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Security Key with Data Scanning

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SECURITY KEY WITH DATA SCANNING

BACKGROUND OF THE INVENTION

[0001] Retailers often put samples of merchandise items on display to allow customers to see the items they may wish to purchase. Given the opportunity to observe and touch the items of merchandise, a customer may be more likely to make a purchase. Small items of merchandise, such as electronic devices, may be stored within security packaging, attached to a display stand or other security device, or placed in a display cabinet. The small size and relative expense of some items, however, makes these items an attractive target for shoplifters. Thus, retail stores may use numerous types of theft deterrent security devices and security systems to discourage shoplifting.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0002] Referring now to the accompanying drawing figures wherein like reference numerals denote like elements throughout the various views, one or more embodiments of systems and methods for managing merchandise are shown. In the embodiments shown and described herein, merchandise managing systems may include keys and corresponding security devices for providing security for items of merchandise. In addition to the keys and security devices, the merchandise managing systems may further include reading devices configured to scan or read data associated with the items of merchandise. As such, an apparatus having both a key for controlling the security device and a reading device for reading data related to an item of merchandise can provide multiple functions within a single portable device.

[0003] In one aspect, the present invention provides a security system and method for protecting an item of merchandise including a programmable key for controlling a security device attached to the item of merchandise. As mentioned through the disclosure, the act of "controlling" the security device may refer to any number of actions, such as arming, disarming, locking, and/or unlocking the security device. The key may be programmable with a code, such as a unique code or codes (e.g., a Security Disarm Code (SDC)). In some cases, the code is provided to the key by a programming station, while in other embodiments the key and/or security device may obtain the code via communication with one another or be pre-programmed with one or more codes. In some embodiments, the SDC may be unique to a particular retail store.

[0004] The present disclosure includes two main implementations of an apparatus capable of both controlling security devices associated with merchandise and reading data associated with the merchandise.

Thereby, two main purposes can be achieved by the apparatus. In a first implementation, the controlling and reading elements are combined or otherwise integrated in a single unitary housing. However, according to a second implementation, the controlling and reading elements may be modular components and may be removably connected to each other and communicate with each as needed. Using such a modular design, a reading device may be connected to the key, such as by including engagement elements on the key and the reading device. In some embodiments, different types of scanning/reading attachments may be removably connected to the key at different times as needed.

[0005] FIG. 1 illustrates a merchandise managing apparatus 100 according to a first embodiment. In this embodiment, the merchandise managing apparatus 100 includes a programmable electric key 305 and a reading device 104. The programmable electric key 305 may be configured to lock and unlock various types of locks and/or arm and disarm various types of alarms for protecting items of merchandise. The reading device 104 may be configured to perform a scanning or reading procedure for scanning Universal Product Code (UPC) or other types of bar codes, Quick Response (QR) codes, and/or other scannable codes. In some embodiments, the reading device 104 may be configured to read Near Field Communication (NFC) signals, Radio Frequency Identification (RFID) signals, or other short range wireless signals from items of merchandise.

[0006] The reading device 104 may be configured as an add-on element that can be interchangeable with other reading devices or components. The reading device 104 can be configured to perform bar code scanning, QR code scanning, RFID reading, etc., and may be capable of transferring a code to the key 305, such that the code can be compared with data related to a lock that the key 305 may be disarming or unlocking. Thus, this combined information can be observed as being indicative of various activities associated with an item of merchandise, such as locking, unlocking, arming, or disarming a case in which the merchandise is held and the scanning of a code associated with the merchandise to perform a price check or other procedure.

[0007] A power source of the merchandise managing apparatus 100, which may be stored in a first housing related to the key 305 and/or a second housing related to the reading device 104, may be used to control a security device in response to a positive identification of an item of merchandise associated with the scanned code of the merchandise. The key 305 may include a coil for delivering wireless power to an associated coil on the reading device 104. In another embodiment, power may be transferred or conducted through contacts and conductors of the key 305 and reading device 104.

[0008] In some embodiments, the merchandise managing apparatus 100 may include a modular design in which the reading device 104 may be removably connected to the programmable electric key 305. The reading device 104 may be connected to the key 305 using any suitable connection elements at any desired

location. According to another alternative embodiment, the merchandise managing apparatus 100 may include a unitary structure in which the features of the reading device 104 are incorporated into the housing of the programmable electric key 305.

[0009] The merchandise managing apparatus 100 may therefore include the key 305, which is configured to control a security device for securing an item of merchandise. The merchandise managing apparatus 100 may also include a reading device (e.g., the reading device 104) configured to read data associated with the item of merchandise.

[0010] In one embodiment, the merchandise managing apparatus 100 may be configured such that the key 305 and the reading device 104 are housed on a unitary body. In this arrangement, the unitary body may be configured to house one or more batteries, which may be used to provide power to the electric key 305 and reading device 104 as needed.

[0011] The merchandise managing apparatus 100 may be configured such that the key 305 is housed on a first body portion and the reading device 104 in incorporated in a second body portion that is removably connected to the first body portion. In this embodiment, the reading device 104 may include an engagement element configured to enable the reading device 104 to be removably connected to the first body portion associated with the key 305. When connected, the apparatus 100 may be configured to perform the reading or scanning functions of the reading device 104. When the reading device 104 is removed, the apparatus 100 may be configured to perform the locking, unlocking, arming, disarming functions of the key 305.

[0012] The first body portion of the key 305 may be configured to house one or more batteries for providing power to the key 305 allowing the key 305 to perform functions associated with the control of security devices. In addition, power from the batteries may be transferred from the first body portion to the reading device 104 to provide power to the reading device 104 to allow the reading device 104 to perform scanning functions. For example, electrical contacts may be formed on both the first body portion of the key 305 and the second body portion of the reading device 104 to enable the transfer of power to the reading device 104.

[0013] In embodiments in which the merchandise managing apparatus 100 is configured as two separate parts and the parts are connected together, the reading device 104 may be configured to also transfer data to the body of the key 305. For example, the reading device 104 and the key 305 may each include inductive components for enabling an inductive transfer of data from the reading device 104 to the first body portion of the key 305. According to another embodiment, the first and second body portions of the reading device 104 and the key 305 may each include conductive components for enabling an electrically conductive transfer of data from the reading device 104 to the first body portion. Data received during a scanning process of the reading device 104 may be transferred to the first body portion of the key

305 and then further delivered to a downstream device, such as a computer configured to run software associated the processing of data related to the locked status of cabinets, drawers, etc. and the processing of merchandise information. In some instances, data transferred from the reading device 104 to the key 305 may be stored in a memory of the key until such time as the data is able to be communicated to a downstream device.

[0014] The key 305 may be configured to mechanically lock or unlock a locking component associated with the security device and/or arm or disarm an alarm associated with the security device, wherein the security device may be part of a display stand connected to a countertop, a merchandise security device package protection device, a display cabinet, or other type of security device. In some embodiments, however, the merchandise managing apparatus 100 may be configured such that the key 305 is an electronic device configured to electronically activate or deactivate a locking component associated with the security device. For example, the key 305 may be an infrared key configured to activate or deactivate a security control locking component.

[0015] Regarding the reading device 104 of the merchandise managing apparatus 100, the reading device 104 may include an optical scanner for reading a Universal Product Code (UPC) or Quick Response Code (QR code) associated with an item of merchandise. The reading device 104 may comprise a wireless transceiver configured to wirelessly read a Radio Frequency Identification (RFID) code or a Near-Field Communication (NFC) code associated with the items of merchandise.

[0016] According to some embodiments, the merchandise managing apparatus 100 may include multiple reading devices for scanning according to different scanning protocols. The multiple reading devices (e.g., reading device 104 or other similar scanning devices) may be loosely held with the body of the key 305 using a key ring 106, loop, ring, chain, or other component for keeping the reading devices together with the key 305 as a set. In this way, a user may select any suitable reading device 104 to read a particular type of code or signal related to items of merchandise to be identified.

[0017] In some embodiments, the reading device 104 or multiple scanning modules may be configured to perform at least one of an inventory checking procedure, a price checking procedure, a purchase checkout procedure, or other type of procedure that involves identifying the scanned codes or signals associated with items of merchandise. For example, the reading device 104 may be configured to read data from a tag or sticker attached to the item of merchandise or attached to packaging for holding the item of merchandise.

[0018] In operation, the user may remove the reading device 104 from the body of the key 305 to allow the user to disarm a lock component associated with the security device, such as a lock component for locking a specific item of merchandise. Once the lock component is disarmed, the user may attach the reading device 104 to the key 305 such that a code associated with the disarmed item of merchandise can

be read. This information can be conveyed to a back-end computer to indicate that the lock component has been disarmed and the item of merchandise has been identified.

[0019] In some embodiments, the reading device 104 may include an opening for receiving a key ring, loop, chain, etc., such as the key ring 106. Thus, the reading device 104 may be kept with the key 305 but separated from the body of the key 305 to allow the key 305 to be used for locking/unlocking or disarming/re-arming locks, alarms, or other security devices. Then, when the reading device 104 is needed, the user may connect the reading device 104 back onto the end of the key 305.

[0020] Therefore, the merchandise managing apparatus 100 may be considered as a single device for performing multiple tasks within a retail store. The apparatus 100 can control security devices, such as by locking, unlocking, arming, or disarming the security devices, opening doors, or performing other processes for obtaining authorized access to certain items or merchandise. The merchandise managing apparatus 100 may be associated with back-end software applications in which inventory items are integrated with a security system. The merchandise managing apparatus 100 may be considered as a conduit to integrating information about the status of locks, alarms, and/or other security devices associated with merchandise along with specific merchandise data obtained from an identification code associated with the merchandise.

[0021] An employee may be able to walk around the retail store and perform these various tasks with the merchandise managing apparatus 100 and consequently the related software may be configured to track and monitor activities involved with the merchandise as it is encountered. Since the merchandise managing apparatus 100 may be integrated in one device, the tracking and monitoring activities can be simplified. As such, a user within a retail store may have fewer devices that he or she may need to carry throughout the store that may be needed for various tasks. Thus, as compared with conventional systems in which the user may need multiple devices for performing these tasks within a retail store, the merchandise managing apparatus 100 of the present disclosure provides an improvement over conventional system by incorporating the hardware for conducting these various retail activities into a single device.

[0022] By allowing a single device to perform various tasks related to merchandise, the merchandise managing apparatus 100 and related software can provide other unconventional benefits. For example, conventional systems may require that interface software is used for each respective task. However, by integrating the multiple functions into one device, a single software program may be used. For example, rather than having a reading device (e.g., an RFID scanner) and interface software for retrieving RFID or other data for use by one system and having user authorization data associated with personnel allowed to unlock or disarm locking mechanisms to allow access to merchandise in another system, the different systems and related software can be combined into one cumulative system. In addition to merchandise

identifying devices and security devices and keys for controlling the security devices, the system may further include clocking components for determining when employees clock in or clock out during the day.

[0023] In addition to conventional scanning processes, the merchandise managing apparatus 100 can be configured to further provide the functions of locking, unlocking, arming, disarming, and/or other control actions. Thus, an employee of a retail store equipped with the merchandise managing apparatus 100 may be able to perform multiple tasks with one device. Instead of the employee having a scanner for scanning the prices for various items and then using a different device to allow the employee to control security devices regarding the access of items of merchandise on display, the merchandise managing apparatus 100 of the present disclosure simplifies the process by integrating the multiple functions of the apparatus 100 in one device and using one software program that is able to perform the various processes associated with the merchandise.

[0024] FIGS. 2-10, described below, are directed to the details of the key 305 shown in FIG. 1 according to various embodiments. FIG. 2 is a diagrammatic view showing the components of a security system 200 according to one embodiment of the present disclosure. As illustrated in FIG. 2, the programmable electronic key 305 is presented to a programming station 203 and communication therebetween is initiated, for example by depressing a flexible member, such as a control button 287 (see FIG. 7) provided on the exterior of the key 305. In this exemplary embodiment, communication between the programming station 203 and the key 305 is accomplished directly by one or more electrical contacts, or alternatively, indirectly by wireless communication. Any form of wireless communication capable of transferring data between the programming station 203 and key 305 is possible, including without limitation optical transmission, acoustic transmission, or magnetic induction. Preferably, data communication between the programming station 203 and the programmable electronic key 305 is accomplished by wireless optical transmission, and more particularly by infrared (IR) transceivers provided in the programming station and the key, as described in greater detail in U.S. Pat. No. 7,737,844 and U.S. Pat. No. 7,737,845, the entire contents of which are incorporated by reference herein. Accordingly, further details of the infrared (IR) system for wireless data communication will not be repeated. For the purpose of describing this embodiment of the present invention, it is sufficient that the programming station 203 comprises a logic control circuit including at least a controller for generating an SDC, an SDC memory for storing the SDC, and a suitable wireless communication circuit for interfacing with the programmable electronic key 305 in the manner described herein.

[0025] FIG. 3 is a diagrammatic view of a merchandise security device 207 for use with the security system 200 of FIG. 2. The merchandise security device 207 can be any type of security device (e. g., security display, security fixture, security packaging, conventional door/window/drawer lock, etc.) that

utilizes an electronic security mechanism that may be armed and/or disarmed and/or a physical lock mechanism that may be locked and/or unlocked. At the same time, the merchandise security device 207 may be a "passive" device in the sense that it does not have an internal power source sufficient to operate the security mechanism and/or the lock mechanism. As a result, the merchandise security device 207 may be configured to receive power, and in some cases, both data and power, from an external source, such as the programmable electronic key 305 shown and described herein.

[0026] The exemplary embodiment of the merchandise security device 207 depicted in FIG. 3 is a cabinet lock configured to be securely affixed to the lock arm 211 of a conventional cabinet lock bracket 213. The cabinet lock 207 comprises a logic control circuit for performing a "handshake" with the logic control circuit of the programmable electronic key 305 to determine if the key is authorized to control the security device and/or for communicating with the key 305 to determine if the SDC stored by the key matches the SDC stored by the security device. In other embodiments, the cabinet lock 207 may be configured to transmit the SDC to the programmable electronic key 305 to authenticate the cabinet lock and thereby authorize the key to unlock the cabinet lock. As previously mentioned, the data (e.g., "handshake" and/or SDC) may be communicated by electrical contacts, optical transmission, acoustic transmission, or magnetic induction.

[0027] The cabinet lock 207 comprises a housing 235 sized and shaped to contain the logic control circuit disposed therein and a conventional internal lock mechanism (not shown). A key receiving port 265 formed in the housing 235 is sized and shaped to receive a transfer end 293 of the programmable electronic key 305, as will be described. At least one, and preferably, a plurality of magnets 266 are disposed within the key receiving port 265 for securely positioning and retaining the transfer end 393 of the key 305 (see FIG. 4) in electrical contact with the logic control circuit of the cabinet lock 207 for providing power to the internal lock mechanism. In the particular embodiment shown and described herein, data is transferred from the programmable electronic key 305 to the cabinet lock 207 by wireless communication, such as infrared (IR) optical transmission.

[0028] Power may be transferred from the programmable electronic key 305 to the cabinet lock 207 by electrical contacts disposed within the key receiving port 265 and disposed on the transfer end 393 of the key305. For example, the key receiving port 265 may comprise a metallic outer ring 268 that forms one electrical contact, while the magnet(s) 266 form another electrical contact to complete an electrical circuit with the electrical contacts disposed on the transfer end 393 the programmable electronic key 305. Regardless, electrical contacts transfer power from the key 305 to the lock mechanism disposed within the housing 235 of the cabinet lock 207. As previously described, the power transferred from the key 305 may

be used to unlock the lock mechanism, for example utilizing an electric motor, DC stepper motor, solenoid, or the like, so that the cabinet lock 207 can be removed from the lock arm 211 of the lock bracket 213.

[0029] It will be readily apparent to those skilled in the art that the cabinet lock 207 shown and described herein is but one of numerous types of a "passive" merchandise security device that can be configured to be operated by a programmable electronic key 305 according to the present invention. By way of example and without limitation, the merchandise security device may be a locking base for securing a merchandise display hook to a display support, such as pegboard, slatwall, bar stock or wire grid, or may be a locking end assembly for preventing the rapid removal of merchandise from the merchandise display hook. Alternatively, the merchandise security device may be a merchandise security alarm module or display stand comprising a lock mechanism for securing the alarm module or display stand to a display support, such as a table, countertop, desk, wall, or other fixed structure and/or a lock mechanism for securing an item of merchandise on the alarm module or display stand. Alternatively, the merchandise security device may be incorporated into security packaging for one or more items of merchandise including a lock mechanism for separating the packaging from the merchandise, or alternatively, for removing the merchandise from the packaging. Still further, the merchandise security device may be a conventional door or window security lock for preventing access to an enclosure, such as a room or closet. In any of these or other embodiments, the merchandise security device may further comprise an electronic security mechanism (e.g., a sensor, such as a conventional proximity, limit or contact switch), and an associated electronic monitoring circuit that activates an alarm in response to the sensor being actuated or the integrity of the sensor or monitoring circuit being compromised. Regardless, the merchandise security device preferably includes a logic control circuit, or the equivalent, including a SDC memory for storing a SDC, and a communication circuit for initially receiving the SDC from the programmable electronic key 305, and for subsequently facilitating data communication, including the SDC, between the programmable electronic key and the merchandise security device.

[0030] FIG. 4 is a perspective view showing a diagram of an embodiment of the programmable electronic key 305 for use with a security system. The programmable electronic key 305 may be configured for inductive and/or conductive transfer of data and/or power. FIG. 5 is another perspective view showing the programmable electronic key 305. FIG. 6 is a cross-sectional view of the programmable electronic key 305. The programmable electronic key 305 shown in FIGS. 4-6 is an embodiment for use with a security system including an alarm module or other security device, as previously described. In this embodiment, the power transfer function provided by the electrical contacts is accomplished with inductive transfer. As previously mentioned, security devices suitable for use with the programmable electronic key 305 include, but are not limited to, a security display (e.g., alarm module or display stand), a security fixture (e.g., hook,

shelf, cabinet) and security packaging for an item of merchandise. However, a programmable electronic key 305 with inductive transfer according to the present invention is useable with any security device or locking device that utilizes power transferred from the key to operate an electronic lock mechanism, or alternatively, utilizes data transferred from the key (or between the key and the security device) to authorize or permit operation of a physical lock mechanism along with power transferred from the key to operate the physical lock mechanism. In other words, the programmable electronic key 305 is useable with any security device or locking device with inductive transfer capability that requires power transfer from the key 305 to the device by induction, or alternatively, data transfer between the key 305 and the device and power transfer from the key 305 to the device by induction. Further examples include, but are not limited to, a door lock, a drawer lock, a shelf lock, as well as any device that prevents an unauthorized person from accessing, removing, and/or detaching an item from a secure location or position.

[0031] In a specific example, a merchandise display security system 200 and method according to the present disclosure utilizes the programmable electronic key 305 with inductive transfer. A programming station 203, merchandise security device 207, and charging station 208 similar to the components shown wherein at least the merchandise security device 207 and the optional charging station 208 are configured with inductive transfer capability for transferring power from the key 305 to the merchandise security device 207 and for transferring power from the charging station 208 to the key 305, respectively. In other words, the merchandise security device 207 is provided with inductive transfer capability compatible with the inductive transfer of the programmable electronic key 305 to be operated by the key 305. Likewise, the charging station 208 is provided with inductive transfer capability compatible with the programmable electronic key 305 to initially charge and/or recharge the internal battery of the key 305. It should be noted that the programming station 203 may likewise be provided with inductive transfer capability compatible with the inductive transfer of the programmable electronic key 305 to initially program (and reprogram or refresh) the key with a security code (e.g., SDC) by inductive transfer instead of the wireless infrared (IR) system previously described. Data communication (e.g., SDC and/or "handshake") between the merchandise security device 207 and the programmable electronic key 305 may likewise be accomplished by inductive transfer instead of the wireless infrared (IR) system previously described. In some embodiments, the programmable electronic key 305 with inductive transfer may be used without a programming station, and thus without a security code programmed, reprogrammed or refreshed at a retail store, to operate a purely mechanical security device, such as a cabinet lock.

[0032] Furthermore, the programmable electronic key 305 with inductive transfer may be provided with a conventional or extended-life internal battery, and thus, may be used without a charging station. In preferred embodiments, however, the programmable electronic key 305 with inductive transfer is provided

with a transient memory, such that a security code (e.g., SDC) must be initially programmed and subsequently reprogrammed or refreshed at predetermined time intervals, as previously described. In such embodiments, a programming station similar to the programming station 203 is provided to initially program and/or to subsequently reprogram the SDC into the programmable electronic key 305 and the key is operable to initially program and/or to subsequently reprogram a security device similar to alarm module or merchandise security device 207 with the SDC. The programmable electronic key 305 is further operable to operate the security device by transferring power by induction, or by transferring data and power by induction, to the device, as will be described. An optional charging station similar to the charging station 208 may be provided to initially charge and/or subsequently recharge a rechargeable internal battery disposed within the programmable electronic key 305 in the manner previously described.

[0033] In one embodiment, a logic control circuit of the programmable electronic 305 causes the internal battery of the key to transfer electrical power to the lock mechanism of the merchandise security device. More particularly, an inductive transceiver disposed within the programmable electronic key 305 operatively couples to a corresponding inductive transceiver disposed within the merchandise security device and transfers power from the internal battery of the key to the lock mechanism of the security device, for example to lock or unlock the security device. By way of example and without limitation, the power source of the cabinet lock transfers power to an electric motor, DC stepper motor, solenoid, or the like that unlocks the lock mechanism of the cabinet lock 207 so that the cabinet lock can be removed from the lock arm 211 of the lock bracket 213 and the sliding doors 201 moved (e.g., slid) relative to one another to access the items of merchandise 209 stored within the cabinet 202. Power transfer from the key to the security device may occur when the merchandise security device 207 is a purely mechanical security device, or alternatively, is an authorized security device already having the SDC and a proper "handshake" is completed. The security device may store the transferred power and is only able to be controlled (e.g., unlocked) if the SDC of the key matches the SDC of the security device. In other cases, the key may simply transfer power to the security device if the handshake communication protocol is successful, while in other cases, the key may simply transfer power to the security device without any data being communicated between the key and the security device. In some cases, power transfer may occur from the key 305 to the security device 207 to initiate communication therebetween if the security device does not have a power source.

[0034] As previously mentioned, the programmable electronic key 305 may be configured to transfer both data and power to a merchandise security device that comprises an electronic lock mechanism and a physical lock mechanism. Accordingly, the programmable electronic key 305 may be an "active" device in the sense that it has an internal power source sufficient to operate the physical lock mechanism of the

merchandise security device. As a result, the programmable electronic key 305 may be configured to transfer data from an internal source, such as a logic control circuit disposed within the key, and to transfer power from an internal power source, such as a conventional, extended-life or rechargeable battery disposed within the key. The exemplary embodiment of the programmable electronic key 305 depicted in FIGS. 4-6 is a merchandise security key with inductive transfer capability configured to be received within a key receiving port of a programming station as well as a key receiving port of a merchandise security device and a key receiving port (or charging port) of a charging station in the manner previously described. As such, the programmable electronic key 305 comprises a logic control circuit for performing a "handshake" with the logic control circuit of the programming station and for receiving the SDC from the programming station, as previously described. The logic control circuit of the programmable electronic key 305 further performs a "handshake" with the logic control circuit of the merchandise security device and transfers the SDC to the merchandise security device, as previously described. Communication of the data (e.g., "handshake" and/or SDC) may be accomplished by electrical contacts, optical transmission, acoustic transmission, radio frequency (RF) or magnetic induction. In a particularly advantageous embodiment, a key 305 with inductive transfer according to the present invention may be configured to transfer both electrical power to a merchandise security device and to communicate data, including for example the "handshake" and the SDC, between the programmable electronic key and the security device by magnetic induction.

[0035] As best shown in FIG. 6, the programmable electronic key 305 comprises a housing 371 defining an internal cavity or compartment that contains the internal components of the key 305, including without limitation an internal battery 375 and a logic control circuit formed on a printed circuit board (PCB) 376 comprising at least an SDC memory and a communication circuit, as previously described. As shown, housing 371 is formed by a lower portion 372 and an upper portion 373 that are joined together after assembly, for example by ultrasonic welding. The programmable electronic key 305 further defines an opening 330 at one end for coupling the key to a key chain ring, lanyard or the like. The programmable electronic key 305 further comprises a transfer end 393 located at an end of housing 371 opposite the opening 330 for transferring data and power to the merchandise security device, as previously described. The transfer end 393 is also operable to transmit and receive the "handshake" and the SDC with the programming station, as previously described, and to receive power from the charging station, as will be described in greater detail with reference to FIGS. 28 and 28A.

[0036] The programmable electronic key 305 further includes an inductive coil having high magnetic permeability that is adapted (e.g., sized and shaped) to be disposed within the housing 371 adjacent the transfer end 393. As shown, the inductive coil comprises a highly magnetically permeable ferrite core

396A surrounded by a plurality of inductive core windings 396B. The inductive core windings 396B consist of a length of a conductive wire that is wrapped around the ferrite core 396A. As will be readily understood and appreciated by those skilled in the art, passing an alternating current through a conductive wire generates (e.g., induces) a magnetic field around an inductive core. An alternating current may be passed through the conductive wire of the inductive core windings 396B by connecting one lead of the conductive wire to the logic control circuit and connecting the other lead of the conductive wire to the internal battery 375 of the programmable electronic key 305. A similar inductive coil having high magnetic permeability is adapted to be disposed within the housing of the merchandise security device, such as within housing 235 of the cabinet lock 207 previously described and shown in FIG. 3 adjacent the key receiving port 265. The inductive coil of the merchandise security device comprises a highly magnetically permeable ferrite core surrounded by a plurality of inductive core windings consisting of a length of a conductive wire that is wrapped around the ferrite core similar to the inductive coil disposed adjacent the transfer end 393 of the programmable electronic key 305. Placing the transfer end 393 of the programmable electronic key 305 into the key receiving port 265 of the cabinet lock 207 and passing an alternating current through the inductive core windings 396B of the inductive core of the key generates a magnetic field in the vicinity of the key receiving port 265 of the cabinet lock 207. As a result, an alternating current is generated in the conductive wire of the inductive core windings of an inductive coil having leads connected to the logic control circuit of the cabinet lock 207. The alternating current induced in the inductive coil of the cabinet lock 207 is then transformed into a direct current (DC) voltage in a known manner, such as for example via a bridge rectifier on the logic control circuit, to provide direct current (DC) power to the cabinet lock 207. The DC power generated in the cabinet lock 207 by the inductive coil of the programmable electronic key 305 may be used, for example, to unlock a lock mechanism disposed within the housing 235 of the cabinet lock.

[0037] As previously mentioned with regard to FIG. 6, the internal battery 375 and the logic control circuit formed on printed circuit board (PCB) 376 are disposed within the housing 371 of the programmable electronic key 305. Battery 375 may be a conventional or extended-life replaceable battery, but preferably, is a rechargeable battery suitable for use with a charging station similar to the charging station 208 previously described. Printed circuit board 376 is operatively coupled and electrically connected to an activation switch 385 that is actuated by a flexible member in the form of a control button 387 provided on the exterior of the programmable electronic key 305 and extending through the housing 371. Control button 387 in conjunction with activation switch 385 controls certain operations of the logic control circuit, and in particular, initiates communication of data (e.g., "handshake" and/or SDC) between the programmable electronic key 305 and the programming station, and between the key and the merchandise security device.

For that purpose, printed circuit board 376 is further operatively coupled and electrically connected to the communication circuit of the logic control circuit for transmitting and receiving the "handshake" and/or SDC data. In the exemplary embodiment shown and described herein, the communication circuit is a wireless infrared (IR) system including an optical transceiver 379 for transmission of data between the programmable electronic key 305 and the programming station, and between the key and the merchandise security device. As a result, the transfer end 393 of the key 305 is provided with an optically transparent or translucent lens 391 for emitting and collecting optical transmissions between the key 305 and the programming station, or between the key and the merchandise security device. As previously described, transfer end 393 further comprises the inductive coil comprising inductive core 396A and inductive core windings 396B for transferring electrical power to the merchandise security device and/or receiving electrical power from the charging station to charge the internal battery 375. Accordingly, the leads of the conductive wire of the inductive coil are electrically connected and operably coupled to the printed circuit board 376, which in turn is electrically connected to the battery 375, in a suitable manner, for example by conductive insulated wires or plated conductors. In an alternative embodiment, the optical transceiver 379 is eliminated and data is transferred between the programmable electronic key 305 and the merchandise security device by magnetic induction using the inductive coil in a known manner.

[0038] FIG. 7 is a diagrammatic view showing the programmable electronic key 307 positioned on the charging station 208 of the security system 200 of FIG. 2 to recharge the internal battery of the key. FIGS. 8 and 9 are top plan and diagrammatic sectional views, respectively, of the charging station of the security system of FIG. 2.

[0039] As shown in FIG. 7, the merchandise security system 200 further includes charging station 208 for initially charging and subsequently recharging a rechargeable battery disposed within the programmable electronic key 305. The charging station 208 comprises at least one, and preferably, a plurality of charging ports 208A each sized and shaped to receive a programmable electronic key 305. Charging port 208A comprises at least one, and preferably, a plurality of electrically conductive magnets 208B for securely positioning and retaining the key 305 within the charging port 208A in electrical contact with the electrical components of the charging station 208. As shown, the charging station 208 includes an internal power source, for example, an extended-life replaceable battery or a rechargeable battery, for providing power to one or more programmable electronic keys 205 positioned within a corresponding charging port 208A. Alternatively, charging station 208 may include a power cord having at least one conductor operatively connected to an external power source.

[0040] As previously mentioned, the charging station 208 recharges the rechargeable internal battery of the programmable electronic key 305, and in some instances deactivates the data transfer and/or power

transfer capability of the key until the key is reprogrammed with the SDC by the programming station 203. As best shown in FIG. 8, the charging station 208 comprises a housing 210 for containing the internal components of the charging station. As previously mentioned, the housing 210 has at least one, and preferably, a plurality of charging ports 208A formed therein that are sized and shaped to receive the transfer end 293 of the programmable electronic key 305 and a plurality of electrically conductive magnets 208B are disposed within each charging port 208A. More particularly, electrical contacts provided on transfer end 293 of the programmable electronic key 305 are retained in electrical contact with the magnets 208B and a resilient "pogo" pin 208C made of a conductive material to complete an electrical circuit between the charging station 208 and the rechargeable internal battery of the key. Housing 210 contains a logic control circuit, similar to the logic control circuits of the programming station 203, the programmable electronic key 305 and the merchandise security device (e.g., cabinet lock) 207 previously described, in the form of a printed circuit board (PCB) 208D that is operatively coupled with and electrically connected to the magnets 208B and the pogo pin 208C of each charging port 208A. The pogo pin 208C is depressible to complete an electrical circuit as the magnets 208B position and retain the electrical contacts disposed on the transfer end 293 of the programmable electronic key 305 within the charging port 208A. In particular, magnets 208B make electrical contact with an outer ring electrical contact on the transfer end 293 of the key 305, while pogo pin 208C makes electrical contact with an inner ring electrical contact on the transfer end of the key. Once pogo pin 208C is depressed and the electrical circuit between the charging station 208 and the programmable electronic key 305 is closed, the charging station recharges the internal battery of the key. As previously mentioned, charging station 208 includes an internal power source, for example, an extended-life replaceable battery or a rechargeable battery, for providing power to the key(s) 205 positioned within the charging port(s) 208A of the charging station. Alternatively, the electrical components of the charging station 208 are electrically connected to an external power source by a power cord having at least one conductor. Furthermore, logic control circuit 208D may be operable for deactivating the data communication and/or power transfer functions of the programmable electronic key 305, or alternatively, for activating a "time-out" feature of the key until it is reprogrammed or refreshed by the programming station 203, as previously described.

[0041] FIG. 10 is a diagrammatic view showing the programmable electronic key 305 positioned on the programming station 203 of the security system 200 of FIG. 2 to be programmed with a security code. As best shown in FIG. 10, programming station 203 comprises a housing 215 configured to contain the logic control circuit that generates the SDC, the SDC memory that stores the SDC, and the optical transceiver for wirelessly communicating the SDC to a corresponding optical transceiver disposed within the key 305. In use, the logic control circuit generates the SDC, which may be a predetermined (e.g.,

"factory preset") security code, but preferably is a random security code generated by the logic control circuit of the programming station 203 at the time a first programmable electronic key 305 is presented to the programming station for programming. In the latter instance, the logic control circuit further comprises an electronic random number generator for producing a unique SDC. A series of visual indicators, for example, light-emitting diodes (LEDs) 224 may be provided on the exterior of the housing 215 for indicating the status of the programming station. Programming station 203 may further be provided with a lock mechanism, for example a conventional key-actuated tumbler switch 231 and mechanical key 233 for preventing use of the programming station by an unauthorized person, as previously described. Alternatively, the programming station 203 may be maintained within a locked enclosure to prevent access by an unauthorized person. As shown herein, the programming station 203 comprises an internal power source, for example an extended-life replaceable battery or a rechargeable battery, for providing power to the logic control circuit and LEDs 224. Alternatively, the programming station 203 may include a power cord for electrically connecting to an external power source.

[0042] The logic control circuit of the programming station 203 performs an exchange of data with a similar logic control circuit of the key 305, referred to herein as a "handshake," to determine whether the key has not previously been programmed with a SDC (e.g., a "new" key), or is an authorized key that is being presented to the programming station a subsequent time to refresh the SDC. In the event that the "handshake" fails for any reason, the programming station 203 will not provide the SDC to the device attempting to obtain the SDC, for example an infrared (IR) reader on a counterfeit key or other illegitimate device. When a proper "handshake" is completed, the programming station 203 permits the SDC generated by the logic control circuit and/or stored in the memory to be transmitted by the optical transceiver to the corresponding optical transceiver disposed within the programmable electronic key 305. As will be readily apparent and understood by those skilled in the art, alternatively the SDC may be transmitted from the programming station 203 to the programmable electronic key 305 by any suitable means, including without limitation, electrical contacts or electromechanical, electromagnetic or magnetic conductors, as desired. In other embodiments, the handshake protocol may be eliminated and an SDC is exchanged between the key 305 and the programming station 203.

[0043] Once programmed with the SDC, the programmable electronic key 305 is then available to operatively engage the merchandise security device 207. In the embodiment shown and described herein, the merchandise security device 207 may be a cabinet lock that has been modified to be operated by the programmable electronic key 305. Preferably, merchandise security device 207 is a passive device. As used herein, the term "passive" is intended to mean that the merchandise security device 207 does not have an internal power source to lock and unlock a physical lock mechanism disposed therein. Significant cost

savings can be obtained by a retail store when the merchandise security device 207 is a passive device since the expense of an internal power source is confined to the programmable electronic key 305, and only one such key is required to operate multiple merchandise security devices. If desired, the merchandise security device 207 may also be provided with a temporary power source (e.g., capacitor or limited-life battery) having sufficient power to activate an alarm, for example a piezoelectric audible alarm, that is actuated by a security sensor in response to a security breach. The temporary power source may also be sufficient to transfer data, for example, an SDC, from the merchandise security device 207 to the programmable electronic key 305 to authenticate the security device and thereby authorize the key to provide power to the merchandise security device. In contrast, the lock mechanism of existing merchandise security devices is operated mechanically, for example by a conventional key and tumbler, or magnetically, for example by a magnetic key. In the security system 200 of the present invention however, the lock mechanism of the merchandise security device 207 is operated by electrical power that is transferred from the programmable electronic key 305 to the merchandise security device, as will be described.

[0044] The merchandise security device 207 further comprises a logic control circuit similar to the logic control circuit disposed within the programming station 203 and the programmable electronic key 305 that performs a "handshake" with the logic control circuit of the key in essentially the same manner as the "handshake" performed between the programming station and the key. In particular, the logic control circuit of the key 305 determines whether the merchandise security device 207 is an authorized "new" security device not having an SDC, or is an authorized security device already having the SDC. In the event that the "handshake" fails for any reason, the programmable electronic key 305 will not provide the SDC to the merchandise security device 207 (e.g., will not initially program a new merchandise security device with the SDC). When the merchandise security device 207 is an authorized "new" device and a proper "handshake" is completed, the key 305 permits the SDC stored in the SDC memory of the key to be transmitted by the optical transceiver disposed within the key to a corresponding optical transceiver disposed within the security device 207 to be stored in a SDC memory of the device. As will be readily apparent to those skilled in the art, the SDC may be transmitted from the programmable electronic key 305 to the merchandise security device 207 by any suitable means, including without limitation, one or more electrical contacts or electromechanical, electromagnetic or magnetic conductors, as desired. In other embodiments, the handshake protocol may be eliminated and only an SDC is exchanged between the key 305 and the security device 207.

[0045] On the other hand, when the merchandise security device 207 is an authorized device already having the SDC and a proper "handshake" is completed, the security device utilizes power from its internal power source to perform a mechanical operation, such as to lock or unlock the lock mechanism, as described

above. In the embodiment shown and described herein, the merchandise security device 207 is a cabinet lock that is affixed to one of a pair of adjacent sliding doors 201 of a conventional cabinet 202 of the type suitable for use in a retail store. The cabinet 202 typically contains relatively expensive items of merchandise 209, such as mobile phones, digital cameras, Global Positioning Satellite (GPS) devices, and the like. The doors 201 overlap at the center of the cabinet 202 and the cabinet lock 207 is secured on a lock arm 211 extending from a lock bracket 213 affixed to the innermost door 201 behind the outermost door 201. In this embodiment, the programmable electronic key 305 transfers power to an electric motor, DC stepper motor, solenoid, or the like that unlocks the lock mechanism of the cabinet lock 207 so that the cabinet lock can be removed from the lock arm 211 of lock bracket 213 and the doors 201 moved relative to one another to access the items of merchandise 209 stored within the cabinet 202. As best shown in FIG. 3, the lock arm 211 is provided with one-way ratchet teeth and the cabinet lock 207 is provided with complimentary ratchet pawls in a conventional manner so that the programmable electronic key 305 is not required to lock the cabinet lock onto the lock arm on the innermost door 201 of the cabinet 202. If desired, however, the cabinet lock 207 can be configured to require use of the programmable electronic key 305 to both unlock and lock the cabinet lock.

[0046] In the foregoing description, certain terms have been used for brevity, clarity and/or simplification. No unnecessary limitations are to be implied therefrom beyond the requirement of the prior art because such terms are used for descriptive purposes and are intended to be construed broadly with respect to the concept and intended scope of the present invention. Moreover, the description and illustration of exemplary and preferred embodiments of the present invention is not intended to be limited to the exact details shown or described herein.

[0047] The foregoing has described one or more exemplary embodiments of a merchandise security key with data scanning capabilities. Embodiments of merchandise security keys, system, and methods have been shown and described herein for purposes of illustrating and enabling one of ordinary skill in the art to make, use and practice the invention. Those of ordinary skill in the art, however, will readily understand and appreciate that numerous variations and modifications of the invention may be made without departing from the spirit and scope thereof. Accordingly, all such variations and modifications are intended to be encompassed by the appended claims.

CLAIMS

What is claimed is:

1. A merchandise managing apparatus comprising:

a key configured to control a security device for securing an item of merchandise: and

a reading device configured to read data associated with the item of merchandise and to communicate with the key.

2. The merchandise managing apparatus of claim 1, wherein the key and the reading device are housed on a unitary body.

3. The merchandise managing apparatus of claim 2, wherein the unitary body comprises one or more batteries.

4. The merchandise managing apparatus of claim 1, wherein the reading device is removably connected to the key.

5. The merchandise managing apparatus of claim 4, wherein the reading device comprises a coupling element configured to enable the reading device to be removably connected to the key.

6. The merchandise managing apparatus of claim 4, wherein the key comprises one or more batteries.

7. The merchandise managing apparatus of claim 6, wherein the key is configured to transfer power to the reading device.

8. The merchandise managing apparatus of claim 6, wherein the reading device is configured to transfer data to the key.

9. The merchandise managing apparatus of claim 8, wherein the reading device and key comprise inductive components for enabling an inductive transfer of data from the reading device to the key.

10. The merchandise managing apparatus of claim 8, wherein the reading device and the key comprise conductive components for enabling an electrically conductive transfer of data from the reading device to the key.

11. The merchandise managing apparatus of claim 8, wherein the key is configured to deliver the data read by the reading device to a downstream device.

12. The merchandise managing apparatus of claim 1, wherein the key is configured to mechanically lock or unlock a locking component associated with the security device and/or arm or disarm an alarm associated with the security device.

13. The merchandise managing apparatus of claim 12, wherein the security device is part of a display stand connected to a countertop, a merchandise security device package protection device, or a display cabinet.

14. The merchandise managing apparatus of claim 1, wherein the key is an electronic device configured to electronically activate or deactivate the security device.

15. The merchandise managing apparatus of claim 14, wherein the key is an infrared key configured to activate or deactivate a security control locking component associated with the security device.

16. The merchandise managing apparatus of claim 1, wherein the reading device includes an optical scanner for reading a Universal Product Code (UPC) or Quick Response Code (QR code) associated with the item of merchandise.

17. The merchandise managing apparatus of claim 1, wherein the reading device comprises a wireless component configured to wirelessly read a Radio Frequency Identification (RFID) code or a Near-Field Communication (NFC) code associated with the item of merchandise.

18. The merchandise managing apparatus of claim 1, further comprising a plurality of reading devices configured to scan using different scanning protocols.

19. The merchandise managing apparatus of claim 1, wherein the reading device is configured to perform at least one of an inventory checking procedure, a price checking procedure, and a purchase checkout procedure.

20. The merchandise managing apparatus of claim 1, wherein the reading device is configured to read data from a tag or sticker attached to the item of merchandise or attached to packaging for holding the item of merchandise.

ABSTRACT

A merchandise managing apparatus including a key and a reading device is provided. The key of the merchandise managing apparatus is configured to control a security device for securing an item of merchandise. The reading device is configured to read data associated with the item of merchandise

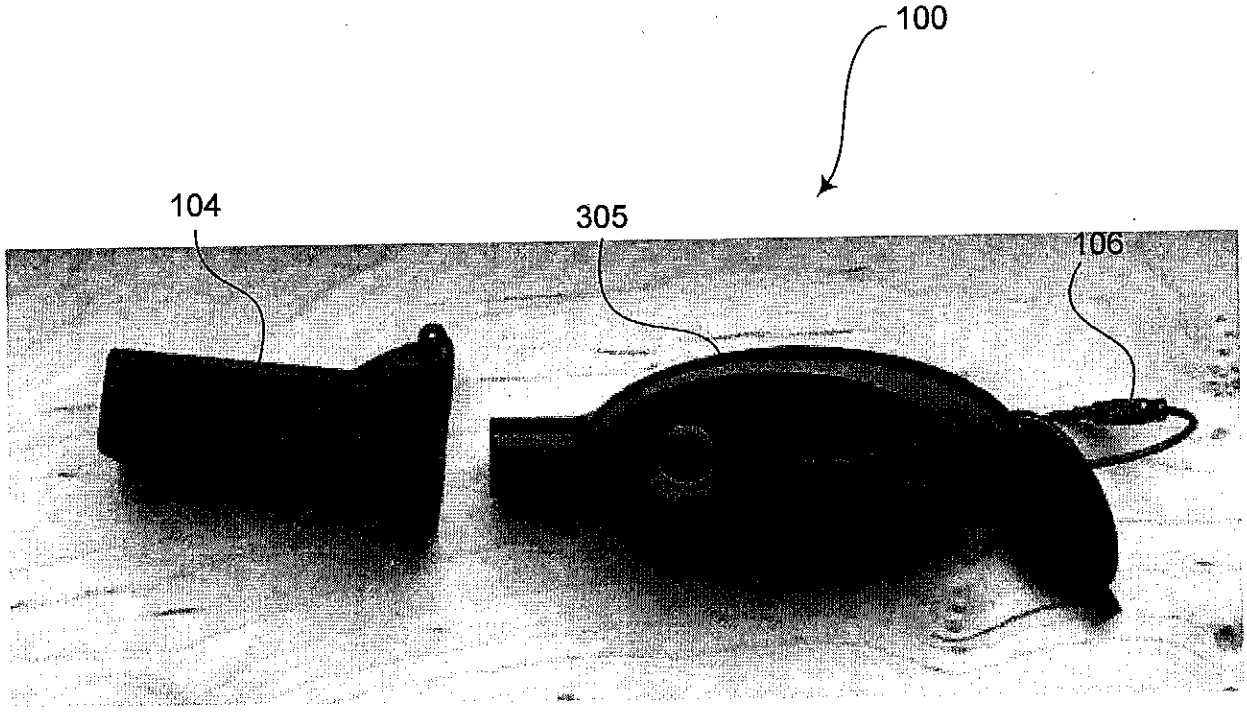

FIG. 1

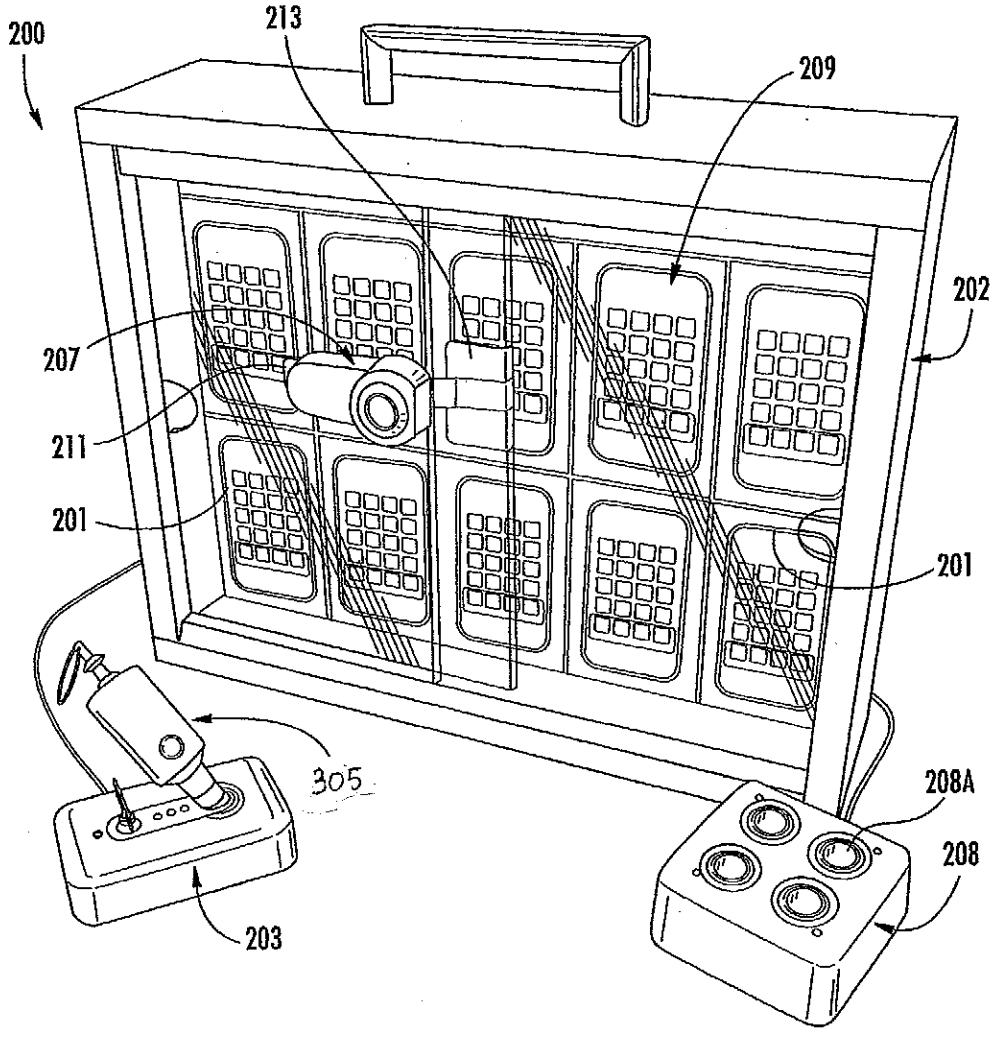

FIG. 2

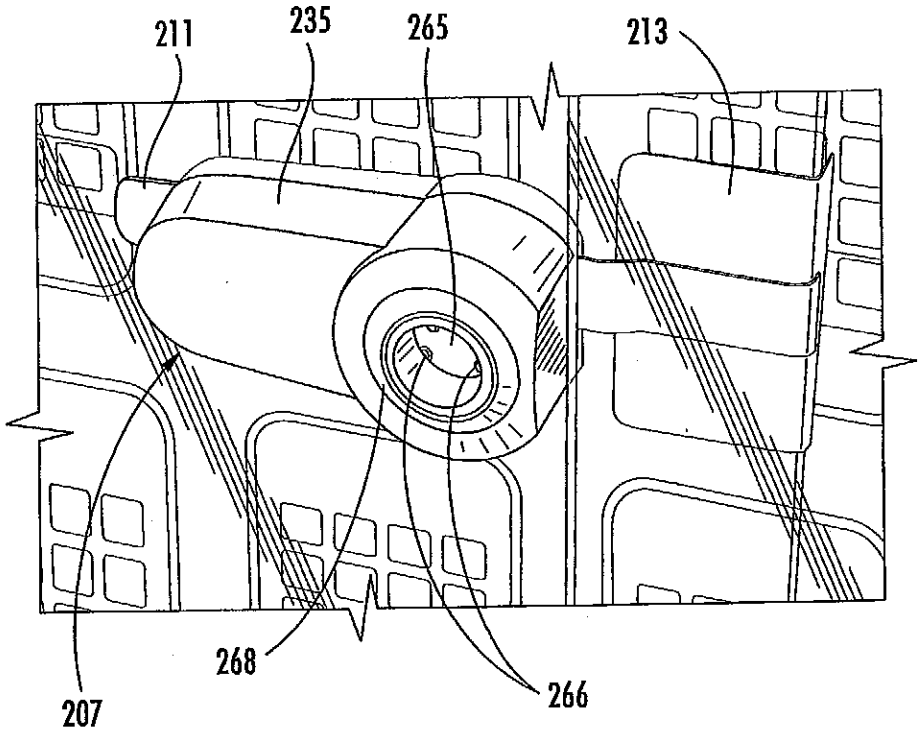

FIG. 3

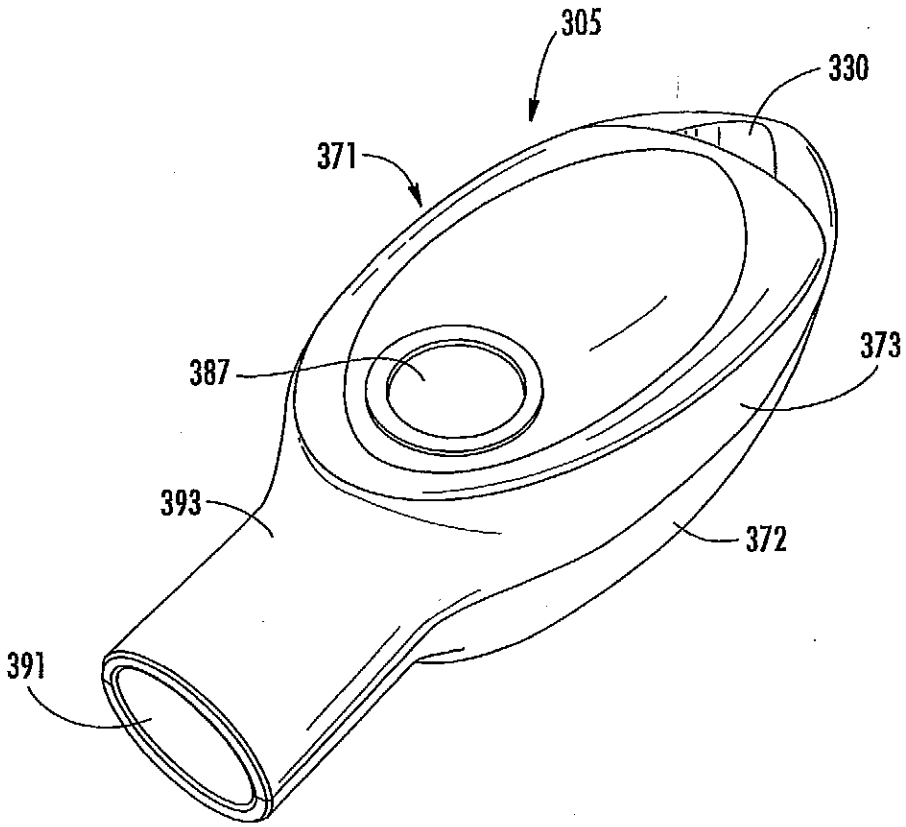

FIG. 4

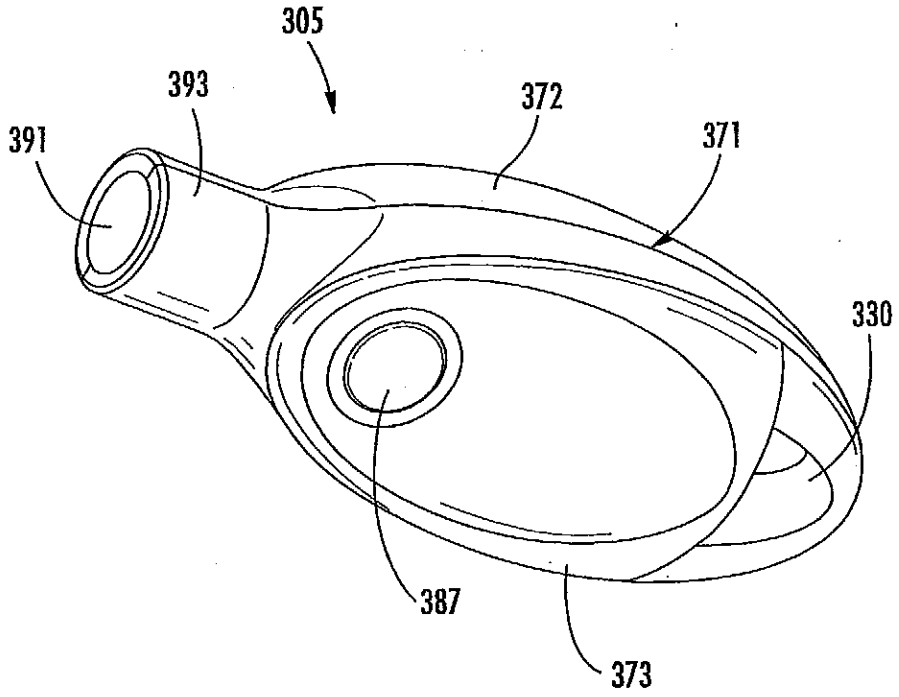

FIG. 5

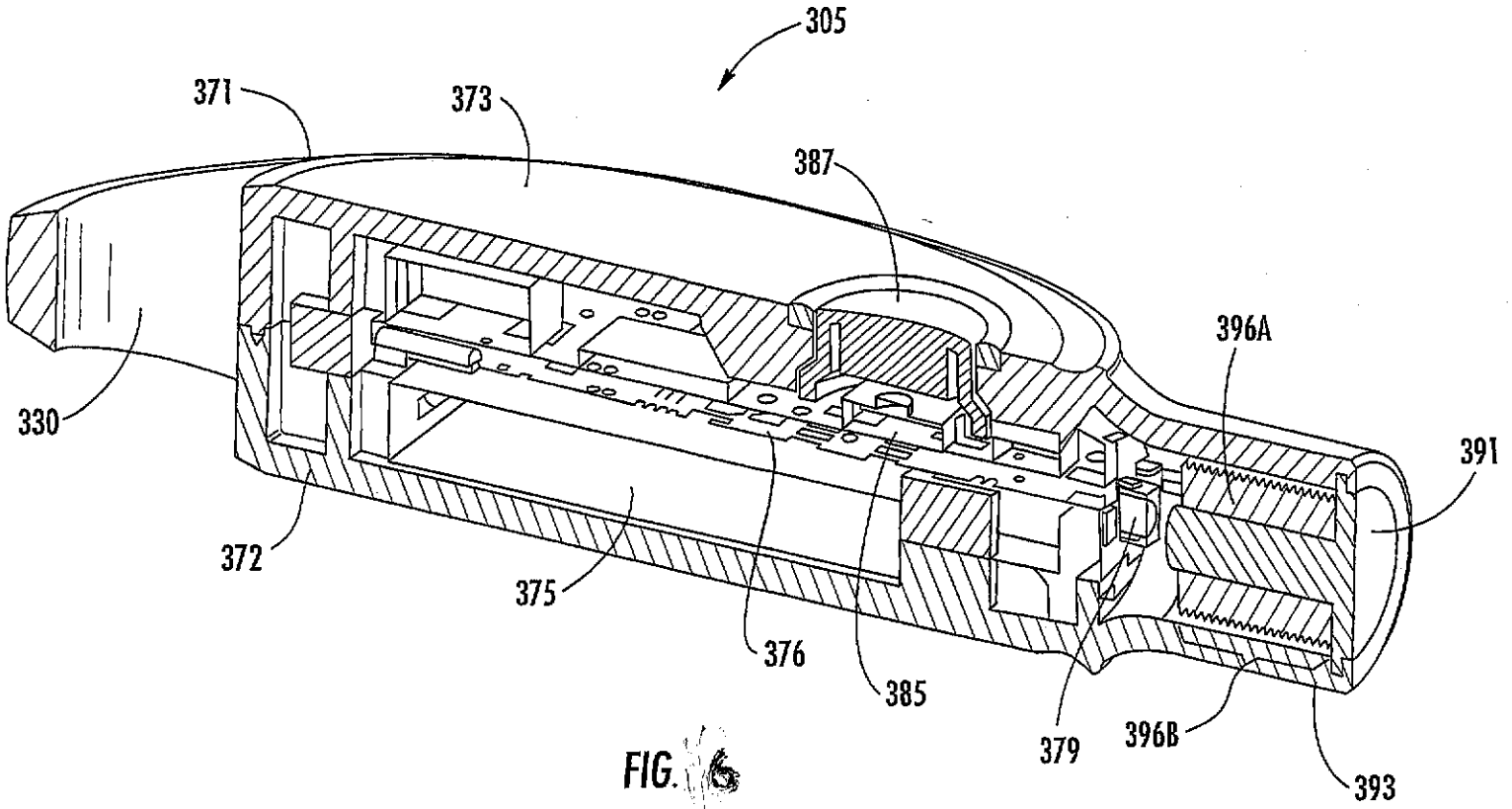

FIG. 6

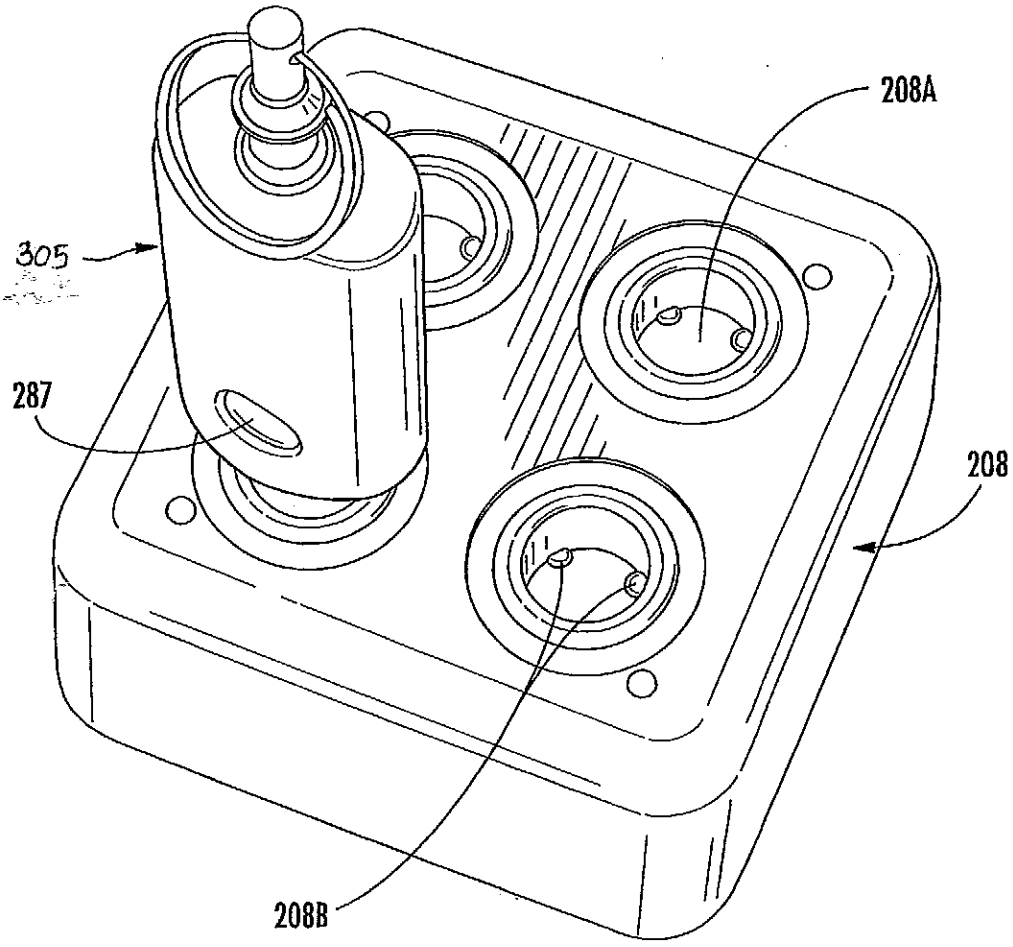

FIG. 7

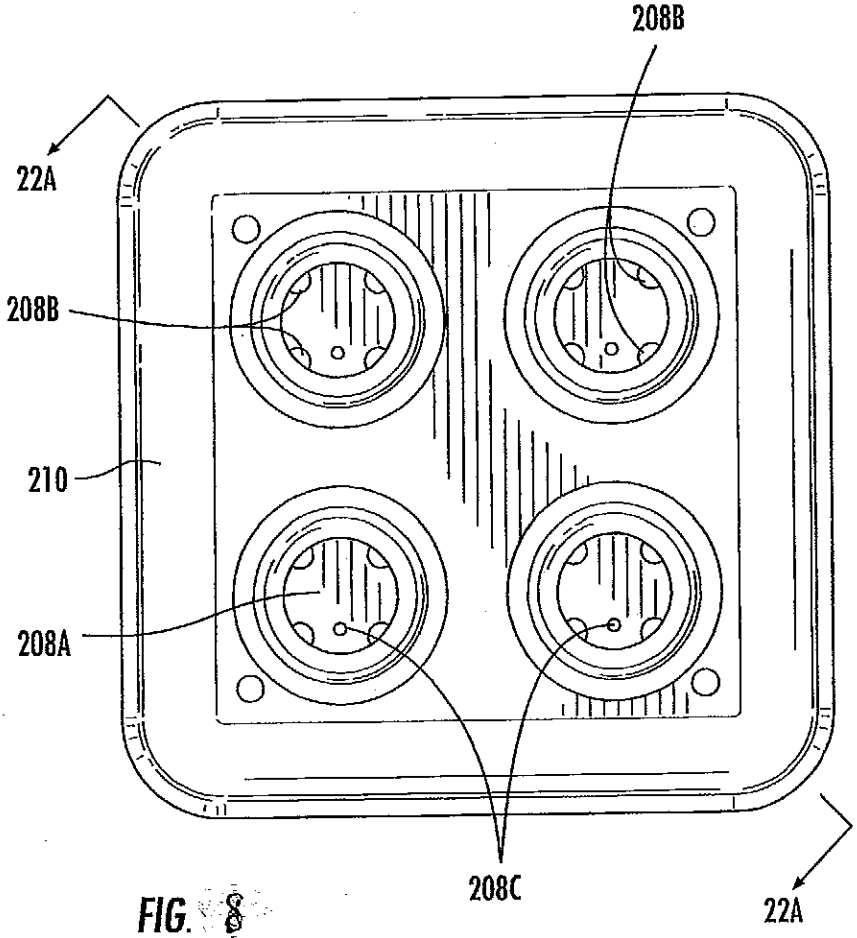

FIG. 8

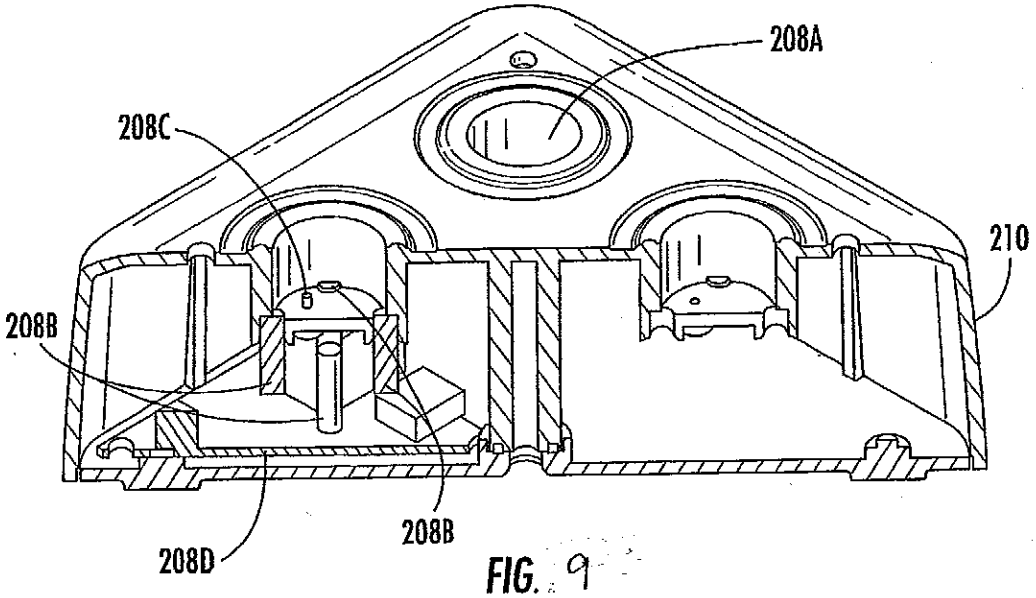

FIG. 9

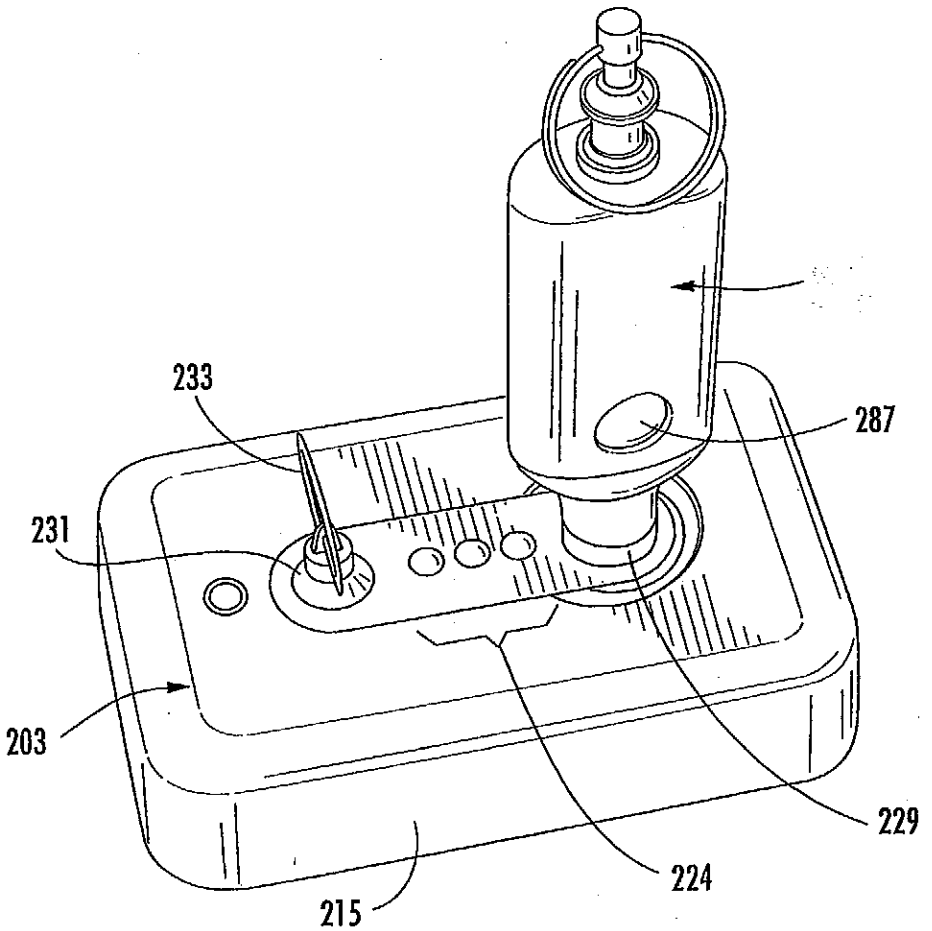

FIG. 10