional elements of Claim 7 are taught by Rettedal, as explained in detail below.

3. **Claim 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.”**

Rettedal teaches matching elements for adjusting the frequency of a radio signal to compensate for a change in the signal’s frequency due to its passing through the mass of the ruminant animal in which the bolus resides. For example, Risky’s bolus includes an antenna 90 for transmitting the radio signals, and a “matching network,” a/k/a “match element,” 118 connected to the antenna. Ex. 1006, [0011], [0051], [0064], [0066], Fig. 6. The matching network 118 adjusts the frequency of the radio signal to compensate for the effect that the mass of the animal has on the radio signal. *Id.* [0011] (bolus includes “a network frequency match element which...compensate[s] for the mass of the animal such that the radiofrequency signal generated by the animal monitoring device antenna located inside the animal can be received by the radio frequency reader antenna located outside of the animal.”), [0064] (“The network frequency match element (118) can include capacitors and resistors in combination to deliver a particular first radio frequency

signal (213)...to the antenna (90)...[T]he network frequency match element (118) can detune [, *i.e.*, adjust, the] first radio frequency signal (13) to...compensate[s] for demodulation of the radio frequency signal (13) due to interaction with the mass of animal (3)...”). Although Rettedal provides a 433-MHz example, it states that this example is “non-limiting” and that the match element would also work at an “other selected frequency.” *Id.* [0064]. Thus, it also intended for use with Rettedal’s 800-900-MHz examples. Ex. 1002, ¶ 112.

Thus, since a POSA would have been motivated to combine Harvey and Rettedal, *supra* § IX.D.1, and since the combination of Harvey and Rettedal contains all elements of Claim 7, Claim 7 is obvious over that combination. Ex. 1002, ¶ 113.

**E. Ground 5: Claims 9 and 10 are Rendered Obvious Under § 103 by Harvey in view of Kunda**

**1. A POSA Would have Been Motivated to Combine Harvey and Kunda**

As discussed in detail *infra* § IX.E.3, the “generating,” “encoding,” “storing,” “enabling,” and “activating” steps of Claim 9 are taught by Harvey. Claim 9 also includes a step of “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.” Claim 10 further specifies that the loops in the antenna “each comprise a loop of conductive sheet material having an inner annular edge and an outer annular edge which join opposed loop faces.”

The teachings of Harvey and Kunda provide substantial motivation to add to Harvey's bolus a double loop antenna as disclosed in Kunda.

First, motivation to add Kunda's antenna to Harvey's bolus is expressly provided in both references. For example, Harvey sought to create a bolus that would fit within the digestive tract of a monitored animal and emphasized the importance of compactness. Ex. 1004, 11:10-13 (goal of providing a "miniature transponder"); *see also id.* 18:15-17 (recognizing importance of "more compact form factor"). Kunda addresses the same size considerations—"The smaller, the better in the case of portable wireless communication devices[, which] has led to demands for smaller antennas for use in portable wireless communication devices." Ex. 1007, [0002]. Thus, a problem that Kunda solves is "[t]o provide a small antenna with satisfactory characteristics." *Id.* Abstract; *see also id.* [0006], [0008], [0020], [0057], [0077]-[0078]. A POSA would embrace the goal of miniaturizing a device that goes into the body of an animal. And because Kunda's double-loop antenna saves space—a benefit touted by Kunda—a POSA would consider it well-suited for use in Harvey's cattle bolus. Ex. 1002, ¶¶ 114-115.

In addition, a problem identified by the '644 Patent is interference with transmission—and resulting loss of data—that can be caused by wire-wound antennas that rely on magnetic cores. Ex. 1001, 6:51-61. The '644 Patent solves that problem by using an antenna comprising a pair of electrically conductive loops

separated by an insulating substrate. *Id.* 6:33-7:33, Figs. 6-13. Kunda's antenna solves that same problem with the same kind of double-loop antenna having an insulating substrate separating the loops, operating in the same frequency band as the antenna in the '644 Patent—700 MHz-1 GHz. Ex. 1001, 4:53-61, 21:46-52, Figs. 6-13; Ex. 1007, [0023] (transmitter operating at 900 MHz), [0064]-[0065], Figs. 2-4, 6-9, 11. A POSA would have recognized that Kunda's double-loop antenna with an insulating substrate between the loops and no magnetic core accomplishes the same goal in the same way as the '644 Patent: it avoids the interference that a magnetic core would cause. Ex. 1002, ¶¶ 116.

Another benefit that the '644 Patent attributes to the double-loop antenna recited in Claims 9 and 10 is increased bandwidth. Ex. 1001, 7:25-29. Kunda touts the same benefit for its own double-loop antenna, stating that the disclosed configuration “makes it possible to expand the frequency band in which the antenna can transmit and receive signals efficiently.” Ex. 1007, [0066]. Thus, Kunda recognized and solved the same problems identified by the '644 Patent. *See KSR*, 550 U.S. at 420 (“[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.”).

Kunda's antenna improves performance by configuring the loops such that their magnetic fields interact with each other constructively, not destructively. *See*,

e.g., Ex. 1007, [0030] (maintaining performance when antenna is close to ground plane, allowing smaller size), [0045]-[0048] (loops configured such that currents at any given point flow in the same direction—thus enhancing each other—due to  $\frac{1}{4}$ -wave resonant effects), [0049] (“[A]ntenna 100 can minimize...interference between loop conductor parts, thereby minimizing the extent to which the antenna characteristics are diminished.”), [0050]-[0057], [0070], [0075], Figs. 6(a)-7(c). A POSA would understand that, when Kunda refers to (1) maintaining antenna performance even when the antenna is close to a ground plane, and (2) mitigating “interference” (meaning destructive interference) between loop-shaped members, *see id.*, it is referring to the advantage that Kunda’s antenna confers in maintaining antenna emission efficiency while allowing small size, providing additional motivation to combine it with wireless devices such as Harvey’s. Ex. 1002, ¶ 118.

Furthermore, Claims 9 and 10—which are met in their entirety by the combination of Harvey and Kunda, *see infra* §§ IX.E.3, 4—“‘simply arrange[] old elements with each performing the same function it had been known to perform’ and yield[] no more than one would expect from such an arrangement, [such that] the combination is obvious.” *KSR*, 550 U.S. at 417. Claims 9 and 10 consist of standard, predictable method steps using a bolus and antenna containing only well-known, off-the-shelf sensors and simple conductive loops that would be familiar to any POSA. Ex. 1002, ¶ 119; *see KSR*, 550 U.S. at 417 (“[A] court must ask whether the

improvement is more than the predictable use of prior art elements according to their established functions.”). Furthermore, the technology and operation of such components was well-understood in the relevant time period such that the combination of Harvey and Kunda would have had a high likelihood of success. Ex. 1002, ¶ 119.

The motivation to combine Harvey and Kunda is further enhanced by the other similarities and common features of their devices, *e.g.*:

- a. Communication device is part of a wireless network. Ex. 1004, 8:23-26, 10:3-11:3, 23:21-29, 36:4-6, 50:4-22, 71:11-17, 77:13-17; Ex. 1007, [0001] (antenna suitable for wireless LANs and mobile telephone systems), [0002], [0023].
- b. Radio communications over Bluetooth, including in the 2-2.5 GHz frequency band. Ex. 1004, 10:7-15 (Bluetooth), 42:36-43:7 (Bluetooth, 2.4 GHz), 43:29-33, 50:9-12, 53:31-37, 55:12-14, 63:3-7; Ex. 1007, [0001] (Bluetooth), [0023] (2.4 GHz), [0043] (2.2 GHz), [0056], [0065].
- c. Radio communications in the 850-950 MHz GHz band. Ex. 1004, 43:4-6 (850-950 MHz band), 55:1-18 (similar); Ex. 1007, [0023] (900 MHz), [0064]-[0065]; *see also* Ex. 1002, 120 (mobile telephony in 900 MHz band).

In addition, Kunda lists a broad range of applications for its antenna, including “wireless local area networks (LANs),” mobile telephony, Bluetooth, “and the like,” as well as “portable wireless communications devices” in general. Ex. 1007, [0001]-[0002]. Harvey teaches that all of those communication methods are suitable for its bolus. *See* Ex. 1004, 4:3-4 (use of bolus as part of wireless LAN (“WLAN”)), 10:3-15 (use of WLAN-based, mobile telephone communication, or Bluetooth protocol), 10:26-30 (WLAN protocol), 10:35-37 (Universal Mobile Telecommunication System (“UMTS”) protocol), 23:34-35, 42:13-19, 42:36-43:4, 43:29-35, 50:4-17.

Thus, since Harvey and Kunda share a common motivation of providing a compact device, since the problems identified in the ’644 Patent were recognized and solved by Kunda, since the combination of elements in Claims 9 and 10 are nothing more than “the predictable use of prior art elements according to their established functions,” since the combination of Harvey and Kunda would have had a high likelihood of success, and since Harvey and Kunda share numerous similarities of operation and purpose, a POSA would have been motivated to combine Harvey and Kunda and would have found it obvious to try using Kunda’s antenna in Harvey’s bolus. Ex. 1002, ¶¶ 121-122.

2. **The Combination of Harvey and Kunda Meets All Elements of Claims 9 and 10**

The Preamble and Elements 9[A]-9[F] of Claim 9 are taught by Harvey, and all other elements of Claims 9 and 10 are taught by Kunda.

3. **Claim 9**

a. **9[Pre]: “A method of monitoring physiological parameters of a ruminant animal, comprising:”**

Regardless of whether the preamble of Claim 9—which is identical to that of Claim 5—is limiting, it is taught by Harvey. *See supra* Ground 1, 5[Pre].

b. **9[A]: “generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal”**

Element 9[A] is identical to Element 5[A]. Both are taught by Harvey. *See supra* Ground 1, 5[A].

c. **9[B]: “said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal”**

Element 9[B] is identical to Element 5[B]. Both are taught by Harvey. *See supra* Ground 1, 5[B].

d. **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”**

Element 9[C] is identical to Element 5[C]. Both are taught by Harvey. *See supra* Ground 1, 5[C].

- e. **9[D]: “storing said encoded physiological data in a non-transitory computer readable media”**

Element 9[D] is identical to Element 5[D]. Both are taught by Harvey. *See supra* Ground 1, 5[D].

- f. **9[E]: “enabling a radio signal generator located within said bolus”**

Element 9[E] is identical to Element 5[E]. Both are taught by Harvey. *See supra* Ground 1, 5[E].

- g. **9[F]: “activating said radio signal generator to generate a radio signal to carry said encoded physiological data”**

Harvey teaches activating the radio signal generator to generate a radio signal to carry the encoded physiological data. *See supra* Ground 1, 5[F].

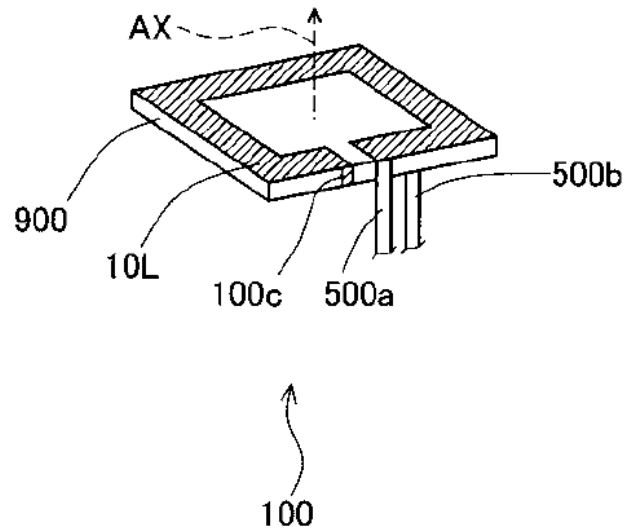
- h. **9[G]: “transmitting said radio signal with an antenna having a pair of electrically conductive loops disposed a distance apart and further comprising transmitting said radio signal through said antenna”**

Kunda teaches transmitting a radio signal with/through an antenna having a pair of electrically conductive loops disposed a distance apart. For example, Kunda’s radio communications module transmits radio signals using an antenna 100 comprising “first loop conductor part 10L and...second loop conductor part 20L, which circle around the same imaginary axis AX.” *See* Ex. 1007, Abstract, Claims 1-7, [0001] (“The present invention pertains to an antenna used to transmit and receive radio frequency signals”), [0005], [0007]-[0021]), [0023]-[0025], [0028]-

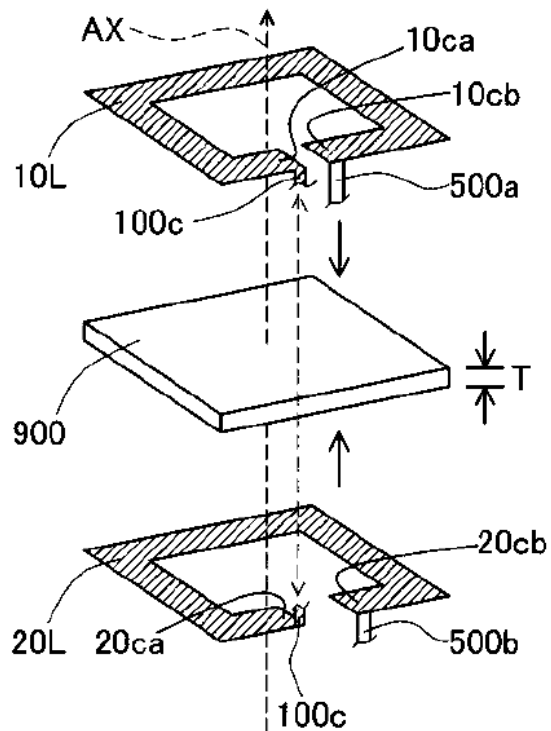
[0057], Figs. 1-7. The configuration of the antenna 100 is illustrated, for example, in Figs. 3(a), (b):

【 図 3 】

(a)



(b)

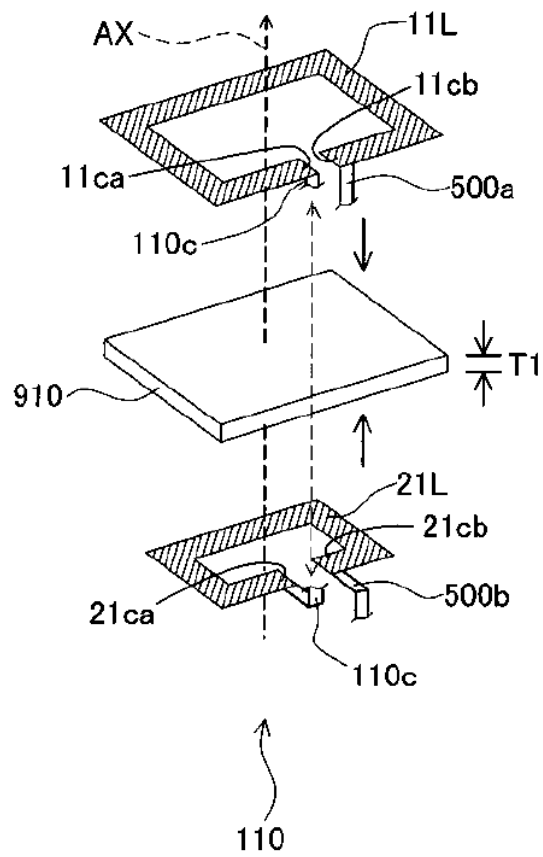


The loops 10L and 20L are disposed a distance T apart, where T is the thickness of the dielectric substrate 900 separating the loops. *Id.* [0033], Figs. 3(a), (b); *see also id.* Figs. 2, 4, 6(a), 6(c), 6(d), 7(b), 7(c).

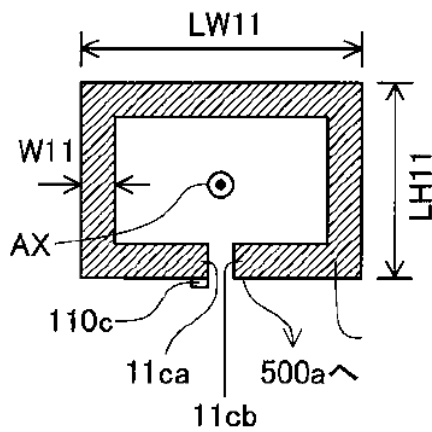
Kunda illustrates additional examples in Figs. 8 and 11:

## 【 図 8 】

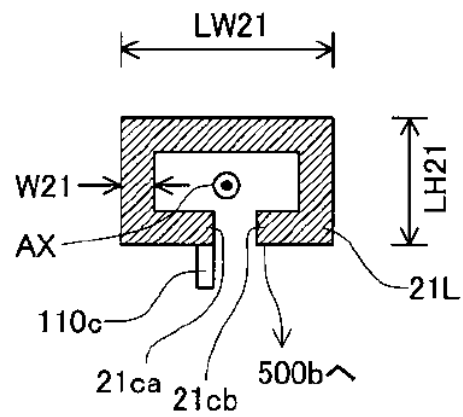
(a)



(b)

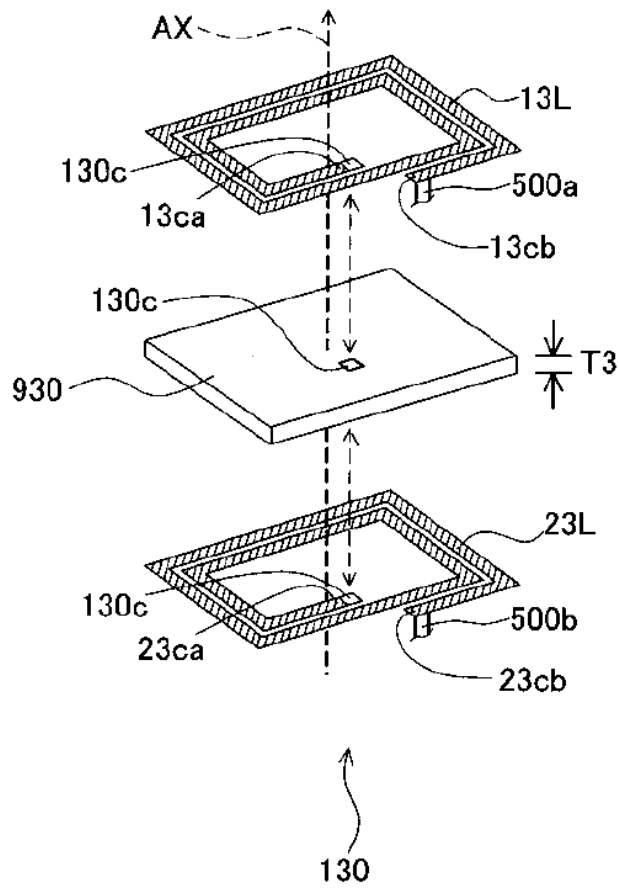


(c)

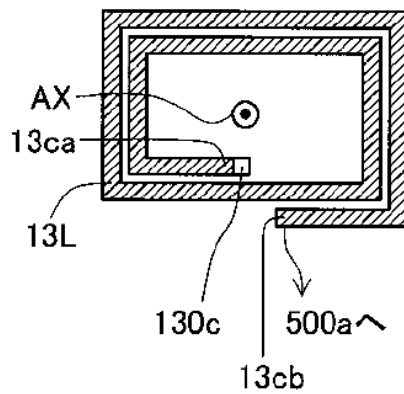


【 図 1 1 】

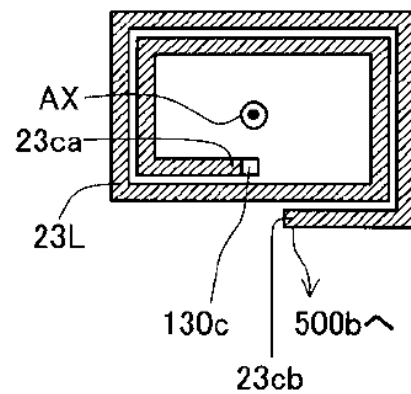
(a)



(b)



(c)



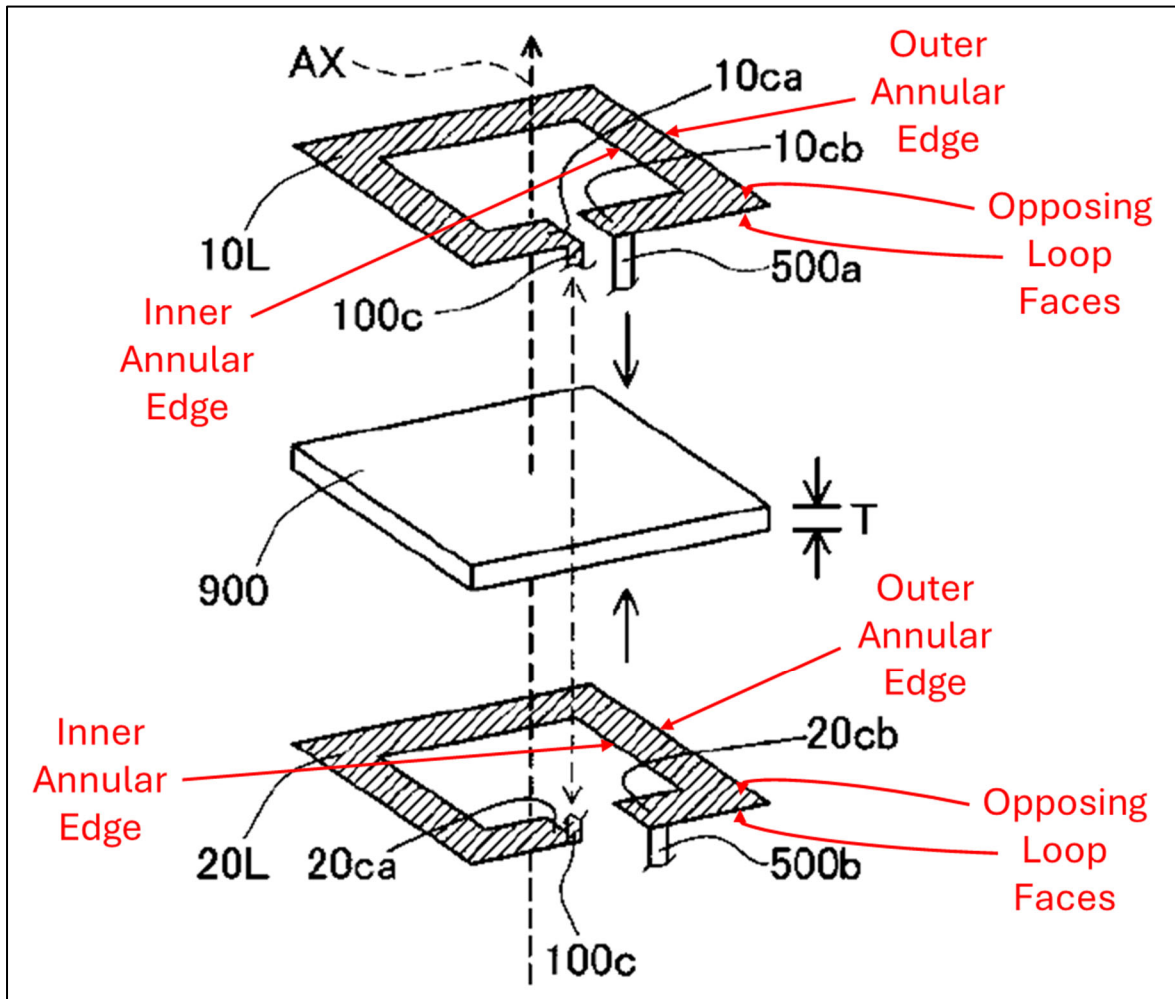
The antenna 110 illustrated in Fig. 8 comprises electrically conductive loops 11L and 21L disposed a distance T1 apart, where T1 is the thickness of the dielectric substrate 910 separating the loops. *Id.* [0058]-[0062]. Antenna 110 is used to transmit radio signals. *Id.* [0063]-[0066]. Similarly, the antenna 130 illustrated in Fig. 11 comprises electrically conductive loops 13L and 23L disposed a distance T3 apart, where T3 is the thickness of the dielectric substrate 930 separating the loops. *Id.* [0072]-[0076]. Antenna 130 is used to transmit radio signals. *Id.* [0077]-[0078]; *see also* Ex. 1002, ¶ 134.

4. **Claim 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.”**

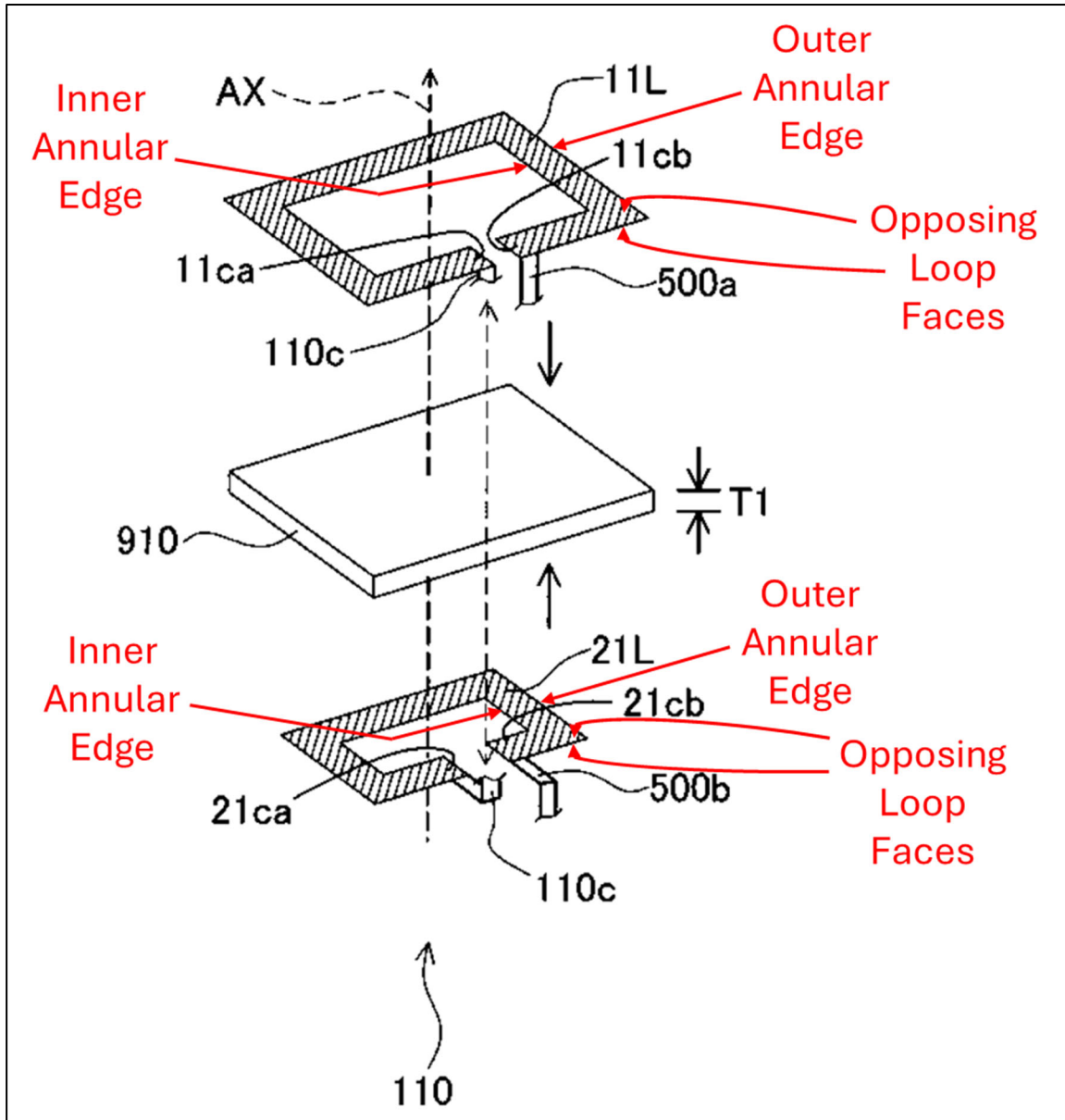
All of Kunda’s electrically conductive antenna loops are formed from conductive sheet material—*e.g.*, a layer of copper, silver, or other conductor. Ex. 1007, [0033] (“[F]irst and second loop conductor parts 10L and 20L [are] formed of conductors such as copper and silver.”), [0036] (Conductive loops can be formed, *e.g.*, by (1) “the use of a silver paste to print the forms of conductor parts 10L, 20L, and 100c on the surface of dielectric substrate 900 through screen-printing followed by a baking step at the desired temperature,” (2) masking, with the antenna pattern, a conductive layer formed on a dielectric substrate and then “melting the unnecessary portion of the conductor part,” or (3) by “vapor deposition.”). A POSA

would recognize that each of those processes would result in a conductive sheet of material as illustrated in Kunda's drawings. Ex. 1002, ¶ 135.

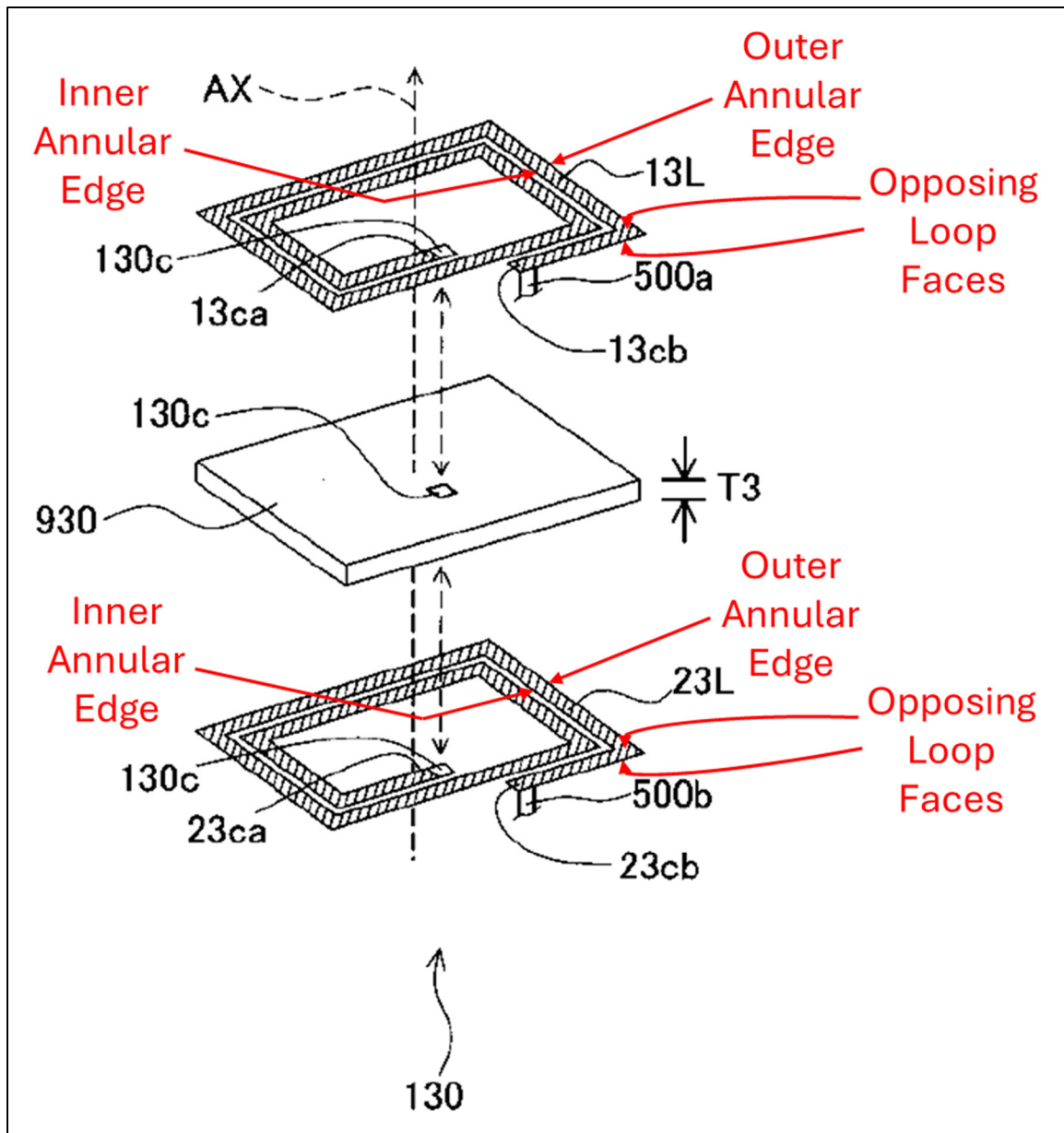
Furthermore, each of the loops disclosed in Kunda has an inner annular edge and an outer annular edge which join opposed loop faces:



*Id.* Fig. 3(b), (annotated).

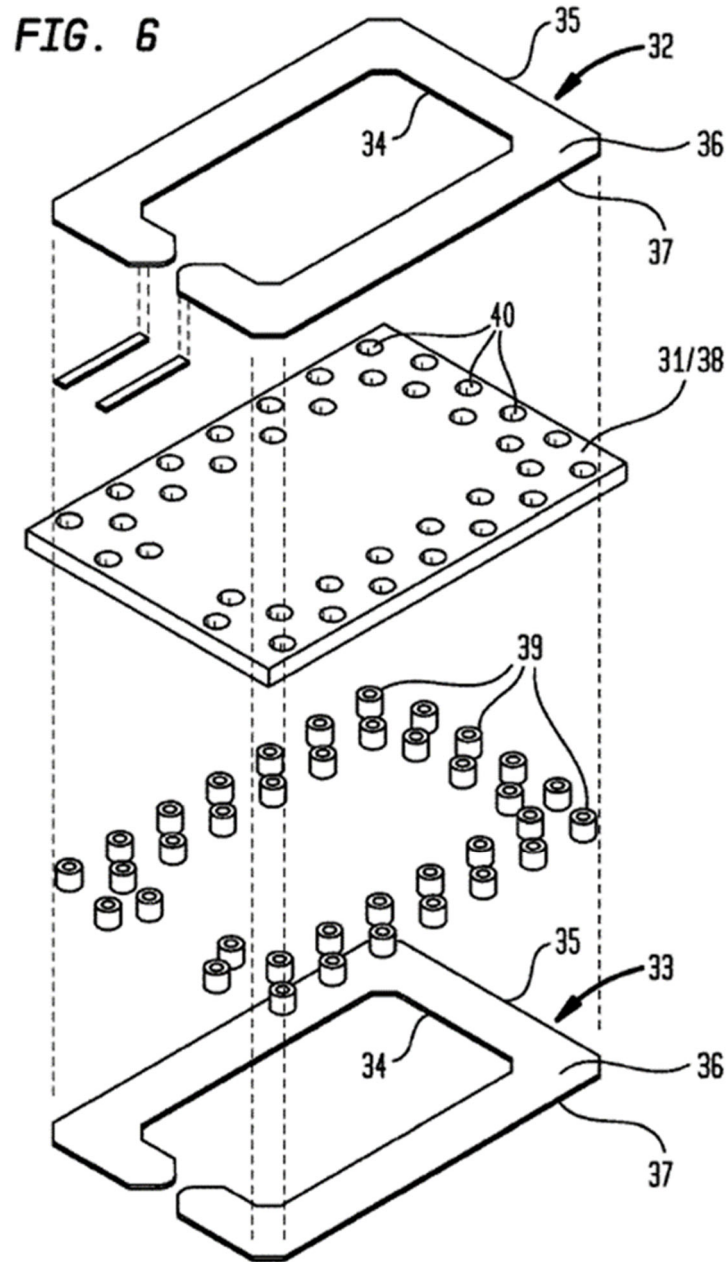


*Id.* Fig. 8(a) (annotated).



Ex. 1007, Fig. 11(a) (annotated); *see also* Ex. 1002, ¶ 136.

For comparison, the '644 Patent refers to similar inner and outer annular edges 34 and 35 and opposing loop faces 36 and 37 in Fig. 6:



See Ex. 1001, 7:2-7 (referring to “inner annular edge (34) and an outer annular edge (35) which join opposed loop faces (36)(37).”).

Thus, since a POSA would have been motivated to combine Harvey and Kunda, *supra* § IX.E.1, and since the combination of Harvey and Kunda contains all

elements of Claims 9 and 10, Claims 9 and 10 are obvious over that combination.

Ex. 1002, ¶ 138.

**A. Ground 6: Claim 13 is Anticipated Under § 102 by Risky**

**1. Claim 13**

**a. 13[pre]: “A method of monitoring physiological parameters of a ruminant animal, comprising:”**

Regardless of whether the preamble of Claim 13 is limiting, it is taught by Risky. *See supra*, Ground 2, 5[Pre].

**b. 13[A]: “administering a bolus to said ruminant animal”**

This element is taught by Risky. *See supra*, Ground 2, 5[A].

**c. 13[B]: “enabling or disabling one or more sensors in said bolus by execution of a computer code contained in a non-transitory computer readable media communicatively coupled to a processor”**

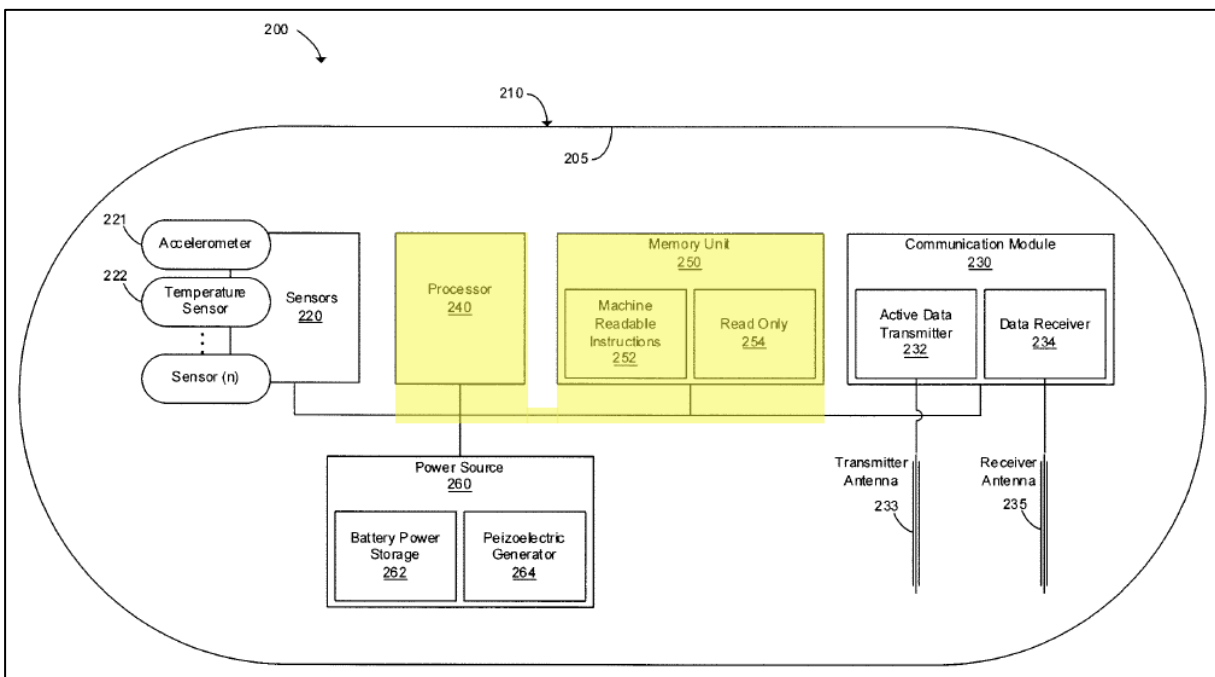
Risky teaches enabling and disabling the sensors in the bolus by executing computer code contained in a non-transitory computer readable media communicatively coupled to a processor. First, Risky’s bolus contains sensors. *See supra* Ground 2, 5[A]. In addition, as discussed *supra* Ground 2, Element 5[D], Risky’s bolus has a memory unit 250 comprising read-only storage 254, which may be EEPROM. Ex. 1005 [0052]. A POSA would know that an EEPROM is a non-transitory computer readable media. Ex. 1002, ¶ 141 (citing Ex. 1021, 30:32-35; Ex. 1023, [0066]).

The computer code that operates Risky's bolus—machine readable instructions 525—is contained in memory unit 250. Ex. 1005 [0038] (“[M]emory unit 250 may comprise machine readable instructions 252 stored thereon.”), [0039] (referring to “[m]achine readable instructions 252 stored on memory unit 250”), [0043]. A POSA would understand that, when Risky describes storing the computer code in memory unit 250, Ex. 1005, [0038], [0039], [0043], it is referring to non-transitory memory such as the EEPROM, because Risky's memory unit 250 contains no transitory memory. *Id.* Fig. 2.

Furthermore, a POSA would recognize that transitory computer readable media requires uninterrupted power to maintain any data or code stored within it, such that if the power is interrupted or lost, all data and code are erased. Ex. 1002, ¶¶ 142-143 (citing Ex. 1016, [0174]-[0175] (“Examples of non-volatile memory are flash memory[,] ROM, PROM, EPROM and EEPROM memory (used for storing firmware such as BIOS) [whereas] [v]olatile memory...requires power to maintain the stored information.”), [0182] (without electrical energy backup, “data is lost [from transitory memory] in the event of a power failure”)). Thus, a POSA in the relevant time period would have considered it essential to store the machine readable instructions 525 in non-transitory computer readable media such as the EEPROM within the memory unit 250, because if it were stored in transitory media, then it would be erased if the battery voltage or charge dropped too low, permanently

disabling the bolus. Ex. 1002, ¶ 143. Risky contemplates such power drops when it refers to impending battery expiration and methods for recharging the battery. Ex. 1005 [0045] (referring to “a possible problem with the bolus 210 (e.g., power source 260 about to expire, etc.)”), [0058] (recharging battery by generating power from animal movement, vibration, or body heat). Thus, since storage of computer code in a non-transitory computer readable media is necessarily present in Risky’s bolus, it is inherent in Risky. Ex. 1002, ¶ 143.

The memory storing the code is communicatively coupled to processor 240, which executes the code:



Ex. 1005, Fig. 2 (annotated); *see also id.* [0038] (“Bolus 210 may comprise a processor 240 communicatively coupled to a memory unit 250. In one embodiment,

memory unit 250 may comprise machine readable instructions 252 stored thereon.

In this embodiment, processor 240 may read and execute machine readable instructions 252 stored on memory unit 250.”), [0053] (“Machine readable instructions 252 may include instructions to be executed by processor 240”).

The instructions 252, when executed, cause the processor to “deactivate” or “re-activate”—*i.e.*, disable or enable—one of more of the sensors in order to conserve power. *Id.* [0042] (“Machine readable instructions 252 may specify that one or more sensors 220 should be deactivated in order to reduce the power consumed by bolus 210. Processor 240 may be communicatively coupled to sensors 220 and may be capable of configuring and/or controlling one or more of sensors 220. Machine readable instructions 252 may specify that one or more sensors 220 should be re-activated.”), [0056] (“[W]hile in ‘off-line’ mode, machine readable instructions 252 may direct processor 240 to deactivate certain sensors 220 in order to conserve power.”), [0145] (“[T]he message of step 885 may activate and/or deactivate one or more bolus sensors....”); Ex. 1002, ¶¶ 144-145.

- d. **13[C]: “generating a sensor signal from said one or more sensors which varies based on a corresponding change in one or more physiological parameters of said ruminant animal”**

Riskey teaches this element. *See supra* Ground 2, Element 5[B].

e. **13[D]: “receiving a radio signal containing programming data”**

Riskey’s bolus receives from the base station a radio signal containing programming data, including, *e.g.*, updates and revisions to the bolus’s computer code—machine readable instructions 252. Ex. 1005, [0057] (“[B]olus 210 may receive new and/or modified machine readable instructions 252 via data receiver 234 of wireless communications unit 230. Such received instructions may comprise changes to the operation of sensors 220 and/or processor 240 including: sensor sampling frequency; sensor reading duration; sensor activation status; sensor calibration data; processor polling frequency; processor operational mode (*i.e.*, ‘instantaneous’ or ‘burst[’]); and the like.”), [0059] (“[T]he computing device 42 [in the base station] may modify the configuration of the bolus 10, 20 (*e.g.*, modify the bolus 10, 20 polling frequency, sample time, transmission time or the like)....”); *see also id.* [0053]-[0054], Ex. 1002, ¶ 147.

f. **13[E]: “re-programming said computer code contained within said non-transitory computer readable medium based on the radio signal containing programming data”**

Riskey’s bolus uses programming data—*e.g.*, an update to the bolus’s machine readable instructions 252—received via a radio signal from the base station to re-program those instructions within the non-transitory memory in memory unit 250. Ex. 1005, [0057] (“[B]olus 210 may receive new and/or modified machine

readable instructions 252 via data receiver 234 of wireless communications unit 230. Such received instructions may comprise changes to the operation of sensors 220 and/or processor 240 including: sensor sampling frequency; sensor reading duration; sensor activation status; sensor calibration data; processor polling frequency; processor operational mode (i.e., ‘instantaneous’ or ‘burst[’]); and the like.”), [0059] (“the computing device 42 [in the base station] may modify the configuration of the bolus 10, 20 (e.g., modify the bolus 10, 20 polling frequency, sample time, transmission time or the like),”); Ex. 1002, ¶ 148.

**B. Ground 7: Claim 13 is Rendered Obvious Under § 103 by Risky**

1. **A POSA Would have Been Motivated to Store Risky’s Computer Code in Risky’s Non-Transitory Computer Readable Media**

“[A] single prior art reference can render a claim obvious [if there is] a showing of a suggestion or motivation to modify the teachings of that reference to the claimed invention...” *SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp.*, 225 F.3d 1349, 1356 (Fed. Cir. 2000). “This suggestion or motivation may be derived from the prior art reference itself, ...from the knowledge of one of ordinary skill in the art, or from the nature of the problem to be solved.” *Id.*

To the extent that Patent Owner argues that: (1) Risky does not expressly teach storing computer code (e.g., Risky’s machine readable instructions 252) in a non-transitory computer readable media (e.g., Risky’s EEPROM) as recited in

Claim 13—which it does; or (2) storing computer code in a non-transitory computer readable media is not inherent in Risky—which it is, *see supra* Ground 6—that limitation would be obvious in view of Risky.

First, as discussed *supra* Ground 2, Element 5[D], Risky teaches a bolus having a memory unit 250 comprising read-only storage 254, which may be EEPROM. Ex. 1005 [0052]. A POSA would know that an EEPROM is a non-transitory computer readable media. Ex. 1002, ¶ 149. A POSA would also recognize that transitory computer readable media requires uninterrupted power to maintain any data or code is stored within it, such that if the power is interrupted, all stored data and code are erased. *Id.* (citing Ex. 1016, [0174]-[0175] (non-transitory memory such as flash and EEPROM memory are used to store code because transitory memory requires power to maintain stored information), [0182] (without backup, transitory memory loses data in the event of a power failure)). Thus, a POSA would have considered it standard practice—indeed, essential—to store the computer code that operates the bolus in non-transitory computer readable media, because otherwise it would be erased if the battery voltage or charge dropped too low, permanently disabling the bolus. Ex. 1002, ¶ 149.

The importance of storing the bolus’s computer code in non-transitory media to prevent its loss is further supported by the teachings of Risky. Risky contemplates power drops and other problems with the battery, because it refers to

impending battery expiration and describes various methods for recharging the battery, including generating power from the animal's movement or body heat. Ex. 1005, [0045] (referring to “a possible problem with the bolus 210 (e.g., power source 260 about to expire, etc.)”), [0058] (recharging battery using built-in generator powered by animal motion or body heat). A POSA would recognize that, if the battery voltage or charge dropped too low to maintain the code in transitory memory, recharging the battery would be futile because the stored code already would already be permanently lost. Ex. 1002, ¶ 150. In contrast, if the code is stored in non-transitory media, *e.g.*, EEPROM, it would not be lost; the bolus would resume operation once the on-board generator adequately recharged the battery.

Thus, a POSA would have been motivated to store the computer code that operates the bolus, including enabling and disabling the sensors, in the EEPROM within Risky's memory unit 250. Ex. 1002, ¶ 151.

Risky also refers to flash memory—a non-transitory computer readable media—as generally applicable to its disclosed embodiments, stating: “One skilled in the art would recognize any data storage and/or retrieval mechanism known in the art could be under the teachings of this disclosure. As such, this disclosure should not be read as limited to any particular data storage and/or retrieval system.” Ex. 1005, [0098]. Thus, in addition to the EEPROM discussed above, a POSA also

would have been motivated to use flash memory to store the computer code that operates the bolus. Ex. 1002, ¶ 152.

In addition, storing computer code in a non-transitory computer readable media was a well-known, predictable, and established technique which would have been familiar to any POSA in 2015. *Id.* ¶ 153; *see KSR*, 550 U.S. at 417. For example, it has been common practice since long before the '644 Patent's filing date to store computer BIOS code in an EEPROM. Using non-transitory computer readable media to store computer code was well-understood in the relevant time period such that it would have had a high likelihood of success. Ex. 1002, ¶ 153.

Thus, since a POSA would have recognized that it would have been crucial to store the code that operates Risky's bolus in a non-transitory computer readable media, and since storing computer code in non-transitory media was well-known and predictable in the relevant time period and would have had a high likelihood of success, a POSA would have been motivated by Risky's teachings to use a non-transitory computer readable media to store the computer code that operates Risky's bolus, including enabling and disabling the sensors.

## 2. **Risky Meets All Elements of Claim 13**

The preamble and every element of Claim 13 are taught by Risky. *See supra* Ground 6. Thus, since a POSA would have been motivated to store Risky's

computer code in Risky's non-transitory computer readable media (*e.g.*, EEPROM or flash), Claim 13 would have been obvious over Risky.

**C. No Relevant Secondary Considerations**

Petitioner is not aware of any secondary considerations which would impact the obviousness analysis of Grounds 3-5 and 7.

**X. DISCRETIONARY DENIAL IS NOT WARRANTED**

**A. Section 325(b)**

Institution denial based on 35 U.S.C. §325(d) is unwarranted because the arguments and evidence presented here were not previously and/or properly considered. *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020) (precedential) (“*Advanced Bionics*”), *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17-18 (PTAB Dec. 15, 2017) (precedential as to §III.C.5, first paragraph).

**1. Advanced Bionics Part One**

Harvey and Kunda neither were before the Examiner nor are “substantially the same” as the prior art considered by the Examiner. *Advanced Bionics*, Paper 6 at 13-19. The only references that the Examiner considered substantively were Brune and Zander. Ex. 1010 at 189-99, 427-39, 493-502. The Examiner never asserted, *e.g.*, that Brune or Zander discloses: (1) generating a radio signal between about 700 MHz to about 1 GHz as in Harvey, *see supra* Ground 1, Element 5[G],

Claim 5; or (2) an antenna having two electrically conductive loops, each comprising a loop of conductive sheet material having inner and outer annular edges joining opposed loop faces, as in Kunda, *see supra* Ground 5, Element 9[G], Claim 10. Ex. 1002, ¶¶ 131-134. Nor are any of those limitations present in Brune or Zander. *Id.* ¶¶ 41-42.

Although Risky and Rettedal were before the Examiner, there is no evidence that either was considered meaningfully. Furthermore, Risky and Rettedal could not have been considered within the combinations asserted here because the other asserted references were not before the Examiner. *St. Jude Medical, LLC v. Snyders Heart Valve LLC*, IPR2018-00105, Paper 15 at 12 (PTAB May 3, 2018) (instituting where “evidence of record does not demonstrate that the Examiner considered the references in the combinations relied upon by Petitioner or addressed arguments similar to those Petitioner now presents”).

## 2. **Advanced Bionics Part Two**

The only place in the prosecution history where Risky and Rettedal appear is in the above-referenced IDSs. *See supra* § VI.C; VIII. Although the Examiner signed the IDSs and added the footnote “ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH,” *id.*, there is no evidence that Risky or Rettedal received meaningful consideration; neither appears in an Office Action or any other substantive discussion in the prosecution file. The lack of any evidence

that the Examiner meaningfully considered Risky or Rettedal favors institution. *Microsoft Corp. v. SurfCast, Inc.*, IPR2022-00590, Paper 9 at 15 (PTAB Oct. 7, 2022) (instituting where cited art “was not extensively evaluated during examination and was not the basis for a rejection”); *Amazon.com, Inc. v. M2M Sols. LLC*, IPR2019-01205, Paper 14 at 16 (PTAB Jan. 27, 2020) (“a reference that ‘was neither applied against the claims nor discussed by the Examiner’ does not weigh in favor of exercising the Board’s discretion under § 325(d) to deny a petition”).

**B. Section 314(a)**

Under the Director’s Interim Procedure for Discretionary Denials (June 21, 2022) (“IP”), “the PTAB will not deny institution based on *Fintiv* if there is compelling evidence of unpatentability” (IP, 5), which this Petition provides. The *Fintiv* factors favor institution based on efficiency, fairness, and patent quality. *Apple v. Fintiv*, IPR2020-00019, Paper 11 at 5 (Mar. 20, 2020) (“*Fintiv*”) (precedential).

**1. Stay Potential**

Petitioner intends to seek a stay of the district court litigation, but without “specific evidence” how the court will rule, this factor is neutral. *Sand Revolution II v. Continental Intermodal Group–Trucking*, IPR2019-01393, Paper 24 at 7 (PTAB June 16, 2020) (informative).

2. **Trial Timing and Diligence**

Institution approximately six months from Petition filing would result in an FWD by December 2025. The district court initially set a trial date of December 8, 2025. Ex. 1017, 9. However, Petitioner plans to seek a stay of the district court litigation during the pendency of this IPR, which is likely to be granted, pushing the trial date back until substantially after the FWD, as the Western District of Wisconsin has historically granted requests to stay pending IPR that were filed after the institution decision. *See e.g., Inguran, LLC d/b/a STGenetics v. ABS Global, Inc. et al.*, No. 3-20-cv-00085, Dkt. 120 (W.D. Wis. Dec. 20, 2021); *Sierra Pacific Industries v. Kolbe & Kolbe Millwork Co., Inc.*, No. 3-18-cv-00853, Dkt. 59 (W.D. Wis. Oct. 18, 2019). Thus, Factor 2 weighs against discretionary denial. *Fintiv*, at 9.

3. **Litigation Investment**

Petitioner filed this petition at an early stage of litigation and no substantive orders have issued, facts that have “weighed against exercising the authority to deny institution[.]” *Seven Networks*, Paper 10 at 11-12 (quoting *Fintiv*, Paper 15 at 11); *Amperex Tech. v. Maxell*, IPR2021-01442, Paper 16 at 10-11 (PTAB Apr. 12, 2022). Petitioner’s diligence weighs against discretionary denial, as this Petition is being filed approximately two months after Petitioner was served the Amended Complaint in which the ’644 Patent was added to the Wisconsin Litigation. *Apple v. Seven*

*Networks*, IPR2020-00156, Paper 10 at 9 n.8 (PTAB June 15, 2020); *Fintiv*, at 11 n.21.

4. **Issue Overlap**

Only claim 5 was asserted in the Amended Complaint (Ex. 1018, ¶¶ 14, 56, 58, 62-68, 117-126), whereas additional claims are challenged here. Institution can enhance patent system integrity and meet Petitioner’s interest in resolving invalidity challenges on the challenged claims, which favors institution. *Seven Networks*, Paper 10 at 17.

5. **Litigation Parties**

This Petition involves the same parties as the Wisconsin case, so this factor may “depend[] on which tribunal was likely to address the challenged patent first,” which is the PTAB (*supra* § X.B.2). *Google v. Parus Holdings*, IPR2020-00846, Paper 9 at 20-21 (PTAB Oct. 21, 2020).

6. **Merits**

The “strong showing on the merits” presented here weighs against denial. *Seven Networks*, Paper 10 at 20.

**XI. CONCLUSION**

For the foregoing reasons, Petitioner requests institution of IPR and cancellation of all the Challenged Claims.

## **XII. PAYMENT OF FEES**

Petitioner submits concurrently herewith the required fees under 37 C.F.R. §§ 42.15(a) and 42.103(a). The Office is authorized to charge any shortfall or other fees due during this proceeding to Deposit Account No. 50-2778.

Dated: June 25, 2024

/ Michael A. Fisher /

Jeffrey B. Plies, reg. no. 46,999

Michael A. Fisher, reg. no. 42,536

DECHERT LLP

*Counsel for Petitioner*

**WORD COUNT CERTIFICATION**

Pursuant to 37 C.F.R. § 42.24(d), I certify that this Petition contains 13,966 words (excluding the title page, table of contents, table of authorities, table of exhibits, mandatory notices, this certificate, the claim listing, and the certificate of service), as determined by Microsoft Word.

Dated: June 25, 2024

/ Michael A. Fisher /

Michael A. Fisher, Reg. No. 42,536

DECHERT LLP

*Counsel for Petitioner*

**CHALLENGED CLAIM LISTING**

|                                                                                                                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Claim 5</b>                                                                                                                                                                                                                                          |
| <b>5[Pre]</b> A method of monitoring physiological parameters of a ruminant animal, comprising:                                                                                                                                                         |
| <b>5[A]</b> generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal,                                                                                                                       |
| <b>5[B]</b> said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal;                                                                                                                  |
| <b>5[C]</b> 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                                                             |
| <b>5[D]</b> storing said encoded physiological data in a non-transitory computer readable media,                                                                                                                                                        |
| <b>5[E]</b> enabling a radio signal generator located within said bolus;                                                                                                                                                                                |
| <b>5[F]</b> activating said radio signal generator at pre-determined intervals to generate a radio signal to carry said encoded physiological data; and                                                                                                 |
| <b>5[F]</b> generating said radio signal having a frequency of between about 700 MHz to about 1 GHz.                                                                                                                                                    |
| <b>Claim 6</b>                                                                                                                                                                                                                                          |
| <b>6[A]</b> 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. |
| <b>Claim 7</b>                                                                                                                                                                                                                                          |

**7[A]** 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.

#### **Claim 9**

**9[Pre]** 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.

#### **Claim 10**

**10[A]** 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.

**Claim 13**

**13[Pre]** A method of monitoring physiological parameters of a ruminant animal, comprising:

**13[A]** administering a bolus to said ruminant animal

**13[B]** enabling or disabling one or more sensors in said bolus by execution of a computer code contained in a non-transitory computer readable media communicatively coupled to a processor;

**13[C]** generating a sensor signal from said one or more sensors which varies based on a corresponding change in one or more physiological parameters of said ruminant animal;

**13[D]** receiving a radio signal containing programming data; and

**13[E]** re-programming said computer code contained within said non-transitory computer readable medium based on the radio signal containing programming data.

**CERTIFICATE OF SERVICE**

I certify that today in:

*smaXtec Inc. and smaXtec Animal Care GmbH v. ST Reproductive  
Technologies, LLC, IPR2024-01067 (U.S. Patent 10,231,644)*

I caused to be served a copy of:

Petition  
Exhibits 1001-1023

upon:

DANIEL L. MOFFETT  
GEORGE A. L. ROSBROOK  
AKIN GUMP STRAUSS HAUER & FELD LLP  
112 East Pecan, Suite 1010  
San Antonio, TX 78205  
Telephone: (210) 281-7000  
dmoffett@akingump.com  
arosbrook@akingump.com

THOMAS W. LANDERS, IV  
AKIN GUMP STRAUSS HAUER & FELD LLP  
1111 Louisiana Street, 44th Floor  
Houston, TX 77002  
Telephone: (713) 220-5800  
twlanders@akingump.com

MEGAN R. MAHONEY  
AKIN GUMP STRAUSS HAUER & FELD LLP  
One Bryant Park  
Bank of America Tower  
New York, NY 10036  
Telephone: (212) 872-1000  
mmahoney@akingump.com

via:

Electronic Mail

Patent Owner agreed to have the above-listed counsel accept electronic service of the Petition on April 30, 2024. *See* 37 CFR § 42.105(b) (“Upon agreement of the parties, service may be made electronically....”).

Dated: June 25, 2024

By: /Michael A. Fisher/  
Michael A. Fisher, Reg. No. 42,536  
Dechert LLP  
Cira Centre  
2929 Arch Street  
Philadelphia, PA 19104-2808  
Tel: 215-994-2079  
Fax: 215-655-2279  
michael.fisher@dechert.com