

October 21, 2025

***smaXtec Inc. and
smaXtec Animal Care GmbH***

v.

ST Reproductive Technologies, LLC

IPR2024-01067

U.S. Patent No. 10,231,644

Demonstrative Exhibit – Not Evidence

GIBSON DUNN

TABLE OF CONTENTS

01	'644 Patent: Ground 1 – Harvey (claims 5 and 6)
02	'644 Patent: Ground 2 – Risky (claims 5 and 6)
03	'644 Patent: Ground 3 – Harvey + Risky (claims 5 and 6)
04	'644 Patent: Ground 4 – Harvey + Rettedal (claim 7)
05	'644 Patent: Ground 5 – Harvey + Kunda (claims 9 and 10)

'644 Patent: Ground 1

Ground 1: Harvey Anticipates Claims 5 and 6

01

Demonstrative Exhibit – Not Evidence

3

Harvey Discloses a Method of Monitoring Animals

5[pre] “A method of monitoring
physiological parameters of a
ruminant animal,
comprising”

15 1. TECHNICAL FIELD

[0002] This invention relates generally to asset monitoring systems. More specifically, the invention relates to a livestock management system, including an active RF tag and corresponding interrogator, configured to infer a monitored subject state from a sensed physical quantity of a monitored subject, relative to a monitored subject group.

Ex. 1004 (Harvey), 1:16-20

Pet., 16

Harvey Discloses Generating a Signal from a Bolus

5[a] “generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal”

[0038] Incorporated telemetry device 1110-1113 (generally, intelligent active tag, or IAT, 1110) can be a telemetry device coupled to a respective monitored subject 1010, which may be disposed internally or externally to a monitored subject, which may be affixed or removable, and which may be coupled permanently or impermanently. Accordingly, certain non-limiting embodiments of active tag may be clipped, pinned, or bound, to, or implanted within, a monitored subject corpus. In certain other non-limiting implementations, an active tag, such as IAT 1110, may be secured to monitored subject 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), 11:4-16

Pet., 10-11, 17-19

Harvey's Signals Vary with Changing Physiological Parameters

5[b] “said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal”

20 [0039] IAT 1110 also may be configured to store subject dynamic information as subject data. Non-limiting examples of subject dynamic information includes a monitored subject vital sign, a sensed physiological parameter, a sensed motion of monitored subject 1010, a sensed behavior of monitored subject 1010, an ambient environmental condition proximate to monitored subject 1010, or a change in one or more of a sign, a parameter, a motion, or a condition. Another non-limiting example of subject
25 dynamic information may include a predetermined monitored subject state, which may be sensed by IAT 1110 or may be inferred from sensed subject dynamic information. IAT 1110 also may be

Ex. 1004 (Harvey), 11:21-24

Pet., 19-20

Harvey Teaches Encoding the Sensor Signal

5[c] “encoding said sensor signal from said one or more sensors as encoded physiological data corresponding to said one or more physiological parameters of said ruminant animal; and”

5

Sensor 5140 can be configured to selectively cause one or more of SENSOR #1 5310, SENSOR #2 5320, or SENSOR #N 5330 to sense preselected subject parameter to provide sensed data to uC 5110.

In addition, SMM 5340 may monitor and characterize sensed data of one or more of SENSOR #1 5310, SENSOR #2 5320, or SENSOR #N 5330 and, in response to a predetermined sensed characteristic, sensor manager 5140 may provide one or both of OPM 5120 or uC 5110 with a sensed parameter alert, in accordance with a predetermined transponder demand operational state. Sensor manager 5140 can

Ex. 1004 (Harvey), 39:4-5

[0036] A selected communication protocol may be a wireless personal area network (WPAN)-based communication protocol; a wireless local area network (WLAN)-based communication protocol; a wireless metropolitan area network (WMAN)-based communication protocol; or a wireless wide area network communications (WAN)-based communication protocol, including a mobile telephony communication protocol. Non-limiting examples of a WPAN-based communication protocol include a BLUETOOTH®-type communication protocol or a ZigBee®-type communication protocol. One

5

10

example of a BLUETOOTH®-type communication protocol may use a BLUETOOTH®-related wireless transmission protocol in cooperation with an IEEE Standard 802.15.1-compliant radio air (wireless medium) interface. Another example BLUETOOTH®-type communication protocol may use

Ex. 1004 (Harvey), 10:4-11

Pet., 20-22

Harvey Teaches Storing the Encoded Physiological Data

5[d] “storing said encoded physiological data in a non-transitory computer readable media”

[0078] XPDR 5000 can include transponder controller module (TCM) 5100, power management module (PMM) 5200, sensor module (SDM) 5300, and RF module (RFM) 5400. As used herein, the term “transponder electrical circuitry,” or its equivalent, pertains to all, or to an electrically segregable circuit portion, of XPDR 5000 electrical circuitry, including one or more of TCM 5100, PMM 5200, SDM 5300, or RFM 5400. TCM 5100 may include microcontroller (uC) 5110 and memory (MEM) 5160. MEM 5160 may be representative of a memory element, in general, so that MEM 5160 may include volatile memory, including RAM, non-volatile memory, including EEPROM or NVRAM, or both. In general, uC 5110 can operate in accordance with executable instructions corresponding to

Ex. 1004 (Harvey), 29:21-24

Pet., 22-23

Harvey Teaches the Generation of a Radio Signal

5[e] “enabling a radio signal generator located within said bolus”

[00102] RFM 5400 may incorporate an RF transceiver, as represented by XCVR #1 5410, by which RFM 5400 may selectively transmit or receive communicated data, including an IAT message, with at least one remote interrogator (INT) 5900. XCVR #1 5410 may be configured to communicate using one or more selected communication techniques. For example, XCVR #1 5410 may be configured to communicate using a first selected communication technique, or a first and a second selected communication technique. In certain embodiments, XCVR #2 5411 may represent one or more

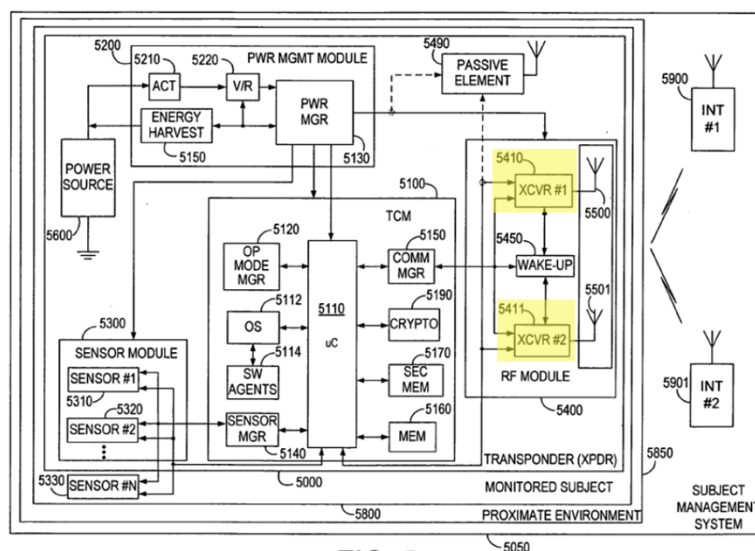


FIG. 5

1004 (Harvey), 42:3-6, Fig. 5.

Pet., 23-25

Harvey Teaches Activating the Generator at Pre-determined Intervals

5[f] “activating said radio signal generator at pre-determined intervals to generate a radio signal to carry said encoded physiological data; and”

[0073] In certain embodiments, a selected tag transmission interval may be assigned to XPDR 5000, for example, during manufacture, by a vendor, or by INT 5900. Alternatively, XPDR 5000 may self-assign a selected tag transmission interval, for example, upon XPDR 5000 initialization, or in response to a change in a predetermined operational mode of XPDR 5000. INT 5900 may be configured to assign a selected tag transmission interval, without limitation, using a predetermined tag transmission interval selection technique, which may be preprogrammed into an operation of INT 5900, or using a selectable tag transmission interval selection technique, which may be selected by an INT 5900 operator, or may be communicated remotely to INT 5900.

Ex. 1004 (Harvey), 27:14-21

Pet., 25-26

Harvey's Radio Signal Has a Frequency from 700 MHz to 1 GHz

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

Bluetooth® SIG, Bellvue, WA, USA. In another non-limiting example, XCVR #1 5410, which may be an LR-WPAN device or radio operating, in accordance with IEEE Std. 802.15.4-2006, within a selected one of selected communication frequency bands of between about 850 MHz to about 950 MHz, or between about 2.4 GHz to about 2.5 GHz, and having an intermediate communication range of up to at least about 100 meters, between XPDR 5000 and INT 5900. However, selected embodiments of an

Ex. 1004 (Harvey), 43:4-8

Harvey's Radio Signal Has a Frequency from 850 to 950 MHz

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.”

Bluetooth® SIG, Bellvue, WA, USA. In another non-limiting example, XCVR #1 5410, which may be
5 an LR-WPAN device or radio operating, in accordance with IEEE Std. 802.15.4-2006, within a selected
one of selected communication frequency bands of between about 850 MHz to about 950 MHz, or
between about 2.4 GHz to about 2.5 GHz, and having an intermediate communication range of up to at
least about 100 meters, between XPDR 5000 and INT 5900. However, selected embodiments of an

Ex. 1004 (Harvey), 43:4-8

Pet., 27

All Four Arguments Patent Owner Raises Against Harvey Fail

Ground 1: Anticipation of Claims 5 and 6 by Harvey

Issue 1: Harvey discloses a bolus with a transponder that includes sensors and a radio signal generator

Issue 2: Harvey teaches storing and transmitting of encoded data

Issue 3: Harvey's predetermined tag transmission intervals are not limited to subject ID numbers

Harvey teaches a transponder to be used in an Intelligent Active Tag

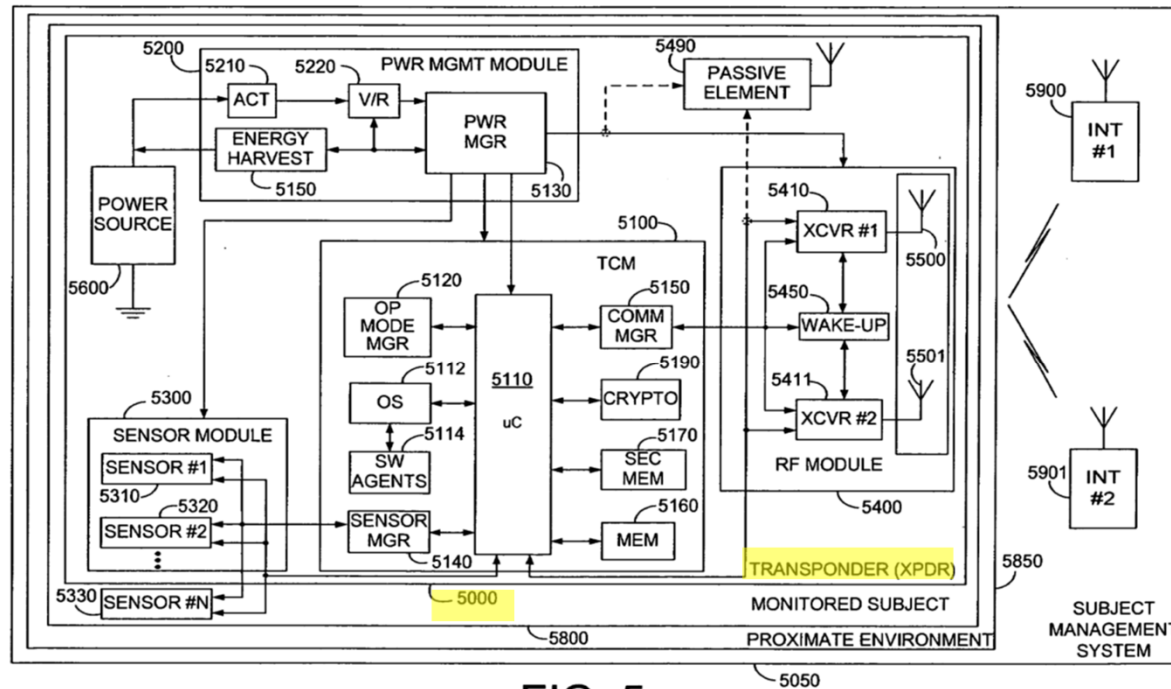


FIG. 5

Ex. 1004 (Harvey), Fig. 5.

Pet., 11, 17-18; Reply, 2-4.

Issue 1: Harvey discloses a bolus with a transponder that includes sensors and a radio signal generator

Demonstrative Exhibit – Not Evidence

14

Harvey teaches that the Intelligent Active Tag In a Bolus

[0038] Incorporated telemetry device 1110-1113 (generally, intelligent active tag, or IAT, 1110) can be a telemetry device coupled to a respective monitored subject 1010, which may be disposed internally or externally to a monitored subject, which may be affixed or removable, and which may be coupled permanently or impermanently. Accordingly, certain non-limiting embodiments of active tag may be clipped, pinned, or bound, to, or implanted within, a monitored subject corpus. In certain other non-limiting implementations, an active tag, such as IAT 1110, may be secured to monitored subject 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), 11:4-15

Issue 1: Harvey discloses a bolus with a transponder that includes sensors and a radio signal generator

Pet., 10-11; Reply, 2-4

Demonstrative Exhibit – Not Evidence

15

Harvey Explicitly Discloses IAT 1110 in a Bolus, and XPDR 5000 as a Component of IAT 1110

10 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
15 digestive tract bolus device may pass through the subject digestive tract and be eliminated. IAT 1110

20 [0131] FIG. 12 illustrates an example embodiment of method 12000 for operating an active tag, which may be described with respect to an intelligent transponder. For the purposes of illustration, method 12000 may be described with reference to FIG. 5, including XPDR 5000. 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.

30 of monitored group 7030. INT 7100 can be configured for contactless communication on a selected communication frequency band, from between about 100 kHz to about 250 GHz. Like XPDR 5000 in FIG. 5, XPDR 7020 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. INT

Ex. 1004 (Harvey) at
11:10-14, 70:22-23,
48:31-33;
Pet. 10-11;
Pet. Reply, at 2-4

Issue 1: Harvey discloses a bolus with a transponder that includes sensors and a radio signal generator

Demonstrative Exhibit – Not Evidence

16

PO Argues That Using Harvey's Tag as a Bolus Would Require a Different Sensor, But The Claims Are Silent as to Sensor Type

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.

Issue 1: Harvey discloses a bolus with a transponder that includes sensors and a radio signal generator

644 Patent, Claim 5; Reply, 4

Demonstrative Exhibit – Not Evidence

17

XPDR 5000 is Not Limited to Any Particular Sensors

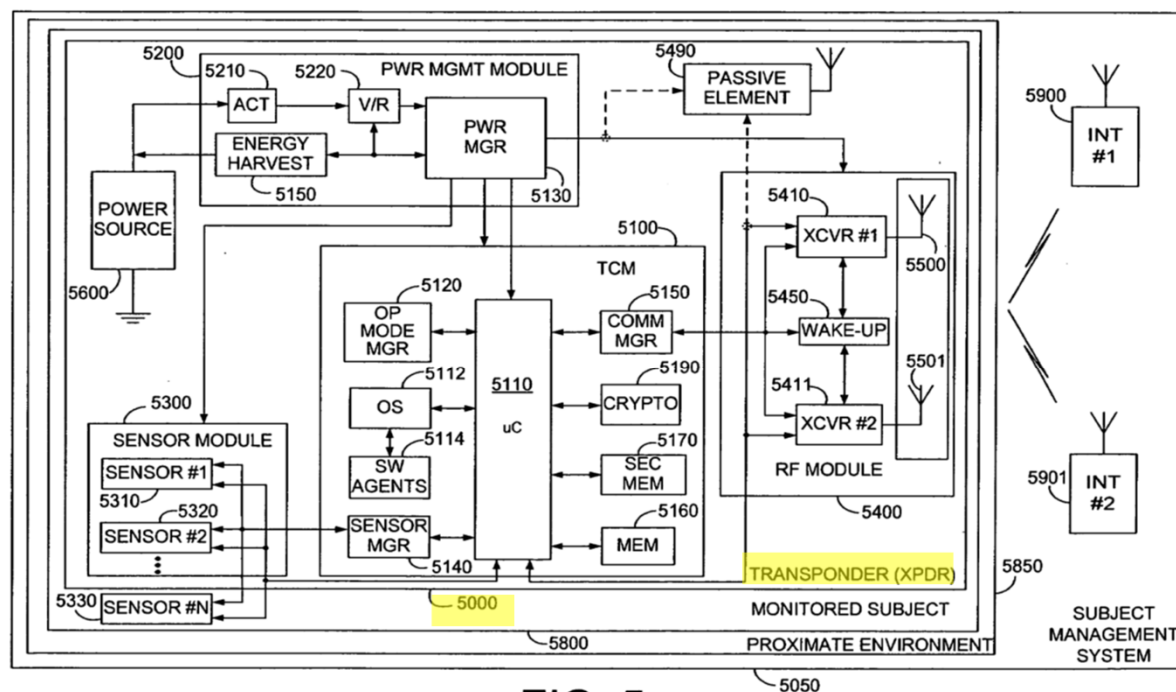


FIG. 5

Issue 1: Harvey discloses a bolus with a transponder that includes sensors and a radio signal generator

Reply, 4; Ex. 1004 (Harvey), Fig. 5

Demonstrative Exhibit – Not Evidence

18

A POSA Would Be Able to Select An Appropriate Sensor For Different Application

[00100] A suitable sensor configuration selected for an embodiment of XPDR 5000 may recognize a balance of XPDR 5000 features including, without limitation, intended transponder environment, transponder application, or expected transponder lifespan; monitored subject lifespan; power availability, power renewability, or energy harvesting availability; sensor type, location, or
10 sturdiness; data generation, data storage, or data offloading; telemetry burden; or cost. In view of the teachings herein, it may become apparent that, in general, sensors used with various embodiments of XPDR 5000 may be selected pragmatically from a full-range of suitable mechanical, electrical, optical, chemical, or biological sensors, which may be implemented using, implanted, minimally-invasive,
15 microsensor or MEMS technologies.

Ex. 1004 (Harvey), 41:7-15

Issue 1: Harvey discloses a bolus with a transponder that includes sensors and a radio signal generator

Pet., 18-19 Reply, 4

Demonstrative Exhibit – Not Evidence

19

A POSA Would Understand EEPROM as Digital Data Storage

12. A POSA reading Harvey or Risky would not have expected the data to be stored in EEPROM in an analog form. An EEPROM is built by employing floating gate transistors. A floating gate transistor's threshold voltage is programmed in a binary form (high threshold voltage and low threshold voltage) as a means to store digital data represented in the form of 1s and 0s. Therefore, a floating gate transistor serves as a memory cell, which is a digital storage element in memory such as EEPROM.

Reply; 6; Ex. 1025 (Young Rep. Dec.), ¶ 12

PO's Expert Only Points to Unrelated AI Applications

- At best, PO presented testimony from its expert that analog EEPROM's exist and used in a limited applications like neuromorphic computing
- Petitioner's expert established that a POSITA would not have read the reference in EEPROM to refer to that very narrow use case

13. When Dr. Kan states that an EEPROM can be used to store analog data, he refers to neuromorphic computing systems or neuromorphic computing applications, which can use floating-gate transistors to store analog information as neural synapses, mimicking a biological neural learning process or an artificial intelligence (AI)-based computational process. Ex. 2006, ¶146. This is an unrelated usage of EEPROM that a POSA would not have considered when reading the teaching of the patent and the cited prior art references.

Reply, 6; Ex. 1025 (Young Rep. Dec.), ¶ 13

Harvey Discloses Numerous Examples of Encoding

30 temperature. SENSOR #1 5310 may provide a sensed thermal parametric signal over a predetermined range of body temperatures, or may produce a sensed thermal parametric signal when a predetermined temperature threshold is met or surpassed, as may indicate hyper- or hypo-thermia of monitored subject 5800. Also, a thermal sensor, such as SENSOR #2 5320, may be used alone, or in conjunction with

Ex. 1004 (Harvey) at 40:30-33
Pet. 18-19; Reply, 6-7; Ex. 1025 (Young Rep. Dec.), ¶ 14-15

Harvey Teaches the Transmission of an Outbound IAT Message at Predetermined Intervals

- 5 selected collision avoidance protocol, in response to an collision avoidance protocol selection signal, 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

Ex. 1004 (Harvey), 26:6-8
Pet., 25-26; Reply, 7-8; Ex. 1025 (Young Rep. Dec.), ¶ 16, 18

Issue 3: Harvey's predetermined tag transmission intervals are not limited to subject ID numbers

Demonstrative Exhibit – Not Evidence

23

Harvey Teaches That The IAT Message May Include Animal Data

[0044] IAT 1110 may be configured to exchange an IAT message with HMM 1525. An IAT message may selectively include an SID, a TID, subject data, subject dynamic information, a predetermined monitored subject state, or a predetermined subject state alert. An inbound IAT message
10 requesting data from IAT 1110 may be one type of an interrogator demand IAT message. HMM 1525

Ex. 1004 (Harvey), 14:7-10
Pet., 25-26; ; Reply, 8; Ex. 1025 (Young Rep. Dec.), ¶ 16, 18

Issue 3: Harvey's predetermined tag transmission intervals are not limited to subject ID numbers

Demonstrative Exhibit – Not Evidence

24

Harvey's Predetermined Tag Transmission Interval is Not Limited to Collision Avoidance Protocols

[0073] In certain embodiments, a selected tag transmission interval may be assigned to XPDR 5000, for example, during manufacture, by a vendor, or by INT 5900. Alternatively, XPDR 5000 may self-assign a selected tag transmission interval, for example, upon XPDR 5000 initialization, or in response to a change in a predetermined operational mode of XPDR 5000. INT 5900 may be configured to assign a selected tag transmission interval, without limitation, using a predetermined tag transmission interval selection technique, which may be preprogrammed into an operation of INT 5900, or using a selectable tag transmission interval selection technique, which may be selected by an INT 5900 operator, or may be communicated remotely to INT 5900.

Ex. 1004 (Harvey), 27:14-17; Pet., 26

Issue 3: Harvey's predetermined tag transmission intervals are not limited to subject ID numbers

Demonstrative Exhibit – Not Evidence

25

'644 Patent: Ground 2

Ground 2: Risky Anticipates Claims 5 and 6

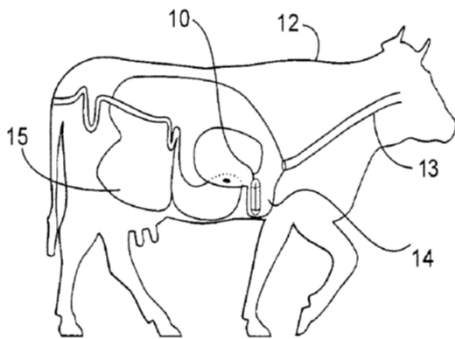
02

Demonstrative Exhibit – Not Evidence

26

Riskey Discloses a Method of Monitoring Animals

5[pre] “A method of monitoring physiological parameters of a ruminant animal, comprising”



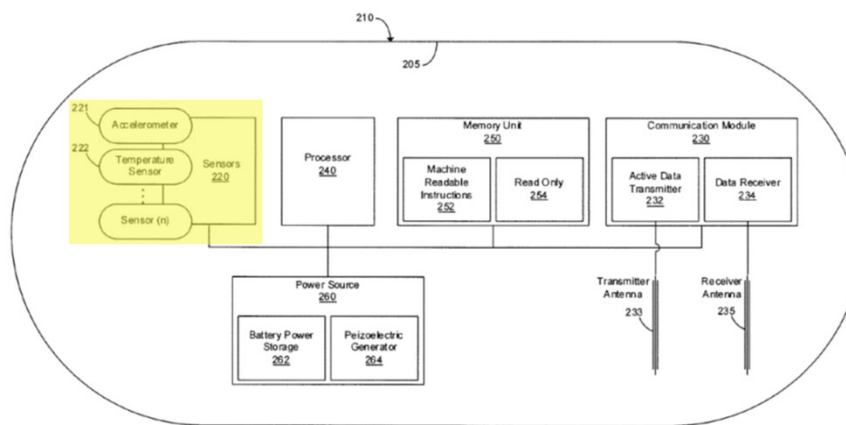
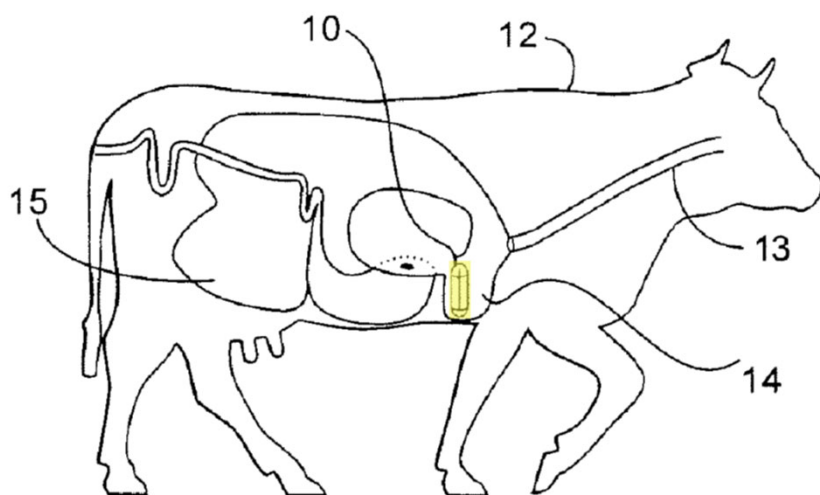
tion 40. Monitored animal characteristics may include physiological characteristics, such as animal temperature, stomach pH, blood pH, heart rate, respiration, stomach or rumen contractions, and the like. Monitored animal characteristics may also include non-physiological characteristics, such as animal movement and/or motion activity, animal location, and the like.

Ex. 1005 (Riskey), Fig. 1, ¶ [0025]

Pet., 27

Riskey Discloses Generating a Signal from a Bolus

5[a] “generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal”



(57)

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. The bolus may comprise a data transmitter in wireless communication with a base station. The base station may

Ex. 1005 (Riskey), Abstract, Fig. 1, Fig. 2

Pet., 28-30

Riskey's Signals Vary with Changing Physiological Parameters

5[b] “said sensor signal varies based on a corresponding change in one or more physiological parameters of said ruminant animal”

[0044] In another embodiment, sensor **220** may alternatively comprise a memory storage location to store sensor samples. In this embodiment, processor **240** may poll sensor **220** by reading a sensor **220** storage location. In another embodiment, sensor **220** may have a sensor reading duration to allow sensor **220** to measure animal characteristics over time (e.g., an accelerometer sensor **221**). Sensor **220** may store such measurements on an internal sensor storage location or on memory unit **250**. The processor **240** may poll such a sensor by reading memory **250** or the internal storage location of the sensor **220**. In this embodiment, processor **240** may be configured to pre-processes the measurement data before transmission. Such preprocessing may comprise calculating a measurement characteristics, such as mean, standard deviation, etc., compressing the data, and the like. As such, the

Ex. 1005 (Riskey), ¶ [0044]

Pet., 31

Riskey Teaches Encoding the Sensor Signal

5[c] “encoding said sensor signal from said one or more sensors as encoded physiological data corresponding to said one or more physiological parameters of said ruminant animal; and”

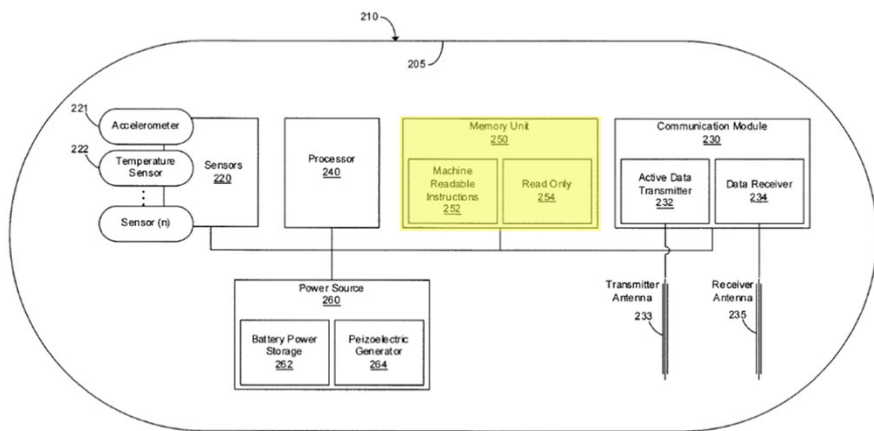
[0041] Machine readable instructions **252** may specify calibration information for one or more sensors **220**. In this embodiment, one or more sensors **220** may be tested to determine whether accurate readings are being returned. In the event a particular sensor **220** is not returning accurate readings, calibration data may be stored within memory unit **250** to rectify the readings to a correct value. In this embodiment, sensor **220** may be communicatively coupled to memory unit **250** to allow a sensor **220** to read the calibration data therefrom. Sensor **220** may itself comprise a memory storage location whereon such calibration information may be stored. Machine readable instructions **252** may instruct processor **240** to transfer sensor calibration data stored within memory unit **250** to the memory storage location of a particular sensor **220**. In another embodiment, sensor **220** may not comprise a memory storage location and may not be capable of reading memory unit **250**. As such, machine readable instructions **252** may configure processor **240** to apply calibration data stored within memory unit **250** to readings returned by sensors **220**.

Ex. 1005 (Riskey), ¶ [0041]

Pet., 32-33

Riskey Teaches Storing the Encoded Physiological Data

5[d] “storing said encoded physiological data in a non-transitory computer readable media”



Ex. 1005 (Riskey), Fig. 2

tion or on memory unit 250. The processor 240 may poll such a sensor by reading memory 250 or the internal storage location of the sensor 220. In this embodiment, processor 240 may be configured to pre-processes the measurement data before transmission. Such preprocessing may comprise calculating a measurement characteristics, such as mean, standard deviation, etc., compressing the data, and the like. As such, the preprocessing may reduce the amount of data transmitted to the base station (not shown) and thereby reduce power and RF transmission requirements.

[0052] In one embodiment, the bolus memory unit 250 may comprise read-only storage 254. Read-only storage 254 may be a Programmable Read-Only Memory (PROM), Erasable Programmable Read-Only Memory (EPROM), Electrically Erasable Programmable Read-Only Memory (EEPROM), or the like. In this embodiment, a unique bolus identifier value

Ex. 1005 (Riskey), ¶ 44, 52

Riskey Teaches the Generation of a Radio Signal

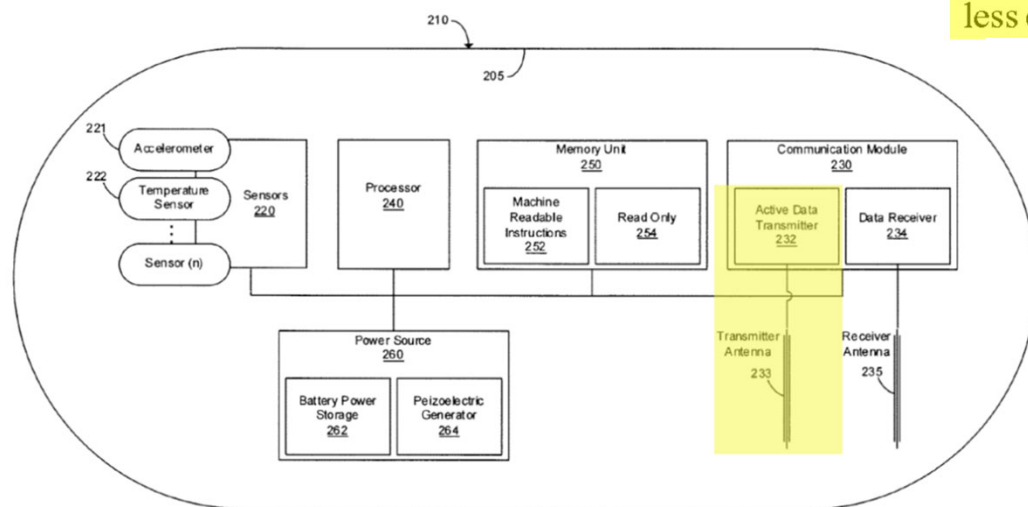
5[e] “enabling a radio signal generator located within said bolus”

(57)

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. The bolus may comprise a data transmitter in wireless communication with a base station. The base station may

Ex. 1005 (Riskey), Abstract.



Ex. 1005 (Riskey), Fig. 2

Pet. 35-36

Risky Teaches Activating the Generator at Pre-determined Intervals [Burst Mode]

5[f] “activating said radio signal generator at pre-determined intervals to generate a radio signal to carry said encoded physiological data; and”

processor 240. In another mode of operation, processor 240 may not immediately transmit the sensor readings polled from sensors 220, but instead store them on memory unit 250. 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. Operation in “burst” mode may reduce the power consumed by bolus 210 by reducing the number of transmissions sent from data transmitter 232.

Ex. 1005 (Risky), ¶ [0049]

Risky Teaches Activating the Generator at Pre-determined Intervals [On-Line Mode]

5[f] “activating said radio signal generator at pre-determined intervals to generate a radio signal to carry said encoded physiological data; and”

[0055] In “on-line” mode, bolus 210 may transmit animal characteristics messages at the “online” transmission frequency specified by machine readable instructions 252. As discussed above, such messages may be transmitted as processor 240 polls sensors 220, or may be transmitted at a periodic transmission interval. The receiver of such messages may be configured to respond with a confirmation message. The confirmation message may be used in the place of a separate ping message in order to decrease the message traffic between bolus 210 and the receiver.

Ex. 1005 (Risky), ¶ [0055]

Riskey's Radio Signal Has a Frequency from 700 MHz to 1 GHz

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

[0021] The wireless communication means of bolus 10, 20 may comprise a wireless transmitter and/or receiver operating at 900 MHz or some other suitable radio frequency (RF). In some embodiments, such wireless communication may be two-way, allowing bolus 10, 20 to transmit and receive data from base station 40. In other embodiments, bolus 10, 20 may only be capable of transmitting data to base station 40.

Ex. 1005 (Riskey), ¶ [0021]

Riskey's Radio Signal Has a Frequency from 850 to 950 MHz

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.”

[0021] The wireless communication means of bolus 10, 20 may comprise a wireless transmitter and/or receiver operating at 900 MHz or some other suitable radio frequency (RF). In some embodiments, such wireless communication may be two-way, allowing bolus 10, 20 to transmit and receive data from base station 40. In other embodiments, bolus 10, 20 may only be capable of transmitting data to base station 40.

Ex. 1005 (Riskey), ¶ [0021]

All Three Arguments Patent Owner Raises Against Risky Fail

Ground 2: Anticipation of Claims 5 and 6 by Risky

Issue 1: Risky teaches storing and transmitting of encoded data

Issue 2: Risky discloses two modes that use predetermined transmission intervals

Issue 3: Risky's disclosure is directed to sensor signals that vary with physiological parameters

A POSA Would Understand EEPROM as Digital Data Storage

12. A POSA reading Harvey or Risky would not have expected the data to be stored in EEPROM in an analog form. An EEPROM is built by employing floating gate transistors. A floating gate transistor's threshold voltage is programmed in a binary form (high threshold voltage and low threshold voltage) as a means to store digital data represented in the form of 1s and 0s. Therefore, a floating gate transistor serves as a memory cell, which is a digital storage element in memory such as EEPROM.

Ex. 1025 (Young Rep. Dec.), ¶ 12

Reply, 10-13

PO's Expert Only Points to Unrelated AI Applications

13. When Dr. Kan states that an EEPROM can be used to store analog data, he refers to neuromorphic computing systems or neuromorphic computing applications, which can use floating-gate transistors to store analog information as neural synapses, mimicking a biological neural learning process or an artificial intelligence (AI)-based computational process. Ex. 2006, ¶146. This is an unrelated usage of EEPROM that a POSA would not have considered when reading the teaching of the patent and the cited prior art references.

Ex. 1025 (Young Rep. Dec.), ¶ 13

Reply, 10-13

Risky Preprocessing Disclosures Confirm the Use of Digital Data

As used herein, polling a sensor refers to obtaining measurement data from one or more sensor 220. Polling a sensor may

tion of the sensor 220. In this embodiment, processor 240 may be configured to pre-processes the measurement data before transmission. Such preprocessing may comprise calculating a measurement characteristics, such as mean, standard deviation, etc., compressing the data, and the like. As such, the preprocessing may reduce the amount of data transmitted to the base station (not shown) and thereby reduce power and RF transmission requirements.

Ex. 1005 (Risky), ¶ [0043-44];
Reply, 11-12

Riskey's Predetermined Intervals Are Not Limited to Conditional Values [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

[0048] In one embodiment, machine readable instructions 252 may define conditions under which the polling frequency associated with one or more sensors 220 may change. For

Ex. 1005 (Riskey), ¶ [0049, 0048]
Reply, 13-14

Riskey's On-Line Mode Employs Predetermined Intervals For Sensor Information

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

Ex. 1005 (Riskey), ¶ [0055]

Reply, 14

The Purpose of Risky's System is to Use Sensors to Monitor for Changes in Physiological Parameters

ciated with the breed and/or sex of the animal. Based on this profile, the process may detect a change in a health condition of the animal. Such health conditions may include, but are not limited to, an estrus condition in the animal, off-feed condition, a nominal condition, the animal leaving an enclosure, or the like.

Q. -- in order to determine whether there has been a change in a physical characteristic, the monitoring system would be looking for a change in the sensor signal; is that fair?

3 A. Yeah, yes.

Ex. 1005 (Risky), Abstract; Ex. 1024 (Depo. Tr. of E. Kan), 35:8-36:2.

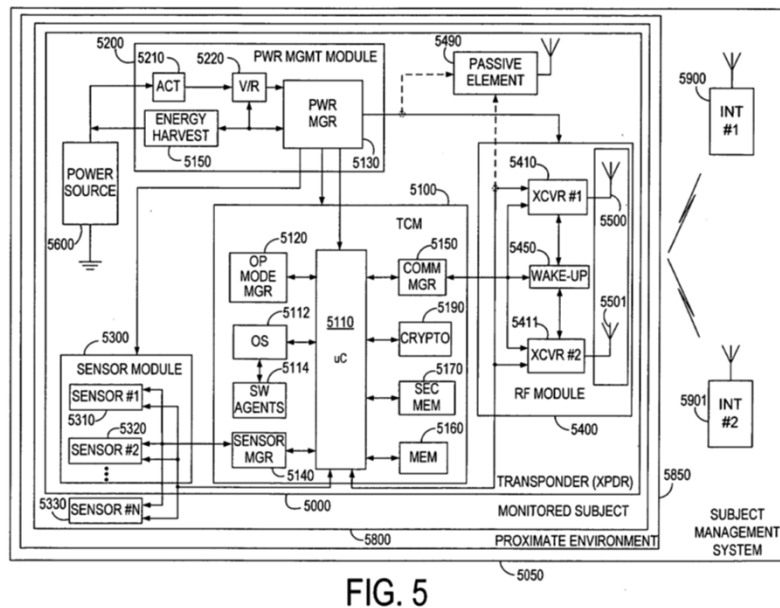
Reply, 14-15

'644 Patent: Ground 3

Ground 3: Claims 5 and 6 are rendered obvious by Harvey in view of Risky

03

Harvey discloses each element of Claims 5 and 6 via its transponder that can be used in a bolus tag



[0038] Incorporated telemetry device 1110-1113 (generally, intelligent active tag, or IAT, 1110) can be a telemetry device coupled to a respective monitored subject 1010, which may be disposed internally or externally to a monitored subject, which may be affixed or removable, and which may be coupled permanently or impermanently. Accordingly, certain non-limiting embodiments of active tag may be clipped, pinned, or bound, to, or implanted within, a monitored subject corpus. In certain other non-limiting implementations, an active tag, such as IAT 1110, may be secured to monitored subject 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), Fig. 5, ¶ [0038]

Pet., 38-43; Reply, 15-17.

A POSA would have been motivated to look at Risky's teachings about a bolus intelligent tag

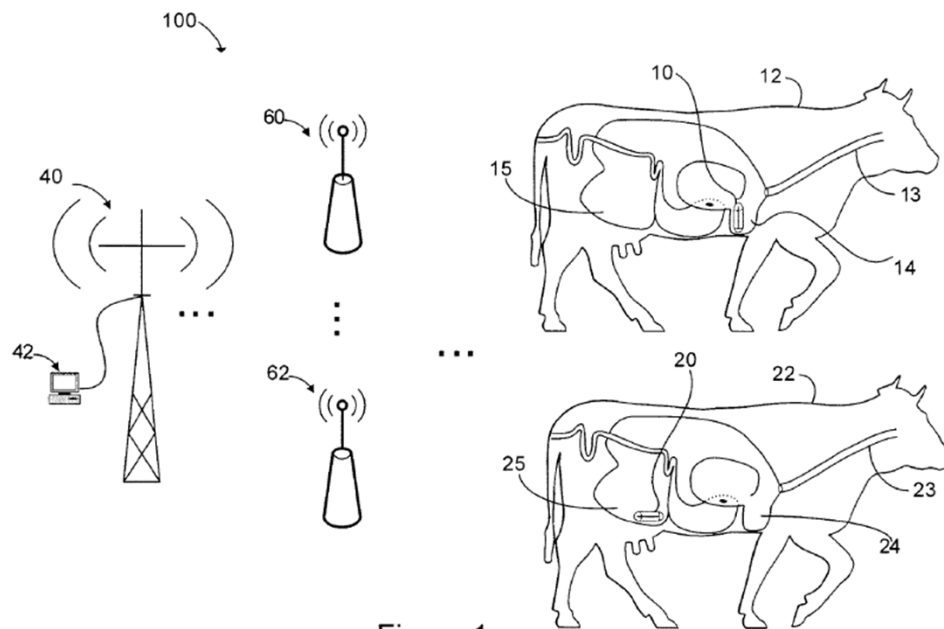


Figure 1

[0035] One or more sensors **220** of bolus **210** may be used to detect physiological characteristics of an animal including, but not limited to: body temperature; heart rate; respiration; stomach contractions; stomach pH; blood pH; and the like. Any number of sensors **220** may be used to detect such characteristics. For example, to detect animal temperature, a temperature sensor **222** may be employed. In this embodiment, temperature sensor **222** may comprise a thermistor, thermocouples or a platinum resistance thermometer, or the like.

Ex. 1005 (Riskey), Fig. 1, ¶ [0035]

Pet., 38-43; Reply, 15-17.

'644 Patent: Ground 4

Ground 4: Claim 7 is rendered obvious by Harvey in view of Rettedal

04

Demonstrative Exhibit – Not Evidence

47

Rettedal discloses the use of matching elements to adjust the frequency of the generated radio signal

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”

[0064] A fourth processor element (117) functions to control a network frequency match element (118). The network frequency match element (118) can include capacitors and resistors in combination to deliver a particular first radio frequency signal (213) under the conditions of the method utilized (for example the method above described) to the antenna (90). As a non-limiting example, the network frequency match element (118) can detune a 433 MHz first radio frequency signal (13) to generate a signal of between about 418 MHz and about 425 MHz. The detuned signal can compensate for demodulation of the radio frequency signal (13) due to interaction with the mass of animal (3). The degree of demodulation can be substantially consistent and repeatable from animal (3) to animal (3). Accordingly, the network frequency match element (118) can be configured to compensate for the signal demodulation due to the unique mass of an animal (3) such that the first radio frequency signal (13) transmitted outside of that unique mass of the animal (3) can be at about 433 MHz (or other selected frequency).

Ex. 1006 (Rettedal), ¶[0064]

Pet., 48-49

Claim 7 Requires Adjustment of the Generated Radio Signal

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.

6. The method of claim 5, wherein said frequency is selected from the group consisting of: between about 700 MHz to about 800 MHz, 750 MHz to about 850 MHz, about 800 MHz to about 900 MHz, 850 MHz to about 950 MHz, 900 MHz to about 1 GHz.

7. The method of claim 6, wherein said bolus further comprises matching elements which adjusts said frequency of said radio signal to compensate for a change in said frequency of said radio signal due to passing through a mass of said ruminant animal.

644 Patent

Pet., 48-49

PO Improperly Attempts to Rewrite Claim 7 to Require Adjustment of the Antenna

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

PO Response, 56.

Claim 7 Requires Adjustment of Radio Signal, Not Antenna

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.

Q. So just to make sure I understand here, in this claim 7, it's talking about the frequency of a radio signal and it's talking about the radio signal that's generated to carry the encoded physiological data, correct?

A. Yes.

644 Patent, cl. 7; Ex. 1024 (Depo. Tr. of E. Kan), 188:3-22.

Reply, 17-22

'644 Patent: Ground 5

Ground 5: Claims 9 and 10 are rendered obvious by Harvey in view of Kunda

05

Kunda Provides the Additional Elements of Claims 9 and 10

**Claim Elements
Disclosed in Harvey
(See Ground 1)**

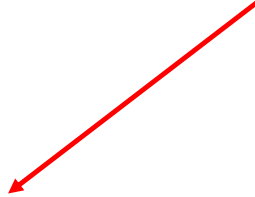


9. A method of monitoring physiological parameters of a ruminant animal, comprising:
generating a sensor signal from one or more sensors contained in a bolus orally administered to said ruminant animal, said sensor signal varies based on a corresponding change in one or more physiological parameters 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.

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.



**Claim Elements
Disclosed by Kunda**



Kunda Provides the Additional Elements of Claims 9 and 10

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”

(57) ABSTRACT (Amended)

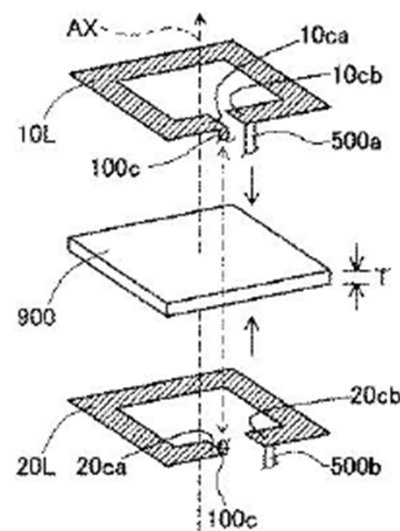
OBJECTIVE: To provide a small antenna with satisfactory characteristics

MEANS FOR ACHIEVING THE OBJECTIVE: The first loop conductor part 10L and the second loop conductor part 20L, which circle around the same imaginary axis AX, are connected in series.

The first loop conductor part 10L is formed on one side of dielectric substrate 900, and the second loop conductor part 20L is formed on the reverse side.

A reversing multi-loop conductor part consisting of the first loop conductor part 10L and the second loop conductor part 20L is used as the antenna.

SELECTED DRAWING: Figure 3



Ex. 1007 (Kunda) at Abstract, Fig. 3.

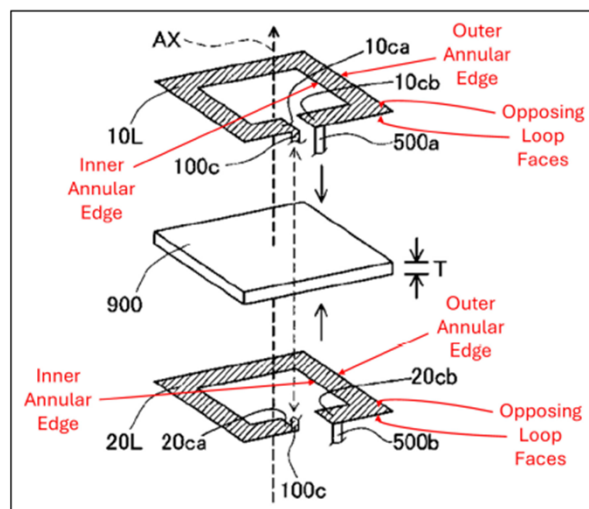
Pet., 56-61

Kunda Provides the Additional Elements of Claims 9 and 10

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.

[0033]

Figure 3 (a) shows a perspective view of antenna 100, and Figure 3 (b) shows an exploded view of antenna 100. Antenna 100 comprises planar plate-like dielectric substrate 900 (which has a thickness of T and is formed of a dielectric such as alumina oxide) and the first and second loop conductor parts 10L and 20L, formed of conductors such as copper and silver.



Ex. 1007 (Kunda) ¶ [0033], Fig. 3 (annotated)

Pet., 61-66

PO Argues That a POSA Would Not Have a REOS Because Kunda Cautions Against Using a Small Antenna Near a PCB

“Kunda, on the other hand, explains that ‘if the antenna is placed *close to a printed circuit board* or housing *in order to reduce the size* of the communication device, that will diminish the characteristics of the antenna.’ EX1007, [0005] (emphasis added).”

PO Resp., 64 (citing Ex. 1007 (Kunda)).

PO's Citation is to Kunda's Description of the Prior Art

“Kunda, on the other hand, explains that ‘if the antenna is placed *close to a printed circuit board* or housing *in order to reduce the size* of the communication device, that will diminish the characteristics of the antenna.’ EX1007, [0005] (emphasis added).”

[0005]

OBJECTIVE TO BE ACHIEVED BY THE INVENTION

Now, with a monopole-type antenna, the electromagnetic interaction between the antenna and the grounding portion decreases as the distance between the open end of the monopole antenna and the grounding portion of an electrical circuit connected to the antenna (such as the earth of the housing of a communication device or the printed circuit board for mounting components) increases. Thus, the antenna's reflection coefficient, radiation efficiency, and gain often improve as the distance between the open end of the antenna and the installation point increases. However, suppose the antenna is placed away from the printed circuit board or housing to improve the characteristics of the antenna. In that case, the antenna must be greater in size, resulting in a larger size of the communication device, which is problematic. In contrast, if the antenna is placed close to a printed circuit board or housing in order to reduce the size of the communication device, that will diminish the characteristics of the antenna.

[0006]

The present invention was achieved to resolve the above-mentioned problems in the prior art and, therefore, is intended to provide a small antenna with satisfactory characteristics.

PO Resp., 64; Exhibit 1007 (Kunda), ¶ [0005], [0006]

Pet., 55-66; Reply, 24-25

GIBSON DUNN

Demonstrative Exhibit – Not Evidence

CERTIFICATE OF SERVICE

A copy of the foregoing exhibit was served via electronic mail on Patent Owner's counsel of record at the email addresses dmoftett@akingump.com, mmahoney@akingump.com, twlanders@akingump.com, AG-ST-SMAXTEC@akingump.com as indicated in Patent Owner's Amended Mandatory Notices, dated March 12, 2025

DATED: October 16, 2025

/Brian M. Buroker/

Brian M. Buroker (Reg. No. 39,125)
GIBSON, DUNN & CRUTCHER LLP
1050 Connecticut Ave. NW
Washington, DC 20036
Phone: (202) 955-8500
Fax: (202) 467-0539
Email: BBuroker@gibsondunn.com

Counsel for Petitioners