(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
9 December 2010 (09.12.2010)

PCT

(10) International Publication Number
WO 2010/141451 A1

(51) International Patent Classification:
G06K 7/00 (2006.01) *G06F 7/00* (2006.01)
G06K 19/07 (2006.01) *H01Q 1/00* (2006.01)
G06K 19/077 (2006.01) *H01H 13/00* (2006.01)

(21) International Application Number: PCT/US2010/036878

(22) International Filing Date: 1 June 2010 (01.06.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
12/477,064 2 June 2009 (02.06.2009) US

(71) Applicant *(for all designated States except US)*: **SIRIT TECHNOLOGIES INC.** [CA/CA]; 372 Bay Street, Suite 1100, Toronto, Ontario M5H 2W9 (CA).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **ROESNER, Bruce B.** [US/US]; 24 Brookside Place, Durham, North Carolina 27705 (US).

(74) Agents: **COX, Michael E.** et al.; Fish & Richardson P.C., P.O. Box 1022, Minneapolis, Minnesota 55440-1022 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH,

[Continued on next page]

(54) Title: SWITCHING RADIO FREQUENCY IDENTIFICATION (RFID) TAGS

(57) Abstract: The present disclosure is directed to switching RFID tags (120). The RFID system includes an RFID tag (120) and a panel. The panel (210, 310) includes one or more contacts configured to move between a first position and a second position. The second position forms an electrical connection between the RFID tag and the one or more contacts to update a state of the RFID tag.

FIG. 3A

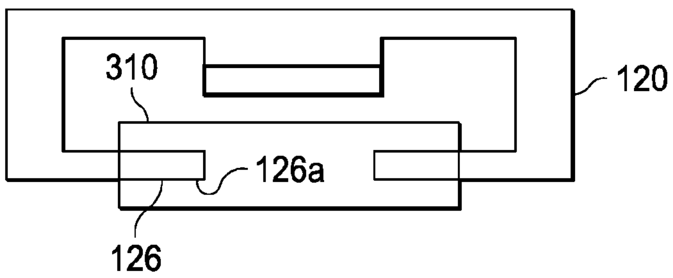
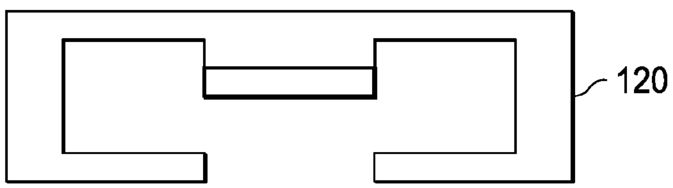


FIG. 3B



WO 2010/141451 A1

GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

— *with international search report (Art. 21(3))*

Switching Radio Frequency Identification (RFID) Tags

CLAIM OF PRIORITY

This application claims priority to U.S. Patent Application Serial No. 12/477,064, filed on June 2, 2009, the entire contents of which are hereby incorporated by reference.

TECHNICAL FIELD

This application relates to switching Radio Frequency Identification (RFID) tags.

BACKGROUND

RFID tags are used in a multitude of situations and may need to operate in two or more distinct conditions or states. A basic example of when an RFID tag is configured to alternate between two different states is when an RFID tag can be activated and deactivated. RFID tags may be deactivated by disrupting the radio frequency (RF) field of the tag. The utility of RFID tags, however, depends on their size, simplicity, and efficiency, and methods for deactivating RFID tags should take into account these factors. Further, as RFID tags transition between states, the present state of the RFID tag may be difficult to ascertain. It may be especially challenging to conveniently and accurately determine the current state of RFID tags that are configured to operate in more than two different states.

SUMMARY

The present disclosure is directed switching RFID tags. In some implementations, the RFID system includes an RFID tag and a panel. The panel includes one or more contacts configured to move between a first position and a second position. The second position forms an electrical connection between the RFID tag and the one or more contacts to update a state of the RFID tag.

The details of one or more embodiments of the invention are set forth in the accompanying drawings and the description below. Other features, objects, and advantages of the invention will be apparent from the description and drawings, and from the claims.

DESCRIPTION OF DRAWINGS

FIGURE 1 illustrates an example system for identifying a state of an RFID tag;

FIGURES 2A-B illustrate an example RFID tag configured to deactivate the RF carrier of the RFID tag;

FIGURES 3A-B illustrate an example RFID tag configured to disable the antenna of the RFID tag;

FIGURES 4A-B illustrate a conceptual apparatus and method of FIGURES 3A-B for deactivating an RFID tag;

FIGURES 5A-B illustrate an example implementation of the apparatus of FIGURES 3A-B configured for deactivation and visual identification of the state of an RFID tag;

FIGURES 6A-B illustrate an example implementation of the apparatus of FIGURES 3A-B configured for deactivation and visual identification of the state of an RFID tag;

FIGURES 7A-C illustrate an example multi-level switched state RFID tag configured for switching between multiple, visually identifiable states;

FIGURES 8A-C illustrate enlarged views of a multi-level switched state RFID tag, such as the RFID tag of FIGURES 7A-C; and

FIGURE 9 is a low-level view of an internal circuit of an RFID tag, such as the RFID tag of FIGURES 7A-C.

Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION

FIGURE 1 illustrates an example system 100 for updating states of Radio Frequency Identification (RFID) tags in accordance with some implementations of the present disclosure. A state may include one of a plurality of different modes of operation of an RFID tag such as active states, deactivated, an idle state, and/or any other operational state of the RFID tag. For example, an RFID tag may be configured to switch between a first state and a second state such as activated and deactivated. In some implementations, the tag state can be updated through suppression of the Radio Frequency (RF) field and/or through changing the state of the tag by redirecting a portion of the RF energy. For example, the electrical change may be accomplished by blocking the RF carrier, shorting the RF voltage on the tag, and/or rectifying the RF energy to generate a logic state. In addition, the RFID tag may include one or more visual indicators that identify a state of the RFID tag. In these instances, the RFID tag may present, in a first configuration, a first color (*e.g.*, green) indicating an activated state and, in a second configuration, a second color (*e.g.*, red) indicating deactivated. For example, the system 100 may include RFID tags with one or more moveable elements configured to update a tag state and visually indicate the associated tag state in response to at least the moveable elements being switched between two positions. In some implementations, the system 100 can include or execute one or more of the following: updating a tag state in response to at least one or more moveable elements switched between one or more positions; visually presenting one or more indications identifying a state of an RFID tag; deactivating an RFID tag by blocking the RF carrier; electrically shorting the RF voltage of an RFID tag; rectifying the RF energy to generate a logic state; and/or other processes. For example, the RF voltage on the tag may be shorted by placing a metal shorting bar or element across the RFID antenna using metal foil on a slide or hinged cover. Alternatively, or in combination, a moveable element may update a logic state of the tag in response to at least the tag positioned in one of a plurality of selectable position. For example, the RFID tag may be switched between three or more states in response to the moveable element being positioned between different locations with each associated with a different state. In some implementations, the system 100 may provide or otherwise include visual indications of the state of an RFID tag, the capability to deactivate an RFID tag with minimal effect on the tag's performance, state updates independent of mechanical contacts (*e.g.*, capacitive coupling), and/or other advantages. For instance, RFID tags capable of switching between multiple, visually identifiable states may be beneficial in transportation systems. For example, the RFID tags may be used in vehicles for electronic toll collection, vehicle identification or routing, traffic monitoring, and/or other uses. The state of the RFID tag may be visually recognized by both passengers within a vehicle and onlookers outside the vehicle.

At a high level, the system 100 can, in some implementations, include one or more RFID tags 120a-c and readers 140a-b. If multiple RFID tags 120 are used, the RFID tags 120 may be used in isolation or grouped together with other RFID tags 120a-c. Each RFID tag 120 may wirelessly communicate one or more RFID readers 140 through an antenna 126. In certain implementations, each RFID tag 120 can include one or more moveable elements, such as a panel 122, that includes one or more conductive pads 124. The panel 122 may be manufactured separately from and later attached or otherwise affixed to the RFID tag 120. The conductive pads 124 may be mounted or otherwise arranged on the panel 122 to align with one or more elements of the RFID tag 120 in one of a plurality of selectable positions associated with the panel 122. In response to a selectable position of the panel 122, the conductive pads 124 for each RFID tag 120 may form a direct or indirect electrical connection to the RFID tag 120 that updates the tag state, such as deactivation or an update to the logic state. The elements of the panel 122 and/or the RFID tag 120 may visually identify a tag state based on, for example, the position of the panel and/or markings of the panel 122 and/or the RFID tag 120. In some examples, a panel 122 in a first position that does not form a connection with the conductive pad 124 with the RFID tag 120 may visually indicate an activated state, whereas a panel 122 in a second position that forms an electrical connection between the conductive pad 124 the RFID tag 120 may visually indicate a deactivated state. Panel 122 may move between the first and second position by way of a variety of methods such as, for example, rotating about a hinge, sliding between positions, folding the panel 122, and/or other methods.

The RFID tags 120 can include any software, hardware, and/or firmware configured to respond to communication from the RFID reader 140. These tags 120 may operate without the use of an internal power supply. Rather, the tags 120 may transmit a reply to a received signal using power stored from the previously received RF signals, independent of an internal power source. This mode of operation is typically referred to as backscattering. In some implementations, the tags 120 alternate between absorbing power from signals transmitted by the RFID reader 140 and transmitting responses to the signals using at least a portion of the absorbed power. In passive tag operation, the tags 120 typically have a maximum allowable time to maintain at least a minimum DC voltage level. In some implementations, this time duration is determined by the amount of power available from an antenna of a tag 120 minus the power consumed by the tag 120 and the size of the on-chip capacitance. The effective capacitance can, in some implementations, be configured to store sufficient power to support the internal DC voltage when there is no received RF power available via the antenna. The tag 120 may consume the stored power when information is either transmitted to the tag 120 or the tag 120 responds to the RFID reader 140 (*e.g.*, modulated signal on the antenna input). In transmitting responses back to the RFID reader 140, the tags 120 may include one or more of the following: an identification string, locally stored data, tag state, internal temperature, and/or others. For example, the tag 120 may transmit information including or otherwise identifying vehicle information such as type, weight, vehicle height, tag height, account number, owner information (*e.g.*, name, license number), and/or other information. In some implementations, the signals can be based, at least in part, on sinusoids having frequencies in the range of 902-928 MHz or 2400-2483.5 MHz. In some implementations, an RFID tag 120 in the inhibited zone may be of a type manufactured to support the ISO 18000-6C standard. An RFID tag manufactured to ISO 18000-6C standard may support dual states: an A state, in which the RFID tag is responsive to RF interrogation, and a B state, in which the RFID tag is temporarily unresponsive to RF interrogation. Under the ISO 18000-6C standard, an RFID tag may typically remain in an unresponsive B state for between 0.8 seconds and 2.0 seconds even without any further power being supplied to the RFID tag 120.

In the illustrated implementations, the RFID tag 120 includes a panel 122, electrical contacts 124, and the antenna 126. The panel 122 may include one or more moveable elements that switch between a plurality of selectable positions. In some implementations, the panel 122 may slide between different positions associated with different tag states. In some implementations, the panel 122 may fold between two positions associated with different states. In some implementations, the panel 122 may present one or more visual indicators identifying a current state of the RFID tag. In a first configuration, the panel 122 may present a green color indicating an active state to observers, and in a second configuration, the panel 122 may present a red color indicating a deactivated state to observers. In response to switching between different configurations, the electrical contacts 124 may dynamically update a state of the RFID tag 120. The electrical contacts 124 may form a shield that substantially prevents the RFID tag 120 from receiving RF signals and/or may form direct or indirect electrical connections with the RFID tag 120 to update the state. In some implementations, the electrical contacts 124 may shield, using conductive elements, the RFID tag 120 to substantially prevent reception of RF signals. For example, the electrical contacts 124 may include a metal foil that overlays at least a portion of the RFID 120 in a first position such that the metal foil substantially shields the antenna 126. In some implementations, the electrical contacts 124 may deactivate the tag 120 by shorting the antenna. For example, the electrical contacts 124 may include a conductive bar that directly or indirectly contacts the antenna 126 to form a short.

The RFID reader 140 can include any software, hardware, and/or firmware configured to transmit and receive RF signals. In general, the RFID reader 140 may transmit a request for information within a certain geographic area, or interrogation zone, associated with the reader 140. The reader 140 may transmit the query in response to a request, automatically, in response to a threshold being satisfied (*e.g.*, expiration of time), as well as other events. The interrogation zone may be based on one or more parameters such as transmission power, associated protocol, nearby impediments (*e.g.*, objects, walls, buildings), as well as others. In general, the RFID reader 140 may include a controller, a transceiver coupled to the controller (not illustrated), and at least one RF antenna 142 coupled to the transceiver. In the illustrated example, the RF antenna 142 transmits commands generated by the controller through the transceiver and receives responses from RFID tags 120 and/or antennas 126 in the associated interrogation zone. In certain cases such as tag-talks-first (TTF) systems, the reader 140 may not transmit commands but only RF energy. In some implementations, the controller can determine statistical data based, at least in part, on tag responses. The readers 140 often include a power supply or may obtain power from a coupled source for powering included elements and transmitting signals. In some implementations, the reader 140 operates in one or more of frequency bands allotted for RF communication. For example, the Federal Communication Commission (FCC) has assigned 902-928 MHz and 2400-2483.5 MHz as frequency bands for certain RFID applications. In some implementations, the reader 140 may dynamically switch between different frequency bands. For example, the reader 140 may switch between European bands 860 to 870 MHz and Japanese frequency bands 952 MHz to 956 MHz. Some implementations of system 100 may further include an RFID reader 140 to control timing, coordination, synchronization, and/or signal strength of transmissions by inhibitor antenna and RFID antenna.

In general, RFID tags 120 may switch between activated and deactivated states. In some implementations, deactivation of an RFID tag 120 ordinarily involves suppressing the RF field of the RFID tag. The suppression of the RF field can be accomplished by physically blocking the RF carrier or electrically deactivating the

RFID tag's antenna. FIGURES 2A-B illustrate an example RFID tag that is deactivated by physically blocking the RF signal carrier 126. This may be accomplished by placing a metal plate 210 in close proximity to the RFID tag 120 as shown in FIGURE 2B. The metal plate 210 may be metal foil, which can be placed in front of or behind the RFID tag 120. RFID tag 120 may be operational when the metal plate 210 is removed from the vicinity of the tag 120 as in FIGURE 2A but may be deactivated when the metal plate is placed in close proximity with the RFID tag 120 as in FIGURE 2B. The metal plate may substantially block the RF signals between the tag 120 and the reader 140.

FIGURES 3A-B illustrate another example RFID tag 120 that deactivaties by shorting the antenna 126. The RFID tag 120 may be disabled by electrically short-circuiting, or shorting, the leads 302a and 302b of the antenna 126. In the illustrated implementation, the RFID tag 120 is shorted by selectively positioning a metal bar 310 across the antenna 126 as shown in FIGURE 3A. Thus, when the metal shorting bar 310 forms a short circuit across the leads 302a and 302b, the antenna 126 is deactivated. When the shorting bar 310 is removed, as depicted in FIGURE 3B, the RFID tag 120 and antenna 126 are operational. In some implementations, the metal bar 310 may form indirect electrical contacts through capacitive coupling between the antenna leads 302a and 302b and the shorting bar 310. Close proximity between the leads 302 and the bar 310 may yield similar results to ohmic contacts. In these instances, the RFID tag 120 may deactivate the metal shorting bar 310, which is less metal than the metal plate 210. In addition, the metal shorting bar 310 may interfere less with the tag 120 during an activate state as compared with the plate 210.

FIGURES 4A-B illustrate yet another example RFID tag 120 that deactivates by shorting the leads 302a and 302b. In the illustrated implementation, the RFID tag 120 includes a switch 410 with one electrical contact connected to the lead 302a and a second contact connected to the lead 302b. Referring to FIGURE 4A, when the switch 410 is closed, the switch 410 connects the leads 302 of the antenna 126 to form a short. The closed switch 410 shorts the leads 302 to disable the RF functionality of the antenna 126. Referring to FIGURE 4B, when the switch 410 is open, the leads 302 are not shorted and form an open circuit. In this instance, the leads 302 of the antenna 126 are activated and the RFID tag 120 is operational.

FIGURES 5A-B illustrate another example RFID tag 120 that deactivates using a sliding plate 510. Referring to FIGURE 5A, the RFID tag 120 may include a case 520 including the RFID tag 120 affixed to a surface of the case 520. The pull-out slide 510 slides two different positions as illustrated in FIGURES 5A and 5B. The pull-out slide 510 includes a metal strip 530 attached to the surface of the pull-out slide 510, and the metal strip 530 operates as a shorting bar capable of deactivating the RFID tag 120. For example, the metal strip 530 may form electrical connections with the antenna 126 in the configuration illustrated in FIGURE 2B. In general, the metal strip 530 may slide between a first position and a second position in response to a user positioning the slide 510 between two positions. In the active state, the slide 510 is inserted into or substantially enclosed by the cover 520 with the metal strip 530 not forming a shorting contact. Accordingly, this example tag 120 may allow easy activation and deactivation of the RFID tag 120 by pulling and inserting a pull-out slide 510 out of and into the case 520. Further, in some implementations, the slide can visually indicate the tag state, *i.e.*, activated or deactivated. For example, the pull-out slide 510 may be marked a particular color, and an extended slide 510 can provide visual confirmation that the RFID tag 120 has been disabled. Similarly, the absence of the color may indicate that the slide 510 has been inserted into the case 520 and that the RFID tag 120 is activated.

FIGURES 6A-B illustrate another example implementation of an RFID tag that is deactivated by shorting the leads 302 of the RFID antenna 126. In the illustrated example, an RFID tag 120 includes a case 620, and the RFID tag 120 is affixed to the surface of the case 620. A cover 610 is attached to the case 620 along a hinge or fold such that the cover 610 rotates about the hinge or fold between an open position and a closed position. In certain implementations, the cover 610 may be structurally similar to the slide 510 described in FIGURES 5A-B, with the difference that the cover 610 moves between two positions via a hinge or fold as opposed to a sliding mechanism. As seen in FIGURE 6A, when the cover 610 is in an open position, the RFID tag 120 is in an active state. When the cover 610 is in a closed position as shown in FIGURE 6B, the RFID tag 120 is deactivated. Attached to the surface of the cover 610 is a metal strip 630 that operates as a shorting bar to deactivate the tag 120 in the second configuration illustrated in FIGURE 6B. The metal strip 630 comes in contact and/or overlaps the leads 302a and 302b to form electrical contacts. In these instances, the metal strip 630 forms a short circuit between the leads 302 of the RFID antenna 126, and the RFID tag 120 is deactivated. When the cover 610 is open as depicted in FIGURE 6A, the metal strip 630 no longer shorts the antenna 126 and results in activation of the tag 120. In other words, the RFID tag 120 is activated when the cover 610 is in an open position and deactivated when the cover 610 is in a closed position. In addition, the cover 610 may visually identify whether the tag 120 is activated or deactivated. For example, the inner surface of the cover 610 may be marked one color and the outer surface of the cover 610 may be marked a different color. Thus, when the cover 610 is in a closed position, only one color is visually apparent, indicating that the RFID tag 120 is deactivated. Likewise, when the cover 610 is opened, a separate color is visible, indicating that the RFID tag 120 is activated.

Some applications may include more functionality than merely the ability to read or deactivate an RFID tag. For example, some applications may update the tag's response as compared with deactivation. Accordingly, in certain implementations, an RFID tag, such as multi-level switched state RFID tags, can switch to different states in addition to an activated and deactivated state and can be switched between the plurality of states in response to a moveable element. In these instances, the RFID tag may be set to a logical state by altering the RF energy instead of shorting the RF energy, as may be implemented when deactivating the RFID tag.

FIGURES 7A-C illustrate an example RFID tag 120 that may be selectively switched between three states including activation and deactivation. In the illustrated implementation, the tag 120 includes slide 720 configured to switch between the different states. The RFID tag 120 includes a case 710 and the slide 720 that is moveable relative to the case 710. In some implementations, the RFID chip and antenna may be embedded in, affixed to, or otherwise included with the case 710. The slide 720 is operable to move relative to the case 710 to a plurality of different positions, where each position may be associated with a different tag state. For example, each of the plurality of positions may be configured to update the RF energy to a different state of the RFID tag 120. As shown in FIGURE 7A, the slide 720 can be positioned at a center point such that substantially equal portions of the slide 720 extend from opposite sides of the case 710. In response to at least selectively positioning the slide 720 at this location, the RFID tag 120 may be updated to a first state based on the RF energy associated with the RFID tag 120 in the first position.

When the slide 720 is positioned to the left, as seen in FIGURE 7B, the cover 710 overlaps a right portion of the slide 720 and may update the RFID tag 120 to a second state. When the slide 720 is positioned to the right, as seen in FIGURE 7C, the cover 710 overlaps a left portion of the slide 720 and may update the RFID tag 120 to a third state. In the illustrated example, the slide 720 may also include colored markings to visually indicate the state of the tag 120 as the slide 720 is switched between the plurality of different positions. For example, in FIGURE 7A the exposed portion 750a of the slide 720 may be green indicating an activated state, in FIGURE 7B the exposed portion 750b of the slide 720 may be yellow indicating a different operational state, and in FIGURE 7C the newly exposed portion 750c of the slide 720 may be red indicating a deactivated state. In these instances, the different exposed colors on the slide 720 may enable visual recognition of the state of the tag 120. Furthermore, using the colored slide implementation of the multi-level switched state tag, the state of the tag may be visually identified from either side of the tag, which may be beneficial in certain implementations, such as when the RFID tag is fixed on the windshield of a vehicle.

FIGURES 8A-C illustrate example circuitry for switching the tag 120 of FIGURE 7 between the different states. The case 710 includes an RFID chip 712, RFID antenna 714, conductive pads 716 and/or other elements. The conductive pads 716 on the case 710 may be connected to isolated nodes within the internal circuit. In the illustrated example, the slide 720 also includes conductive pads 726 fixed to the surface of the slide. The conductive pads 726 on the slide are positioned so that as the slide 720 moves into specified positions, the conductive pads 726 on the slide 720 electrically contact associated conductive pads 716 on the RFID case 710. Once the conductive pads 716 and 726 are in contact, the conductive pads 726 on the slide 720 form a direct or indirect electrical connection.

FIGURE 8B illustrates an enlarged view of the circuitry associated with the RFID case 710 and slide 720. The individual conductive pads 716a-c of the RFID case 710 are isolated from each other while the slide 720 is in a center position corresponding with the first state of the RFID tag 120 as described with respect to FIGURE 7A. In this position, the conductive pads 726a-b on the slide 720 are isolated from the conductive pads 716a-c on the RFID case 710. FIGURE 8C illustrates the case 710 and slide 720 at different relative positions associated with the second state.

In this instance, the conductive pad 726b overlaps conductive pads 716b and 716c to form an electrical connection between these pads 716. In addition, the slide 720 may be shifted to the right into a position corresponding with a third state of the RFID tag (*see* FIGURE 7C). In this instance, the conductive pad 726a overlaps conductive pads 716a and 716c.

FIGURE 9 illustrates an example circuit 900 used in connection with the pads 716 and 726. Conductive pads 716b and 716c are illustrated as nodes in the circuit 900. In the illustrated example, when the slide 720 is positioned in the second state (*e.g.*, FIGURES 7B and 8C), the conductive pad 726b is substantially aligned with pads 716a and 716c. In this case, the RF signal is conducted through a Schottky diode 910, which may cause node 920 (the common node of resistor 930, capacitor 940, and gate of transistor 960) to increase in voltage. As a result, transistor 950 is activated, and the drain of transistor 970 can be used to pull down a resistor or the input of a circuit mounted on an associated printed circuit board. In some implementations, based on the design of circuit 900 and values of the components comprising circuit 900, the voltage on node 920 may rise in a relatively short period of time when compared to the time that the voltage would be maintained when the RF power is removed. A circuit identical or similar to circuit 900 in FIGURE 9 may be used to transition the RFID tag 120 into a third state when the slide 720 is shifted to the right as illustrated in FIGURE 7C and conductive pads 716a and 716c are electrically connected.

A number of embodiments of the invention have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the invention. Accordingly, other embodiments are within the scope of the following claims.

WHAT IS CLAIMED IS:

1. An RFID system comprising:

an RFID tag; and

a panel including one or more contacts configured to move between a first position and a second position, the second position forms an electrical connection between the RFID tag and the one or more contacts to update a state of the RFID tag.

2. The RFID system of claim 1, the tag state updated by at least of blocking an RF carrier, shorting an RF voltage on the RFID tag, or rectifying RF energy to generate a logic state.

3. The RFID system of claim 1, the electrical connection formed by a capacitive coupling between the one or more contacts and the RFID antenna.

4. The RFID system of claim 1, the RFID tag including a first and a second antenna lead, the electrical connection forms a short between the first and the second lead to deactivate the RFID tag.

5. The RFID system of claim 1, the one or more contacts comprising metal foil, the metal foil proximate the RFID tag in the second position.

6. The RFID system of claim 1, further comprises a case configured to enclose at least a portion of the panel in the first position.

7. The RFID system of claim 1, further comprises a case configured to slide relative to the panel to a plurality of different positions, each position associated with a different tag state.

8. The RFID system of claim 1, the panel includes one or more colors to visually identify a current state of the RFID tag.

9. A method, comprising:

wireless communicating with an RFID reader in accordance with a first set of operating parameters associated with a first physical configuration of an RFID tag; and

in response to at least updating the RFID tag to a second physical configuration, updating operating conditions of the RFID tag to a second set of operating parameters.

10. The method of claim 9, the second set of operating parameters includes at least one of blocking an RF carrier, shorting an RF voltage on the RFID tag, or rectifying RF energy to generate a logic state.

11. The method of claim 9, the second physical configuration includes capacitively coupling one or more contacts of a moveable panel with an RFID antenna of the RFID tag.

12. The method of claim 9, the RFID tag including a first and a second antenna lead, the second physical configuration includes shorting the first and the second antenna lead to deactivate the RFID tag.

13. The method of claim 9, the second physical configuration includes a metal foil proximate the RFID tag.

14. The method of claim 9, a case enclosing at least a portion of a moveable in the first physical configuration.

15. The method of claim 9, wherein an update to the second configuration includes sliding a cover relative to an associated panel to a plurality of different positions, each position associated with a different tag state.

16. The method of claim 9, the RFID tag includes a panel that visually identifies a current state of the RFID tag using one or more colors.

17. A system, comprising:

a means for wirelessly communicating with an RFID reader in accordance with a first set of operating parameters associated with a first physical configuration of an RFID tag; and

in response to at least updating the RFID tag to a second physical configuration, a means for updating operating conditions of the RFID tag to a second set of operating parameters.

18. The system of claim 17, further comprising a means for visually identifying a current state of the RFID tag using one or more colors.

FIG. 1

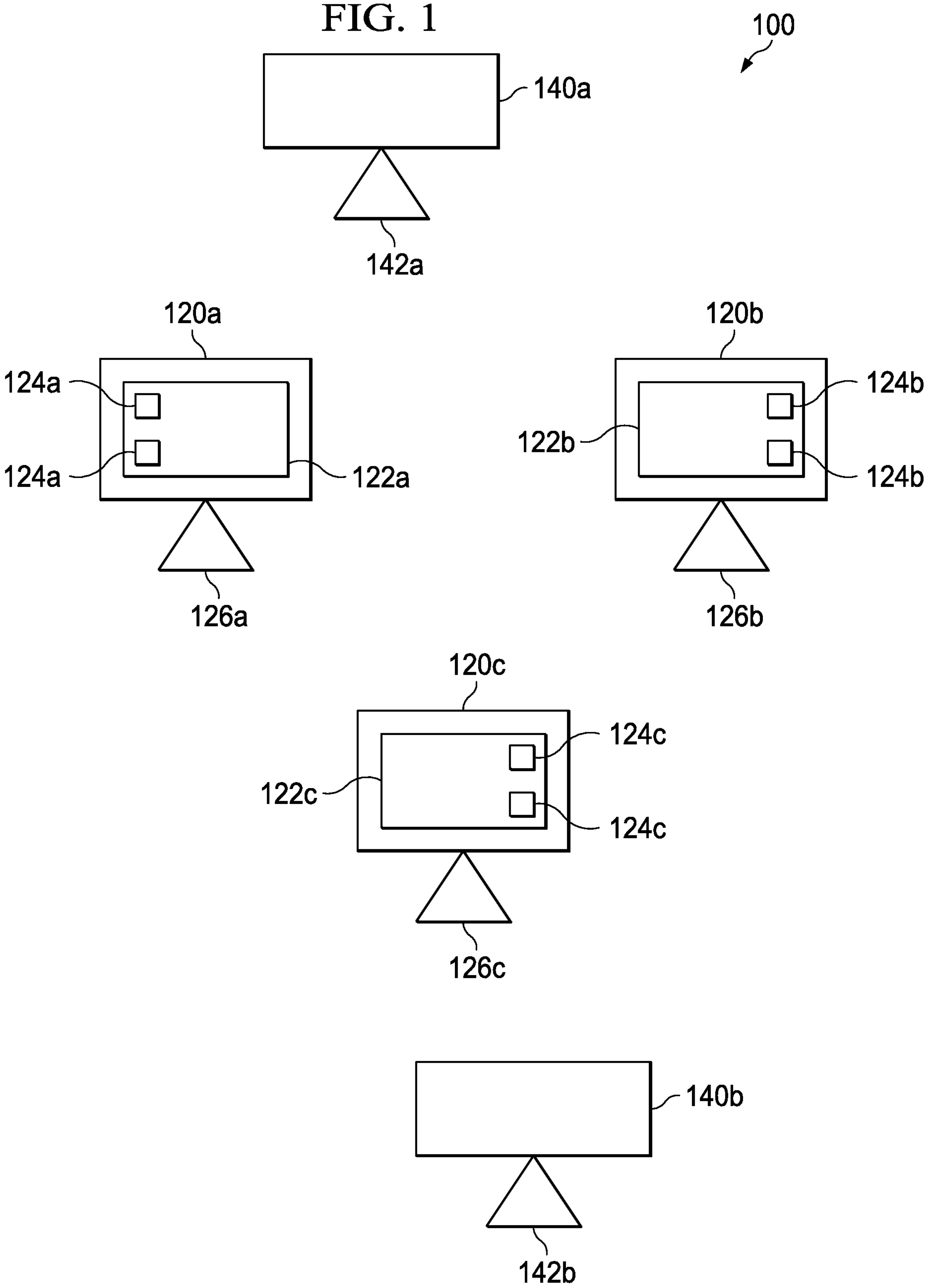

100
140a
142a
120a
124a
124a
122a
126a
120b
124b
122b
124b
126b
120c
124c
122c
124c
126c
140b
142b

FIG. 2A

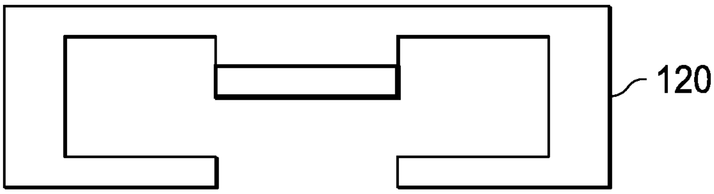


FIG. 2B

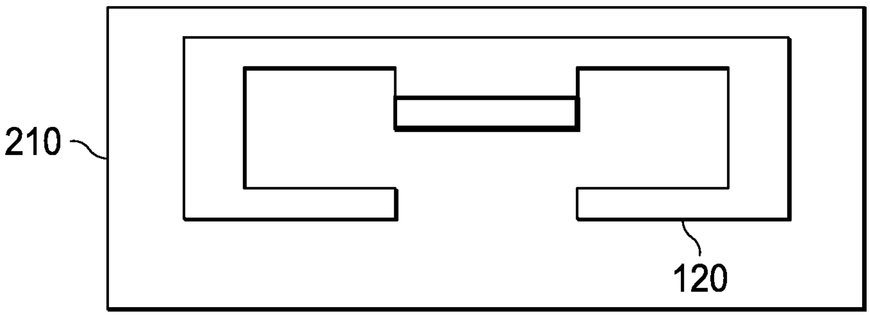


FIG. 3A

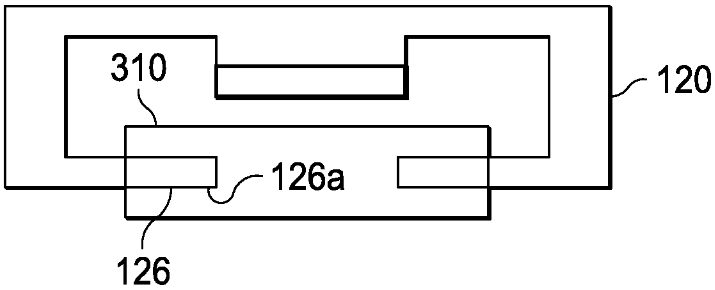


FIG. 3B

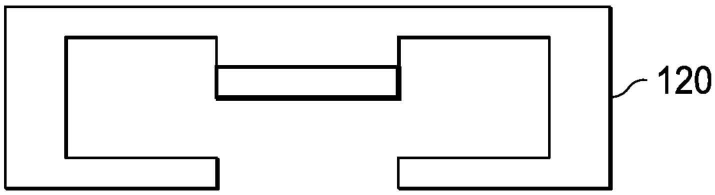


FIG. 4A

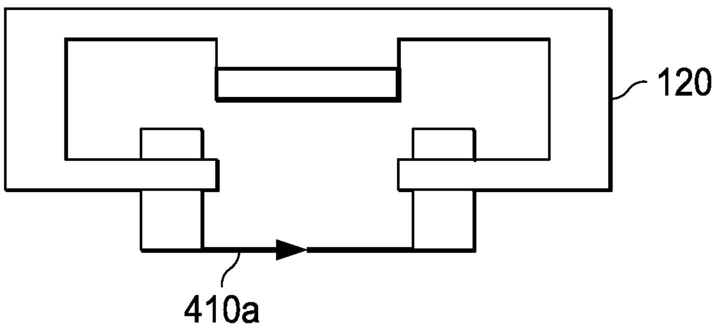


FIG. 4B

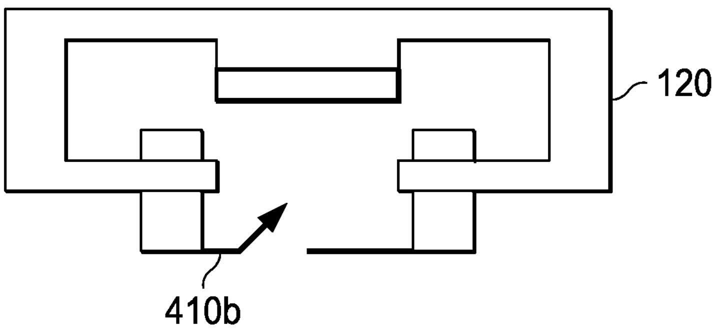


FIG. 5A

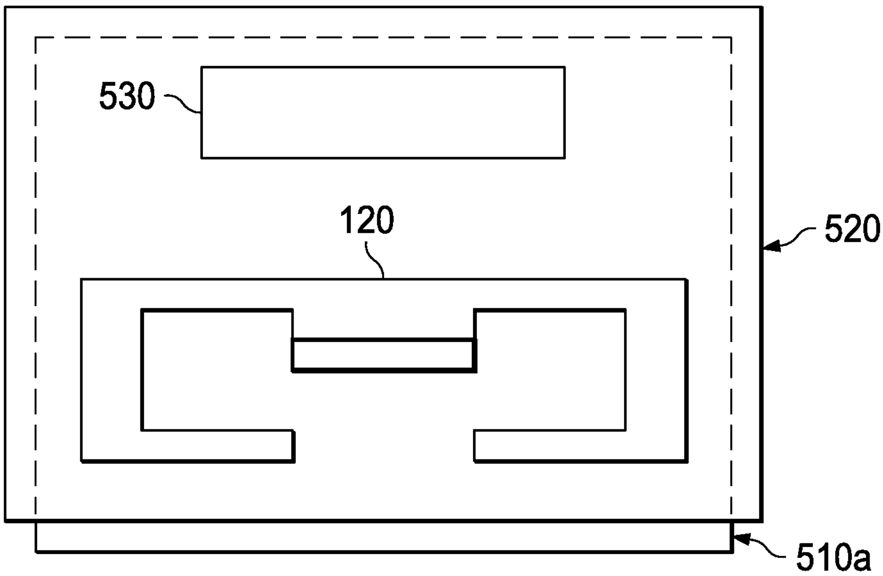


FIG. 5B

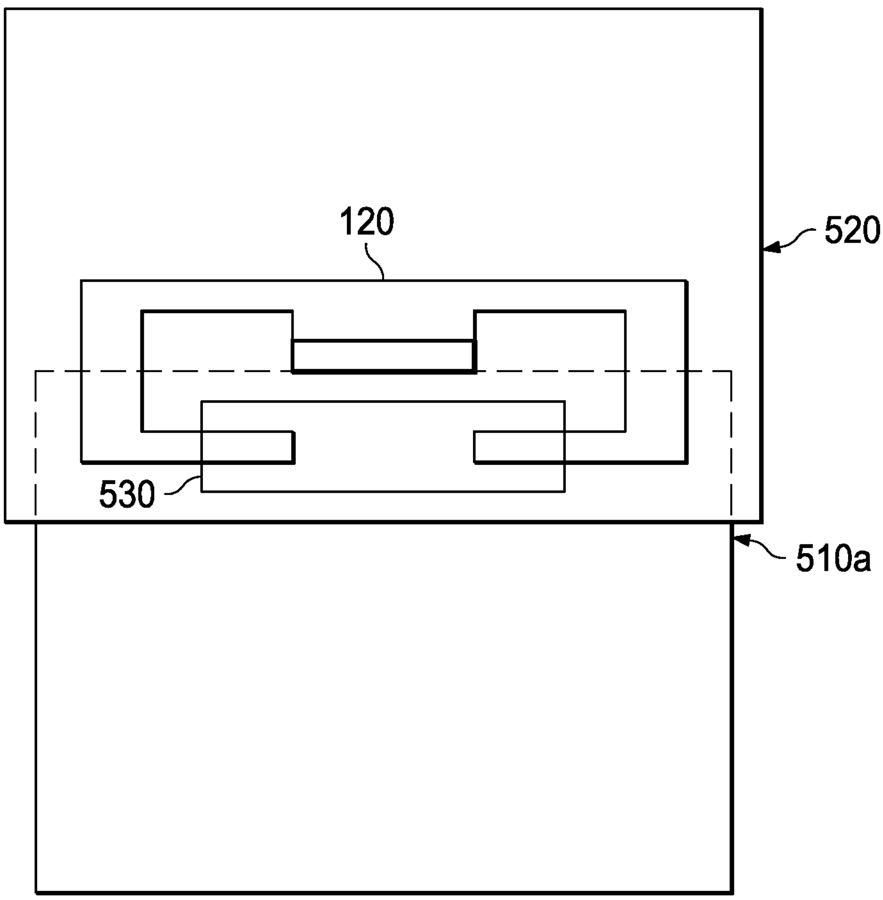


FIG. 6A

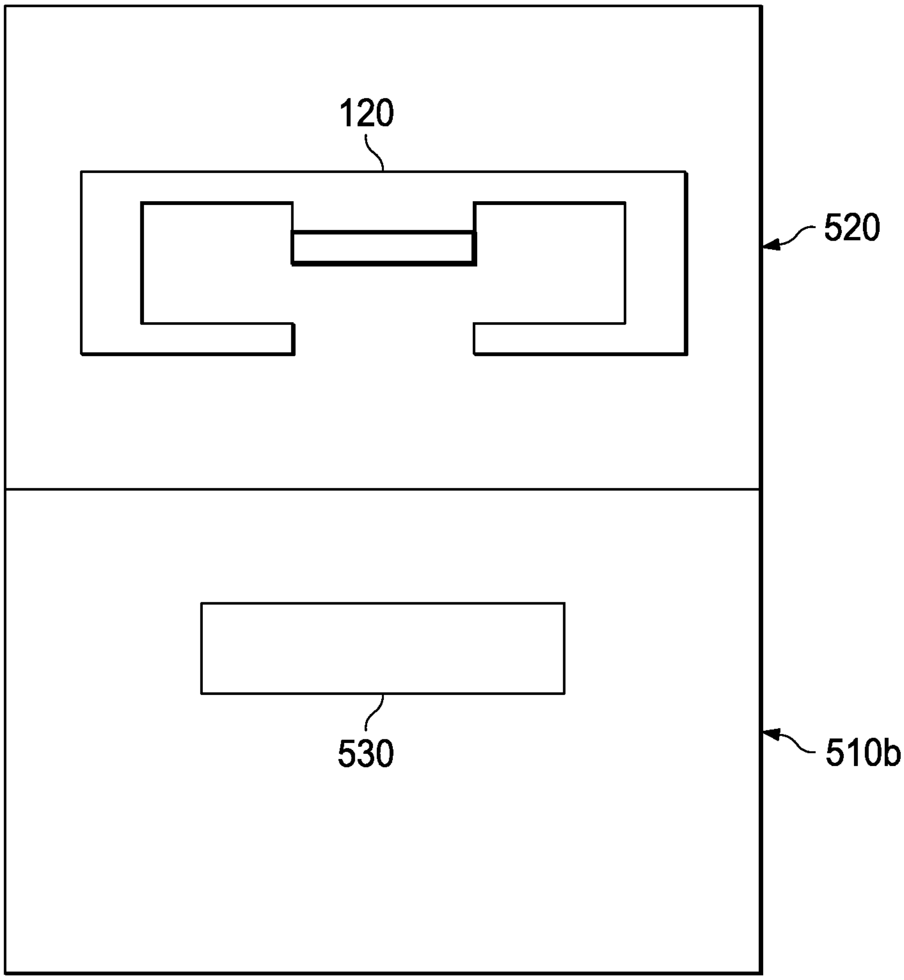


FIG. 6B

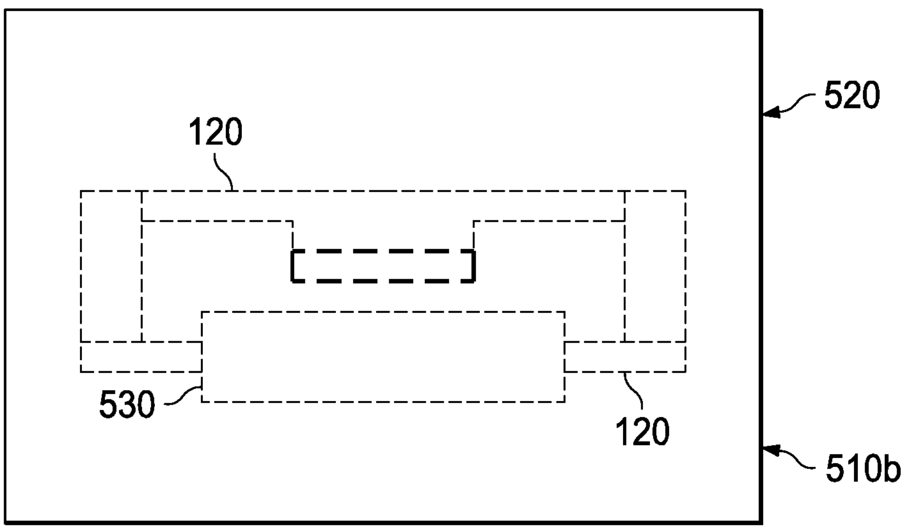


FIG. 7A

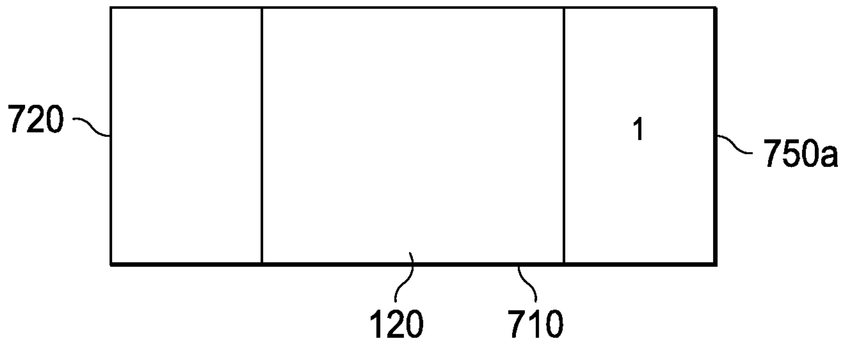


FIG. 7B

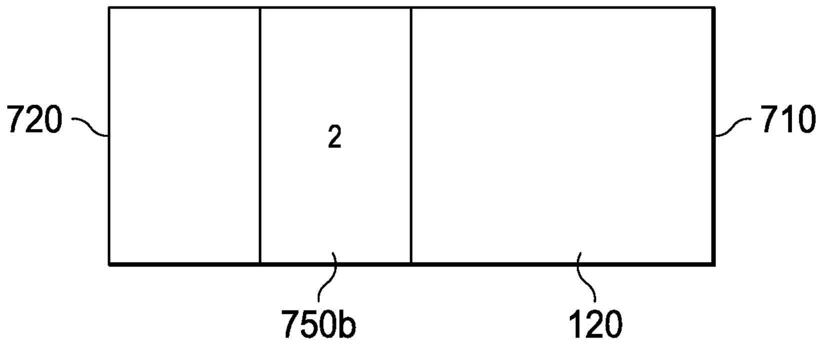


FIG. 7C

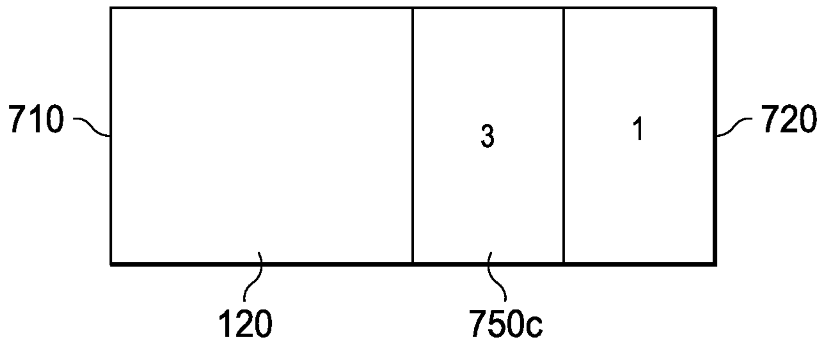
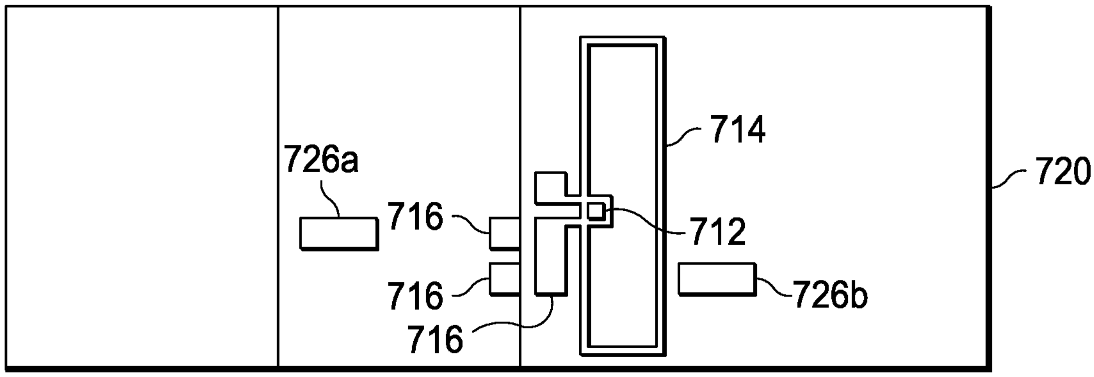
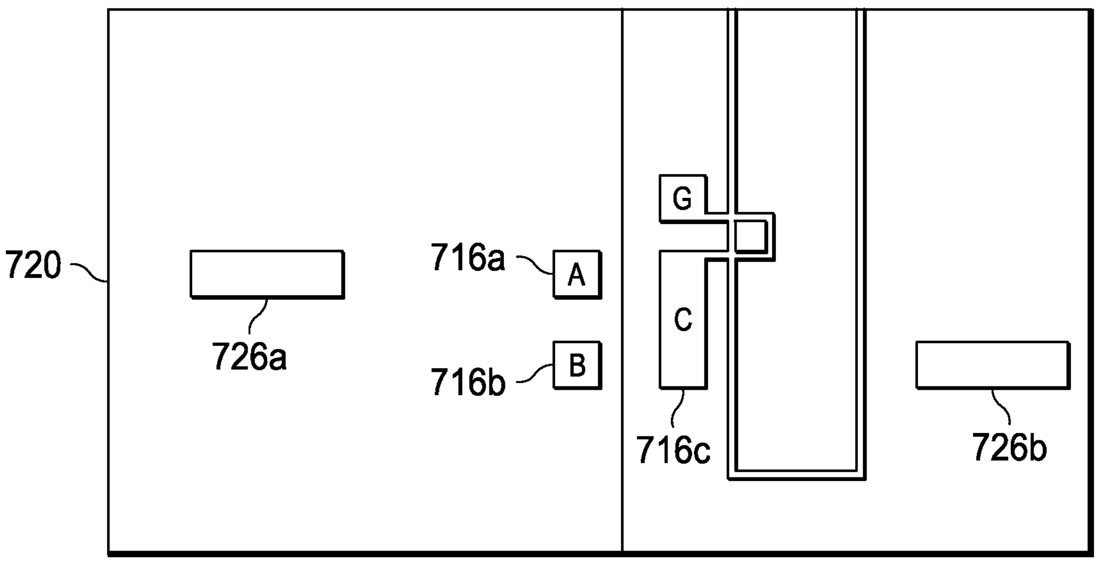


FIG. 8A



726a
716
716
716
714
712
720
726b

FIG. 8B



720
726a
716a
A
716b
B
G
C
716c
726b

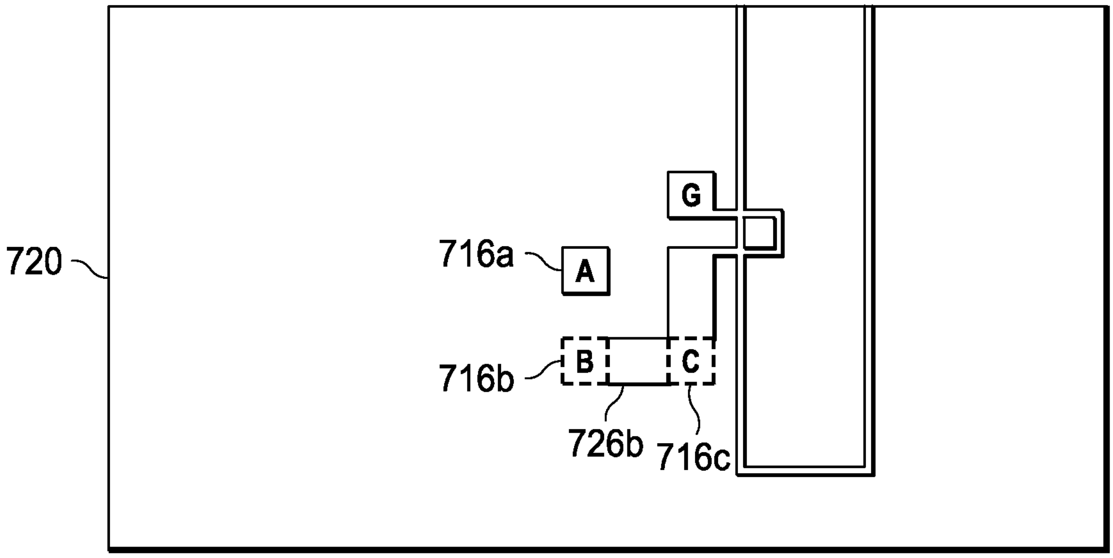

720
G
716a
A
716b
B
C
726b
716c

FIG. 8C

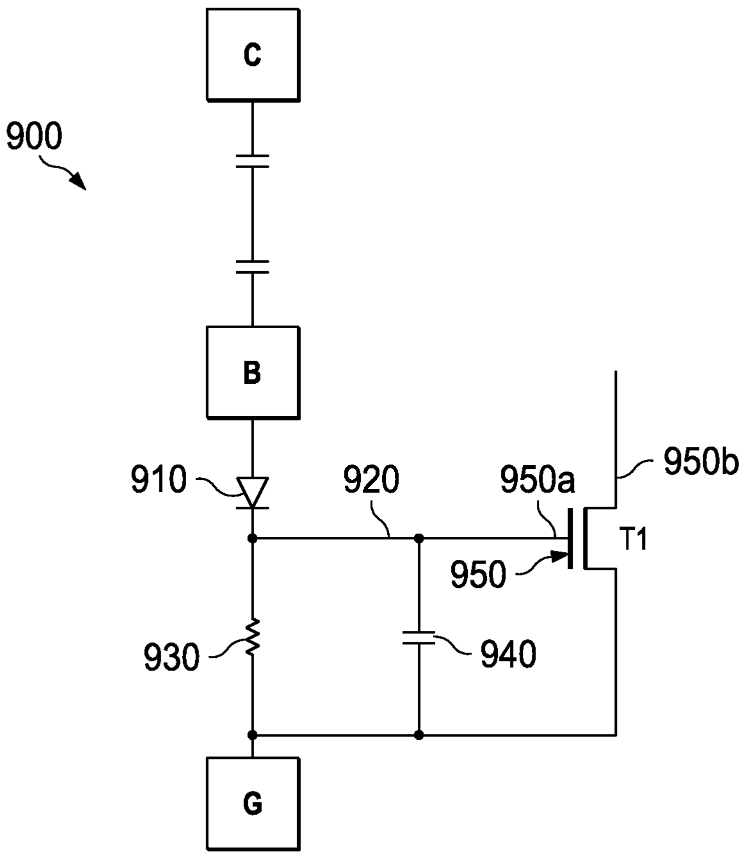

C
900
B
910
920
950a
950b
T1
950
930
940
G

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/036878

A. CLASSIFICATION OF SUBJECT MATTER

INV. G06K7/00 G06K19/07 G06K19/077 G07F7/00 H01Q1/00
H01H13/00

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06K G07F H01Q H01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/107877 A1 (MENNECART JOSE [FR] ET AL) 12 June 2003 (2003-06-12) paragraph [0016]; figure 2	1-18
X	US 7 083 083 B2 (DROZ FRANCOIS [CH]) 1 August 2006 (2006-08-01) column 1, line 48 - line 56 column 2, line 44 - line 48 column 5, line 6 - line 8 figures	1-18
X	US 2007/205953 A1 (BOMBAY BART [US] ET AL BOMBAY BART [US] ET AL) 6 September 2007 (2007-09-06) paragraphs [0020] - [0036]; figures 1,2	1-18

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 August 2010	31/08/2010

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Heusler, Nikolaus

Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/116634 A1 (TANAKA MASAHIKO [JP]) 26 June 2003 (2003-06-26) paragraphs [0041], [0047]; figure 3	1-18
X,P	EP 2 178 023 A2 (ROCKWELL AUTOMATION TECH INC [US]) 21 April 2010 (2010-04-21) paragraphs [0006], [0018], [0024]; figures 2-5	1-18
A	DE 10 2005 062827 A1 (BUNDESDRUCKEREI GMBH [DE]) 28 June 2007 (2007-06-28) paragraphs [0049], [0053] - [0056]; figures 1,5,6	1-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2010/036878

Patent document cited in search report		Publication date	Patent family member(s)			Publication date
US 2003107877	A1	12-06-2003	EP	1279140	A1	29-01-2003
			WO	0184492	A1	08-11-2001
US 7083083	B2	01-08-2006	AU	2005236643	A1	03-11-2005
			BR	PI0509425	A	04-09-2007
			CA	2563249	A1	03-11-2005
			CN	1947137	A	11-04-2007
			EP	1741051	A1	10-01-2007
			WO	2005104024	A1	03-11-2005
			JP	2007535063	T	29-11-2007
			KR	20070011403	A	24-01-2007
			RU	2374685	C2	27-11-2009
			US	2005236489	A1	27-10-2005
US 2007205953	A1	06-09-2007	NONE			
US 2003116634	A1	26-06-2003	AU	2002354112	A1	10-06-2003
			DE	60209036	T2	13-07-2006
			EP	1442423	A2	04-08-2004
			WO	03046823	A2	05-06-2003
			TW	223775	B	11-11-2004
EP 2178023	A2	21-04-2010	US	2010079289	A1	01-04-2010
DE 102005062827	A1	28-06-2007	EP	1969533	A1	17-09-2008
			WO	2007074011	A1	05-07-2007