Simple Passive Locking Mechanism with Active Key

Description of Invention

Field of Invention:

This invention relates to a simple passive locking mechanism with no moving parts with an active key. There is no specific locking mechanism other than the fact that the part-to-be-locked can only be opened with an active key. The part-to-be-locked has only an indicator which can be controlled from a central point via wired or wireless signals. This indication by the part-to-be-locked is detected by the active key. If a user attempts to open the part-to-be-locked, the active key will unlock the part-to-be-locked only if it detects that the indicator is in a "Release" state.

This arrangement of the part-to-be-locked where it only need to provide a signal to the active key, is especially useful in deployments where there is a bank of many parts-to-be-locked which is to be opened with one single active key or if not, a small number of active keys.

Background:

Conventional locking mechanisms have either a mechanical or electronic locking mechanism on each part-to-be-locked. This will cause a bank of part-to-be-locked to be costly and less reliable.

This invention overcomes the above problem by shifting to a system where the part-to-be-locked only needs to indicate to the active key whether it is in a "Release" state. If it is in a "Release" state, the active key will energised to open the part-to-be-locked.

In applications where multiple parts-to-be-locked need to be locked and unlocked frequently, the reliability and cost of the system will be an aggregate of the individual parts. Keeping high degree of reliability and reasonable cost for such systems will be highly challenging if we use locking solutions like mechanical locks with requires mechanical parts with many moving parts like gears, hinges and latches. Electronic controlled locking solutions, such as electro-magnetic locks will also be a challenge to meet the needed reliability and cost performance targets and they will also need to be energised all the time thus having high power consumption.

One example of this scenario is an intelligent pillbox with individual compartments that are secured until it is time for the patient to take the medication stored in a particular compartment. Another example of this scenario is a secure, manual-picked system where the compartments storing the medicine can only be opened when its contents is to be retrieved or replenished.

To eliminate the disadvantage of high cost and reliability problems, this invention seek to provide a simple passive locking mechanism which requires no moving parts and an un-energised passive default state except

for an active key. The objective of this invention is to act as a deterrent to discourage the user from accessing the wrong content and to have a key that can help the user to only access the allowed content. It is not designed to be a secure lock but a fool-proof guide to the correct content.

This invention is especially useful in applications, like a picking system, where there is a need for multiple users who need to access selected part-to-be-locked in the array of multiple parts-to-be-locked when they are given the instructions at any time. This invention will allow any number of users each holding an active key, to access the right part-to-be-locked simultaneously.

In a conventional system, once a part-to-be-locked is unlocked, any user would be able to access its contents. However, in this invention, only the user designated by the system would be able to access the contents. This is because the part-to-be-locked can only be opened by the designated active key held by the designated user.

Different embodiments of the basic concept allows for the different design of the part-to-be-locked, different design of the key, different methods of detection of the key, different methods of communication between the part-to-be-locked to the key, the amount of built in intelligence in each part of the system giving rise to difference degree of performance as is required in any specific system.

Summary of Invention:

1) The locking mechanism is made up of 2 parts, the part-to-be-locked and the active key. The part-to-be-locked can be multiple units but there is only a need for a minimum of one key to unlock all the parts-to-be-locked. There are no restrictions to the number of keys. Multiple, identical keys may be provided for users to have easy access to a key. They can also be used as backup keys. Multiple sets of keys can also be deployed such that each unique set of keys is used by one user.

2) The first part of this invention is the part-to-be-locked. Each part-to-be-locked is in a passive locked state. This means that it is designed such that there is no way to access the contents within the part-to-be-locked without a key to unlock it.

3) When it is ready to allow a user to get to the contents within the part-to-be-locked, it will indicate that part-to-be-locked is in "Release" state, the key will then proceed to unlock it.

4) The second part of the invention is the key. The key to unlock the part-to-be-locked is an active key. There can be multiple keys. All these keys are actively detecting the needed signal telling it to function as a key. When the specific active key detects the signal from the indicator of the part-to-be-locked that it is in a "Release" state, it can become energised and open the part-to-be-locked.

5) One embodiment of the locking mechanism for the part-to-be-locked is a lid or a door that is closed without a handle and cannot be opened with bare hands or any other means without an active key. This lid or door is fitted with a metal plate and the key in its energised state is an electromagnet. The electromagnet key attaches itself onto the lid or door via the metal plate and acts as a handle to lift it from it locked state.

6) A second embodiment of the locking mechanism for the part-to-be-locked is a container with a cover and a metal disc is built-in on the cover. This whole container sits passively in its housing with its top being flushed with the housing. This prevents it from being taken out of the housing with bare hands. When the container is ready to be unlocked, the energised key operates an electromagnet which attaches to the top cover of the container and acts as a handle. This allows the contents in the container to be accessed after the container is lifted out of the housing.

Brief description of drawings:

1) Figure 1 shows one embodiment of this invention as applied to a manual-pick system. The figure shows four of the many compartments in the cabinet where the user needs to retrieve or replenish the contents.

2) To prevent mistakes by the user to pick the wrong contents, the compartments are locked by means of having a lid 2 that is flushed with the surface of the housing 1. The user will not be able to lift up the lid 2.

3) This surface of the housing 1 is slanted at an angle such that gravity will keep the lid 2 closed. The lid will be attached to the housing 1 by means of a simple hinge 3.

4) The lid 2 is fitted with a metal plate 4.

5) To open the lid, an active key 5 is needed. This active key 5 detects the compartment that is in a "Release" state.

6) The active key 5 has an electromagnet which will get energised and attaches itself onto the metal plate of the compartment to be opened when it detects that the part-to-be-locked is in a "Release" state. It acts as a handle and allows the user to lift up the lid.

7) Figure 2 shows a second embodiment of this invention as applied to a pillbox. The pillbox has many cups and the patient needs to take the correct cup 8 for his medication at a specific time.

8) The housing 7 of the pillbox, has 7X4 slots, where the cups 8 containing the medication sits in.

9) The cup 8 has a small notch 6 at its base to ensure that the cup 8 is aligned in the correct direction.

10) The cup 8 has a lid 12 for the person filling up the cup to open it up to put in the medicine. It also allows the cup to be cleaned.

11) The cup 8 has an opening mouth 11 at its side. This is the opening for the patient to pour out his medicine to consume.

12) The cup 8 has a metal plate 10 at its top surface for the key to attach onto.

13) When the cup 8 sits in the housing, the top of the cup 8 is flushed or slightly below the surface of the housing 7.This will prevent the patient from taking out the cup with his bare hands.

14) When it is time for the patient to take his medicine, the indicator light 13 will turn on. The key will be brought near to the cup and when it received the signal that the cup is in a "Release" state, the key 14 which has an electromagnet which will be energised.

15) The key 14 will attach itself onto the top of the cup at the metal plate 10 and the whole cup can be lifted up. The patient can then pour out his medicine.

Claims:

What is claimed is:

1) An access control device comprising
   a part-to-be-locked or a plurality of part-to-be-locked with no locking mechanism but is inaccessible without a key; and
   a key or a plurality of keys that allows the part-to-be-locked to be accessed

2) The part-to-be-locked in claim1, comprises an indicator module.

3) The part-to-be-locked in claim 1, wherein said part-to-be-lock is inaccessible unless the key in claim 1 activates to allow the part-to-be-locked to be accessed.

4) The indicator module in claim 2, wherein said indicator module will send a signal to activate the key in claim 1 if the part-to-be-locked in claim 1 is meant to be accessible.

5) The key in claim 1, wherein said key will activate to make the part-to-be-locked in claim 1 accessible upon receiving the signal sent by the indicator module.

6) The part-to-be-locked in claim 1, further comprises a door without a handle and cannot be opened without the key in claim 1.

7) The key in claim 1, wherein said key will make the part-to-be-locked accessible by acting as a handle for the door in claim 6 if it receives the signal in claim 4; whereby allowing the said door to be opened.

8) The key in claim 1, comprises a electro-magnet.

9) The door in claim 6, comprises a metal plate.

10) The electro-magnet in claim 8, wherein the electro-magnet energizes when it receives the signal in claim 4, get attached to the metal plate in claim 9 through magnetic forces allowing the key in claim 1 to act as a handle.

11) The part-to-be-locked in claim 1, further comprise a container in a housing and cannot be pulled-out.

12) The key in claim 1, wherein said key will make the part-to-be-locked in claim 1 accessible by acting as a handle for the container in claim 11; whereby allowing the container to be pulled out.

13) The container in claim 11, comprises a metal plate at the exposed end of the housing in claim 11.

14) The electro-magnet in claim 8, wherein the electro-magnet energizes when it receives the signal in claim 4, get attached to the metal plate in claim 13 through magnetic forces allowing the key in claim 1 to act as a handle for the container in claim 11 to be pulled out.