

Exhibit G-3

Invalidity of U.S. Patent No. 9,083,204 in view of US 2009/0174263 (“’263 Baarman”)

As described in detail below, **’263 Baarman** anticipates and/or renders obvious claims 1-6, and 8 (the “Asserted Claims”) of U.S. Patent No. 9,083,204 (“the ’204 Patent”) under 35 U.S.C. §102 and/or §103, either alone or in combination with other prior art references, and/or in combination with the knowledge of a person of ordinary skill. This invalidity claim chart is based on Defendant Anker’s present understanding of the Asserted Claims and Plaintiff Powermat Technologies Ltd. (“Powermat”) apparent construction of the Asserted Claims in its Preliminary Infringement Contentions (“Infringement Contentions”).

’263 Baarman was originally filed on September 14, 2007, and published on April 4, 2008, and thus is available as prior art at least under pre-AIA 35 USC §§ 102 and/or 103. In addition, the following secondary references (collectively the “**Secondary Refs**”) are available as prior art under at least pre-AIA 35 USC §§ 102 and/or 103. U.S. Patent No. 2007/0236169 (“’169 Purdy”) was filed on June 14, 2007, and thus is also available as prior art under at least pre-AIA 35 USC §§ 102 and/or 103. U.S. Patent No. 7,106,078 (“’078 Frank”) was issued September 12, 2006, and thus is also available as prior art under at least pre-AIA 35 USC §§ 102 and/or 103. Digital Systems, Principles and Applications, 10th Edition (“Tocci”) was published as of January 1, 2006, and this is also available as prior art under at least pre-AIA 35 USC §§ 102 and/or 103.

The following invalidity chart includes references to the structure, function, operation, and/or features of the technology described in **’263 Baarman** and/or **Secondary Refs**. The cited portions of **’263 Baarman** and/or the **Secondary Refs** are merely illustrative, and Anker reserves the right to rely on alternative or additional evidence, including uncited portions of **’263 Baarman** and/or the **Secondary Refs**. Where the chart below states that **’263 Baarman** and/or the **Secondary Refs** “describes” or “provides for” a limitation, such disclosure may be express, inherent, or implicit. To the extent it is found **’263 Baarman** and/or the **Secondary Refs** does not expressly disclose certain limitations in the asserted claim, such limitations are inherent. Anker reserves the right to present direct evidence of the structure, function, operation, and/or features of the technology described in **’263 Baarman** and/or the **Secondary Refs** (including product samples, source code, and/or witness testimony) and/or its prior art status, and to present alternative or additional documents concerning the same as evidence that the technology described in **’263 Baarman** and/or the **Secondary Refs** anticipates and/or renders obvious the Asserted Claims of the ’204 Patent.

Although Defendant notes that there is no longer a rigid requirement regarding motivation to combine under *KSR Int’l Co. v. Teleflex Inc.*, Defendant provides the following statements regarding motivation to combine out of an overabundance of caution. 550 U.S. 398, 127 S.Ct. 1727, 1742 (2007). Multiple teachings, suggestions, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits 343-A through 343-G come from many sources, including the prior art (specific and as a whole),

common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demand or pressure, market forces, obvious to try, the nature of the problem faced, and/or knowledge possessed by one of ordinary skill. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field or endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. The combination of prior art references identified in these contentions would have been obvious because the combination represents the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance, would motivate the addition of features to systems as they become available, become less expensive, become more commonly used, provide better performance, reduce costs, size or weight, or predictably achieve other clearly desirable results.

This chart is subject to all reservations, objections, and disclaimers in Anker's Invalidity Contentions and any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety. This chart may apply claim constructions that Powermat appears to use for its infringement theories with which Anker disagrees, and nothing stated herein shall be treated as an admission or suggestion that Anker agrees with Powermat regarding the scope of the Asserted Claims, Powermat's apparent claim constructions, or the accuracy of any particular claim construction. Anker reserves all rights to challenge any of the claim terms herein under 35 U.S.C. § 112, including by arguing that they are indefinite, are not supported by the written description, and/or are not enabled. Anker further reserves all rights to amend this invalidity claim chart without leave of court pursuant to the Court's Scheduling Order, or upon a showing of good cause.

Claim	Limitation	
Claim 1		
[1.pre]	An inductive power transfer system comprising	'263 Baarman discloses an inductive power transfer system. For example: “An inductive power supply that maintains resonance and adjusts duty cycle based on feedback from a secondary circuit. A controller, driver circuit and switching circuit cooperate to generate an AC signal at a selected operating frequency and duty cycle. The AC signal is applied to the tank circuit to create an inductive field for powering the secondary. The secondary communicates feedback about the received power back to the primary controller. The power transfer efficiency may be optimized by maintaining the operating frequency substantially at resonance, and the amount of power transferred may be controlled by adjusting the duty cycle.” '263 Baarman at Abstract. “An inductive power supply or primary circuit in accordance with an embodiment of the present invention is shown in FIG. 1, and generally designated 100. The primary circuit 100 includes a primary controller 110, a driver circuit 111 including a pair of drivers 112, 114, a switching circuit 115 including a pair of switches 116, 118, a tank circuit 120 a primary sensor 122 and an optional wireless receiver 124. The primary controller 110, driver circuit 111 and the switching circuit 115 together generate an AC signal at a selected frequency and selected duty cycle that is applied to the tank circuit 120 to create an inductive field for transferring power wirelessly to a secondary circuit.” '263 Baarman at [0019].

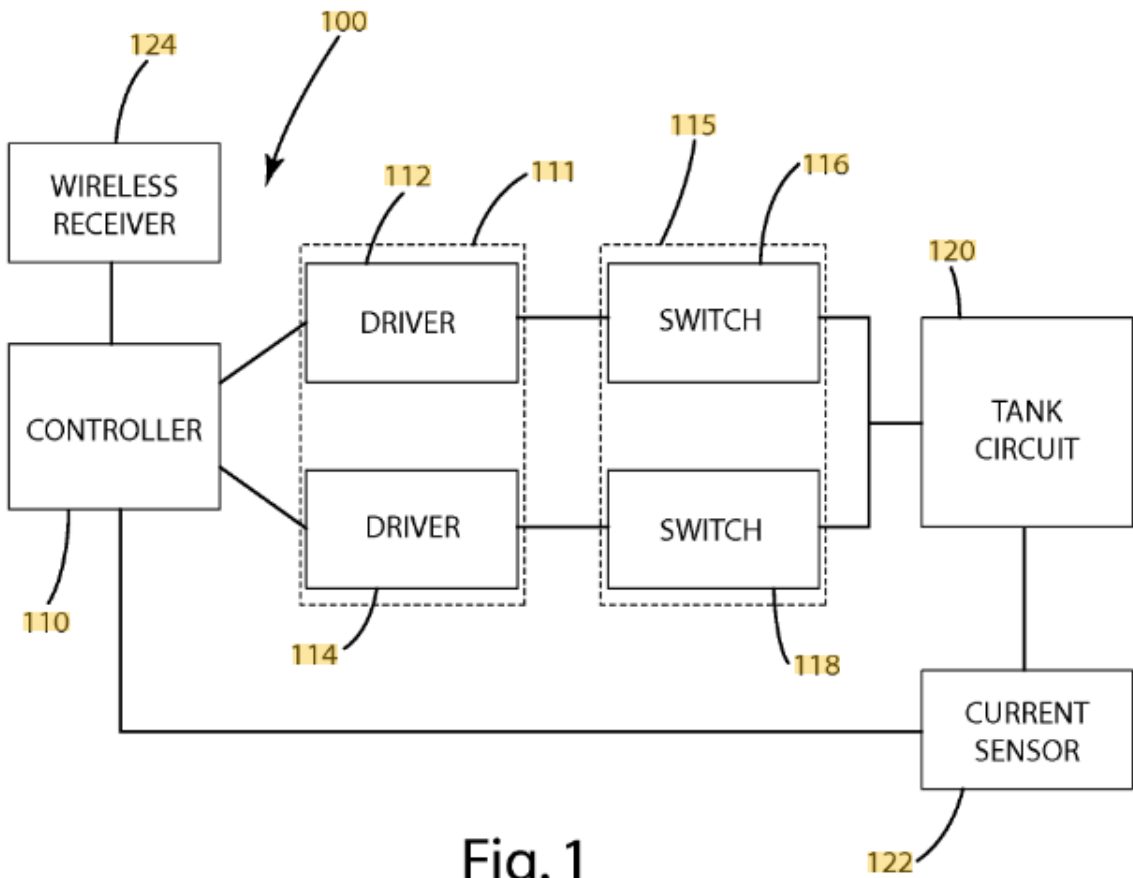


Fig. 1

'263 Baarman at Fig. 1.

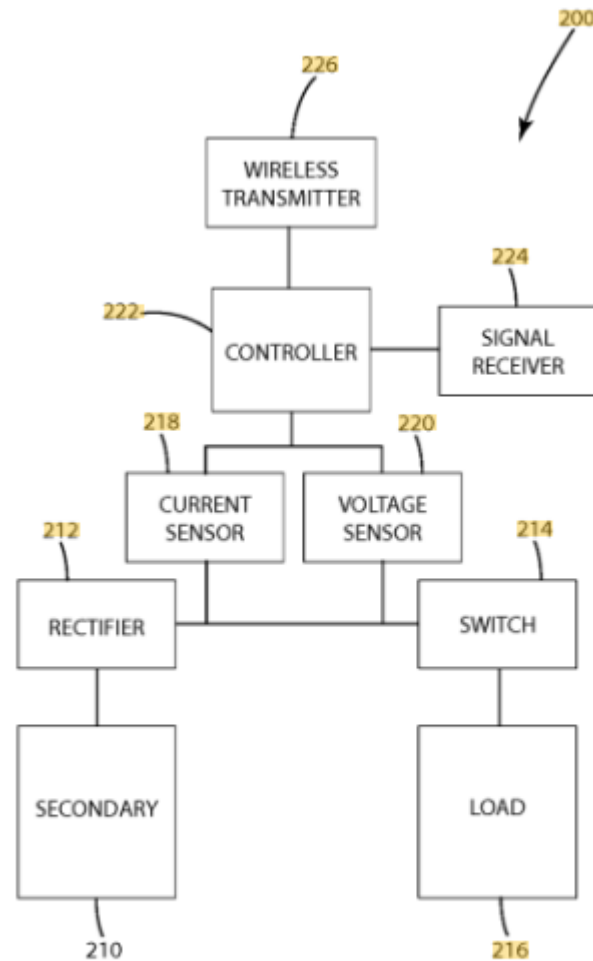
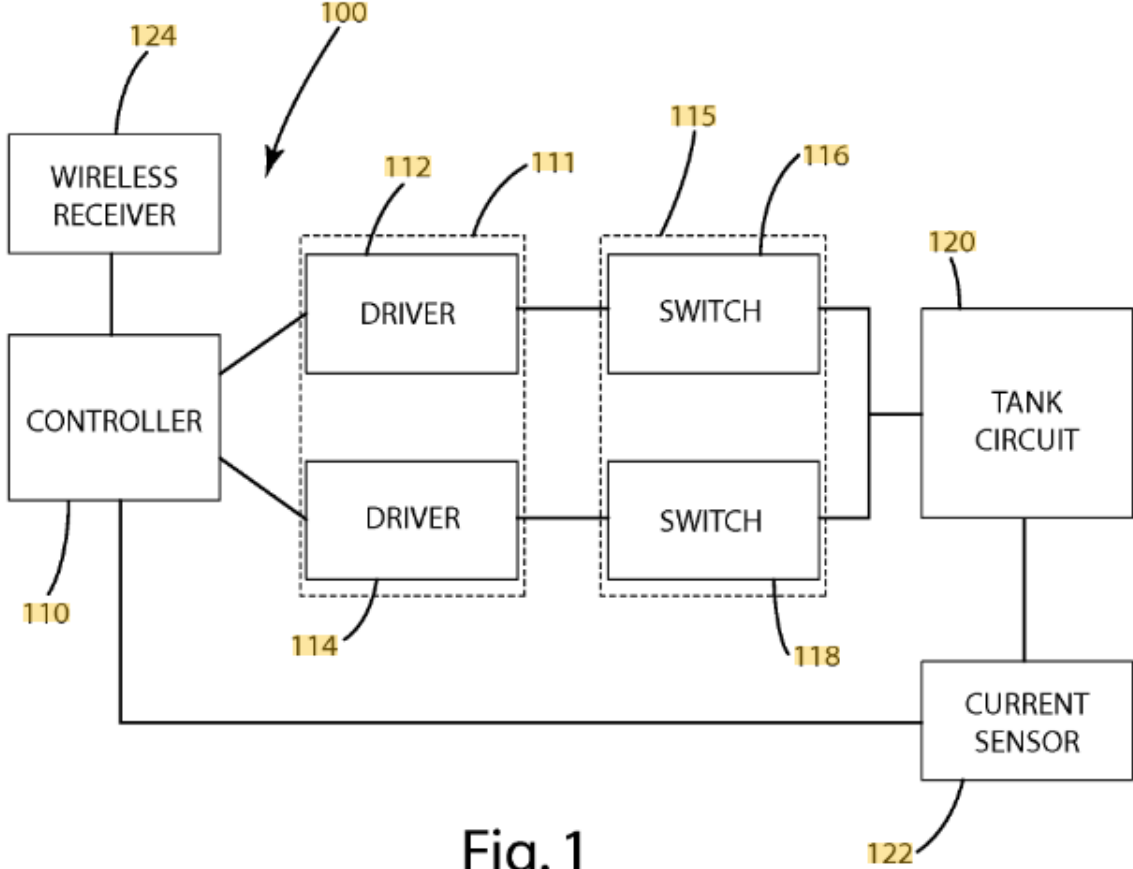


Fig. 2

'263 Baarman at Fig. 2.

"The present invention is suitable for use with a wide variety of inductive power supplies. As used herein, the term "inductive power supply" is intended to broadly include any inductive power

		supply capable of providing power wirelessly. The present invention is also suitable for use with “adaptive inductive power supplies.” ’263 Baarman at [0021]. To the extent ’263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions.
[1.a]	at least one inductive power outlet comprising at least one primary inductive coil wired to a power supply via a driver;	’263 Baarman discloses at least one inductive power outlet comprising at least one primary inductive coil wired to a power supply via a driver. For example: “An inductive power supply that maintains resonance and adjusts duty cycle based on feedback from a secondary circuit. A controller, driver circuit and switching circuit cooperate to generate an AC signal at a selected operating frequency and duty cycle. The AC signal is applied to the tank circuit to create an inductive field for powering the secondary. The secondary communicates feedback about the received power back to the primary controller. The power transfer efficiency may be optimized by maintaining the operating frequency substantially at resonance, and the amount of power transferred may be controlled by adjusting the duty cycle.” ’263 Baarman at Abstract. “An inductive power supply or primary circuit in accordance with an embodiment of the present invention is shown in FIG. 1, and generally designated 100. The primary circuit 100 includes a primary controller 110, a driver circuit 111 including a pair of drivers 112, 114, a switching circuit 115 including a pair of switches 116, 118, a tank circuit 120 a primary sensor 122 and an optional wireless receiver 124. The primary controller 110, driver circuit 111 and the switching circuit 115 together generate an AC signal at a selected frequency and selected duty cycle that is applied to the tank circuit 120 to create an inductive field for transferring power wirelessly to a secondary circuit.” ’263 Baarman at [0019].



'263 Baarman at Fig. 1.

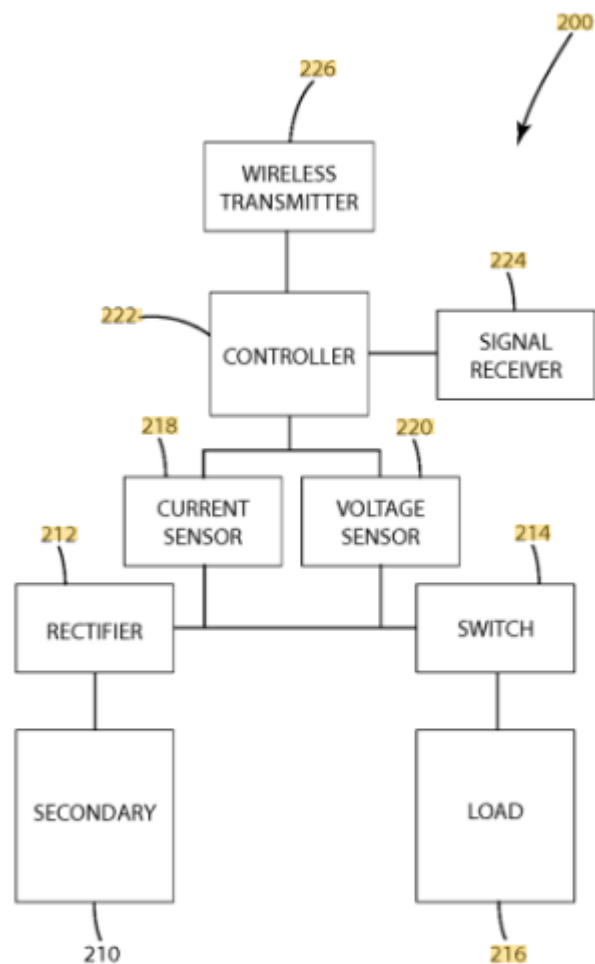


Fig. 2

'263 Baarman at Fig. 2.

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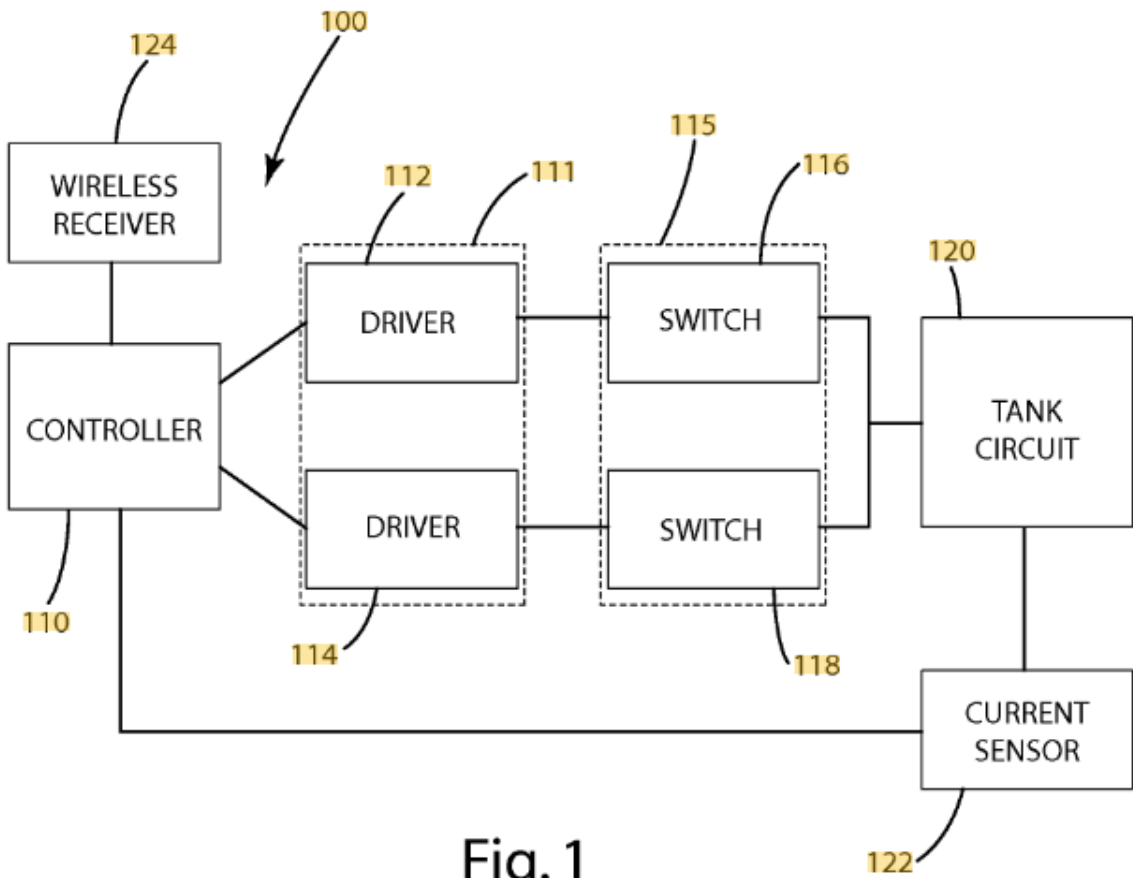


Fig. 1

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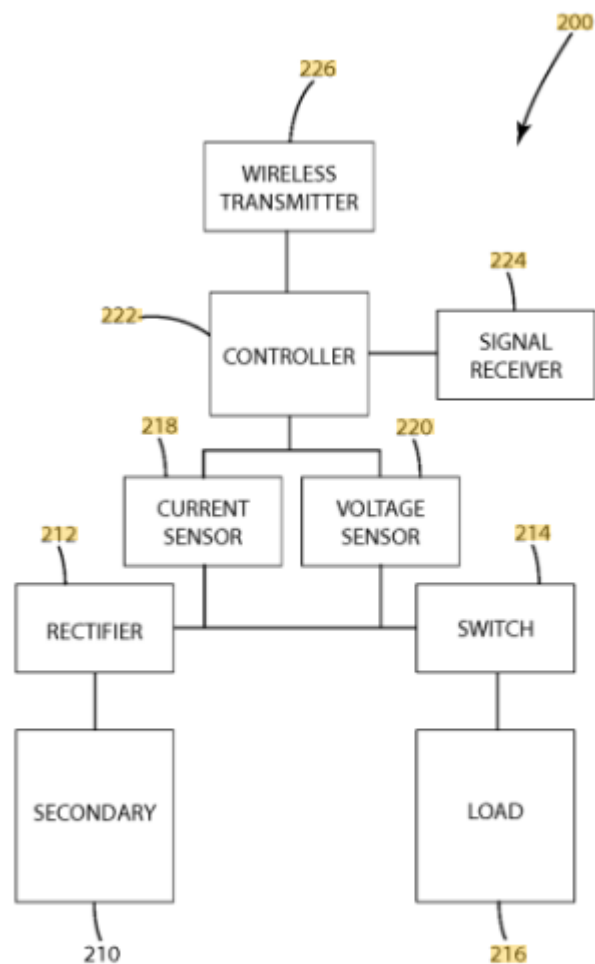


Fig. 2

'263 Baarman at Fig. 2.

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[1.b]	said primary inductive coil for forming an inductive couple having a characteristic resonant frequency with at least one secondary inductive coil wired to an electric load,	’263 Baarman discloses a primary inductive coil for forming an inductive couple having a characteristic resonant frequency with at least one secondary inductive coil wired to an electric load. For example: “The present invention provides an inductive power supply that maintains resonance and adjusts duty cycle based on feedback from a secondary circuit.” ’263 Baarman at [0006]. “In one embodiment, a process for inductively powering a load by maintaining substantial resonance and adjusting duty cycle is provided. Initially an operating frequency and duty cycle are set to an acceptable value. The initial operating frequency is determined by sweeping a range of frequencies and selecting the operating frequency which provided the highest power transfer efficiency. The initial duty cycle is set to a relatively low value, such as 20%, to ensure that too much power is not delivered to the secondary. Once the initial values have been set, the inductive power supply enters a continuous process of adjusting the operating frequency to maintain substantial resonance and adjusting the duty cycle depending on whether the amount of power is too high or too low or temperature is too high.” ’263 Baarman at [0008]. “An inductive power supply or primary circuit in accordance with an embodiment of the present invention is shown in FIG. 1, and generally designated 100. The primary circuit 100 includes a primary controller 110, a driver circuit 111 including a pair of drivers 112, 114, a switching circuit 115 including a pair of switches 116, 118, a tank circuit 120 a primary sensor 122 and an optional wireless receiver 124. The primary controller 110, driver circuit 111 and the switching circuit 115 together generate an AC signal at a selected frequency and selected duty cycle that is applied to the tank circuit 120 to create an inductive field for transferring power wirelessly to a secondary circuit.” ’263 Baarman at [0019].

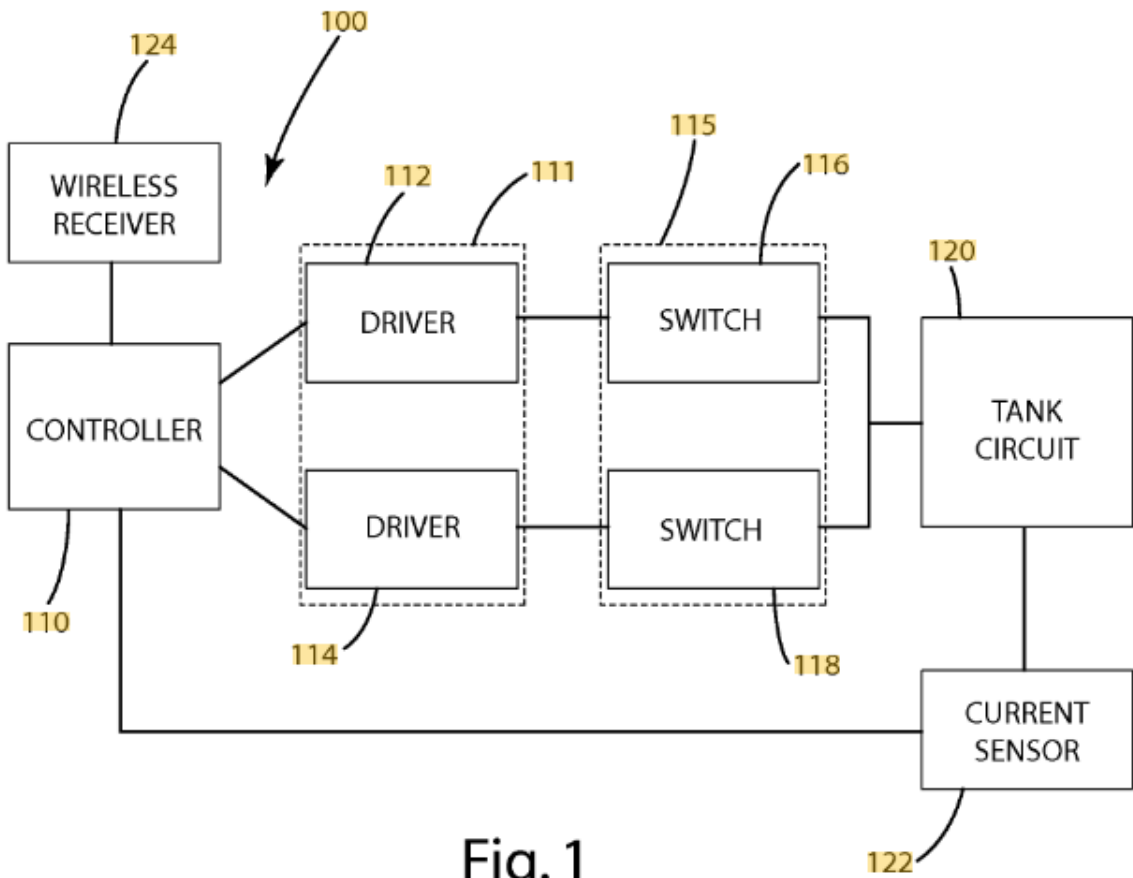


Fig. 1

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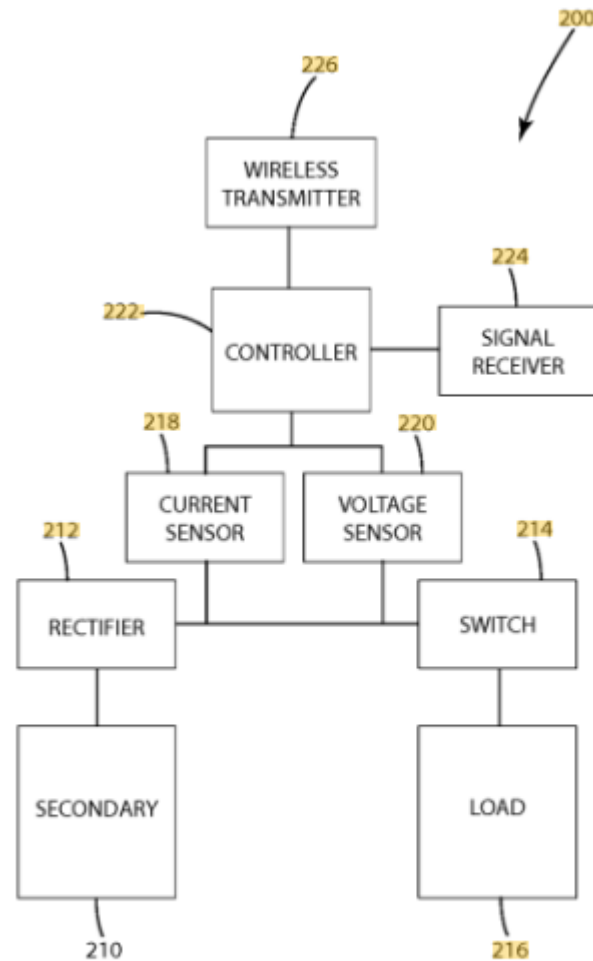


Fig. 2

'263 Baarman at Fig. 2.

"In operation, an embodiment of the process for adjusting the duty cycle is shown in FIG. 5, the initial operating frequency is set substantially at resonant frequency 504 and the initial duty cycle

		is set at a relatively low value 506 . The primary controller continuously adjusts the operating frequency 508 to maintain substantially resonant frequency and continuously determines if the amount of power being transferred is too high 510 . If too much power is being provided or temperatures are above a preset threshold then the duty cycle is decreased 514 . If too little power is being provided then the duty cycle is increased 512 . Various conditions may temporarily or permanently reduce or halt the power transfer.” ’263 Baarman at [0020].
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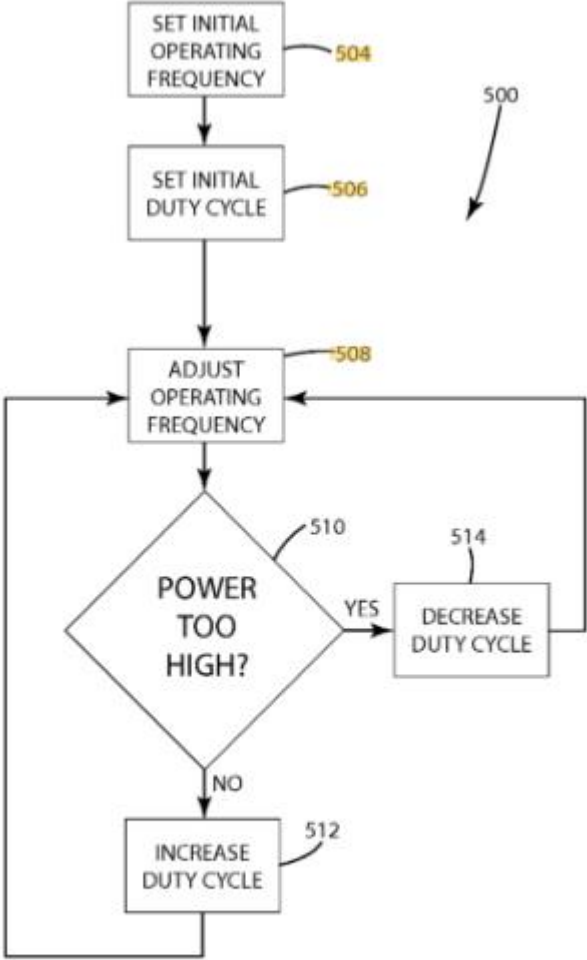
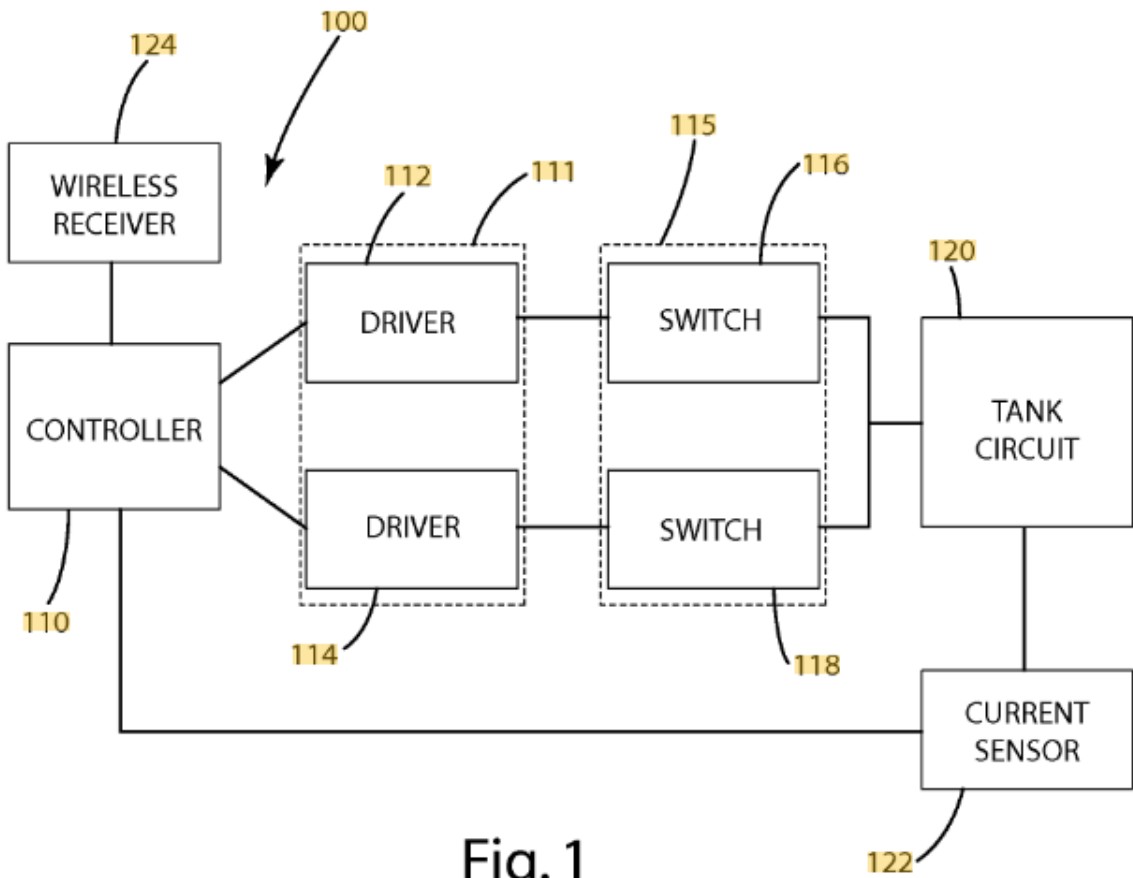


Fig.5

'263 Baarman at Fig. 5.

		“In this embodiment, the primary circuit determines and sets the initial operating frequency 504. Typically, the goal of setting the initial operating frequency is to set it as close to the resonant frequency as possible, which varies depending on many different factors including, among other things, the orientation and distance between the primary circuit and secondary circuit. In the current embodiment, a simple frequency sweep is used to determine where to set the initial operation frequency. Specifically, in this embodiment, the range of valid frequencies is swept and the power transfer efficiency at each frequency is noted. The step between frequencies may vary, but in the current embodiment, the frequency is swept between 70 k Hz and 250 k Hz at steps of 100 Hz. Once the entire range of frequencies has been swept, the operating frequency that yielded the highest power transfer efficiency is selected as the initial operating frequency. The operating frequency that yielded the highest power transfer efficiency indicates that it is the closest frequency to resonance” ’263 Baarman at [0041]. To the extent ’263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions.
[1.c]	said secondary inductive coil associated with an inductive power receiver	’263 Baarman discloses a secondary inductive coil associated with an inductive power receiver. For example: “The present invention provides an inductive power supply that maintains resonance and adjusts duty cycle based on feedback from a secondary circuit. ” ’263 Baarman at [0006]. “In one embodiment, a process for inductively powering a load by maintaining substantial resonance and adjusting duty cycle is provided. Initially an operating frequency and duty cycle are set to an acceptable value. The initial operating frequency is determined by sweeping a range of frequencies and selecting the operating frequency which provided the highest power transfer efficiency. The initial duty cycle is set to a relatively low value, such as 20%, to ensure that too much power is not delivered to the secondary. Once the initial values have been set, the inductive power supply enters a continuous process of adjusting the operating frequency to maintain substantial resonance and adjusting the duty cycle depending on whether the amount of power is too high or too low or temperature is too high.” ’263 Baarman at [0008].

		“An inductive power supply or primary circuit in accordance with an embodiment of the present invention is shown in FIG. 1, and generally designated 100. The primary circuit 100 includes a primary controller 110, a driver circuit 111 including a pair of drivers 112, 114, a switching circuit 115 including a pair of switches 116, 118, a tank circuit 120 a primary sensor 122 and an optional wireless receiver 124. The primary controller 110, driver circuit 111 and the switching circuit 115 together generate an AC signal at a selected frequency and selected duty cycle that is applied to the tank circuit 120 to create an inductive field for transferring power wirelessly to a secondary circuit.” ’263 Baarman at [0019].
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'263 Baarman at Fig. 1.

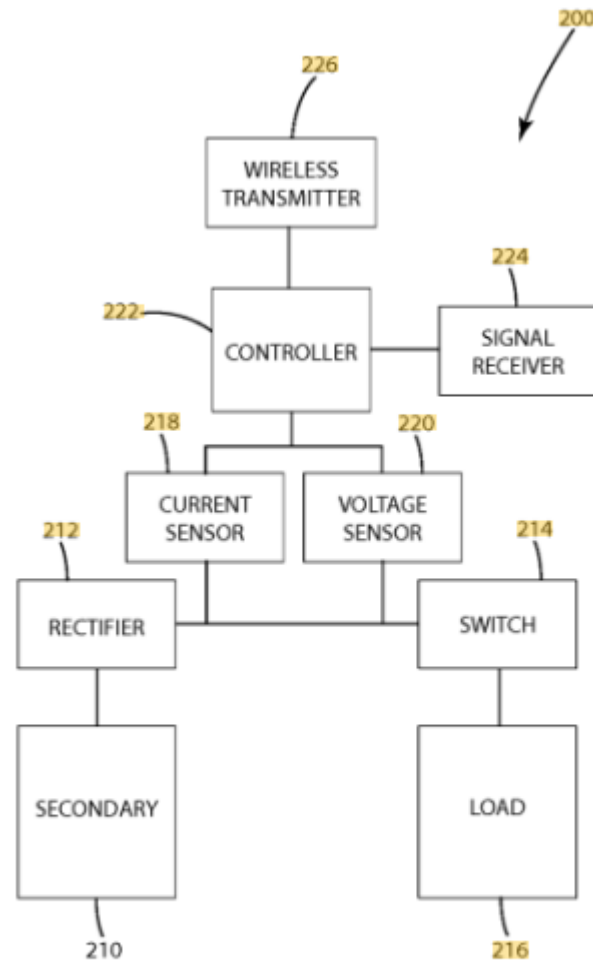


Fig. 2

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“In operation, an embodiment of the process for adjusting the duty cycle is shown in FIG. 5, the initial operating frequency is set substantially at resonant frequency 504 and the initial duty cycle

		is set at a relatively low value 506 . The primary controller continuously adjusts the operating frequency 508 to maintain substantially resonant frequency and continuously determines if the amount of power being transferred is too high 510 . If too much power is being provided or temperatures are above a preset threshold then the duty cycle is decreased 514 . If too little power is being provided then the duty cycle is increased 512 . Various conditions may temporarily or permanently reduce or halt the power transfer.” ’263 Baarman at [0020].
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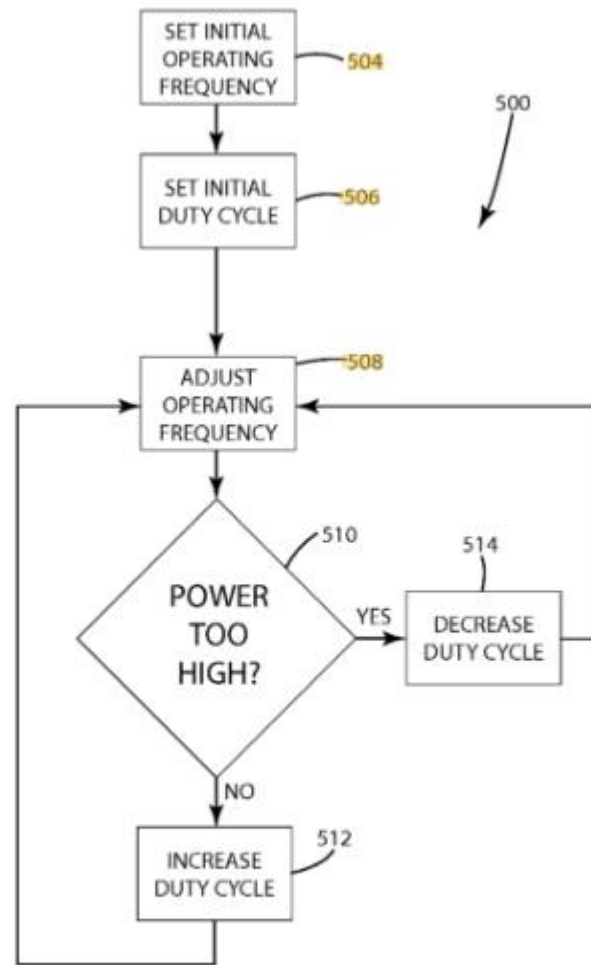


Fig.5

'263 Baarman at Fig. 5.

		“In this embodiment, the primary circuit determines and sets the initial operating frequency 504. Typically, the goal of setting the initial operating frequency is to set it as close to the resonant frequency as possible, which varies depending on many different factors including, among other things, the orientation and distance between the primary circuit and secondary circuit. In the current embodiment, a simple frequency sweep is used to determine where to set the initial operation frequency. Specifically, in this embodiment, the range of valid frequencies is swept and the power transfer efficiency at each frequency is noted. The step between frequencies may vary, but in the current embodiment, the frequency is swept between 70 k Hz and 250 k Hz at steps of 100 Hz. Once the entire range of frequencies has been swept, the operating frequency that yielded the highest power transfer efficiency is selected as the initial operating frequency. The operating frequency that yielded the highest power transfer efficiency indicates that it is the closest frequency to resonance” ’263 Baarman at [0041]. “In one embodiment, a process for inductively powering a load by maintaining substantial resonance and adjusting duty cycle is provided. Initially an operating frequency and duty cycle are set to an acceptable value. The initial operating frequency is determined by sweeping a range of frequencies and selecting the operating frequency which provided the highest power transfer efficiency. The initial duty cycle is set to a relatively low value, such as 20%, to ensure that too much power is not delivered to the secondary. Once the initial values have been set, the inductive power supply enters a continuous process of adjusting the operating frequency to maintain substantial resonance and adjusting the duty cycle depending on whether the amount of power is too high or too low or temperature is too high.” ’263 Baarman at [0008]. “In operation, an embodiment of the process for adjusting the duty cycle is shown in FIG. 5, the initial operating frequency is set substantially at resonant frequency 504 and the initial duty cycle is set at a relatively low value 506. The primary controller continuously adjusts the operating frequency 508 to maintain substantially resonant frequency and continuously determines if the amount of power being transferred is too high 510. If too much power is being provided or temperatures are above a preset threshold then the duty cycle is decreased 514. If too little power is being provided then the duty cycle is increased 512. Various conditions may temporarily or permanently reduce or halt the power transfer.” ’263 Baarman at [0020].
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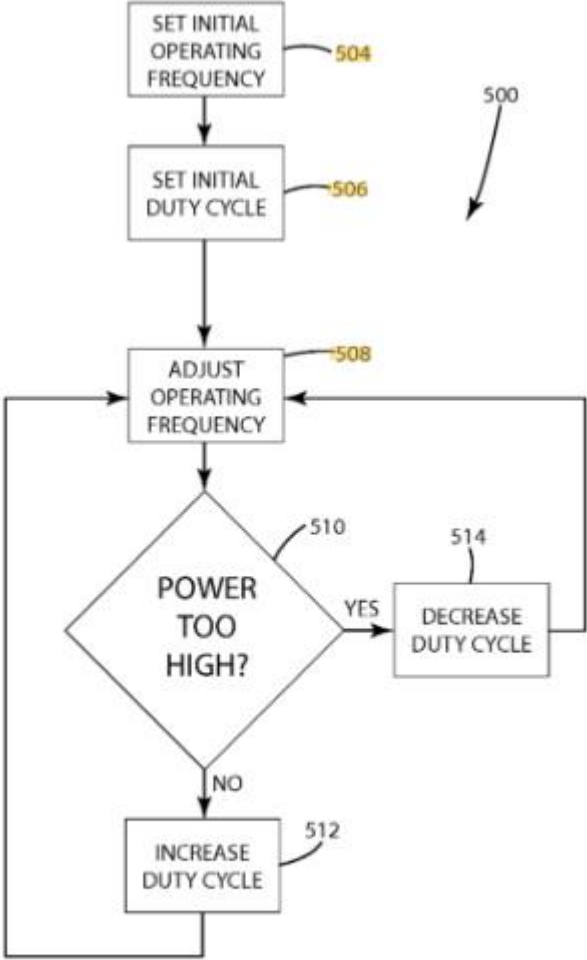


Fig.5

'263 Baarman at Fig. 5.

	“A secondary circuit in accordance with an embodiment of the present invention is shown in FIG. 2, and generally designated 200. The secondary circuit 200 may include a secondary 210, a rectifier 212, a switch 214, a load 216, a current sensor 218 or voltage sensor 220, a secondary controller 222, a signal resistor 224 for communicating using reflected impedance and an optional wireless transmitter 226.” ’263 Baarman at [0019]. “The switching circuit 318 includes two switches. In the current embodiment, the switches are implemented as MOS field effect transistors. In alternative embodiments, other circuit components may be used to implement the switching circuit. Additionally, depending on power requirements MOSFETs with different characteristics may be implemented during manufacture. In some embodiments, multiple sets of switches may be provided on the circuit board, allowing one set of switches to be soldered at the time of manufacture based on the particular power requirements of that application.” ’263 Baarman at [0026]. “In one embodiment, the switching circuit 115 includes two separate switches 116, 118 that are switched on at the same frequency, but out of phase with each other. FIG. 8 illustrates the timing for one embodiment of such a switching circuit. In FIG. 8, both switches have the same duty cycle, but are shifted in time from each other by half of the period of the switching waveform. In alternative embodiments, each switch may have a different duty cycle and they the switches may be shifted in time a different amount from each other. That is, half period separation and similar duty cycle are desirable, but unnecessary, for the switches because it may result in increased power transfer efficiency from the inductive power supply to the remote device.” ’263 Baarman at [0027]. “In this embodiment, the primary circuit determines and sets the initial operating frequency 504. Typically, the goal of setting the initial operating frequency is to set it as close to the resonant frequency as possible, which varies depending on many different factors including, among other things, the orientation and distance between the primary circuit and secondary circuit. In the current embodiment, a simple frequency sweep is used to determine where to set the initial operation frequency. Specifically, in this embodiment, the range of valid frequencies is swept and the power transfer efficiency at each frequency is noted. The step between frequencies may vary, but in the current embodiment, the frequency is swept between 70 k Hz and 250 k Hz at steps of 100 Hz. Once the entire range of frequencies has been swept, the operating frequency that yielded the highest power transfer efficiency is selected as the initial operating frequency. The operating frequency that yielded the highest power transfer efficiency indicates that it is the closest frequency to resonance” ’263 Baarman at [0041].
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		To the extent '263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions.
[1.d]	wherein said driver is configured to provide a driving voltage across said primary inductive coil,	'263 Baarman discloses the driver being configured to provide a driving voltage across said primary inductive coil. For example: “In one embodiment, a process for inductively powering a load by maintaining substantial resonance and adjusting duty cycle is provided. Initially an operating frequency and duty cycle are set to an acceptable value. The initial operating frequency is determined by sweeping a range of frequencies and selecting the operating frequency which provided the highest power transfer efficiency. The initial duty cycle is set to a relatively low value, such as 20%, to ensure that too much power is not delivered to the secondary. Once the initial values have been set, the inductive power supply enters a continuous process of adjusting the operating frequency to maintain substantial resonance and adjusting the duty cycle depending on whether the amount of power is too high or too low or temperature is too high.” '263 Baarman at [0008]. “In operation, an embodiment of the process for adjusting the duty cycle is shown in FIG. 5, the initial operating frequency is set substantially at resonant frequency 504 and the initial duty cycle is set at a relatively low value 506. The primary controller continuously adjusts the operating frequency 508 to maintain substantially resonant frequency and continuously determines if the amount of power being transferred is too high 510. If too much power is being provided or temperatures are above a preset threshold then the duty cycle is decreased 514. If too little power is being provided then the duty cycle is increased 512. Various conditions may temporarily or permanently reduce or halt the power transfer.” '263 Baarman at [0020].

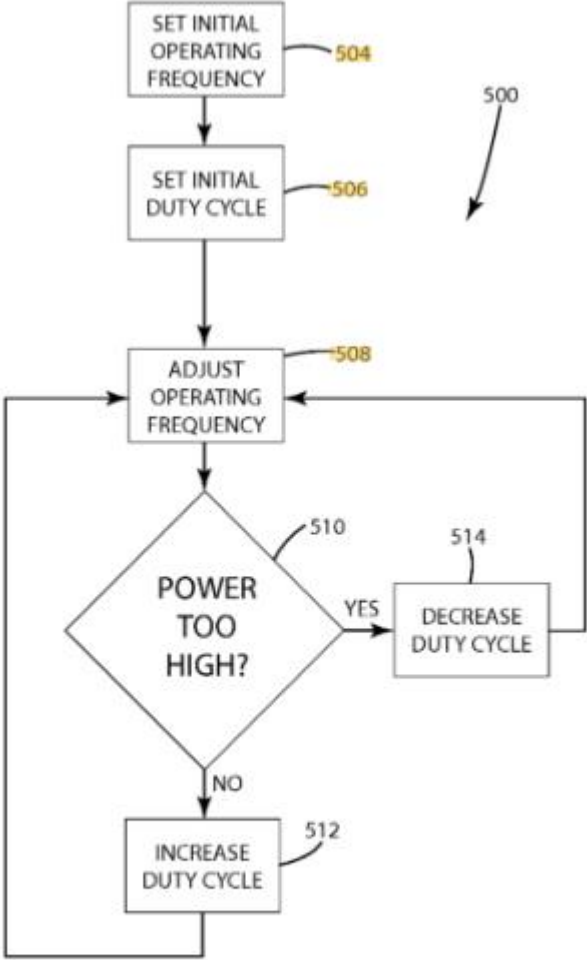
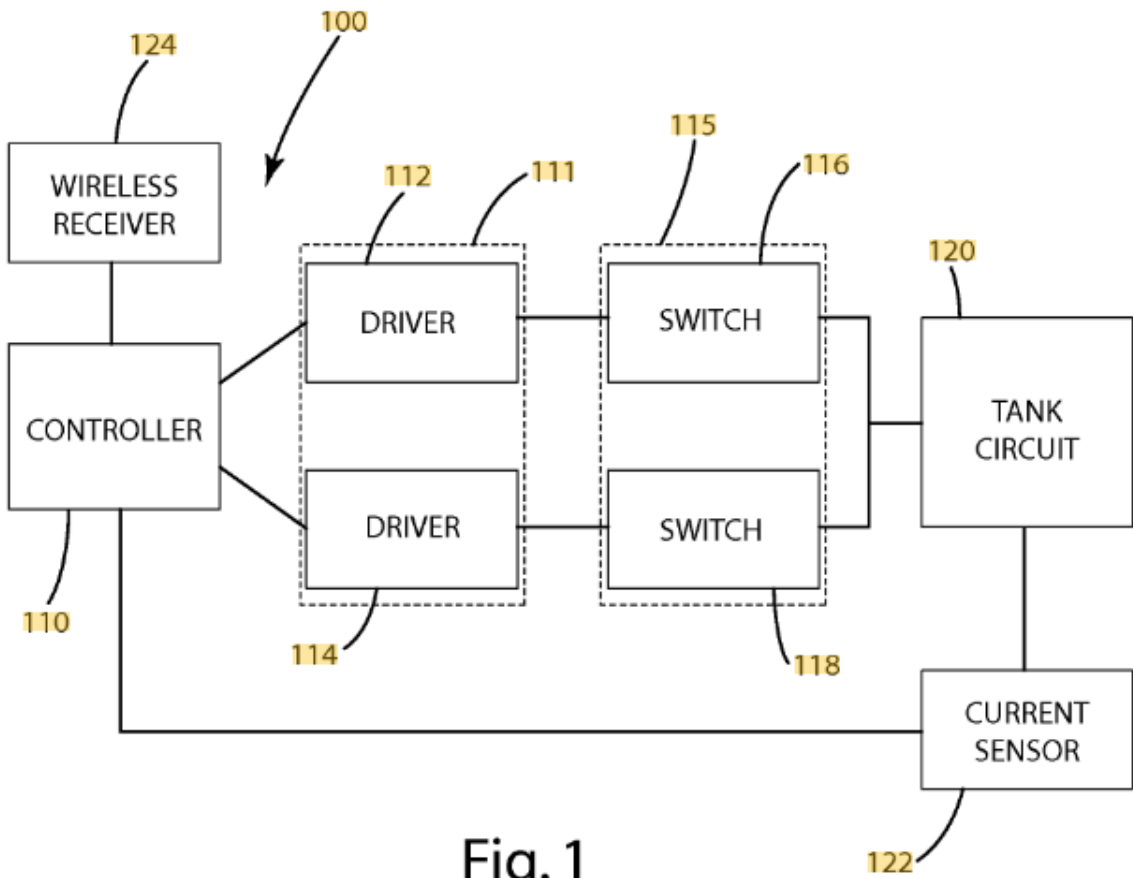


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		“In one embodiment, the inductive power supply includes a primary controller, a driver circuit, a switching circuit, and a tank circuit. The controller, driver circuit and switching circuit cooperate to generate an AC signal at a selected operating frequency and duty cycle. The AC signal is applied to the tank circuit to create an inductive field for powering the secondary. The secondary communicates feedback about the received power back to the primary controller. The power transfer efficiency may be optimized by maintaining the operating frequency substantially at resonance, and the amount of power transferred may be controlled by adjusting the duty cycle.” ’263 Baarman at [0006]. “In one embodiment, the secondary circuit includes a secondary, a rectifier, a switch, a load, a sensor, a secondary controller, and a communication means. A voltage and/or current sensor detects characteristics about the power which are transmitted back to the primary controller using the communication means. Optionally, over-voltage and over-current protection may be provided. If a fault condition is detected the load is disconnected using the switch.” ’263 Baarman at [0007]. “In one embodiment, a process for inductively powering a load by maintaining substantial resonance and adjusting duty cycle is provided. Initially an operating frequency and duty cycle are set to an acceptable value. The initial operating frequency is determined by sweeping a range of frequencies and selecting the operating frequency which provided the highest power transfer efficiency. The initial duty cycle is set to a relatively low value, such as 20%, to ensure that too much power is not delivered to the secondary. Once the initial values have been set, the inductive power supply enters a continuous process of adjusting the operating frequency to maintain substantial resonance and adjusting the duty cycle depending on whether the amount of power is too high or too low or temperature is too high.” ’263 Baarman at [0008]. “An inductive power supply or primary circuit in accordance with an embodiment of the present invention is shown in FIG. 1, and generally designated 100. The primary circuit 100 includes a primary controller 110, a driver circuit 111 including a pair of drivers 112, 114, a switching circuit 115 including a pair of switches 116, 118, a tank circuit 120 a primary sensor 122 and an optional wireless receiver 124. The primary controller 110, driver circuit 111 and the switching circuit 115 together generate an AC signal at a selected frequency and selected duty cycle that is applied to the tank circuit 120 to create an inductive field for transferring power wirelessly to a secondary circuit.” ’263 Baarman at [0019].
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'263 Baarman at Fig. 1.

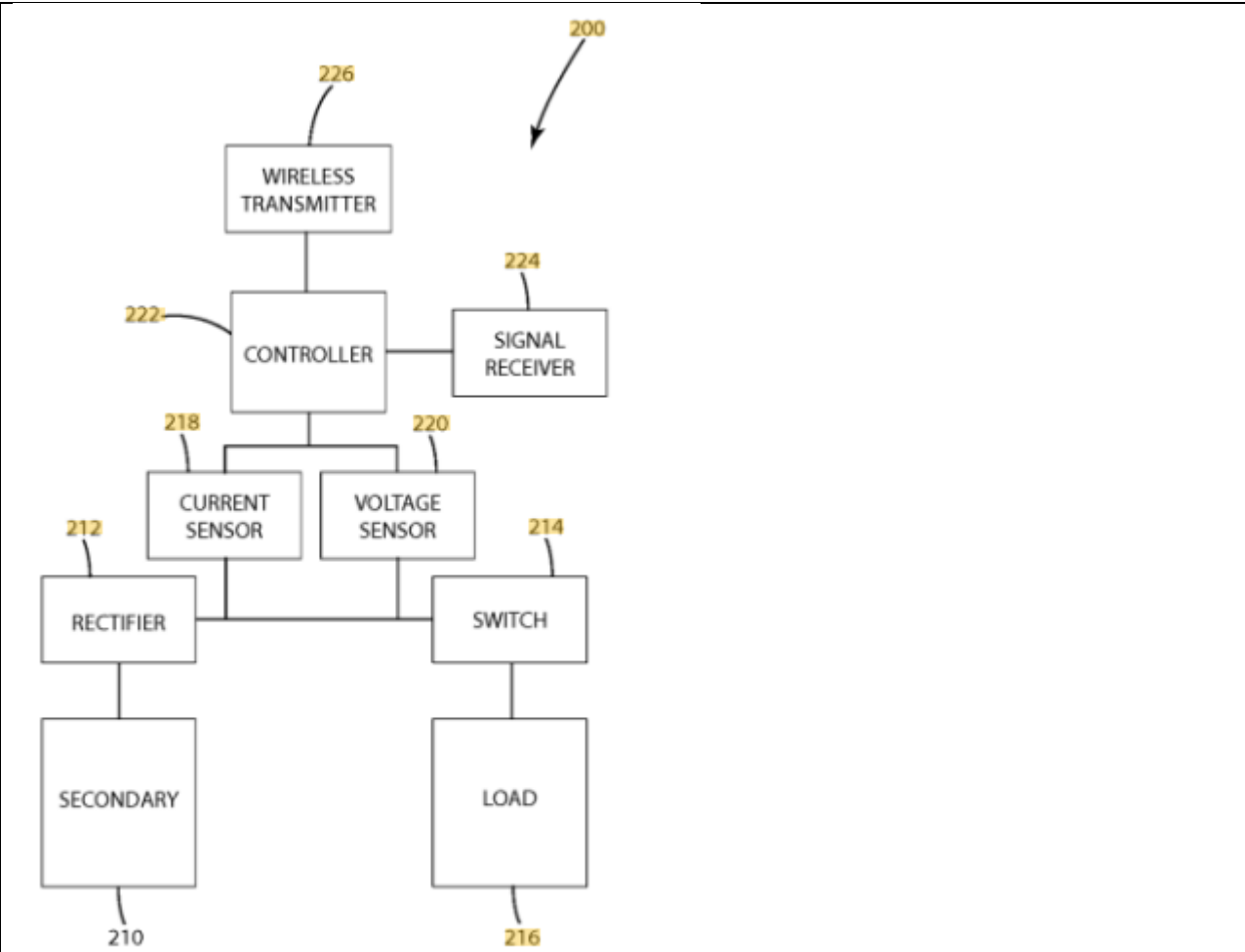


Fig. 2

'263 Baarman at Fig. 2.
“In the illustrated embodiment, the adaptive inductive power supply 300 generally includes a primary controller 310, a low voltage power supply 312, memory 314, a driver circuit 316, a

		switching circuit 318 a tank circuit 320, a current sensor 322, a filter 324 and optionally a wireless receiver 326. In operation, the primary controller 310, driver circuit 316 and switching circuit 318 apply power to the tank circuit 320 to generate a source of electromagnetic inductive power at a selected frequency and a selected duty cycle.” ’263 Baarman at [0022]. “In one embodiment, the switching circuit 115 includes two separate switches 116, 118 that are switched on at the same frequency, but out of phase with each other. FIG. 8 illustrates the timing for one embodiment of such a switching circuit. In FIG. 8, both switches have the same duty cycle, but are shifted in time from each other by half of the period of the switching waveform. In alternative embodiments, each switch may have a different duty cycle and they the switches may be shifted in time a different amount from each other. That is, half period separation and similar duty cycle are desirable, but unnecessary, for the switches because it may result in increased power transfer efficiency from the inductive power supply to the remote device.” ’263 Baarman at [0027]. “By sensing the voltage and/or current in the secondary circuit and knowing the voltage and/or current provided by the primary circuit, the primary controller can calculate the power transfer efficiency. By sweeping a range of operating frequencies, noting the power transfer efficiency at each frequency, the operating frequency closest to resonance can be determined—it corresponds with the operating frequency that yields the best power transfer efficiency. In addition, the voltage and current sensors 418, 422 can be used in conjunction with a protection algorithm in the secondary controller 428 to disconnect the load 424 if a fault condition is detected.” ’263 Baarman at [0035]. “The current sensor 418 detects the amount of current in the received power and provides that information to the secondary controller 428. The voltage sensor 422 detects the amount of voltage in the received power and provides that information to the secondary controller 428.” ’263 Baarman at [0035]. “Use of a wireless transmitter or transceiver was previously described in U.S. Patent Application Publication US 2004/130915A1 to Baarman, which is entitled “Adapted Inductive Power Supply with Communication” that was previously incorporated by reference. Specifically, the use of WIFI, infrared, blue tooth, cellular or RFID were previously discussed as ways to wirelessly transmit data from a remote device to an inductive power supply. Further, communication using the induction coils and a power line communication protocol was discussed. Any of these methods
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		of transmitting data could be implemented in the present invention in order to transfer the desired data from the secondary to the primary.” ’263 Baarman at [0039]. “In the current embodiment, the operating frequency is adjusted with each iteration, however, in alternative embodiments, the operating frequency may be adjusted less frequently or only when an event triggers that it should be adjusted. For example, if a motion detector on the secondary indicates movement or a change in orientation of the secondary. Or, for example, if there is a sharp decrease or increase in the amount of power provided to the secondary.” ’263 Baarman at [0045]. “This process continues as desired or until the power supply is turned off, the secondary is removed, or in the case of charging a battery, when the battery is fully charged.” ’263 Baarman at [0049]. To the extent ’263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions.
[1.e]	said driving voltage oscillating at a non-resonant transmission frequency substantially different from said characteristic resonant frequency of said inductive couple,	’263 Baarman discloses driving voltage oscillating at a non-resonant transmission frequency substantially different from said characteristic resonant frequency of said inductive couple. For example: “In one embodiment, a process for inductively powering a load by maintaining substantial resonance and adjusting duty cycle is provided. Initially an operating frequency and duty cycle are set to an acceptable value. The initial operating frequency is determined by sweeping a range of frequencies and selecting the operating frequency which provided the highest power transfer efficiency. The initial duty cycle is set to a relatively low value, such as 20%, to ensure that too much power is not delivered to the secondary. Once the initial values have been set, the inductive power supply enters a continuous process of adjusting the operating frequency to maintain substantial resonance and adjusting the duty cycle depending on whether the amount of power is too high or too low or temperature is too high.” ’263 Baarman at [0008]. “In operation, an embodiment of the process for adjusting the duty cycle is shown in FIG. 5, the initial operating frequency is set substantially at resonant frequency 504 and the initial duty cycle

		is set at a relatively low value 506 . The primary controller continuously adjusts the operating frequency 508 to maintain substantially resonant frequency and continuously determines if the amount of power being transferred is too high 510 . If too much power is being provided or temperatures are above a preset threshold then the duty cycle is decreased 514 . If too little power is being provided then the duty cycle is increased 512 . Various conditions may temporarily or permanently reduce or halt the power transfer.” ’263 Baarman at [0020].
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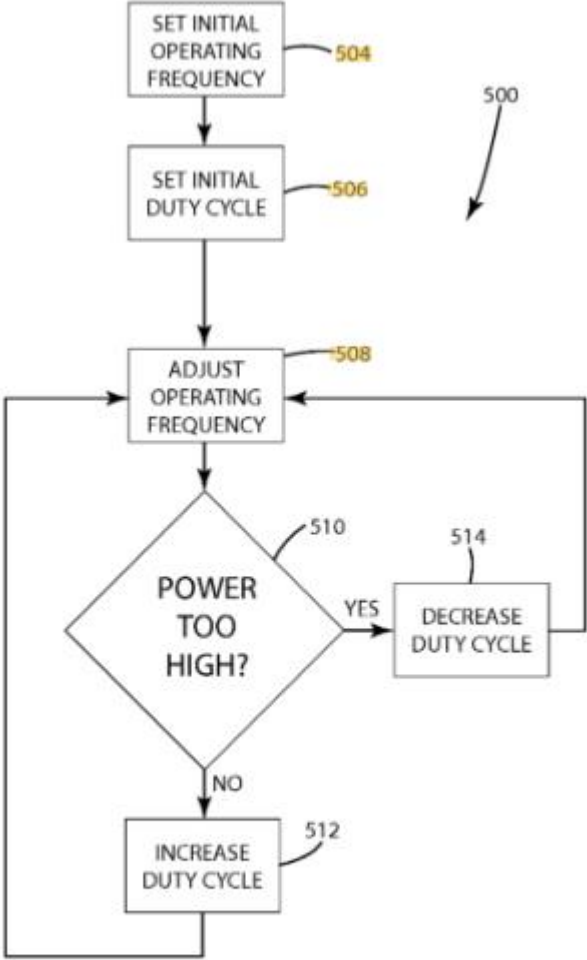
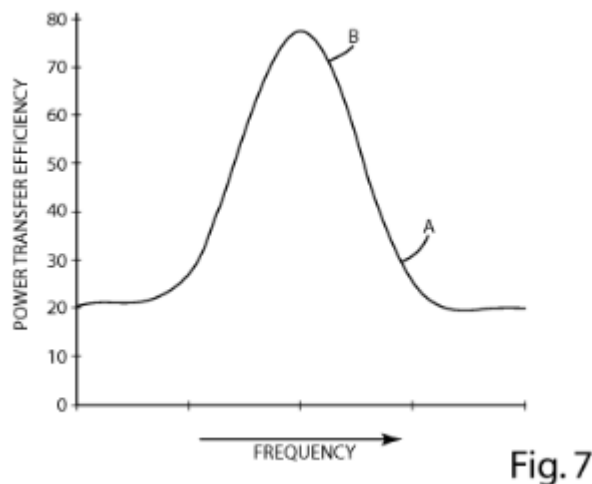


Fig.5

'263 Baarman at Fig. 5.

		“By sensing the voltage and/or current in the secondary circuit and knowing the voltage and/or current provided by the primary circuit, the primary controller can calculate the power transfer efficiency. By sweeping a range of operating frequencies, noting the power transfer efficiency at each frequency, the operating frequency closest to resonance can be determined—it corresponds with the operating frequency that yields the best power transfer efficiency. In addition, the voltage and current sensors 418, 422 can be used in conjunction with a protection algorithm in the secondary controller 428 to disconnect the load 424 if a fault condition is detected.” ’263 Baarman at [0035]. “In this embodiment, the primary circuit determines and sets the initial operating frequency 504. Typically, the goal of setting the initial operating frequency is to set it as close to the resonant frequency as possible, which varies depending on many different factors including, among other things, the orientation and distance between the primary circuit and secondary circuit. In the current embodiment, a simple frequency sweep is used to determine where to set the initial operation frequency. Specifically, in this embodiment, the range of valid frequencies is swept and the power transfer efficiency at each frequency is noted. The step between frequencies may vary, but in the current embodiment, the frequency is swept between 70 k Hz and 250 k Hz at steps of 100 Hz. Once the entire range of frequencies has been swept, the operating frequency that yielded the highest power transfer efficiency is selected as the initial operating frequency. The operating frequency that yielded the highest power transfer efficiency indicates that it is the closest frequency to resonance” ’263 Baarman at [0041]. “The adjust operating frequency step 508 is a multi-step process which ensures that the operating frequency is being maintained substantially at resonance. FIG. 6 describes one embodiment of this process in more detail. In the described embodiment, the operating frequency is increased by a pre-selected amount, referred to as a step up. The adjustment is allowed to propagate through the system and the power efficiency is checked 604. If the power efficiency increased then the system was not substantially at resonance and the operating frequency is stepped up again. This process continues until the power efficiency either decreases or stays the same. Once that occurs, the operating frequency is stepped down 608. The power efficiency is checked 608. If the power efficiency increases then the operating frequency is stepped down again, until the power efficiency stays the same or decreases. The final step is to step up the operating frequency 610 to get back to the operating frequency with the peak power efficiency. This is merely one embodiment of a process to maintain the operating frequency substantially at resonance. Any other process could be used to maintain the operating frequency substantially at resonance.” ’263 Baarman at [0043].
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“One reason that the operating frequency is stepped up and stepped down can be explained by looking at an exemplary graph of operating frequency vs. power efficiency, shown in FIG. 7. As can be seen, there are several peaks of power efficiency over the range of operating frequencies shown. The initial sweep of frequencies sets the operating frequency to the resonant frequency, i.e. the highest peak on FIG. 7. Each time the adjustment comes, although the operating frequency has not changed, the power efficiency values may have changed as a result in any number of factors, most notably movement of the secondary. Typically, the change in the graph is merely a slight shift, meaning that the optimum operating frequency may be a few steps in either direction. This is why the current embodiment steps up and steps down. If the first step up leads to a decrease in power efficiency transfer, the process immediately steps down until. If stepping down also leads to a decrease in power efficiency transfer then it is evident that no adjustment is necessary and the operating frequency was already at resonant frequency. In an alternative embodiment an analog circuit could be used to directly determine how far off resonance the system is, causing the controller to react directly to the proper frequency. A phase comparator is one such circuit.” ’263 Baarman at [0044].



’263 Baarman at Fig. 7.

To the extent ’263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of

		the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions.
[1.f]	wherein said inductive power outlet further comprises a signal detector adapted to detect a first signal and a second signal, and said driver is configured to:	'263 Baarman discloses the inductive power outlet further comprising a signal detector adapted to detect a first signal and a second signal. For example: “In one embodiment, the inductive power supply includes a primary controller, a driver circuit, a switching circuit, and a tank circuit. The controller, driver circuit and switching circuit cooperate to generate an AC signal at a selected operating frequency and duty cycle. The AC signal is applied to the tank circuit to create an inductive field for powering the secondary. The secondary communicates feedback about the received power back to the primary controller. The power transfer efficiency may be optimized by maintaining the operating frequency substantially at resonance, and the amount of power transferred may be controlled by adjusting the duty cycle.” '263 Baarman at [0006]. “In one embodiment, the secondary circuit includes a secondary, a rectifier, a switch, a load, a sensor, a secondary controller, and a communication means. A voltage and/or current sensor detects characteristics about the power which are transmitted back to the primary controller using the communication means. Optionally, over-voltage and over-current protection may be provided. If a fault condition is detected the load is disconnected using the switch.” '263 Baarman at [0007]. “In one embodiment, a process for inductively powering a load by maintaining substantial resonance and adjusting duty cycle is provided. Initially an operating frequency and duty cycle are set to an acceptable value. The initial operating frequency is determined by sweeping a range of frequencies and selecting the operating frequency which provided the highest power transfer efficiency. The initial duty cycle is set to a relatively low value, such as 20%, to ensure that too much power is not delivered to the secondary. Once the initial values have been set, the inductive power supply enters a continuous process of adjusting the operating frequency to maintain substantial resonance and adjusting the duty cycle depending on whether the amount of power is too high or too low or temperature is too high.” '263 Baarman at [0008]. “An inductive power supply or primary circuit in accordance with an embodiment of the present invention is shown in FIG. 1, and generally designated 100. The primary circuit 100 includes a primary controller 110, a driver circuit 111 including a pair of drivers 112, 114, a switching circuit 115 including a pair of switches 116, 118, a tank circuit 120 a primary sensor 122 and an optional wireless receiver 124. The primary controller 110, driver circuit 111 and the switching

circuit **115** together generate an AC signal at a selected frequency and selected duty cycle that is applied to the tank circuit **120** to create an inductive field for transferring power wirelessly to a secondary circuit.” ’263 Baarman at [0019].

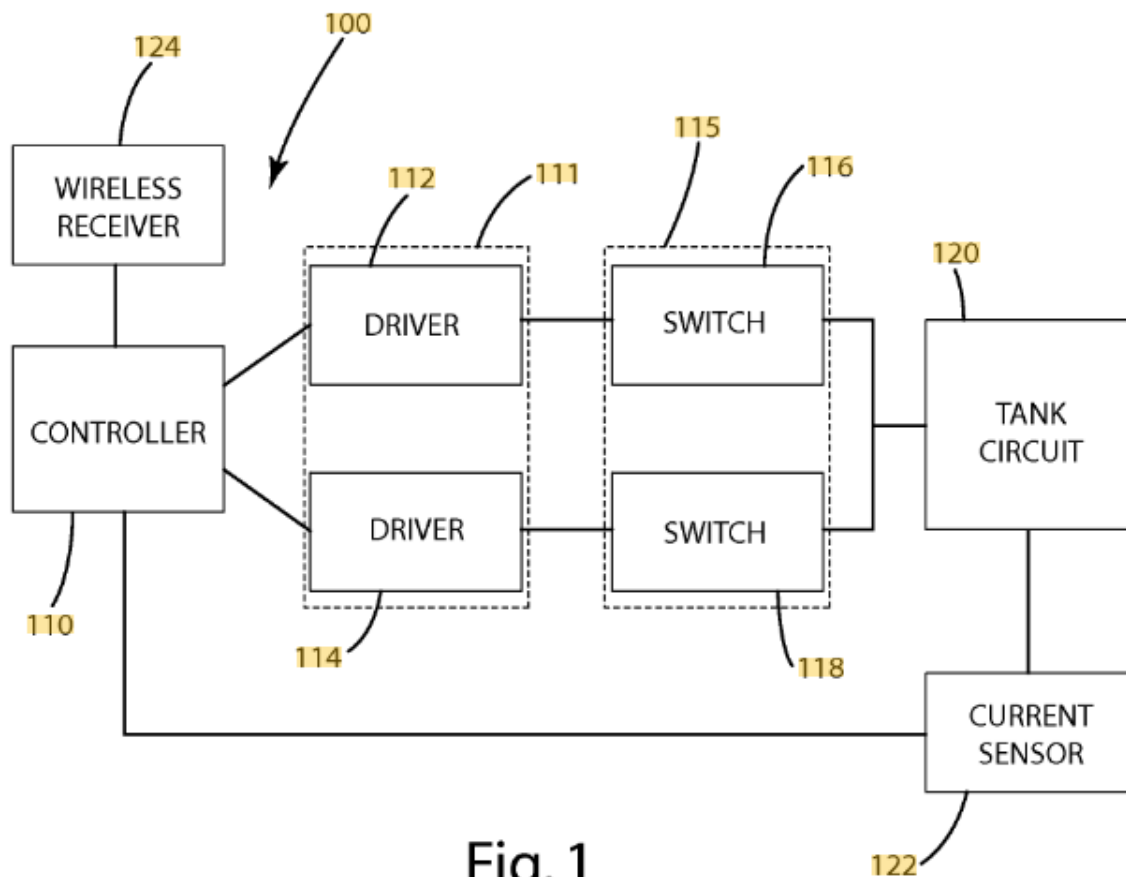


Fig. 1

’263 Baarman at Fig. 1.

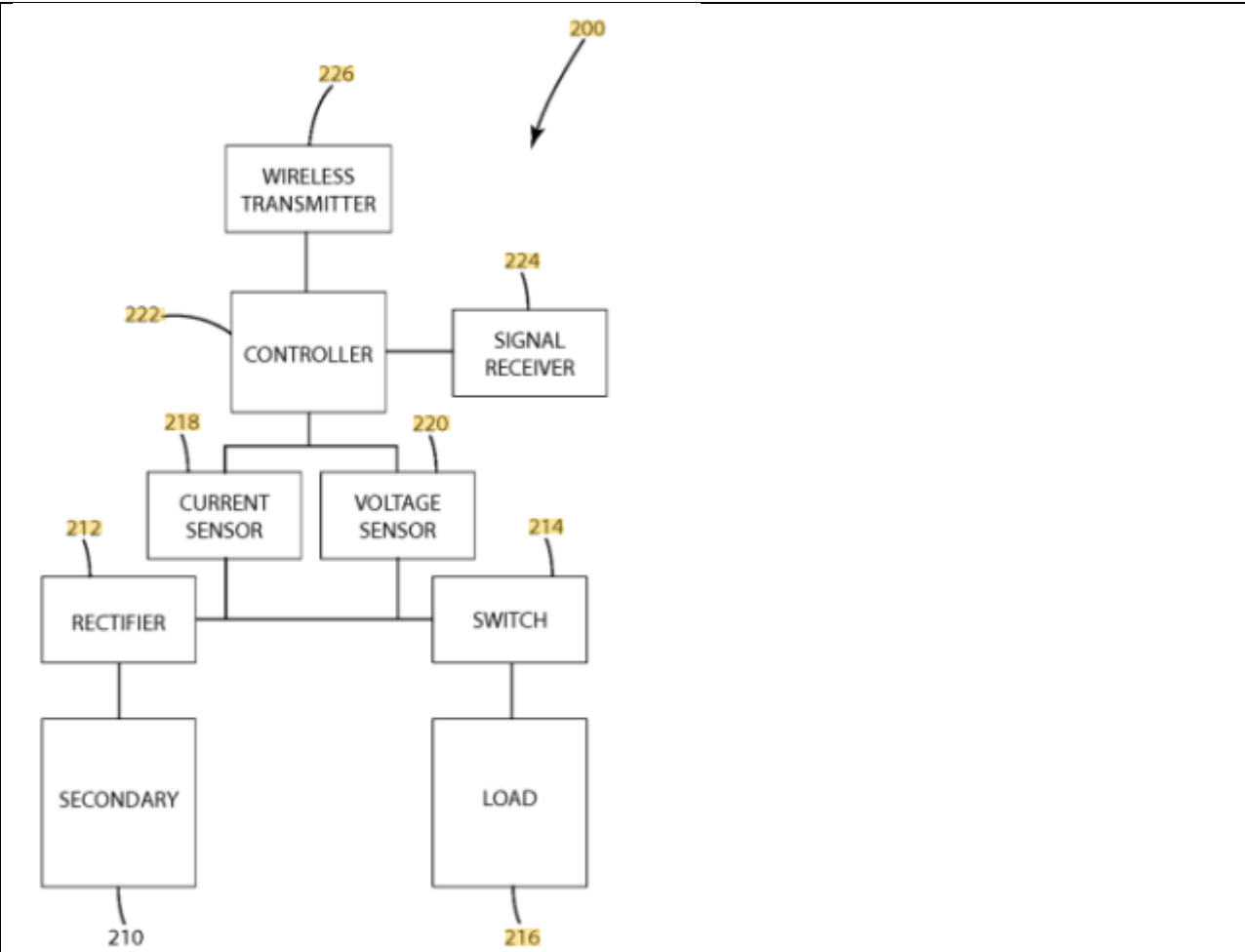


Fig. 2

'263 Baarman at Fig. 2.
“In the illustrated embodiment, the adaptive inductive power supply 300 generally includes a primary controller 310, a low voltage power supply 312, memory 314, a driver circuit 316, a

		switching circuit 318 a tank circuit 320, a current sensor 322, a filter 324 and optionally a wireless receiver 326. In operation, the primary controller 310, driver circuit 316 and switching circuit 318 apply power to the tank circuit 320 to generate a source of electromagnetic inductive power at a selected frequency and a selected duty cycle.” ’263 Baarman at [0022]. “In one embodiment, the switching circuit 115 includes two separate switches 116, 118 that are switched on at the same frequency, but out of phase with each other. FIG. 8 illustrates the timing for one embodiment of such a switching circuit. In FIG. 8, both switches have the same duty cycle, but are shifted in time from each other by half of the period of the switching waveform. In alternative embodiments, each switch may have a different duty cycle and they the switches may be shifted in time a different amount from each other. That is, half period separation and similar duty cycle are desirable, but unnecessary, for the switches because it may result in increased power transfer efficiency from the inductive power supply to the remote device.” ’263 Baarman at [0027]. “By sensing the voltage and/or current in the secondary circuit and knowing the voltage and/or current provided by the primary circuit, the primary controller can calculate the power transfer efficiency. By sweeping a range of operating frequencies, noting the power transfer efficiency at each frequency, the operating frequency closest to resonance can be determined—it corresponds with the operating frequency that yields the best power transfer efficiency. In addition, the voltage and current sensors 418, 422 can be used in conjunction with a protection algorithm in the secondary controller 428 to disconnect the load 424 if a fault condition is detected.” ’263 Baarman at [0035]. “The current sensor 418 detects the amount of current in the received power and provides that information to the secondary controller 428. The voltage sensor 422 detects the amount of voltage in the received power and provides that information to the secondary controller 428.” ’263 Baarman at [0035]. “Use of a wireless transmitter or transceiver was previously described in U.S. Patent Application Publication US 2004/130915A1 to Baarman, which is entitled “Adapted Inductive Power Supply with Communication” that was previously incorporated by reference. Specifically, the use of WIFI, infrared, blue tooth, cellular or RFID were previously discussed as ways to wirelessly transmit data from a remote device to an inductive power supply. Further, communication using the induction coils and a power line communication protocol was discussed. Any of these methods
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		of transmitting data could be implemented in the present invention in order to transfer the desired data from the secondary to the primary.” ’263 Baarman at [0039]. “In the current embodiment, the operating frequency is adjusted with each iteration, however, in alternative embodiments, the operating frequency may be adjusted less frequently or only when an event triggers that it should be adjusted. For example, if a motion detector on the secondary indicates movement or a change in orientation of the secondary. Or, for example, if there is a sharp decrease or increase in the amount of power provided to the secondary.” ’263 Baarman at [0045]. “This process continues as desired or until the power supply is turned off, the secondary is removed, or in the case of charging a battery, when the battery is fully charged.” ’263 Baarman at [0049]. To the extent ’263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions.
[1.g]	provide less power by increasing said non-resonant transmission frequency by an incremental value when said first signal is detected by the detector, and	’263 Baarman discloses providing less power by increasing said non-resonant transmission frequency by an incremental value when said first signal is detected by the detector. For example: “In one embodiment, a process for inductively powering a load by maintaining substantial resonance and adjusting duty cycle is provided. Initially an operating frequency and duty cycle are set to an acceptable value. The initial operating frequency is determined by sweeping a range of frequencies and selecting the operating frequency which provided the highest power transfer efficiency. The initial duty cycle is set to a relatively low value, such as 20%, to ensure that too much power is not delivered to the secondary. Once the initial values have been set, the inductive power supply enters a continuous process of adjusting the operating frequency to maintain substantial resonance and adjusting the duty cycle depending on whether the amount of power is too high or too low or temperature is too high.” ’263 Baarman at [0008]. “In operation, an embodiment of the process for adjusting the duty cycle is shown in FIG. 5, the initial operating frequency is set substantially at resonant frequency 504 and the initial duty cycle

		is set at a relatively low value 506 . The primary controller continuously adjusts the operating frequency 508 to maintain substantially resonant frequency and continuously determines if the amount of power being transferred is too high 510 . If too much power is being provided or temperatures are above a preset threshold then the duty cycle is decreased 514 . If too little power is being provided then the duty cycle is increased 512 . Various conditions may temporarily or permanently reduce or halt the power transfer.” ’263 Baarman at [0020].
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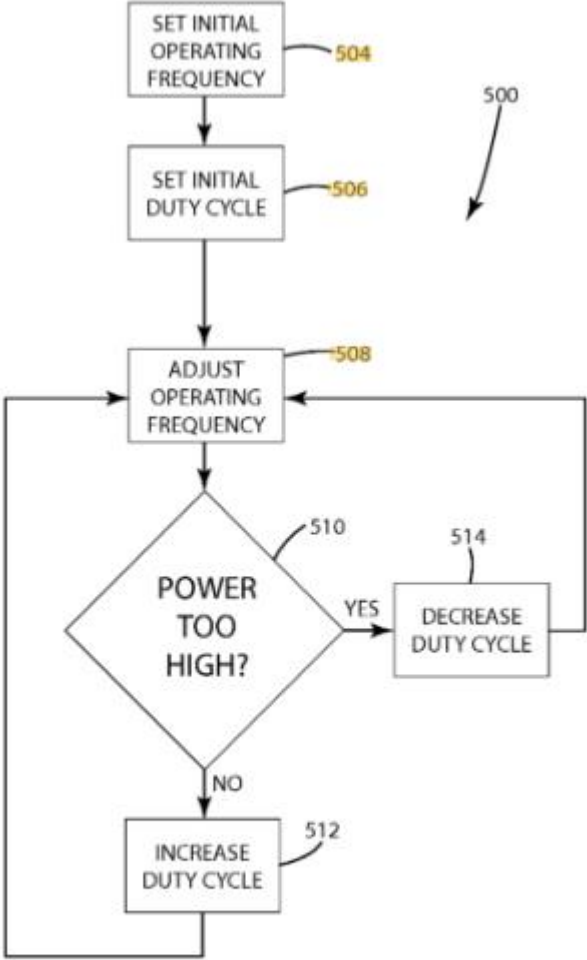
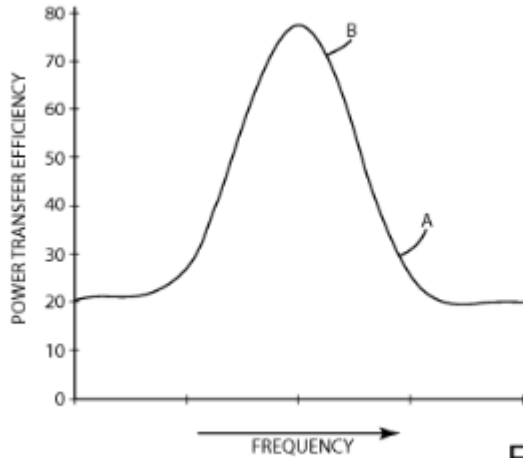


Fig.5

'263 Baarman at Fig. 5.

		“In one embodiment, the switching circuit 115 includes two separate switches 116, 118 that are switched on at the same frequency, but out of phase with each other. FIG. 8 illustrates the timing for one embodiment of such a switching circuit. In FIG. 8, both switches have the same duty cycle, but are shifted in time from each other by half of the period of the switching waveform. In alternative embodiments, each switch may have a different duty cycle and they the switches may be shifted in time a different amount from each other. That is, half period separation and similar duty cycle are desirable, but unnecessary, for the switches because it may result in increased power transfer efficiency from the inductive power supply to the remote device.” ’263 Baarman at [0027]. “The adjust operating frequency step 508 is a multi-step process which ensures that the operating frequency is being maintained substantially at resonance. FIG. 6 describes one embodiment of this process in more detail. In the described embodiment, the operating frequency is increased by a pre-selected amount, referred to as a step up. The adjustment is allowed to propagate through the system and the power efficiency is checked 604. If the power efficiency increased then the system was not substantially at resonance and the operating frequency is stepped up again. This process continues until the power efficiency either decreases or stays the same. Once that occurs, the operating frequency is stepped down 608. The power efficiency is checked 608. If the power efficiency increases then the operating frequency is stepped down again, until the power efficiency stays the same or decreases. The final step is to step up the operating frequency 610 to get back to the operating frequency with the peak power efficiency. This is merely one embodiment of a process to maintain the operating frequency substantially at resonance. Any other process could be used to maintain the operating frequency substantially at resonance.” ’263 Baarman at [0043]. “One reason that the operating frequency is stepped up and stepped down can be explained by looking at an exemplary graph of operating frequency vs. power efficiency, shown in FIG. 7. As can be seen, there are several peaks of power efficiency over the range of operating frequencies shown. The initial sweep of frequencies sets the operating frequency to the resonant frequency, i.e. the highest peak on FIG. 7. Each time the adjustment comes, although the operating frequency has not changed, the power efficiency values may have changed as a result in any number of factors, most notably movement of the secondary. Typically, the change in the graph is merely a slight shift, meaning that the optimum operating frequency may be a few steps in either direction. This is why the current embodiment steps up and steps down. If the first step up leads to a decrease in power efficiency transfer, the process immediately steps down until. If stepping down also leads to a decrease in power efficiency transfer then it is evident that no adjustment is necessary and the operating frequency was already at resonant frequency. In an alternative embodiment an analog
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		circuit could be used to directly determine how far off resonance the system is, causing the controller to react directly to the proper frequency. A phase comparator is one such circuit.” ’263 Baarman at [0044].  Fig. 7 ’263 Baarman at Fig. 7. To the extent ’263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions.
[1.h]	provide more power by decreasing said non-resonant transmission frequency by an incremental value when said second	’263 Baarman discloses providing more power by decreasing said non-resonant transmission frequency by an incremental value when said second signal is detected by the detector. For example: “In one embodiment, a process for inductively powering a load by maintaining substantial resonance and adjusting duty cycle is provided. Initially an operating frequency and duty cycle are set to an acceptable value. The initial operating frequency is determined by sweeping a range of frequencies and selecting the operating frequency which provided the highest power transfer

	signal is detected by the detector.	efficiency. The initial duty cycle is set to a relatively low value, such as 20%, to ensure that too much power is not delivered to the secondary. Once the initial values have been set, the inductive power supply enters a continuous process of adjusting the operating frequency to maintain substantial resonance and adjusting the duty cycle depending on whether the amount of power is too high or too low or temperature is too high.” ’263 Baarman at [0008]. “In operation, an embodiment of the process for adjusting the duty cycle is shown in FIG. 5, the initial operating frequency is set substantially at resonant frequency 504 and the initial duty cycle is set at a relatively low value 506. The primary controller continuously adjusts the operating frequency 508 to maintain substantially resonant frequency and continuously determines if the amount of power being transferred is too high 510. If too much power is being provided or temperatures are above a preset threshold then the duty cycle is decreased 514. If too little power is being provided then the duty cycle is increased 512. Various conditions may temporarily or permanently reduce or halt the power transfer.” ’263 Baarman at [0020].
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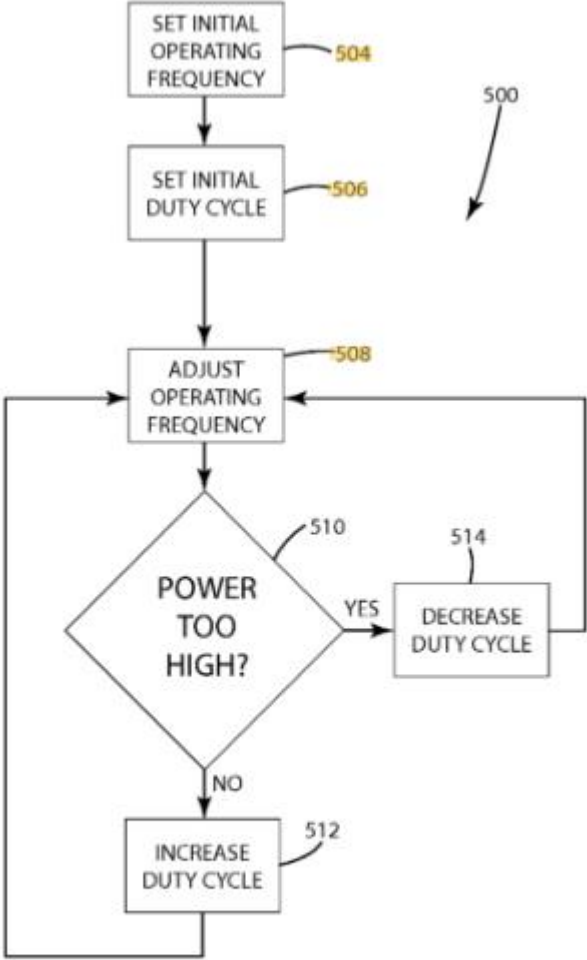
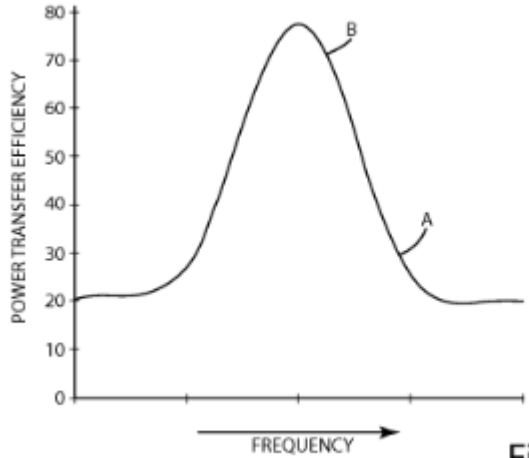


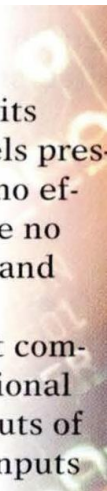
Fig.5

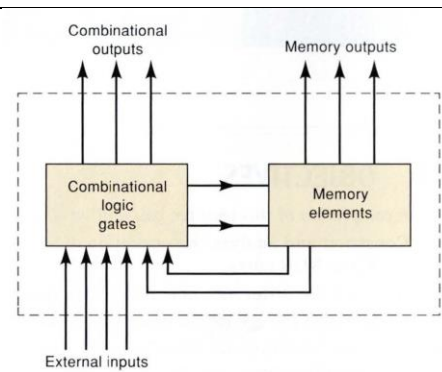
'263 Baarman at Fig. 5.

		“The adjust operating frequency step 508 is a multi-step process which ensures that the operating frequency is being maintained substantially at resonance. FIG. 6 describes one embodiment of this process in more detail. In the described embodiment, the operating frequency is increased by a pre-selected amount, referred to as a step up. The adjustment is allowed to propagate through the system and the power efficiency is checked 604. If the power efficiency increased then the system was not substantially at resonance and the operating frequency is stepped up again. This process continues until the power efficiency either decreases or stays the same. Once that occurs, the operating frequency is stepped down 608. The power efficiency is checked 608. If the power efficiency increases then the operating frequency is stepped down again, until the power efficiency stays the same or decreases. The final step is to step up the operating frequency 610 to get back to the operating frequency with the peak power efficiency. This is merely one embodiment of a process to maintain the operating frequency substantially at resonance. Any other process could be used to maintain the operating frequency substantially at resonance.” ’263 Baarman at [0043]. “One reason that the operating frequency is stepped up and stepped down can be explained by looking at an exemplary graph of operating frequency vs. power efficiency, shown in FIG. 7. As can be seen, there are several peaks of power efficiency over the range of operating frequencies shown. The initial sweep of frequencies sets the operating frequency to the resonant frequency, i.e. the highest peak on FIG. 7. Each time the adjustment comes, although the operating frequency has not changed, the power efficiency values may have changed as a result in any number of factors, most notably movement of the secondary. Typically, the change in the graph is merely a slight shift, meaning that the optimum operating frequency may be a few steps in either direction. This is why the current embodiment steps up and steps down. If the first step up leads to a decrease in power efficiency transfer, the process immediately steps down until. If stepping down also leads to a decrease in power efficiency transfer then it is evident that no adjustment is necessary and the operating frequency was already at resonant frequency. In an alternative embodiment an analog circuit could be used to directly determine how far off resonance the system is, causing the controller to react directly to the proper frequency. A phase comparator is one such circuit.” ’263 Baarman at [0044].
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		 Fig. 7 '263 Baarman at Fig. 7. To the extent '263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions.
Claim 2		
2.	The system of claim 1 said signal detector being configured to adjust said transmission frequency in response to feedback signals.	'263 Baarman discloses signal detector being configured to adjust said transmission frequency in response to feedback signals. For example: “In one embodiment, the inductive power supply includes a primary controller, a driver circuit, a switching circuit, and a tank circuit. The controller, driver circuit and switching circuit cooperate to generate an AC signal at a selected operating frequency and duty cycle. The AC signal is applied to the tank circuit to create an inductive field for powering the secondary. The secondary communicates feedback about the received power back to the primary controller. The power transfer efficiency may be optimized by maintaining the operating frequency substantially at

		resonance, and the amount of power transferred may be controlled by adjusting the duty cycle.” ’263 Baarman at [0006]. “In one embodiment, the secondary circuit includes a secondary, a rectifier, a switch, a load, a sensor, a secondary controller, and a communication means. A voltage and/or current sensor detects characteristics about the power which are transmitted back to the primary controller using the communication means. Optionally, over-voltage and over-current protection may be provided. If a fault condition is detected the load is disconnected using the switch.” ’263 Baarman at [0007]. “In one embodiment, a process for inductively powering a load by maintaining substantial resonance and adjusting duty cycle is provided. Initially an operating frequency and duty cycle are set to an acceptable value. The initial operating frequency is determined by sweeping a range of frequencies and selecting the operating frequency which provided the highest power transfer efficiency. The initial duty cycle is set to a relatively low value, such as 20%, to ensure that too much power is not delivered to the secondary. Once the initial values have been set, the inductive power supply enters a continuous process of adjusting the operating frequency to maintain substantial resonance and adjusting the duty cycle depending on whether the amount of power is too high or too low or temperature is too high.” ’263 Baarman at [0008]. “By sensing the voltage and/or current in the secondary circuit and knowing the voltage and/or current provided by the primary circuit, the primary controller can calculate the power transfer efficiency. By sweeping a range of operating frequencies, noting the power transfer efficiency at each frequency, the operating frequency closest to resonance can be determined—it corresponds with the operating frequency that yields the best power transfer efficiency. In addition, the voltage and current sensors 418, 422 can be used in conjunction with a protection algorithm in the secondary controller 428 to disconnect the load 424 if a fault condition is detected.” ’263 Baarman at [0035]. “This process continues as desired or until the power supply is turned off, the secondary is removed, or in the case of charging a battery, when the battery is fully charged.” ’263 Baarman at [0049]. To the extent ’263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of
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		the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions. For example, Tocci discloses signal detector being configured to adjust said transmission frequency in response to feedback signals: ■ INTRODUCTION The logic circuits considered thus far have been combinational circuits whose output levels at any instant of time are dependent on the levels present at the inputs at that time. Any prior input-level conditions have no effect on the present outputs because combinational logic circuits have no memory. Most digital systems consist of both combinational circuits and memory elements. Figure 5-1 shows a block diagram of a general digital system that combines combinational logic gates with memory devices. The combinational portion accepts logic signals from external inputs and from the outputs of the memory elements. The combinational circuit operates on these inputs 
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to produce various outputs, some of which are used to determine the binary values to be stored in the memory elements. The outputs of some of the memory elements, in turn, go to the inputs of logic gates in the combinational circuits. This process indicates that the external outputs of a digital system are functions of both its external inputs and the information stored in its memory elements.

The most important memory element is the **flip-flop**, which is made up of an assembly of logic gates. Even though a logic gate, by itself, has no storage capability, several can be connected together in ways that permit information to be stored. Several different gate arrangements are used to produce these flip-flops (abbreviated FF).

Figure 5-2(a) is the general type of symbol used for a flip-flop. It shows two outputs, labeled Q and $\bar{Q}$, that are the inverse of each other. $Q/\bar{Q}$ are the most common designations used for a FF's outputs. From time to time, we will use other designations such as $X/\bar{X}$ and $A/\bar{A}$ for convenience in identifying different FFs in a logic circuit.

The Q output is called the *normal* FF output, and $\bar{Q}$ is the *inverted* FF output. Whenever we refer to the state of a FF, we are referring to the state of its normal (Q) output; it is understood that its inverted output ($\bar{Q}$) is in the opposite state. For example, if we say that a FF is in the HIGH (1) state, we mean that $Q = 1$; if we say that a FF is in the LOW (0) state, we mean that $Q = 0$. Of course, the $\bar{Q}$ state will always be the inverse of Q .

The two possible operating states for a FF are summarized in Figure 5-2(b). Note that the HIGH or 1 state ($Q = 1/\bar{Q} = 0$) is also referred to as the **SET** state. Whenever the inputs to a FF cause it to go to the $Q = 1$ state, we call this *setting* the FF; the FF has been set. In a similar way, the LOW or

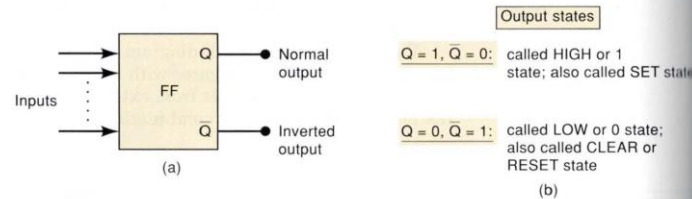


FIGURE 5-2 General flip-flop symbol and definition of its two possible output states.

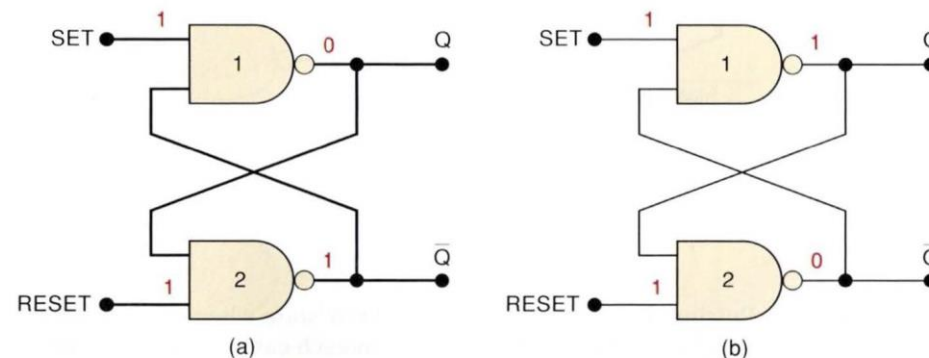
		0 state ($Q = 0/\bar{Q} = 1$) is also referred to as the CLEAR or RESET state. Whenever the inputs to a FF cause it to go to the $Q = 0$ state, we call this <i>clearing</i> or <i>resetting</i> the FF; the FF has been cleared (reset). As we shall see, many FFs will have a SET input and/or a CLEAR (RESET) input that is used to drive the FF into a specific output state. As the symbol in Figure 5-2(a) implies, a FF can have one or more inputs. These inputs are used to cause the FF to switch back and forth (“flip-flop”) between its possible output states. We will find out that most FF inputs need only to be momentarily activated (pulsed) in order to cause a change in the FF output state, and the output will remain in that new state even after the input pulse is over. This is the FF’s <i>memory</i> characteristic. The flip-flop is known by other names, including <i>latch</i> and <i>bistable multivibrator</i>. The term <i>latch</i> is used for certain types of flip-flops that we will describe. The term <i>bistable multivibrator</i> is the more technical name for a flip-flop, but it is too much of a mouthful to be used regularly.
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5-1 NAND GATE LATCH

The most basic FF circuit can be constructed from either two NAND gates or two NOR gates. The NAND gate version, called a **NAND gate latch** or simply a **latch**, is shown in Figure 5-3(a). The two NAND gates are cross-coupled so that the output of NAND-1 is connected to one of the inputs of NAND-2, and vice versa. The gate outputs, labeled Q and $\bar{Q}$, respectively, are the latch outputs. Under normal conditions, these outputs will always be the inverse of each other. There are two latch inputs: the SET input is the input that *sets* Q to the 1 state; the RESET input is the input that *resets* Q to the 0 state.

The SET and RESET inputs are both normally resting in the HIGH state, and one of them will be pulsed LOW whenever we want to change the latch outputs. We begin our analysis by showing that there are two equally likely output states when $\text{SET} = \text{RESET} = 1$. One possibility is shown in Figure 5-3(a), where we have $Q = 0$ and $\bar{Q} = 1$. With $\bar{Q} = 0$, the inputs to NAND-2 are 0 and 1, which produce $\bar{Q} = 1$. The 1 from $\bar{Q}$ causes NAND-1 to have a 1 at both inputs to produce a 0 output at Q . In effect, what we have is the LOW at the NAND-1 output producing a HIGH at the NAND-2 output, which, in turn, keeps the NAND-1 output LOW.

The second possibility is shown in Figure 5-3(b), where $Q = 1$ and $\bar{Q} = 0$. The HIGH from NAND-1 produces a LOW at the NAND-2 output, which, in turn, keeps the NAND-1 output HIGH. Thus, there are two possible output states when $\text{SET} = \text{RESET} = 1$; as we shall soon see, the one that actually exists will depend on what has occurred previously at the inputs.



Setting the Latch (FF)

Now let's investigate what happens when the SET input is momentarily pulsed LOW while RESET is kept HIGH. Figure 5-4(a) shows what happens when $Q = 0$ prior to the occurrence of the pulse. As SET is pulsed LOW at time t_0 , Q will go HIGH, and this HIGH will force $\bar{Q}$ to go LOW so that NAND-1 now has two LOW inputs. Thus, when SET returns to the 1 state at t_1 , the NAND-1 output *remains* HIGH, which, in turn, keeps the NAND-2 output LOW.

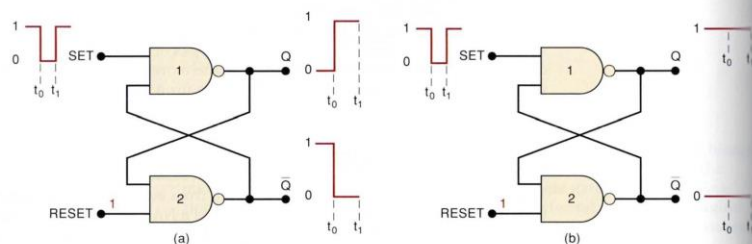


FIGURE 5-4 Pulsing the SET input to the 0 state when (a) $Q = 0$ prior to SET pulse; (b) $Q = 1$ prior to SET pulse. Note that, in both cases, Q ends up HIGH.

Figure 5-4(b) shows what happens when $Q = 1$ and $\bar{Q} = 0$ prior to the application of the SET pulse. Since $\bar{Q} = 0$ is already keeping the NAND-1 output HIGH, the LOW pulse at SET will not change anything. Thus, when SET returns HIGH, the latch outputs are still in the $Q = 1$, $\bar{Q} = 0$ state.

We can summarize Figure 5-4 by stating that a LOW pulse on the SET input will always cause the latch to end up in the $Q = 1$ state. This operation is called *setting* the latch or FF.

Resetting the Latch (FF)

Now let's consider what occurs when the RESET input is pulsed LOW while SET is kept HIGH. Figure 5-5(a) shows what happens when $Q = 0$ and $\bar{Q} = 1$

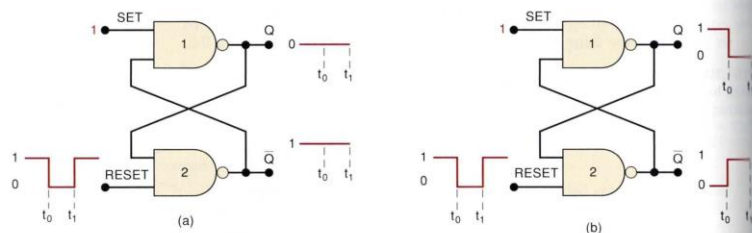


FIGURE 5-5 Pulsing the RESET input to the LOW state when (a) $Q = 0$ prior to RESET pulse; (b) $Q = 1$ prior to RESET pulse. In each case, Q ends up LOW.

prior to the application of the pulse. Since $Q = 0$ is already keeping the NAND-2 output HIGH, the LOW pulse at RESET will not have any effect. When RESET returns HIGH, the latch outputs are still $Q = 0$ and $\bar{Q} = 1$.

Figure 5-5(b) shows the situation where $Q = 1$ prior to the occurrence of the RESET pulse. As RESET is pulsed LOW at t_0 , $\bar{Q}$ will go HIGH, and this HIGH forces Q to go LOW so that NAND-2 now has two LOW inputs. Thus, when RESET returns HIGH at t_1 , the NAND-2 output *remains* HIGH, which, in turn, keeps the NAND-1 output LOW.

Figure 5-5 can be summarized by stating that a LOW pulse on the RESET input will always cause the latch to end up in the $Q = 0$ state. This operation is called *clearing* or *resetting* the latch.

Simultaneous Setting and Resetting

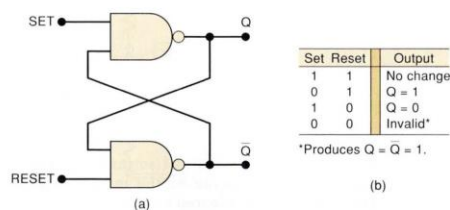
The last case to consider is the case where the SET and RESET inputs are simultaneously pulsed LOW. This will produce HIGH levels at both NAND outputs so that $Q = \bar{Q} = 1$. Clearly, this is an undesired condition because the two outputs are supposed to be inverses of each other. Furthermore, when the SET and RESET inputs return HIGH, the resulting output state will depend on which input returns HIGH first. Simultaneous transitions back to the 1 state will produce unpredictable results. For these reasons the $SET = RESET = 0$ condition is normally not used for the NAND latch.

Summary of NAND Latch

The operation described above can be conveniently placed in a function table (Figure 5-6) and is summarized as follows:

1. $SET = RESET = 1$. This condition is the normal resting state, and it has no effect on the output state. The Q and $\bar{Q}$ outputs will remain in whatever state they were in prior to this input condition.
2. $SET = 0$, $RESET = 1$. This will always cause the output to go to the $Q = 1$ state, where it will remain even after SET returns HIGH. This is called *setting* the latch.
3. $SET = 1$, $RESET = 0$. This will always produce the $Q = 0$ state, where the output will remain even after RESET returns HIGH. This is called *clearing* or *resetting* the latch.
4. $SET = RESET = 0$. This condition tries to set and clear the latch at the same time, and it produces $Q = \bar{Q} = 1$. If the inputs are returned to 1 simultaneously, the resulting state is unpredictable. This input condition should not be used.

FIGURE 5-6 (a) NAND latch; (b) function table.



		Tocci at 209-13.
Claim 3		
3.	The system of claim 2 wherein said feedback signals carry data pertaining to the operational parameters of said electric load.	'263 Baarman discloses the feedback signals carry data pertaining to the operational parameters of said electric load. For example: “In one embodiment, the inductive power supply includes a primary controller, a driver circuit, a switching circuit, and a tank circuit. The controller, driver circuit and switching circuit cooperate to generate an AC signal at a selected operating frequency and duty cycle. The AC signal is applied to the tank circuit to create an inductive field for powering the secondary. The secondary communicates feedback about the received power back to the primary controller. The power transfer efficiency may be optimized by maintaining the operating frequency substantially at resonance, and the amount of power transferred may be controlled by adjusting the duty cycle.” ’263 Baarman at [0006]. “In one embodiment, the secondary circuit includes a secondary, a rectifier, a switch, a load, a sensor, a secondary controller, and a communication means. A voltage and/or current sensor detects characteristics about the power which are transmitted back to the primary controller using the communication means. Optionally, over-voltage and over-current protection may be provided. If a fault condition is detected the load is disconnected using the switch.” ’263 Baarman at [0007]. “In one embodiment, a process for inductively powering a load by maintaining substantial resonance and adjusting duty cycle is provided. Initially an operating frequency and duty cycle are set to an acceptable value. The initial operating frequency is determined by sweeping a range of frequencies and selecting the operating frequency which provided the highest power transfer efficiency. The initial duty cycle is set to a relatively low value, such as 20%, to ensure that too much power is not delivered to the secondary. Once the initial values have been set, the inductive power supply enters a continuous process of adjusting the operating frequency to maintain substantial resonance and adjusting the duty cycle depending on whether the amount of power is too high or too low or temperature is too high.” ’263 Baarman at [0008]. “An inductive power supply or primary circuit in accordance with an embodiment of the present invention is shown in FIG. 1, and generally designated 100. The primary circuit 100 includes a primary controller 110, a driver circuit 111 including a pair of drivers 112, 114, a switching circuit 115 including a pair of switches 116, 118, a tank circuit 120 a primary sensor 122 and an optional wireless receiver 124. The primary controller 110, driver circuit 111 and the switching

		circuit 115 together generate an AC signal at a selected frequency and selected duty cycle that is applied to the tank circuit 120 to create an inductive field for transferring power wirelessly to a secondary circuit.” ’263 Baarman at [0019]. “A secondary circuit in accordance with an embodiment of the present invention is shown in FIG. 2, and generally designated 200. The secondary circuit 200 may include a secondary 210, a rectifier 212, a switch 214, a load 216, a current sensor 218 or voltage sensor 220, a secondary controller 222, a signal resistor 224 for communicating using reflected impedance and an optional wireless transmitter 226.” ’263 Baarman at [0019].
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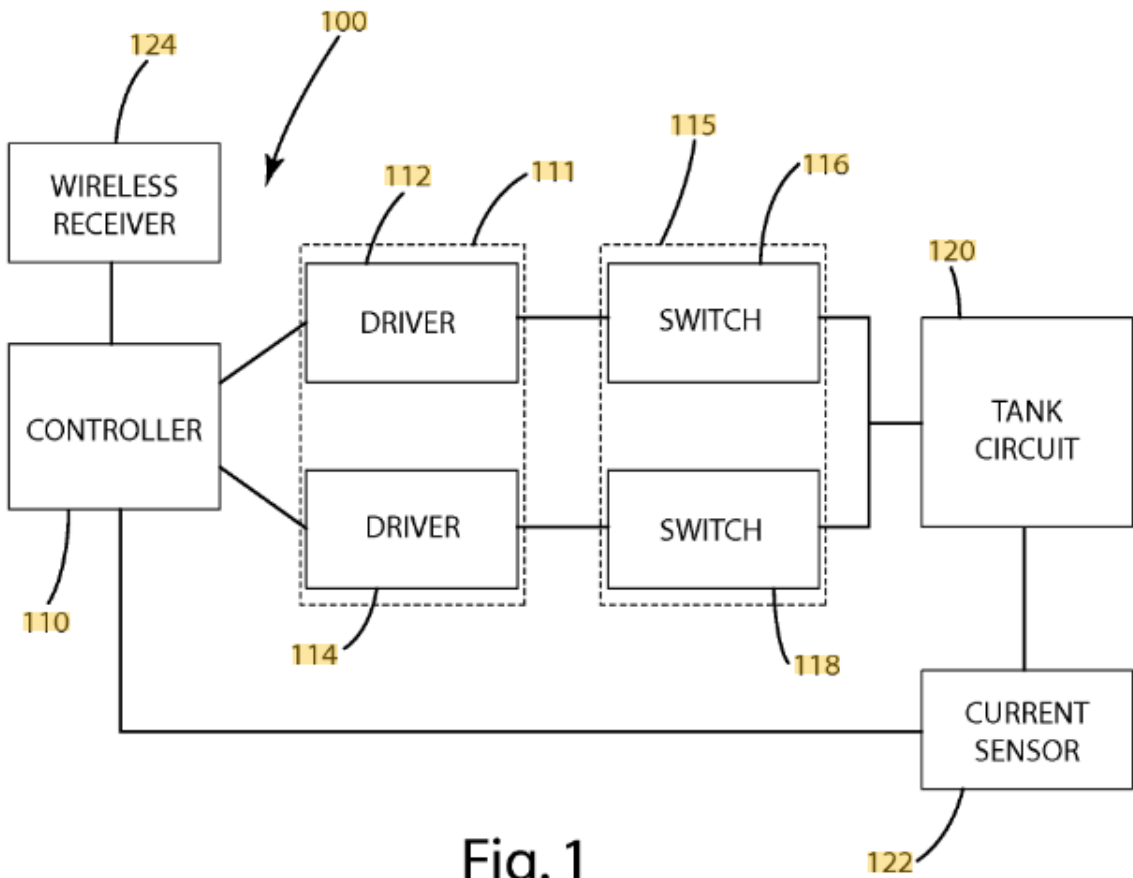


Fig. 1

'263 Baarman at Fig. 1.

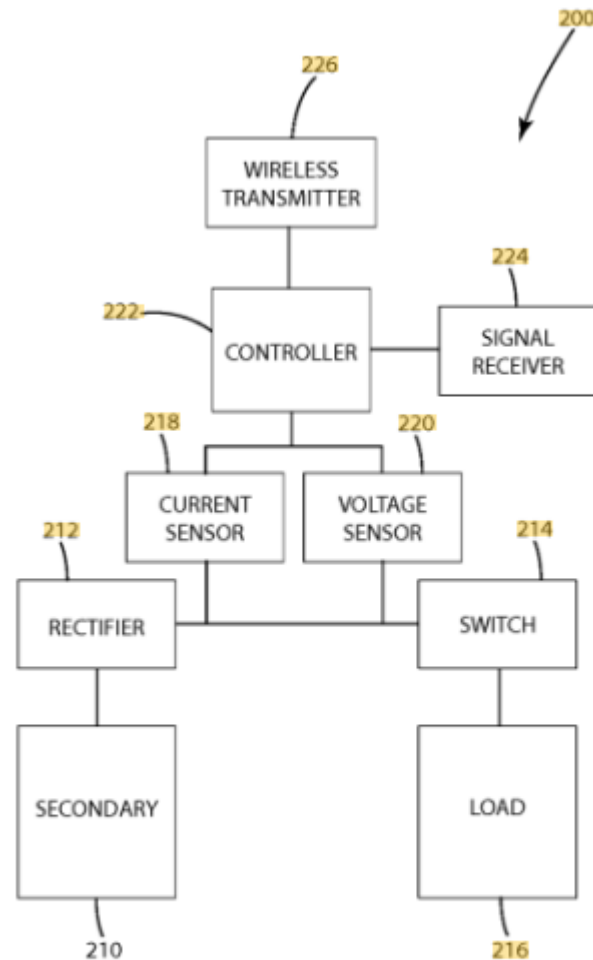


Fig. 2

'263 Baarman at Fig. 2.

"The primary controller 310 may also establish the duty cycle as a function of input from the current sensor 322. Planned shunting of the signal resistor on the secondary, which will be

		described in more detail below, may be used to provide information to the primary using reflected impedance detected with the current sensor 322. Alternatively, the duty cycle may be established using a separate communication link, such as the wireless receiver 326, implemented in the current embodiment as an IR receiver. This could also be near field or other RF communication channels.” ’263 Baarman at [0030]. “For purposes of disclosure, one embodiment of a secondary circuit 400 is shown in FIG. 4. In the embodiment of FIG. 4, the secondary circuit 400 generally includes a secondary 410 for receiving power from the inductive power supply 300, a rectifier 414 (or other components for converting AC power to DC), a low voltage power supply 412 that scales the received power to operate the secondary controller 428, conditioning circuitry 416, 426 to remove ripple in the signal, current sensor 418, voltage sensor 422, switch 420, load 424, secondary controller 428, a signal resistor 432 and an optional wireless transmitter 430. In operation, the rectifier 414 converts the AC power generated in the secondary 410 to DC power, which is typically needed to power the load.” ’263 Baarman at [0034]. “The current sensor 418 detects the amount of current in the received power and provides that information to the secondary controller 428. The voltage sensor 422 detects the amount of voltage in the received power and provides that information to the secondary controller 428.” ’263 Baarman at [0035]. “By sensing the voltage and/or current in the secondary circuit and knowing the voltage and/or current provided by the primary circuit, the primary controller can calculate the power transfer efficiency. By sweeping a range of operating frequencies, noting the power transfer efficiency at each frequency, the operating frequency closest to resonance can be determined—it corresponds with the operating frequency that yields the best power transfer efficiency. In addition, the voltage and current sensors 418, 422 can be used in conjunction with a protection algorithm in the secondary controller 428 to disconnect the load 424 if a fault condition is detected.” ’263 Baarman at [0035]. “Communication of the sensed voltage and/or current in the secondary may be transmitted to the primary controller 310 in a variety of ways. In the illustrated embodiment, the information may be transmitted using the signal resistor 432 or the wireless transmitter 430.” ’263 Baarman at [0037]. “In one embodiment, signal resistor 432 may be used to send information to the primary controller 310. The use of a signal resistor 432 to provide communication from the secondary to the primary was discussed in U.S. patent application Ser. No. 11/855,710 entitled System and
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		Method for Inductively Charging a Battery to Baarman et al, which is herein incorporated by reference. The signal resistor 432, when shunted, sends a communication signal that signifies an over-current or over-voltage state. When the resistor is shunted, the peak detector on the primary circuit is able to sense the over-voltage/over-current condition and act accordingly. The signal resistor 432 of the present invention may be shunted systematically to communicate additional data to the primary controller 310. For example, a stream of data could represent the sensed current and/or sensed voltage. Alternatively, the signal resistor could be used solely in the previously described way as an over-voltage/over-current transmitter or it could be removed entirely.” ’263 Baarman at [0038]. To the extent ’263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions. For example, ’169 Purdy discloses the feedback signals carry data pertaining to the operational parameters of said electric load: “Another example is disclosed in U.S. Pat. No. 6,362,610 to Yang. More particularly, this patent discloses a universal USB power supply unit which includes a USB port connector and a charging connector. The USB port connector plugs into the jack of the USB port, while the charging connector plugs into the jack of an electronic product to be charged. The current flowing into the USB port connector will then pass through an automatic voltage regulator. Disposed within a housing of the automatic voltage regulator is a DC voltage transformer which transforms the DC voltage (e.g., 5 V) coming from the USB port to the requisite voltage supplied to a power/signal connecting jack. A feedback control voltage output circuit compares the feedback voltage signal of the power/signal connecting jack and enables the DC voltage transformer to output a preset voltage. The charging connector is fitted with a power cord which includes a power/signal connector to fit the power/signal connecting jack. Moreover, a voltage parameter associated with the particular electronic device is preset within the charging connector using a variable resistor.” ’169 Purdy at [0005].
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		“In view of the foregoing background, it is therefore an object of the present invention to provide a battery charger that may be used with numerous types of portable devices and associated batteries, and yet which may account for differences between the charging parameters thereof.” ’169 Purdy at [0007]. “[0013] More specifically, the controller may enter the learning mode upon receiving a learning mode signal from the portable device. For example, if a portable device of an unknown device type, or which has an unknown battery type, is connected to the charger connector, the controller may provide an error signal to the portable device based thereon. The portable device may then provide the learning mode signal to the controller and communicate the appropriate charging parameter(s) thereto once the controller enters the learning mode. As such, the newly learned charging parameter(s) may advantageously be stored in the memory and used upon future connections of the device and/or battery type to the battery charger. [0014] Additionally, the charger connector may also carry communications signals between the controller and a host device (e.g., a computer) connected thereto. More particularly, the communications signals may relate to at least one charging parameter. That is, the controller may advantageously learn charging parameters from the host device as well the portable device. Furthermore, in some embodiments the charger connector may also carry communications signals between the portable device and the host device. Thus, the battery charger may provide a docking station between the portable device and the host device. This arrangement may be particularly advantageous for portable devices such as personal digital assistants (PDAs) which not only have portable batteries, but which frequently are also used to synchronize calendar, contact, email, and other data with a computer. [0015] The controller may also monitor the charging circuit to detect a charging error during charging of the rechargeable battery. By way of example, such charging errors may include over or undervoltage conditions, over or undercurrent conditions, excessive temperatures, exceeding a maximum charging time, etc. The battery charger may also include an indicator connected to the controller for providing an error indication upon detecting the charging error. For example, the error indicator could be an LED or LCD display. Also the charger connector may be a universal serial bus (USB) connector, for example.” ’169 Purdy at [0013] – [0015].
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	“Even if a device or battery type is unknown to the controller 27, it may advantageously learn or download the appropriate charging parameters for the device/battery. This allows the charger 23 to be used with future generations or models of devices/batteries that are not available when the battery charger 23 is manufactured, for example. [0045] More specifically, the controller 27 may enter a learning mode for learning the new device/battery parameters upon receiving a learning mode signal from the portable device 21, at Block 44. For example, the portable device 21 may store its own charging parameters and, responsive to receiving an unknown device error signal from the controller 27, send a designated learning mode signal that the battery charger 23 will recognize as such. The charging parameters for the rechargeable battery 22 may be stored in its identification circuit, for example. [0046] Once the controller 27 enters the learning mode, the microprocessor 30 of the portable device 21 then communicates the appropriate charging parameters to the controller, which it then stores in the memory 32, at Block 45. The newly learned charging parameters are then available for use in charging the device and/or battery type, and these device types will be recognized by the controller 27 thereafter. If a learning mode signal is not received, the battery charger 23 will stop the charging process (Block 52).” ’169 Purdy at [0044]-[0046]. “In addition, the controller 27 may also monitor the charging circuit 26 to detect a charging error during charging of the battery 22, at Block 50. By way of example, such charging errors may include over or undervoltage conditions, over or undercurrent conditions, excessive temperatures, etc. Upon detecting such an error, the controller 27 may provide an error indication via the indicator 33 (and/or an indicator of the portable device 21) upon detecting a charging error. The controller 27 may also take corrective action responsive to the error condition, such as limiting the charging voltage or current, or terminating charging, as illustratively shown at Block 52. If no such error is detected, then charging continues until a predetermined event occurs, such as a maximum charging time or charge level being reached, at Block 53. [0052] In accordance with another advantageous aspect of the invention, the charger connector 24 may also carry communications signals between the controller 27 and the host device. For example, the controller 27 may communicate with the host device over the same differential signal lines D+, D– connected to the charger connector 24. In particular, the communications signals may relate to
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one or more charging parameters. That is, the controller 27 may download charging parameters for unknown device/battery types from the host device instead of, or in addition to, downloading charging parameters from portable devices themselves,

[0053]

Of course, this configuration also allows the charger connector 24 to carry communications signals between the portable device 21 and the host device. In other words, the battery charger 23 may thus be used as a docking station for allowing the portable device 21 to communicate with the host device while it is being charged. This arrangement may be particularly advantageous for portable devices such as PDAs. This is because PDAs not only have portable batteries which typically require regular re-charging, but they also typically need to synchronize calendar, contact, email, and other data with a computer, as will be appreciated by those of skill in the art.” ’169 Purdy at [0051]-[0053].

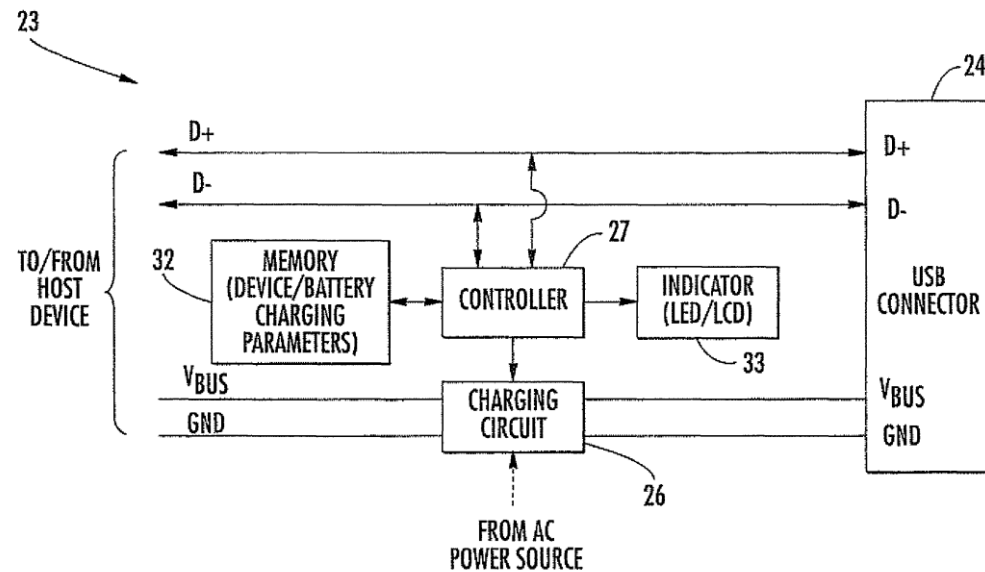


FIG. 2

’169 Purdy at Figure 2.

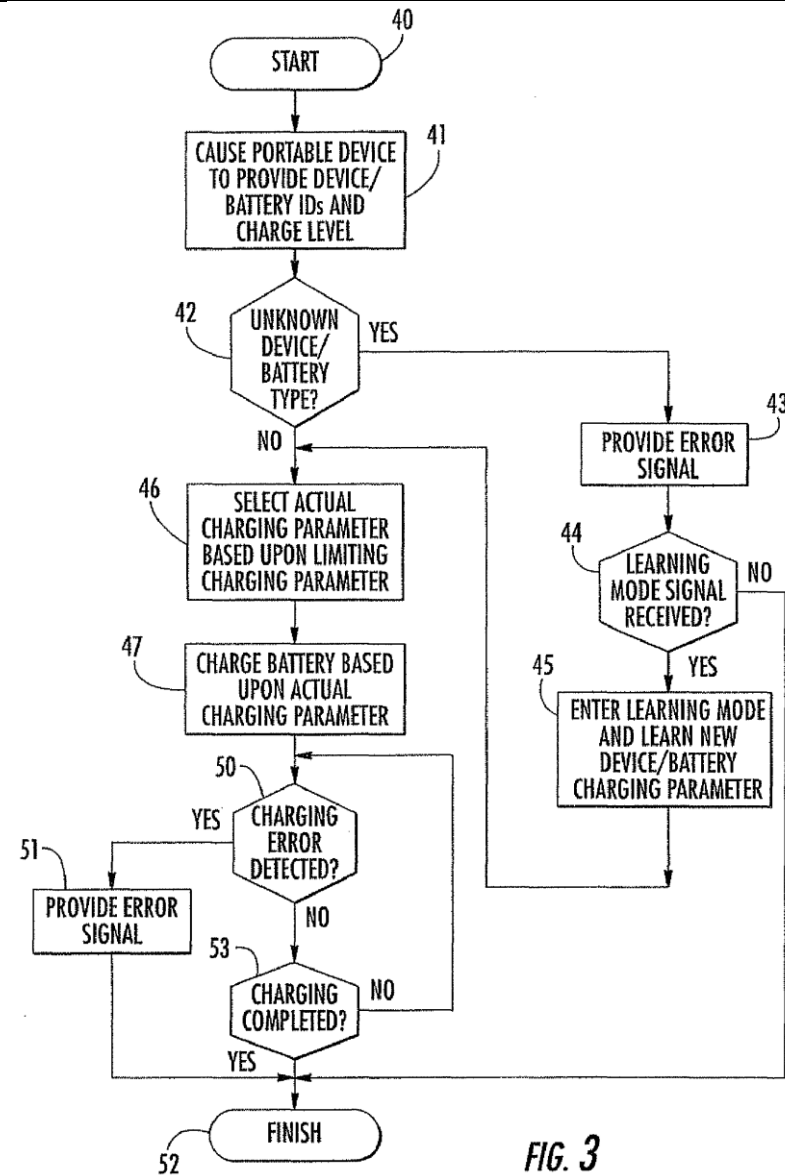
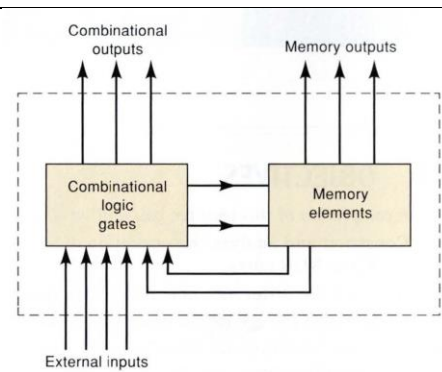


FIG. 3

'169 Purdy at Figure 3.

		Additionally, Tocci discloses the feedback signals carry data pertaining to the operational parameters of said electric load. For example: ■ INTRODUCTION The logic circuits considered thus far have been combinational circuits whose output levels at any instant of time are dependent on the levels present at the inputs at that time. Any prior input-level conditions have no effect on the present outputs because combinational logic circuits have no memory. Most digital systems consist of both combinational circuits and memory elements. Figure 5-1 shows a block diagram of a general digital system that combines combinational logic gates with memory devices. The combinational portion accepts logic signals from external inputs and from the outputs of the memory elements. The combinational circuit operates on these inputs
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to produce various outputs, some of which are used to determine the binary values to be stored in the memory elements. The outputs of some of the memory elements, in turn, go to the inputs of logic gates in the combinational circuits. This process indicates that the external outputs of a digital system are functions of both its external inputs and the information stored in its memory elements.

The most important memory element is the **flip-flop**, which is made up of an assembly of logic gates. Even though a logic gate, by itself, has no storage capability, several can be connected together in ways that permit information to be stored. Several different gate arrangements are used to produce these flip-flops (abbreviated FF).

Figure 5-2(a) is the general type of symbol used for a flip-flop. It shows two outputs, labeled Q and $\bar{Q}$, that are the inverse of each other. $Q/\bar{Q}$ are the most common designations used for a FF's outputs. From time to time, we will use other designations such as $X/\bar{X}$ and $A/\bar{A}$ for convenience in identifying different FFs in a logic circuit.

The Q output is called the *normal* FF output, and $\bar{Q}$ is the *inverted* FF output. Whenever we refer to the state of a FF, we are referring to the state of its normal (Q) output; it is understood that its inverted output ($\bar{Q}$) is in the opposite state. For example, if we say that a FF is in the HIGH (1) state, we mean that $Q = 1$; if we say that a FF is in the LOW (0) state, we mean that $Q = 0$. Of course, the $\bar{Q}$ state will always be the inverse of Q .

The two possible operating states for a FF are summarized in Figure 5-2(b). Note that the HIGH or 1 state ($Q = 1/\bar{Q} = 0$) is also referred to as the **SET** state. Whenever the inputs to a FF cause it to go to the $Q = 1$ state, we call this *setting* the FF; the FF has been set. In a similar way, the LOW or

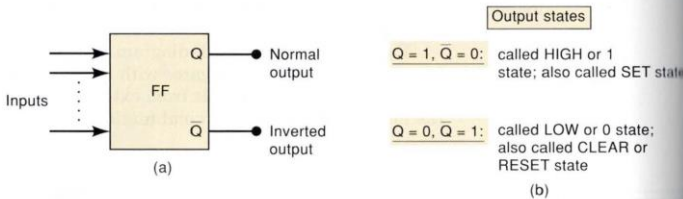


FIGURE 5-2 General flip-flop symbol and definition of its two possible output states.

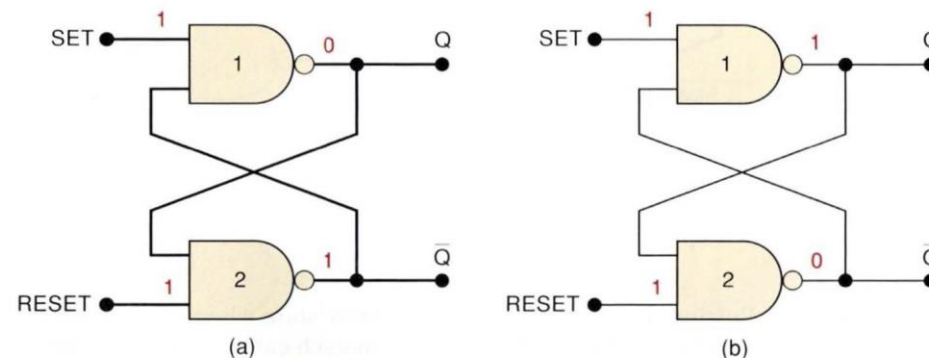
		0 state ($Q = 0/\bar{Q} = 1$) is also referred to as the CLEAR or RESET state. Whenever the inputs to a FF cause it to go to the $Q = 0$ state, we call this <i>clearing</i> or <i>resetting</i> the FF; the FF has been cleared (reset). As we shall see, many FFs will have a SET input and/or a CLEAR (RESET) input that is used to drive the FF into a specific output state. As the symbol in Figure 5-2(a) implies, a FF can have one or more inputs. These inputs are used to cause the FF to switch back and forth (“flip-flop”) between its possible output states. We will find out that most FF inputs need only to be momentarily activated (pulsed) in order to cause a change in the FF output state, and the output will remain in that new state even after the input pulse is over. This is the FF’s <i>memory</i> characteristic. The flip-flop is known by other names, including <i>latch</i> and <i>bistable multivibrator</i>. The term <i>latch</i> is used for certain types of flip-flops that we will describe. The term <i>bistable multivibrator</i> is the more technical name for a flip-flop, but it is too much of a mouthful to be used regularly.
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5-1 NAND GATE LATCH

The most basic FF circuit can be constructed from either two NAND gates or two NOR gates. The NAND gate version, called a **NAND gate latch** or simply a **latch**, is shown in Figure 5-3(a). The two NAND gates are cross-coupled so that the output of NAND-1 is connected to one of the inputs of NAND-2, and vice versa. The gate outputs, labeled Q and $\bar{Q}$, respectively, are the latch outputs. Under normal conditions, these outputs will always be the inverse of each other. There are two latch inputs: the SET input is the input that *sets* Q to the 1 state; the RESET input is the input that *resets* Q to the 0 state.

The SET and RESET inputs are both normally resting in the HIGH state, and one of them will be pulsed LOW whenever we want to change the latch outputs. We begin our analysis by showing that there are two equally likely output states when $\text{SET} = \text{RESET} = 1$. One possibility is shown in Figure 5-3(a), where we have $Q = 0$ and $\bar{Q} = 1$. With $\bar{Q} = 0$, the inputs to NAND-2 are 0 and 1, which produce $\bar{Q} = 1$. The 1 from $\bar{Q}$ causes NAND-1 to have a 1 at both inputs to produce a 0 output at Q . In effect, what we have is the LOW at the NAND-1 output producing a HIGH at the NAND-2 output, which, in turn, keeps the NAND-1 output LOW.

The second possibility is shown in Figure 5-3(b), where $Q = 1$ and $\bar{Q} = 0$. The HIGH from NAND-1 produces a LOW at the NAND-2 output, which, in turn, keeps the NAND-1 output HIGH. Thus, there are two possible output states when $\text{SET} = \text{RESET} = 1$; as we shall soon see, the one that actually exists will depend on what has occurred previously at the inputs.



Setting the Latch (FF)

Now let's investigate what happens when the SET input is momentarily pulsed LOW while RESET is kept HIGH. Figure 5-4(a) shows what happens when $Q = 0$ prior to the occurrence of the pulse. As SET is pulsed LOW at time t_0 , Q will go HIGH, and this HIGH will force $\bar{Q}$ to go LOW so that NAND-1 now has two LOW inputs. Thus, when SET returns to the 1 state at t_1 , the NAND-1 output *remains* HIGH, which, in turn, keeps the NAND-2 output LOW.

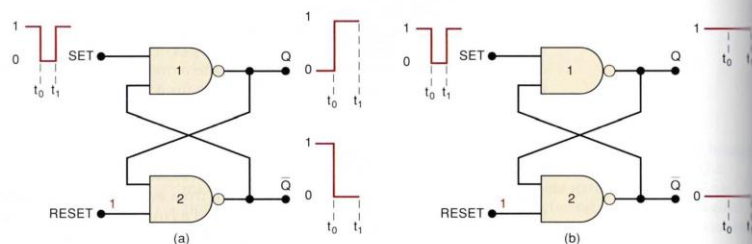


FIGURE 5-4 Pulsing the SET input to the 0 state when (a) $Q = 0$ prior to SET pulse; (b) $Q = 1$ prior to SET pulse. Note that, in both cases, Q ends up HIGH.

Figure 5-4(b) shows what happens when $Q = 1$ and $\bar{Q} = 0$ prior to the application of the SET pulse. Since $\bar{Q} = 0$ is already keeping the NAND-1 output HIGH, the LOW pulse at SET will not change anything. Thus, when SET returns HIGH, the latch outputs are still in the $Q = 1$, $\bar{Q} = 0$ state.

We can summarize Figure 5-4 by stating that a LOW pulse on the SET input will always cause the latch to end up in the $Q = 1$ state. This operation is called *setting* the latch or FF.

Resetting the Latch (FF)

Now let's consider what occurs when the RESET input is pulsed LOW while SET is kept HIGH. Figure 5-5(a) shows what happens when $Q = 0$ and $\bar{Q} = 1$

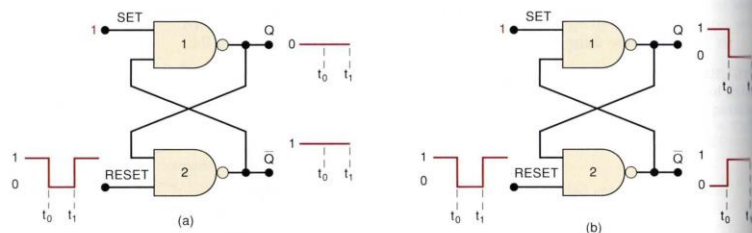
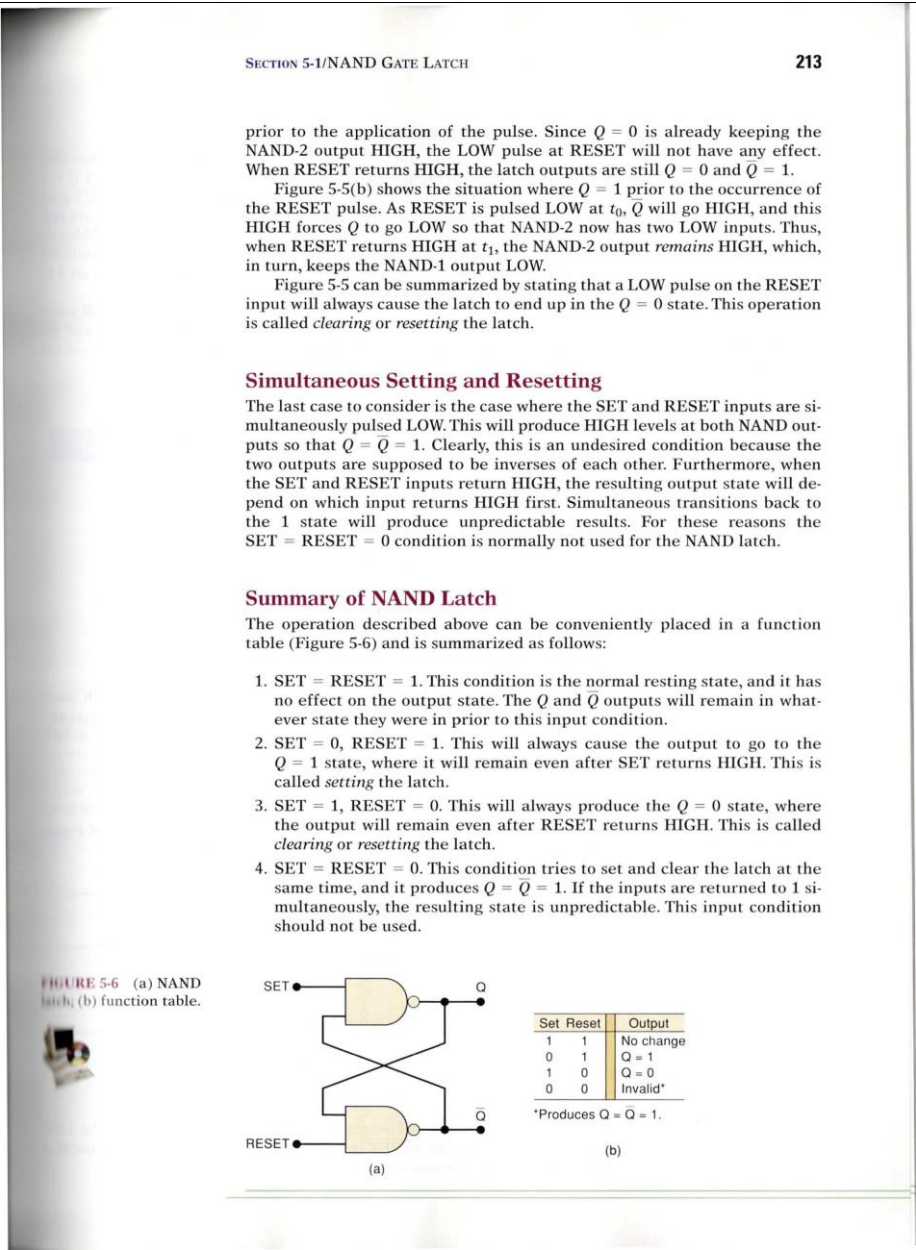
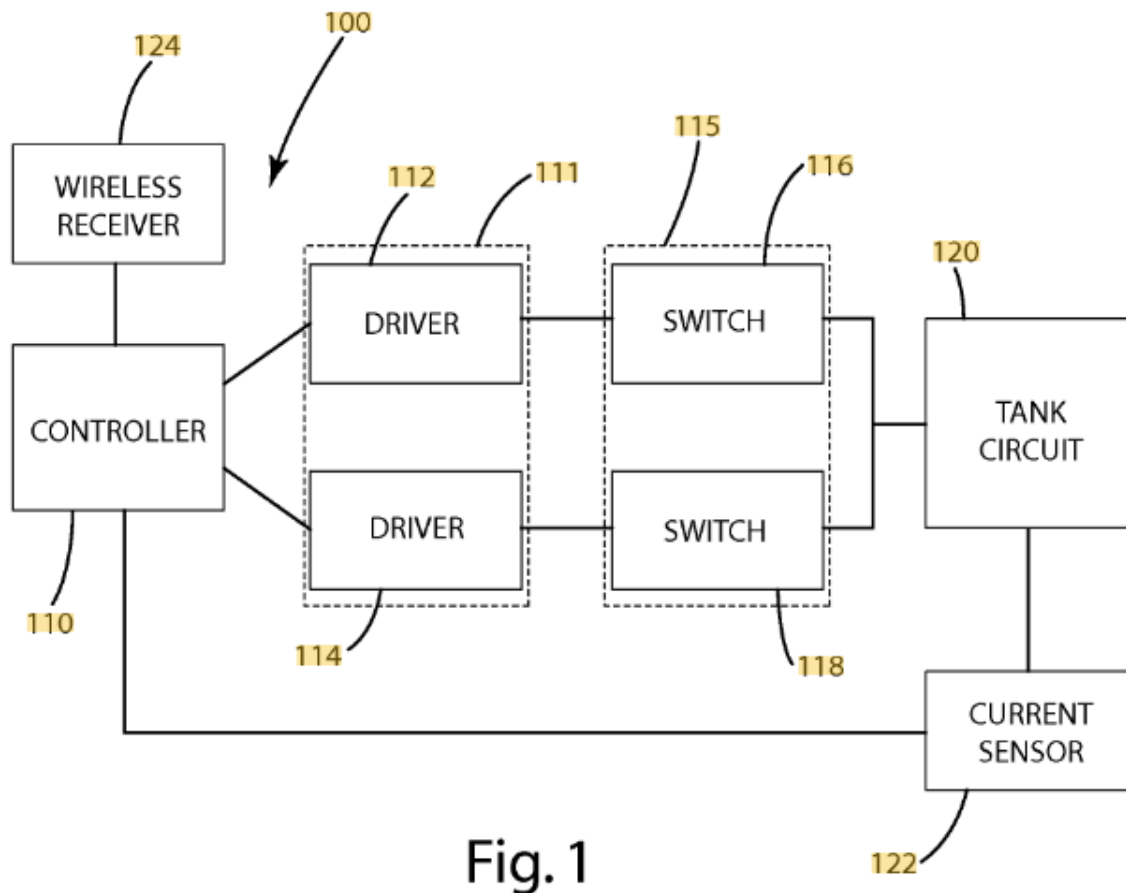


FIGURE 5-5 Pulsing the RESET input to the LOW state when (a) $Q = 0$ prior to RESET pulse; (b) $Q = 1$ prior to RESET pulse. In each case, Q ends up LOW.



		Tocci at 209-13.
Claim 4		
4.	The system of claim 3 wherein said operational parameters are selected from the group consisting of: required operating voltage for said electric load; required operating current for said electric load; required operating temperature for said electric load; required operating power for said electric load; measured operating voltage for said electric load; measured operating current for said electric load; measured operating temperature for said electric load; measured operating power for said electric load;	'263 Baarman discloses operational parameters. For example: “In one embodiment, the secondary circuit includes a secondary, a rectifier, a switch, a load, a sensor, a secondary controller, and a communication means. A voltage and/or current sensor detects characteristics about the power which are transmitted back to the primary controller using the communication means. Optionally, over-voltage and over-current protection may be provided. If a fault condition is detected the load is disconnected using the switch.” '263 Baarman at [0007]. “In one embodiment, a process for inductively powering a load by maintaining substantial resonance and adjusting duty cycle is provided. Initially an operating frequency and duty cycle are set to an acceptable value. The initial operating frequency is determined by sweeping a range of frequencies and selecting the operating frequency which provided the highest power transfer efficiency. The initial duty cycle is set to a relatively low value, such as 20%, to ensure that too much power is not delivered to the secondary. Once the initial values have been set, the inductive power supply enters a continuous process of adjusting the operating frequency to maintain substantial resonance and adjusting the duty cycle depending on whether the amount of power is too high or too low or temperature is too high.” '263 Baarman at [0008]. “A secondary circuit in accordance with an embodiment of the present invention is shown in FIG. 2, and generally designated 200. The secondary circuit 200 may include a secondary 210, a rectifier 212, a switch 214, a load 216, a current sensor 218 or voltage sensor 220, a secondary controller 222, a signal resistor 224 for communicating using reflected impedance and an optional wireless transmitter 226.” '263 Baarman at [0019].

power delivered to said primary inductive coil; power received by said secondary inductive coil; and a user identification code.



'263 Baarman at Fig. 1.

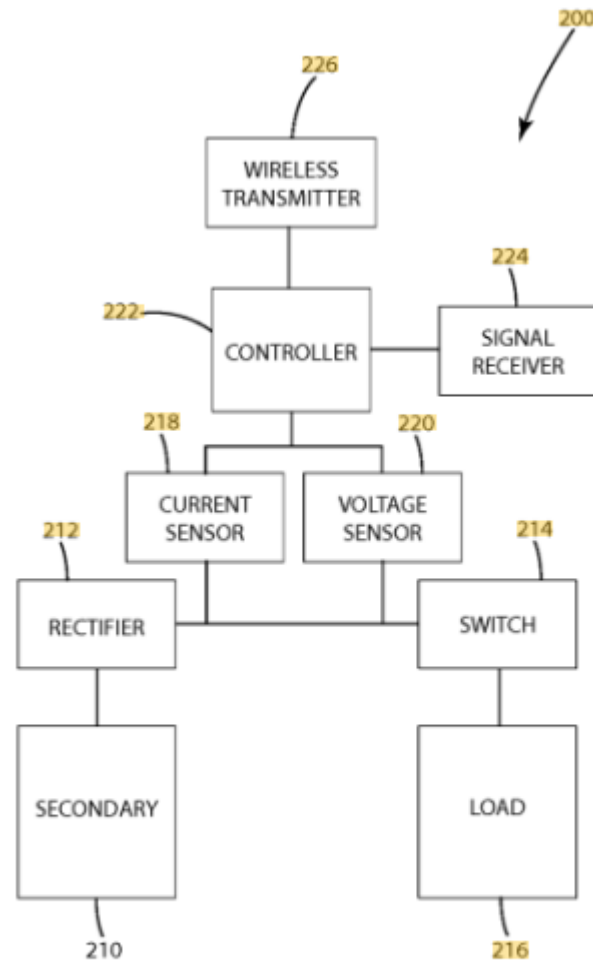


Fig. 2

'263 Baarman at Fig. 2.

"The primary controller 310 may also establish the duty cycle as a function of input from the current sensor 322. Planned shunting of the signal resistor on the secondary, which will be

		described in more detail below, may be used to provide information to the primary using reflected impedance detected with the current sensor 322. Alternatively, the duty cycle may be established using a separate communication link, such as the wireless receiver 326, implemented in the current embodiment as an IR receiver. This could also be near field or other RF communication channels.” ’263 Baarman at [0030]. “In the illustrated embodiment, the current sensor 322 is a current transformer having a primary coil connected to the tank circuit and a secondary coil connected to the primary controller 310. In the current embodiment, the current sensor 322 includes circuitry to adjust the gain of the output of the current sensor to accommodate the ranges accepted by the primary controller 310. Further, the amount of gain may be adjusted by the primary controller 310 by applying a signal to the switch. The inductive power supply 300 may include conditioning circuitry 324 for conditioning the current transformer output before it is supplied to the primary controller 310. In the current embodiment, the conditioning circuitry 324 is a 5K Hz 2-pole filter. Although the illustrated embodiment includes a current transformer for sensing the reflected impedance of the secondary or remote device, the inductive power supply 300 may include essentially any alternative type of sensor capable of providing information regarding reflected impedance from the secondary 400. Further, although the current sensor 322 of the illustrated embodiment is connected directly to the tank circuit, the current sensor (or other reflected impedance sensor) can be located in essentially any location where it is capable of providing readings indicative of the reflected impedance.” ’263 Baarman at [0031]. “For purposes of disclosure, one embodiment of a secondary circuit 400 is shown in FIG. 4. In the embodiment of FIG. 4, the secondary circuit 400 generally includes a secondary 410 for receiving power from the inductive power supply 300, a rectifier 414 (or other components for converting AC power to DC), a low voltage power supply 412 that scales the received power to operate the secondary controller 428, conditioning circuitry 416, 426 to remove ripple in the signal, current sensor 418, voltage sensor 422, switch 420, load 424, secondary controller 428, a signal resistor 432 and an optional wireless transmitter 430. In operation, the rectifier 414 converts the AC power generated in the secondary 410 to DC power, which is typically needed to power the load.” ’263 Baarman at [0034]. “The current sensor 418 detects the amount of current in the received power and provides that information to the secondary controller 428. The voltage sensor 422 detects the amount of voltage in the received power and provides that information to the secondary controller 428.” ’263 Baarman at [0035].
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		“By sensing the voltage and/or current in the secondary circuit and knowing the voltage and/or current provided by the primary circuit, the primary controller can calculate the power transfer efficiency. By sweeping a range of operating frequencies, noting the power transfer efficiency at each frequency, the operating frequency closest to resonance can be determined—it corresponds with the operating frequency that yields the best power transfer efficiency. In addition, the voltage and current sensors 418, 422 can be used in conjunction with a protection algorithm in the secondary controller 428 to disconnect the load 424 if a fault condition is detected.” ’263 Baarman at [0035]. “Communication of the sensed voltage and/or current in the secondary may be transmitted to the primary controller 310 in a variety of ways. In the illustrated embodiment, the information may be transmitted using the signal resistor 432 or the wireless transmitter 430.” ’263 Baarman at [0037]. To the extent ’263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions. For example, ’169 Purdy discloses operational parameters: “The controller may also monitor the charging circuit to detect a charging error during charging of the rechargeable battery. By way of example, such charging errors may include over or undervoltage conditions, over or undercurrent conditions, excessive temperatures, exceeding a maximum charging time, etc. The battery charger may also include an indicator connected to the controller for providing an error indication upon detecting the charging error. For example, the error indicator could be an LED or LCD display. Also the charger connector may be a universal serial bus (USB) connector, for example.” ’169 Purdy at [0015]. “Different portable device types will typically have one or more different portable device charging parameters, and different battery types may similarly have one or more different battery charging
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parameters. Table 1 provides exemplary charging parameters for two different types of USB compatible PDAs, while Table 2 provides exemplary charging parameters for two different types of PDA batteries.

TABLE 1

<u>Exemplary Device Charging Parameters</u>		
Device Charging Parameter	Device Type #1	Device Type #2
Overvoltage limit (V)	6.0	5.25
Undervoltage limit (V)	4.0	4.8
Overcurrent limit (mA)	800	400
Constant current (mA)	750	350
Battery full (mA)	40	20
Battery full (V)	4.15	4.22

[0037]

TABLE 2

<u>Exemplary Battery Charging Parameters</u>		
Battery Charging Parameter	Battery Type #1	Battery Type #2
Max. Charge time (Hours)	4.0	8.0
Battery Capacity (mAh)	1000	2000

'169 Purdy at [0036] – [0037].

		“Moreover, even if a charger detects the appropriate voltage level for charging a particular battery, as with the prior art discussed above, a particular battery may support voltage or current levels inside the acceptable ranges for device type #1, but outside those for device type #2, for example. Thus, while the same battery type may fit in both device types and have a suitable operating voltage for both, charging the battery at or near its maximum charge limits could exceed the acceptable range for device type #2, as will be appreciated by those skilled in the art. Of course, the opposite is also true, namely that a given portable device could support charging parameters that could damage a particular battery type.” ’169 Purdy at [0040]. Additionally, Tocci discloses operational parameters. For example:
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SECTION 1-5/DIGITAL CIRCUITS/LOGIC CIRCUITS

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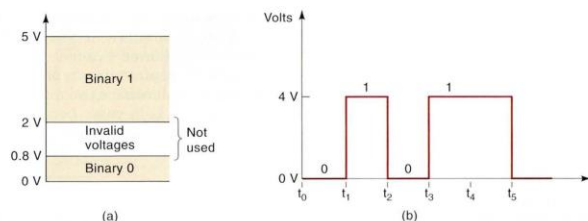


FIGURE 1-8 (a) Typical voltage assignments in digital system; (b) typical digital signal timing diagram.

for example, for the voltage assignments of Figure 1-8(a), a voltage of 3.6 V means the same as a voltage of 4.3 V. In analog systems, the exact value of a voltage is important. For instance, if the analog voltage is proportional to the temperature measured by a transducer, the 3.6 V would represent a different temperature than would 4.3 V. In other words, the voltage value carries significant information. This characteristic means that the design of accurate analog circuitry is generally more difficult than that of digital circuitry because of the way in which exact voltage values are affected by variations in component values, temperature, and noise (random voltage fluctuations).

Digital Signals and Timing Diagrams

Figure 1-8(b) shows a typical digital signal and how it varies over time. It is actually a graph of voltage versus time (t) and is called a **timing diagram**. The horizontal time scale is marked off at regular intervals beginning at t_0 and proceeding to t_1 , t_2 , and so on. For the example timing diagram shown here, the signal starts at 0 V (a binary 0) at time t_0 and remains there until time t_1 . At t_1 , the signal makes a rapid transition (jump) up to 4 V (a binary 1). At t_2 , it jumps back down to 0 V. Similar transitions occur at t_3 and t_5 . Note that the signal does not change at t_4 but stays at 4 V from t_3 to t_5 .

The transitions on this timing diagram are drawn as vertical lines, and so they appear to be instantaneous, when in reality they are not. In many situations, however, the transition times are so short compared to the times between transitions that we can show them on the diagram as vertical lines. We will encounter situations later where it will be necessary to show the transitions more accurately on an expanded time scale.

Timing diagrams are used extensively to show how digital signals change with time, and especially to show the relationship between two or more digital signals in the same circuit or system. By displaying one or more digital signals on an *oscilloscope* or *logic analyzer*, we can compare the signals to their expected timing diagrams. This is a very important part of the testing and troubleshooting procedures used in digital systems.

1-5 DIGITAL CIRCUITS/LOGIC CIRCUITS

Digital circuits are designed to produce output voltages that fall within the prescribed 0 and 1 voltage ranges such as those defined in Figure 1-8. Likewise, digital circuits are designed to respond predictably to input voltages that are within the defined 0 and 1 ranges. What this means is that a

		Tocci at 15.
Claim 5		
5.	The system of claim 1 wherein said signal detector is selected from the list comprising optical detectors, radio receivers, audio detectors and voltage peak detectors.	'263 Baarman discloses a signal detector being selected from the list comprising optical detectors, radio receivers, audio detectors and voltage peak detectors. For example: “An inductive power supply or primary circuit in accordance with an embodiment of the present invention is shown in FIG. 1, and generally designated 100. The primary circuit 100 includes a primary controller 110, a driver circuit 111 including a pair of drivers 112, 114, a switching circuit 115 including a pair of switches 116, 118, a tank circuit 120 a primary sensor 122 and an optional wireless receiver 124. The primary controller 110, driver circuit 111 and the switching circuit 115 together generate an AC signal at a selected frequency and selected duty cycle that is applied to the tank circuit 120 to create an inductive field for transferring power wirelessly to a secondary circuit.” '263 Baarman at [0019]. “A secondary circuit in accordance with an embodiment of the present invention is shown in FIG. 2, and generally designated 200. The secondary circuit 200 may include a secondary 210, a rectifier 212, a switch 214, a load 216, a current sensor 218 or voltage sensor 220, a secondary controller 222, a signal resistor 224 for communicating using reflected impedance and an optional wireless transmitter 226.” '263 Baarman at [0019]. “By sensing the voltage and/or current in the secondary circuit and knowing the voltage and/or current provided by the primary circuit, the primary controller can calculate the power transfer efficiency. By sweeping a range of operating frequencies, noting the power transfer efficiency at each frequency, the operating frequency closest to resonance can be determined—it corresponds with the operating frequency that yields the best power transfer efficiency. In addition, the voltage and current sensors 418, 422 can be used in conjunction with a protection algorithm in the secondary controller 428 to disconnect the load 424 if a fault condition is detected.” '263 Baarman at [0035]. “The current sensor 418 detects the amount of current in the received power and provides that information to the secondary controller 428. The voltage sensor 422 detects the amount of voltage in the received power and provides that information to the secondary controller 428.” '263 Baarman at [0035].

	To the extent '263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions. For example, '169 Purdy discloses a signal detector being selected from the list comprising optical detectors, radio receivers, audio detectors and voltage peak detectors: “The detection of the identification signal may be accomplished using a variety of methods. For example, the microprocessor 30 may detect the identification signal by detecting the presence of an abnormal data line condition at the USB port 25, for example. As noted above, one exemplary identification signal results from the application of voltage signals greater than two volts to both the D+ and D– lines by the controller 27. The foregoing will be further understood with reference to FIG. 4. [0033] Beginning at Block 220, the portable device 21 detects the presence of a voltage on the Vbus line of the USB connector 25, at Block 210. The mobile device 21 then checks the state of the D+ and D– lines, at Block 220. The D+ and D– lines are compared to a 2V reference, for example. The controller 27 of the charger 23 may apply a logic high signal, such as +5V reference, to both the D+ and D– lines. If the voltages on both the D+ and D– lines are greater than 2V, then the portable device 21 determines that it is not connected to a typical USB host or hub, and that the charger 23 has instead been detected (Block 230). The portable device 21 is then ready to charge the battery or otherwise use power provided via the Vbus and Gnd lines (Block 260) without waiting for enumeration, and without being limited by the power restrictions imposed by the USB specification, as will be appreciated by those skilled in the art.” '169 Purdy at [0032] – [0033]. “Moreover, even if a charger detects the appropriate voltage level for charging a particular battery, as with the prior art discussed above, a particular battery may support voltage or current levels inside the acceptable ranges for device type #1, but outside those for device type #2, for example. Thus, while the same battery type may fit in both device types and have a suitable operating voltage for both, charging the battery at or near its maximum charge limits could exceed the acceptable range for device type #2, as will be appreciated by those skilled in the art. Of course, the opposite
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		is also true, namely that a given portable device could support charging parameters that could damage a particular battery type.” ’169 Purdy at [0040]. “In addition, the controller 27 may also monitor the charging circuit 26 to detect a charging error during charging of the battery 22, at Block 50. By way of example, such charging errors may include over or undervoltage conditions, over or undercurrent conditions, excessive temperatures, etc. Upon detecting such an error, the controller 27 may provide an error indication via the indicator 33 (and/or an indicator of the portable device 21) upon detecting a charging error. The controller 27 may also take corrective action responsive to the error condition, such as limiting the charging voltage or current, or terminating charging, as illustratively shown at Block 52. If no such error is detected, then charging continues until a predetermined event occurs, such as a maximum charging time or charge level being reached, at Block 53.” ’169 Purdy at [0051]. Additionally, Tocci discloses voltage peak detectors. For example:
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SECTION 1-5/DIGITAL CIRCUITS/LOGIC CIRCUITS

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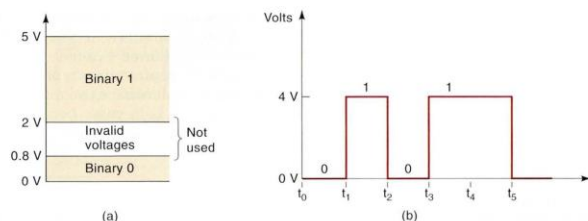


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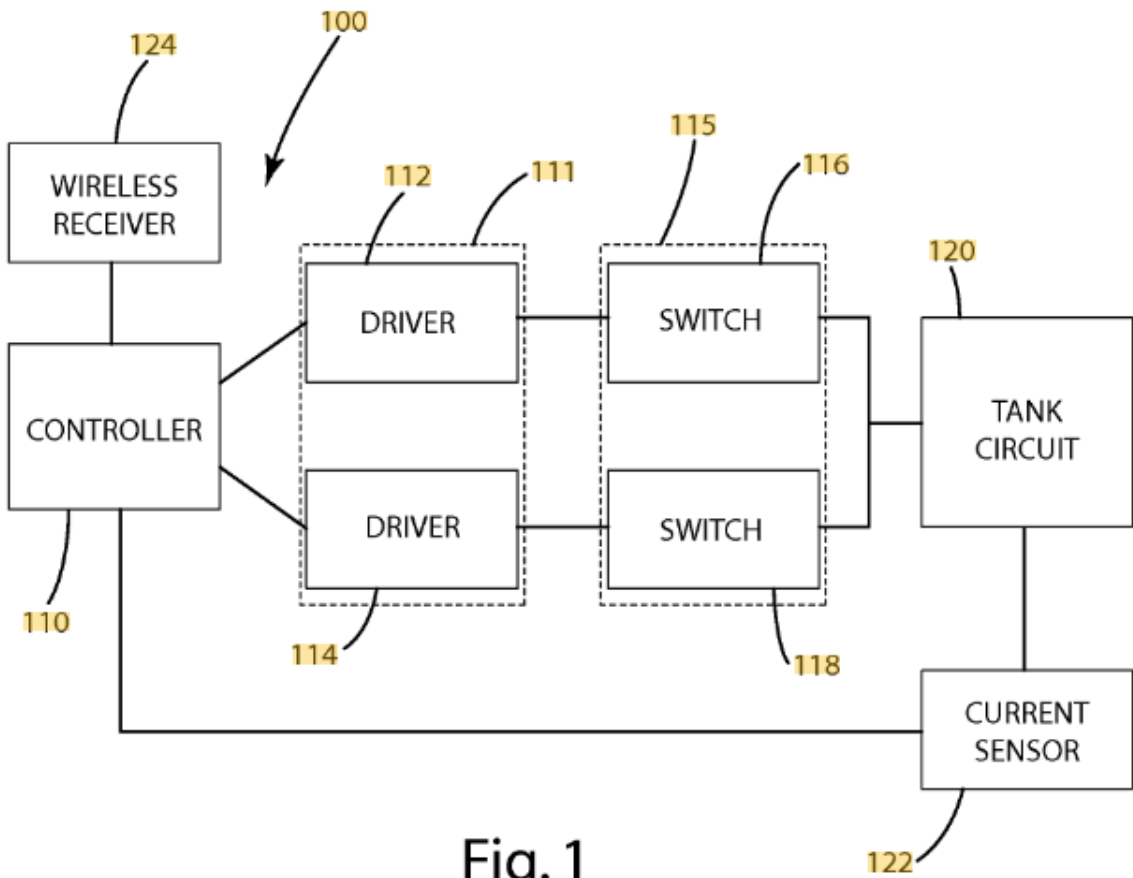
The transitions on this timing diagram are drawn as vertical lines, and so they appear to be instantaneous, when in reality they are not. In many situations, however, the transition times are so short compared to the times between transitions that we can show them on the diagram as vertical lines. We will encounter situations later where it will be necessary to show the transitions more accurately on an expanded time scale.

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1-5 DIGITAL CIRCUITS/LOGIC CIRCUITS

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		Tocci at 15.
Claim 6		
6.	The system of claim 1 wherein said driver further comprises a voltage monitor for monitoring the amplitude of a primary voltage across said primary coil.	'263 Baarman discloses driver further comprising a voltage monitor for monitoring the amplitude of a primary voltage across said primary coil. For example: “In one embodiment, the secondary circuit includes a secondary, a rectifier, a switch, a load, a sensor, a secondary controller, and a communication means. A voltage and/or current sensor detects characteristics about the power which are transmitted back to the primary controller using the communication means. Optionally, over-voltage and over-current protection may be provided. If a fault condition is detected the load is disconnected using the switch.” '263 Baarman at [0007]. “In one embodiment, a process for inductively powering a load by maintaining substantial resonance and adjusting duty cycle is provided. Initially an operating frequency and duty cycle are set to an acceptable value. The initial operating frequency is determined by sweeping a range of frequencies and selecting the operating frequency which provided the highest power transfer efficiency. The initial duty cycle is set to a relatively low value, such as 20%, to ensure that too much power is not delivered to the secondary. Once the initial values have been set, the inductive power supply enters a continuous process of adjusting the operating frequency to maintain substantial resonance and adjusting the duty cycle depending on whether the amount of power is too high or too low or temperature is too high.” '263 Baarman at [0008]. “A secondary circuit in accordance with an embodiment of the present invention is shown in FIG. 2, and generally designated 200. The secondary circuit 200 may include a secondary 210, a rectifier 212, a switch 214, a load 216, a current sensor 218 or voltage sensor 220, a secondary controller 222, a signal resistor 224 for communicating using reflected impedance and an optional wireless transmitter 226.” '263 Baarman at [0019].



'263 Baarman at Fig. 1.

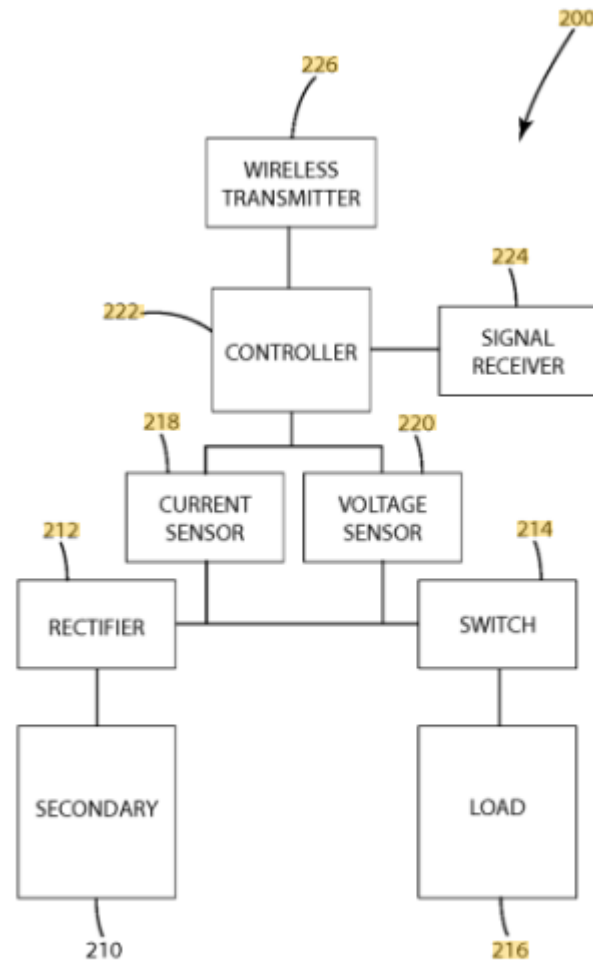


Fig. 2

'263 Baarman at Fig. 2.

“The primary controller 310 may also establish the duty cycle as a function of input from the current sensor 322. Planned shunting of the signal resistor on the secondary, which will be

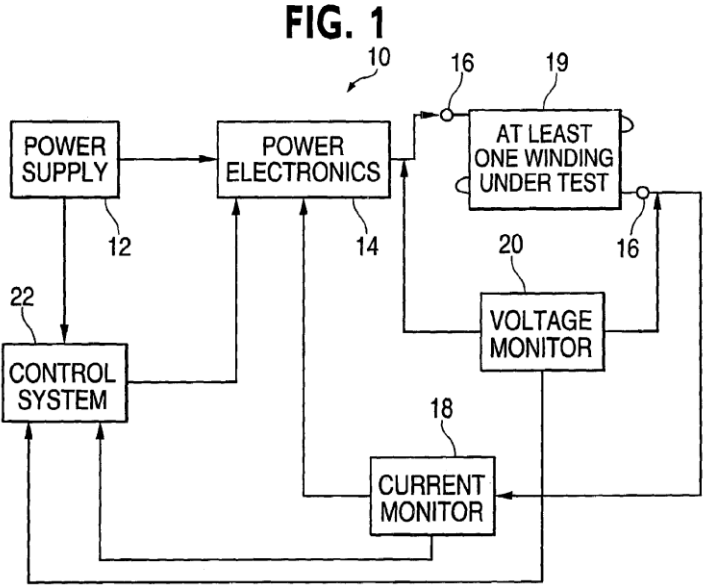
		described in more detail below, may be used to provide information to the primary using reflected impedance detected with the current sensor 322. Alternatively, the duty cycle may be established using a separate communication link, such as the wireless receiver 326, implemented in the current embodiment as an IR receiver. This could also be near field or other RF communication channels.” ’263 Baarman at [0030]. “In the illustrated embodiment, the current sensor 322 is a current transformer having a primary coil connected to the tank circuit and a secondary coil connected to the primary controller 310. In the current embodiment, the current sensor 322 includes circuitry to adjust the gain of the output of the current sensor to accommodate the ranges accepted by the primary controller 310. Further, the amount of gain may be adjusted by the primary controller 310 by applying a signal to the switch. The inductive power supply 300 may include conditioning circuitry 324 for conditioning the current transformer output before it is supplied to the primary controller 310. In the current embodiment, the conditioning circuitry 324 is a 5K Hz 2-pole filter. Although the illustrated embodiment includes a current transformer for sensing the reflected impedance of the secondary or remote device, the inductive power supply 300 may include essentially any alternative type of sensor capable of providing information regarding reflected impedance from the secondary 400. Further, although the current sensor 322 of the illustrated embodiment is connected directly to the tank circuit, the current sensor (or other reflected impedance sensor) can be located in essentially any location where it is capable of providing readings indicative of the reflected impedance.” ’263 Baarman at [0031]. “For purposes of disclosure, one embodiment of a secondary circuit 400 is shown in FIG. 4. In the embodiment of FIG. 4, the secondary circuit 400 generally includes a secondary 410 for receiving power from the inductive power supply 300, a rectifier 414 (or other components for converting AC power to DC), a low voltage power supply 412 that scales the received power to operate the secondary controller 428, conditioning circuitry 416, 426 to remove ripple in the signal, current sensor 418, voltage sensor 422, switch 420, load 424, secondary controller 428, a signal resistor 432 and an optional wireless transmitter 430. In operation, the rectifier 414 converts the AC power generated in the secondary 410 to DC power, which is typically needed to power the load.” ’263 Baarman at [0034]. “The current sensor 418 detects the amount of current in the received power and provides that information to the secondary controller 428. The voltage sensor 422 detects the amount of voltage in the received power and provides that information to the secondary controller 428.” ’263 Baarman at [0035].
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		“By sensing the voltage and/or current in the secondary circuit and knowing the voltage and/or current provided by the primary circuit, the primary controller can calculate the power transfer efficiency. By sweeping a range of operating frequencies, noting the power transfer efficiency at each frequency, the operating frequency closest to resonance can be determined—it corresponds with the operating frequency that yields the best power transfer efficiency. In addition, the voltage and current sensors 418, 422 can be used in conjunction with a protection algorithm in the secondary controller 428 to disconnect the load 424 if a fault condition is detected.” ’263 Baarman at [0035]. “Communication of the sensed voltage and/or current in the secondary may be transmitted to the primary controller 310 in a variety of ways. In the illustrated embodiment, the information may be transmitted using the signal resistor 432 or the wireless transmitter 430.” ’263 Baarman at [0037]. To the extent ’263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions. For example. ’169 Purdy discloses a driver further comprising a voltage monitor for monitoring the amplitude of a primary voltage across said primary coil: “The controller may also monitor the charging circuit to detect a charging error during charging of the rechargeable battery. By way of example, such charging errors may include over or undervoltage conditions, over or undercurrent conditions, excessive temperatures, exceeding a maximum charging time, etc. The battery charger may also include an indicator connected to the controller for providing an error indication upon detecting the charging error. For example, the error indicator could be an LED or LCD display. Also the charger connector may be a universal serial bus (USB) connector, for example.” ’169 Purdy at [0015]. “The controller 27 may also cause the portable device 21 to identify a battery charge level of the battery 22 and use this information in establishing the actual charging parameters. For example, the battery charge level may be communicated to the controller 27 by the microprocessor 30
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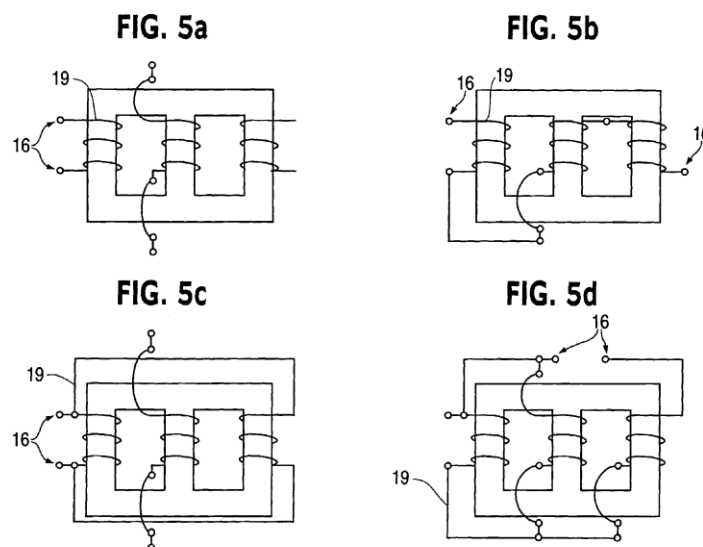
		along with the portable device and battery types (Block 41). The battery charge level may also be sent to the controller 27 during charging, if desired, to help determine when the battery 22 has reached its full charge. This could be done automatically by the microprocessor 30 at predetermined intervals, or upon request by the controller 27, for example. The controller 27 may also determine when the battery 22 has been fully charged based upon a charging parameter, e.g., a steady state current value which indicates when a battery has been completely charged, for example. [0051] In addition, the controller 27 may also monitor the charging circuit 26 to detect a charging error during charging of the battery 22, at Block 50. By way of example, such charging errors may include over or undervoltage conditions, over or undercurrent conditions, excessive temperatures, etc. Upon detecting such an error, the controller 27 may provide an error indication via the indicator 33 (and/or an indicator of the portable device 21) upon detecting a charging error. The controller 27 may also take corrective action responsive to the error condition, such as limiting the charging voltage or current, or terminating charging, as illustratively shown at Block 52. If no such error is detected, then charging continues until a predetermined event occurs, such as a maximum charging time or charge level being reached, at Block 53.” ’169 Purdy at [0050] – [0051]. Additionally, ’078 Frank discloses the driver further comprising a voltage monitor for monitoring the amplitude of a primary voltage across said primary coil. For example: “The method is based on connecting the at least one winding to the source of electrical energy; increasing driving power from the source of electrical energy applied to the at least one winding until current in the at least one winding provided from the source of electrical energy reaches a predetermined level which is below a core saturation current level of the transformer whose at least one winding is having its resistance measured or a current limit of the source of electrical energy; controlling the power from the source of electrical energy applied to the at least one winding to maintain the predetermined current flowing through the at least one winding over a desired time period sufficient to cause a $L \, di/dt$ contribution to the voltage drop across the at least one winding to decrease below a threshold level; and calculating the resistance of the at least one winding from the measured current flowing through the at least one winding and the voltage drop across the at least one winding.” ’078 Frank at 3:6-22.
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		“The method of transformer winding resistance measurements in accordance to the present invention is based on the active control of the voltage $V(t)$ in the Equation (1) to maintain a predetermined current flowing through the at least one winding over a desired period of time sufficient to cause a $L \, di/dt$ contribution to the voltage drop across the at least one winding to decrease below a threshold level. The power source in accordance to the present invention is shown in a block diagram in FIG. 1. A first embodiment of a transformer winding resistance measuring device 10 shown in FIG. 1 is powered by a power supply 12 which, when attached to an external source of electrical energy (not illustrated), provides electrical power to the components of the device. A controllable power electronics module 14 provides a desired test current signal with the maximum current substantially lower than the core saturation current to the connecting terminals 16 of the winding resistance measuring configuration 19 comprising at least one winding as for example illustrated in FIGS. 5 a–d. A current monitor 18 measures the current flowing in the winding resistance measuring configuration as for example without limitation illustrated in FIGS. 5 a–d during the testing, and a voltage monitor 20 that measures the voltage drop over the winding resistance measuring configuration 14. A control system 22 controls the controllable power module to generate the test current signal according to predetermined values, user input and measured currents and voltage drop values, calculates, stores, and communicates measured resistances, and provides interfacing with the device users. The power electronic module 14 can be designed as a controllable voltage source providing an increase of the driving voltage during the ramping of the current flowing through the at least one winding such as but not limited to the configuration of FIGS. 5 a–d. When the current approaches the desired predetermined test current value, the driving voltage is modified by a feedback loop or otherwise in order to stabilize the current flowing through the at least one winding, and achieve the $di/dt \approx 0$ condition. Equivalently, the power electronic module 14 can be designed as a controllable current source that directly controls the current inserted in the at least one winding through the connecting terminals 16, both during the current ramp-up to the desired test current value and during a measurement phase when the substantially constant measurement current with $di/dt \approx 0$ is maintained at which time the resistance of the at least one winding is calculated from the voltage and current measured by the current and voltage monitors 18 and 20. The voltage source and the current source designs are functionally equivalent. The inspection of the equation (1) directly implies that the increase of the voltage $V(t)$ must result in the positive
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		di/dt and the increase in the current $i(t)$. Once the condition $di/dt \approx 0$ is achieved, the voltage and current are linearly related and the control of either one of the two values causally results in the control of the other. The control system 22 continuously receives and stores the time-dependent values of the current flowing in the resistance measuring configuration measured by the current monitor 18 and the time-dependent values of the voltage drop as measured by the voltage monitor 20.” ’078 Frank at 5:50-6:42. “The method of operation of the transformer winding resistance measuring device 10 shown in FIG. 1 is presented in the flowchart form in FIG. 2. The flowchart illustrates a feedback loop controlled algorithm.” ’078 Frank at 7:18-21. “The current i flowing throw the winding measuring configuration 19 and the voltage drop v over the winding measuring configuration is sampled during the measurement as represented by step 39.” ’078 Frank at 7:44-47. “The active current control feature of the apparatus of the invention that keeps $di(\infty)/dt \approx 0$ also means that the magnetic relationship between different transformer windings does not influence resistance measurements. Any individual transformer winding (primary, secondary, tertiary, diagnostic etc.) can comprise a winding resistance measuring configuration, as shown without limitation in the FIG. 5 a, and can be measured independently. Also any set of windings can be connected in series (FIG. 5 b), parallel (FIG. 5 c), or a parallel-series winding resistance measuring configuration (FIG. 5 d) and the equivalent resistance may be measured without regard of any other winding not connected in the winding resistance measuring configuration. The equivalent resistance measurement of a series winding resistance measuring configuration of (FIG. 5 b) is frequently used in the transformer diagnostic art for detection of the potential damages of winding conductors. The parallel winding resistance measuring configuration (FIG. 5 c) can be used for detection of the insulation failure between windings, while the parallel-series winding resistance measuring configuration (FIG. 5 d) can be beneficial for diagnostics of multiphase transformers.” ’078 Frank at 8:52-9:6.
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'078 Frank at Figure 1.



'078 Frank at Figure 5.

“1. A method for measuring resistance of at least one winding of a transformer utilizing a test current with a maximum test current less than either a core saturation current of a transformer whose at least one winding is having its resistance measured or a current limit of a source of electrical energy used for measuring of the resistance comprising:
 selecting at least one transformer winding for measurement of winding resistance of the at least one winding;
 connecting the at least one winding to the source of electrical energy;
 increasing driving power from the source of electrical energy applied to the at least one winding until current in the at least one winding provided from the source of electrical energy reaches a predetermined level which is below a core saturation current level of the transformer whose at least one winding is having its resistance measured or a current limit of the power source of electrical energy;

		controlling the power from the source of electrical energy applied to the at least one winding to maintain the predetermined current flowing through the at least one winding over a time period sufficient to cause a $L \, di/dt$ contribution to a voltage drop across the at least one winding to decrease below a threshold level; and calculating the resistance of the at least one winding from a measured current flowing through the at least one winding and a voltage drop across the at least one winding which are measured after the time period.” ’078 Frank at Claim 1. “7. The method of claim 1 wherein the power of the source of the electrical energy is controlled to maintain the predetermined current flowing in the at least one winding over the time period is achieved automatically using a feedback loop.” ’078 Frank at Claim 7. “12. The method of claim 7 wherein the feedback loop uses a measured voltage drop over the at least one winding as the input control parameter of a control of the power source of electrical energy.” ’078 Frank at Claim 12. Additionally, Tocci discloses monitoring voltage amplitude. For example:
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		CHAPTER 1/INTRODUCTORY CONCEPTS often electronic, but they can also be mechanical, magnetic, or pneumatic. Some of the more familiar digital systems include digital computers and calculators, digital audio and video equipment, and the telephone system—the world’s largest digital system. An analog system contains devices that manipulate physical quantities that are represented in analog form. In an analog system, the quantities can vary over a continuous range of values. For example, the amplitude of the output signal to the speaker in a radio receiver can have any value between zero and its maximum limit. Other common analog systems are audio amplifiers, magnetic tape recording and playback equipment, and a simple light dimmer switch. Advantages of Digital Techniques An increasing majority of applications in electronics, as well as in most other technologies, use digital techniques to perform operations that were once performed using analog methods. The chief reasons for the shift to digital technology are: 1. <i>Digital systems are generally easier to design.</i> The circuits used in digital systems are <i>switching circuits</i>, where <i>exact</i> values of voltage or current are not important, only the range (HIGH or LOW) in which they fall. 2. <i>Information storage is easy.</i> This is accomplished by special devices and circuits that can latch onto digital information and hold it for as long as necessary, and mass storage techniques that can store billions of bits of information in a relatively small physical space. Analog storage capabilities are, by contrast, extremely limited. 3. <i>Accuracy and precision are easier to maintain throughout the system.</i> Once a signal is digitized, the information it contains does not deteriorate as it is processed. In analog systems, the voltage and current signals tend to be distorted by the effects of temperature, humidity, and component tolerance variations in the circuits that process the signal. 4. <i>Operation can be programmed.</i> It is fairly easy to design digital systems whose operation is controlled by a set of stored instructions called a <i>program</i>. Analog systems can also be <i>programmed</i>, but the variety and the complexity of the available operations are severely limited. 5. <i>Digital circuits are less affected by noise.</i> Spurious fluctuations in voltage (noise) are not as critical in digital systems because the exact value of a voltage is not important, as long as the noise is not large enough to prevent us from distinguishing a HIGH from a LOW. 6. <i>More digital circuitry can be fabricated on IC chips.</i> It is true that analog circuitry has also benefited from the tremendous development of IC technology, but its relative complexity and its use of devices that cannot be economically integrated (high-value capacitors, precision resistors, inductors, transformers) have prevented analog systems from achieving the same high degree of integration. Limitations of Digital Techniques There are really very few drawbacks when using digital techniques. The two biggest problems are: The real world is analog. Processing digitized signals takes time.
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		Tocci at 6.
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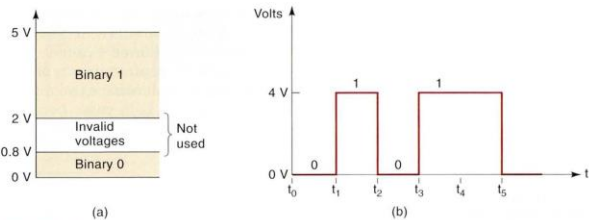


FIGURE 1-8 (a) Typical voltage assignments in digital system; (b) typical digital signal timing diagram.

for example, for the voltage assignments of Figure 1-8(a), a voltage of 3.6 V means the same as a voltage of 4.3 V. In analog systems, the exact value of a voltage is important. For instance, if the analog voltage is proportional to the temperature measured by a transducer, the 3.6 V would represent a different temperature than would 4.3 V. In other words, the voltage value carries significant information. This characteristic means that the design of accurate analog circuitry is generally more difficult than that of digital circuitry because of the way in which exact voltage values are affected by variations in component values, temperature, and noise (random voltage fluctuations).

Digital Signals and Timing Diagrams

Figure 1-8(b) shows a typical digital signal and how it varies over time. It is actually a graph of voltage versus time (t) and is called a **timing diagram**. The horizontal time scale is marked off at regular intervals beginning at t_0 and proceeding to t_1, t_2 , and so on. For the example timing diagram shown here, the signal starts at 0 V (a binary 0) at time t_0 and remains there until time t_1 . At t_1 , the signal makes a rapid transition (jump) up to 4 V (a binary 1). At t_2 , it jumps back down to 0 V. Similar transitions occur at t_3 and t_5 . Note that the signal does not change at t_4 but stays at 4 V from t_3 to t_5 .

The transitions on this timing diagram are drawn as vertical lines, and so they appear to be instantaneous, when in reality they are not. In many situations, however, the transition times are so short compared to the times between transitions that we can show them on the diagram as vertical lines. We will encounter situations later where it will be necessary to show the transitions more accurately on an expanded time scale.

Timing diagrams are used extensively to show how digital signals change with time, and especially to show the relationship between two or more digital signals in the same circuit or system. By displaying one or more digital signals on an *oscilloscope* or *logic analyzer*, we can compare the signals to their expected timing diagrams. This is a very important part of the testing and troubleshooting procedures used in digital systems.

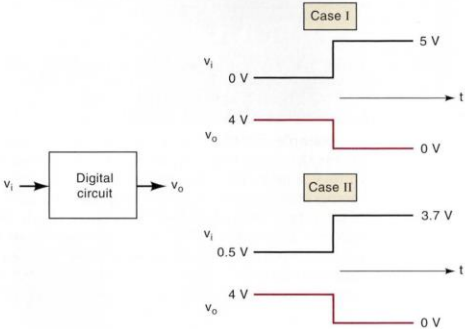
1-5 DIGITAL CIRCUITS/LOGIC CIRCUITS

Digital circuits are designed to produce output voltages that fall within the prescribed 0 and 1 voltage ranges such as those defined in Figure 1-8. Likewise, digital circuits are designed to respond predictably to input voltages that are within the defined 0 and 1 ranges. What this means is that a

digital circuit will respond in the same way to all input voltages that fall within the allowed 0 range; similarly, it will not distinguish between input voltages that lie within the allowed 1 range.

To illustrate, Figure 1-9 represents a typical digital circuit with input v_i and output v_o . The output is shown for two different input signal waveforms. Note that v_o is the same for both cases because the two input waveforms, while differing in their exact voltage levels, are at the same binary levels.

FIGURE 1-9 A digital circuit responds to an input's binary level (0 or 1) and not to its actual voltage.



Logic Circuits

The manner in which a digital circuit responds to an input is referred to as the circuit's *logic*. Each type of digital circuit obeys a certain set of logic rules. For this reason, digital circuits are also called **logic circuits**. We will use both terms interchangeably throughout the text. In Chapter 3, we will see more clearly what is meant by a circuit's "logic."

We will be studying all the types of logic circuits that are currently used in digital systems. Initially, our attention will be focused only on the logical operation that these circuits perform—that is, the relationship between the circuit inputs and outputs. We will defer any discussion of the internal circuit operation of these logic circuits until after we have developed an understanding of their logical operation.

Digital Integrated Circuits

Almost all of the digital circuits used in modern digital systems are integrated circuits (ICs). The wide variety of available logic ICs has made it possible to construct complex digital systems that are smaller and more reliable than their discrete-component counterparts.

Several integrated-circuit fabrication technologies are used to produce digital ICs, the most common being CMOS, TTL, NMOS, and ECL. Each differs in the type of circuitry used to provide the desired logic operation. For example, TTL (transistor-transistor logic) uses the bipolar transistor as its main circuit element, while CMOS (complementary metal-oxide-semiconductor) uses the enhancement-mode MOSFET as its principal circuit element. We will learn about the various IC technologies, their characteristics, and their relative advantages and disadvantages after we master the basic logic circuit types.

		Tocci at 15-16.
Claim 8		
8.	The system of claim 1 comprising a power converter selected from the group comprising: a transformer, a DC-to-DC converter, an AC-to-DC converter, an AC-to-AC converter, a flyback transformer, a flyback converter, a full-bridge converter, a half-bridge converter and a forward converter.	'263 Baarman discloses a power converter selected from the group comprising: a transformer, a DC-to-DC converter, an AC-to-DC converter, an AC-to-AC converter, a flyback transformer, a flyback converter, a full-bridge converter, a half-bridge converter and a forward converter. For example: “The primary circuit 300 may also include a low voltage power supply 312 for supplying low voltage power to the primary controller 310, the driver circuit as well as any other components requiring low voltage power for operation. In the illustrated embodiment the low voltage power supply 312 provides scales the input voltage to 3.3 volts. In alternative embodiments, a different voltage may be provided.” '263 Baarman at [0024]. “For purposes of disclosure, one embodiment of a secondary circuit 400 is shown in FIG. 4. In the embodiment of FIG. 4, the secondary circuit 400 generally includes a secondary 410 for receiving power from the inductive power supply 300, a rectifier 414 (or other components for converting AC power to DC), a low voltage power supply 412 that scales the received power to operate the secondary controller 428, conditioning circuitry 416, 426 to remove ripple in the signal, current sensor 418, voltage sensor 422, switch 420, load 424, secondary controller 428, a signal resistor 432 and an optional wireless transmitter 430. In operation, the rectifier 414 converts the AC power generated in the secondary 410 to DC power, which is typically needed to power the load.” '263 Baarman at [0034]. To the extent '263 Baarman does not disclose any elements of this claim limitation, it would have been obvious to a person having ordinary skill in the art to combine, with the teachings of the Prior Art, those elements, as known to them or as disclosed by other prior art identified in the invalidity contentions. For example, '169 Purdy discloses a power converter selected from the group comprising: a transformer, a DC-to-DC converter, an AC-to-DC converter, an AC-to-AC converter, a flyback transformer, a flyback converter, a full-bridge converter, a half-bridge converter and a forward converter:

		“Another example is disclosed in U.S. Pat. No. 6,362,610 to Yang. More particularly, this patent discloses a universal USB power supply unit which includes a USB port connector and a charging connector. The USB port connector plugs into the jack of the USB port, while the charging connector plugs into the jack of an electronic product to be charged. The current flowing into the USB port connector will then pass through an automatic voltage regulator. Disposed within a housing of the automatic voltage regulator is a DC voltage transformer which transforms the DC voltage (e.g., 5 V) coming from the USB port to the requisite voltage supplied to a power/signal connecting jack. A feedback control voltage output circuit compares the feedback voltage signal of the power/signal connecting jack and enables the DC voltage transformer to output a preset voltage. The charging connector is fitted with a power cord which includes a power/signal connector to fit the power/signal connecting jack. Moreover, a voltage parameter associated with the particular electronic device is preset within the charging connector using a variable resistor.” ’169 Purdy at [0005]. “Once the actual charging parameters are established, the charger 23 then causes the charging circuit 26 to charge the battery 22 in accordance with these actual charging parameters, at Block 47. The charging circuit 26 may include a power supply or transformer for converting power from either an AC or DC source to the appropriate charging voltage based upon the actual charging parameters. Of course, the charging circuit 26 need not include a power supply/transformer in all embodiments. For example, in some applications the charging circuit 26 may receive power (i.e., 5 V) from the host device via the VBUS line. Moreover, the power supply may be carried in a different housing than the controller 27, for example, such as in the case of a wall plug transformer. Various configurations of the charging circuitry 26 will be readily apparent to those skilled in the art based upon a given application.” ’169 Purdy at [0049]. Additionally, Tocci discloses a power converter selected from the group comprising: a transformer, a DC-to-DC converter, an AC-to-DC converter, an AC-to-AC converter, a flyback transformer, a flyback converter, a full-bridge converter, a half-bridge converter and a forward converter.
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