



PATENT OWNER'S HEARING DEMONSTRATIVES

Anker Innovations Ltd., v. Powermat Technologies Ltd.

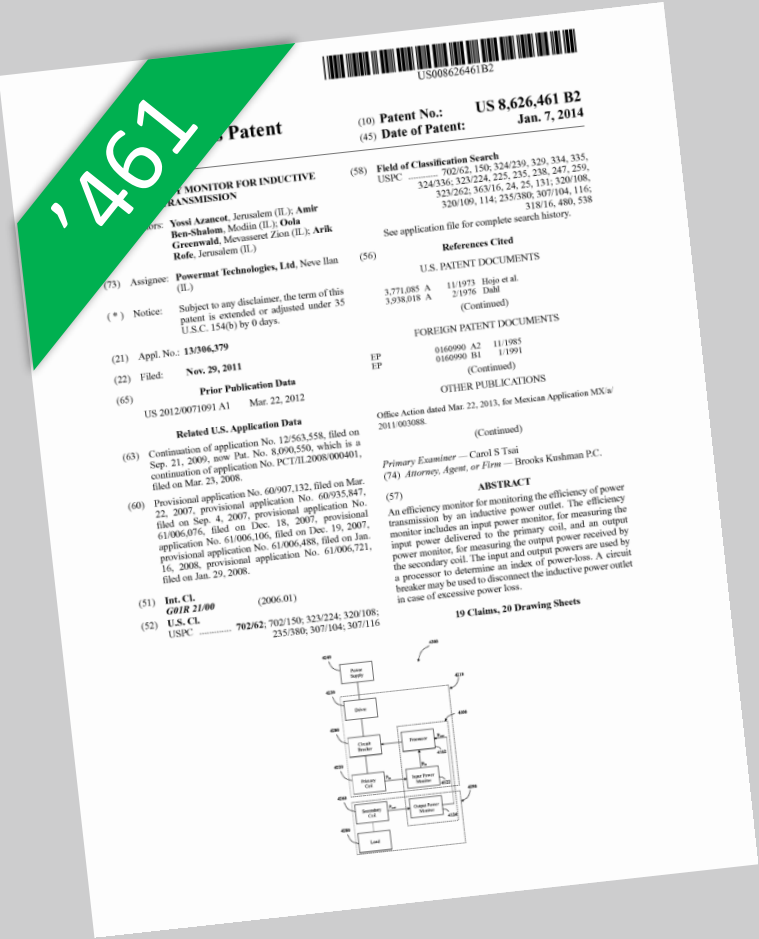
IPR2024-00996

U.S. Patent No. 8,626,461

November 18, 2025

Table of Contents

Content	Slide #
Overview of '461 Patent	3
'461 Patent Claim Construction	7
Deficiencies of Ground 1A: Olson Fails to Anticipate [13.1]	18
Deficiencies of Ground 1A: Olson Fails to Anticipate [13.2]	24
Deficiencies of Ground 1A: Olson Fails to Anticipate [14]	28
Deficiencies of Ground 1A: Olson Fails to Anticipate [15]	30
Deficiencies of Ground 1B: Olson Fails to Anticipate [17]	36
Deficiencies of Ground 2: A POSITA Would Not Combine Stevens + Olson	40
Deficiencies of Ground 2: Stevens-Olson Fails to Render Obvious [13.1]	45
Deficiencies of Ground 2: Stevens-Olson Fails to Render Obvious [13.2]	50
Deficiencies of Ground 3: A POSITA Would Not Combine Stevens + Jin	52
'461 Patent Challenged Claims	56



EFFICIENCY MONITOR FOR INDUCTIVE POWER TRANSMISSION

U.S. PATENT NO. 8,626,461

'461 PATENT OVERVIEW

4

Overview of U.S. Patent No. 8,626,461



PROBLEM

- Prior to the '461 Patent, power-loss (i.e., leak prevention) systems existed for detecting power emanating from a primary coil not coupled to a secondary coil and cutting of power to the uncoupled primary coil. EX1001 at 2:47-50; *see also* POR 2 (Paper 13).
- However, due to the lack of connecting wires in inductive power couplings, communication channels for determining power-loss between a primary coil coupled to a secondary coil was not practical until the '461 Patent. EX1001 at 2:50-55; *see also* POR 2 (Paper 13).

Overview of U.S. Patent No. 8,626,461



SOLUTION

- The '461 Patent discloses—as illustrated in Figure 5—an efficiency monitor that includes an input power monitor for measuring the input power delivered to the primary coil, an output power monitor for measuring the output power received by the secondary coil, a processor for determining an index of power loss, and a communication channel for communicating the input power and the output power to the processor. EX1001 at 12:38-39.

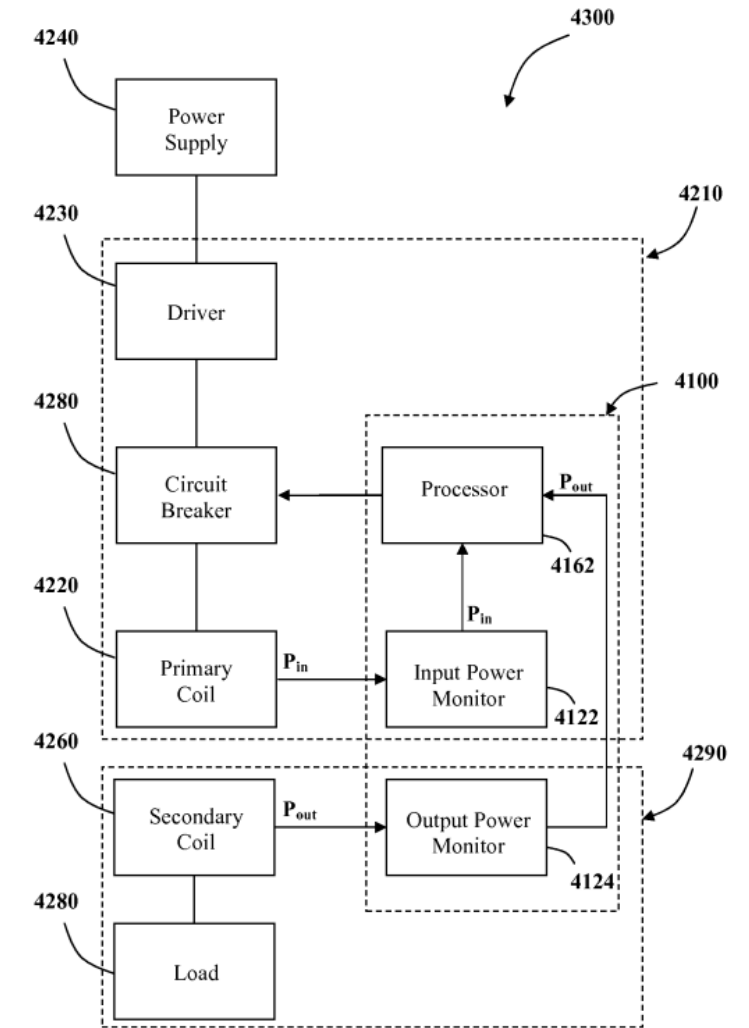
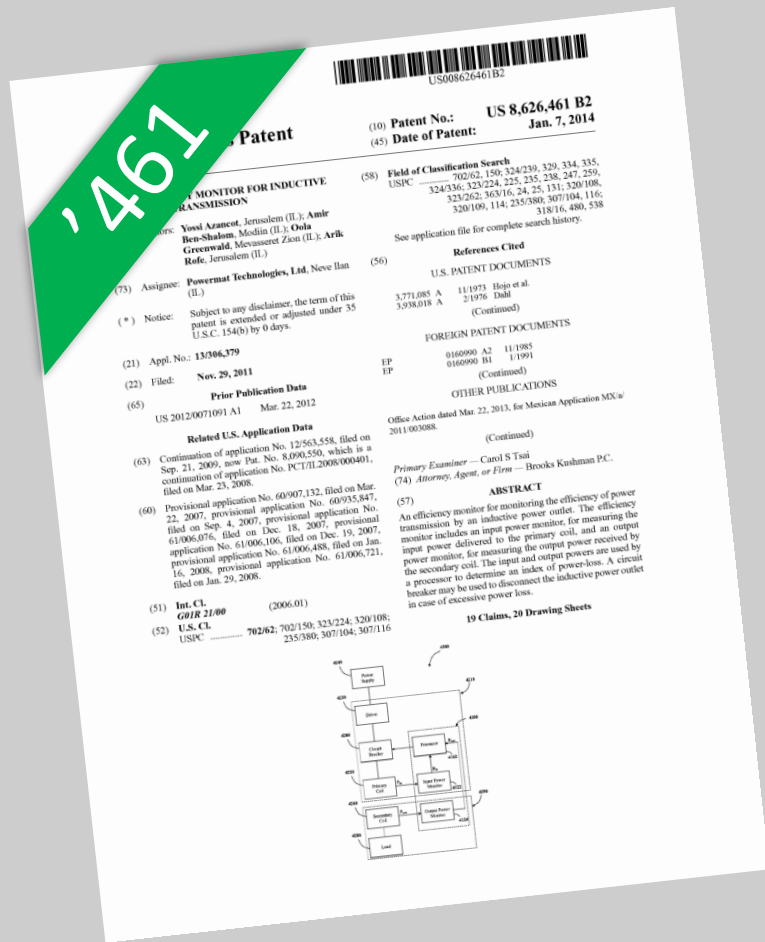


Fig. 5

EX1001 Fig. 5; see also POR 3 (Paper 13).



EFFICIENCY MONITOR FOR INDUCTIVE POWER TRANSMISSION

U.S. PATENT NO. 8,626,461

'461 CLAIM CONSTRUCTION

“at least one input power monitor configured to measure input power received by the primary coil from the power supply” (limitation [13.1])

Patent Owner's Construction

Petitioner's Construction

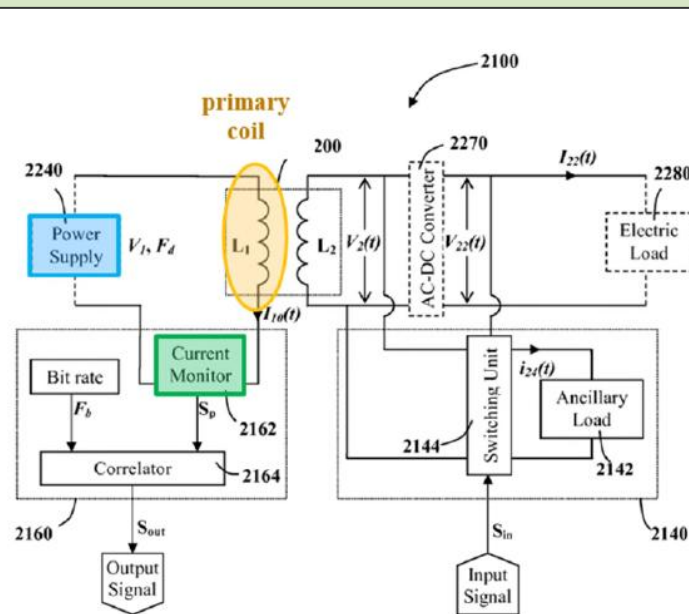


Fig. 2a

claim is rarely, if ever, correct.”). The evidence here instead confirms that the claimed “measure [of] input power received by the primary coil” encompasses measurements that correspond to and reasonably reflect the input power received by the primary coil—even if the measurement is not direct or is not specifically for the entire input power received only by the primary coil. EX1017, ¶10.

Claim 13

[13.1] at least **one input power monitor** configured to measure input power received by the primary coil from the power supply

Intrinsic Evidence Supports Patent Owner's Construction

Applicant-Initiated Interview Summary

Claim(s) discussed: 1.

Identification of prior art discussed: Stevens.

Substance of Interview

(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The examiner conveyed to the applicant's representative claim language suggestions from examiner Carol Tsai which she believes would improve the clarity of the claimed invention. In particular, replacing "delivered to the primary coil" in lines 5-6 with "received by the primary coil from a power supply"; replacing "output power received by the secondary coil" in lines 7-8 with "inductive output power received by the secondary coil from the primary coil"; and including the limitations of claim 10 in claim 1, with a clarification that the efficiency quotient Q and efficiency differential delta are indicative of the efficiency of the inductive coupling. Differences between the Stevens reference and the applicant's invention were discussed. As the application remains after a Final rejection, the examiner will await a formal response from the applicant.

EX1002 at 210; see Sur-Reply 3-5 (Paper 21); POR 8-10 (Paper 13).

Claim 13

[13.1] at least **one input power monitor** configured to **measure input power received by the primary coil from the power supply**

Intrinsic Evidence Supports Patent Owner's Construction

14. (Currently Amended) An inductive power outlet comprising at least one primary coil, for inductively coupling with a secondary coil wired to an electric load, the inductive power outlet further comprising an efficiency monitor comprising:

at least one input power monitor configured to measure input power received by the primary coil from the power supply~~delivered to the primary coil;~~

at least one signal detector configured to detect signals carrying data pertaining to output power received by the secondary coil;

at least one processor configured to receive data pertaining to the input power and the output power, the processor further configured to determine an index of power-loss indicative of the efficiency of an inductive coupling between the primary coil and the secondary coil;

wherein the index of power-loss comprises at least one of:

an efficiency quotient Q , defined as the ratio of the output power to the input power; and

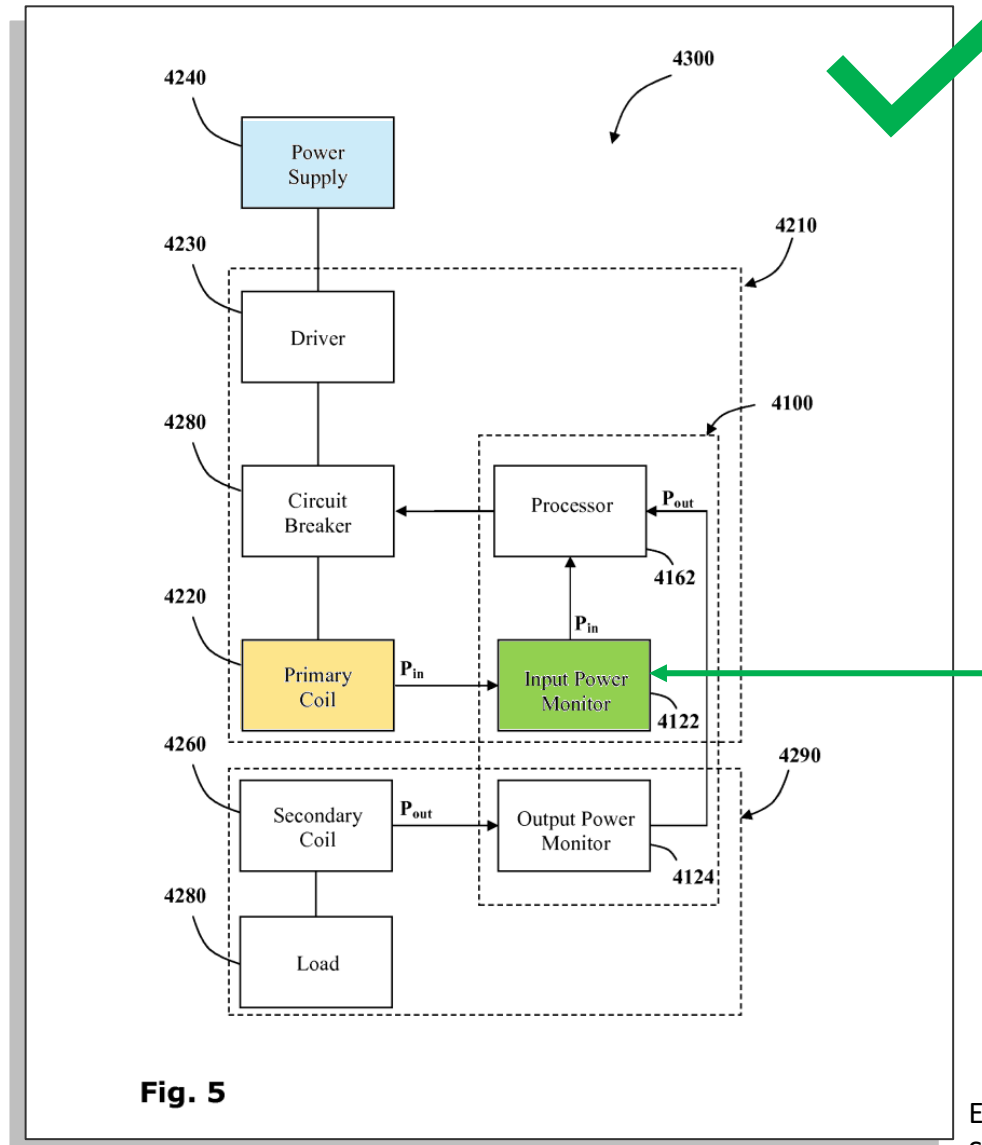
an efficiency differential Δ , defined as the difference between the output power and the input power.

*Claim 14 (pictured) issued as claim 13.
EX1002 at 218; Sur-Reply 3-5 (Paper 21); POR 8-10 (Paper 13).

Claim 13

[13.1] at least **one input power monitor** configured to **measure input power received by the primary coil from the power supply**

Intrinsic Evidence Supports Patent Owner's Construction



Measures power **received by the primary coil from the power supply**

EX1001 Fig. 5 (annotated); see POR 2-3 (Paper 13);
Sur-Reply 9 (Paper 21); EX2003 ¶180.

Claim 13

[13.1] at least **one input power monitor** configured to **measure input power received by the primary coil from the power supply**

Intrinsic Evidence Supports Patent Owner's Construction

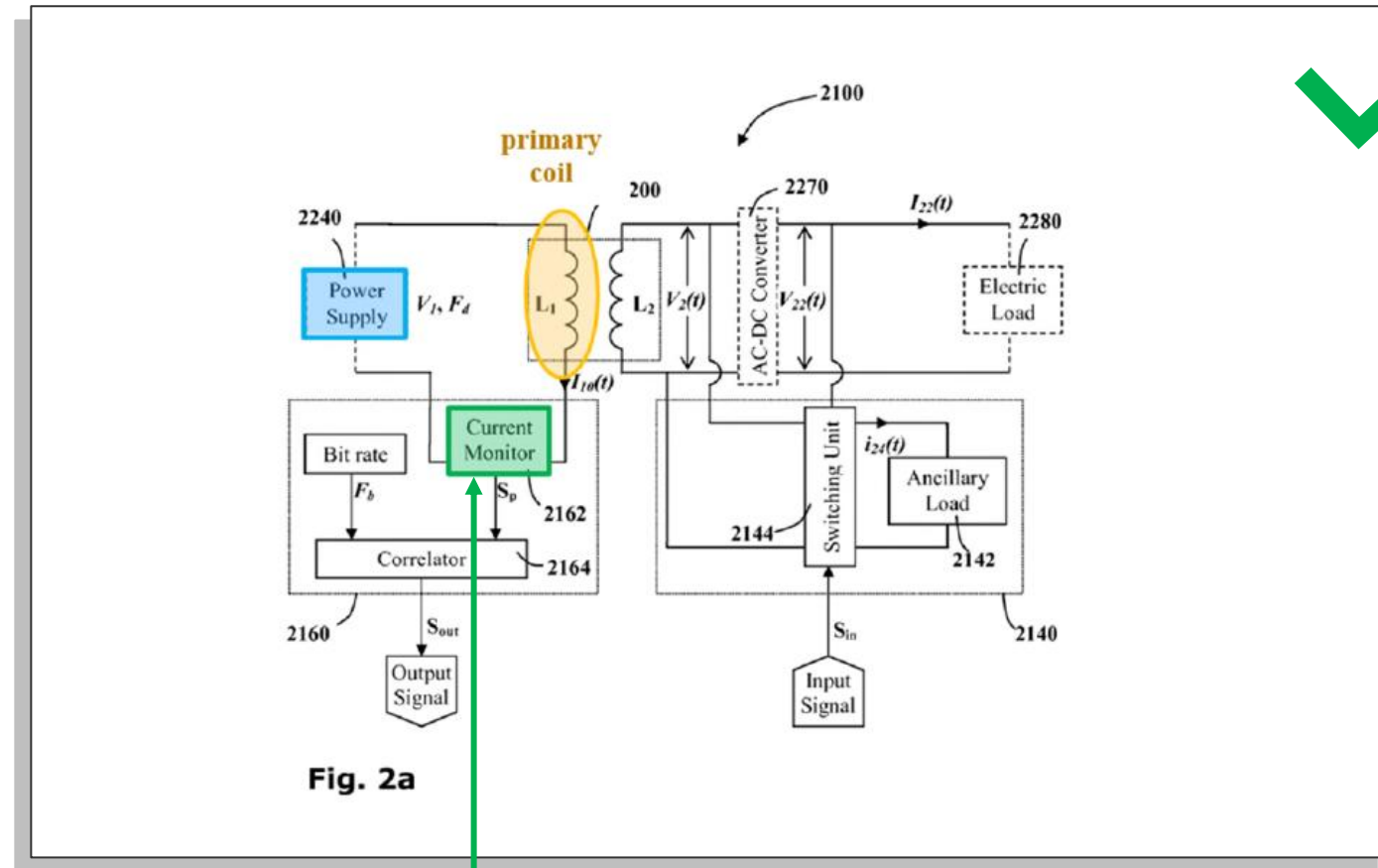


Fig. 2a

Measures current **received by** the primary coil **from the** power supply

EX1001 Fig. 2a (annotated); POR 21-22
(Paper 13); EX2003 ¶ 80.

Petitioner's Own References State Location Matters

10 In the simplest case, in step S3 the control unit 16 simply compares the measured power with a predetermined shutdown threshold. If the measured power exceeds the shutdown threshold value, the control unit 16 determines that the inductive power supply from the primary unit should be restricted or stopped. As described in more detail below, however, it is preferable to take into account losses which inevitably occur

15 in the power transfer system. In particular, these losses include losses in the primary unit itself and/or any secondary devices/host objects present. These losses include inefficiencies in the primary coil itself and any other components associated with the primary coil such as the electrical drive unit, for example I^2R losses in the copper of the coil or effective series resistance of any resonating capacitor. The losses also include

20 any magnetic losses in the primary unit and the secondary devices, for example magnetic is hysteretic loop losses in any coils associated with the primary unit and/or secondary devices. According, the control unit 16 may employ, in addition to the

EX1005 at 19:13-22; see Sur-Reply 12-13 (Paper 21); POR
53-54 (Paper 13); EX2003 ¶141.

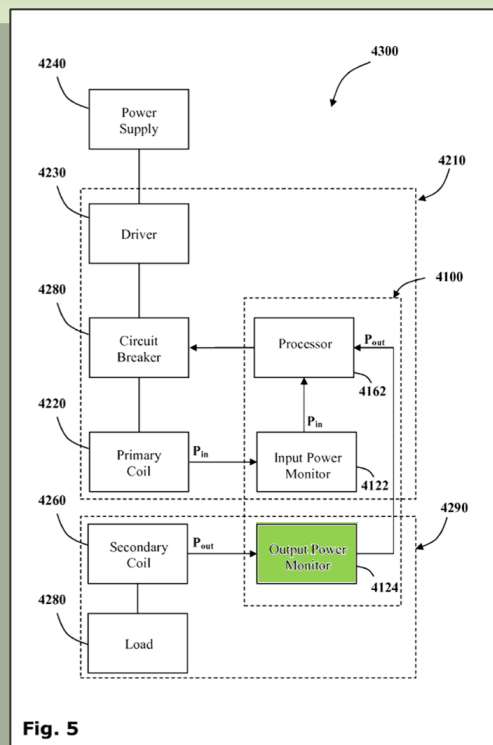
Petitioner's Own References State Location Matters

[0112] Efficiency of energy transfer is an important measure of the effectiveness of energy transfer from primary coil **54** of external antenna **52** to secondary coil **34**. Efficiency is measured by dividing the power in, i.e., the power received by secondary coil **34**, by the power out, i.e., the power transmitted by primary coil **54**. While energy efficiency can be measured at other locations in external antenna **52** and/or implantable medical device **16**, for purposes of some embodiments of the present invention it is preferred that efficiency is measured coil-to-coil, i.e., from primary coil **54** to secondary coil **34**.

EX1004 ¶ [0112]; Sur-Reply 12 (Paper 21);
POR 12-13, 32-33 (Paper 13).

“at least one signal detector configured to detect signals carrying data pertaining to output power received by the secondary coil” (limitation [13.2])

Patent Owner's Construction



Petitioner's Construction

The intrinsic evidence here cuts against Powermat's narrow view. The plain language of Element [13.2] merely recites “at least one signal detector configured to detect signals carrying data pertaining to output power received by the secondary coil,” and is thus satisfied if the signal detector is configured to detect signals carrying any data “*pertaining to*” output power received by the secondary coil. EX1017, ¶20. The term “pertaining to” does not require any particular form of measurement of the output power received by the secondary coil—in fact, no measurement is recited at all. EX1017, ¶20 (citing corroborating references EX1022 (“to have reference or relevance”); EX1023). The specification, for

EX1001 Fig. 5 (annotated); see Sur-Reply 9-11 (Paper 21);
POR 29-30; EX2003 ¶ 93.

Reply 12 (Paper 18).

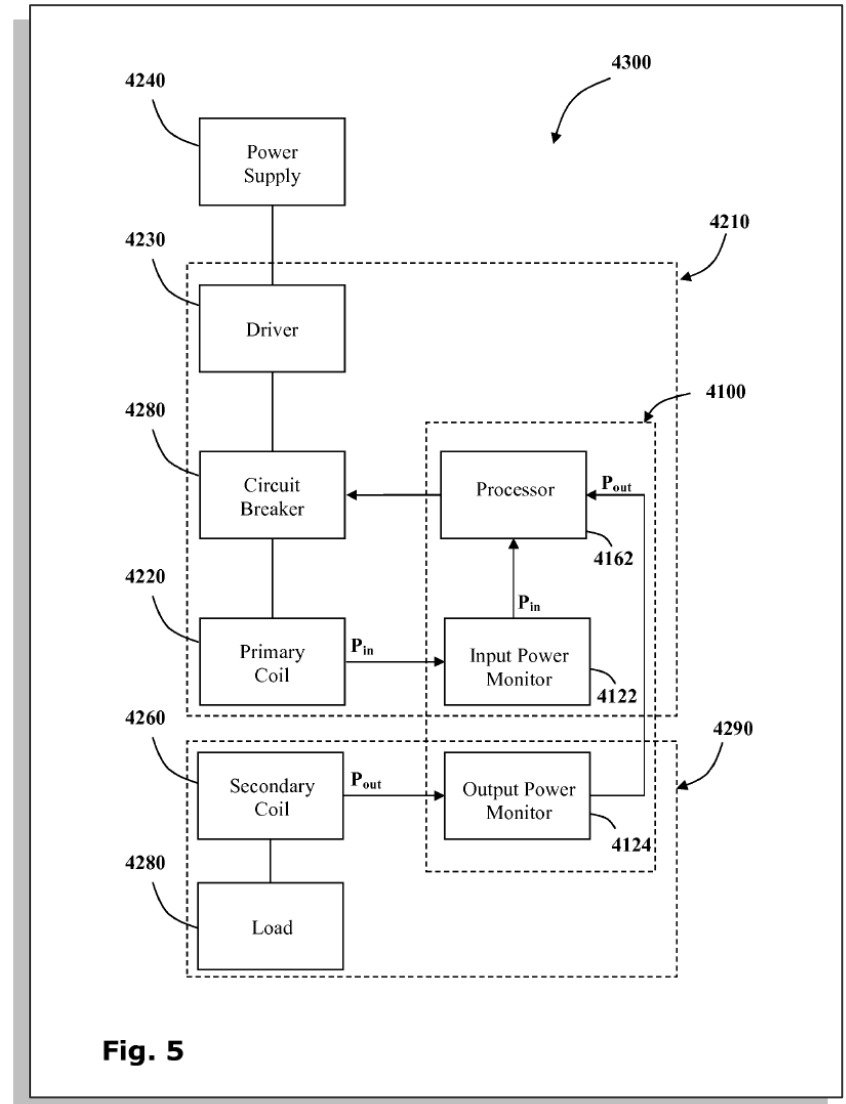
Intrinsic Evidence Supports Patent Owner's Construction



**Patrick Mercier,
Ph.D.**

Figure 5 has a block diagram showing how it would be monitored or how the output is connected to the secondary coil, for example. So that, along with the description of the specifics of how they discuss monitoring the output power, I think the '461 patent is – it's quite clear and gives good direction to the POSITA on how to do this.

EX1018 at 48:18-25; *see also* Sur-Reply 10 (Paper 21).

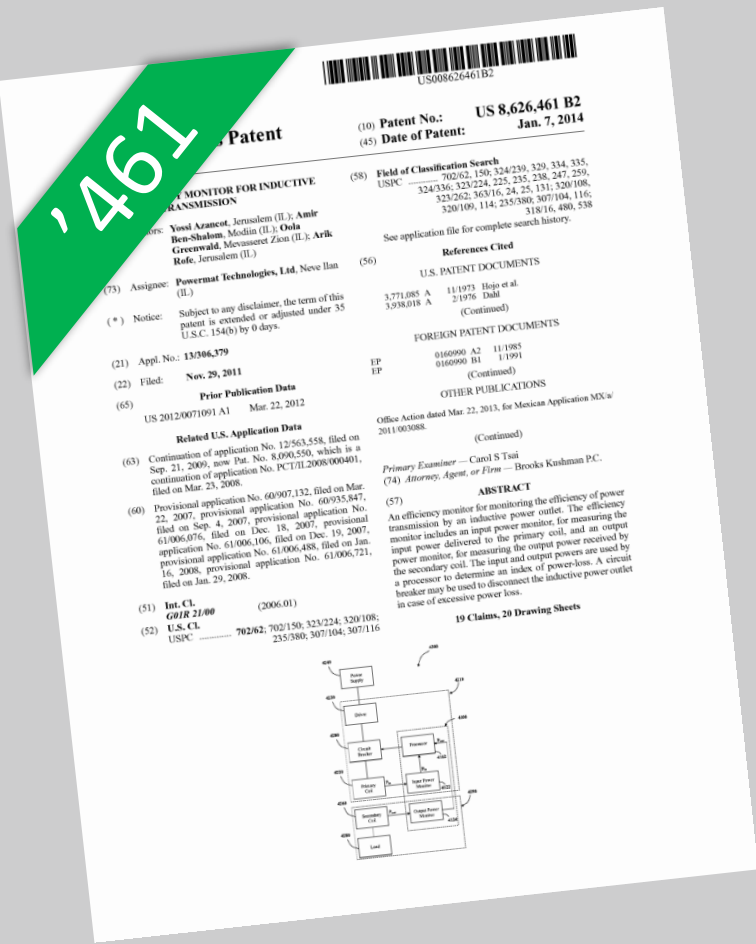


EX1001 at Fig. 5; *see also* Sur-Reply 9 (Paper 21).

Petitioner's "Intrinsic Evidence" Goes to Type of Data, Not Where Data Measurement Is Taken

The control signal S_C communicates encoded data pertaining to the power transmission. This data may be pertinent to regulating efficient power transmission. Examples of such data includes parameters such as: required operating voltage, current, temperature or power for the electric load 280, the measured voltage, current, temperature or power supplied to the electric load 280 during operation, the measured voltage, current, temperature or power received by the electric load 280 during operation and the like.

EX1001 at 7:21-29; see Reply 7-8 (Paper 18); Sur-Reply 10 (Paper 21).



EFFICIENCY MONITOR FOR INDUCTIVE POWER TRANSMISSION

U.S. PATENT NO. 8,626,461

DEFICIENCIES OF GROUND 1A: OLSON FAILS TO ANTICIPATE [13.1]

Claim 13

[13.1] at least **one input power monitor** configured to **measure input power received by the primary coil** from the power supply

Petitioner and References State That Location Matters

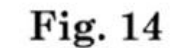
- 10 In the simplest case, in step S3 the control unit 16 simply compares the measured power with a predetermined shutdown threshold. If the measured power exceeds the shutdown threshold value, the control unit 16 determines that the inductive power supply from the primary unit should be restricted or stopped. As described in more detail below, however, it is preferable to take into account losses which inevitably occur
- 15 in the power transfer system. In particular, these losses include losses in the primary unit itself and/or any secondary devices/host objects present. These losses include inefficiencies in the primary coil itself and any other components associated with the primary coil such as the electrical drive unit, for example I^2R losses in the copper of the coil or effective series resistance of any resonating capacitor. The losses also include
- 20 any magnetic losses in the primary unit and the secondary devices, for example magnetic hysteresis loop losses in any coils associated with the primary unit and/or secondary devices. According, the control unit 16 may employ, in addition to the

EX1005 at 19:13-22; see POR 53-54 (Paper 13); Sur-Reply 12-13 (Paper 21).

[0112] Efficiency of energy transfer is an important measure of the effectiveness of energy transfer from primary coil 54 of external antenna 52 to secondary coil 34. Efficiency is measured by dividing the power in, i.e., the power received by secondary coil 34, by the power out, i.e., the power transmitted by primary coil 54. While energy efficiency can be measured at other locations in external antenna 52 and/or implantable medical device 16, for purposes of some embodiments of the present invention it is preferred that efficiency is measured coil-to-coil, i.e., from primary coil 54 to secondary coil 34.

EX1004 ¶ [0112]; see Sur-Reply 12 (Paper 21); POR 12-13 (Paper 13).

Olson Fails to Disclose Limitation [13.1]



DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Claim 13

[13.1] at least **one input power monitor** configured to **measure input power received by the primary coil from the power supply**

The '461 Patent Shows Measurement In Correct Location

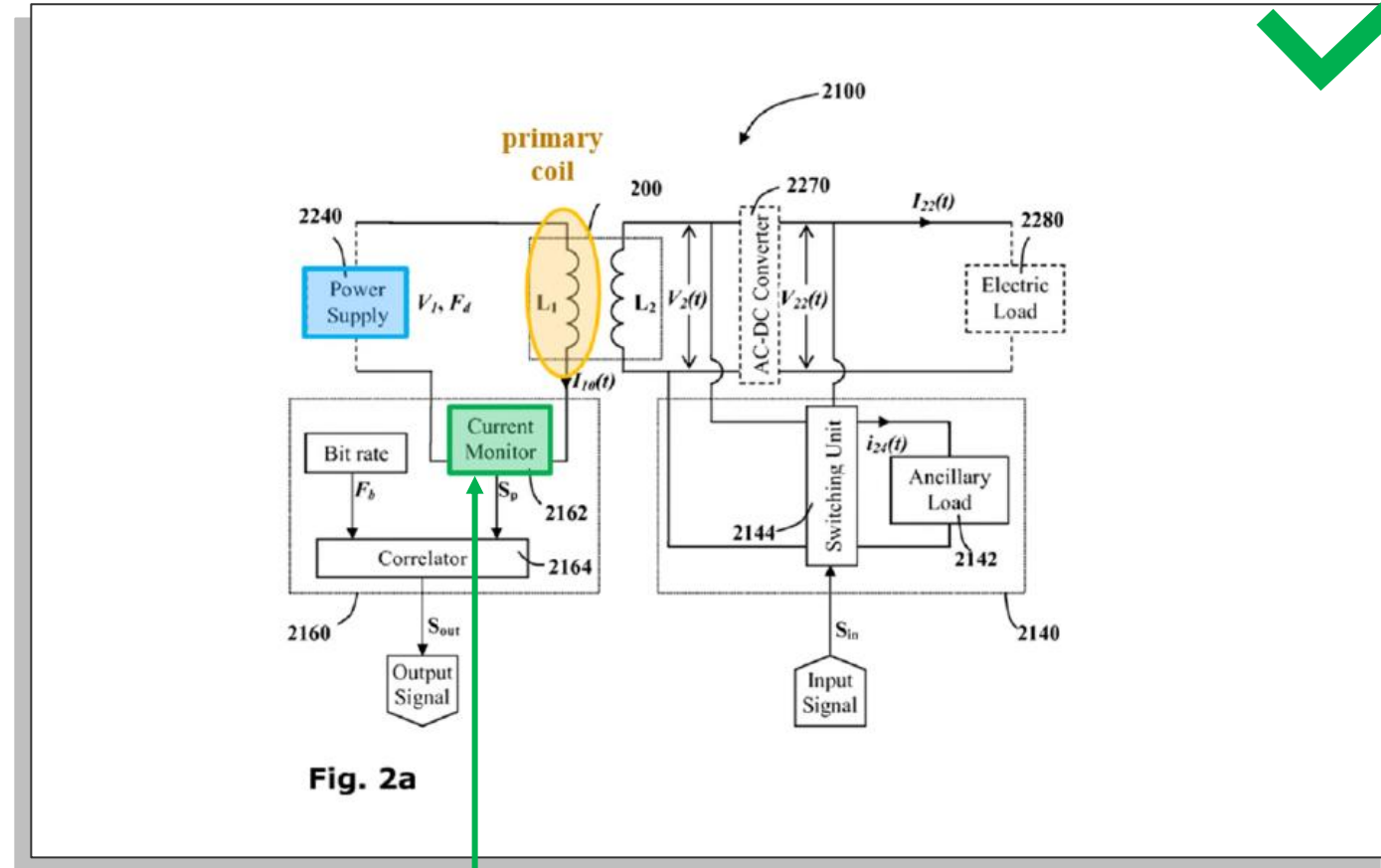


Fig. 2a

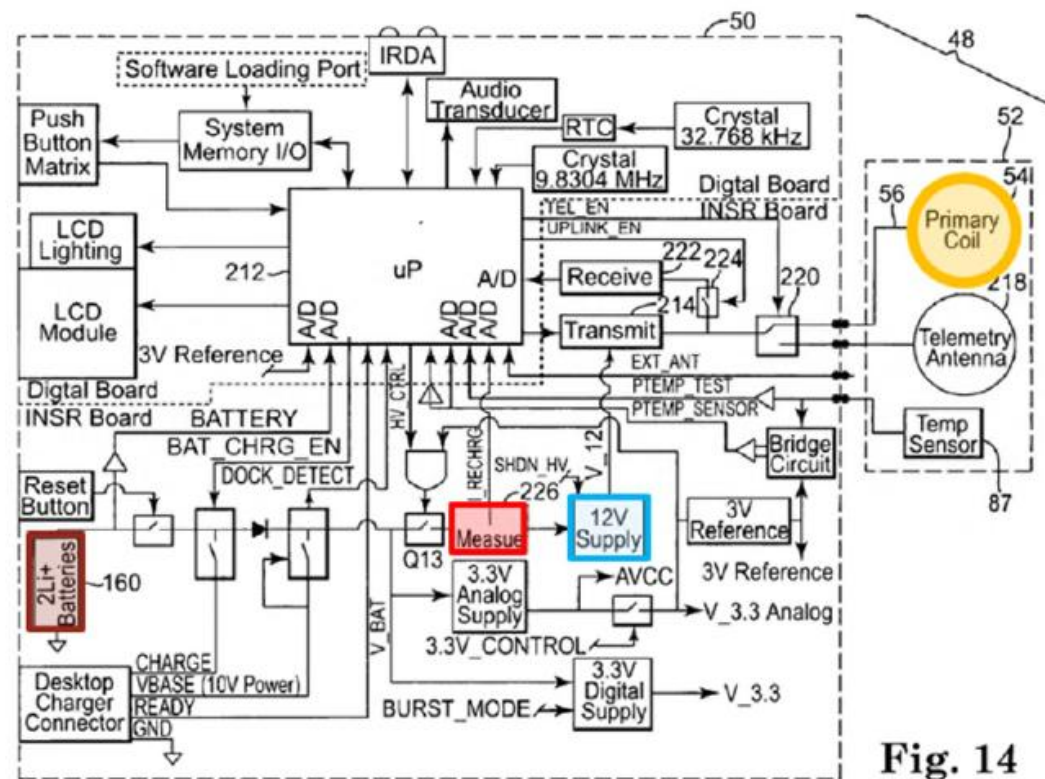
Measures current **received by** the primary coil **from** the power supply

EX1001 Fig. 2a (annotated); POR 21-22
(Paper 13); EX2003 ¶ 80.

Claim 13

[13.1] at least **one input power monitor** configured to **measure input power received by the primary coil** from the **power supply**

Olson Fails to Disclose Limitation [13.1]

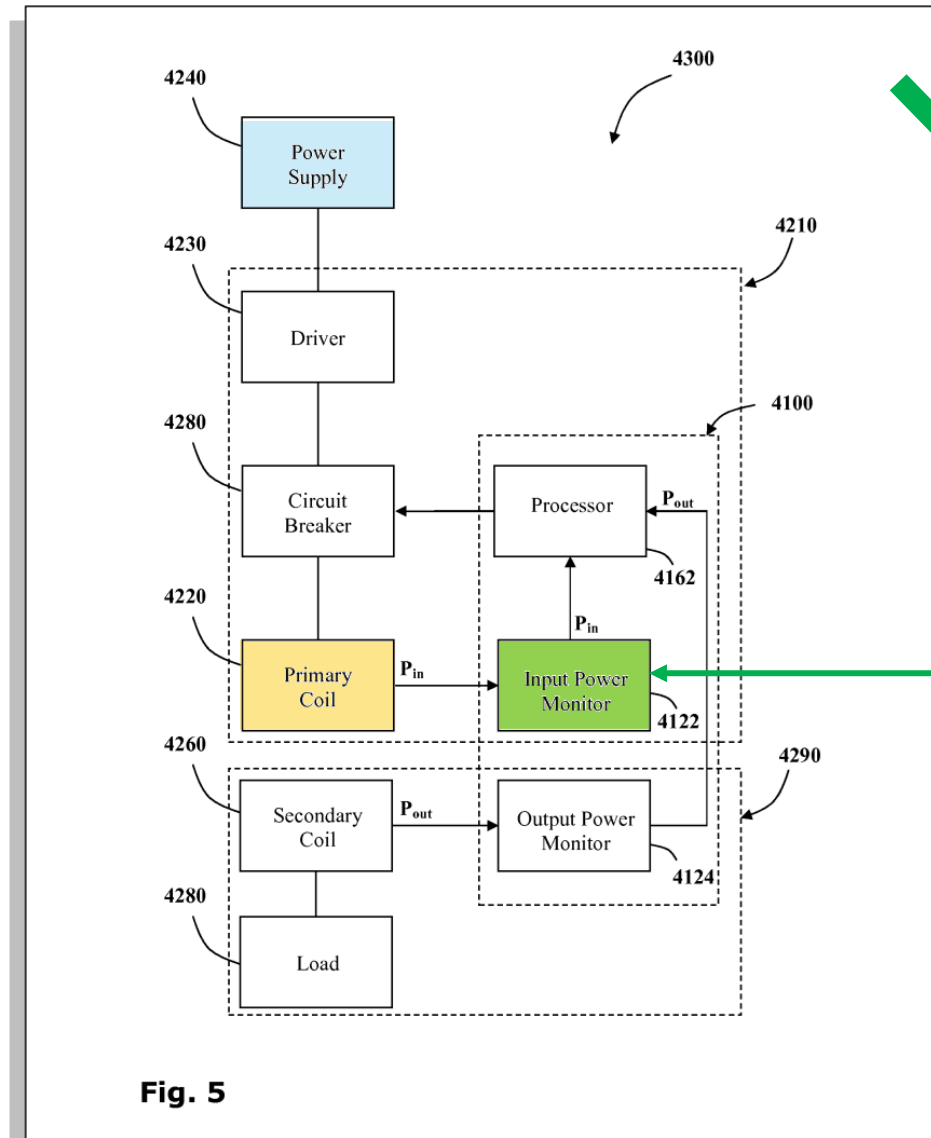


EX1004 Fig. 14 (annotated); see POR 19 (Paper 13);
EX2003 ¶ 79.

Claim 13

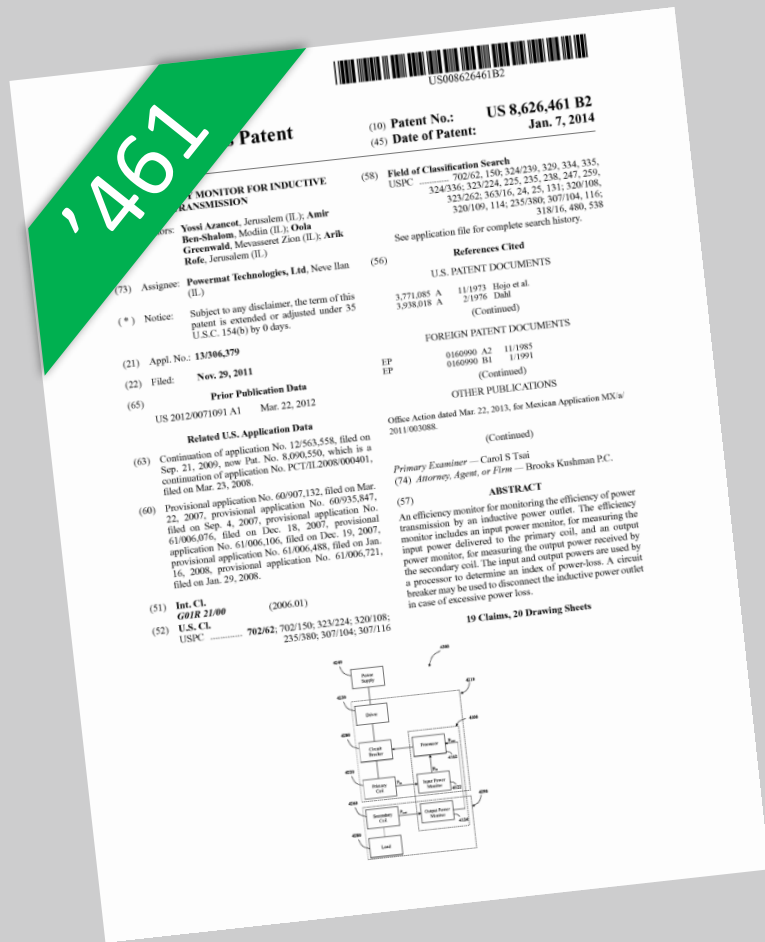
[13.1] at least **one input power monitor** configured to **measure input power received by the primary coil from the power supply**

The '461 Patent Shows Measurement In Correct Location



Measures power received by the primary coil from the power supply

EX1001 Fig. 5; see POR 2-3 (Paper 13).



EFFICIENCY MONITOR FOR INDUCTIVE POWER TRANSMISSION

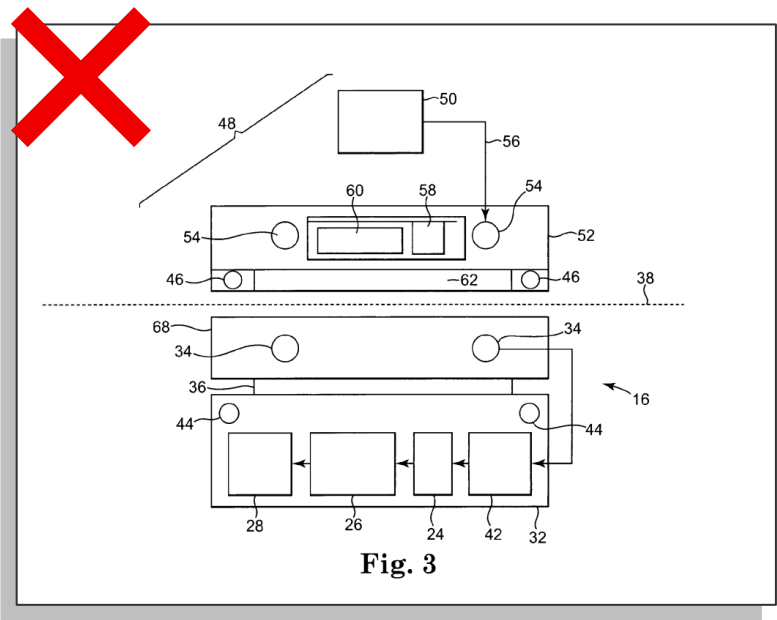
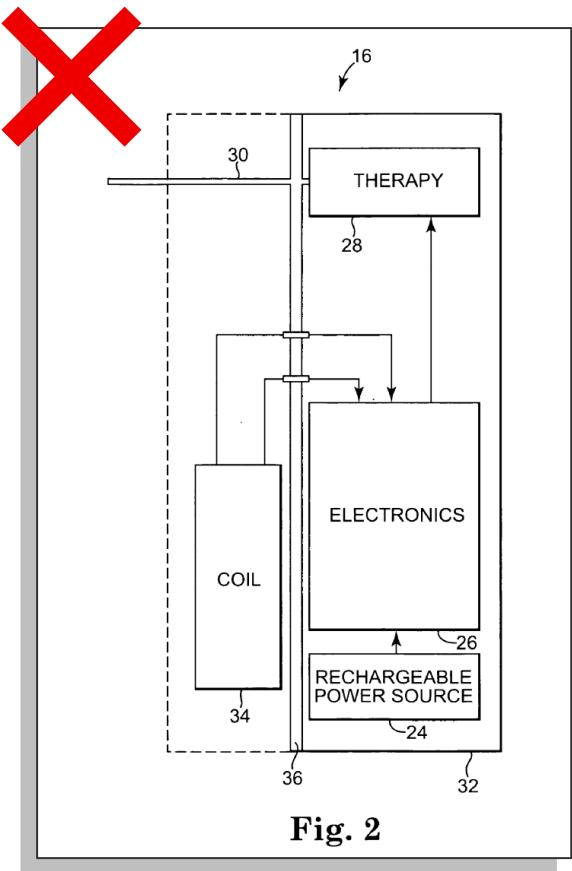
U.S. PATENT NO. 8,626,461

DEFICIENCIES OF GROUND 1A: OLSON FAILS TO ANTICIPATE [13.2]

Claim 13

[13.2] at least **one signal detector** configured to detect signals carrying data pertaining to **output power received by the secondary coil**;

Olson Fails to Disclose Limitation [13.2]

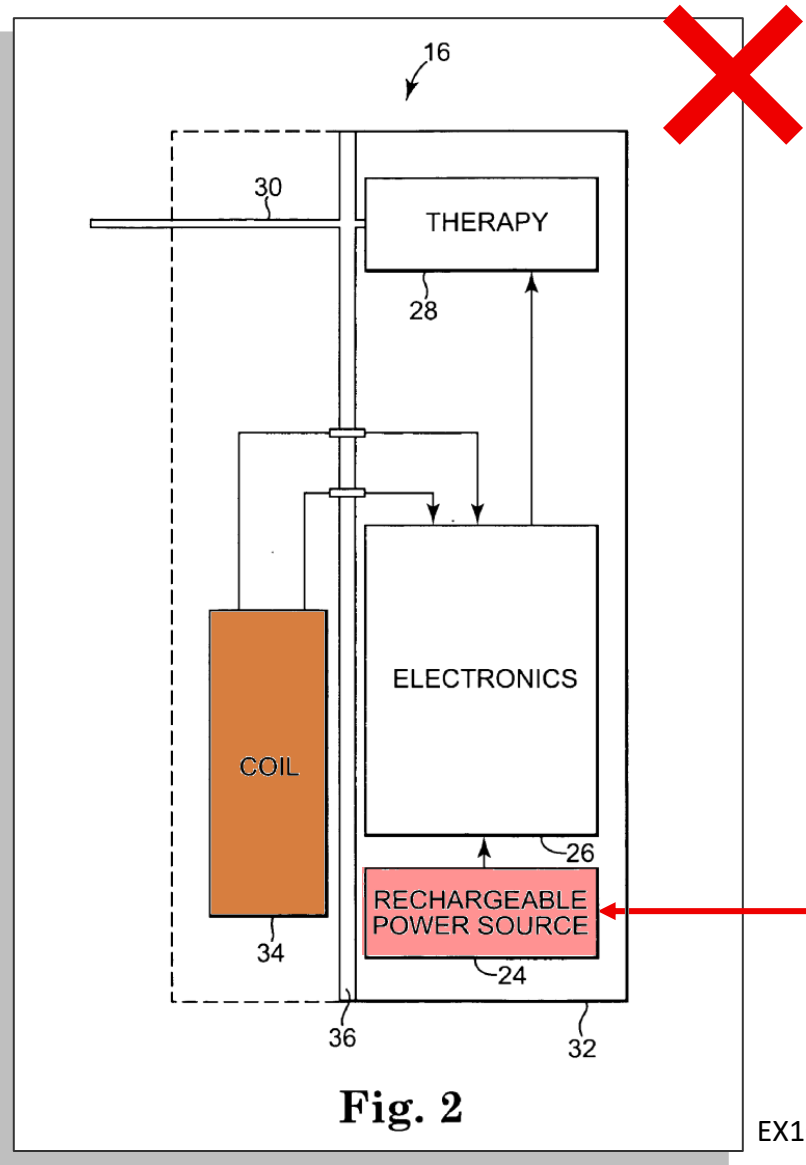


Olson fails to disclose any detail on where current is measured

Claim 13

[13.2] at least **one signal detector** configured to detect signals carrying data pertaining to **output power received by the secondary coil**;

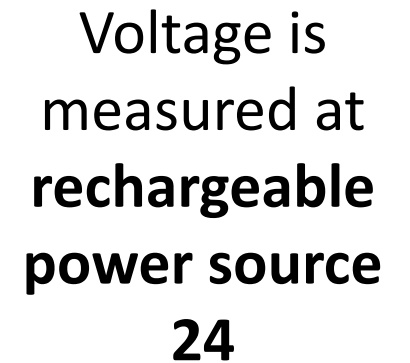
Olson Fails to Disclose Limitation [13.2]

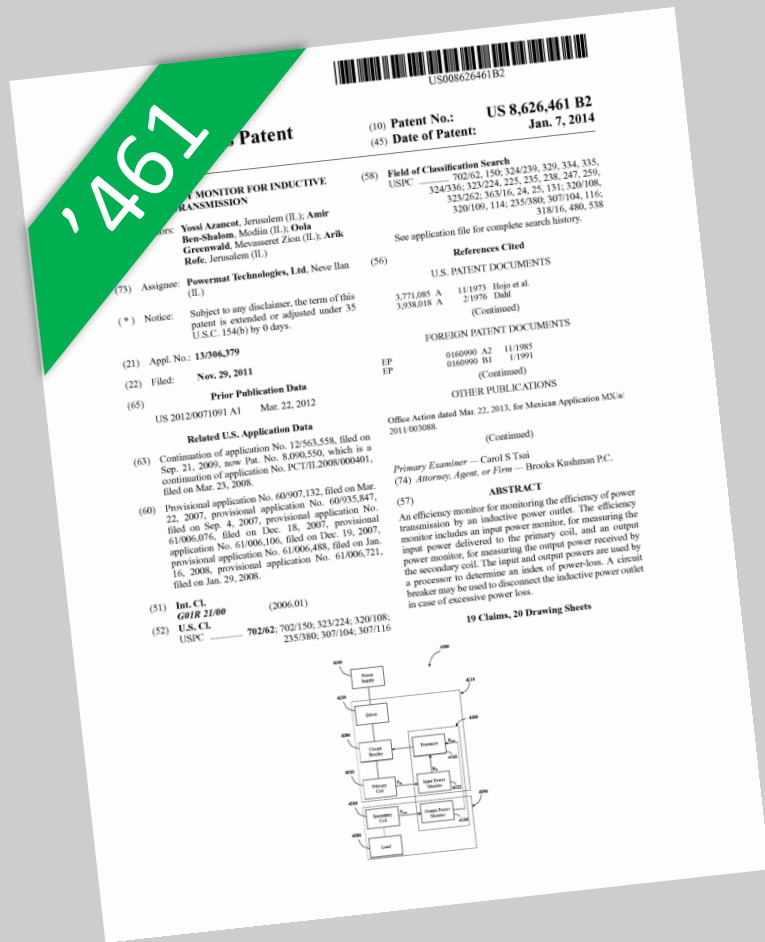


Voltage is measured at
rechargeable power source 24

EX1004 Fig. 2 (annotated); POR 30-31 (Paper 13); EX2003 ¶ 93.

Olson Fails to Disclose Limitation [13.2]





EFFICIENCY MONITOR FOR INDUCTIVE POWER TRANSMISSION

U.S. PATENT NO. 8,626,461

DEFICIENCIES OF GROUND 1A:
OLSON FAILS TO ANTICIPATE
[14]

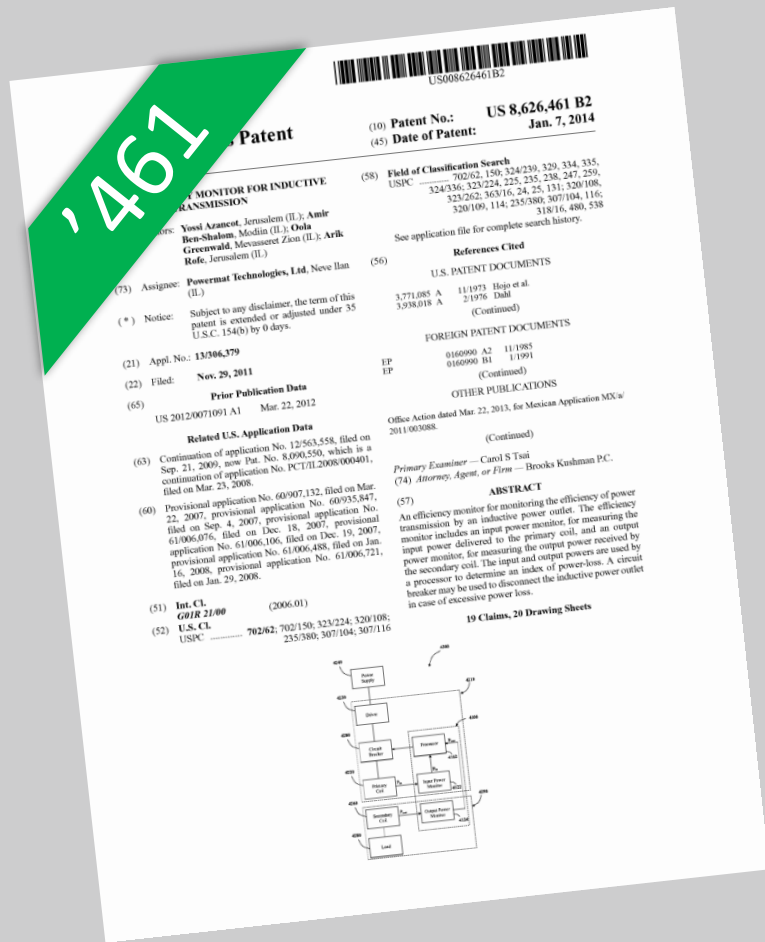
Claim 14

[14] The inductive power outlet of claim 13 additionally comprising at least one **circuit-breaker** configured to disconnect the primary coil from the power supply.

Petitioner Advances Inconsistent Arguments

204. I disagree that sending a test packet and noting that the A2503 is no longer sending power necessarily requires a “circuit-breaker configured to disconnect the primary coil from the power supply.” There are many ways to stop power transfer without using a circuit-breaker to disconnect the primary coil from the power supply. For example, the A2503 could simply deactivate the drivers that drive the Primary Coil. Alternatively, the A2503 could use something other than a circuit-breaker, such as a transistor or a switch, to disconnect the primary coil from the power supply.

EX2005 at 3; POR 38 (Paper 13).



EFFICIENCY MONITOR FOR INDUCTIVE POWER TRANSMISSION

U.S. PATENT NO. 8,626,461

DEFICIENCIES OF GROUND 1A: OLSON FAILS TO ANTICIPATE [15]

Claim 15

[15.2] the inductive power receiver further comprising: **at least one output power monitor for measuring output power received inductively by the secondary coil from the primary coil**

Claims 13 and 15 Are of Different Scope

[15.2] the inductive power receiver further comprising: **at least one output power monitor for measuring output power received inductively by the secondary coil from the primary coil**

[13.2] at least **one signal detector** configured to detect signals **carrying data pertaining to output power received by the secondary coil**

Sur-Reply 20-21 (Paper 21); POR 39-42 (Paper 13).

Claim 15

[15.2] the inductive power receiver further comprising: **at least one output power monitor for measuring output power received inductively by the secondary coil from the primary coil**

Petitioner Failed to Rebut PO's Arguments

B. Olson Discloses Element [15.2]

Powermat next fails to refute the Petition's showing that Olson discloses Element [15.2]. EX1017, ¶52. Powermat's argument that Olson lacks sufficient detail about the location of current/voltage measurements in implantable medical device 16 is misguided because Olson explicitly describes that power transfer efficiency is determined based on "the power received by secondary coil 34" as part of a "coil-to-coil" measurement. EX1004, [0112]; Pet. 23-24 and 19 (footnote 2); EX1003, ¶54. Accordingly, a POSITA would have understood Olson's implantable medical device to include an output power monitor that measures this "power received by secondary coil 34." *Id.* Powermat's arguments also fail because they erroneously imply a requirement for direct measurements of the secondary coil's voltage and current, which is unsupported by and inconsistent with the '461 Patent's own disclosure. *Supra*, §II.B.

Reply 22 (Paper 18).

The Reply fails to address the arguments in the POR, which do not merely discuss that the location of current/voltage measurements is unsatisfactory, but also states that the independent measurements of current and voltage do not satisfy this limitation. POR, 39-42. Olson's implantable medical device merely obtains separate current and voltage values and telemeters them; it does not disclose at least one output power monitor in an inductive power **receiver** that measures the **output power** received by the secondary coil from the primary coil.

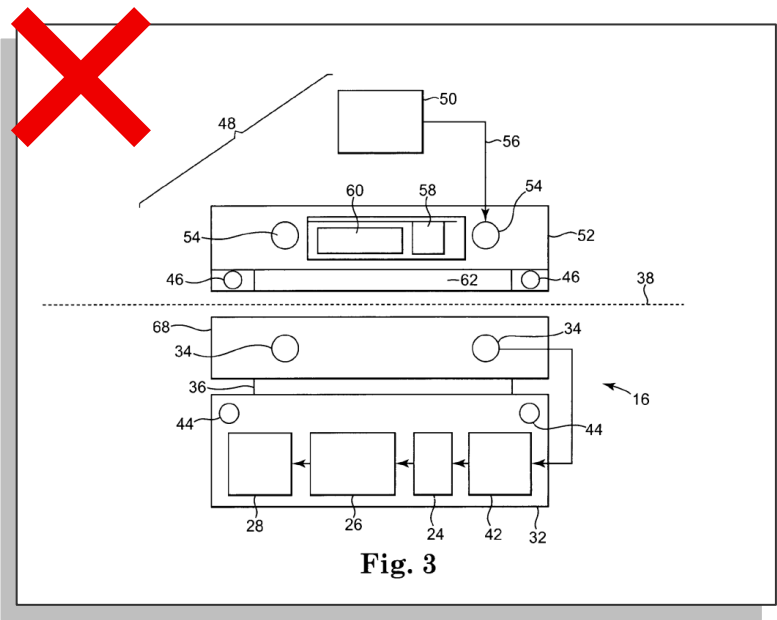
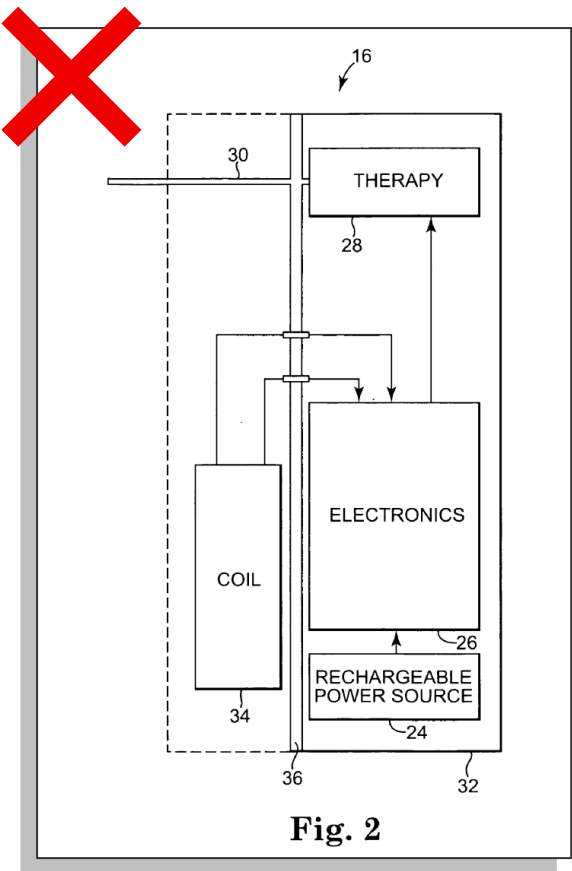
Petitioner's reliance on its [13.2] arguments is therefore misplaced, and the Reply does not demonstrate that the prior art meets the requirements of [15.2]. *See* POR, 39-42; EX2003, ¶¶104-110. Patent Owner's arguments regarding the fact that individual current and voltage measurements do not satisfy this limitation are un rebutted by Petitioner. Reply, 22.

Sur-Reply 20-21 (Paper 21); POR 39-42 (Paper 13).

Claim 15

[15.2] the inductive power receiver further comprising: **at least one output power monitor for measuring output power received inductively by the secondary coil from the primary coil**

Petitioner Failed to Point to Any Component in Olson That Measures Power



Olson fails to disclose any detail on where power is measured

Claim 15

[15.2] the inductive power receiver further comprising: **at least one output power monitor for measuring output power received inductively by the secondary coil from the primary coil**

Petitioner Only Pointed to Individual Measurements Being Taken in Implantable Medical Device 16

[0075] Rotating core cup assembly 92 is rotated in external antenna 52 for better lateral alignment of primary coil 54 and secondary coil 34. A feedback mechanism is used to determine the best rotation of core cup assembly 92. External charging device 48 can determine whether the current position of rotating core cup assembly 92 is optimally aligned for energy transfer and/or charging. External charging device 48 measures the power out of external charging device 48 divided by the power into external charging device 48. This calculation is a measure of the efficiency of external charging device 48. The power out is gauged by the power induced in implantable medical device 16 and is determined by multiplying the voltage of rechargeable power source 24 by the charging current in implantable medical device 16. These values are obtained by telemetry from implanted medical device 16. The power in is gauged by the power generated by charging unit 50 and is determined by multi-

EX1004 ¶ [0075]; POR 39-42 (Paper 13).

Claim 15

[15.2] the inductive power receiver further comprising: **at least one output power monitor for measuring output power received inductively by the secondary coil from the primary coil**

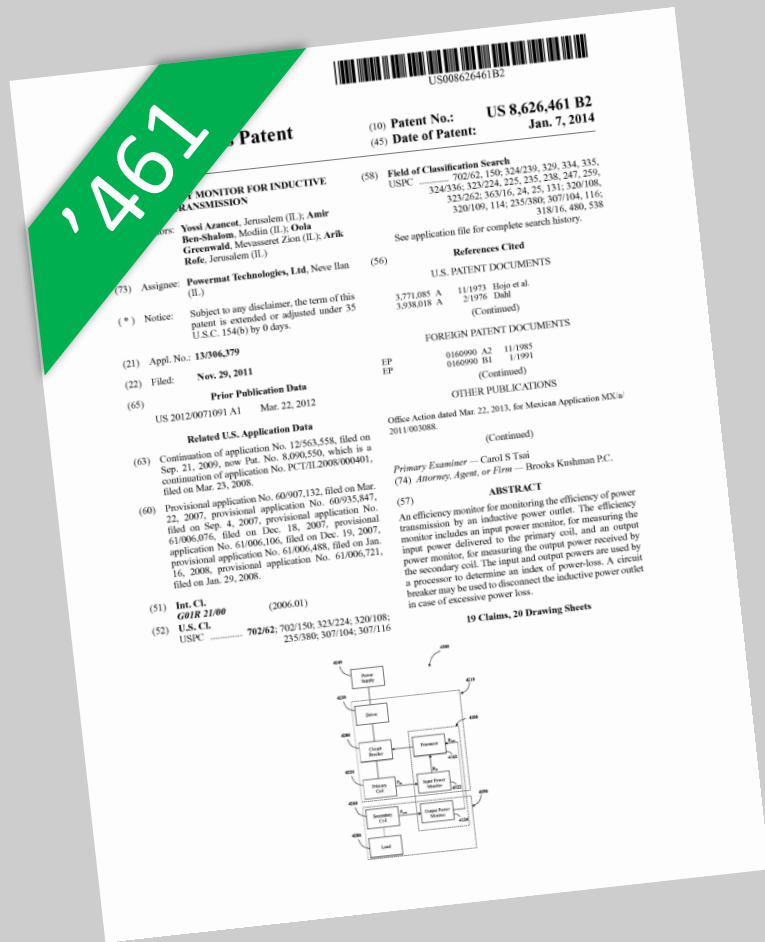
Petitioner Failed to Point to Any Component in Olson That Measures Power



**Patrick Mercier,
Ph.D.**

The fact that Olson states that “**values** are obtained by telemetry” implies that **multiple** values (*i.e.*, the current and voltage values) are transmitted rather than a single value (*i.e.*, a measurement of power). Therefore, this passage of Olson supports that the individual values of current and voltage are obtained, and no such power measurement is performed on the implantable medical device 16. Instead, Olson implies that a **different** device performs such a calculation based on the implantable medical device 16 transmitting these separate values of current and voltage. In further confirmation of this, Olson includes no language that indicates that the implantable medical device 16 performs such a power determination and fails to disclose that the implantable medical device 16 includes a component that performs such a power

EX2003 ¶ 108; POR 39-42 (Paper 13).



EFFICIENCY MONITOR FOR INDUCTIVE POWER TRANSMISSION

U.S. PATENT NO. 8,626,461

DEFICIENCIES OF GROUND 1B: OLSON FAILS TO ANTICIPATE [17]

Claim 17

[17.1] The inductive power receiver of claim 15 wherein the transmitter comprises: an ancillary load selectively connectable to the secondary inductive coil, a modulator for modulating a bit-rate signal with an input signal to create a modulated signal, and [17.2] a switch for intermittently connecting the ancillary load to the secondary inductive coil according to the modulated signal.

Stevens Is Directed to Restricting or Stopping Power Transfer

(57) Abstract: An inductive power transfer system (1) comprises a primary unit (10) operable to generate an electromagnetic field and at least one secondary device (30), separable from the primary unit, and adapted to couple with the field when the secondary device is in proximity to the primary unit so that power can be received inductively by the secondary device from the primary unit without direct electrical conductive contacts therebetween. The system detects if there is a substantial difference between, on the one hand, a power drawn from the primary unit and, on the other hand, a power required by the secondary device or, if there is more than one secondary device, a combined power required by the secondary devices. Following such detection, the system restricts or stops the inductive power supply from the primary unit. Such a system can detect the presence of unwanted parasitic loads in the vicinity of the primary unit reliably.

EX1005 Abstract; POR 49 (Paper 13); EX2003 ¶129.

Claim 17

[17.1] The inductive power receiver of claim 15 wherein the transmitter comprises: an ancillary load selectively connectable to the secondary inductive coil, a modulator for modulating a bit-rate signal with an input signal to create a modulated signal, and [17.2] a switch for intermittently connecting the ancillary load to the secondary inductive coil according to the modulated signal.

Olson Is Directed to Improving Power Transfer

[0019] In an embodiment, the present invention provides a system for transcutaneous energy transfer in a transverse direction. An external power source having a primary coil being driven at a frequency selectable in the range between eight and twelve kiloHertz contained in a housing. An implantable medical device has componentry for providing a therapeutic output and a secondary coil operatively coupled to the componentry. The external power source is capable of providing energy to the implantable medical device when the primary coil of the external power source is placed in proximity of the secondary coil of the implantable medical device. The external power source has a lateral positional adjustment for the primary coil. The frequency of the external power source is frequency adjustable providing a frequency adjustment. The positional adjustment and the frequency adjustment allows, at least in part, the system to attain an efficiency of energy transfer from the external power source to the implantable medical device of at least thirty percent.

EX1004 ¶ [0019]; POR 49 (Paper 13); EX2003 ¶131.

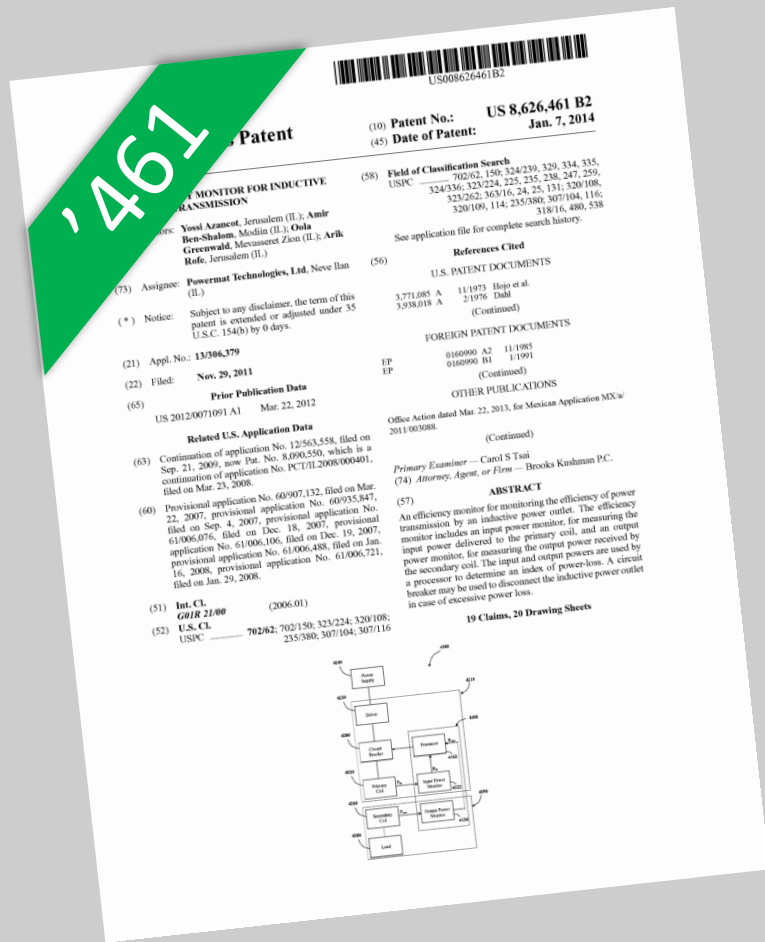
Claim 17

[17.1] The inductive power receiver of claim 15 wherein the transmitter comprises: an ancillary load selectively connectable to the secondary inductive coil, a modulator for modulating a bit-rate signal with an input signal to create a modulated signal, and [17.2] a switch for intermittently connecting the ancillary load to the secondary inductive coil according to the modulated signal.

Stevens's Load Modulators Are Directed to Simulating Different Parasitic Loads

The ability to change the dummy load dynamically is useful for devices whose 'friendly parasitic' load may change. For instance a self-charging battery may have a different 'friendly parasitic' load when charged alone, compared to when it is charged whilst connected to a mobile phone. The control unit 36 could detect whether the phone was attached and modify the dummy load accordingly. Alternatively, the phone could communicate its 'friendly parasitics' to the battery. Other removable attachments which contribute additional 'friendly parasitic' load could also be detected and the dummy load modified accordingly. These include for example, but are not limited to, removable camera attachments, cases and speakers.

EX1005 30:13-22; POR 47 (Paper 13).



EFFICIENCY MONITOR FOR INDUCTIVE POWER TRANSMISSION

U.S. PATENT NO. 8,626,461

DEFICIENCIES OF GROUND 2:
A POSITA WOULD NOT
COMBINE STEVENS + OLSON

Stevens Is Directed to Restricting or Stopping Power Transfer

(57) Abstract: An inductive power transfer system (1) comprises a primary unit (10) operable to generate an electromagnetic field and at least one secondary device (30), separable from the primary unit, and adapted to couple with the field when the secondary device is in proximity to the primary unit so that power can be received inductively by the secondary device from the primary unit without direct electrical conductive contacts therebetween. The system detects if there is a substantial difference between, on the one hand, a power drawn from the primary unit and, on the other hand, a power required by the secondary device or, if there is more than one secondary device, a combined power required by the secondary devices. Following such detection, the system restricts or stops the inductive power supply from the primary unit. Such a system can detect the presence of unwanted parasitic loads in the vicinity of the primary unit reliably.

EX1005 Abstract; POR 49 (Paper 13); EX2003 ¶129.

Olson Is Directed to Improving Power Transfer

[0019] In an embodiment, the present invention provides a system for transcutaneous energy transfer in a transverse direction. An external power source having a primary coil being driven at a frequency selectable in the range between eight and twelve kiloHertz contained in a housing. An implantable medical device has componentry for providing a therapeutic output and a secondary coil operatively coupled to the componentry. The external power source is capable of providing energy to the implantable medical device when the primary coil of the external power source is placed in proximity of the secondary coil of the implantable medical device. The external power source has a lateral positional adjustment for the primary coil. The frequency of the external power source is frequency adjustable providing a frequency adjustment. The positional adjustment and the frequency adjustment allows, at least in part, the system to attain an efficiency of energy transfer from the external power source to the implantable medical device of at least thirty percent.

EX1004 ¶ [0019]; POR 49 (Paper 13); EX2003 ¶131.

Petitioner Failed to Show a POSITA Would Combine Stevens and Olson

Stevens

(to stop or restrict
excess power)

$$\textit{power drawn from primary unit} - \textit{power required by secondary devices} < \textit{threshold}$$

Olson

(to improve power transfer)

$$\frac{\textit{power out}}{\textit{power in}}$$

Petitioner’s Stevens + Olson Combination

(to stop or restrict excess power)

$$\frac{\textit{power drawn from primary unit}}{\textit{power required by secondary devices}} < \textit{threshold}$$

POR 48-51 (Paper 13); Sur-Reply 23-25 (Paper 21);
EX2003 ¶¶ 134-36.

Petitioner Failed to Show a POSITA Would Combine Stevens and Olson

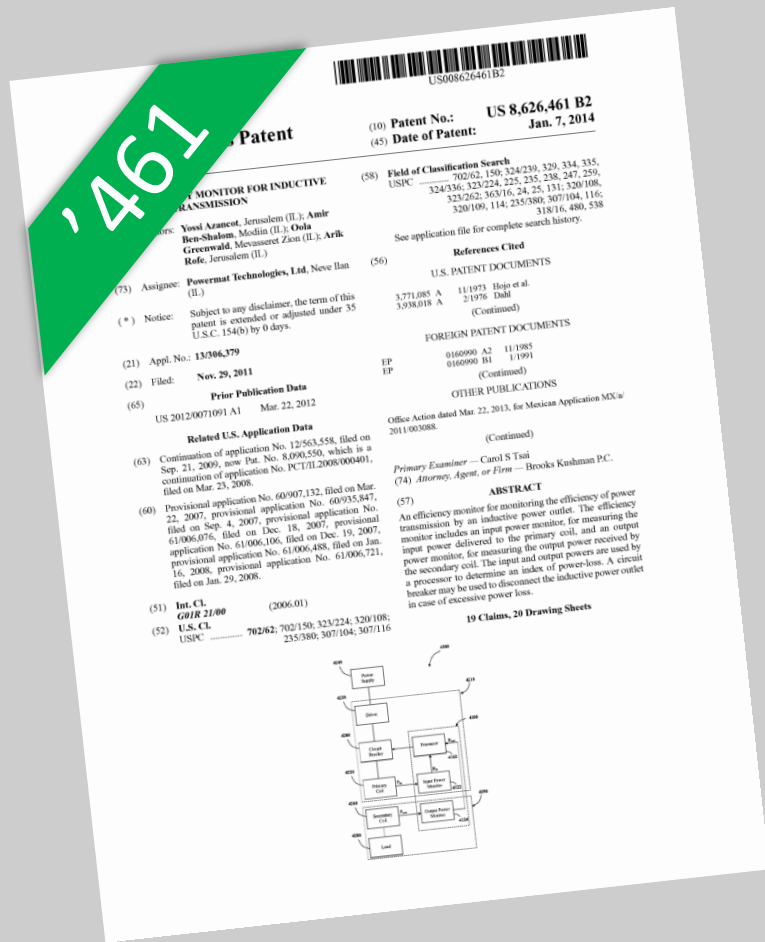


**Patrick Mercier,
Ph.D.**

135. However, Dr. Woods's ratio format is less desirable for evaluating parasitic load because it evaluates relative values instead of absolute values. Parasitic loads are better evaluated as absolute values and using Stevens's methodology of comparison. For example, if the sum of load measures is zero, Stevens's method would lead to a proper determination of the parasitic load and scale appropriately with increasing measured power. On the other hand, using Olson's ratio format, the resultant value would be "zero," regardless of how small or large the parasitic load is.

136. As additional examples, minor parasitic load could be misrepresented as a substantial parasitic load when using the ratio format if very small values comprise the measured power and sum of load measures. Similarly, very large parasitic load could be misrepresented as small parasitic load when using the ratio format if large values comprise the measured power and sum of load measures. It is therefore detrimental to use Olson's ratio format to determine substantial parasitic loss and a POSITA would not be motivated to combine Stevens with Olson to use Olson's ratio format over Stevens's prescribed methodology. A POSITA would better understand "substantial" parasitic loss in terms of absolute values, whereas

EX2003 ¶¶ 135-136.



EFFICIENCY MONITOR FOR INDUCTIVE POWER TRANSMISSION

U.S. PATENT NO. 8,626,461

DEFICIENCIES OF GROUND 2:
STEVENS-OLSON FAILS TO
RENDER OBVIOUS [13.1]

Claim 13

[13.1] at least **one input power monitor** configured to **measure input power received by the primary coil** from the power supply

Petitioner and References State Location Matters

- 10 In the simplest case, in step S3 the control unit 16 simply compares the measured power with a predetermined shutdown threshold. If the measured power exceeds the shutdown threshold value, the control unit 16 determines that the inductive power supply from the primary unit should be restricted or stopped. As described in more detail below, however, it is preferable to take into account losses which inevitably occur
- 15 in the power transfer system. In particular, these losses include losses in the primary unit itself and/or any secondary devices/host objects present. These losses include inefficiencies in the primary coil itself and any other components associated with the primary coil such as the electrical drive unit, for example I^2R losses in the copper of the coil or effective series resistance of any resonating capacitor. The losses also include
- 20 any magnetic losses in the primary unit and the secondary devices, for example magnetic hysteresis loop losses in any coils associated with the primary unit and/or secondary devices. According, the control unit 16 may employ, in addition to the

EX1005 at 19:13-22; Sur-Reply 12-13 (Paper 21);
POR 53-54 (Paper 13); EX2003 ¶141.

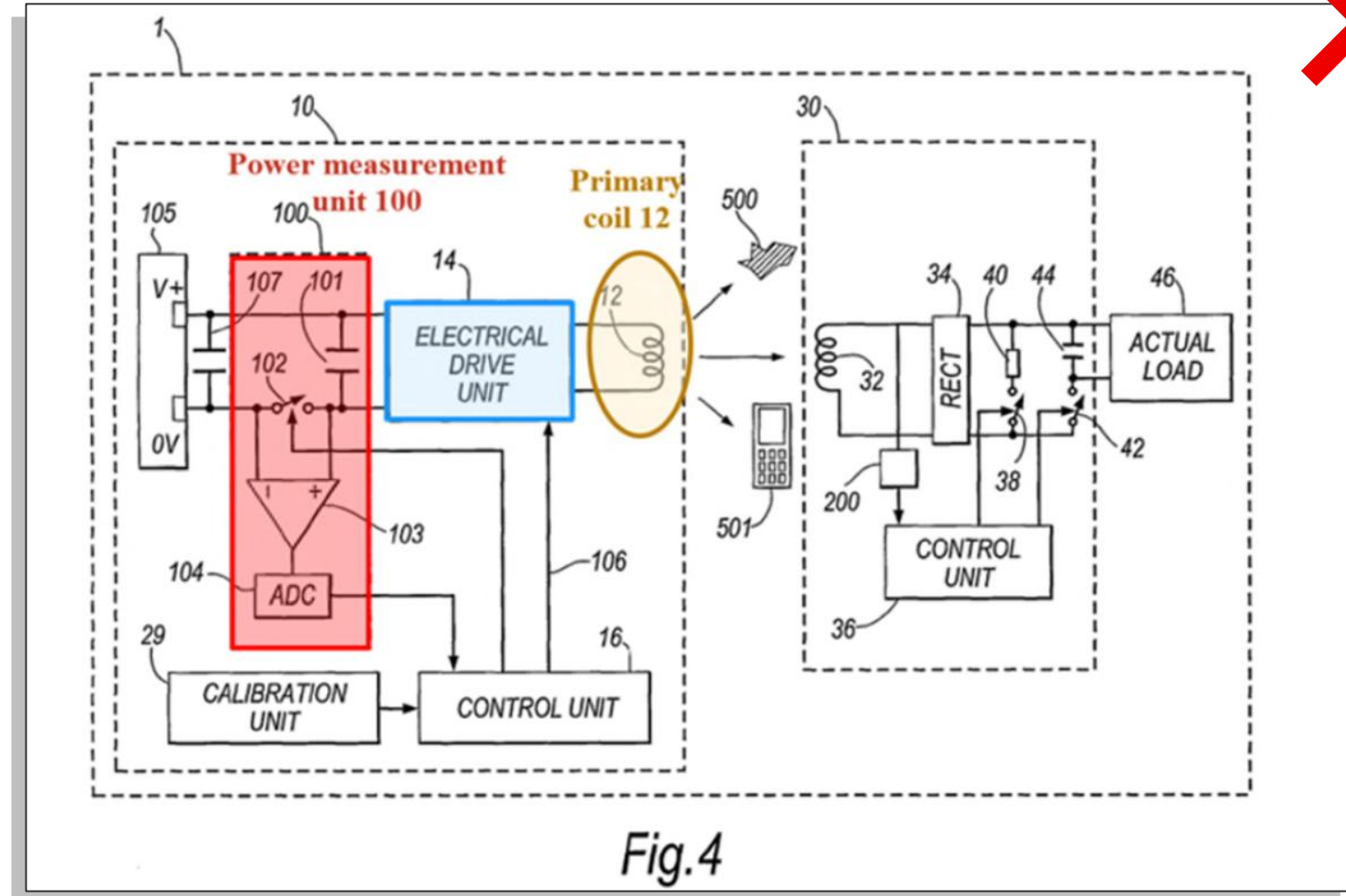
[0112] Efficiency of energy transfer is an important measure of the effectiveness of energy transfer from primary coil 54 of external antenna 52 to secondary coil 34. Efficiency is measured by dividing the power in, i.e., the power received by secondary coil 34, by the power out, i.e., the power transmitted by primary coil 54. While energy efficiency can be measured at other locations in external antenna 52 and/or implantable medical device 16, for purposes of some embodiments of the present invention it is preferred that efficiency is measured coil-to-coil, i.e., from primary coil 54 to secondary coil 34.

EX1004 ¶ [0112]; see Sur-Reply 12 (Paper 21);
POR 12-13 (Paper 13).

Claim 13

[13.1] at least **one input power monitor** configured to **measure input power** received by the primary coil **from the power supply**

Stevens + Olson Combination Fails to Disclose Limitation [13.1]



EX1005 Fig. 4 (annotated); POR 51-54 (Paper 13); EX2003 ¶ 140.

Claim 13

[13.1] at least **one input power monitor** configured to **measure input power received by the primary coil from the power supply**

The '461 Patent Shows Appropriate Measurement

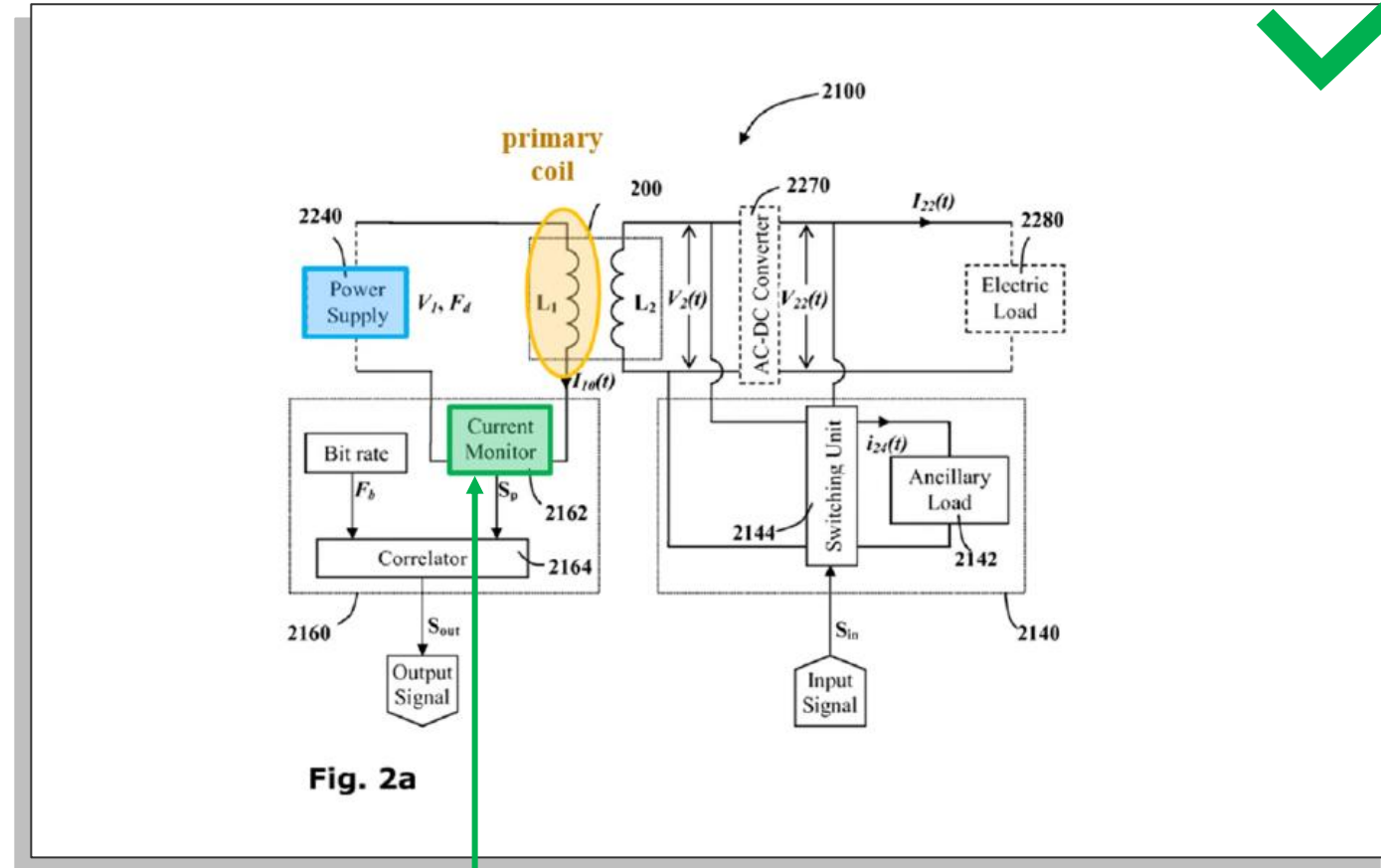


Fig. 2a

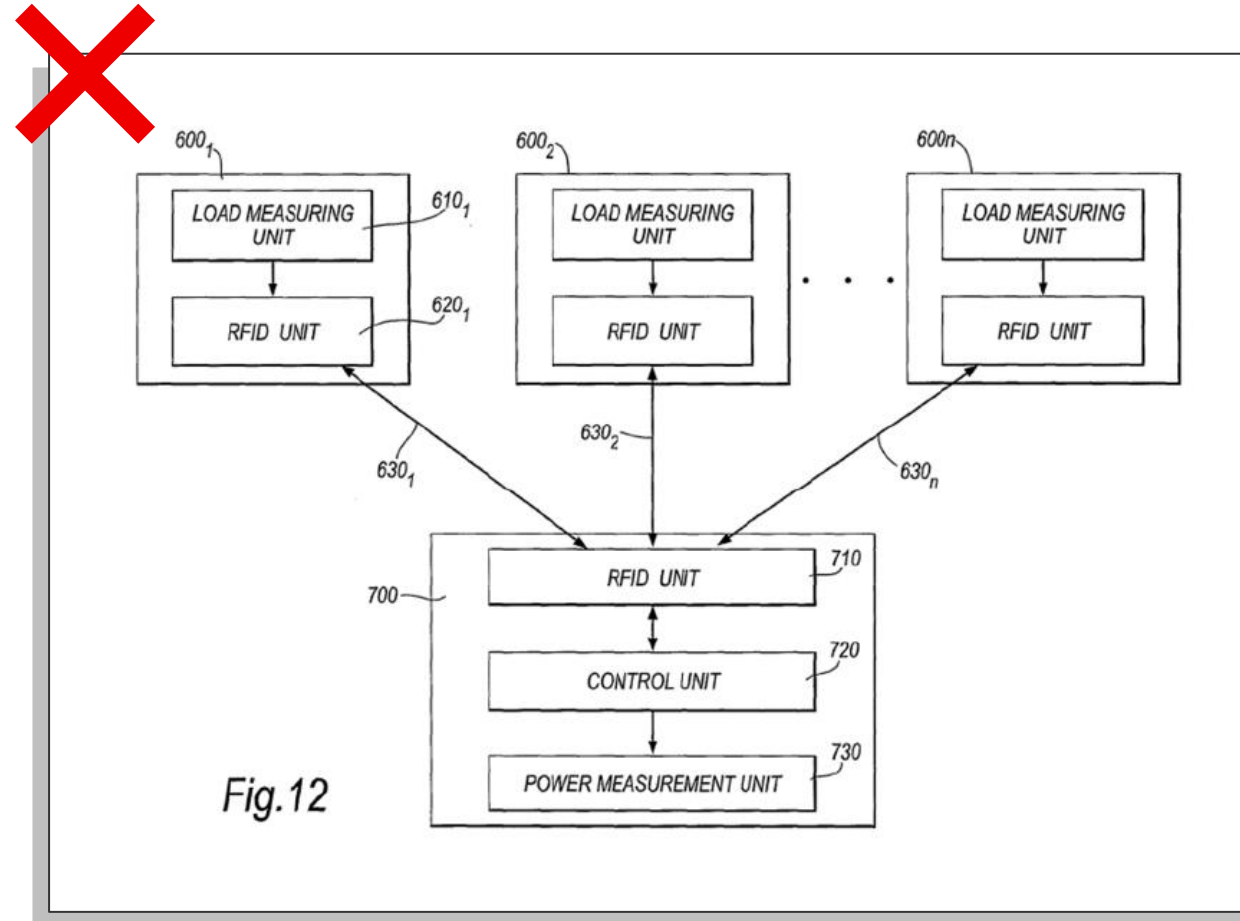
EX 1001 Fig. 2a (annotated); POR 55
(Paper 13); EX2003 ¶ 142.

Measures current **received by** the
primary coil **from the** power supply

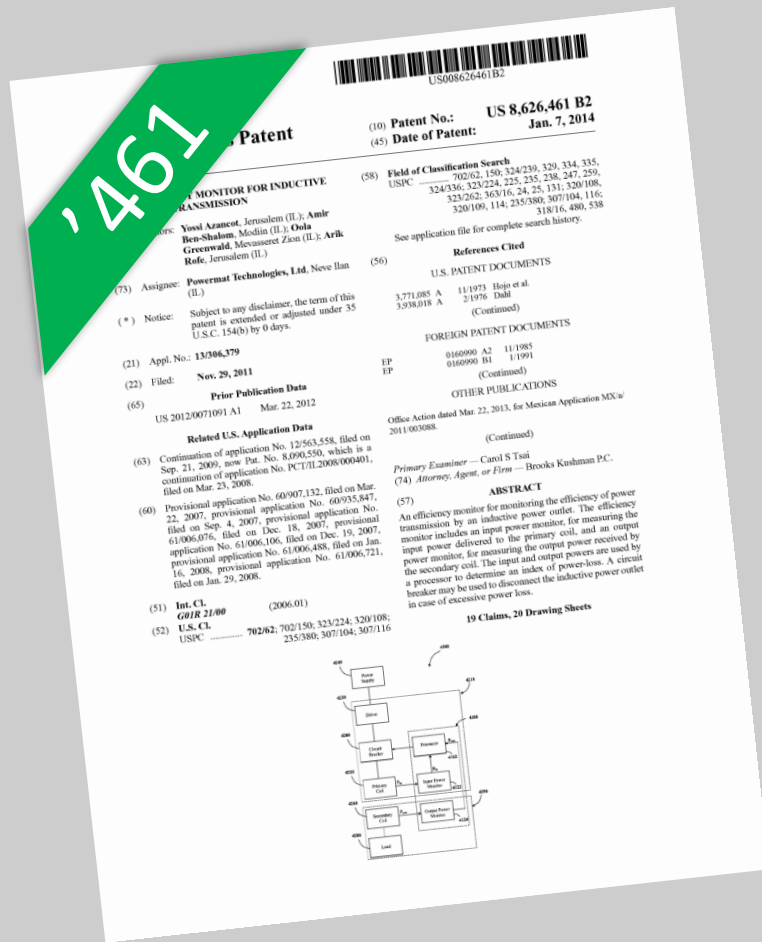
Claim 13

[13.1] at least **one**
input power monitor
configured to **measure**
input power
received by the
primary coil **from the**
power supply

Stevens + Olson Fails to Disclose Limitation [13.1]



EX1005 Fig. 12; POR 55-56 (Paper 13); EX2003 ¶ 143.



EFFICIENCY MONITOR FOR INDUCTIVE POWER TRANSMISSION

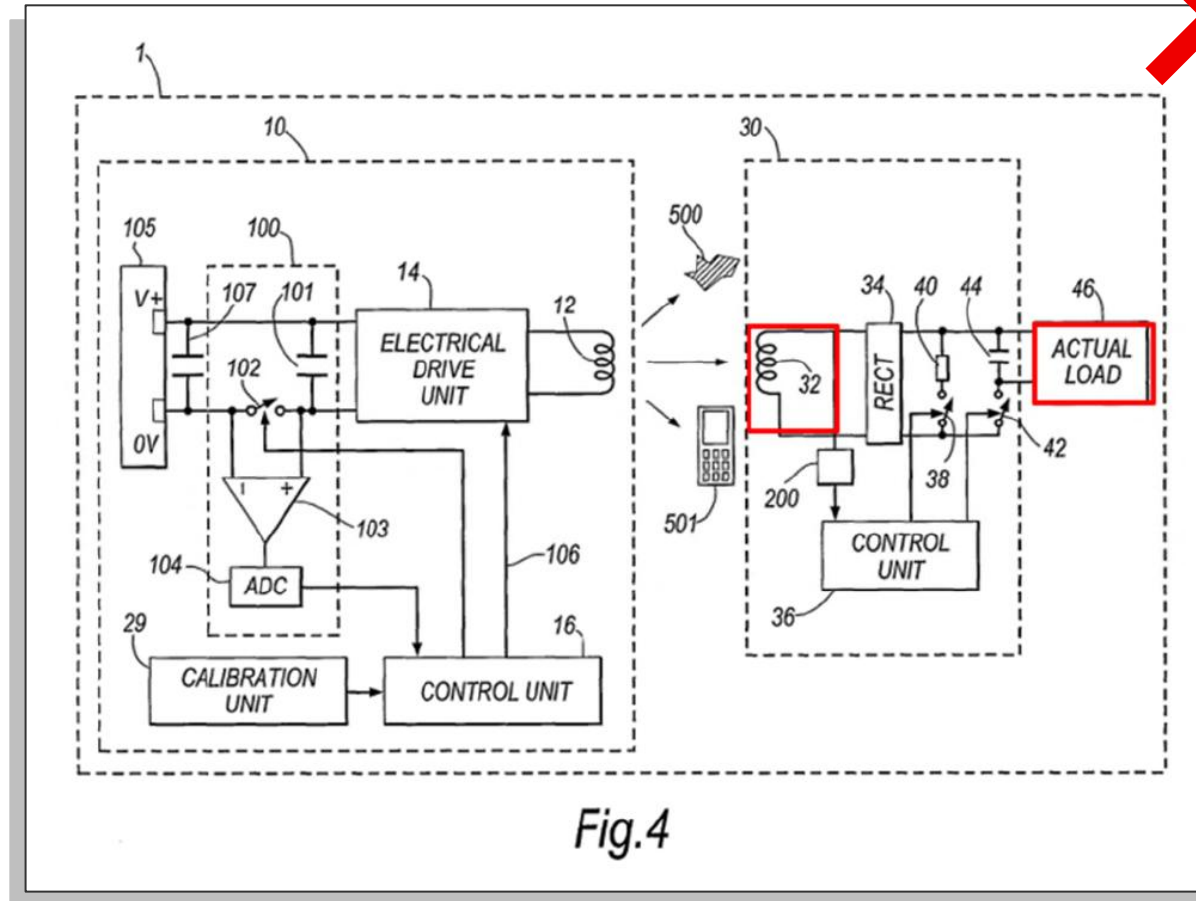
U.S. PATENT NO. 8,626,461

DEFICIENCIES OF GROUND 2:
STEVENS-OLSON FAILS TO
RENDER OBVIOUS [13.2]

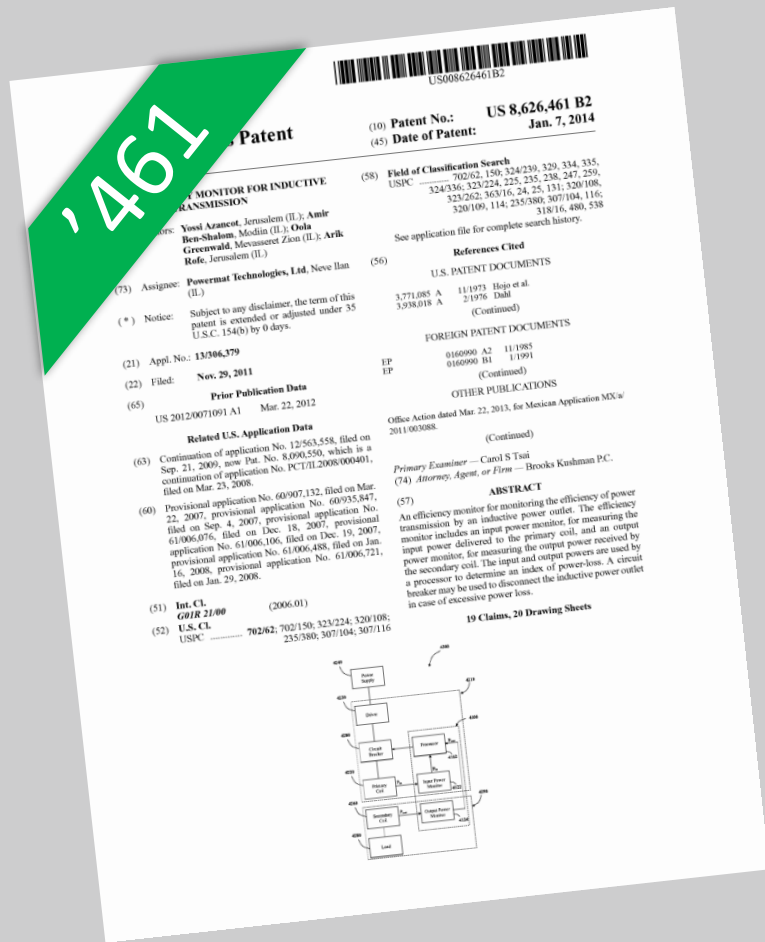
Claim 13

[13.2] at least **one signal detector** configured to detect signals carrying data pertaining to **output power received by the secondary coil**;

Stevens + Olson Fails to Disclose Limitation [13.2]



EX1005 Fig. 4; POR 57-59 (Paper 13); EX2003 ¶ 149.



EFFICIENCY MONITOR FOR INDUCTIVE POWER TRANSMISSION

U.S. PATENT NO. 8,626,461

DEFICIENCIES OF GROUND 3: A POSITA WOULD NOT COMBINE STEVENS + JIN

Stevens Is Directed to Restricting or Stopping Power Transfer

(57) Abstract: An inductive power transfer system (1) comprises a primary unit (10) operable to generate an electromagnetic field and at least one secondary device (30), separable from the primary unit, and adapted to couple with the field when the secondary device is in proximity to the primary unit so that power can be received inductively by the secondary device from the primary unit without direct electrical conductive contacts therebetween. The system detects if there is a substantial difference between, on the one hand, a power drawn from the primary unit and, on the other hand, a power required by the secondary device or, if there is more than one secondary device, a combined power required by the secondary devices. Following such detection, the system restricts or stops the inductive power supply from the primary unit. Such a system can detect the presence of unwanted parasitic loads in the vicinity of the primary unit reliably.

EX1005 Abstract; POR 49 (Paper 13); EX2003 ¶ 129.

Jin Is Directed to Evaluating Transmission Efficiency of Different Configurations

[0093] Then, the coupling condition between the coils was judged using transmission efficiency as a parameter. Although the relation between transmission efficiency and coupling coefficient between the coils is not simple, there is a quite strong correlation between the transmission efficiency and coupling coefficient if the same test condition is applied.

[0094] Transmission efficiency = (effective current value of secondary side × effective voltage) / (effective current value of primary side × effective voltage)

EX1006 ¶¶ [0093]-[0094]; POR 66-69 (Paper 13); EX2003 ¶¶ 172-79.

Petitioner Failed to Show a POSITA Would Combine Stevens and Jin

Stevens

(to stop or restrict excess power)

$$\text{power drawn from primary unit} - \text{power required by secondary devices} < \text{threshold}$$

Jin

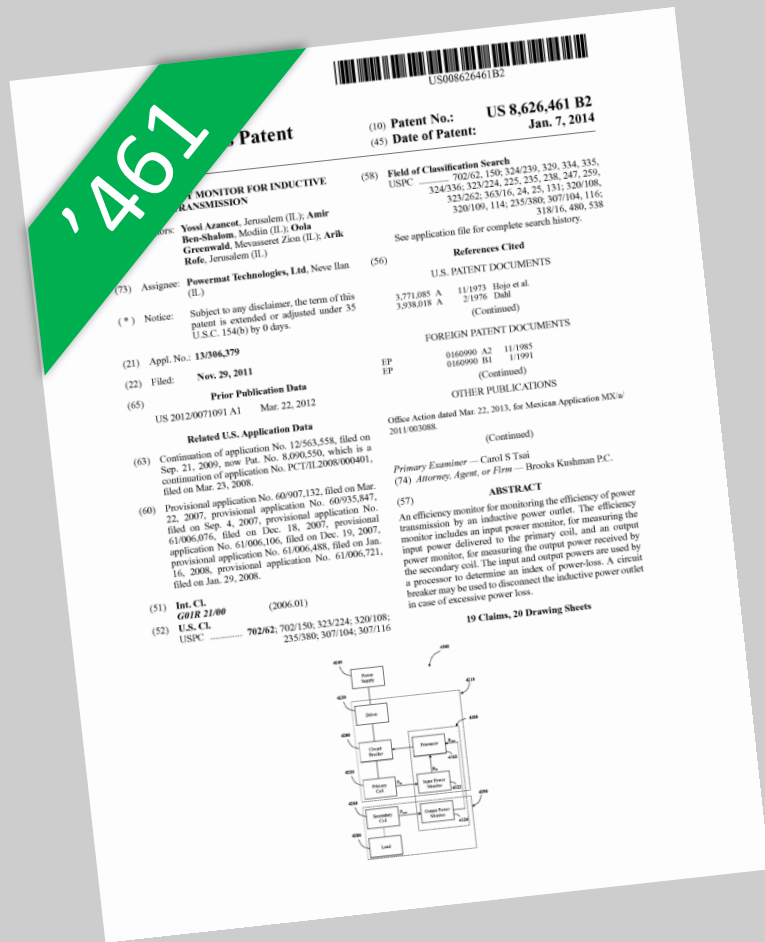
(to evaluate transmission efficiency)

$$\text{transmission efficiency} = \frac{\text{effective current value of secondary side} \times \text{effective voltage}}{\text{effective current value of primary side} \times \text{effective voltage}}$$

Petitioner's Stevens + Jin Combination

(to stop or restrict excess power)

$$\frac{\text{power drawn from primary unit}}{\text{power required by secondary devices}} < \text{threshold}$$



EFFICIENCY MONITOR FOR INDUCTIVE POWER TRANSMISSION

U.S. PATENT NO. 8,626,461

'461 PATENT CHALLENGED CLAIMS

Claim 13

CLAIM 13	
[13.pre]	An inductive power outlet comprising at least one primary coil, for inductively coupling with a secondary coil wired to an electric load, the inductive power outlet further comprising an efficiency monitor comprising:
[13.1]	at least one input power monitor configured to measure input power received by the primary coil from the power supply;
[13.2]	at least one signal detector configured to detect signals carrying data pertaining to output power received by the secondary coil;
[13.3]	at least one processor configured to receive data pertaining to the input power and the output power, the processor further configured to determine an index of power-loss indicative of the efficiency of an inductive coupling between the primary coil and the secondary coil;
[13.4]	wherein the index of power-loss comprises at least one of: an efficiency quotient Q , defined as the ratio of the output power to the input power; and an efficiency differential Δ , defined as the difference between the output power and the input power.

Claim 14

CLAIM 14
The inductive power outlet of claim 13 additionally comprising at least one circuit-breaker configured to disconnect the primary coil from the power supply.

Claim 15

CLAIM 15
[15.pre] An inductive power receiver comprising at least one secondary coil for inductively coupling to a primary coil and supplying power to an electric load, the inductive power receiver further comprising
[15.a] at least one output power monitor for measuring output power received inductively by the secondary coil from the primary coil, and
[15.b] at least one signal transmitter configured to transmit signals carrying data pertaining to the output power to the inductive power outlet of claim 13.

Claim 16

CLAIM 16
The inductive power receiver of claim 15 wherein the signal transmitter is selected from a group consisting of: light emitting diodes, radio transmitters, optocouplers, and transmitter circuits.

Claim 17

CLAIM 17	
[17.pre]	The inductive power receiver of claim 15 wherein the transmitter comprises:
[17.a]	an ancillary load selectively connectable to the secondary inductive coil, a modulator for modulating a bit-rate signal with an input signal to create a modulated signal, and
[17.b]	a switch for intermittently connecting the ancillary load to the secondary inductive coil according to the modulated signal.

Claim 18

CLAIM 18	
The inductive power receiver of claim 15 wherein the output power monitor is incorporated into an electric device.	