

Armory Weapon Rack

Field of the Invention

[001] The present invention relates to an armory weapon rack for a secure safekeeping of weapons. In particular, the armory weapon rack has a unique place and
5 lock mechanism that enables a single flowing action with a highly secured and robust locking arm for various weapons.

Background

[002] A rise in the number of weapon thefts has also been reported all around the world. The military, authorities or authorized personnel have become
10 more concerned with the rising numbers. As such, there is a need to tighten the security measures in safeguarding the weapons against theft or loss.

[003] There are various types of storage facilities for weapon in the market. Some of the storage facilities include armories, security cabinets, weapon racks, etc. The storage facilities may include security features such as access card approval,
15 biometric sensors, etc. Such security features require specific authorization before accessing the weapons.

[004] US patent number “US 7,448,156”, discloses a firearm wall lock that allows quick and easy removal of a firearm when the lock is released. The firearm wall lock is primarily constructed of four components including a post, a shelf, a
20 locking clasp assembly and a clamp. A firearm is supported by the shelf and is positioned parallel to the post. The clamp holds the top of the firearm barrel in place

and the locking clasp assembly encircles and secures the trigger, breach and firing mechanism of the firearm. To release the lock, a key is inserted into the lock, turning the lock to an unlocked position.

[005] PCT publication application “WO 2005/013031”, discloses a firearm
5 security and access system comprising a combined firearm repository and security access control system. The firearm repository includes a housing chamber defining an internal space to accommodate at least one firearm, a means of holding the firearm securely in the housing chamber and a means of securely locking the firearm in the housing chamber. The means of securely locking the firearm in the housing
10 chamber includes at least one type of locking mechanism. The locking mechanism further consists of at least one motor mechanism, at least two adjoining plates and a lever means. Further, the system includes triggering an alarm system when an authorized access to the firearm is detected, identifying and verifying an authorized access to the firearm, and recording all transactions relating to an authorized or an
15 unauthorized access to the firearm held in the housing chamber of the firearm repository.

Summary

[006] In one aspect of the present invention, there is provided an armory weapon rack adapted for housing a number of weapons and securing them therein in a
20 controlled manner. The armory weapon rack comprising a plurality of weapon lock module units fitted on the armory weapon rack, wherein each weapon lock module unit further includes a base holder for holding the weapon thereon, and a place and lock mechanism for securing a distal part of the weapon on the weapon lock module unit,

the place and lock mechanism further comprises a locking arm, a support, a back panel, and a locking assembly, the locking arm includes an actuating bar and a closing bar, the locking arm pivots about the support, the locking arm is securable by the locking assembly at a locked position, the support together with the closing bar of the locking arm form a substantially closed loop for securing the distal part of the weapon with a single flowing action by a user; and the single flowing action by the user includes using the weapon to push the actuating bar of the locking arm.

[007] In another embodiment, the armory weapon rack further includes an electronics compartment located along the sides of the armory weapon rack, wherein the electronics compartment houses various security components. The electronic compartment also includes a high security key lock to secure the electronic compartment, wherein the high security key lock may only be locked or unlocked with a key held by a person with an authorized access to the electronics compartment.

[008] In yet another embodiment, the armory weapon rack further includes a security camera for capturing video scenes in front of the armory weapon rack.

[009] In another embodiment, the weapon lock module unit is removably attached to the inner structure of the armory weapon rack.

[0010] In another embodiment, the armory weapon rack further comprises a back panel disposed across the width of the armory weapon rack within the recess area where the weapons are being stored.

[0011] In yet another embodiment, the base holder is fixed on the base of the internal structure of the armory weapon rack. The base holder further includes a radio-

frequency identification (RFID) module that is housed within the base holder. The RFID module in the base holder identifies the weapon placed into the base holder.

[0012] In yet another embodiment of the present invention, a locking assembly in a place and lock mechanism for a weapon lock module unit is fitted within an armory weapon rack. The locking assembly comprising a solenoid, a locking pin, a stopper and a spring, located within a back panel in the armory weapon rack; the locking assembly when enabled, power is supplied to the solenoid and carries an electrical current, the solenoid pulls the locking pin inwards, enabling the movement of the stopper, the locking assembly when disabled, there is no power supply and the solenoid ceases carrying an electrical current, the locking pin propels out of the solenoid, restricting the movement of the stopper; and the spring to push the stopper into or out of the back panel.

[0013] In yet another embodiment of the present invention, the armory weapon rack is adapted as part of a weapon management system installed within a facility, wherein the weapon management system enables networks of all the armory weapon rack within the facility to provide a central command and control center.

Brief Description of the Drawings

[0014] This invention will be described by way of non-limiting embodiments of the present invention, with reference to the accompanying drawings, in which:

[0015] **FIGs. 1A** illustrates an overall structure of an armory weapon rack in a weapon management system as one embodiment of the present invention;

[0016] **FIG. 1B** illustrates an overall view of a single weapon lock module unit;

[0017] **FIGs. 1C-1E** provides a cross-sectional view of the back panel and the place and lock mechanism from a locked position to an unlocked position;

[0018] **FIG. 2** exemplifies an armory weapon rack with a modified weapon lock module unit;

5 [0019] **FIG. 3A** illustrates an overall architecture of the weapon management system; and

[0020] **FIG. 3B** exemplifies a screenshot of the security interface.

Detailed Description

[0021] The following descriptions of a number of specific and alternative
10 embodiments are provided to understand the inventive features of the present invention. It shall be apparent to one skilled in the art, however that this invention may be practiced without such specific details. Some of the details may not be described in length so as to not obscure the invention. For ease of reference, common reference numerals will be used throughout the figures when referring to same or similar features
15 common to the figures.

[0022] **FIG. 1A** illustrates an armory weapon rack **102** as one embodiment of the present invention. The armory weapon rack **102** is adapted as part of a weapon management system installed within a facility. The armory weapon rack **102** is adapted for housing a number of weapons **101** and securing them therein in a controlled
20 manner. The armory weapon rack **102** can hold weapons **101** of different type and sizes. The weapons **101** may include rifles, submachine guns, etc. Preferably, the armory weapon rack **102** would allow authorized personnel to deposit or remove the

weapons **101** with minimal effort, yet able to secure the weapons **101** deposited thereon.

[0023] The armory weapon rack **102** includes an electronics compartment **103** and a plurality of weapon lock module units **104**. Each weapon lock module unit **104**
5 further includes a place and lock mechanism **105** and a base holder **106** for holding one weapon **101**. The base holder **106** holds the weapon **101** thereon, and the place and lock mechanism **105** secures a distal part of the weapon **101** on the weapon lock module unit **104**.

[0024] The armory weapon rack **102** is typically made of metal such as steel,
10 etc. with a complete welded structure with possibly reinforcement structures to secure its recess area from unauthorized access. The electronics compartment **103** may be located along the sides of the armory weapon rack **102**. The electronics compartment **103** houses various security components such as a rack controller, a manual bypass switch, a variety of access control units, etc. The electronics compartment **103** also
15 includes a high security key lock **107** to secure the electronics compartment **103**. The high security key lock **107** may only be unlocked/locked with a key that is held by a person with an authorized access to the electronics compartment **103**.

[0025] The variety of access control units authorizes and identifies a user requesting access to the weapon **101**. Types of access control units include biometrics
20 systems, card readers, etc. The users may include individuals who have the authority to access the weapons **101** such as soldiers, police, armed personnel, etc.

[0026] The access control unit identifies and authenticates the user as owner of the weapon **101**. The user first requests for authorization through a mode of request in

the access control unit. The mode of request depends on the type of access control unit utilized. The mode of request may include a fingerprint, an access card, facial detection, etc. The access control unit then matches the user to their weapon **101** that is secured in the weapon lock module unit **104**. Once the access control unit accepts the
5 mode of request, the place and lock mechanism **105** releases and the user may retrieve the weapon **101**.

[0027] In another embodiment in the present invention, all the weapon lock module units **104** are removably attached to the inner structure of the armory weapon rack **102**. The armory weapon rack **102** further comprises a body lock bar (not shown)
10 disposed across the width of the armory weapon rack **102** within the recess area where the weapons are being stored. The body lock bar allows the weapon lock module units **104** to attach to the internal structure of the armory weapon **102**. Preferably, the weapon lock module units **104** are only removable from the armory weapon rack **102** by detaching them from the internal structure. As mentioned, the armory weapon rack
15 **102** is properly shielded from unauthorized access; unauthorized personnel cannot easily access the weapon lock module units **104**.

[0028] The number of weapons **101** that may be stored within the armory weapon rack **102** depends on the number of weapon lock module units **104** fitted into the armory weapon rack **102**. The design or structure of the weapon lock module unit
20 **104** is configurable according to the design of the weapon **101**. As such, the weapon lock module unit **104** provides for a flexible housing or storage of different types and sizes of weapons **101** within one armory weapon rack **102**. The weapon lock module unit **104** also allows hassle-free replacements and flexibility of maintaining different type of weapon **101** within the armory weapon rack **102**.

[0029] Still referring to FIG. 1A, the place and lock mechanism 105 further comprises a locking arm 108, a support 109, a back panel 110, and a locking assembly. The locking arm 108 has three sides: a short bar 111; a side bar 112; and a front bar 113. The side bar 112 may also serve as an actuating bar and the front bar 113 may serve as a closing bar. The support 109 has a fork-like shape, with four protruding arms 114. The support 109 is fixated firmly onto the back panel 110. Further, the corner between the side bar 112 and the front bar 113 of the locking arm 108 pivots between the tips of two vertically aligned protruding arms 114 of the support 109. The length of the front bar 113 is similar to the length between the two horizontally aligned protruding arms 114. The locking assembly is located within the back panel 110. The support 109 together with the locking arm 108 forms a substantially closed loop for securing the weapon 101.

[0030] When the place and lock mechanism 105 is in a locked position, the front bar 113 of the locking arm 108 is aligned to the tips of the four protruding arms 114 of the support 109. In the locked position, the four protruding arms 114 and the front bar 113 securely enclose the weapon 101. When the place and lock mechanism 105 is in an unlocked position, the front bar 113 and the short bar 111 of the locking arm 108 protrudes out and the side bar 112 is aligned to the tips of the four protruding arms 114 of the support 109.

20 [0031] The base holder 106 may be modified to support different types of the butt of the weapon 101, depending on the type of weapon 101 being stored in the armory weapon rack 102. Typically, the base holder 106 is located along the same vertical axis as the place and lock mechanism 105 and is fixed onto the base of the internal structure in the armory weapon rack 102. Each base holder 106 further includes

a radio-frequency identification (RFID) module that is housed within the base holder **106**.

[0032] The RFID module identifies the weapon **101** placed into the base holder **106**. If a false object (i.e. an object that is not a weapon **101** or any other device without an RFID tag recognized by the RFID module) is placed in the base holder **106**, an alert
5 may be notified through the weapon management system.

[0033] The locking assembly includes a solenoid, a locking pin, a stopper and a spring. The solenoid is made out of metal that acts as a magnet when carrying an electrical current. The solenoid is fixed onto the back panel **110**. The electrical current
10 is passed through the back panel **110** from the electronics compartment **103** through the rack controller.

[0034] When the place and lock mechanism **105** is in the locked position, there is no electrical current passing through the solenoid. The solenoid ceases acting as a magnet and the locking pin propels outward due to a spring on the solenoid. However,
15 when the place and lock mechanism **105** switches to the unlocked position, the electrical current passes through the solenoid. The solenoid then acts as a magnet and pulls the locking pin inwards.

[0035] The stopper in the locking assembly comprises a head and a body. The stopper's head protrudes out of the back panel **110**, on the surface of the base of the
20 support **109**. The stopper's body is inserted through the base of the support **109** and into the back panel **110**. The spring in the locking assembly is located beneath the stopper's head, in between the support **109** and the back panel **110**. The stopper may be pushed into or out of the back panel **110** by the spring easily. However, when the

locking pin propels outwards, the locking pin blocks the movement of the stopper and prevents the stopper from moving further into the back panel **110**.

[0036] When the user attempts to safely secure the weapon **101** into the weapon lock module unit **104**, the user first place the butt of the weapon **101** into the base holder **106** before further pushing the weapon inwards to bring the place and lock mechanism **105** into its locked position. This requires only the single flowing action by the user in order to lock the weapon **101**.

[0037] Firstly, the butt of the weapon **101** is placed into the base holder **106** and pushed inwards towards the internal structure of the weapon rack **102**. The place and lock mechanism **105** is initially in the unlocked position, therefore the front bar **113** and the short bar **111** of the locking arm **108** are protruding outwards. Still pushing the weapon **101** inwards, the barrel hand guard portion of the weapon **101** presses against the side bar **112**. As the weapon **101** pushes inward, the corner between the side bar **112** and the front bar **113** of the locking arm **108** pivots between the tips of the two vertically aligned protruding arms **114** of the support **109**.

[0038] As the weapon **101** continues to push inwards, the locking arm **108** also moves. The side bar **112** of the locking arm **108** also moves towards the two vertically aligned protruding arms **114** of the support **109** that is in contact with the locking arm **108**.

[0039] **FIG. 1B** illustrates an overall view of a single weapon lock module unit **104**. The locking arm **108** fully encloses the weapon **101** within the support **109**, thereby locking the weapon **101**.

[0040] FIGs. 1C-1E provides a cross-sectional view of the place and lock mechanism 105 from a locked position to an unlocked position. The place and lock mechanism 105 comprises a locking arm 108, a support 109, a back panel 110 and a locking assembly 115. The locking arm 108 has a short bar 111, a side bar 112 and a front bar 113. The support 109 has four protruding arms 114. The locking assembly 115 is located within the back panel 110. The locking assembly 115 includes a solenoid 116, a locking pin 117, a stopper 118 and a spring 119. The locking arm 108 pivots about a pivoting point 120, between the protruding arms 114 of the support 109. The pivoting point 120 is in the corner between the side bar 112 and the front bar 113 of the locking arm 108.

[0041] From FIG. 1C, the place and lock mechanism 105 is in its locked position, securing the weapon 101 therein. The side bar 112 of the locking arm 108 is in the same vertical axis as the protruding arms 114 of the support 109. The front bar 113 of the locking arm 108 is in line with the tips of the protruding arms 114. The locking pin 117 is propelled outwards by the solenoid 116, restricting the stopper 118 from moving further inwards into the back panel 110. As the locking pin 117 restricts the stopper 118 from moving further inwards, the locking arm 108 is not able to turn outwards.

[0042] In FIG. 1D, the place and lock mechanism 105 switches to its unlocked position. The locking arm 108 turns outwards as the weapon 101 moves outwards. Electric current passes through the solenoid 116 and therefore the locking pin 117 pulled into the solenoid 116. The rack controller in the electronics compartment 103 triggers the solenoid 116 after a user has been authenticated and required his weapon to be released from the weapon lock module unit 104. As the locking arm 108 is turning,

the locking arm **108** pushes the stopper inwards and the spring **119** compresses downwards.

[0043] In **FIG. 1E**, the locking arm **108** turns outward with the short bar **111** and the front bar **113** protruding outwards. The side bar **112** is in the same axis as the
5 tips of the protruding arms **114** of the support **109**. Thereafter, the weapon **101** may be removed entirely from the armory weapon rack **102**.

[0044] In another embodiment of the present invention, if the user wants to lock the weapon **101**, the user will place the weapon **101** in the place and lock mechanism **105** and through the access control unit in the electronics compartment **103**. The access
10 control unit identifies and authenticates the user as its owner. The access control unit then matches the user to the weapon **101** secured in the weapon lock module unit **104** and enables the locking process by disabling the solenoid's **116** power source. When disabled, the electric current stops passing through the solenoid **116** and the locking
pin **117** propels outwards. The locking pin **117** blocks the stopper **118** from pushing
15 downward into the back panel **110**. This therefore prevents the locking arm **108** from turning outwards.

[0045] Further, the rack controller in the electronics compartment **103** monitors the weapon **101** that is locked in place on individual lock through a sensor integrated in each weapon lock module unit **104**. When a user is authenticated through the access
20 control unit as the owner of the weapon **101**, the rack controller will activate the selected weapon lock module unit's **104** place and lock mechanism **105** and its solenoid **116**, thus releasing the locking arm **108** for the user to retrieve his weapon **101**.

[0046] In another embodiment of the present invention, there is a manual bypass switch that can only be assessed through the electronics compartment **103**. The use of the manual bypass switch is known to those skilled in the art, therefore no further illustrations will be provided.

5 [0047] In yet another embodiment of the present invention, each weapon lock module unit **104** further includes a fail-safe-mode lock. The fail-safe-mode lock is provided for the weapon lock module unit **104** to remain in its locked position during cases such as power failure, etc. For example, during a power failure, electric current will not flow through the solenoid **116**. The locking pin **117** propels outward and the
10 locking arm **108** will not be able to turn or move.

[0048] In an alternative embodiment, the armory weapon rack **102** may include a security camera installed at a suitable location for capturing video scenes in front of the armory weapon rack **102**. Preferably, the security camera is installed on the armory weapon rack **102** where an entire view of the area in front of the armory weapon rack
15 **102** may be captured. More specifically, the security camera may be installed in the middle of the top of the armory weapon rack **102**. The security camera is electrically coupled to the weapon management system. The security camera record video scenes of any user retrieving/storing the weapon **101** from/into the armory weapon rack **102**.

[0049] **FIG. 2** exemplifies an armory weapon rack **200** with a modified weapon
20 lock module unit **201** to secure a weapon **202** as another embodiment of the present invention. The armory weapon rack **200** further includes an access control unit **203**. The access control unit **203** is stored along the top corner of the armory weapon rack

200. Similarly, the armory weapon rack **200** is adapted for the weapon management system.

[0050] Different weapons have different overall lengths, different barrel sizes, etc. As such the modified weapon lock module unit **201** is an exemplarily modification
 5 of the weapon lock module unit **105** as shown in **FIG. 1A**. The modified weapon lock module unit **201** includes a place and lock mechanism **204** and a base holder **205**. Similar to **FIG. 1A**, the place and lock mechanism **204** comprises a locking arm **206**, a modified support **207**, a back panel and a locking assembly. However, the modified support **207** is bulkier as it is designed specially to store the weapon **202**.

10 [0051] The barrel of the weapon **202** in **FIG. 2** is slimmer than the barrel of the weapon **101** in **FIG. 1A**. The design modification of the modified weapon lock module unit **201** only differs in the overall size, length, width, etc. of the individual components but the place and lock mechanism **204** works the same way as the place and lock mechanism **105** that is described above.

15 [0052] **FIG. 3A** illustrates an overall architecture of a weapon management system **300** in a facility as another embodiment in the present invention. The weapon management system **300** enables networks of all the armory weapon rack **102** within the facility to provide a central command and control center. This allows users a quicker access to the inventory of the weapons **101** within their care as well as an
 20 ability to track any breach in weapon security. The weapon management system **300** provides access to existing security and Closed-Circuit Television (CCTV) system via a security interface **301**. The security interface **301** is a graphical user interface that enables a security personnel to activate the CCTV and track a suspect within the

facility when there is any breach in the weapon security. The security personnel may also control the entrances or exits within the facility, to prevent the suspects from escaping. The suspects may include people who attempted to steal the weapons **101** from the armory weapon rack **102**, unauthorized users, etc.

5 **[0053]** The weapon management system **300** may also control at least one armory weapon rack **102** (i.e. *n* armories weapon racks **102**) throughout the facility.

[0054] Security personnel may use an electronic device **302** with a display screen to view the security interface **301**. Some examples of the electronic device **302** include computers, laptops, etc. As the security interface **301** incorporates the various
10 devices such as surveillance cameras **303**, access gates **304**, etc., the security personnel may control or view all ongoing activities captured using the security interface **301**.

[0055] In another embodiment of the present invention, the weapon management system **300** is also coupled to an electronic key management interface **305** to manage of all access control units to the armory weapon rack **102** and lock keys
15 including a manual override key of the armory weapon rack **102**. As such, any removal of the lock keys may be controlled tightly with the weapon management system **300**.

[0056] Additionally, the security personnel may obtain the audit trail of weapons **101** through the security interface **301**. This enables the security personnel to continuously keep track of the weapons **101** that have been taken in and out of the
20 armory weapon rack **102**, and to also keep track of the user that has accessed to the weapon **101**.

[0057] FIG. 3B is a screenshot 306 of the security interface 301. The screenshot 306 is an image of a map of the facility. If there is a forced entry or a suspect accessing to the weapons 101 in the armory weapon rack 102, the security interface 301 activates a locking mode that locks all the access gates 304 or any other possible escape route exit door. The suspect is a user that does not have an authority or a permit to access the weapons 101. The security interface 301 activating the locking mode locks the suspect within the facility. As such, the weapon management system 300 may assist in capturing the suspect and also prevent loss of the weapons 101 from the armory weapon rack 102.

10 [0058] The above description illustrates various embodiments of the present invention along with examples of how aspects of the present invention may be implemented. While specific embodiments have been described and illustrated it is understood that many changes, modifications, variations and combinations thereof could be made to the present invention without departing from the scope of the present invention. The above examples, embodiments, instructions semantics, and drawings should not be deemed to be the only embodiments, and are presented to illustrate the flexibility and advantages of the present invention as defined by the following claims:

Claims

1. An armory weapon rack adapted for housing a number of weapons and securing them therein in a controlled manner, the armory weapon rack comprising:

a plurality of weapon lock module units fitted on the armory weapon rack, wherein each weapon lock module unit further includes a base holder for holding the weapon thereon, and a place and lock mechanism for securing a distal part of the weapon on the weapon lock module unit,

the place and lock mechanism further comprises a locking arm, a support, a back panel, and a locking assembly,

the locking arm includes an actuating bar and a closing bar,

the locking arm pivots about the support, the locking arm is securable by the locking assembly at a locked position,

the support together with the closing bar of the locking arm form a substantially closed loop for securing the distal part of the weapon with a single flowing action by a user; and

the single flowing action by the user includes using the weapon to push the actuating bar of the locking arm.

2. The armory weapon rack according to claim 1, wherein the armory weapon rack further includes an electronics compartment located along the sides of the armory weapon rack, wherein the electronics compartment houses various security components.

3. The armory weapon rack according to claim 2, wherein the electronic compartment also includes a high security key lock to secure the electronic compartment, wherein the high security key lock may only be locked or unlocked with a key held by a person with an authorized access to the electronics compartment.
4. The armory weapon rack according to claim 1, wherein the armory weapon rack further includes a security camera for capturing video scenes in front of the armory weapon rack.
5. The armory weapon rack according to claim 1, wherein the weapon lock module unit is removably attached to the inner structure of the armory weapon rack.
6. The armory weapon rack according to claim 1, wherein the armory weapon rack further comprises a body lock bar disposed across the width of the armory weapon rack within the recess area where the weapons are being stored.
7. The armory weapon rack according to claim 1, wherein the base holder is fixed on the base of the internal structure of the armory weapon rack.
8. The armory weapon rack according to claim 1, wherein the base holder further includes a radio-frequency identification (RFID) module that is housed within the base holder.
9. The armory weapon rack according to claim 8, wherein the RFID module in the base holder identifies the weapon placed into the base holder.
10. A locking assembly in a place and lock mechanism for a weapon lock module unit is fitted within an armory weapon rack, the locking assembly comprising:

a solenoid, a locking pin, a stopper and a spring, located within a back panel in the armory weapon rack,

the locking assembly when enabled, power is supplied to the solenoid and carries an electrical current, the solenoid pulls the locking pin inwards, enabling the movement of the stopper,

the locking assembly when disabled, there is no power supply and the solenoid ceases carrying an electrical current, the locking pin propels out of the solenoid, restricting the movement of the stopper; and

the spring to push the stopper into or out of the back panel.

11. The armory weapon rack according to claim 1, wherein the armory weapon rack is adapted as part of a weapon management system installed within a facility, wherein the weapon management system enables networks of all the armory weapon rack within the facility to provide a central command and control center.