US007002467B2

(12) **United States Patent**
Deconinck et al.

(10) **Patent No.: US 7,002,467 B2**
(45) **Date of Patent: Feb. 21, 2006**

(54) **ALARM INTERFACE SYSTEM**

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(73) Assignee: **Protex International Corporation**, Bohemia, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 435 days.

(21) Appl. No.: **10/137,879**

(22) Filed: **May 2, 2002**

(65) **Prior Publication Data**

US 2003/0206106 A1 Nov. 6, 2003

(51) **Int. Cl.**
G08B 1/08 (2006.01)

(52) **U.S. Cl.** **340/539.1**; 340/539.25; 340/539.31; 340/568.2; 340/568.1; 340/571; 340/825.36; 340/825.49

(58) **Field of Classification Search** 340/539.1, 340/539.16, 539.22, 539.25, 539.31, 568.1, 340/568.2, 571, 572.1, 572.8, 825.36, 825.49
See application file for complete search history.

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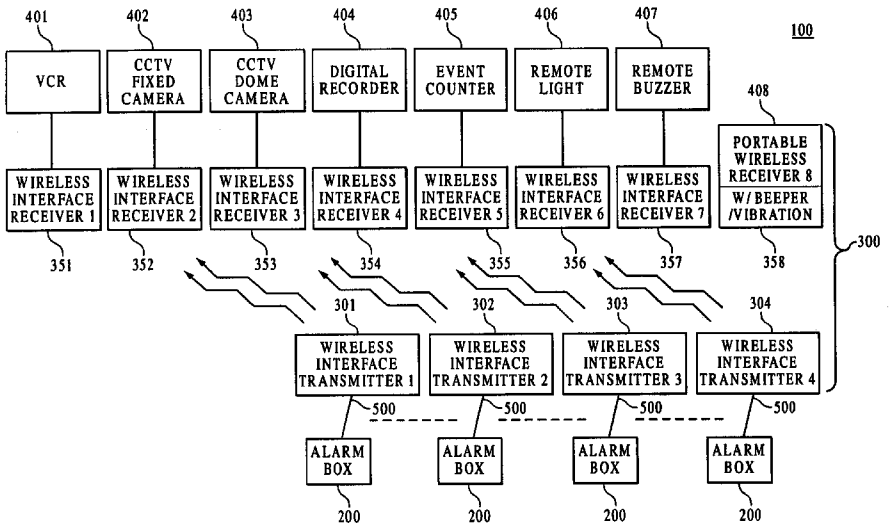
(57) **ABSTRACT**

An alarm interface for a merchandise security system is coupled to an alarm system of the merchandise security system. The alarm interface includes one or more wireless interface transmitters and receivers. One or more output devices are connected to at least one of the one or more wireless receivers. In one aspect, the alarm system includes a controller for sensing alarm events, one or more hubs connected to the controllers, and a plurality of sensors capable of attachment to a plurality of objects to be secured. A set of sensors within the plurality of sensors is attached to a corresponding hub, and each sensor or hub generates an alarm event when separated from the controller or object to be secured. The wireless interface transmitters wirelessly transmit one or more alarm signals from the alarm system. The wireless interface receivers are adapted to receive at least one of these alarm signals transmitted from one or more of the wireless interface transmitters. One or more of the output devices are activated by at least one of the wireless interface receivers in response to at least one alarm signal-received by the receiver.

21 Claims, 14 Drawing Sheets



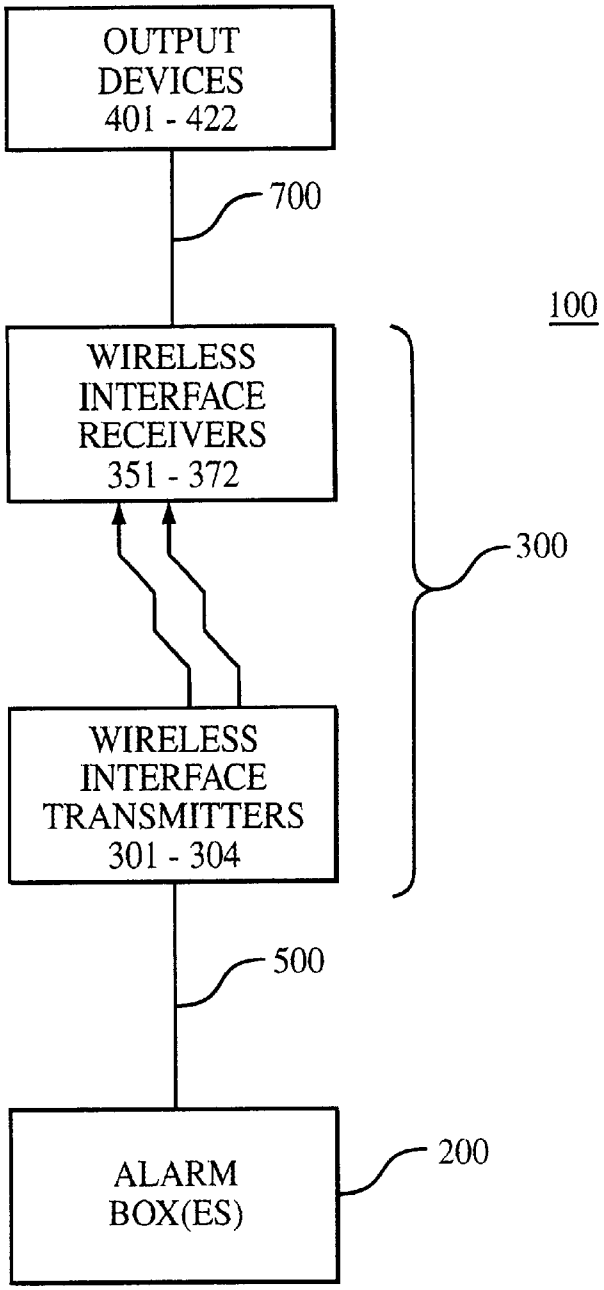

OUTPUT DEVICES 401 - 422
700
100
WIRELESS INTERFACE RECEIVERS 351 - 372
300
WIRELESS INTERFACE TRANSMITTERS 301 - 304
500
ALARM BOX(ES)
200

FIG. 1A

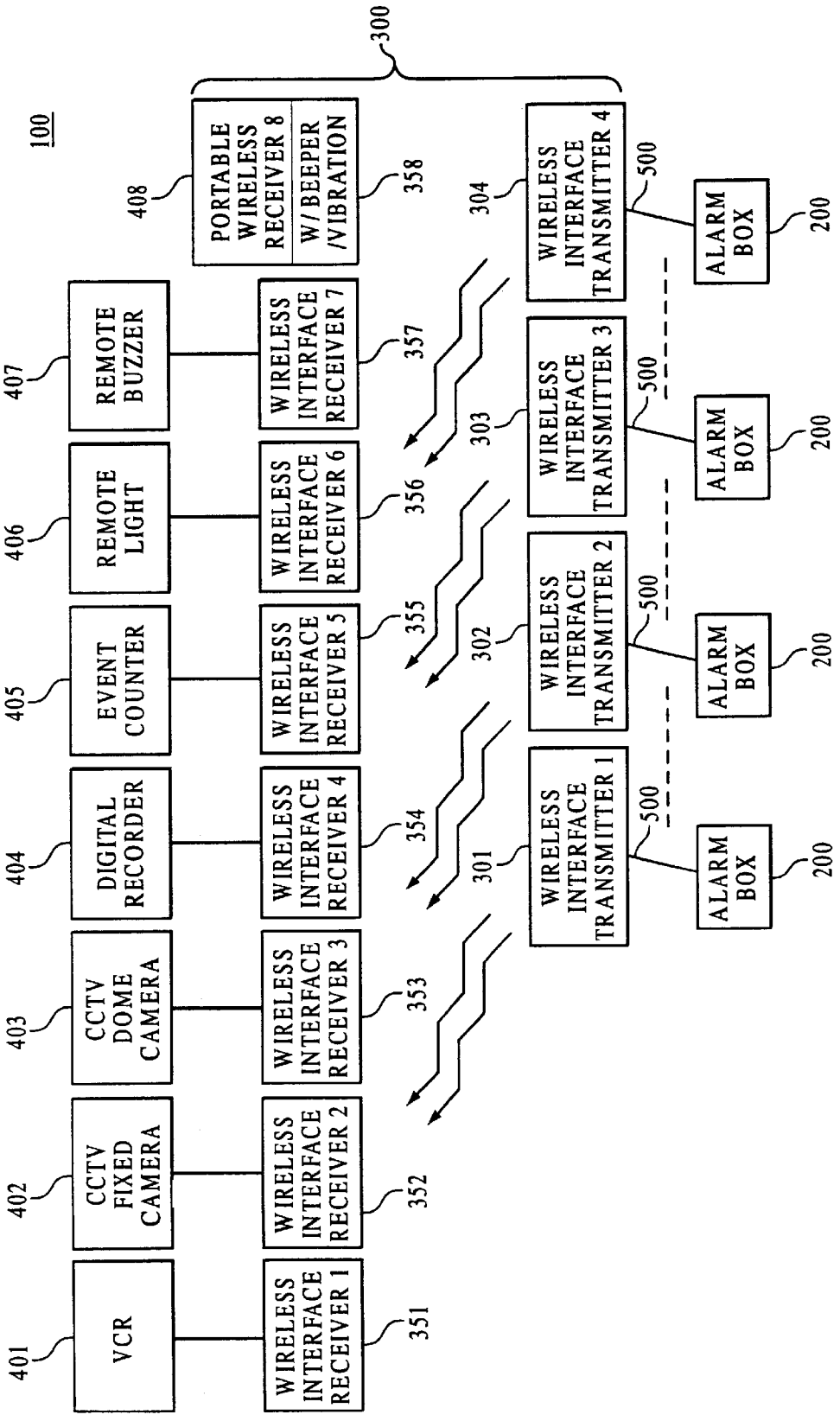

100
300
408
PORTABLE WIRELESS RECEIVER 8
W/ BEEPER /VIBRATION
358
401
VCR
402
CCTV FIXED CAMERA
403
CCTV DOME CAMERA
404
DIGITAL RECORDER
405
EVENT COUNTER
406
REMOTE LIGHT
407
REMOTE BUZZER
WIRELESS INTERFACE RECEIVER 1
351
WIRELESS INTERFACE RECEIVER 2
352
WIRELESS INTERFACE RECEIVER 3
353
WIRELESS INTERFACE RECEIVER 4
354
WIRELESS INTERFACE RECEIVER 5
355
WIRELESS INTERFACE RECEIVER 6
356
WIRELESS INTERFACE RECEIVER 7
357
301
WIRELESS INTERFACE TRANSMITTER 1
302
WIRELESS INTERFACE TRANSMITTER 2
303
WIRELESS INTERFACE TRANSMITTER 3
304
WIRELESS INTERFACE TRANSMITTER 4
500
ALARM BOX
200

FIG. 1B

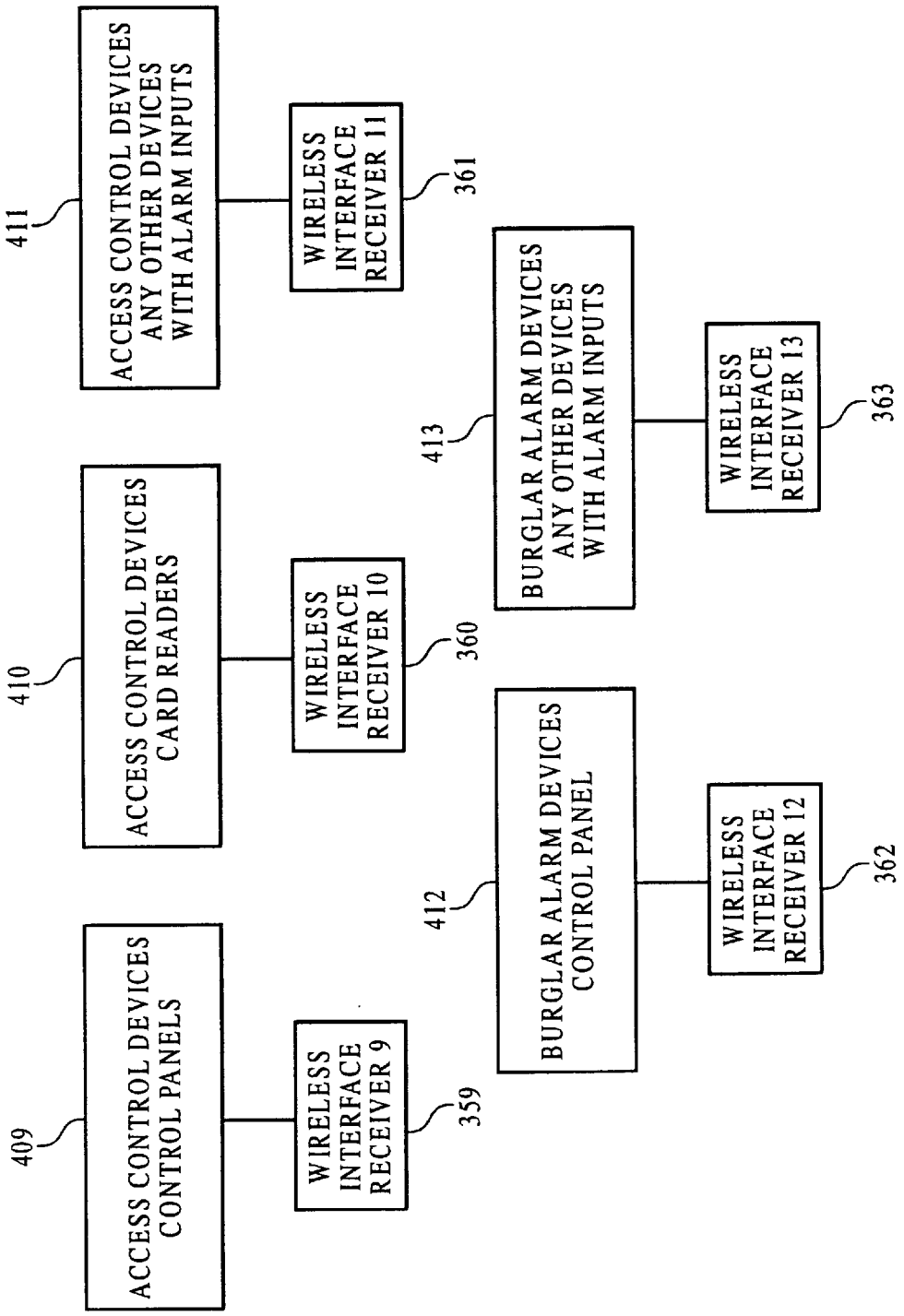

ACCESS CONTROL DEVICES CONTROL PANELS
409
WIRELESS INTERFACE RECEIVER 9
359
ACCESS CONTROL DEVICES CARD READERS
410
WIRELESS INTERFACE RECEIVER 10
360
ACCESS CONTROL DEVICES ANY OTHER DEVICES WITH ALARM INPUTS
411
WIRELESS INTERFACE RECEIVER 11
361
BURGLAR ALARM DEVICES CONTROL PANEL
412
WIRELESS INTERFACE RECEIVER 12
362
BURGLAR ALARM DEVICES ANY OTHER DEVICES WITH ALARM INPUTS
413
WIRELESS INTERFACE RECEIVER 13
363

FIG. 1C

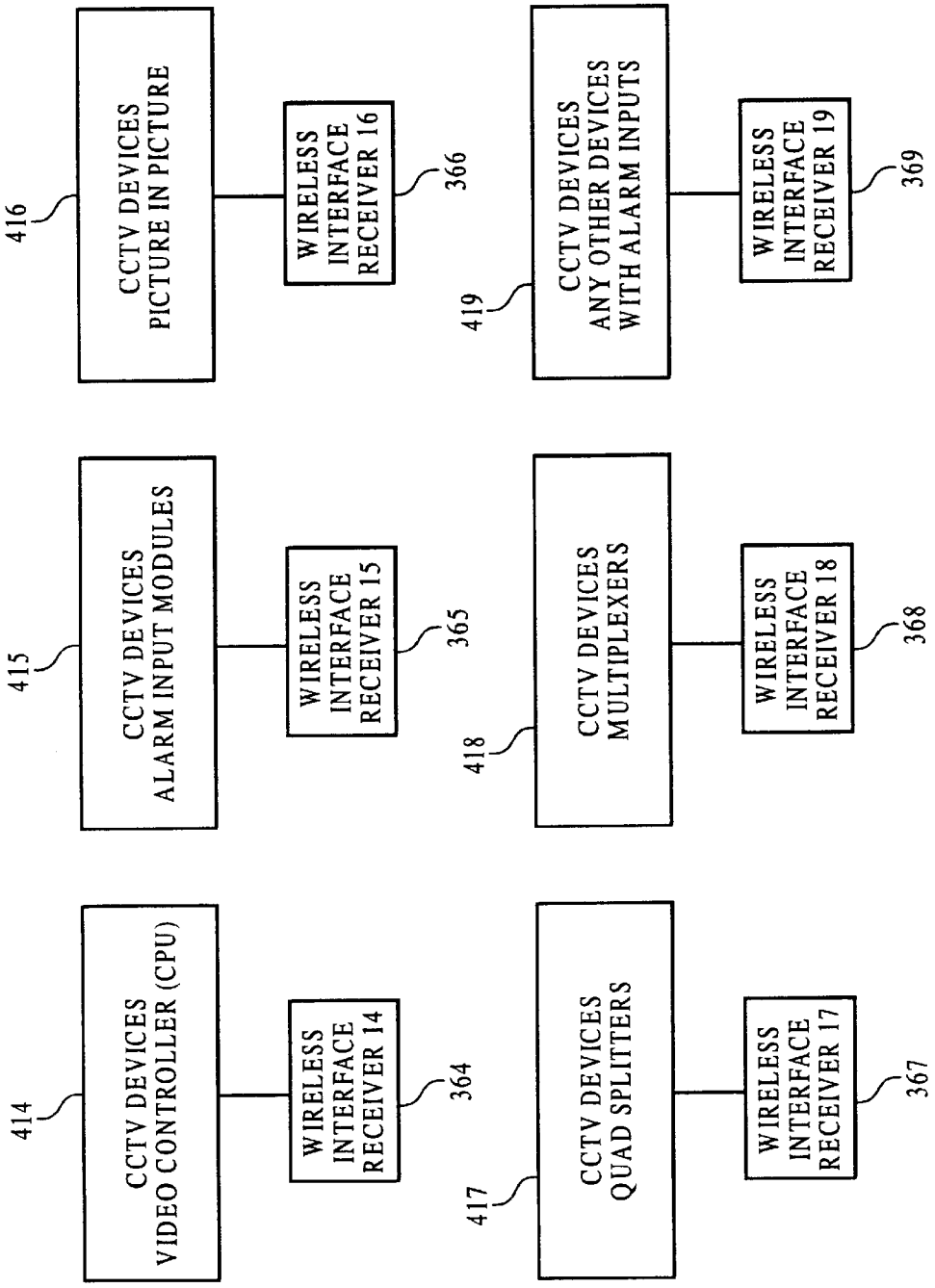

414
CCTV DEVICES VIDEO CONTROLLER (CPU)
WIRELESS INTERFACE RECEIVER 14
364
415
CCTV DEVICES ALARM INPUT MODULES
WIRELESS INTERFACE RECEIVER 15
365
416
CCTV DEVICES PICTURE IN PICTURE
WIRELESS INTERFACE RECEIVER 16
366
417
CCTV DEVICES QUAD SPLITTERS
WIRELESS INTERFACE RECEIVER 17
367
418
CCTV DEVICES MULTIPLEXERS
WIRELESS INTERFACE RECEIVER 18
368
419
CCTV DEVICES ANY OTHER DEVICES WITH ALARM INPUTS
WIRELESS INTERFACE RECEIVER 19
369

FIG. 1D

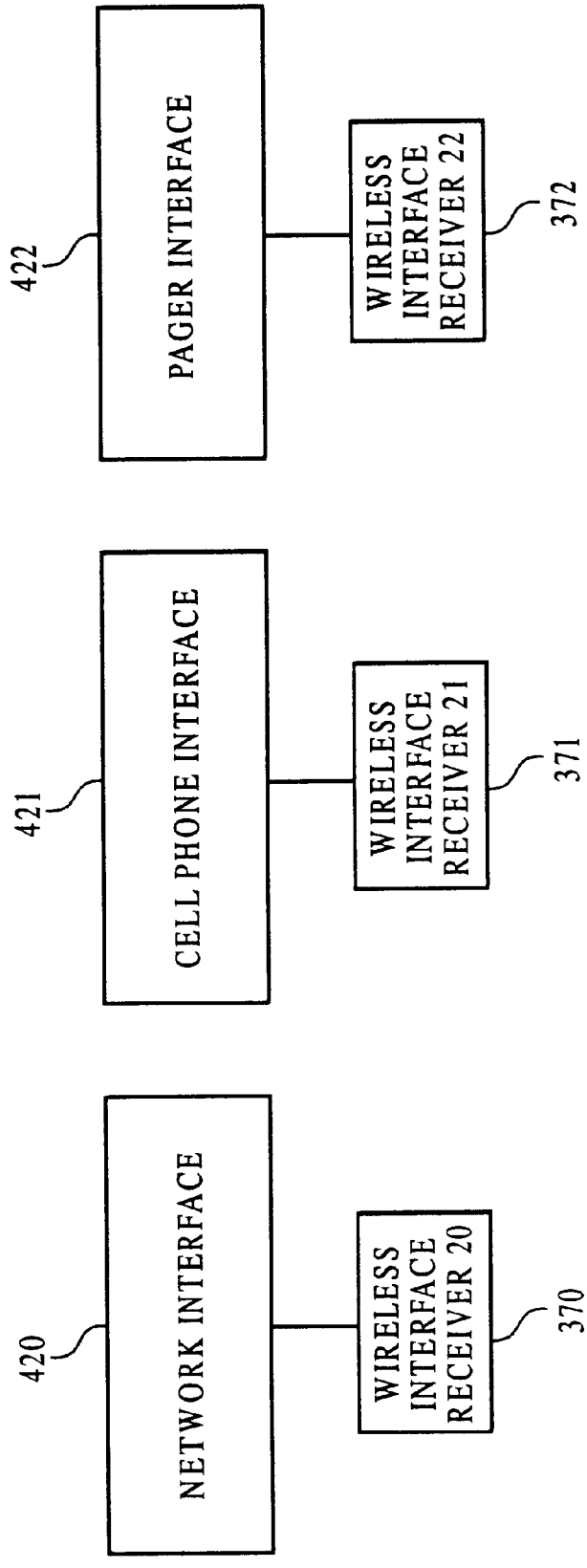

NETWORK INTERFACE
420
WIRELESS INTERFACE RECEIVER 20
370
CELL PHONE INTERFACE
421
WIRELESS INTERFACE RECEIVER 21
371
PAGER INTERFACE
422
WIRELESS INTERFACE RECEIVER 22
372

FIG. 1E

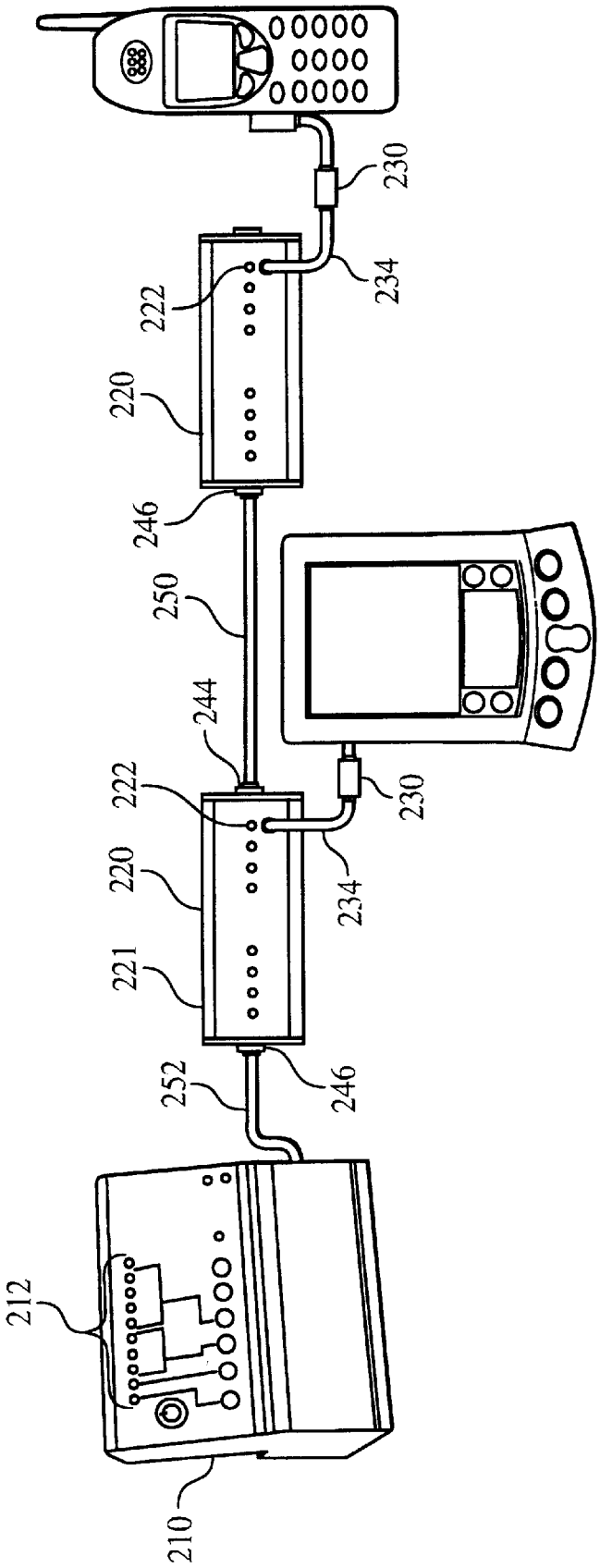


FIG. 2A

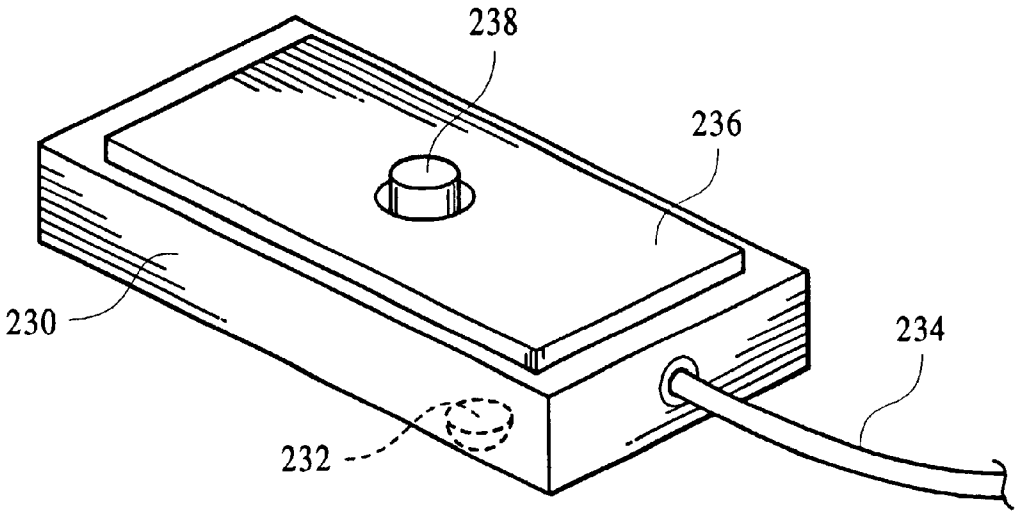


FIG. 2B

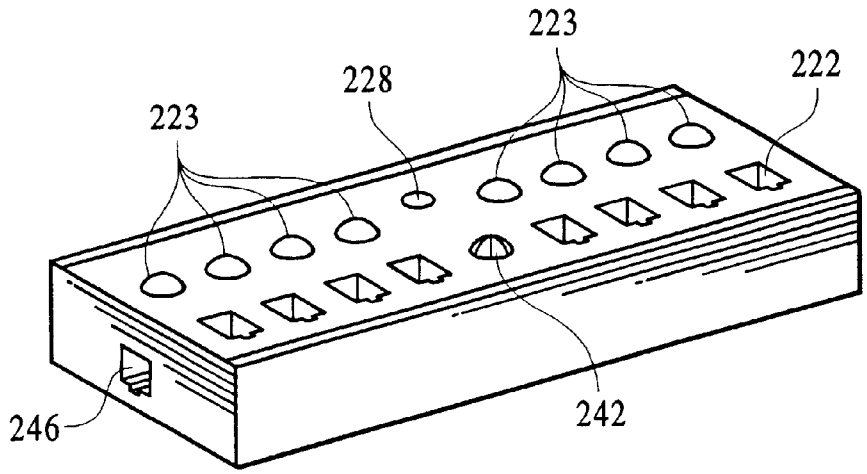


FIG. 2C

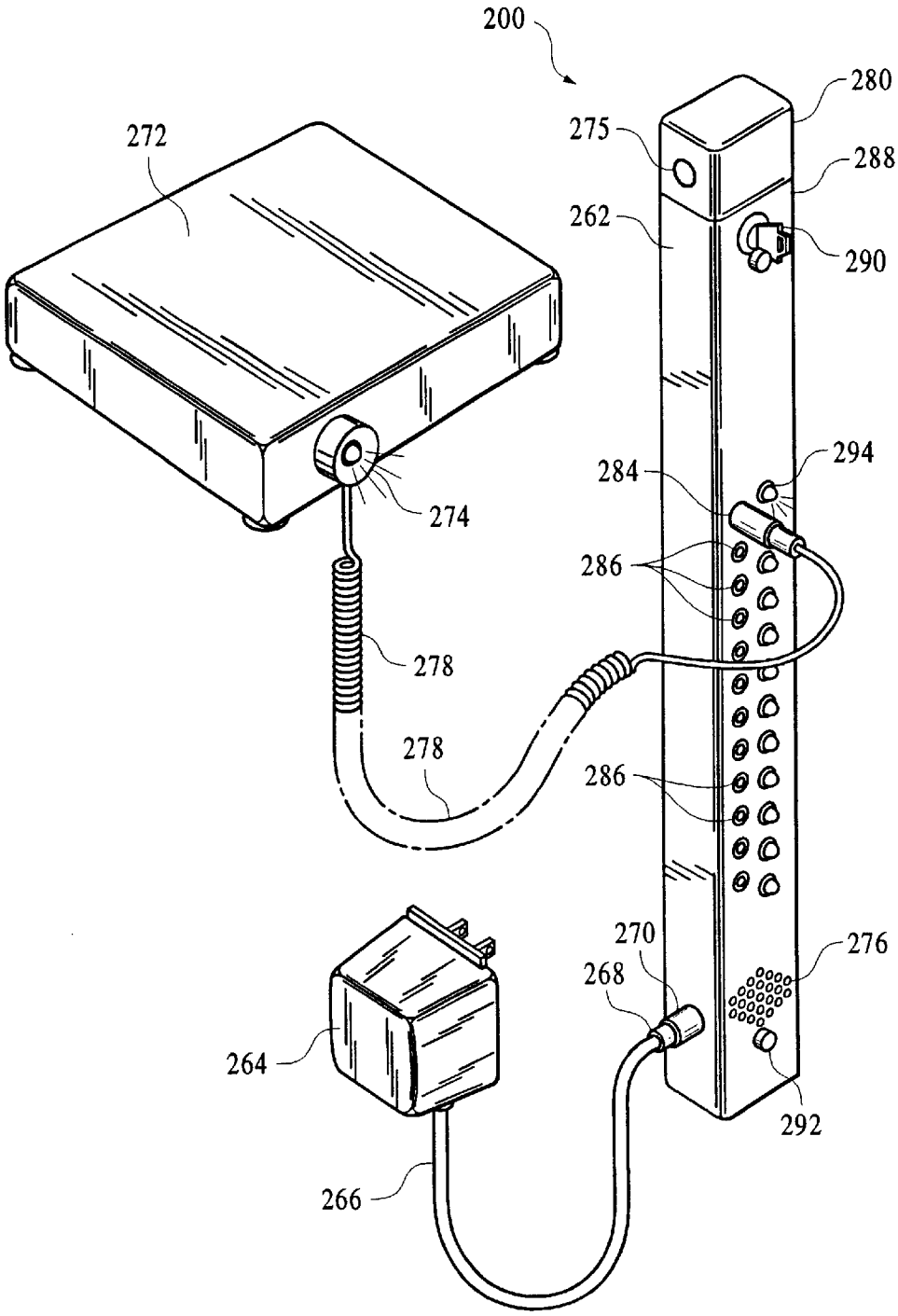

200
280
275
288
272
262
290
294
284
274
286
278
278
286
270
276
268
264
292
266

FIG. 3A

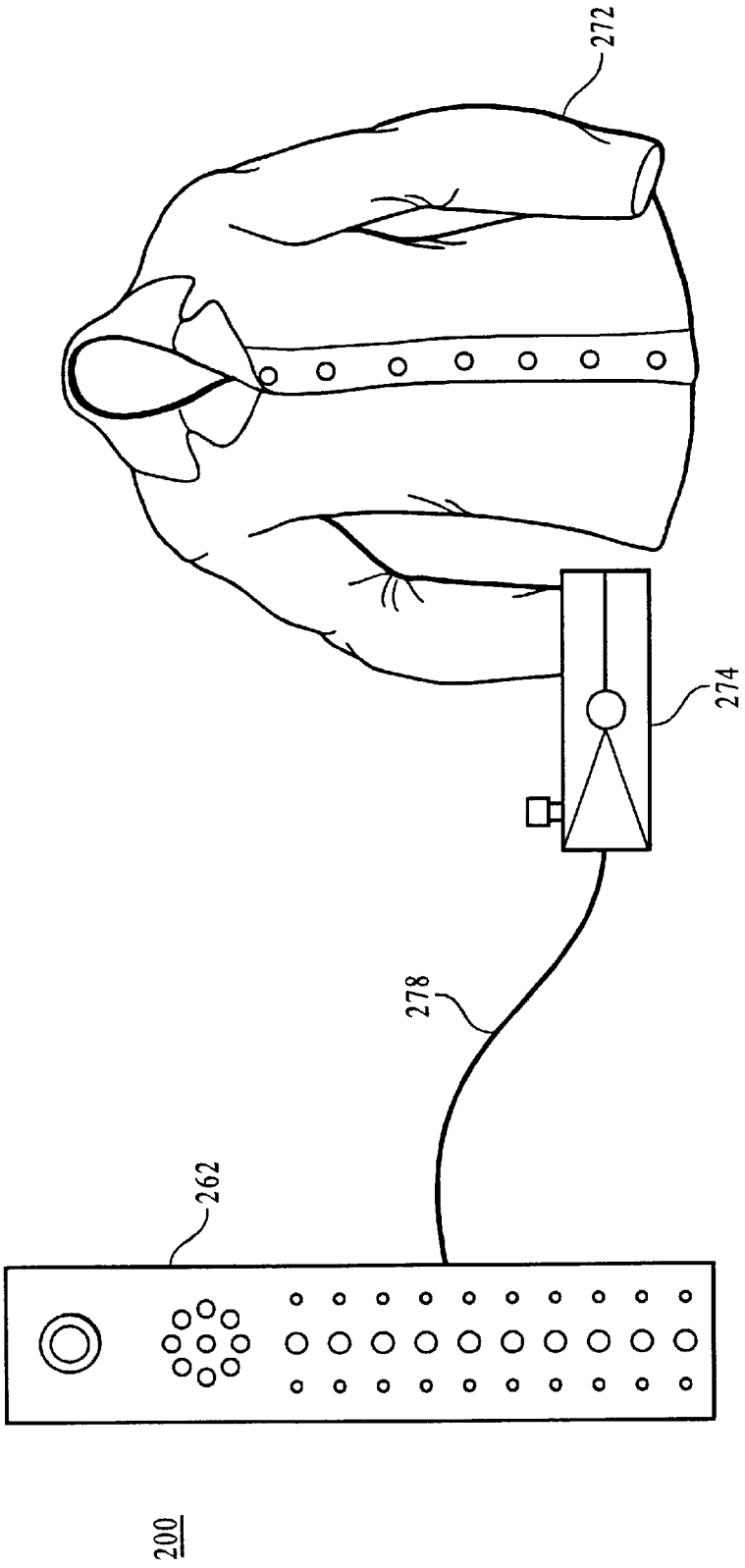


FIG. 3B

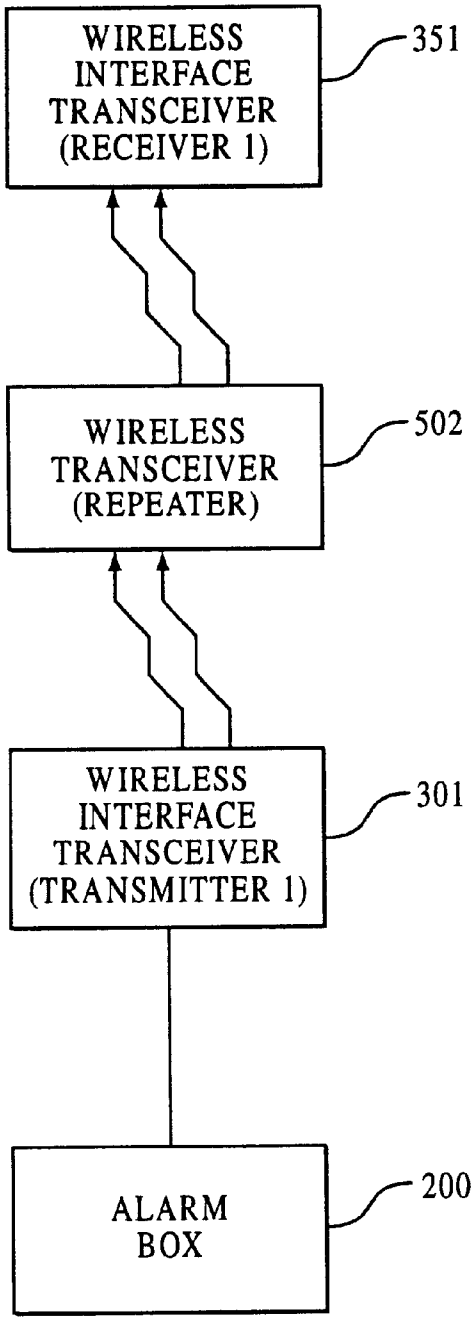

WIRELESS INTERFACE TRANSCEIVER (RECEIVER 1)
351
WIRELESS TRANSCEIVER (REPEATER)
502
WIRELESS INTERFACE TRANSCEIVER (TRANSMITTER 1)
301
ALARM BOX
200

FIG. 4

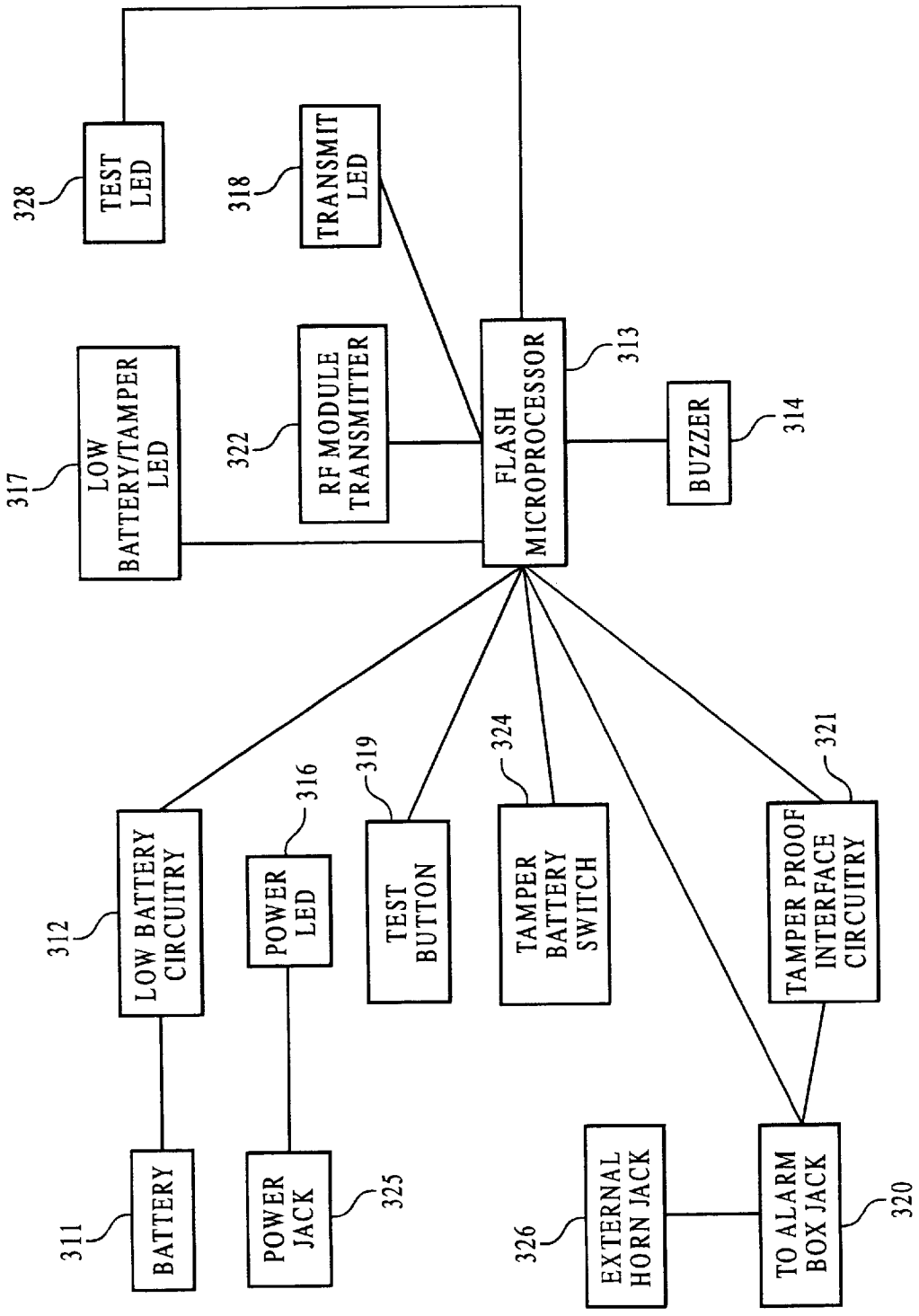

328
TEST LED
318
TRANSMIT LED
317
LOW BATTERY/TAMPER LED
322
RF MODULE TRANSMITTER
FLASH MICROPROCESSOR
313
BUZZER
314
312
LOW BATTERY CIRCUITRY
316
POWER LED
319
TEST BUTTON
324
TAMPER BATTERY SWITCH
321
TAMPER PROOF INTERFACE CIRCUITRY
311
BATTERY
POWER JACK
325
326
EXTERNAL HORN JACK
TO ALARM BOX JACK
320

FIG. 5

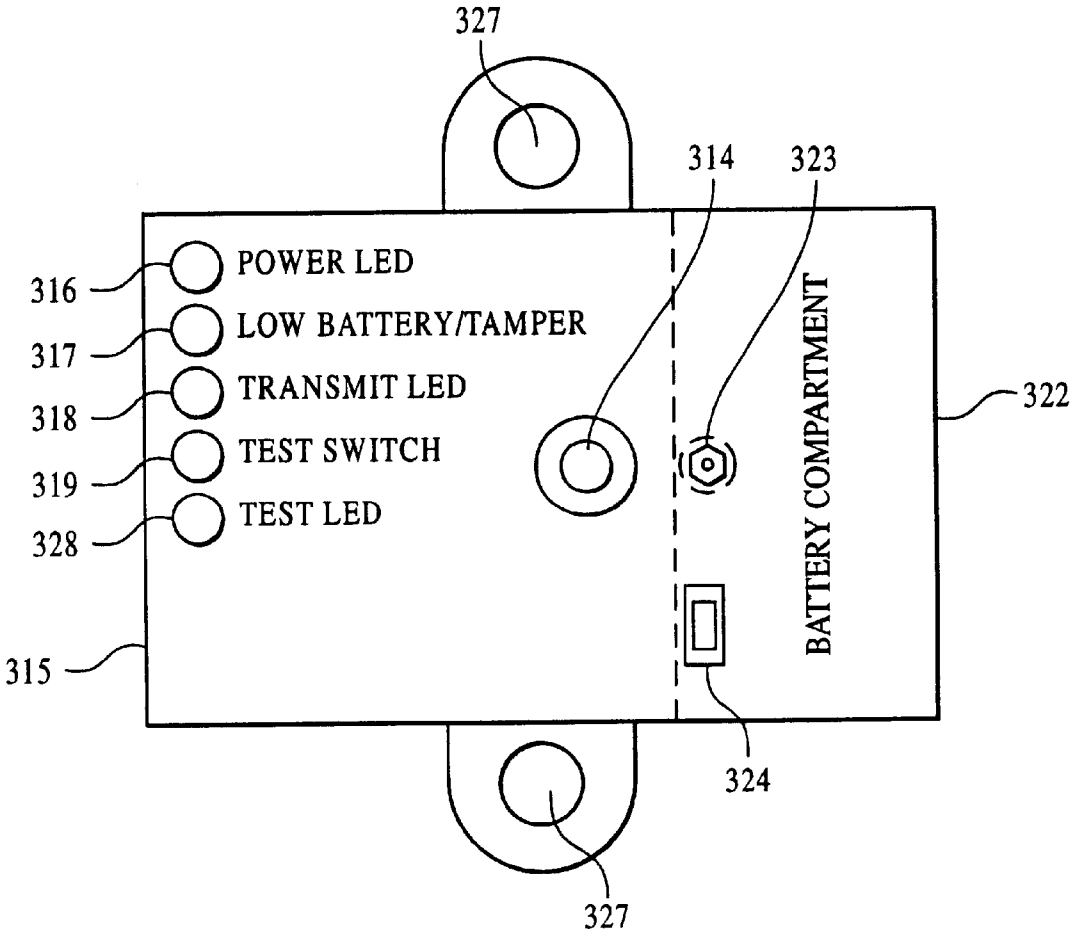

327
314
323
POWER LED
LOW BATTERY/TAMPER
TRANSMIT LED
TEST SWITCH
TEST LED
316
317
318
319
328
315
322
BATTERY COMPARTMENT
324
327

FIG. 6

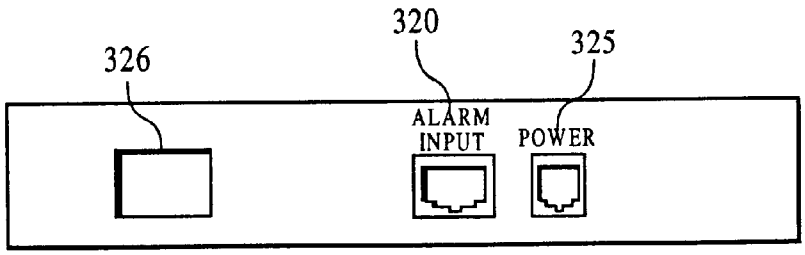

320
325
326
ALARM INPUT
POWER

FIG. 7

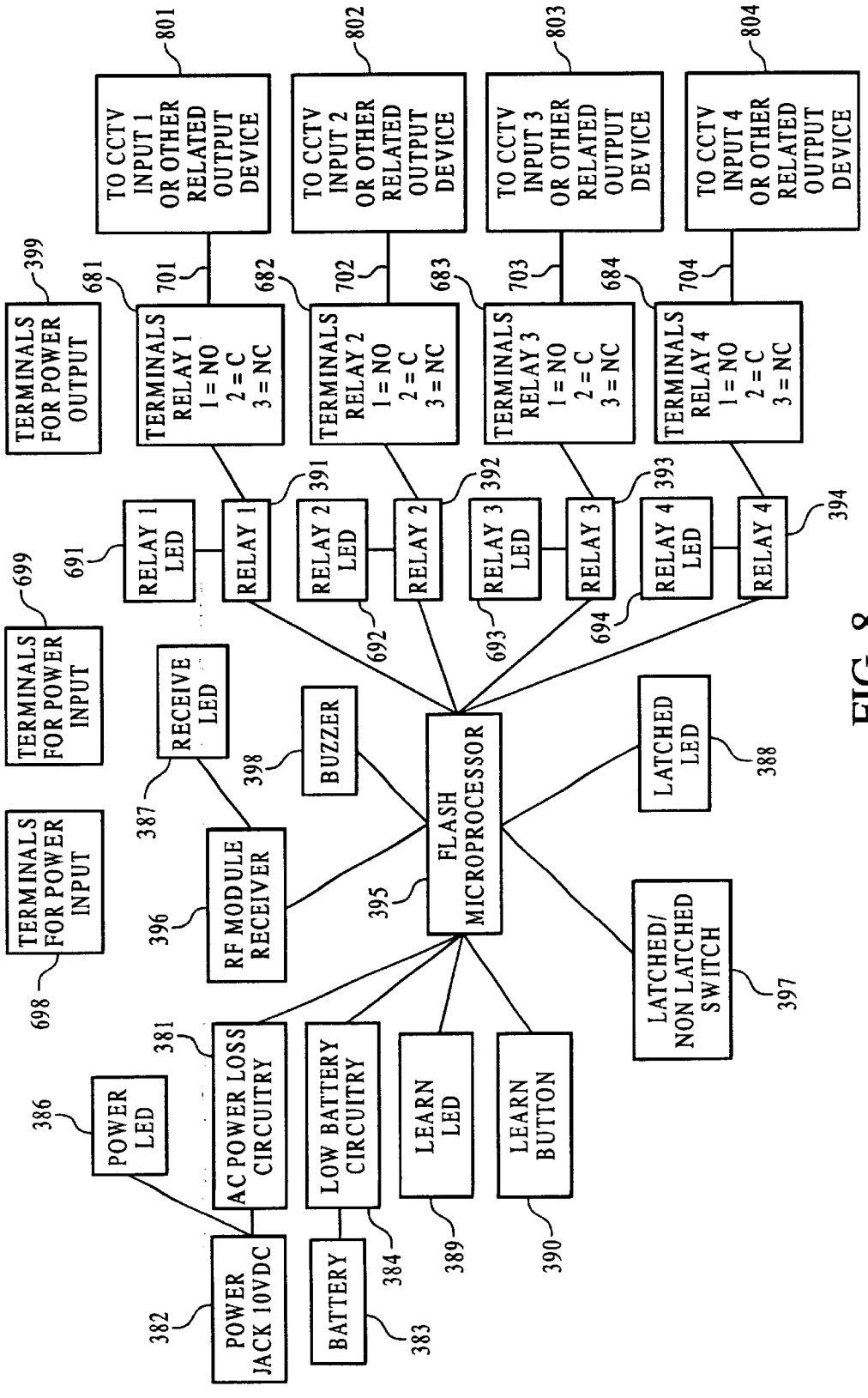

TO CCTV INPUT 1 OR OTHER RELATED OUTPUT DEVICE
TO CCTV INPUT 2 OR OTHER RELATED OUTPUT DEVICE
TO CCTV INPUT 3 OR OTHER RELATED OUTPUT DEVICE
TO CCTV INPUT 4 OR OTHER RELATED OUTPUT DEVICE
801
802
803
804
TERMINALS FOR POWER OUTPUT
399
TERMINALS RELAY 1 1 = NO 2 = C 3 = NC
681
701
TERMINALS RELAY 2 1 = NO 2 = C 3 = NC
682
702
TERMINALS RELAY 3 1 = NO 2 = C 3 = NC
683
703
TERMINALS RELAY 4 1 = NO 2 = C 3 = NC
684
704
RELAY 1 LED
691
RELAY 1
391
RELAY 2 LED
RELAY 2
392
RELAY 3 LED
RELAY 3
393
RELAY 4 LED
RELAY 4
394
TERMINALS FOR POWER INPUT
699
692
693
694
RECEIVE LED
387
BUZZER
398
FLASH MICROPROCESSOR
LATCHED LED
388
TERMINALS FOR POWER INPUT
698
RF MODULE RECEIVER
396
395
LATCHED/ NON LATCHED SWITCH
397
POWER LED
386
AC POWER LOSS CIRCUITRY
381
LOW BATTERY CIRCUITRY
LEARN LED
LEARN BUTTON
POWER JACK 10VDC
382
BATTERY
383
384
389
390

FIG. 8

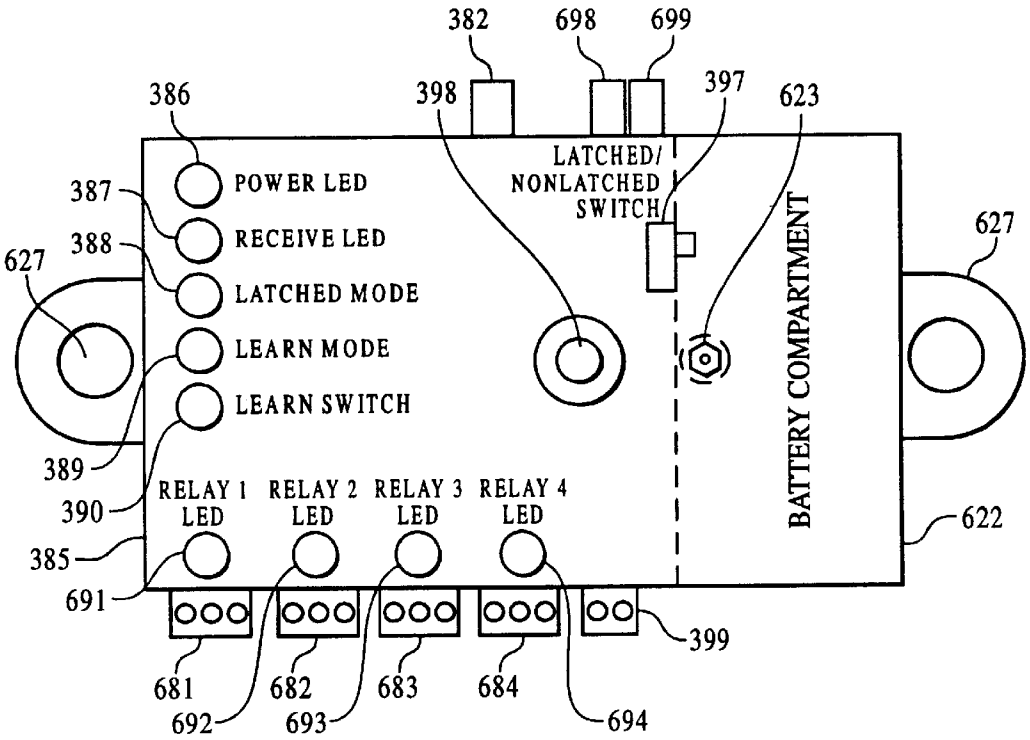


FIG. 9

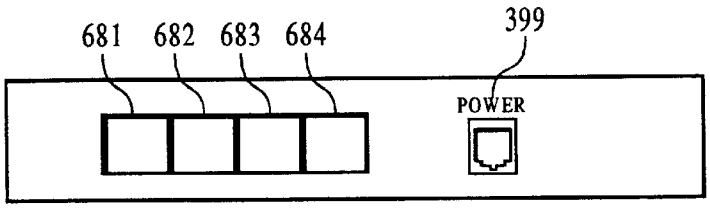


FIG. 10

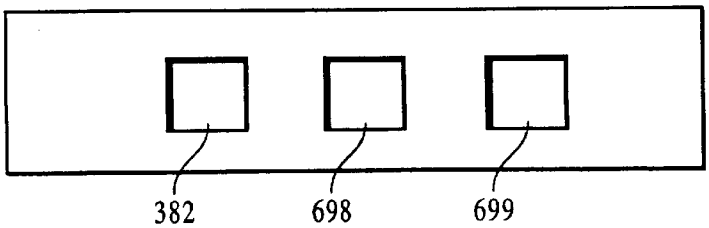


FIG. 11

ALARM INTERFACE SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to security and anti-theft devices. More particularly, it relates to an alarm interface system between an alarm system and a video camera or other output device to protect merchandise and consumer product displays.

2. The Prior Art

At the present time, there are a large variety of anti-theft security systems commonly used in many retail establishments, especially those that sell expensive and easily portable items such as consumer electronics. See, e.g., the security systems described in U.S. Pat. Nos. 5,543,782 and 5,561,417 to Rothbaum et al., U.S. Pat. Nos. 5,726,627 and 6,278,365 to Kane et al., and U.S. Pat. Nos. 5,821,857 and 6,104,289 to Rand. In many of these devices the anti-theft security system has a command module or controller and a plurality of sensor satellites or hubs arranged in a daisy chain configuration. The command module and sensor satellites operate with microprocessors to monitor sensors attached to items to be secured and to the satellites. Cutting the wire attaching the sensor to the satellite or the satellite to the command module, or removing the sensor from the item, generates an alarm event which is detected by the central command module and causes an alarm to sound. In other devices, the alarm and detection circuitry and all connections to the sensors are located in one housing without requiring separate alarm modules or splitter boxes. Item cords connect the sensors directly to an alarm circuit. In still other devices, a cable has mating connectors which form a closed loop after being intertwined with an item to be protected. Both ends of the cable extend from an alarm box which sounds an alarm if the cable is disconnected. See, e.g. U.S. Pat. No. 3,444,547.

Although these systems have many benefits, there is still a need to improve on such systems by providing an interface between the alarm system and a video camera or other output device so that the output device or devices can be readily activated when the alarm system generates an alarm event.

SUMMARY OF THE INVENTION

An alarm interface system for a merchandise security system is provided. The merchandise security system includes an alarm system to which the alarm interface is coupled, and one or more output devices are connected to the alarm interface. In one aspect, the alarm system includes a controller for sensing alarm events generated by the alarm system, one or more hubs connected to the controller, and a plurality of sensors capable of attachment to a plurality of objects to be secured. Each hub has attached to it a set of sensors within the plurality of sensors. Each sensor or hub generates an alarm event when separated from the controller or object to be secured.

In another aspect, the alarm system includes a controller for sensing alarm events generated by the alarm system and a plurality of sensors capable of attachment to the controller and a plurality of objects to be secured. Each sensor generates an alarm event when separated from the controller or object to be secured.

The alarm interface includes one or more wireless interface transmitters and one or more wireless interface receivers. The wireless interface transmitters transmit one or more alarm signals. The alarm signals may contain information corresponding to a location of the sensor or, if hubs are in the system, the hub generating an alarm event. Other signals transmitted may include a signal indicating that the alarm system is armed or disarmed. Another signal transmitted may be a signal indicating a low battery in the alarm system. The wireless interface receivers are adapted to receive at least one or more alarm signals transmitted when the at least one alarm signal contains selected information.

At least one output device is activated by a wireless interface receiver in response to the alarm signal received by the wireless interface receiver.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and features of the present invention will become apparent from the following detailed description considered in conjunction with the accompanying drawings. It should be understood, however, that the drawings are designed for the purpose of illustration only and not as a definition of the limits of the invention.

In the drawings, wherein similar reference characters denote similar elements throughout the several views:

FIG. **1A** is a schematic block diagram showing the overall parts of an embodiment of the present invention.

FIG. **1B** is a schematic block diagram showing a number of output devices that can be used in the embodiment of FIG. **1A**.

FIGS. **1C** to **1E** are schematic block diagrams showing further output devices that can be used in the embodiment of FIG. **1A**.

FIG. **2A** is a diagram of an alarm system in accordance with one aspect of the invention.

FIG. **2B** is a perspective view of one form of sensor used with the alarm system of FIG. **2A**.

FIG. **2C** is a perspective view of one form of hub used with the alarm system of FIG. **2A**.

FIG. **3A** is a diagram of another form of alarm system in accordance with a further aspect of the invention.

FIG. **3B** is a diagram of another form of alarm system in accordance with a further aspect of the invention.

FIG. **4** is a schematic block diagram showing the use of a wireless repeater in accordance with a further embodiment of the invention.

FIG. **5** is a schematic block diagram of a wireless interface transmitter incorporated in the embodiment of FIG. **1**.

FIGS. **6** and **7** are top and side views respectively of the wireless interface transmitter of FIG. **5**.

FIG. **8** is a schematic block diagram of a wireless interface receiver incorporated in the embodiment of FIG. **1**.

FIGS. **9** to **11** are top and first and second side views, respectively, of the wireless interface receiver of FIG. **8**.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Turning now in detail to the drawings, FIG. **1A** shows a merchandise security system **100** including one or more alarm systems **200**, an alarm interface **300**, and one or more output devices **401–422**. Alarm interface **300** is addressable or can be programmed to permit specific receivers within the interface to respond. Alarm interface **300** includes at least one wireless interface transmitter, such as transmitters **301–304**, and at least one wireless interface receiver, such as

receivers **351–372**. The transmitters are connected to respective alarm boxes **200**, preferably by cables **500**. The receivers are likewise connected to the respective output devices, preferably by cables **700**.

Each alarm system **200** may be an alarm system such as is described in U.S. Pat. Nos. 5,726,627 or 6,104,289. As shown in FIG. **2**A, alarm system **200** includes a control unit **210**, a plurality of hubs **220** and a plurality of sensors **230** coupled to the hubs **220**. As shown in FIG. **2**B, each sensor **230** may include an indicator **232** such as an LED and a sensor cable **234**. Sensor **230** is connected to an object, for example, by adhesive foam tape **236** which depresses plunger **238** and closes a switch (not shown) contained within sensor **230** to complete the circuit as described in U.S. Pat. No. 6,104,289. The sensor **230** is connected to a hub **220** by plugging the sensor cable **234** into a sensor jack **222** having corresponding status indicators **223** such as bi-color LEDs having red and green operating modes as shown in FIG. **2**C. Each hub **220** includes a plurality of sensor jacks **222**. Each hub **220** also includes a hub/sensor location annunciator **242**, a hub reset switch **228**, and an upstream jack **246** and a downstream jack **244**. The downstream jack **244** is connected to another hub **220** by using hub connection cable **250**. The hub connection cable **250** is connected between the downstream jack **244** of one hub **220** and the upstream jack **246** of another hub **220**. In this manner, a plurality of hubs **220** can be connected in a serial chain. The first hub **221** is connected to the control unit **210** by a control unit hub connection cable **252** connected to the upstream jack **246** of the first hub **221** and the control unit **210**.

The control unit **210** includes the display unit including indicator lights **212** and optionally a keypad (not shown). Information such as passwords and commands may be entered through the keypad **214** and displayed on control unit **210**. The control unit **210** also displays other data such as alarm event locations using the display unit **212**.

Each hub **220** is connected with either the control unit **210** or a hub **220** through the upstream jack **246** and/or a hub **220** through the downstream jack **244**. The last hub **222** is connected only to one other hub **220** through the upstream jack **246**. Hubs **221** and **222** are identical to each other and to any other hubs **220** used in the system except that hub **221** is connected to the control unit **210** and the hub **222** is the last hub in the chain of hubs. Accordingly, all reference to hubs **220** also apply to the hubs **221** and **223**.

As is more fully described in U.S. Pat. Nos. 5,726,627 or 6,104,289, the controller or control unit **210** senses alarm events generated by each sensor **230** or hub **220** when the sensor or hub is separated from the controller or object to be secured, such as an item of merchandise.

Alternatively, alarm system **200** may be an alarm system such as is described in U.S. Pat. No. 5,543,782. As shown in FIG. **3**A, a multi jack alarm system **200** includes a strip or housing **262** containing the majority of the circuitry for the system. Twelve jacks are shown but alarm system **200** may have other numbers of jacks. For example sixteen jacks could be included. Power to the alarm system **200** is supplied by an AC adapter **264**. AC voltage is converted by AC adapter **264** to a low voltage DC, such as nine or ten volts, and is supplied to the system circuitry via power cord **266**.

Power cord **266** may be hard-wired to the security system. However, for flexibility and maintenance reasons, a two-wire plug **268** is attached to the end of the power cord **266** for connection to the alarm circuit. A jack **270** on the housing **262** plug **268**. The wires connected to jack **270** carry the voltage to the circuitry.

Whenever plug **268** is inserted into jack **270** and adapter **264** is being supplied AC power from an outlet, power indicator light **292** is lit. If power is interrupted (e.g., plug **268** is removed from jack **270** or there is an AC power failure) power LED **292** is turned off. The illumination of power indicator **292** is independent of the position of key switch **288** which switches the alarm system from a SET-UP mode to the armed or ON mode by turning key **290**.

In the embodiment shown in FIG. **3**A, a number of items of merchandise **272** may be secured by attaching sensors, such as hard goods sensor **274**, to the merchandise. For example, twelve, sixteen or some other number of items may be secured depending on the particular design. Hard goods sensor **274** is connected to the alarm circuitry in strip **262** by item cord **278**.

A dual-switch mating jack **286** is mounted in the housing **262**. The sensor plug **284** at the end of item cord **278** and its corresponding mating jack **286** are off-the-shelf items. When a sensor is attached to an article, current flows from the alarm circuit through plug **284** to the sensor and back to the alarm circuit and LED **294** on strip **262** for that plug is turned on.

A horn **276** is provided in strip **262** which sounds once a breach of security condition is detected. In addition, strip **262** may be provided with a battery inside a compartment **280** secured by battery compartment screw **275**.

FIG. **3**B shows another form of alarm system known as the Electronic ProAlert (EPA) available from Protex International Corp., Bohemia, N.Y. As shown in FIG. **3**B, alarm system **200** includes an alarm box **262** containing the majority of the circuitry for the system. A number of items of merchandise, such as garment **272**, may be secured by attaching a soft goods sensor or clip **274** to the garment. Clip **274** is connected to the alarm circuitry in alarm box **262** by cable **278**.

Another form of alarm system is known as the Loop Alarm also available from Protex International Corp., Bohemia, N.Y. In this alarm system, a cable loops around an item of merchandise and connects to itself to complete the circuit.

Other forms of alarm systems may also be used, such as the alarm system shown in U.S. Pat. No. 5,561,417. In addition, standard fire alarm or motion detector or other stand-alone alarm device may be used as the alarm system.

The alarm interface **300** coupled to alarm system **200** includes one or more wireless interface transmitters **301–304** and one or more wireless interface receivers **351–372**.

As shown in FIG. **1**B, each wireless interface transmitter **301–304** is connected to an alarm system **200**. For example, wireless interface transmitter **301** may be connected to the command module **210** of the alarm system of FIG. **2** or the alarm box **262** of the alarm system of FIGS. **3**A–**3**B. The wireless interface transmitter is preferably connected to the command module or the alarm box using, for example, a 12-foot, 6-conductor modular cable **500** with 6-position, 6-contact modular jacks at each end. Other types of connections may be used. The alarm output of alarm system **200** can be hard-wired to an external annunciator, such as external lights, through the same connector **500** used for alarm interface **300**. The alarm output preferably has three pulse rates or duration sequences to identify alarm, arm/disarm and low battery conditions. The wireless interface transmitter preferably communicates with a corresponding

wireless interface receiver over a suitable distance, preferably to 300 feet, with a minimum distance with limited obstacles of, for example, fifty feet. Preferably four transmitters **301–304** and as many as eight transmitters are connected to a given receiver **351**. In other words, each receiver **351–372** preferably has the capacity to receive signals from each of the four or eight transmitters. However, any of the receivers could be adapted so as to receive signals from a greater number of transmitters, for example, more than eight.

An infinite number of receivers can be connected to the same transmitter. Preferably, an unlimited number of receivers can communicate with a given transmitter. Preferably, each receiver has the ability to "learn" and "unlearn" transmitters, i.e. to be adapted to accept or not accept signals from selected transmitters. Alternatively, each receiver has the ability to be matched to a selected receiver using dip switches. The wireless interface receivers can be connected to a variety of different output devices **401–422**. All possible devices may or may not be included in a given system.

At least one output device **401–422** is connected to at least one wireless interface receiver **351–372** by one or more cables and may be activated when its corresponding wireless interface transmitter is separated from the controller or alarm box or the wireless interface receiver or receivers is separated from the output device. For example, the cable connection to the output device may form a normally closed circuit which triggers the output device when the circuit becomes open such as when the cable is cut. Conversely, the cable connection could form a normally open circuit which would be triggered when the circuit is closed. For this circuit, severance of the cable connection could form a closed circuit, thereby triggering the output device.

Examples of the various output devices are shown in FIGS. **1**B to **1**E. For example, as shown in FIG. **1**B, wireless interface receiver **351** may be connected to the input of a recording device such as a video cassette recorder (VCR) **401**. When wireless interface transmitter **301** sends a signal to receiver **351**, the receiver closes a relay connected to the VCR input, which triggers VCR **401** to start recording at the start of the alarm condition.

Similarly, wireless interface receiver **352** may be connected to the input of a fixed video camera such as a closed circuit television (CCTV) camera. When transmitter **301** sends a signal to receiver **352**, receiver **352** closes a relay connected to the CCTV fixed camera input, which triggers the camera to start recording at the start of the alarm condition. If this camera **402** is connected to a digital or other recorder, saved recordings prior to the alarm event can be captured.

Wireless interface receiver **353** is shown in FIG. **1**B connected to the input of a CCTV dome camera **403**. When transmitter **302** sends a signal to receiver **353**, receiver **353** closes a relay connected to the CCTV dome camera input, which triggers the camera **403** to swing over to a preprogrammed location and start recording at the start of the alarm condition.

Wireless interface receiver **354** is connected to the input of a digital recorder **404**. When transmitter **302** sends a signal to receiver **354**, receiver **354** closes a relay connected to the digital recorder input, which triggers the digital recorder **404** to start recording at the start of the alarm condition. If the camera is fixed, the system can capture events occurring before the alarm condition.

Wireless interface receiver **355** is connected to the input of an event counter **405**. When transmitter **303** sends a signal to receiver **355**, receiver **355** closes a relay connected to the event counter input which triggers the event counter **405** to put a time stamp on the event at the start and stop of the alarm condition. In addition to a signal containing information that an alarm condition has occurred at the alarm system, wireless interface transmitter **303** may be designed to transmit signals indicating a low battery condition or a condition indicating that the system is in either the armed or the disarmed state. Thus, event counter **405** will be able to see how many times the alarm unit was armed and disarmed or when a low battery condition occurred and what unit it was that had the condition.

The information generated by the event counter may be used to monitor human traffic or demographics for marketing purposes. For example, the arming/disarming information could be used to monitor sales volume as the system is typically disarmed when a sale is being transacted.

Wireless interface receiver **356** is connected to a remote light **406**. When transmitter **303** sends a signal to receiver **356**, receiver **356** closes a relay connected to remote light **406**, which triggers the remote light to turn on at the start of the alarm condition. Light **406** could be located anywhere in the store for convenience.

Similarly wireless interface receiver **357** is connected to a remote buzzer **407** which can be located anywhere in the store and be turned on at the start of the alarm condition when receiver **357** closes a relay in response to a signal transmitted by wireless transmitter **304**.

Wireless interface receiver **358** can also be made portable with the output device **408** incorporated in receiver **358**. When transmitter **358** sends a signal to portable receiver **358**, receiver **358** will act similar to a pager by either beeping or vibrating to tell someone that an alarm condition has occurred. Receiver **358** may also be designed to determine whether there was an alarm condition at the controller of the alarm system and to trace the alarm condition down to the particular satellite or sensor causing the condition. Receiver **358** may also be designed to determine whether the battery was low, or whether the unit was armed or disarmed.

As shown in FIG. **1**C, wireless interface receiver **359** is connected to the input of an access control panel **409**. When transmitter **301** sends a signal to receiver **359**, receiver **359** closes a relay connected to the access control panel input.

Similarly, wireless interface receivers **360** and **361** can be connected to the respective input of an access control card recorder **410** or other access control device **411** with alarm input. When transmitter **301** sends a signal, the receiver closes a relay connected to the input of the device.

Likewise, wireless interface receivers **362** and **363** can be connected to the respective input of a burglar alarm control panel **412** or any burglar alarm device **413** with alarm input. Receiver **362** and **363** closes a respective associated relay connected to the input of the device in response to a signal from the transmitter.

As shown in FIG. **1**D, other devices include a CCTV video controller (CPU) **414**, a CCTV alarm input module **415**, a CCTV picture in picture **416**, a CCTV Quad splitter **417**, a CCTV multiplexer **418**, or any CCTV device **419** with alarm input. Receivers **364–369** are respectively connected to the inputs of these devices and close a relay connected to the inputs in response to a signal from a transmitter.

As shown in FIG. **1**E, wireless interface receivers **370–372** can be connected to the input of any network interface device **420**, cell phone interface device **421**, or pager device **422** that accepts inputs. When the transmitter

sends a signal to the receiver, the receiver closes a relay connected to the input of the device. For a cell phone interface device **421** or pager device **422**, the device would then dial a cell phone or pager.

Each of the transmitters and receivers may be transceiver units to provide feed back to one another as to whether the radio frequency signal was transmitted or received. Preferably, the radio frequency range between transceivers or transmitter and receiver is at least 200 feet in an open field and at least 50 feet in a store environment with obstructions. As shown in FIG. **4**, if longer distances between transceivers or transmitters and receivers are required, one or more wireless repeaters **502** which may also be transceivers may be provided to increase the length between transceivers or transmitter and receiver.

The RF frequency may be a 433 MHz to 800 MHz scan spectrum so that frequency is automatically adjusted to adapt to environmental noise conditions. However, it is not necessary to use a scan spectrum and other frequencies may also be used besides those in the range 433 MHz to 800 MHz.

FIGS. **5–7** show a preferred form of transmitter for the security system. The transmitter is addressable so that only specific receivers respond to alarms. The transmitter is preferably provided with backup battery power **311**, such as a 9V battery or four AA batteries. If main power goes down, or if interface cable **500** is cut, battery power **311** will be used to transmit an alarm signal to the receiver. The battery power source is housed in battery compartment **322** in housing **315** of the transmitter. Battery compartment **322** can be secured by a tamper proof screw **323** or a tamper switch **324** which is activated when battery compartment **322** is tampered with and which causes the alarm system to generate an alarm signal.

The transmitter preferably includes low battery circuitry **312** which alerts a flash microprocessor **313** in the transmitter if battery power gets weak. Microprocessor **313** in turn will sound a buzzer **314** or other annunciator in the transmitter at regular intervals, preferably every thirty seconds, to indicate a low battery condition.

The housing **315** of the transmitter may be made from a durable extruded material or pre-plated or vinyl coated steel or like material. Preferably housing **315** includes indicators, such as LEDs **316–318** and **328**, and a test switch **319**. If power is present from the command module or alarm box of the alarm system, power LED **316** will light. If the unit is operating from battery power, power LED **316** will be off. Transmit LED **318** lights each time the transmitter transmits a signal. Preferably, low battery/tamper LED **317** will light for one second every twenty-five seconds for a low battery condition, and for one second every two seconds, if the tamper switch is opened.

Test button or switch **319** may be a jumper that puts the unit into a setup or testing mode. Alternatively, a membrane switch or other suitable switch technology may be used. Pushing switch **319** a first time sends a signal to microprocessor **313** to send a start of alarm signal to the receiver. Five seconds later microprocessor **313** sends a stop alarm signal to the receiver. Holding the test button for ten seconds puts the unit into a continuous test mode. The unit will repeatedly transmit start and stop signals every five seconds and repeat the process every five seconds. When the unit is put into test or setup mode, test LED **328** will light.

Housing **315** also includes an alarm input jack **320** to enable the transmitter to be connected to an alarm box jack on the command module or alarm box of alarm system **200**. The alarm module or box provides power, preferably 10 volts dc, ground and the alarm signal to the transmitter unit, preferably via a 6-conductor modular cable with a 6-position, 6-control modular plug at each end.

The transmitter also includes tamper proof interface circuitry **321**. If interface cable **500** is cut, circuitry **321** will tell microprocessor **313** to sound buzzer **314** in the transmitter and transmit an alarm signal to the receiver.

The transmitter also includes a radio frequency (RF) module transitter **322**, preferably an FM SIL transmitter module that is capable of transmitting up to 250 meters. Transitter **322** preferably has a Cmos/ttl input, no adjustable components, and a very stable operating frequency, with low current consumption and wide operating voltage, preferably 2.7–14 v. The frequency of transitter **322** may be 315, 418, 433 MHz or another frequency depending on the particular needs of the user.

As stated previously, flash microprocessor **313** will sound buzzer **314** and light low battery LED **317** for one second, preferably every twenty-five seconds, if a low battery is sensed. Buzzer **314** will sound continuously if interface cable **500** is cut. Microprocessor **313** preferably has "flash on board" allowing the chip to be reprogrammed both in and out of the circuit. This feature allows the software to be changed or upgraded as new programs are developed. Preferably, microprocessor **313** has a code hopping encoder supporting Keeloq technology or other deciphering algorithm to ensure that each transmission is unique.

Microprocessor **313** senses an alarm condition from the alarm box or module, sounds the buzzer continuously and transmits to the receiver one or more times that the alarm condition has started. Microprocessor **313** also senses when an alarm condition stops, turns the buzzer off and transmits to the receiver one or more times that the alarm condition has stopped.

In addition, microprocessor **313** will sense the cutting of the alarm system interface cable **500**. In that case, microprocessor **313** sounds buzzer **314** and transmits to the receiver one or more times that an alarm condition has occurred.

Microprocessor **313** also senses when test button **319** is pushed, turns test LED **328** on, and sends a start alarm signal to the receiver. Five seconds later, microprocessor **313** sends a stop alarm signal to the receiver and turns test LED **328** off. Holding test button **319** for ten seconds puts unit into continuous test mode. Unit will repeatedly transmit start and stop signals every five seconds and repeat process every five seconds. When the unit is put into test or setup mode, test LED **328** will light.

Microprocessor **313** also senses the tampering of battery compartment **322** via tamper switch **324**. When tampering is sensed, microprocessor **313** sounds buzzer **314**, turns on low battery/tamper LED **317** for one second every two seconds, and transmits an alarm signal to the receiver one or more times.

Microprocessor **313** also lights the transmit LED **318** every time the transmitter transmits to the receiver.

The transmitter also includes a power jack **325** which is used to input power to the transmitter. Preferably, power jack **325** will accept power from the transformer of the alarm system.

An external horn jack **326** is also provided on housing **315** which allows connection of an external horn, light or other annunciator to the transmitter unit. Mounting holes **327** extending from housing **315** may be provided to mount the transmitter to a supporting structure.

FIGS. **8–11** show a preferred form of receiver for the security system. Preferably, the receiver has a receiver circuit with a number of relay alarm outputs, preferably at least 4 to 12. The relays, such as relays **391–394**, are preferably disposed in sockets so that the interface cable can be configured to accommodate a particular user's requirements and to replace defective relays easily. Alternatively, any type of switch, dry or wet, analog or digital, may be used in place of the relay. Preferably, twelve alarm outputs are provided, with ten of the alarm outputs being satellite alarm outputs and the remaining two being respectively for the signals indicating disarm of the command module or alarm box and a low battery condition in the alarm system. The receiver is preferably provided with AC power loss circuitry **381** so that if AC power is lost, the unit will go into alarm and trip all relays **391–394**.

The receiver also includes a power jack **382** preferably disposed in the side of housing **385** of the receiver. Power jack **382** preferably is a 4 position, 4 contacts modular jack able to accept a 10 vdc transformer such as is present in certain alarm systems.

Housing **385** of the receiver may be made from the same material as is used to make transmitter housing **315**. Preferably, housing **385** includes indicators, such as LEDs **386–389**, a learn switch **390**, and a latched/nonlatched switch **397**. If power is present from the 10 vdc power jack **382**, the 10–12 DC power terminals **698**, or the 24 vac power terminal **699**, power LED **386** will light. Receive LED **387** will light every time a transmitter is sensed by the receiver. Latched LED **388** will light if the unit is in latched mode and will be unlit for nonlatched mode. Learn LED **389** is on solid when the receiver is waiting to learn a particular transmitter. Learn LED **389** blinks after the receiver has learned the transmitter.

Each of Relays LEDs **691–694** is associated with a corresponding relay **391–394**. Relay LED **691** will go on as long as the first relay is on and will blink if in learn mode and the receiver is waiting to learn the transmitter to trigger the first relay **391**. The same is true for Relays LEDs **692–694** for their respective relays **392–394**.

Pressing of learn button or switch **390** turns learn LED **389** on solid, along with blinking the first relay LED **691**. Once learn LED **389** is on, the unit will poll for a signal for a period of time, for example, thirty seconds. If a transmission received the first time, learn LED **389** will turn off and the first relay **691** will be solid on. If the same transmission is received a second time, learn LED **389** will flash to indicate the transmitter has been learned and the first relay LED **691** will turn off. While the learn LED **389** is on, pressing the learn switch **390** a second time will repeat the process for the second, third and fourth relays **392–394**. Holding learn button **390** for a period of time, for example five seconds, while learn LED **389** is on solid will erase all learned transmitters for a particular relay or if no relay LEDs are on, erases all transmitters.

Latched/Nonlatched switch **397** may be a jumper or switch which allows the user to select between latched and nonlatched mode. For latched mode, the relay will remain closed for the duration of the alarm condition. For nonlatched mode, the relay will stay closed only for a selected period of time, preferably the first 250 ms of the alarm condition. Some output devices, such as certain cameras, require a latched mode where a normally open or normally closed dry contact is closed for the entire duration of the alarm. Other devices, including other cameras require a nonlatched mode where a normally open or normally closed dry contact is closed for only 250 ms or other interval so that the camera or other device can continue receive other signals during the alarm condition. The relays may also be designed so that each individual relay has its own jumper or switch so that each relay can be set to the latched or unlatched mode independently of the other relays.

The receiver is preferably provided with backup battery power **383**, similar to the transmitter, in case of AC power loss. A tamper proof battery screw **623**, like screw **323** in the transmitter, is provided for battery compartment **622** which houses the battery or batteries **383**. Mounting holes **627** extending from housing **385** may be provided to mount the receiver to a supporting structure. Circuitry may be included so that an alarm signal is generated in the controller upon tampering with the power sources to the system.

Also like the transmitter, the receiver preferably includes low battery circuitry **384** which alerts a flash microprocessor **395** in the receiver if battery power gets weak. Microprocessor **395** in turn will sound a buzzer **398** or other annunciator in the receiver at regular intervals, preferably every twenty-five seconds, to indicate a low battery condition.

The receiver also includes a radio frequency (RF) module receiver **396**, preferably an FM SIL receiver module that has a receiver range of up to 250 meters. RF module receiver **396** preferably has a Cmos/ttl output, no adjustable components, and a very high frequency stability, with low current consumption and a suitable operating voltage, for example 5V. The frequency of RF module receiver **396** may be 315, 418, 433 MHz or another frequency depending on the particular needs of the user.

As stated previously, flash microprocessor **395** will sound buzzer **398**, preferably every twenty-five seconds, if a low battery is sensed. Microprocessor **395** preferably has "flash on board" allowing the chips to be reprogrammed both in and out of the circuit to allow for software changes and upgrades. Preferably, microprocessor **395** has a code hopping encoder supporting Keeloq technology or other deciphering algorithm to ensure that the receiver does not mistake stray signals or noise as valid transmissions.

Microprocessor **395** senses an alarm condition sent by the transmitter and closes the appropriate relay. If the receiver is set to the nonlatched condition, the relay is closed for a suitable period of time, preferably 250 ms. If the receiver is set to the latched condition, the relay is closed and remains closed until the system receives a stop signal. Microprocessor **395** also senses the stop of the alarm condition sent by the transmitter and opens the appropriate relay.

Microprocessor **395** also will sense AC power loss and sound buzzer **398** and close relays **391–394** until AC power is restored if latched/nonlatched switch **397** is set to latched mode. Microprocessor **395** will open all relays after a selected interval, such as 250 ms, if latched/nonlatched switch **397** is set to nonlatched mode.

Microprocessor **395** also senses the pressing of learn button **390**. When learn button **390** is pressed, microprocessor **395** selects programming of a particular transmitter for a selected relay and stores the unique transmitter information in an eeprom or other non-volatile memory when received. Microprocessor **395** will also sense the holding of learn button **390** and erase any transmitter information stored in memory.

The receiver is also provided with terminals, for example w and/or screwless terminals **681–684** for each of relays **691–694**. These terminals provide for easy connection of wires the dry contact of a CCTV camera or other output device. Each of terminals **681–684** include a relay common

contact for its associated relay, a normally open contact, and a normally closed contact.

The receiver also includes a 2-conductor cable **701–704** connecting each relay to the respective input **801–804** of its associated CCTV camera or other output device. One wire in the cable will connected to the common contact of the associated relay. The other will either connect to the normally open or normally closed contact of the relay depending on what input the CCTV camera or output device requires.

The receiver also includes three terminals **382, 698, 699** for input power and one terminal for output power **399**. All these terminals may be screw, screwless or jack terminals, or other suitable terminals. Preferably, the input power ranges from 9 vdc to 12 vdc. For example, terminal **382** may be for 10 vdc power input, terminal **698** may be for 10–12 dc power input and terminal **699** may be for 24 vac power input. For certain installations, the receiver may be designed to accept higher dc voltages as well as some AC voltages. The output power **399** can supply power for an external device, such as a remote light or buzzer.

Each transmitter and receiver may also be designed as a transceiver to simplify installation of the system. The transceiver at the command module or alarm box of the alarm system preferably provides an indication that the transceiver at the output device is receiving a signal. For example, the transceiver **301** connected to the command module or alarm box **200** would transmit the signal to the transceiver **351** connected to an alarm input of various output devices. Transceiver **351** would then send an acknowledgment back to transceiver **301** which preferably provides an indication, such as by lighting a "Received OK" LED to indicate that the transmission went through.

For portable receivers, such as receiver **358**, battery life preferably is approximately three weeks on strictly battery power. A rechargeable battery and charger may also be provided in receiver **358** along with vibrator and/or beeper and clip.

Each transmitter and receiver may also have the option to use rechargeable or nonrechargeable batteries in the unit. For this option, a battery charging circuit and internal jumper would be included in the unit. The user would set the jumper depending on the type of batteries used. Preferably, the unit has a default setting in which the jumper is set for nonrechargeable batteries.

Each output device may be designed to become activated if the wireless interface transmitter is separated from the alarm system or the wireless interface receiver is separated from the output device. For example, an open circuit could be created if the cable connecting the output device to the wireless interface receiver is cut, with the open circuit triggering the output device to turn on. Also, each output device may be designed to become activated when power tampering occurs at the wireless interface transmitter.

While several embodiments of the present invention have been shown and described, it is to be understood that many changes and modifications may be made thereunto without departing from the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. A merchandise security system for monitoring objects to be secured against theft, which comprises:

(a) an alarm system comprising a controller for sensing alarm events generated by the alarm system, one or more hubs connected to the controller, and a plurality of sensors capable of attachment to a plurality of objects to be secured, a set of sensors within the plurality of sensors being attached to a corresponding hub, each sensor or hub generating an alarm event when separated from the controller or object to be secured, the controller generating an alarm signal in response to an alarm event generated by said sensor or hub;

(b) an alarm interface coupled to said alarm system, said alarm interface comprising:

at least one wireless interface transmitter for wirelessly transmitting at least one alarm signal; and

at least one wireless interface receiver adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at least one alarm signal contains selected information; and

(c) at least one output device connected to at least one of said at least one wireless interface receiver, at least one of said at least one output device being activated by at least one of said at least one wireless interface receiver in response to said at least one alarm signal received by said at least one wireless interface receiver;

wherein:

each of said at least one wireless interface transmitter comprises an addressable flash microprocessor selectively communicating with at least one selected wireless interface receiver of said at least one wireless interface receiver.

2. The merchandise security system according to claim **1** wherein said at least one alarm signal contains information corresponding to a location of the sensor or hub generating an alarm event.

3. The merchandise security system according to claim **1** wherein:

said at least one wireless interface transmitter is connected to said controller by at least one cable communicating said at least one alarm signal;

at least one of said at least one output device is connected to said at least one wireless interface receiver by at least one cable and is activated when power tampering occurs at the wireless interface transmitter, the wireless interface transmitter is separated from the controller, or the wireless interface receiver is separated from the output device.

4. The merchandise security system according to claim **1** wherein an alarm signal is generated by the controller when power tampering occurs at the controller.

5. A merchandise security system for monitoring objects to be scouted against theft, which comprises:

(a) an alarm system comprising a controller for sensing alarm events generated by the alarm system and at least one sensor capable of attachment to the controller and a plurality of objects to be secured, each sensor generating an alarm event when separated from the controller or object to be secured, the controller generating an alarm signal in response to an alarm event generated by said sensor;

(b) an alarm interface coupled to said alarm system, said alarm interface comprising:

at least one wireless interface transmitter for wirelessly transmitting at least one alarm signal; and

at least one wireless interface receiver adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at least one alarm signal contains selected information; and

(c) at least one output device connected to at least one of said at least one wireless interface receiver, at least one of said at least one output device being activated by at least one of said at least one wireless interface receiver in response to said at least one alarm signal received by said at least by said at least one wireless interface receiver;

wherein:

each of said at least one wireless interface transmitter comprises an addressable flash microprocessor selectively communicating with at least one selected wireless interface receiver of said at least one wireless interface receiver.

6. The merchandise security system according to claim **5** wherein said at least one alarm signal contains information corresponding to a location of the sensor generating an alarm event.

7. The merchandise security system according to claim **5** wherein:

said at least one wireless interface transmitters are connected to said controller by at least one cable communicating said at least one alarm signal;

at least one of said at least one output device is connected to said at least one wireless interface receiver by at least one cable and is activated when power tampering occurs at the wireless interface transmitter, the wireless interface transmitter is separated from the controller, or the wireless interface receiver is separated from the output device.

8. The merchandise security system according to claim **5** wherein an alarm signal is generated by the controller when power tampering occurs at the controller.

9. An alarm interface system for actuating at least one output device in response to an alarm system coupled to said alarm interface system, which comprises:

(a) at least one wireless interface transmitter for wirelessly transmitting at least one alarm signal; and

(b) at least one wireless interface receiver adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at least one alarm signal contains selected information;

wherein:

each of said at least one wireless interface transmitter comprises an addressable flash microprocessor selectively communicating with at least one selected wireless interface receiver of said at least one wireless interface receiver.

10. The alarm interface system according to claim **9** further comprising at least one cable connected to said at least one wireless interface transmitter for receiving said at least one alarm signal from the alarm system.

11. A merchandise security system for monitoring objects to be secured against theft, which comprises:

(a) an alarm system comprising a controller for sensing alarm events generated by the alarm system, one or more hubs connected to the controller, and a plurality of sensors capable of attachment to a plurality of objects to be secured, a set of sensors within the plurality of sensors being attached to a corresponding hub, each sensor or hub generating an alarm event when separated from the controller or object to be secured, the controller generating an alarm signal in response to an alarm event generated by said sensor or hub;

(b) an alarm interface coupled to said alarm system, said alarm interface comprising:

at least one wireless interface transmitters for wirelessly transmitting at least one alarm signal; and

at least one wireless interface receiver adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at least one alarm signal contains selected information; and

(c) at least one output device connected to at least one of said at least one wireless interface receiver, at least one of said at least one output device being activated by at least one of said at least one wireless interface receiver in response to said at least one alarm signal received by said at least one wireless interface receiver;

wherein:

each of said at least one wireless interface transmitter comprises an addressable microprocessor selectively communicating with at least one selected wireless interface receiver of said at least one wireless interface receiver; and

at least one of said at least one output device comprising a video recorder connected to said at least one of said at least one interface receiver and activated by said at least one of said at least one interface receiver.

12. A merchandise security system tot monitoring objects to be secured against theft, which comprises:

(a) an alarm system comprising a controller for sensing alarm events generated by the alarm system, one or more hubs connected to the controller, and a plurality of sensors capable of attachment to a plurality of objects to be secured, a set of sensors within the plurality of sensors being attached to a corresponding hub, each sensor or hub generally an alarm event when separated from the controller or object to be secured, the controller generating an alarm signal in response to an alarm event generated by said sensor or hub;

(b) an alarm interface coupled to said alarm system, said alarm interface comprising:

at least one wireless interface transmitter for wirelessly transmitting at least one alarm signal; and

at least one wireless interface receiver adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at least one alarm signal contains selected information; and

(c) at least one output device connected to at least one of said at least one wireless interface receiver, at least one of said at least one output device being activated by at least one of said at least one wireless interface receiver in response to said at least one alarm signal received by said at least one wireless interface receiver;

wherein:

each of said at least one alarm signal is communicated by a radio frequency transmission be wean at least one of said at least one wireless interface transmitter and at least one of said at least one wireless interface receiver;

said alarm interface automatically adjusts the frequency of the radio frequency transmission to adapt to environmental noise conditions; and

said at least one of said at least one wireless interface receiver activates a relay to activate said at least one of said at least one output device.

13. A merchandise security system for monitoring objects to be secured against theft, which comprises:

(a) an alarm system comprising a controller for sensing alarm events generated by the alarm system, one or

more hubs connected to the controller, and a plurality of sensors capable of attachment to a plurality of objects to be secured, a set of sensors within the plurality of sensors being attached to a corresponding hub, each sensor or hub generating an alarm event when separated from the controller or object to be secured, the controller generating an alarm signal in response to an alarm event generated by said sensor or hub;

(b) an alarm interface coupled to said alarm system, said alarm interface comprising:

at least one wireless interface transmitters for wirelessly transmitting at least one alarm signal; and

at least one wireless interface receivers adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at least one alarm signal contains selected information; and

(c) at least one output device connected to at least one of said at least one wireless interface receiver, at least one of said at least one output device being activated by at least one of said at least one wireless interface receiver in response to said at least one alarm signal received by said at least one wireless interface receiver;

wherein said at least one wireless interface receiver has a plurality of relays respectively connected to a corresponding one of said at least one output device for activation thereof in an alarm condition, each of said relays being able to be selectively placed in a latched state or a nonlatched state each relay in the latched state remaining in an alarm condition until the controller is reset and each relay in the nonlatched state remaining in an alarm condition for a selected period of time before returning to a nonalarm condition.

14. A merchandise security system for monitoring objects to be secured against theft, which comprises:

(a) an alarm system comprising a controller for sensing alarm events generated by the alarm system, one or more hubs connected to the controller, and a plurality of sensors capable of attachment to a plurality of objects to be secured, a set of sensors within the plurality of sensors being attached to a corresponding hub, each sensor or hub generating an alarm event when separated from the controller or object to be secured, the controller generating an alarm signal in response to an alarm event generated by said sensor or hub;

(b) an alarm interface coupled to said alarm system, said alarm interface comprising:

at least one wireless interface transmitter for wirelessly transmitting at least one alarm signal; and

at least one wireless interface receiver adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at boot one alarm signal contains selected information; and

(c) at least one output device connected to at least one of said at least one wireless interface receiver, at least one of said at least one output device being activated by at least one of said at least one wireless interface receiver in response to said at least one alarm signal received by said at least one wireless interface receiver;

wherein said at least one output device comprises a plurality of cameras, each camera directed to monitor a respective area containing objects, within the plurality of objects to be secured and activated by a relay for the camera activated by said at least one wireless interface receiver.

15. A merchandise security system for monitoring objects to be secured against theft, which comprises:

(a) an alarm system comprising a controller for sensing alarm events generated by the alarm system and at least one sensor capable of attachment to the controller and a plurality of objects to be secured, each sensor generating an alarm event when separated from the controller or object to be secured, the controller generating an alarm signal in response to an alarm event generated by said sensor;

(b) an alarm interface coupled to said alarm system, said alarm interface comprising:

at least one wireless interface transmitters for wirelessly transmitting at least one alarm signal; and

at least one wireless interface receiver adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at least one alarm signal contains selected information; and

(c) at least one output device connected to at least one of said at least one wireless interface receiver, at least one of said at least one output device being activated by at least one of said at least one wireless interface receiver in response to said at least one alarm signal received by said at least one wireless interface receiver;

wherein:

each of said at least one wireless interface transmitter comprises an addressable microprocessor selectively communicating with at least one selected wireless interface receiver of said at least one wireless interface receiver; and

at least one of said at least one output device comprising a video recorder connected to said at least one of said at least one interface receiver and activated by said at least one of said at least one interface receiver.

16. A merchandise security system for monitoring objects to be secured against theft, which comprises:

(a) an alarm system comprising a controller for sensing alarm events generated by the alarm system, and at least one sensor capable of attachment to the controller, and a plurality of objects to be secured, each sensor generating an alarm event when separated from the controller or object to be secured, the controller generating an alarm signal in response to an alarm event generated by said sensor;

(b) an alarm interface coupled to said alarm system, said alarm interface comprising:

at least one wireless interface transmitter for wirelessly transmitting at least one alarm signal; and

at least one wireless interface receiver adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at least one alarm signal contains selected information; and

(c) at least one output device connected to at least one of said at least one wireless interface receiver, at least one of said at least one output device being activated by at least one of said at least one wireless interface receiver in response to said at least one alarm signal received by said at least one wireless interface receiver;

wherein:

each of said at least one alarm signal is communicated by a radio frequency transmission be wean at least one of said at least one wireless interface transmitter and at least one of said at least one wireless interface receiver;

said alarm interface automatically adjusts the frequency of the radio frequency transmission to adapt to environmental noise conditions; and

said at least one of said at least one wireless interface receiver activates a relay to activate said at least one of said at least one output device.

17. A merchandise security system for monitoring objects to be secured against theft, which comprises:

(a) an alarm system comprising a controller for sensing alarm events generated by the alarm system, and at least one sensor capable of attachment to the controller and a plurality of objects to be secured, each sensors generating an alarm event when separated from the controller or object to be secured, the controller generating an alarm signal in response to an alarm event generated by said sensor;

(b) an alarm interface coupled to said alarm system, said alarm interface comprising:

at least one wireless interface transmitters for wirelessly transmitting at least one alarm signal; and

at least one wireless interface receivers adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at least one alarm signal contains selected information; and

(c) at least one output device connected to at least one of said at least one wireless interface receiver, at least one of said at least one output device being activated by at least one of said at least one wireless interface receiver in response to said at least one alarm signal received by said at least one wireless interface receiver;

wherein said at least one wireless interface receiver has a plurality of relays respectively connected to a corresponding one of said at least one output device for activation thereof in an alarm condition, each of said relays being able to be selectively placed in a latched state or a nonlatched state, each relay in the latched state remaining in an alarm condition until the controller is reset and each relay in the nonlatched state remaining in an alarm condition for a selected period of time before returning to a nonalarm condition.

18. A merchandise security system for monitoring objects to be secured against theft, which comprises:

(a) an alarm system comprising a controller for sensing alarm events generated by the alarm system, and at least one sensor capable of attachment to the controller, and a plurality of objects to be secured, each sensor generating an alarm event when separated from the controller or object to be secure, the controller generating an alarm signal in response to an alarm event generated by said sensor;

(b) an alarm interface coupled to said alarm system, said alarm interface comprising:

at least one wireless interface transmitter for wirelessly transmitting at least one alarm signal; and

at least one wireless interface receiver adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at least one alarm signal contains selected information; and

(c) at least one output device connected to at least one of said at least one wireless interface receiver, at least one of said at least one output device being activated by at least one of said at least one wireless interface receiver in response to said at least one alarm signal received by said at least one wireless interface receiver;

wherein said at least one output device comprises a plurality of cameras, each camera directed to monitor a respective area containing objects, within the plurality of objects to be secured and activated by a relay for the camera activated by said at least one wireless interface receiver.

19. An alarm interface system for actuating at least one output device in response to an alarm system coupled to said alarm interface system, which comprises:

(a) at least one wireless interface transmitter for wirelessly transmitting at least one alarm signal; and

(b) at least one wireless interface receiver adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at least one alarm signal contains selected information;

wherein:

each of said at least one alarm signal is communicated by a radio frequency transmission between at least one of said at least one wireless interface transmitter and at least one of said at least one wireless interface receiver;

said alarm interface automatically adjusts the frequency of the radio frequency transmission to adapt to environmental noise conditions; and

said at least one of said at least one wireless interface receiver activates a relay to activate an output device.

20. An alarm interface system for actuating at least one output device in response to an alarm system coupled to said alarm interface system, which comprises:

(a) at least one wireless interface transmitter for wirelessly transmitting at least one alarm signal; and

(b) at least one wireless interface receiver adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at least one alarm signal contains selected information;

wherein said at least one wireless interface receiver has a plurality of relays respectively connected to a corresponding one of said at least one output device for activation thereof in an alarm condition, each of said relays being able to be selectively placed in a latched state and or a nonlatched state, each relay in the latched state remaining in an alarm condition until reset and each relay in the nonlatched state remaining in an alarm condition for a selected period of time before returning to a nonalarm condition.

21. A merchandise security system for monitoring objects to be secured against theft, which comprises:

(a) an alarm system comprising a controller for sensing alarm events generated by the alarm system and at least one sensor capable of attachment to the controller and a plurality of objects to be secured, each sensor generating an alarm event when separated from the controller or object to be secured, the controller generating an alarm signal in response to an alarm event generated by said sensor;

(b) an alarm interface coupled to said alarm system, said alarm interface comprising:

at least one wireless interface transmitter for wirelessly transmitting at least one alarm signal; and

at least one wireless interface receiver adapted to receive at least one of said at least one alarm signal transmitted from said at least one wireless interface transmitter when said at least one alarm signal contains selected information; and

(c) at least one output device connected to at least one of said at least one wireless interface receiver, at least one of said at least one output device being activated by at least one of said at least one wireless interface receiver in response to said at least one alarm signal received by said at least one wireless interface receiver;

wherein said at least one wireless interface receiver has a plurality of relays respectively connected to a corresponding one of said at least one output device for activation thereof in an alarm condition, each of said relays being able to be selectively placed in a latched state and or a non-latched state, each relay in the latched state remaining in an alarm condition until the controller is reset and each relay in the non-latched state remaining in an alarm condition for a selected period of time before returning to a non-alarm condition; and

wherein the alarm interface system is coupled to an alarm system selected from the group consisting of a fire alarm and a motion detector and actuates at least one output device in response to a signal from said alarm system.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,002,467 B2
APPLICATION NO. : 10/137879
DATED : February 21, 2006
INVENTOR(S) : Deconinck et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In Column 14, line 1 (line 16 of Claim 11), please change "transmitters" to: --transmitter--.
In Column 14, lines 20-21 (Lines 35-36 of Claim 11), please change "comprising" to: --comprises--.
In Column 14, line 24 (Line 1 of Claim 12), please change "tot" to correctly read: --for--.
In Column 14, line 53 (Line 30 of Claim 12), please change "be wean" to correctly read: --between--.
In Column 15, line 12 (Line 16 of Claim 13), please change "transmitters" to: --transmitter--.
In Column 15, line 14 (Line 18 of Claim 13), please change "receivers" to: --receiver--.
In Column 15, line 30 (Line 34 of Claim 13), after "nonlatched state", please insert: --,--.
In Column 15, line 55 (Line 21 of Claim 14), please change the word "boot" to correctly read: --least--.
In Column 15, line 65 (Line 3l of Claim 14), after the word "objects" please delete: ",".
In Column 16, line 13 (Line 13 of Claim 15), please change "transmitters" to: --transmitter--.
In Column 16, lines 32-33 (Lines 32-33 of Claim 15), please change "comprising" to: --comprises--.
In Column 16, line 40 (Line 5 of Claim 16), after the word "controller" delete: ",".
In Column 16, line 63 (Line 28 of Claim 16), please change "be wean" to correctly read: --between--.
In Column 17, line 19 (Line 13 of Claim 17), please change "transmitters" to: --transmitter--.
In Column 17, line 21 (Line 15 of Claim 17), please change "receivers" to: --receiver--.
In Column 17, line 49 (Line 8 of Claim 18), please change "secure" to: --secured--.
In Column 18, line 3 (Line 28 of Claim 18), after the word "objects" please delete: ",".
In Column 18, line 43 (Line 16 of Claim 20) after the word "state" (first occurrence), please delete: "and".

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

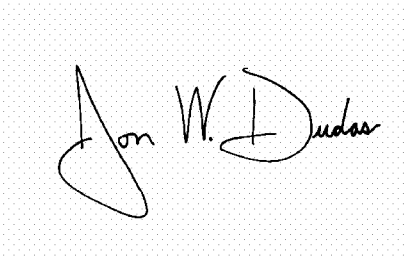
PATENT NO. : 7,002,467 B2
APPLICATION NO. : 10/137879
DATED : February 21, 2006
INVENTOR(S) : Deconinck et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In Column 19, line 12 (Line 31 of Claim 21) after the word "state" (first occurrence), please delete: "and".

Signed and Sealed this

Sixth Day of February, 2007



JON W. DUDAS
Director of the United States Patent and Trademark Office