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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SMAXTEC INC. and
SMAXTEC ANIMAL CARE GMBH,
Petitioners

v.

ST REPRODUCTIVE TECHNOLOGIES, LLC,
Patent Owner

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

PATENT OWNER'S DEMONSTRATIVE EXHIBITS



Inter Partes Review of U.S. Patent No. 10,231,644 Case IPR2024-01067

Oral Hearing: October 21, 2025
Patent Owner's Demonstrative Exhibit

STREPRO

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

OVERVIEW

The '644 Invention

02-03

Harvey Does Not Anticipate Claims 5-6

04-23

Harvey Does Not Disclose the Claimed "Bolus"

Harvey Does Not Disclose "Pre-Determined Intervals"

Harvey Does Not Disclose "Encoding"

Riskey Does Not Anticipate Claims 5-6

24-39

Riskey Does Not Disclose "Pre-Determined Intervals"

Riskey Does Not Disclose "Encoding"

Harvey Combinations Do Not Render Obvious Claims 5-7 or 9-10

40-53

Harvey + Riskey Does Not Render Obvious Claims 5-6

Harvey + Rettedal Does Not Render Obvious Claim 7

Harvey + Kunda Does Not Render Obvious Claims 9-10

THE '644 INVENTION

'644 Patent

II. BACKGROUND OF THE INVENTION

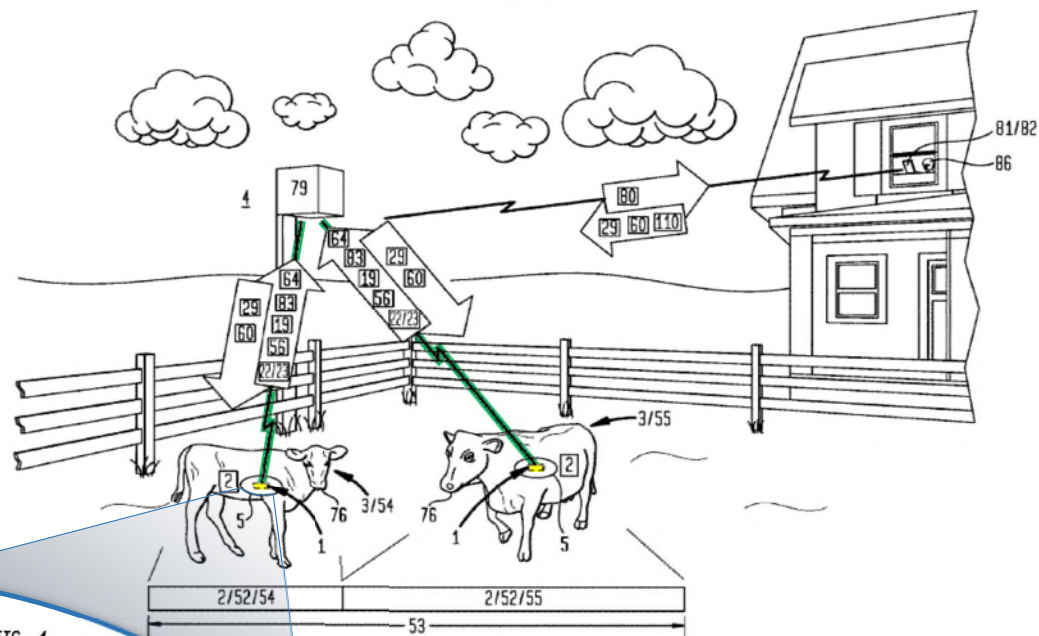
Conventional boluses orally administered to reside in the reticulorumen for monitoring of physiological parameters of ruminant animals may not have a configuration capable of oral administration at birth. Additionally, boluses even when orally administered to adult ruminant animals may not have an operational lifespan long enough to monitor useful physiological parameters over the remaining productive lifespan of the ruminant animal. Moreover, uncontrollable changes in

'644 Patent at 1:18-25



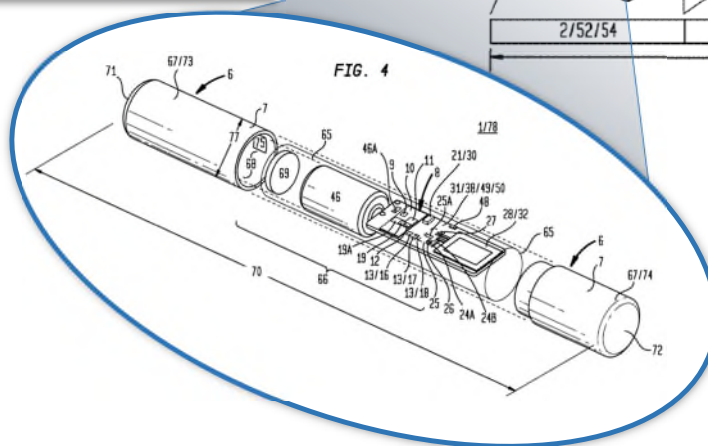
Smartec Exhibit 1001
Smartec, Inc. v. ST Reproductive Tech, LLC
Page 1 of 21

FIG. 1



'644 Patent at Figs. 1 (annotated), 4

FIG. 4



OVERVIEW

The '644 Invention

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GROUND 1: HARVEY DOES NOT DISCLOSE THE CLAIMED “BOLUS”

'644 Patent

(12) United States Patent
Rettedal et al.

(10) Patent No.: US 10,231,644 B2
(45) Date of Patent: Mar. 19, 2019

(54) CATTLE BOLUS

(71) Applicant: ST. Regis

(72) Inventors: Nicholas

(73) Assignee: ST. Regis

(*) Notice: Subject

(21) Appl. No.: 14/736

(22) Filed: Jan. 11

(65) Prior

(51) Int. Cl.

(52) U.S. Cl.

(53) CPC

(54) CATTLE BOLUS

(71) Applicant: ST. Regis

(72) Inventors: Nicholas

(73) Assignee: ST. Regis

(*) Notice: Subject

(21) Appl. No.: 14/736

(22) Filed: Jan. 11

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(51) Int. Cl.

(52) U.S. Cl.

(53) CPC

5. A method of monitoring physiological parameters of a ruminant animal, comprising:

generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal, said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal;

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

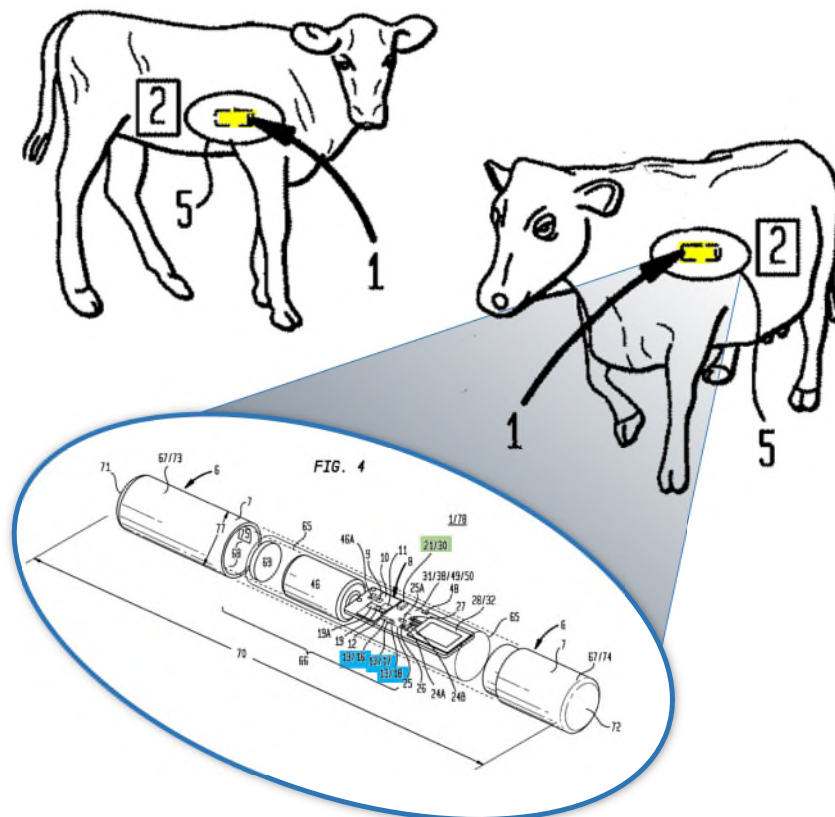
storing said encoded physiological data in a non-transitory computer readable media,

enabling a radio signal generator located within said bolus;

activating said radio signal generator at pre-determined intervals to generate a radio signal to carry said encoded physiological data; and

generating said radio signal having a frequency of between about 700 MHz to about 1 GHz.

'644 Patent at claim 5



'644 Patent at Figs. 1, 4 (excerpted and annotated)

GROUND 1: HARVEY DOES NOT DISCLOSE THE CLAIMED “BOLUS”

Harvey's Sole Reference to a “Bolus”

Harvey

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
12 September 2008 (12.09.2008)

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(54) Agent: O'ROURKE, John, R., 122 E. Main Street, Laguna
Niguel, CA 92653-2101

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PCT/US2007/020014

(22) International Filing Date
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(25) Filing Language
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(26) Publication Language
English

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PCT/US2007/0112, 1 March 2007 (01.03.2007), US

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(72) Inventor, and
Inventor/Applicant (as all designated States except US): **HARVEY, Stephen, Taylor**, 1111 S. 11th St., Suite 200, North, Raleigh, NC 27607-1111

(73) HARVEY, Stephen, Taylor, 1111 S. 11th St., Suite 200, North, Raleigh, NC 27607-1111

(74) SMITH, Christopher, R., 1111 S. 11th St., Suite 200, North, Raleigh, NC 27607-1111

(54) Title: SYSTEM AND METHOD FOR MONITORING ANIMALS

FIG. 1

1010 as a collar, bracelet, ring, or apparel, or as an ear tag, tail tag, or piercing stud. In yet other non-limiting implementations, IAT 1110 may be restrained or moveable within monitored subject 1010, for example, as a digestive tract **bolus** device, or as a miniature transponder lodged or secured within the circulatory system, bone, or soft tissue. In ruminant monitored subjects such as cattle, a digestive tract **bolus** tag may be retained indefinitely within the animal. In a non-ruminant monitored subject, a digestive tract **bolus** device may pass through the subject digestive tract and be eliminated. IAT 1110

Ex. 1004, Harvey at 11:10-15

WO 2008/108816 A1

Smarteac Exhibit 1004
Smarteac, Inc. v. ST Reproductive Tech. LLC
Page 1

POR, 14; Sur-Reply, 3-4

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

GROUND 1: HARVEY DOES NOT DISCLOSE THE CLAIMED “BOLUS”

Petitioners Rely on XPDR 5000 Embodiment for Claimed “Sensor” and “Radio Signal Generator”

Reply

The focus of Ground 1 is Harvey’s transponder “XPDR 5000”, as a component of Harvey’s intelligent active tag “IAT 1110.” Pet., 16-27. Harvey

Reply, 2-3

(Harvey) at 11:4-19. The transponder XPDR 5000 then contains the sensors and radio signal generator that generates the signal that carries the animal data to the receiver. Ex. 1002, ¶44-45.

Reply, 2-3

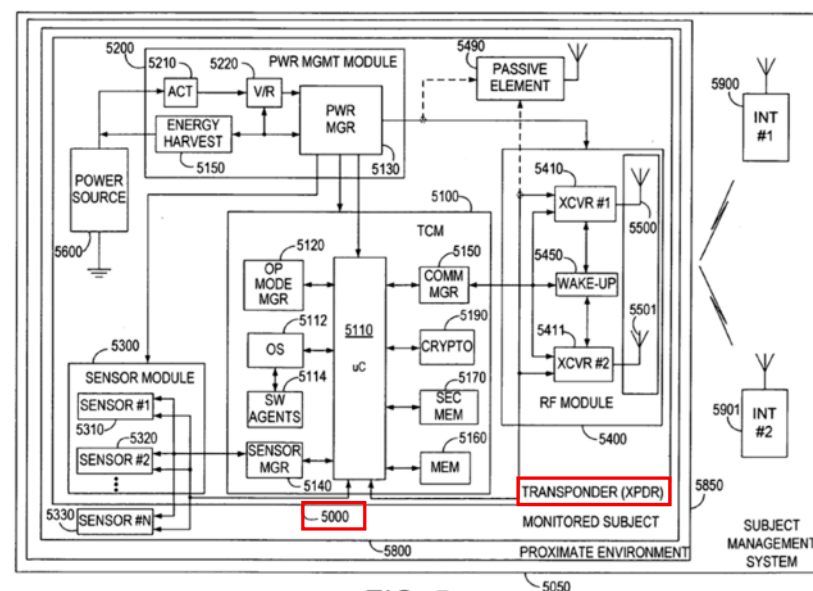


FIG. 5

Ex. 1004 at Fig. 5 (annotated)

GROUND 1: HARVEY DOES NOT DISCLOSE THE CLAIMED “BOLUS”

XPDR 5000 is a Specific Embodiment Only Disclosed in the Context of Ear Tags

Harvey

[0063] FIG. 5 illustrates an example embodiment of intelligent transponder (XPDR) 5000, which may be used as a constituent element of multi-modal intelligent active tag 2000. XPDR 5000 can be coupled to monitored subject 5800, for example, by intimate affixment, as described relative to FIG. 3. A suitable active tag may be an intelligent active tag, such as IAT 1110 in FIG.1 and tag 2000 in FIGS. 2 and 3. XPDR 5000 can be a non-limiting example embodiment of XPDR 4300, 4800 in FIG. 4.

Ex. 1004, Harvey at 22:29-33

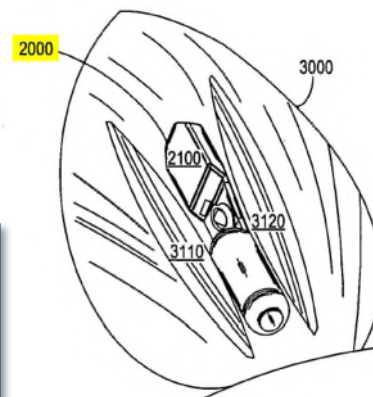


FIG. 3A

Ex. 1004 at Fig. 3A

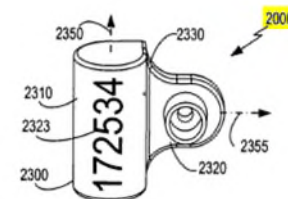
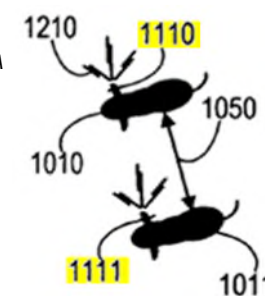


FIG. 2C

Ex. 1004 at Fig. 2C



Ex. 1004 at Fig. 1 (excerpted)

GROUND 1: HARVEY DOES NOT DISCLOSE THE CLAIMED “BOLUS”

POSA: XPDR 5000 Not Suitable for a Bolus



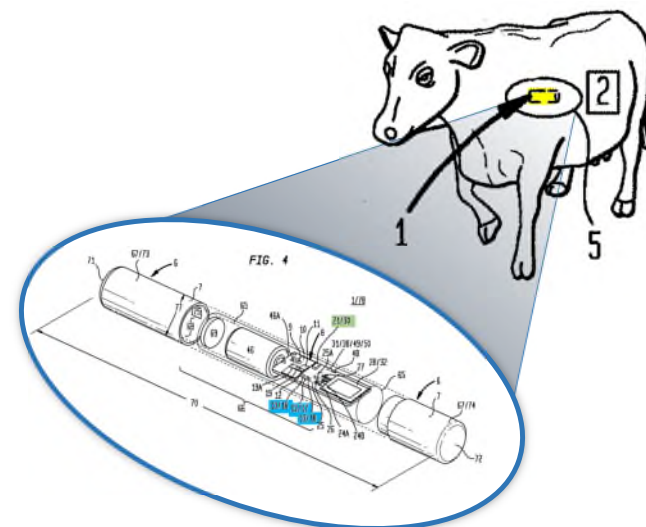
Dr. Kan

Instead, Harvey focuses on an implementation of an “ear tag” attached to the ear of an animal, which has different design requirements than a bolus. For example, an internal bolus and external ear tag require different antennae, batteries, and communication protocols. In relying on separate “bolus” and “ear tag” embodiments

Ex. 2006, Kan Decl., ¶197

3B. For example, Harvey explains that the XPDR 5000 can include “a biopotential sensor for identifying electrophysiological events including one or more of EEG (electroencephalogram), ECG (electrocardiogram), and EMG (electromyogram) waves.” Ex. 1004 at 41:1-6. A POSA would have understood these sensors as described in Harvey to be used to measure physiological parameters from intimate affixment to the exterior surface of an animal and that they are not feasible or practical in a bolus that resides freely inside the reticulum of an animal. See Section

Ex. 2006, Kan Decl., ¶106



'644 Patent at Figs. 1, 4 (excerpted and annotated)

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Harvey + Riskey Does Not Render Obvious Claims 5-6

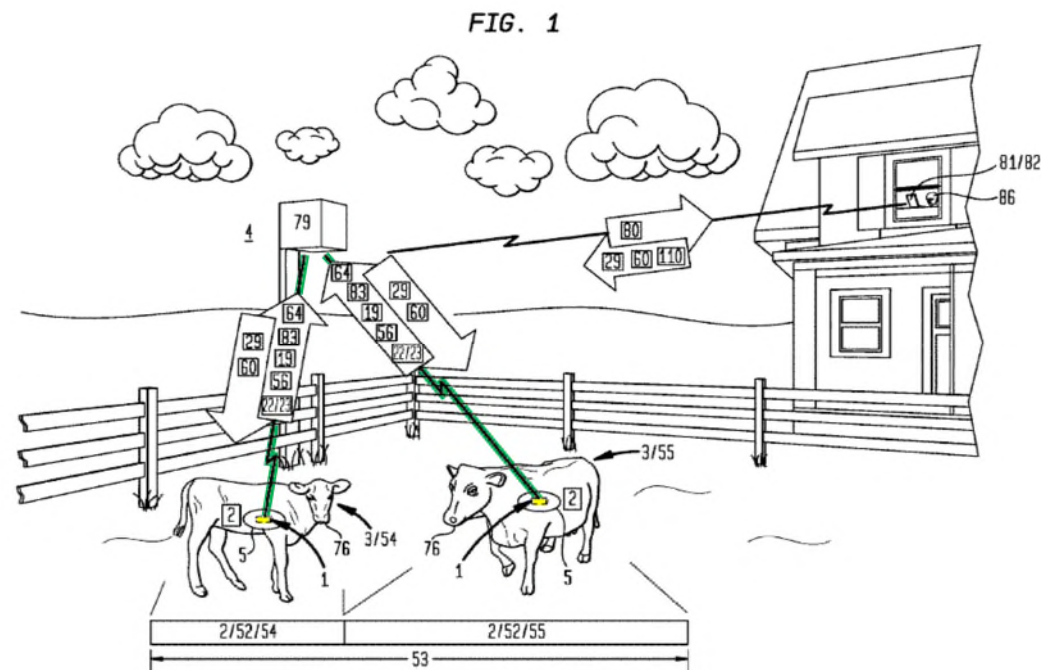
Harvey + Rettedal Does Not Render Obvious Claim 7

Harvey + Kunda Does Not Render Obvious Claims 9-10

'644 Patent

generating said radio signal having a frequency of between about 700 MHz to about 1 GHz.

'644 Patent at claim 5



'644 Patent at Fig. 1 (annotated)

GROUND 1: HARVEY DOES NOT DISCLOSE “PRE-DETERMINED INTERVALS”

Signal Activated at “Pre-Determined Intervals” Includes Physiological Data

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

'644 Patent at claim 5



Dr. Kan

and a “period of time”). This claim element also requires that the specific radio signal that was transmitted at pre-determined intervals must “carry” the “encoded physiological data” of the animal, as opposed to providing mere identification information or pings. Ex. 1004 at 4:39-41, 10:31-43, 11:16-27, claim 5. The

Ex. 2006, Kan Decl., ¶129

GROUND 1: HARVEY DOES NOT DISCLOSE “PRE-DETERMINED INTERVALS”

The Petition’s Entire “Pre-Determined Intervals” Argument

Petition

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

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

Petition, 25-26

GROUND 1: HARVEY DOES NOT DISCLOSE “PRE-DETERMINED INTERVALS”

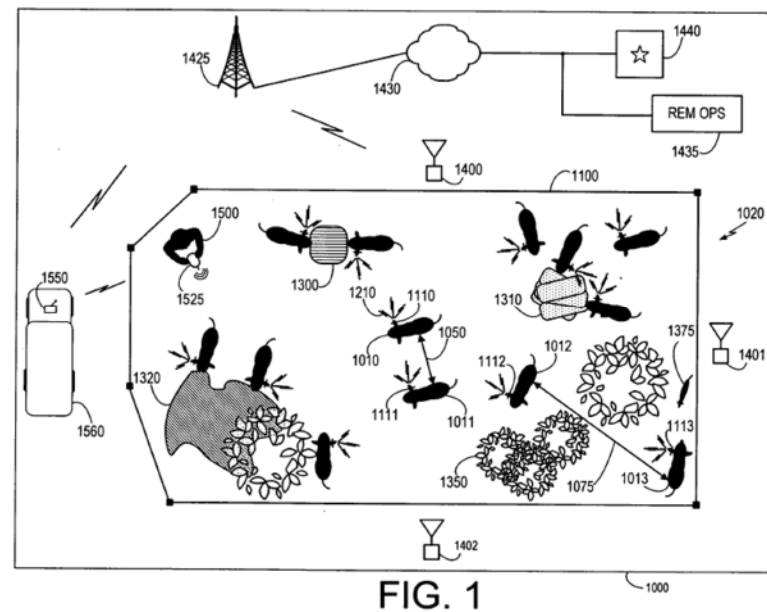
Alleged “Pre-Determined Intervals” Disclosure Part of Collision Avoidance Protocol

Harvey

[0069] With reference to FIG. 1, monitored region 1100 may represent an interrogation field disposed with multiple monitored subjects 1010-1013 having respective transponders, such as IAT 1110-1113. In such an interrogation field, communication collision may occur where two or more transponders initiate a transmit operation at approximately the same time, where information can be lost.

which may be provided by OPM 5120. In an example implementation of a selected collision avoidance protocol, XPDR 5000 may initiate communication by transmitting an outbound IAT message to INT 5900 on a preselected tag transmission interval, which may be periodic or aperiodic. A selected periodic collision avoidance protocol embodiment may be exemplified by XPDR 5000 periodically transmitting an outbound IAT message to INT 5900, over a selected periodic tag transmission interval of about 2 seconds.

Ex. 1004, Harvey at 25:30-33, 26:6-11



Ex. 1004 at Fig. 1

GROUND 1: HARVEY DOES NOT DISCLOSE “PRE-DETERMINED INTERVALS”

Collision Avoidance Pings Do Not Carry “Physiological Data”

Dr. Kan

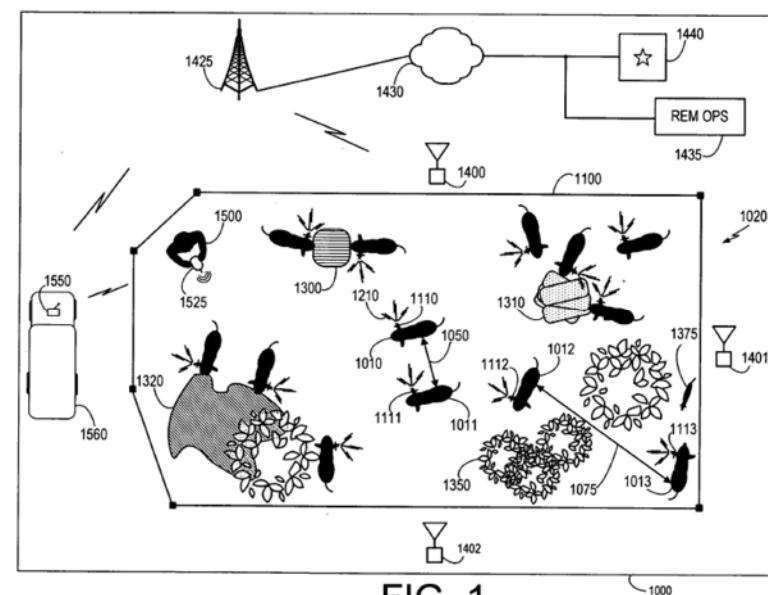
“collision avoidance protocol.” Ex. 1004 at 25:2-6, 25:30-26:6, 27:6-8. A POSA would understand that a message containing physiological data would not be used to “initiate communication”—and therefore is not the “outbound IAT message” in the collision avoidance protocol—because the sole purpose of that communication is to confirm whether a channel is clear, not to send animal data. Only if a ping is acknowledged at an undetermined time does Harvey actually transmit additional information about the animal.

Ex. 2006, Kan Decl., ¶138

Petitioners

As Patent Owner acknowledges, the purpose of sending an IAT message in this protocol, even without physiological data, is to determine whether a channel is clear so that physiological data can be sent. Resp., 26 (explaining animal data is sent if

Reply, 9



Ex. 1004 at Fig. 1

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The '644 Invention

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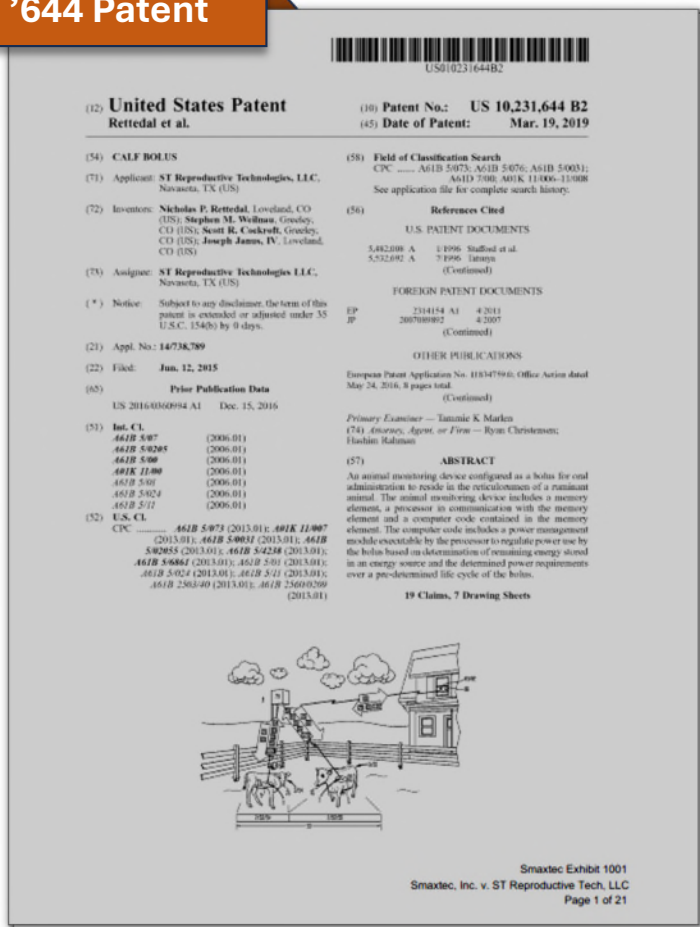
Harvey + Riskey Does Not Render Obvious Claims 5-6

Harvey + Rettedal Does Not Render Obvious Claim 7

Harvey + Kunda Does Not Render Obvious Claims 9-10

GROUND 1: HARVEY DOES NOT DISCLOSE “ENCODING”

'644 Patent



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

'644 Patent at claim 5

GROUND 1: HARVEY DOES NOT DISCLOSE “ENCODING”

Petitioners Rely on Inherency for “Encoding” Elements

Petition

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.

Petition, 21

Petitioners' Expert

10:3-11:3, 24:20-23, 42:36-43:20). Since storage in memory and transmission by a digital protocol both only work with digital information, Harvey 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, Young Decl., ¶62

GROUND 1: HARVEY DOES NOT DISCLOSE “ENCODING”

Petitioners Cannot Establish That “Encoding” is Inherent in Harvey



“Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.”

In re Robertson, 169 F.3d 743, 745 (Fed. Cir. 1999)

GROUND 1: HARVEY DOES NOT DISCLOSE “ENCODING”

Harvey Does Not “Necessarily Require” Digital, “Encoded” Signals

Sensors Produce Analog Signals

- Thermal sensors
 - Heart-rate sensor
 - Accelerometer
 - Acoustic sensor
 - Humidity sensor
 - Substance detector
 - Biopotential sensor
 - Electrokinetic sensor
 - Electrophoretic sensor
- Ex. 1002, Young Decl., ¶162

Digital Storage Not Required

Analog EEPROM storage

Ex. 2006, ¶1116; Ex. 2007, 214:6-217:17

Digital Transmission Not Required

17 Q. And nothing in paragraphs 36 or
18 37 of Harvey require that the wireless
19 communication protocol be digital, right?

22 A. I think that's right. The
Ex. 2007, Young Dep., 276:17-22 (objection omitted)

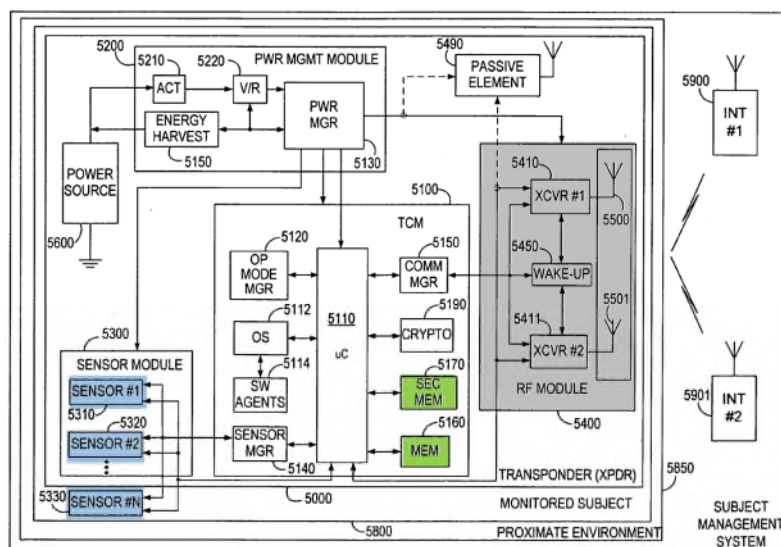


FIG. 5

Ex. 1004 at Fig. 5 (annotated)

GROUND 1: HARVEY DOES NOT DISCLOSE “ENCODING”

Petitioners Foreclosed from Shifting to New “Encoding” Theory in Reply

Petition

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.

Petition, 21

10:3-11:3, 24:20-23, 42:36-43:20). Since storage in memory and transmission by a digital protocol both only work with digital information, Harvey 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, Young Decl., ¶162

Reply

22. Petitioner’s argument, however, is that Harvey discloses the use of digital (and otherwise encoded) data in XPDR 5000 embodiments and applications, not that every embodiment and application is digital. Ex. 1025, ¶11.

Reply, 5

11. A POSA reading Harvey in 2015 would have been motivated to store and transmit digital physiological data. It would be obvious to a POSA at the relevant time of the alleged invention to have that encoding done before memory storage, as digital data is considerably more robust than analog signals. Analog signals are known to be sensitive to noise, interference and

Ex. 1025, Young Reply Decl., ¶11

Sur-Reply, 5-6

GROUND 1: HARVEY DOES NOT DISCLOSE “ENCODING”

Petitioners Foreclosed from Shifting to New “Encoding” Theory in Reply



“[Petitioner’s] subsequent arguments amount to an entirely new theory [] absent from the petition. Shifting arguments in this fashion is foreclosed by statute, our precedent, and Board guidelines.”

Wasica Fin. GmbH v. Cont’l Auto. Sys., 853 F.3d 1272, 1286-87 (Fed. Cir. 2017) (citing 35 U.S.C. § 312(a)(3))



“[Petitioner], as the master of its complaint, could have presented its reply argument in its petition but chose not to.”

Yita LLC v. MacNeil IP LLC, 69 F.4th 1356, 1367 (Fed. Cir. 2023)

GROUND 1: HARVEY DOES NOT DISCLOSE “ENCODING”

New “Encoding” Definition of “Methods *Other* Than Analog to Digital” Ignores Additional Requirements

5. A method of monitoring physiological parameters of a ruminant animal, comprising:

generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal, said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal;

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

storing said encoded physiological data in a non-transitory computer readable media,

enabling a radio signal generator located within said bolus;

activating said radio signal generator at pre-determined intervals to generate a radio signal to carry said encoded physiological data; and

generating said radio signal having a frequency of between about 700 MHz to about 1 GHz.

'644 Patent at claim 5

New conclusory argument

No argument

No argument

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GROUND 2: RISKY DOES NOT DISCLOSE “PRE-DETERMINED INTERVALS”

'644 Patent

5. A method of monitoring physiological parameters of a ruminant animal, comprising:

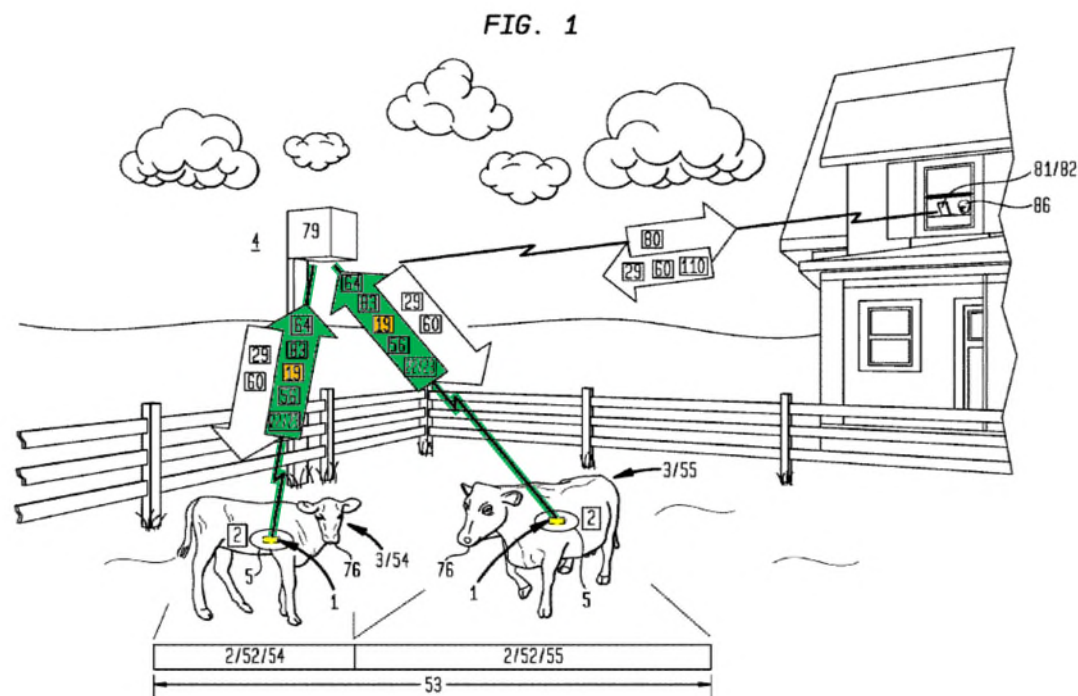
generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal, said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal;

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

storing said encoded physiological data in a non-transitory computer readable media,
enabling a radio signal generator located within said bolus;

activating said radio signal generator at pre-determined intervals to generate a radio signal to carry said encoded physiological data; and
generating said radio signal having a frequency of between about 700 MHz to about 1 GHz.

'644 Patent at claim 5



'644 Patent at Fig. 1 (annotated)

GROUND 2: RISKEY DOES NOT DISCLOSE “PRE-DETERMINED INTERVALS”

“Pre-Determined Intervals” Are a Set and Known Period of Time



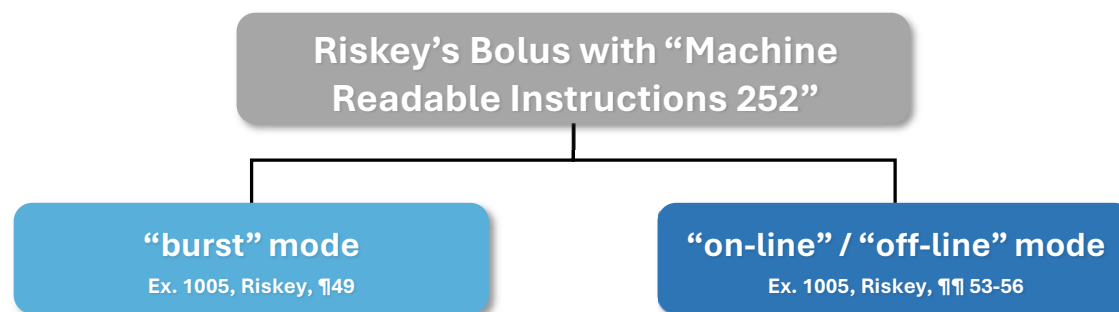
Dr. Kan

element 5[F]. Claim 5 requires that the radio signal generator be activated to generate a radio signal at “pre-determined intervals,” as opposed to being activated at random times or in response to a triggering event, such as environmental conditions. *See* Ex. 1001 at 1:59-66, claim 5. The ’644 Patent further explains that the “pre-determined intervals” are a set and known period of time, e.g., every twenty-four hours, at which the radio signal generator transmits encoded physiological data. Ex. 1001 at 10:31-43, 11:16-20 (consistently identifying intervals between transmission as periods of time, such as “twenty four hours,” a certain “time period,” and a “period of time”). This claim element also requires that the specific radio

Ex. 2006, Kan Decl., ¶129

GROUND 2: RISKY DOES NOT DISCLOSE “PRE-DETERMINED INTERVALS”

Riskey’s Operational Modes Do Not Transmit Animal Data at “Pre-Determined Intervals”



Dr. Kan

“Based on my review, Riskey does not provide disclosures indicating that the transmission interval or transmission frequency in either [burst mode or online/offline mode] is ‘pre-determined.’”

Ex. 2006, Kan Decl., ¶158

GROUND 2: RISKY DOES NOT DISCLOSE “PRE-DETERMINED INTERVALS”

“Machine Readable Instructions 252” Specify Transmission Intervals in “Burst” Mode

Risky’s “Burst” Mode

In this mode, machine 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.

Ex. 1005, Risky, ¶149

Petitioners’ Expert

8 Q. Okay. And you would agree that
9 in burst mode, the machine readable
10 instructions 252 specify the transmission
11 interval, right?

12 A. That's what the passage says.

Ex. 2008, Young Dep., 53:8-12

GROUND 2: RISKY DOES NOT DISCLOSE “PRE-DETERMINED INTERVALS”

Petitioners Improperly Ignore How “Machine Readable Instructions 252” Operate



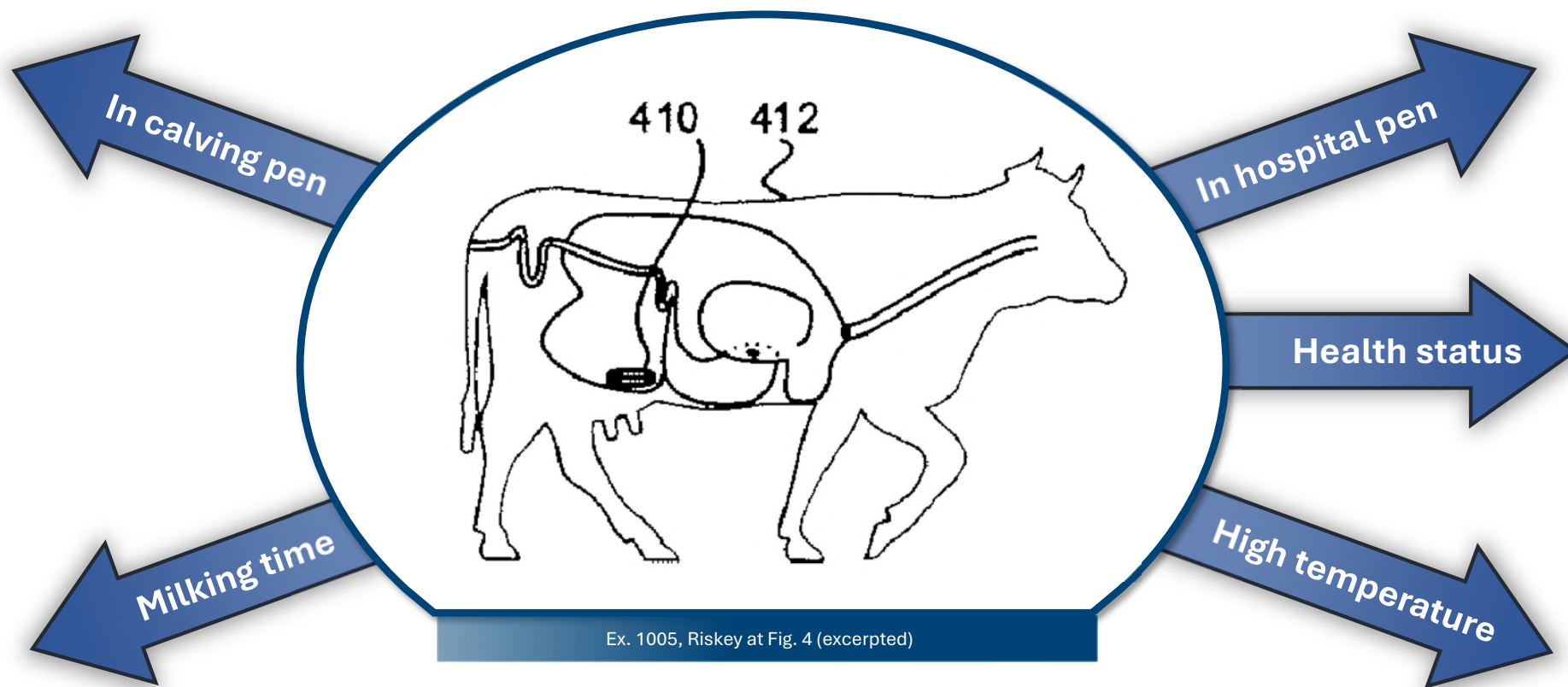
Dr. Kan

Notably, paragraph 49 itself does not provide specific details on exactly how the instructions implement the “intervals,” and a POSA would look to Risky’s teachings as a whole, including in the surrounding paragraphs, for additional context to get an understanding of how the processor and machine readable instructions operate in the burst mode. In doing so, a POSA reading Risky would understand that the “transmission interval” in Risky is not pre-determined, but dependent on triggering events that affect the delay applied between transmissions. Specifically,

Ex. 2006, Kan Decl., ¶161

GROUND 2: RISKY DOES NOT DISCLOSE “PRE-DETERMINED INTERVALS”

“Machine Readable Instructions 252” Vary Transmission “Frequency” Based on “Conditions”



POR, 40-41 (citing EX1005, ¶148); Sur-Reply, 14-15

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

30

GROUND 2: RISKY DOES NOT DISCLOSE “PRE-DETERMINED INTERVALS”

“Machine Readable Instructions 252” Specify Transmission “Frequency” in “On-line” / “Off-line” Mode

1 Q. So just to be clear, in other
2 words, machine readable instructions 252
3 specify the transmission frequency when the
4 bolus is in online mode, right?

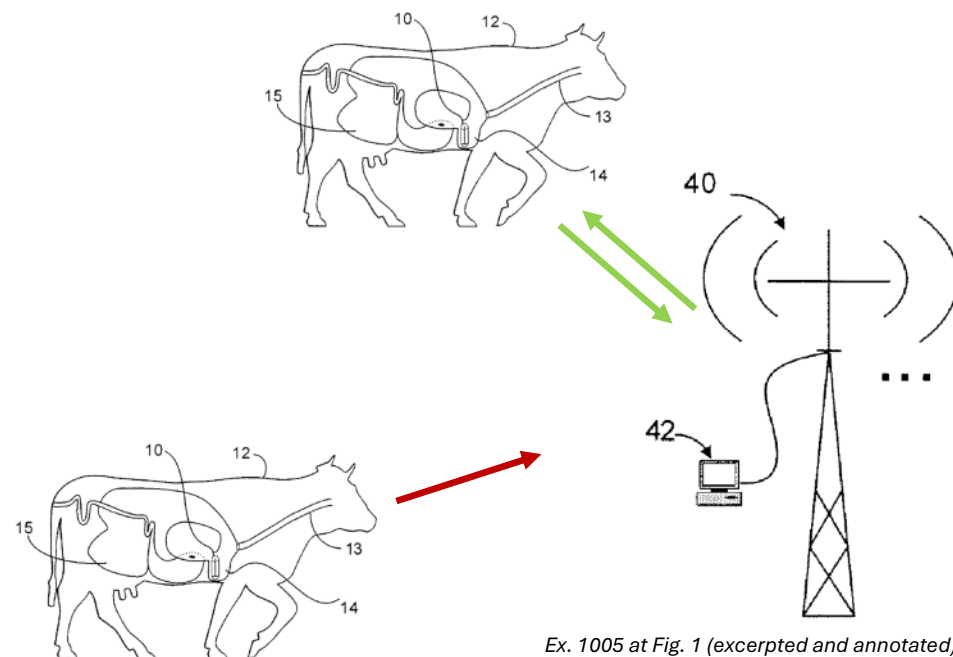
5 A. That's what that passage says.

Ex. 2008, Young Dep., 50:1-5

2 Q. So in other words, machine
3 readable instructions 252 specify the
4 decreased transmission frequency for when the
5 bolus is in offline mode, right?

6 A. That's what the passage says.

Ex. 2008, Young Dep., 51:2-6



POR, 41-42; Sur-Reply, 16-17

GROUND 2: RISKY DOES NOT DISCLOSE “PRE-DETERMINED INTERVALS”

“On-line” / “Offline” Mode “Transmission Frequency”

Risky

[0055] In “on-line” mode, bolus 210 may transmit animal characteristics messages at the “online” transmission frequency specified by machine readable instructions 252. As

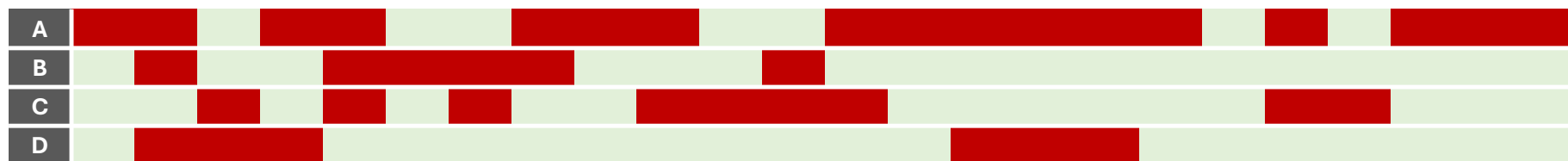
[0056] In “off-line” mode, bolus 210 may decrease transmission frequency of messages according to machine readable instructions 252. Additionally, while in “off-line” mode,

Risky, ¶48

according to animal location. For example, the processor 240 may increase a polling and/or transmission frequency when the animal is in the vicinity of a calving pen and/or hospital pen, and may decrease the polling and/or transmission frequency when the animal is moved out of the pen. Similarly, the sensor polling and/or transmission frequencies may be configured to vary depending an animal schedule. For

GROUND 2: RISKY DOES NOT DISCLOSE “PRE-DETERMINED INTERVALS”

“On-line” / “Offline” Mode: Transmission “Frequency” *Changes*



OVERVIEW

The '644 Invention

02-03

Harvey Does Not Anticipate Claims 5-6

04-23

Harvey Does Not Disclose the Claimed "Bolus"

Harvey Does Not Disclose "Pre-Determined Intervals"

Harvey Does Not Disclose "Encoding"

Riskey Does Not Anticipate Claims 5-6

24-39

Riskey Does Not Disclose "Pre-Determined Intervals"

Riskey Does Not Disclose "Encoding"

Harvey Combinations Do Not Render Obvious Claims 5-7 or 9-10

40-53

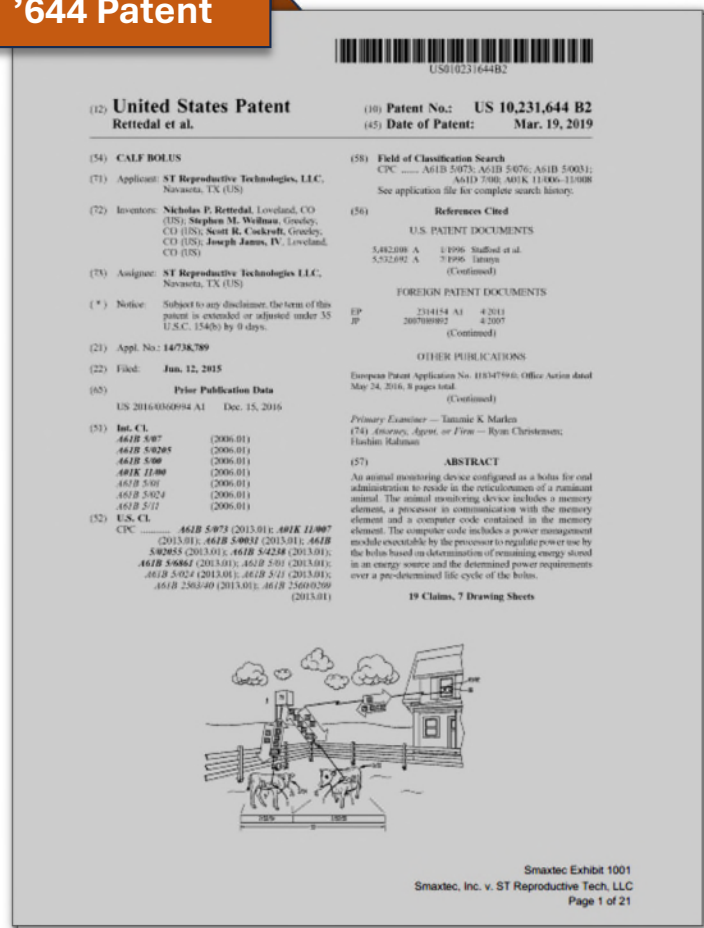
Harvey + Riskey Does Not Render Obvious Claims 5-6

Harvey + Rettedal Does Not Render Obvious Claim 7

Harvey + Kunda Does Not Render Obvious Claims 9-10

GROUND 2: RISKEY DOES NOT DISCLOSE “ENCODING”

'644 Patent



5. A method of monitoring physiological parameters of a ruminant animal, comprising:

- generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal, said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal;
- 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
- storing said encoded physiological data in a non-transitory computer readable media,
- enabling a radio signal generator located within said bolus;
- activating said radio signal generator at pre-determined intervals to generate a radio signal to carry said encoded physiological data; and
- generating said radio signal having a frequency of between about 700 MHz to about 1 GHz.

'644 Patent at claim 5

GROUND 2: RISKEY DOES NOT DISCLOSE “ENCODING”

Petitioners Rely on Inherency Argument in Petition

Petition

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.

Petition, 32

GROUND 2: RISKEY DOES NOT DISCLOSE “ENCODING”

Experts Agree That Risky Does Not “Necessarily Require” Digital, “Encoded” Signals

Analog Sensor Signals

Thermistors → Current / Voltage

Ex. 1025, ¶24; Ex. 2006, ¶83

Thermocouple → Voltage

Ex. 1002, ¶84; Ex. 2006, ¶82

Analog Storage

Capacitive storage

Ex. 2006, ¶87; Ex. 2007, 198:6-203:17

Magnetic storage

Ex. 2006, ¶88; Ex. 2007, 191:6-193:15

EEPROM storage

Ex. 2006, ¶86; Ex. 2007, 214:6-217:17

Analog Transmission

Amplitude Modulation (AM)

Ex. 2006, ¶90

Frequency Modulation (FM)

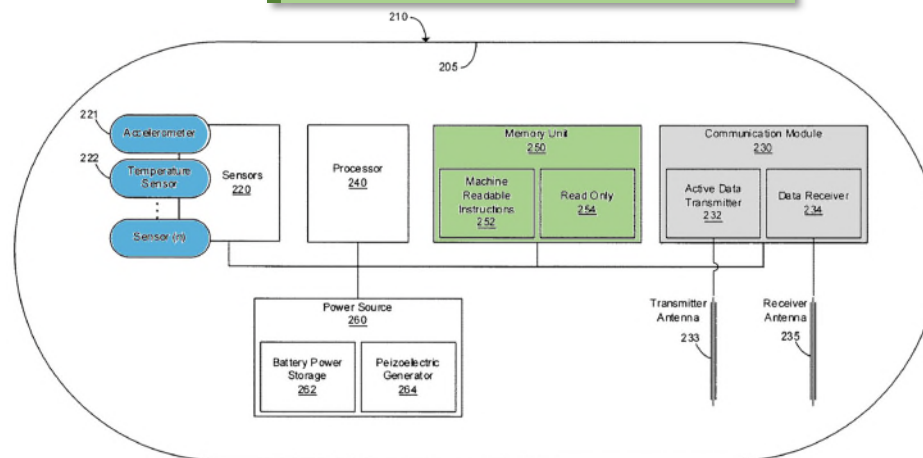
Ex. 2006, ¶90; Ex. 2007, 180:20-181:16

Phase Modulation (PM)

Ex. 2006, ¶90

“[T]here are analog-based modulation form [sic] to transmit analog information. That’s in the textbook.”

Ex. 2007, 180:22-181:2



Ex. 1005 at Fig. 2 (excerpted and annotated)

GROUND 2: RISKY DOES NOT DISCLOSE “ENCODING”

Petitioners Improperly Recast Their Inherency Argument

Reply

Patent Owner argues that these disclosures do not require digital data. But a POSA would have understood that Risky is clearly discussing digital data in many instances. For example, Risky discusses the pre-processing of measurement data

Reply, 11



“The inherent result must inevitably result from the disclosed steps; ‘[i]nherency . . . may not be established by probabilities or possibilities.’”

EIS GmbH v. Novoluto GmbH, IPR2019-01302, Paper 50 at 57 (PTAB June 14, 2021),
aff’d, 2023 WL 2472639 (Fed. Cir. Mar. 13, 2023)

Sur-Reply, 11-12

GROUND 2: RISKEY DOES NOT DISCLOSE “ENCODING”

Petitioners’ New Conclusory Definition of “Encoding” Should Be Rejected

First Declaration

[0051], [0058], Fig. 2 (depicting “Active Data Transmitter 232”). Since storage in memory, organization into a data structure, and transmission by a digital protocol all require digital information, 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. The digital representation of an analog signal is an encoded signal.

Ex. 1002, Young Decl., ¶186

Reply Declaration

24. Risky teaches additional encoding techniques besides analog to digital conversion. For example, Risky discloses a temperature sensor 222 that is a thermistor. Ex. 1005, [0035]. The thermistor’s resistance value changes as the animal’s body temperature changes. As a POSA would have understood, the thermistor’s resistance value (which is the sensor signal) needs to be converted (encoded) into a voltage or current signal to be processed by the microprocessor. The voltage or current signal is therefore encoded physiological data that corresponds to a physiological parameter (body temperature) of the animal.

Ex. 1025, Young Reply Decl., ¶124

Sur-Reply, 12-14; see also Petition, 32-33 (citing EX1002, ¶186); Reply, 12-13 (citing EX1025, ¶124)

OVERVIEW

The '644 Invention

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04-23

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Harvey Does Not Disclose "Pre-Determined Intervals"

Harvey Does Not Disclose "Encoding"

Riskey Does Not Anticipate Claims 5-6

24-39

Riskey Does Not Disclose "Pre-Determined Intervals"

Riskey Does Not Disclose "Encoding"

Harvey Combinations Do Not Render Obvious Claims 5-7 or 9-10

40-53

Harvey + Riskey Does Not Render Obvious Claims 5-6

Harvey + Rettedal Does Not Render Obvious Claim 7

Harvey + Kunda Does Not Render Obvious Claims 9-10

GROUND 3: HARVEY + RISKEY DOES NOT RENDER OBVIOUS CLAIMS 5-6

Petition Fails to Engage in a Proper Obviousness Analysis

Petition

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.

Petition, 42

Identify primary and secondary references	X
Identify missing elements from primary reference	X
Identify elements to add from secondary reference	X
Identify motivation to make the combination	X
Show a reasonable expectation that the combination would be successful	X

POR, 47-54; Sur-Reply, 18-21

Sisvel Int'l S.A. v. Sierra Wireless, Inc., 82 F.4th 1355, 1364 (Fed. Cir. 2023)

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

41

GROUND 3: HARVEY + RISKEY DOES NOT RENDER OBVIOUS CLAIMS 5-6

Petitioners' Evidence of "Similarities" is Reason *NOT* to Combine Harvey and Risky

"the same type of apparatus"

Petition, 38

"other similarities and common features"

Petition, 39

"used for the same purpose"

Petition, 38

"recognized and solved [the] same problem"

Petition, 40



Affirming no obviousness based in part on evidence of no motivation to combine the claimed feature with "a system that already includes a [feature] that serves this purpose" because of the "redundant functions" of the two features.

S.-Tek Sys., LLC v. Engineered Corrosion Sols., LLC, 748 F.App'x 1003, 1006-07 (Fed. Cir. 2018)

GROUND 3: HARVEY + RISKEY DOES NOT RENDER OBVIOUS CLAIMS 5-6

Petitioners' Reply Introduces New, Deficient Obviousness Combination

Reply

It would have been obvious for a POSA to have supplemented Harvey's disclosure of its XPDR 5000 transponder with additional detail of the bolus form from Risky, and to further incorporate Risky's teaching regarding compression of the animal measurement data. Ex. 1025, ¶30.

Reply, 17

Still Fails to Identify:

Elements missing from primary reference	X
Elements in secondary reference	X
Motivation to combine	X
Reasonable expectation of success	X

Sur-Reply, 18-19

Sisvel Int'l S.A. v. Sierra Wireless, Inc., 82 F.4th 1355, 1364 (Fed. Cir. 2023)

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

OVERVIEW

The '644 Invention

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Harvey Combinations Do Not Render Obvious Claims 5-7 or 9-10

40-53

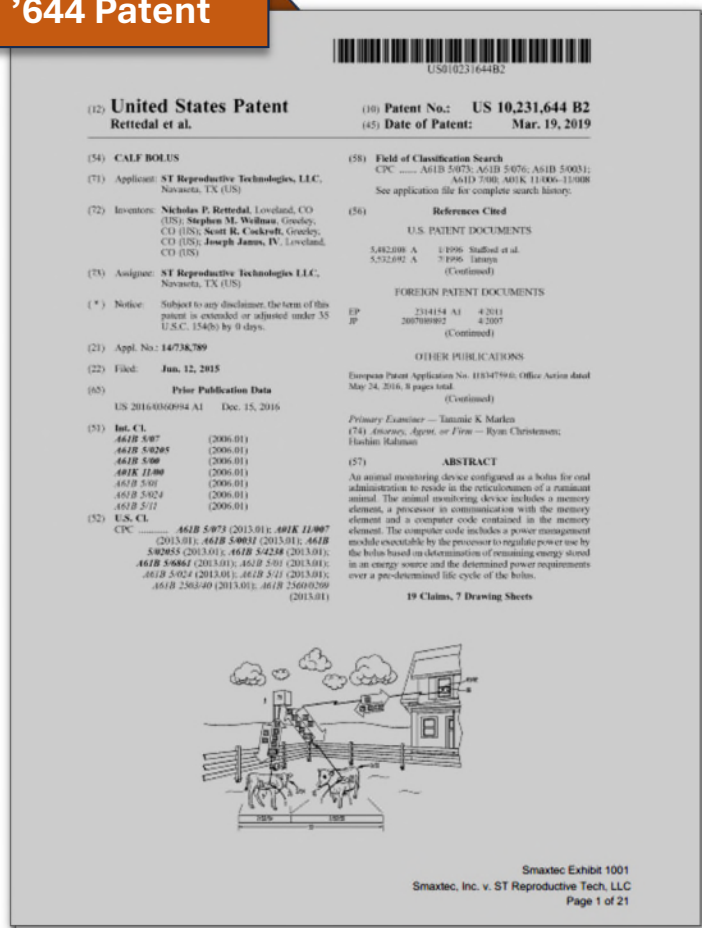
Harvey + Riskey Does Not Render Obvious Claims 5-6

Harvey + Rettedal Does Not Render Obvious Claim 7

Harvey + Kunda Does Not Render Obvious Claims 9-10

GROUND 4: HARVEY + RETTEDAL DOES NOT RENDER OBVIOUS CLAIM 7

'644 Patent



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.

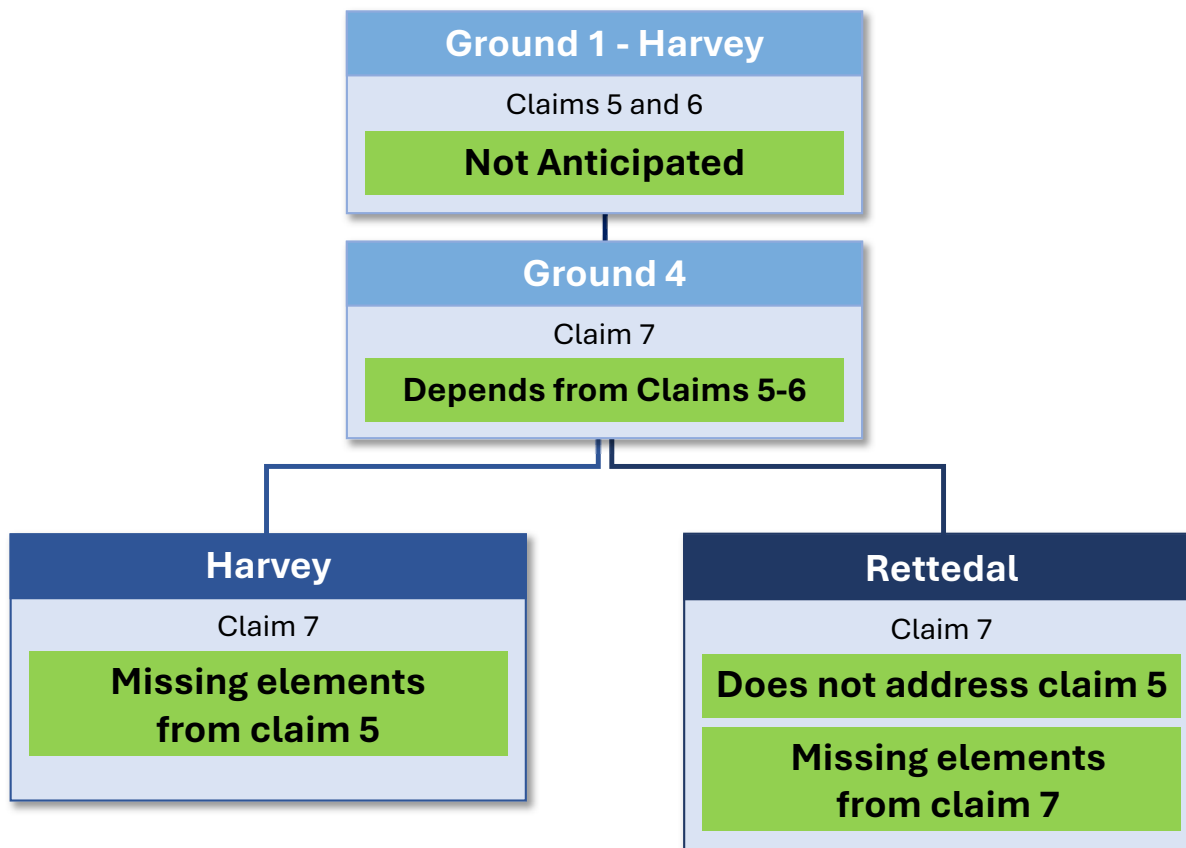
'644 Patent at claim 6

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.

'644 Patent at claim 7

GROUND 4: HARVEY + RETTEDAL DOES NOT RENDER OBVIOUS CLAIM 7

Ground 4 Inherits Harvey's Deficiencies



GROUND 4: HARVEY + RETTEDAL DOES NOT RENDER OBVIOUS CLAIM 7

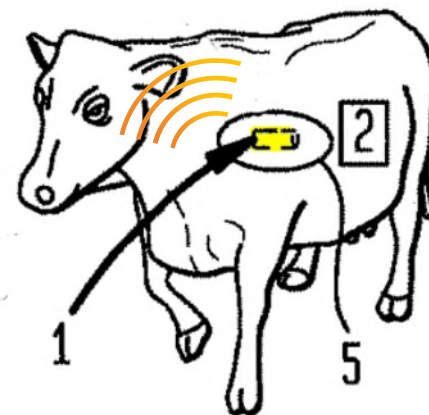
Claim 7 Requires Adjusting Antenna Resonant Frequency



Dr. Kan

animal.” As I explain more below, a POSA would understand that the “change” in frequency stated in the claim is a shift in the “resonant frequency” (or “center frequency”) of the antenna caused by the animal mass. Specifically, the shift in resonant frequency caused by the animal mass creates a mismatch between the center frequency and the frequency of the signal delivered by the radio signal generator. A POSA would understand that the claimed “matching elements” adjust the antenna’s center frequency property to match the radio signal generator’s output frequency.

Ex. 2006, Kan Decl., ¶188



'644 Patent at Fig. 1 (excerpted and annotated)

GROUND 4: HARVEY + RETTEDAL DOES NOT RENDER OBVIOUS CLAIM 7

Claim 7 Requires Adjusting Antenna Resonant Frequency

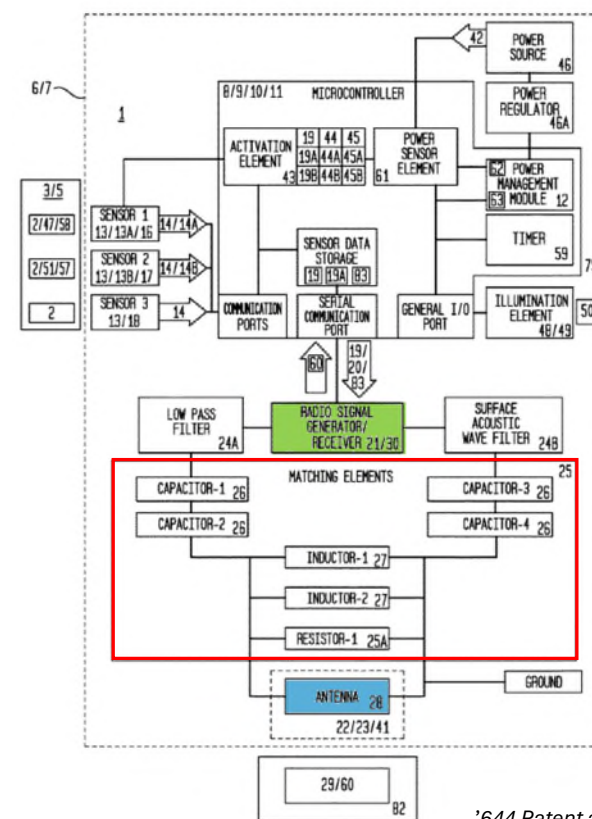
'644 Patent

as "free air"). Because the radio signal generator (21) included in embodiments of the bolus (1) operate within the mass of a ruminant animal (3), it has been discovered that the center frequency (the arithmetic mean of the lower cutoff frequency and the upper cutoff frequency) is shifted lower and may not have the maximum gain.

Accordingly, there can be a substantial advantage, by selection of the inductors (27) and capacitors (26) as well as their position in the resonant circuit (25) to increase the inductance and capacitance values to purposefully shift the center frequency upward and allowing the radio signal frequency (23) to be re-tuned to a desired radio signal frequency (23) by passing through the mass of the ruminant animal (3).

'644 Patent at 6:27-40

FIG. 2



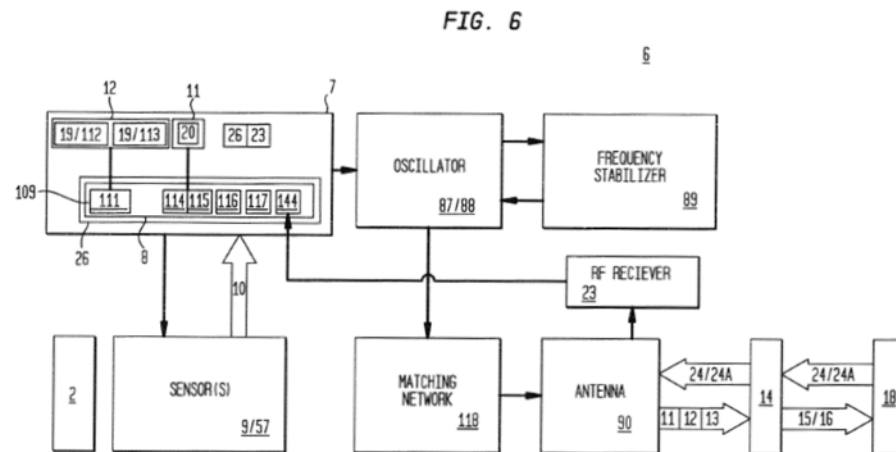
'644 Patent at Fig. 2 (annotated)

GROUND 4: HARVEY + RETTEDAL DOES NOT RENDER OBVIOUS CLAIM 7

Rettedal Fails to Teach the Claimed “Matching Elements”

Young rely on in Rettedal is different from the claimed “matching elements.” For example, Rettedal’s so-called “match element” does not adjust the center frequency of the antenna. Instead, Rettedal describes it as configured to “deliver a particular first radio frequency signal...to the antenna.” Ex. 1006 at [0064]. In other words, it does not adjust the properties of the antenna (i.e., its resonant frequency or center frequency) by impedance matching. It is intended to deliver a specific signal frequency *to the antenna*. For example, Rettedal’s match element supposedly “can detune a 433 MHz first radio frequency signal (13) to generate a signal of between about 418 MHz and about 425 MHz.” *Id.* That is, it changes the frequency of the signal to generate a specific frequency from the oscillator without changing the antenna’s center frequency.

Ex. 2006, Kan Decl., ¶192



Ex. 1006 at Fig. 6

OVERVIEW

The '644 Invention

02-03

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Harvey Does Not Disclose "Encoding"

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40-53

Harvey + Riskey Does Not Render Obvious Claims 5-6

Harvey + Rettedal Does Not Render Obvious Claim 7

Harvey + Kunda Does Not Render Obvious Claims 9-10

'644 Patent



'644 Patent at claim 9

GROUND 5: HARVEY + KUNDA DOES NOT RENDER OBVIOUS CLAIMS 9-10

Ground 5 Inherits Harvey's Deficiencies

5. A method of monitoring physiological parameters of a ruminant animal, comprising:

generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal, said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal;

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

storing said encoded physiological data in a non-transitory computer readable media,

enabling a radio signal generator located within said bolus;

activating said radio signal generator at pre-determined intervals to generate a radio signal to carry said encoded physiological data; and

generating said radio signal having a frequency of between about 700 MHz to about 1 GHz.

'644 Patent at claim 5

9. A method of monitoring physiological parameters of a ruminant animal, comprising:

generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal, said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal;

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;

storing said encoded physiological data in a non-transitory computer readable media;

enabling a radio signal generator located within said bolus;

activating said radio signal generator to generate a radio signal to carry said encoded physiological data; and

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.

'644 Patent at claim 9

GROUND 5: HARVEY + KUNDA DOES NOT RENDER OBVIOUS CLAIMS 9-10

A POSA Would Not Look to Kunda's Mobile Phone Antenna for Internal Bolus

Dr. Kan

208. The key design criteria for an antenna within an animal's reticulum are unique and different from Kunda's antenna. Professor Young and Petitioners do not explain how a POSA would have modified Kunda's antenna to meet those criteria and successfully arrive at the claims. For example, Kunda provides no disclosures suggesting that its antenna could be applied in a device used inside an animal's reticulum, where, for example, impedance mismatching, uncontrollable orientation, and antenna detuning are caused by internal factors, such as the properties of body tissue and complex food mixtures, resulting in significant performance loss, reduced battery life, attenuation, and polarization loss. A POSA would recognize those as necessary design focuses for an antenna in a bolus, which Kunda does not specifically address. A POSA would not be able to conclude from Kunda's

Ex. 2006, Kan Decl., ¶1208

Petitioners' Expert

16 Q. So when a POSA is deciding what
17 type of antenna to use, how many antennas to
18 use, or where to locate those antennas in the
19 monitoring device, you would agree that a
20 POSA would take into consideration the medium
21 that the antenna needs to transmit through?

2 A. Yeah, I think that's fair to say.

Ex. 2008, Young Dep., 29:16-30:2 (objection omitted)

POR, 62-66; Sur-Reply, 24-25

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

Dated: October 16, 2025

Respectfully submitted,

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ST Reproductive Technologies, LLC

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing Patent Owner's Demonstrative Exhibits was served on counsel of record on October 16, by filing this document through the Patent Trial and Appeal Case Tracking System (P-TACTS), as well as delivering a copy via electronic mail to counsel of record for the Petitioners at the following addresses:

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Dated: October 16, 2025

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