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(54) **SECURED AND CONTROLLED ACCESS TO MEDIA CASSETTES**

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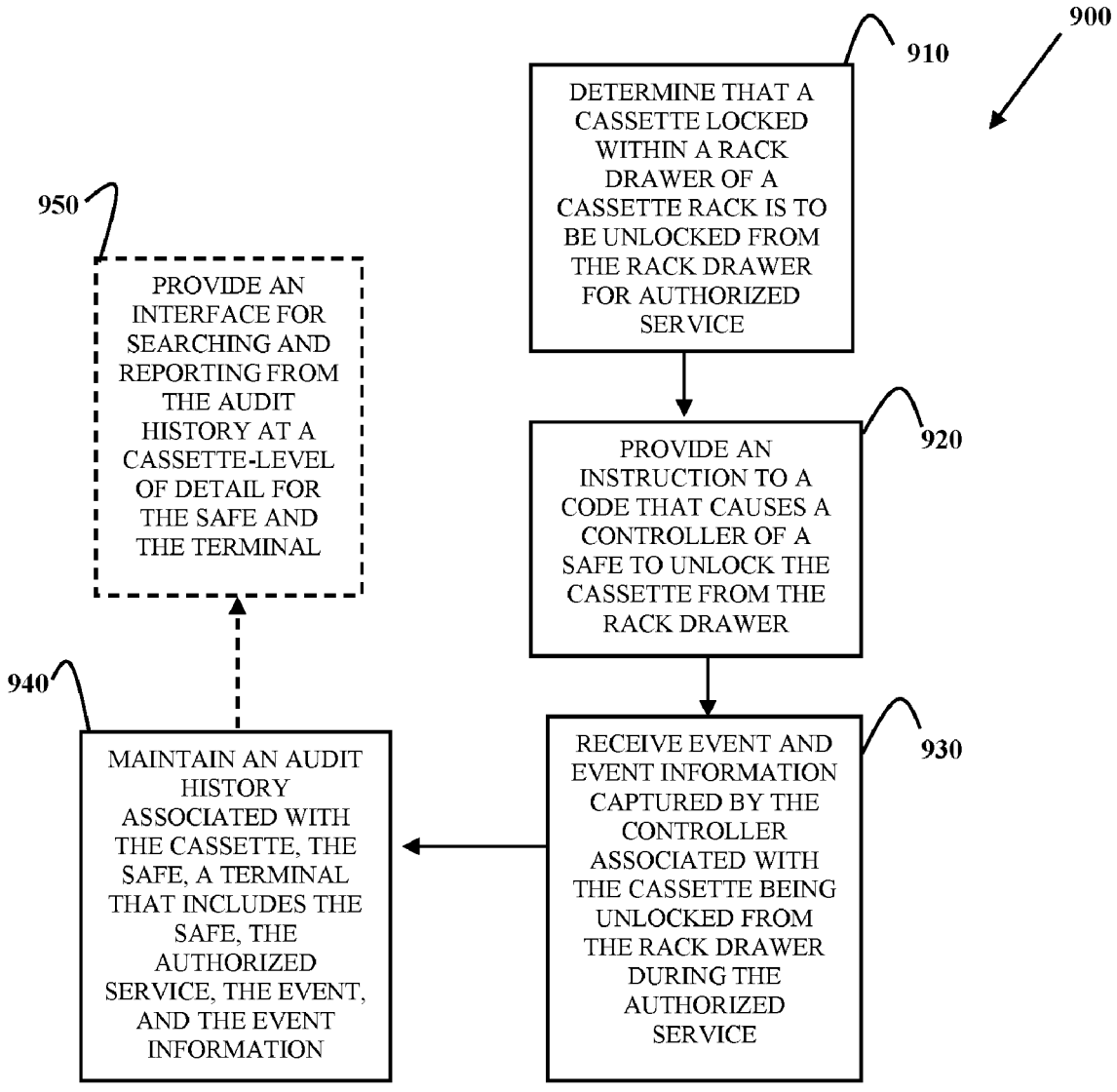
(57) **ABSTRACT**

Individualized locks are mounted on side walls of a cassette rack within a safe. Each lock corresponding to a cassette or rack drawer. Each lock is controlled by a safe controller to extend a pin through a side wall of the rack into a ridge, a rib, or an aperture of a guide for the cassette when a cassette is locked and to retract the pin back into the lock out of the guide when the cassette is unlocked. When the safe door is opened, each of the cassettes remained locked and the controller authorizes individual, independent, and separate unlocking of each of cassette. Audit information associated with unlocking and locking the cassettes are maintained by a cloud-based service along with information correlated for administrative operations, administrative sessions, service personnel, and terminals associated with the cassettes. A cassette-level of detail of audit information is managed by the cloud-based service.



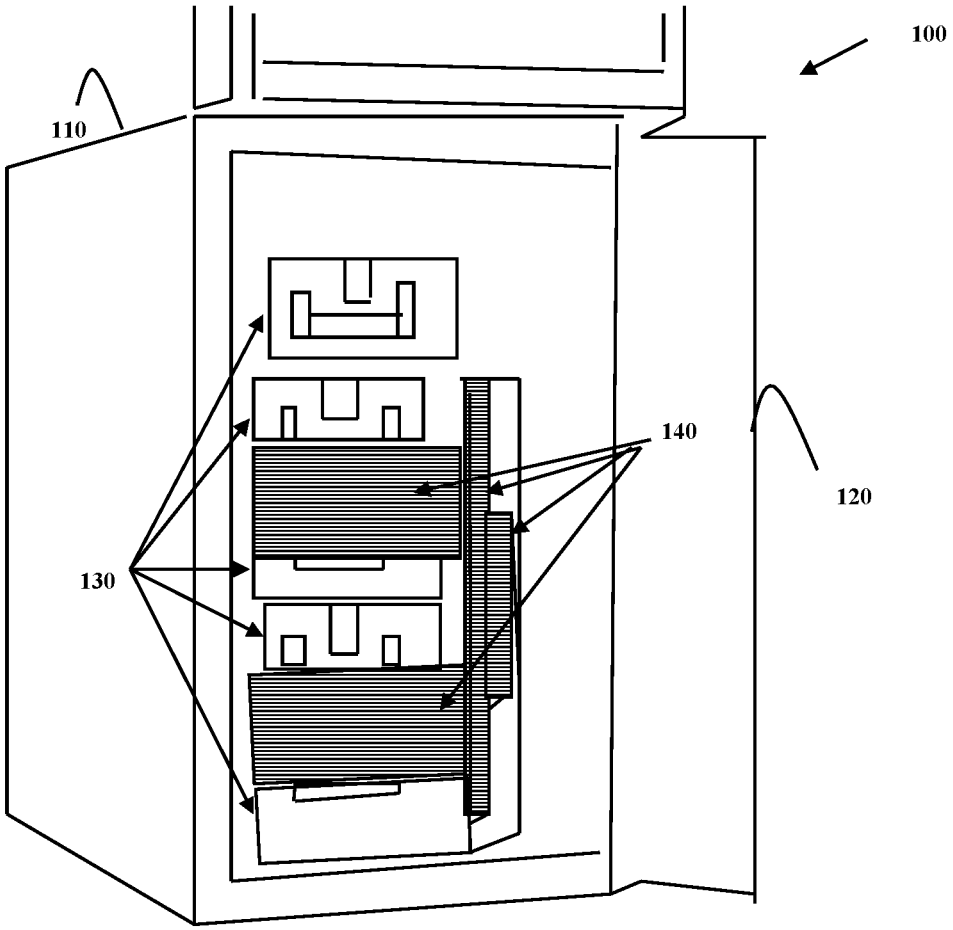


FIG. 1
PRIOR ART

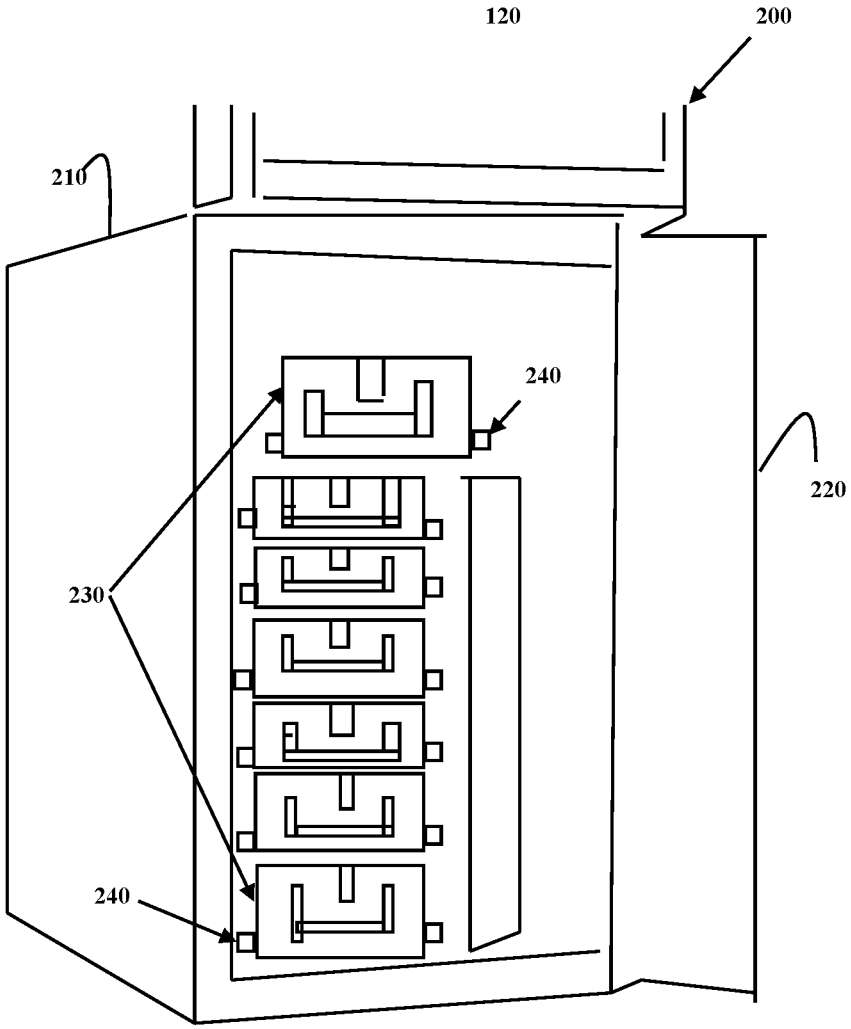


FIG. 2

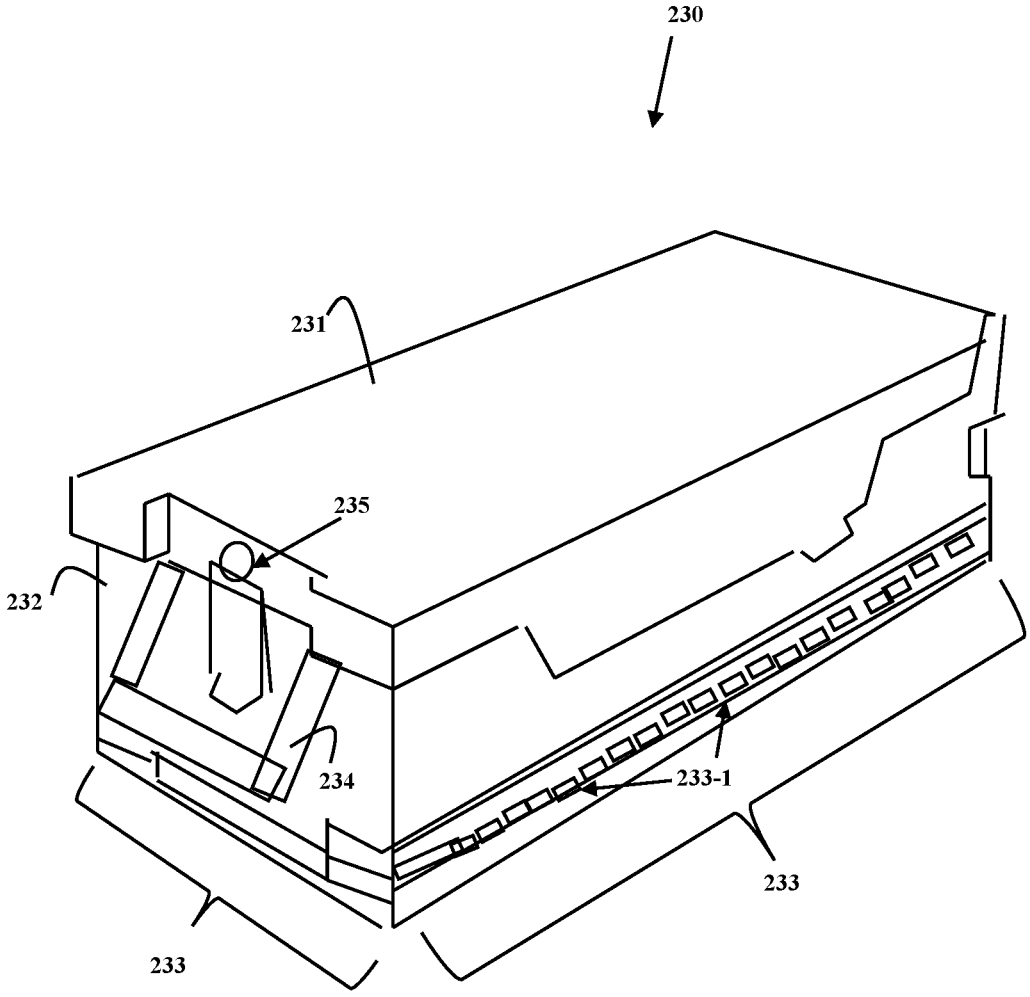


FIG. 3

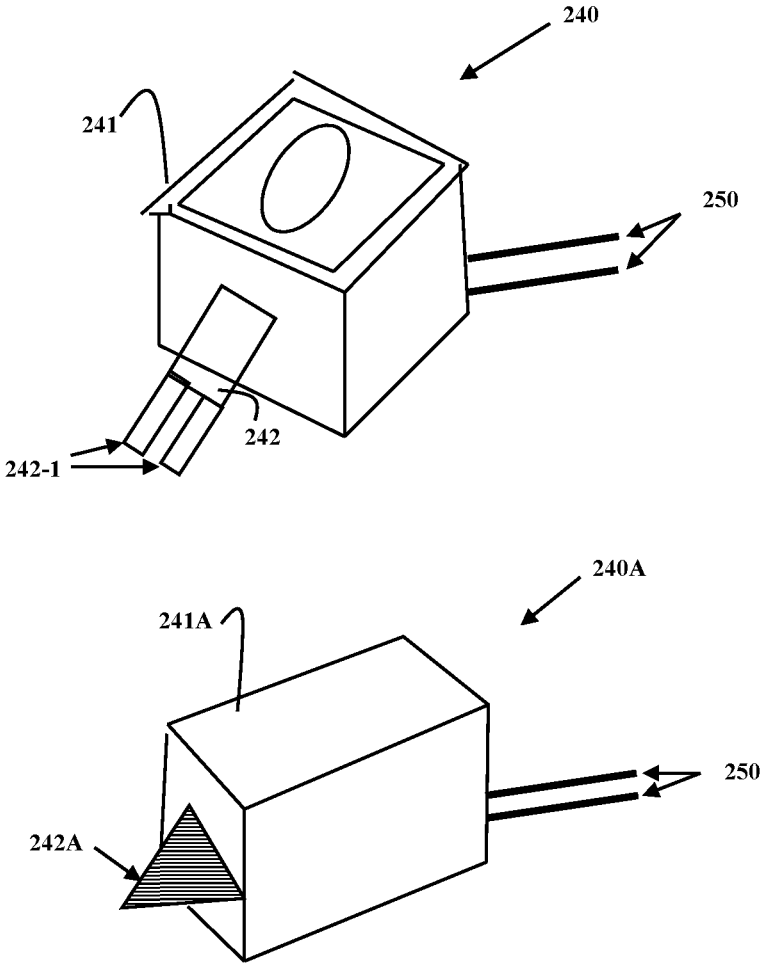


FIG. 4

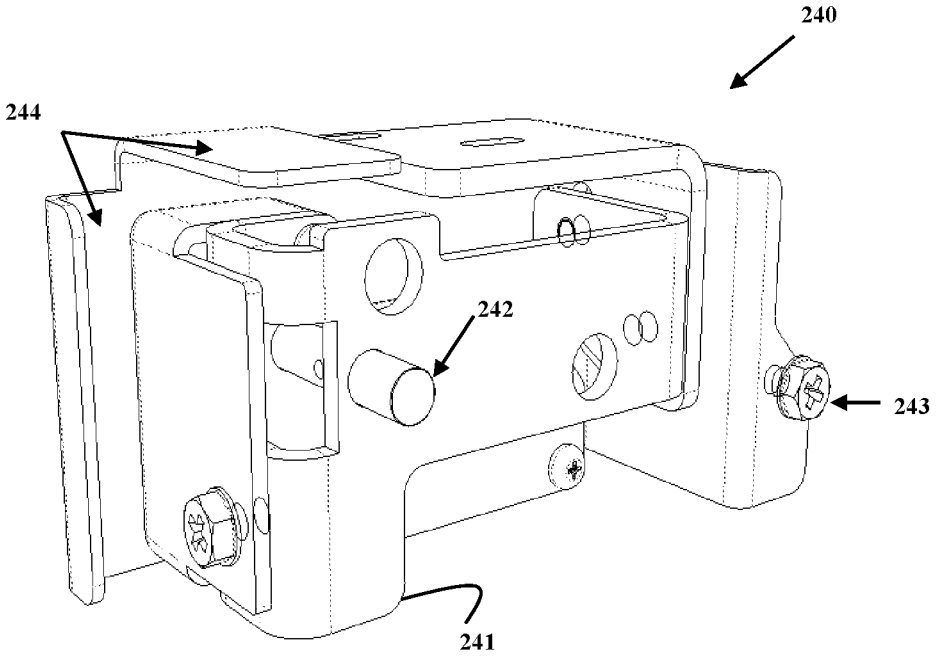


FIG. 5

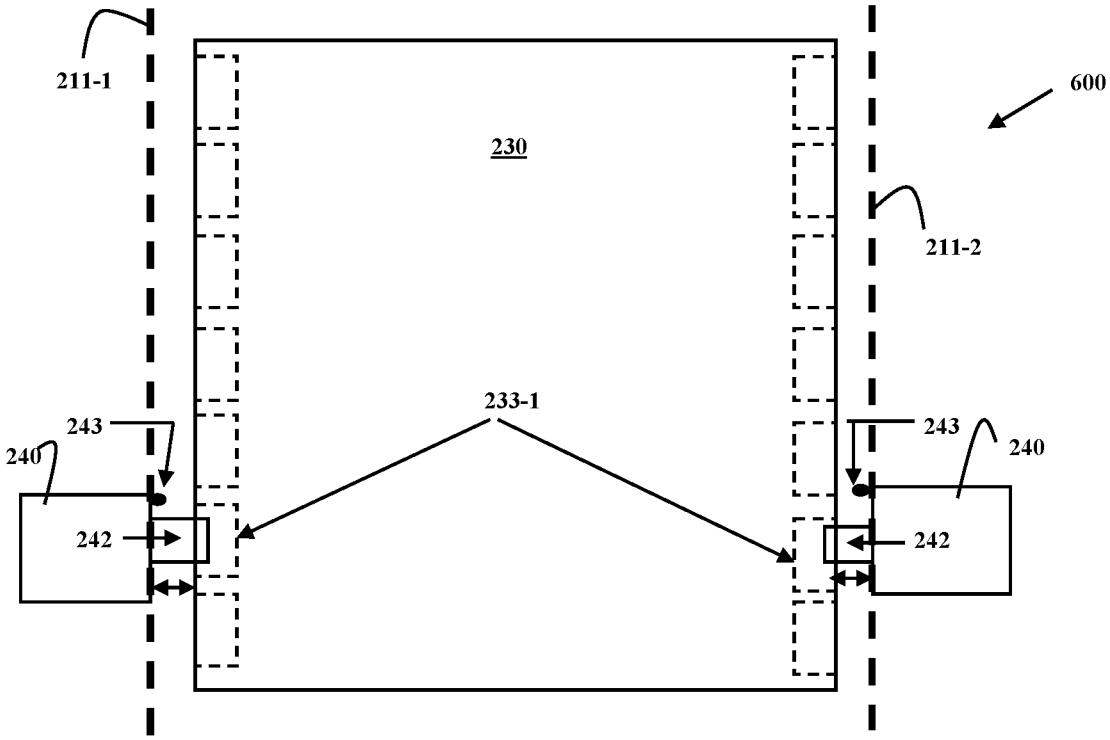


FIG. 6

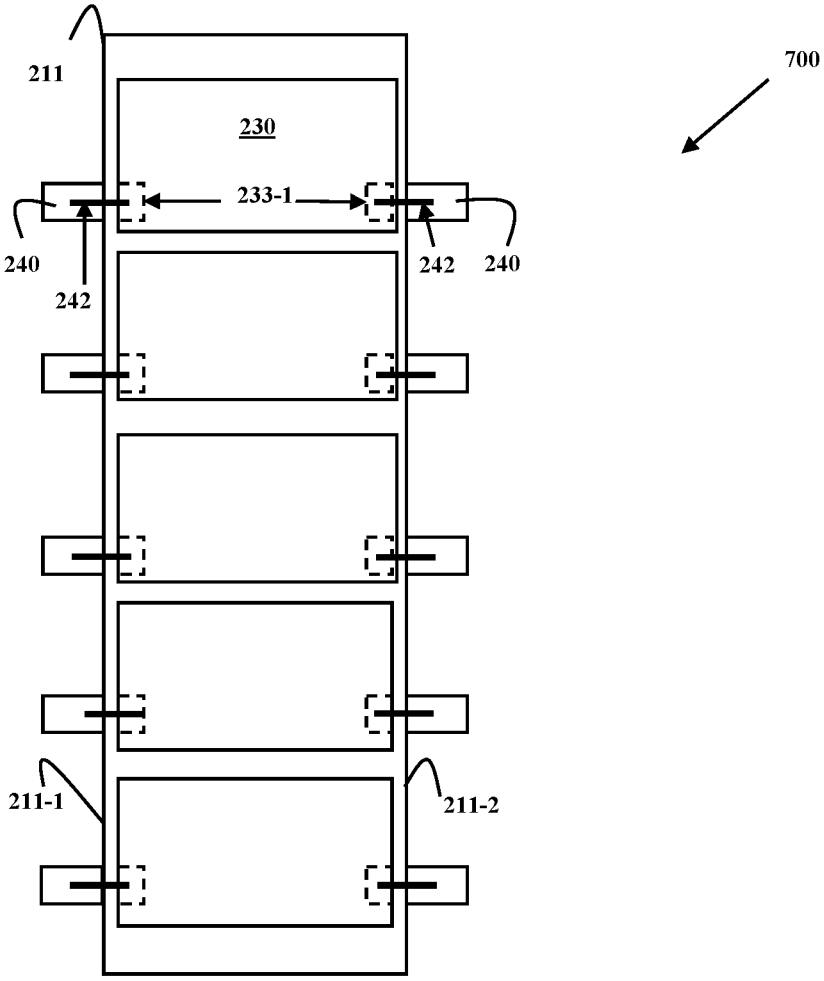


FIG. 7

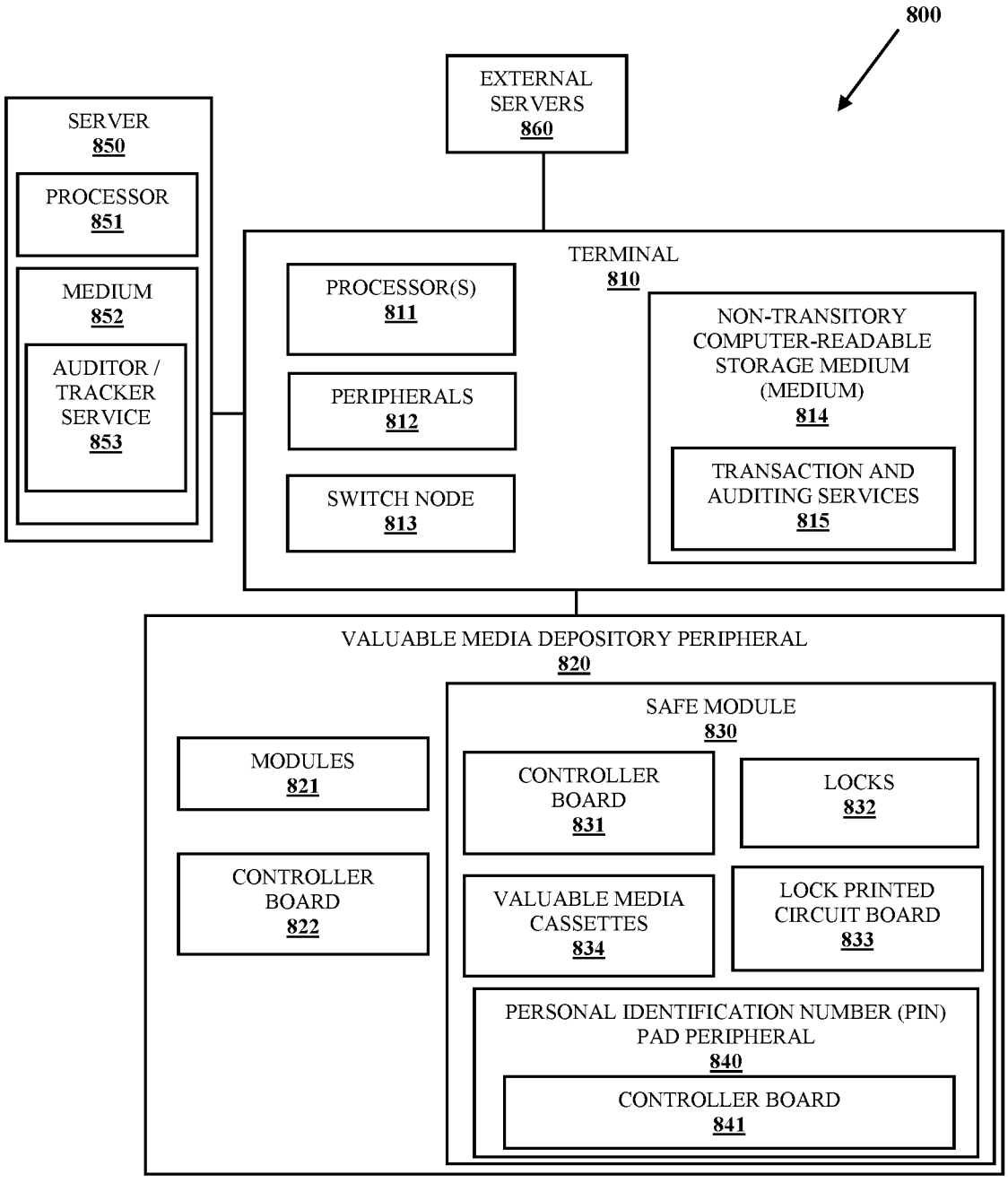

800
EXTERNAL SERVERS 860
SERVER 850
PROCESSOR 851
MEDIUM 852
AUDITOR / TRACKER SERVICE 853
TERMINAL 810
PROCESSOR(S) 811
PERIPHERALS 812
SWITCH NODE 813
NON-TRANSITORY COMPUTER-READABLE STORAGE MEDIUM (MEDIUM) 814
TRANSACTION AND AUDITING SERVICES 815
VALUABLE MEDIA DEPOSITORY PERIPHERAL 820
MODULES 821
CONTROLLER BOARD 822
SAFE MODULE 830
CONTROLLER BOARD 831
LOCKS 832
VALUABLE MEDIA CASSETTES 834
LOCK PRINTED CIRCUIT BOARD 833
PERSONAL IDENTIFICATION NUMBER (PIN) PAD PERIPHERAL 840
CONTROLLER BOARD 841

FIG. 8

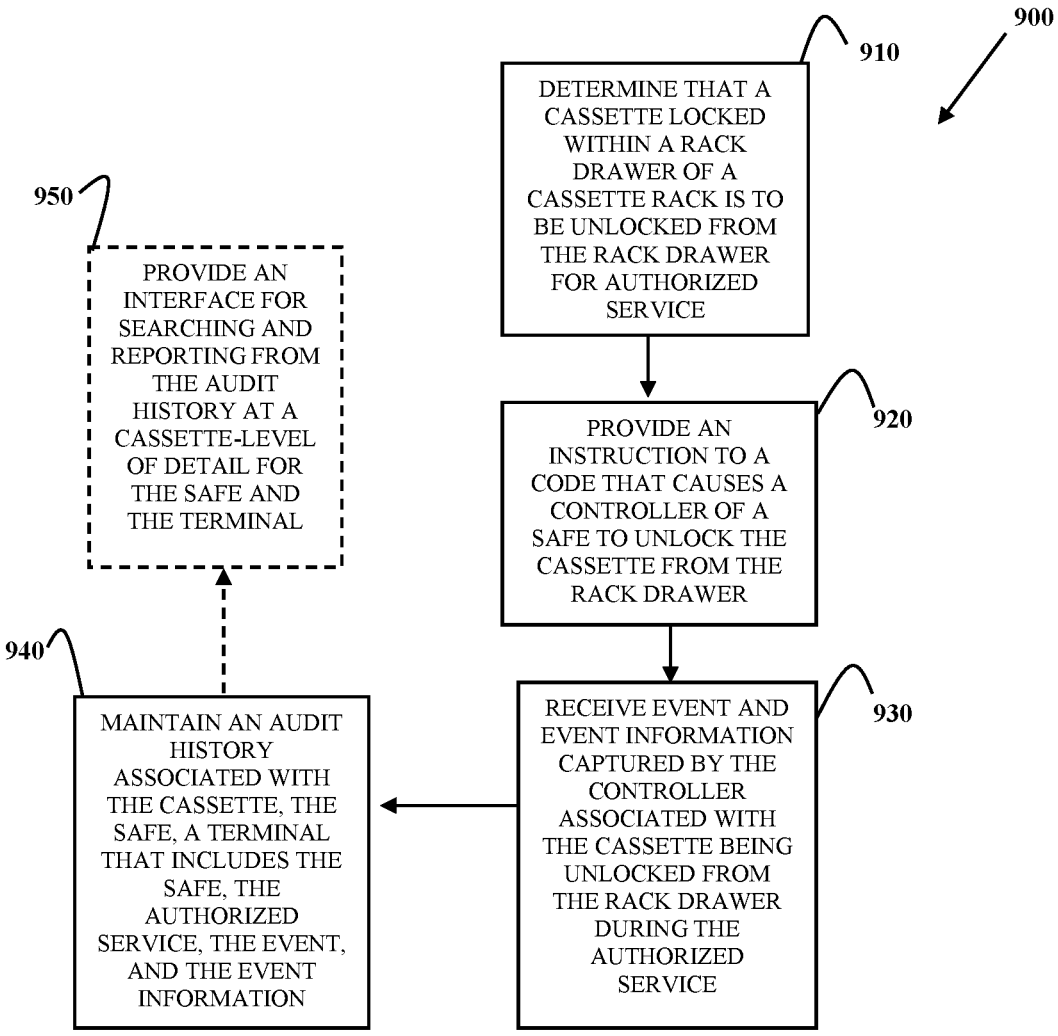

900
910
DETERMINE THAT A CASSETTE LOCKED WITHIN A RACK DRAWER OF A CASSETTE RACK IS TO BE UNLOCKED FROM THE RACK DRAWER FOR AUTHORIZED SERVICE
920
PROVIDE AN INSTRUCTION TO A CODE THAT CAUSES A CONTROLLER OF A SAFE TO UNLOCK THE CASSETTE FROM THE RACK DRAWER
930
RECEIVE EVENT AND EVENT INFORMATION CAPTURED BY THE CONTROLLER ASSOCIATED WITH THE CASSETTE BEING UNLOCKED FROM THE RACK DRAWER DURING THE AUTHORIZED SERVICE
940
MAINTAIN AN AUDIT HISTORY ASSOCIATED WITH THE CASSETTE, THE SAFE, A TERMINAL THAT INCLUDES THE SAFE, THE AUTHORIZED SERVICE, THE EVENT, AND THE EVENT INFORMATION
950
PROVIDE AN INTERFACE FOR SEARCHING AND REPORTING FROM THE AUDIT HISTORY AT A CASSETTE-LEVEL OF DETAIL FOR THE SAFE AND THE TERMINAL

FIG. 9

SECURED AND CONTROLLED ACCESS TO MEDIA CASSETTES

BACKGROUND

[0001] Terminals that accept and dispense cash include a cash depository, dispenser, and/or recycler. The depository includes a safe within which cash cassettes reside, each cassette includes a specific denomination of currency. Substantial security mechanisms are available in the industry to prevent unauthorized access to the cassettes within the safe. Yet, even when the safe is opened for authorized activities such as cash replenishment, excess cash removal, or maintenance on componentry of the safe there are still substantial risks of theft and/or to the safety of the individual performing an authorized activity.

[0002] In fact, little technology exists in the industry to secure the cassettes and monitor the cassettes during authorized service-related activities. When the safe door is opened, the cassettes are easily removed by manually unlatching the cassette and pulling the cassette out of its rack. Access to the cassette is not audited when removed from their racks; rather, the service activity that opened the safe door is monitored but each of the cassettes is not tracked and monitored separately from the activity as a whole.

[0003] Authorized individuals are trusted to perform service, but trust is not a viable security approach. A passer-by can remove cassettes easily after the safe door was opened and during an authorized service such as if the service personnel is distracted or the passer-by engages in physical violence or threats against the service personnel to obtain the cassettes. With the safe door opened, a variety of risks emerge with respect to the cash in the cassettes that did not exist when the safe door is closed. Additionally, should an individual be capable of breaching the safe or the safe door, the cassettes pose no additional impediments to the criminal for purposes of obtaining the cash.

SUMMARY

[0004] In various embodiments, a cassette apparatus, a system, and a method are presented for securing and controlling access to media cassettes when the safe is closed and when the safe is opened. In an embodiment, a cassette apparatus includes a reinforced bottom guide situated a bottom of a cassette. The guide includes ridges, apertures, and/or ribs. An electronically controlled lock is mounted to a wall of a rack within a safe housing of the safe. The guide of the cassette slides into the rack with at least one ridge, rib, and/or aperture of the guide aligned and adjacent to the mounted lock.

[0005] A controller of the safe executes instructions to lock the cassette within the rack by extending a pin from the lock into the guide's ridge, rib, and/or aperture such that when the cassette is locked it cannot be removed from the rack. The instructions are also executed by the controller to unlock the cassette by retracting the pin out of the ridge, rib, and/or aperture. Furthermore, the instructions, executed by the controller, can also record audit information indicating when the cassette was locked and unlocked for access.

[0006] In an embodiment, when the safe door is authorized to be opened and is opened for service, the cassette remains locked in the rack and is unlocked after a separate and additional credential is provided by the service personnel. When the separate and additional credential is authenticated, the safe controller retracts the pin of the lock from the ridge, aperture, and/or rib of the cassette's guide such that cassette can be removed from the rack.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. **1** is a diagram of a prior art cassette security apparatus within a safe body of a safe for restricting access to cassettes when the safe door is opened.

[0008] FIG. **2** is a diagram of a cassette security apparatus for restricting access to cassettes when the safe door is opened, according to an example embodiment.

[0009] FIG. **3** is a diagram of a cassette with a security guide used by the cassette security apparatus of FIG. **2**, according to an example embodiment.

[0010] FIG. **4** illustrates two diagrams for two example locks used by the cassette security apparatus of FIG. **2**, according to an example embodiment.

[0011] FIG. **5** is a diagram illustrating some components of a lock used by the cassette security apparatus of FIG. **2**, according to an example embodiment.

[0012] FIG. **6** is a diagram illustrating locks mounted on side walls of a rack with pins of the locks extended and engaged in ribs or apertures in the guide to lock a cassette within the rack, according to an example embodiment.

[0013] FIG. **7** is a diagram illustrating a plurality of locks and cassettes that secure the cassettes to the rack of the safe body, according to an example embodiment.

[0014] FIG. **8** is a diagram of a system for securing, monitoring, and controlling access to media cassettes within a safe of a terminal, according to an example embodiment.

[0015] FIG. **9** is a flow diagram of a method for securing, monitoring, and controlling access to media cassettes within a safe of a terminal, according to an example embodiment.

DETAILED DESCRIPTION

[0016] As stated above, it is not enough to simply securely control and audit access to a safe door when the media cassettes themselves lack any security or auditing capabilities once the safe door is opened. One approach has been attempted in the industry to plug this security hole, but it only addresses the security of the media cassettes when the safe door is opened and does not provide cassette-level auditing for the cassettes.

[0017] The prior approach is directed to steel door assemblies that are retrofitted onto the cassette rack within the safe body in front of the cassettes and behind the safe door. Once the safe door is opened, service personnel has to manually unlock the steel door to gain access to the cassettes within the rack. Installation is time consuming and requires assembling heavy steel panels. The approach also does not address terminals with dual safes. In fact, either steel door assemblies cannot be provided to dual safe terminals or require significant custom manufacturing that depends upon the dimensions and locations of the racks relative to one another within the safe. Additionally, the steel door assembly approach is an aftermarket and retrofitted technique, which provides no cassette-level auditing and tracking capabilities once the cassettes are removed. Furthermore, if service engineer removed more than one cassette at a time, there is a danger that one of the removed cassettes could just be stolen while the service engineer has attention directed away

from the removed cassettes during the service call or a danger the engineer is attacked by a criminal who physically takes the removed cassettes.

[0018] These issues are solved with the teachings provided herein and below. Individualized small locks are integrated into walls of a cassette rack within a safe body of a safe. The locks when activated extend pins into apertures, ribs, or ridges of guides at the bottom of the cassettes to lock each cassette individually onto the rack. Each cassette can be associated with one or two separate locks within its racked position. For example, two opposing walls of the rack for each cassette slot can include a separate lock such that each cassette is locked on two sides to the rack.

[0019] Activation and deactivation of the locks are monitored and controlled by an existing safe controller that is enhanced to lock and unlock each of the locks via a printed circuit board (PCB) wired to the locks. In an embodiment, the PCB is daisy chained off an existing controller board for the safe and firmware/software executed by the safe controller enhanced to report events and event information associated with locking and unlocking each of the locks. The events and event information can be reported to a security or auditing service over a network connection of the terminal to provide cassette-level auditing capabilities.

[0020] The teachings provided herein do not require any steel door assemblies to secure the cassettes within the rack. Each individual cassette within the rack can be locked and unlocked independently and separately from other cassettes within the rack. This means if only one cassette in the rack requires service, the other cassettes within the rack remained locked. Additionally, should another module of the safe require service unrelated to the cassettes that module can be removed and worked on while the cassettes remained locked to the rack with the safe door opened. Furthermore, should the safe door be breached by a thief, the cassettes remained locked to the rack, which provides additional impediments experienced by the thief when attempting to acquire cash from the cassettes.

[0021] FIG. **1** is a diagram of a prior art cassette security apparatus **140** within a safe body **110** of a safe **100** for restricting access to cassettes **130** when the safe door **120** is opened. As discussed above, the security apparatus **140** includes one or more steel door assemblies, which are expensive, difficult to install, do not provide sufficient cassette security, and have no cassette-level auditing capabilities. Furthermore, the doors of the apparatus **140** are designed to cover two of the cassettes **130** at a time, such that at any given point in time at least two cassettes **130** are unlocked when a given door is unlocked by a service engineer.

[0022] As used herein, the term "cassette" refers to valuable media cassettes that store types of valuable media. The types can include cash or currency, bank notes, checks, coupons, tickets, etc. Each cassette may be associated with a specific valuable media denomination; for example, a cash denomination can have separate cassettes for $1 denominations, $5 denominations, $10 denominations, $20 denominations, $50 denominations, and $100 denominations. More than 1 cassette is stored in a cassette rack within a safe, a safe apparatus, or a safe module. The cassettes of a given cassette rack can be associated with different media types; for example, a cassette rack within a safe module of a terminal includes separate cassettes for each U.S. currency denomination and a cassette for checks.

[0023] FIG. **2** is a diagram of a cassette security apparatus/safe **200** for restricting access to cassettes when the safe door **210** is opened, according to an example embodiment. A plurality of modular and individually controlled locks **230** are illustrated. Each cassette **230** includes two locks **130** on each side of the corresponding cassette **230**. It is noted that in some embodiments, each cassette **230** only includes a single lock **240** on a single side of the corresponding cassette **230**. The cassettes **240** are encased within a cassette rack within the safe's body **210**.

[0024] FIG. **3** is a diagram of a cassette **230** with a security guide **233** used by the cassette security apparatus **200** of FIG. **2**, according to an example embodiment. The cassette **230** includes a lid or cover **231**, a cassette body **232**, a guide **233**, a handle **234**, and a latch **235**. The guide **233** further includes apertures, ridges, and/or ribs **233-1** integrated into the bottom sides of the cassette **230**. In an embodiment, cassette **230** is an existing cassette with its existing guide replaced by guide **233**. Guide **233** is reinforced to provide structural strength in apertures **233-1**.

[0025] Cassette **230** is inserted and removed from a cassette rack of the safe body **210** when service is required on the cassette **230**. Guide **233** allows cassette **230** to slide into and out of its rack drawer or racked position. Apertures **233-1** permit a pin from a lock **240** to be inserted and withdrawn by lock **240**. When the pin is inserted into an aperture **233-1** of guide **233**, cassette **230** is locked within the rack and is incapable of being removed. Handle **234** is manufactured to break away from cassette body **232** when a predefined amount of force is exerted on handle **234**. Thus, when cassette **230** is locked with the rack, any force above the predefined amount will cause the handle **234** to break off and prevent the cassette **230** from being removed without first unlocking the corresponding lock(s) **240**.

[0026] FIG. **4** illustrates two diagrams for two example locks **240** and **240**A used by the cassette security apparatus **200** of FIG. **2**, according to an example embodiment. Lock **240** includes a lock body **241** and a pin **242**. The end of pin **242-1** is forked shaped, which permits pin **242** to be inserted between a single ridge/rib **233-1** in guide **233** to lock the cassette **230** on the cassette rack within safe body **210**.

[0027] Lock **240**A includes lock body **241**A and a triangular shaped pin **242**A. The base of **242**A can be extended between two ridges or ridges **233-1** within an aperture in guide **233** to lock the cassette **230** on the cassette rack within safe body **210**.

[0028] Both locks **240** and **240**A are wired to a PCB via electrical wires **250**. The PCB can be daisy chained off the controller board associated with the safe **200**.

[0029] In an embodiment, locks **240** and **240**A are solenoids. In an embodiment, pins **242** and **242**A are steel pins with a diameter of 6 mm. The solenoids are controlled by signals provided over wires **250** to retract pins **240** and **240**A back into lock bodies **241** and **241**A when cassettes **230** are unlocked from the rack to provide unobstructed clearance for the guides **233** to slide out of their rack drawers/positions. The solenoids are also controlled by signals provided over wires **250** to extend pins **242** and **242**A out from lock bodies **241** and **241**A and into or in between ribs, ridges, or apertures **233-1** of guides **233** when cassettes **230** are locked into the rack to prevent cassettes **230** from being removed from their racked positions within the rack.

[0030] The locks **240** and **240**A are mounted and secured to walls of the cassette rack. If necessary, holes are drilled

in the sides of the walls to accommodate the pins **242** and **242**A when they are being extended for locking and being retracted for unlocking. The pins **242** and **242**A are aligned and positioned along the sides of the walls of the rack so as to lock and unlock via the ridges, ribs, or apertures **233-1** which are associated with back edges of the cassettes **230**. That is, the locks **240** and **240**A are mounted and secured to the rack walls at locations along the rack sides that correspond to backends of the cassettes **230**, the front ends associated with the handles **234** are opposite of the backends associated with where the locks **240** and **240**A are mounted on the rack walls.

[0031] FIG. **5** is a diagram illustrating some components of a lock **240** used by the cassette security apparatus **200** of FIG. **2**, according to an example embodiment. Lock **240** includes a a lock housing or body **241**, a pin **242**, a inside mounting screw **243**, and an adjustable alignment component or tab **244**. Adjustable tab **244** permits lock body **241** to be aligned properly with ridges, ribs, or apertures **233-1** after body **241** is mounted to the rack side wall. That is, pin **242** can be moved left, right, up, and down for proper alignment using tab **244**.

[0032] Inside mounting screw **243** provides additional security by mounting lock body **241** on an outside surface of the rack side wall and inserting screw **243** from the inside surface of the side wall back into the aperture on lock body **241** that corresponds to screw **243**. Thus, should the safe door **220** be breached and handle **234** broken off in a failed attempt to remove a cassette **230** from the rack, a thief would have to dismount the lock **240** from the inside surface of the side wall while the cassette **230** is still securely fastened to the side wall. Short of cutting the side wall itself, the cassette **230** and the lock **240** would be incapable of being removed and the cassette **230** remains locked in the rack.

[0033] FIG. **6** is a diagram **600** illustrating locks **240** mounted on side walls **211-1** of a cassette rack **211** (shown in FIG. **7** below) with pins **242** of the locks **240** extended and engaged in ribs or apertures **233-1** in the guide **233** to lock a cassette **230** within the rack **211**, according to an example embodiment.

[0034] Notice the head of screw **243** is threaded through side walls **211-1** and **211-2** from an inside surface of rack **211** into the corresponding screw hole or aperture in lock body **241**. The handle end of cassette **230** is shown oriented to the top of diagram **600** with the end opposite the handle end illustrating the location and alignment of lock **240** mounted on side walls **211-1** and **211-2**. Positioning lock **240** at a rear position of a racked cassette **230** makes it more difficult for a thief to access the lock **240** when the safe door **220** is opened.

[0035] FIG. **7** is a diagram **700** illustrating a plurality of locks **240** and cassettes **230** that secure the cassettes **230** to the rack **211** of the safe body **210**, according to an example embodiment. The rack **211** is illustrated with 5 cassettes **230**, it is noted that any configuration of less than or more than 5 cassettes **230** can be provided with the teachings herein. Additionally, diagram **700** shows that each cassette **230** includes two locks **240** on its sides when in a racked position within the rack **211**. It is to be noted that a single lock **240** can secure a single cassette **230** within rack **211**. Moreover, some cassettes **230** can be secured within the rack **211** by a single lock **240** while other cassettes **230** within the same rack **211** are secured by two locks **240**. Still further, the individualized lock(s) **240** and architecture permits any sized rack **211** and/or dual safes with multiple cassette racks **210** to be implemented with the teachings herein. That is, there is no need to manufacture expensive customized sized steel doors or arrangement of doors to secure cassettes within their rack, since apparatus **200** can accommodate and be installed with any safe architecture using guide **233**, ribs, ridges, or apertures **233-1**, and locks **240**.

[0036] FIG. **8** is a diagram of a system **800** for securing, monitoring, and controlling access to media cassettes **230** within a depository **830** of a safe, according to an example embodiment. It is noted that system **800** is shown in greatly simplified form with only those components necessary for understanding the embodiments provided. Thus, there can be more or less components without departing from the teachings provided herein.

[0037] System **800** includes a terminal **810**, a valuable media depository **820**, a safe module **830**, a personal identification number (PIN) pad **840**, a server **850**, and one or more external servers **860**. Terminal **810** includes one or more processors **811**, a variety of peripherals **812**, a network switch node **813**, and a non-transitory computer-readable storage medium (medium) **814**, which includes executable instructions for transaction and auditing services **815**. The instructions when executed by the processor **811** cause the processor **811** to perform operations discussed herein and below with respect to transaction and auditing services **815**.

[0038] Valuable media depository peripheral (depository) **820** includes modules **821**, a controller board **822**, and a safe module **830**. Modules **821** include a media deskew module, an upper media transport module, a lower media transport module, a media diverter module, a recycler module, a media infeed module, a media separator module, a media validation module, etc. Controller board **822** includes one or more processors and a medium, which includes software and/or firmware instructions to control and to operate modules **821**, safe module **830**, lock PCB **833**, and PIN pad **840**.

[0039] In an embodiment, lock PCB **833** is daisy chained off of controller board **831**, which permits instructions processed on controller board **831** to lock and unlock locks **832** and receive events associated with locks **832** through lock PCB **833**.

[0040] Safe module **830** (e.g., safe apparatus **200** described above) includes a controller board **831**, one or more locks **832** (e.g., locks **240** described above), a lock PCB **833**, valuable media cassettes **834** (e.g., cassettes **230**), and an integrated PIN pad peripheral **841**. PIN pad **841** includes a controller board **841** to operate and control PIN pad **841** independent of and in connection with safe module **830**. For example, PIN pad **841** can be an encrypted PIN pad **841**, which encrypts, and decrypts entered PIN data and provides a unique hash value, the hash value is incapable of being decrypted by controller board **831** and is passed with a transaction being processed up to transaction and auditing services **815**. Similarly, the transaction and auditing services **815** are incapable of decrypting encrypted PIN data such that the encrypted data is forwarded through switch node **813** to an external server **860** where the encrypted data can be decrypted and validated for a transaction being processed on terminal **810**.

[0041] Locks **832** are mounted on side walls of cassette rack **211** inside safe body **210** within safe module **830** and wired to lock PCB **833**. Lock PCB **833** is daisy chained off controller board **831**. This permits instructions of controller board **831** to extend and retract pins **242** from and back into

the lock bodies **241** for purposes of locking and unlocking individual cassettes **834** through ridges, ribs, or apertures **233-1** in guides **233** of cassettes **230**. Additionally, events associated with locking and unlocking individual cassettes **130** are captured and forwarded to controller board **831** from lock PCB **833**.

[0042] Configuration information is maintained by controller board **831** that maps lock identifiers to cassette identifiers such that specific instructions processed by controller board **831** can properly lock and unlock specific cassettes **834** within rack **211**. Additionally, the identifiers permit specific events associated with specific locks **832** to be captured, recorded, and reported by instructions of controller board **831** as events and event information associated with a specific cassette **834**.

[0043] In an embodiment, instructions of controller board **831** mandate that each lock **832** or a pair of locks **832** associated with a specific cassette **834** receive an inputted password or code through PIN pad **840**. Either controller board **831** or controller board **841** processes an algorithm that is capable of verifying the inputted password or code with a specific transaction operation or a specific administrative session being processed on terminal **810**.

[0044] For example, a time-based one-time password (TOTP) algorithm can be based on a hash associated with an operation identifier and a current date and time. The TOTP can be initially generated by auditor/tracker service **853** and a hash of its value provided by service **853** to a cell phone of a service engineer. The service engineer has already authenticated and successfully opened a safe door **220** of safe module **840** through a first authentication. Controller board **841** or controller board **831** receives the code via input on PIN pad **840** by the engineer and independently generates the hash expected using the operation identifier provided by transaction and auditing services **815**. The independently generated hash is then compared against a hash performed on the inputted code by the engineer and if they match controller board **831** unlocks a specific lock **832** or pair of locks **832** associated with an authorized cassette **834** or associated with a set of authorized cassettes **834**. The events and event information raised are during the authentication to perform an unlock of a cassette **834** or set of cassettes **834** are captured by controller board **831** and reported to controller board **822**. Controller board **822** reports the events and event information to tracking and auditing services **815**, and services **815** provide to the auditor/tracking service **835**. Service **853** records the event and event information in an audit trail associated with terminal **810**, depository **820**, safe module **830**, PIN pad **840**, the corresponding locks **832**, the corresponding cassettes **834**, correlated with an identifier for the administrative session, which initiated the request by the engineer to perform the cassette unlocking, and correlated with a service engineer identifier for the service engineer.

[0045] It is to be noted that there are a variety of process flows for which a credential of a service engineer is authenticated before controller board **831** unlocks a cassette **834** from the rack **211**. Each such process flow is capable of being processed with system **800**.

[0046] For example, auditor/tracker service **853** can independently interact with a mobile device of the service engineer for purposes of granting the service engineer permission to unlock one or more cassettes **834**. Once authenticated, service **853** sends a command through transaction and auditing services **815**, controller board **822**, and to controller board **831**. In response to the command, controller board **822** unlocks the cassette(s) **834**. In an embodiment, the command sent by service **853** includes an expiration time from issuance after which controller board **831** will not unlock the cassette(s) **834**.

[0047] In another case, during an administrative session services **815** display a randomly generated code or Quick Response (QR) code after the service engineer has authenticated and opened the safe door **220**. The service engineer scans the code and is redirected to service **853** via a browser and given a code to enter on the Pin pad **840**. The code is only valid for a defined period of time after provided by service **853**.

[0048] In an embodiment, the QR code authorizing access is sent from service **853** to a mobile device of the service engineer. The engineer displays the QR code to a scanner peripheral **821** or a camera peripheral **821** of terminal **810**. Services **815** decode the QR code and send the authorization down to controller board **831**. In an embodiment, the QR code has a time limit after which the QR code is no longer valid for use.

[0049] Event and event information can be stored and correlated by auditor/tracker service **853** from information collected in connection with a lock event from controller board **831**, controller board **822**, and transaction and auditing services **815**. Identifiers for the service engineer, the terminal **810**, the depository **820**, an administrative session between the engineer and services **815**, locks **832**, cassettes **834**, etc. In this way, a safe door open event and be correlated with specific cassettes **834** which were unlocked during an administrative session by an engineer.

[0050] In an embodiment, terminal **820** is an automated teller machine (ATM), a self-service terminal (SST), a point-of-sale (POS) terminal, or a kiosk that accepts and distributes valuable media. In an embodiment, depository **830** is a valuable media dispenser, a valuable media deposit device, a combined dispenser and deposit device, or a valuable media recycler.

[0051] In an embodiment, controller of controller board **831** is able to receive an override code or instruction received from PIN pad **840** or service **853** to force all locks **832** to unlock. This may be useful when other instructions become corrupted and authorized service personnel are unable with other authentication techniques to cause the locks **832** to unlock the cassettes **834** from the rack drawers of the rack **211**.

[0052] In an embodiment, controller board **831**, locks **832**, and PIN pad **840** include their own independent battery backup power. This ensures that the cassettes can be unlocked from the rack drawers during a power outage with proper authentication or with a proper override code.

[0053] FIG. **9** is a flow diagram of a method **900** for securing, monitoring, and controlling access to media cassettes **230** and **840** within a safe **200** and **830** of a terminal **810**, according to an example embodiment. The method is implemented as one or more software modules referred to herein and below as an "auditor/tracker service." The executable instructions for the auditor/tracker service are executed by one or more processors of a device causing the processor to perform operations of the method **900** as discussed below. The auditor/tracker service has access to one or more networks during operation and the networks can be wired, wireless, or a combination of wired and wireless.

[0054] In an embodiment, the device that executes the auditor/tracker service is server **850**. In an embodiment, the devices that executes the auditor/tracker service is a collection of servers operating as a cloud. In an embodiment, the auditor/tracker service is auditor/tracker service **853**.

[0055] At **910**, the auditor/tracker service determines that a cassette **230** locked within a rack drawer of a cassette rack **211** is to be unlocked from the rack drawer for an authorized service. This can be done in any of the manners discussed above. Moreover, this occurs only after a safe door **220** for a safe **200** is opened and the authorized service initiated. When the safe door **220** is closed, the cassette **230** remains locked to the rack drawer via one or two (a pair) of locks **240**.

[0056] At **920**, the auditor/tracker service provides an instruction or a code that causes a controller **831** of a safe **200** or **830** to unlock the cassette **230** or **834** from the rack drawer. That is, a secure instruction can be sent through terminal **810** to controller **831** to cause unlocking of the cassette **230** or **834**; or an authentication code can be provided to a service engineer associated with the authorized service or sent to terminal **810** as was described above.

[0057] At **930**, the auditor/tracker service receive event and event information captured by the controller **831**. The event and event information is associated with the cassette being unlocked from the rack drawer during the authorized service. The event information can include identifiers for the devices and individuals involved in the authorized service, a current date, a current time of day, and an elapsed time that the cassette was unlocked before being re-racked and locked within the cassette rack.

[0058] At **940**, the auditor/tracker service maintains an audit history associated with the cassette **230** or **834**, the safe **200** or **830**, the terminal **810**, the authorized service, the event, and the event information. The auditor/tracker service maintains the audit history for the devices, the personnel, the cassette **230** or **834**, and other cassettes unlocked for the safe **200** or **830**.

[0059] In an embodiment, at **950**, the auditor/tracker service provides an interface for searching and reporting from the audit history at a cassette-level of detail for the safe **200** or **830** and the terminal **810**. In an embodiment, the interface is a user interface of auditor/tracker service **853**.

[0060] The above description is illustrative, and not restrictive. Many other embodiments will be apparent to those of skill in the art upon reviewing the above description. The scope of embodiments should therefore be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled.

[0061] In the foregoing description of the embodiments, various features are grouped together in a single embodiment for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted as reflecting that the claimed embodiments have more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive subject matter lies in less than all features of a single disclosed embodiment. Thus, the following claims are hereby incorporated into the Description of the Embodiments, with each claim standing on its own as a separate exemplary embodiment.

1. A safe cassette apparatus, comprising:

a safe door;

a cassette rack located on an inside of a safe body and accessible when the safe door is opened;

a cassette comprising a cassette body and a cassette guide;

the cassette guide comprising ribs, ridges, or apertures located on bottom sides of the cassette guide;

a lock comprising a pin that extends from a lock body when the lock is locked and that retracts back into the lock body when the lock is unlocked;

the lock mounted on a first side wall of the cassette rack and aligned with at least one rib, ridge, or aperture on a first bottom side of the guide when the cassette is racked within the cassette rack; and

a controller configured to determine when the lock is to unlock the cassette from the cassette rack and lock the cassette to the cassette rack, unlock and lock the cassette from and to the cassette rack by controlling the pin of the lock, and capture and report events and event information associated with the cassette being locked and unlocked from the cassette rack.

2. The safe cassette apparatus of claim **1** further comprising, a second lock mounted on a second side wall of the cassette rack and aligned with at least one other rib, ridge, or aperture on a second bottom side of the guide when the cassette is racked within the cassette rack.

3. The safe cassette apparatus of claim **2**, wherein the lock and the second lock are mounted in locations on the first and second side walls that correspond to a back portion of cassette when the cassette is racked within the cassette rack, the back portion opposite a handle portion of the cassette.

4. The safe cassette apparatus of claim **1**, wherein the lock is a solenoid wired to a printed circuit board (PCB).

5. The safe cassette apparatus of claim **4**, wherein the PCB is daisy chained off a controller board associated with the controller.

6. The safe cassette apparatus of claim **1**, wherein the lock further includes a mounting screw adapted to attach the lock to the first side wall from an inside surface of the first side wall with the lock body positioned on an outside surface of the first side wall.

7. The safe cassette apparatus of claim **6**, wherein the an adjustable tab adapted to adjust the location of the pin after the lock is mounted to the first side wall using the mounting screw to align the pin with the at least one rib, ridge, or aperture.

8. The safe cassette apparatus of claim **1**, wherein the cassette is associated with a first rack drawer within the rack, wherein the safe cassette apparatus further includes two or more additional locks mounted on the first side wall and aligned with two or more additional cassettes associated with tow or more additional rack drawers within the rack.

9. The safe cassette apparatus of claim **1**, the controller is further configured to perform authentication or ensure authentication was performed on a user that requests the cassette be unlocked from the rack.

10. The safe cassette apparatus of claim **9**, wherein controller is further configured to receive a credential from the user, wherein the credential is inputted by the user though an integrated personal identification number (PIN) pad of the safe cassette apparatus when authentication is performed by the controller.

11. A system, comprising:

a transaction terminal; and

a depository comprising a safe module;

the safe module comprising:

a cassette rack adapted to hold cassettes in rack drawers, each cassette associated with a denomination of cash or deposited checks;

each cassette comprising a guide long a bottom of the corresponding cassette adapted to slide the corresponding cassette in and out of the corresponding rack drawer

each guide comprising ribs, ridges, or apertures along a first side and a second side of the corresponding guide;

pairs of locks, each lock of a given pair of locks mounted on a side wall in a location that corresponds to a back portion of a corresponding cassette when the corresponding cassette is racked in the corresponding rack drawer, wherein a first lock in the given pair of locks mounted on a first side wall of the cassette rack that corresponds to and aligns with the first side of the corresponding guide and wherein a second lock in the given pair of locks mounted on a second side wall of the cassette rack that corresponds to and aligns with the second side of the corresponding guide;

a controller configured to individually and separately control the pairs of locks for the rack drawers by activating pins of the locks to extend into the corresponding ribs, ridges, or apertures when locking the cassettes to the rack drawers and by retracting the pins out of the corresponding ribs, ridges, or apertures when unlocking the cassettes from the rack drawers.

12. The system of claim **11**, wherein the controller is further configured to ensure each of the cassettes are locked to their corresponding rack drawer when a safe door for the safe module is opened and when the safe door is closed.

13. The system of claim **11**, wherein the controller is further configured to process authentication on a request to unlock a given pair of locks for a given cassette before unlocking the given pair of locks.

14. The system of claim **13**, wherein the controller is further configured to receive a credential inputted by a user for processing the authentication from a personal identification number (PIN) pad of the safe module.

15. The system of claim **11**, wherein the controller is further configured to unlock a given pair of locks or a combination of pairs of locks when an authorized instruction to unlock the corresponding cassettes is received from the terminal.

16. The system of claim **11**, wherein the controller is further configured to capture and report events and event information associated with unlocking and locking the cassettes to the rack drawers to the terminal.

17. The system of claim **11**, wherein the depository is a dispenser, a deposit device, a combined dispenser and deposit device, or a recycler.

18. The system of claim **17**, wherein terminal is an automated teller machine (ATM), a self-service terminal (SST), or a point-of-sale (POS) terminal.

19. A method, comprising:

determining that a cassette locked within a rack drawer of a cassette rack is to be unlocked from the rack drawer for authorized service;

providing an instruction or a code that causes a controller of a safe to unlock the cassette from the rack drawer;

receiving event and event information captured by the controller, wherein the event and the event information are associated with the cassette being unlocked from the rack drawer during the authorized service; and

maintaining an audit history associated with the cassette, the safe, a terminal that includes the safe, the authorized service, the event, and the event information.

20. The method of claim **19** further comprising, providing an interface for searching and reporting from the audit history at a cassette-level of detail for the safe and the terminal.

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