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(54) **DOOR ACCESS CONTROL AND KEY MANAGEMENT SYSTEM AND THE METHOD THEREOF**

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(57) **ABSTRACT**

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A door access control and key management system is disclosed, in which a number of doors and door users are involved. The system comprises a door/key administering system and a door lock/control assembly mounted on each door, which are communicatively interconnected with each other via a communications network. The door/key administering system serves to store a key unique to each of the users, store an identification code unique to each of the doors, and assign access authorization to at least one user for each door. The door lock/control assembly serves to read the key presented by the user, verify that the key has access authorization, and operate the door in response to the authorization for access. Each user can gain access to the doors authorized to the user with a unique key and each door can provide access to the user or users assigned thereto.

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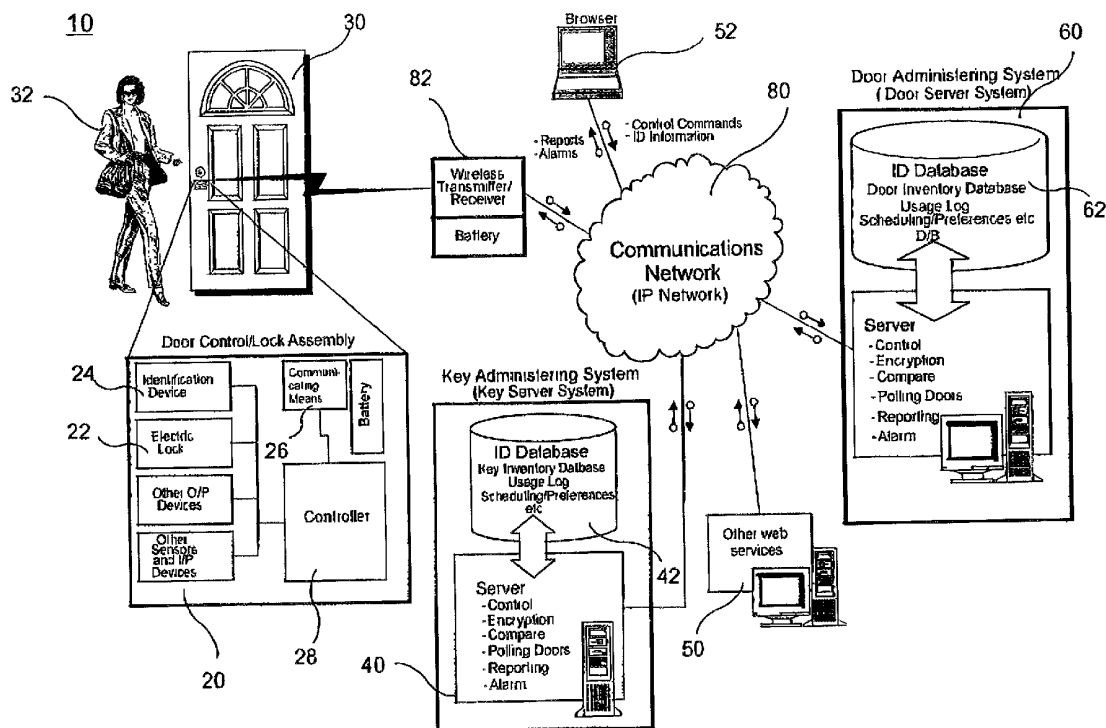
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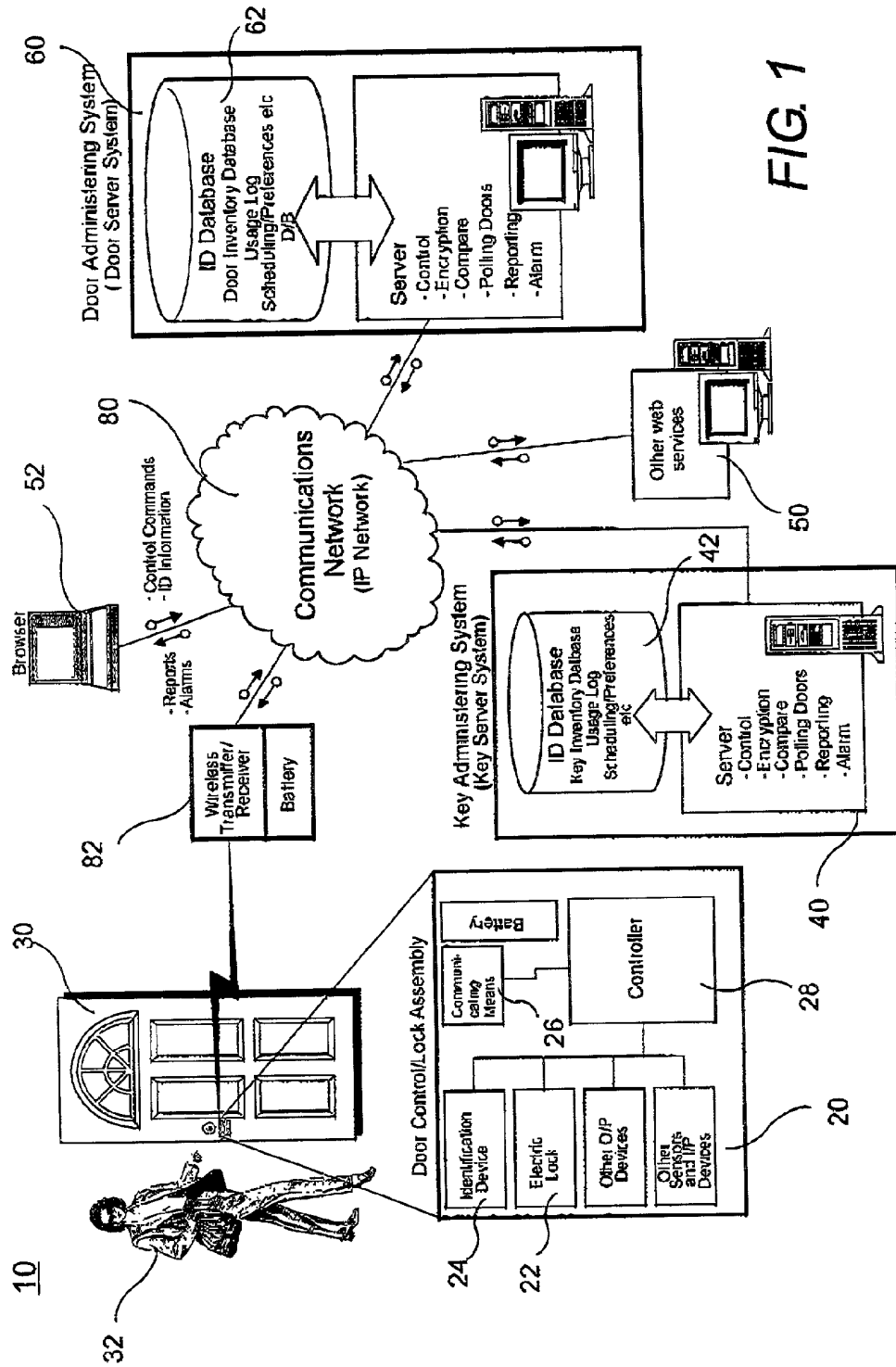
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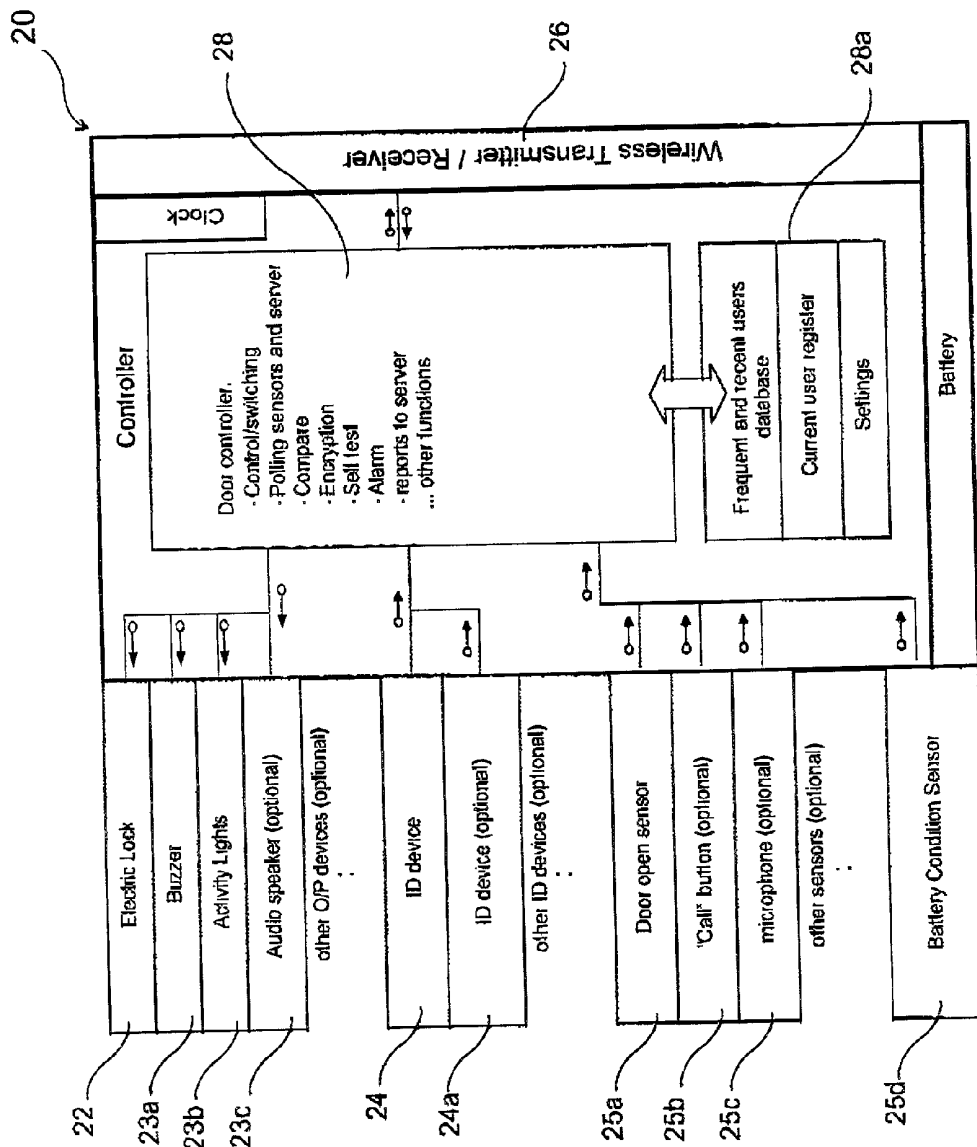


FIG. 2

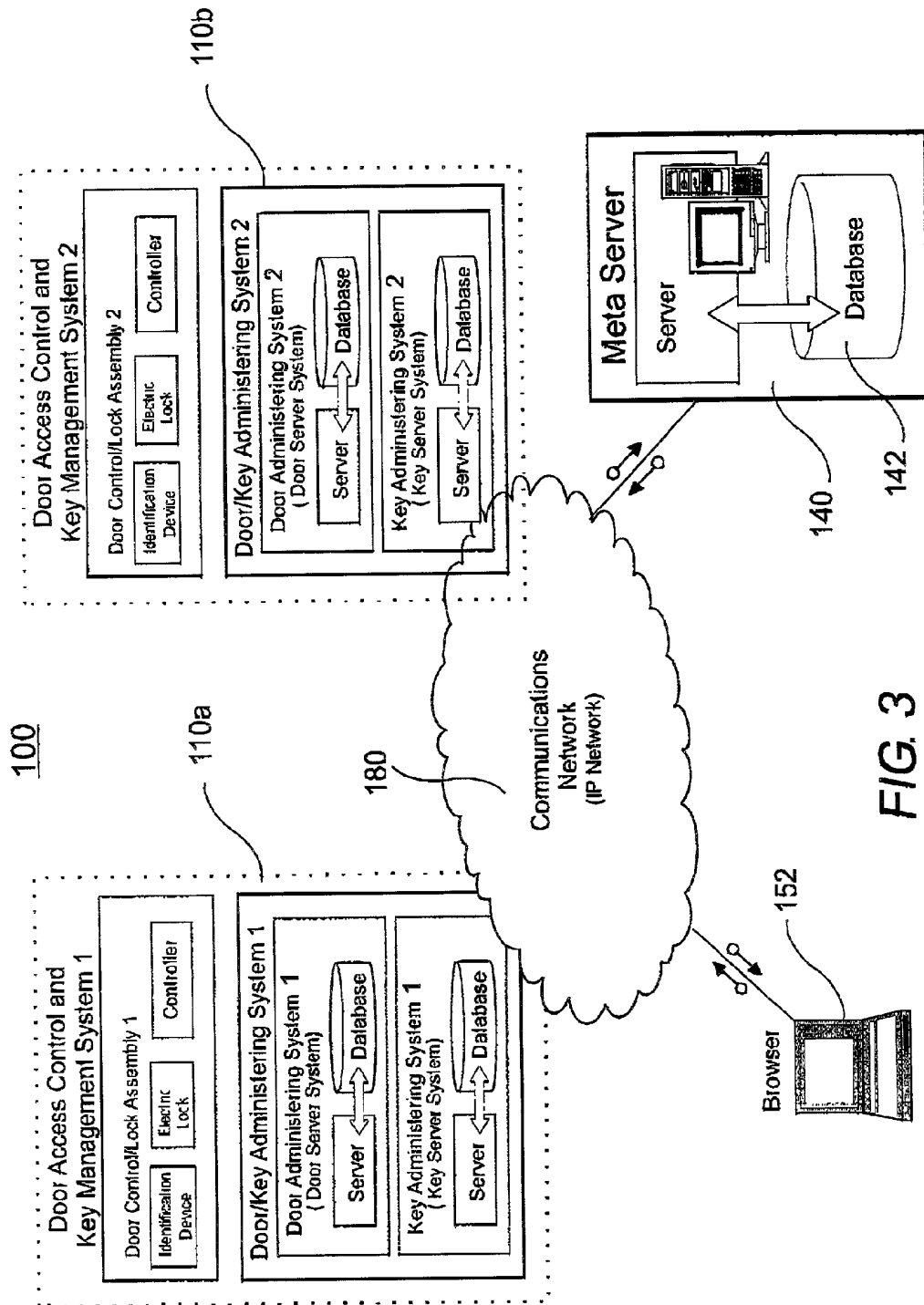


FIG. 3

**DOOR ACCESS CONTROL AND KEY  
MANAGEMENT SYSTEM AND THE METHOD  
THEREOF**

FIELD OF THE INVENTION

**[0001]** The invention relates generally to a security system and particularly to a system and method for controlling physical access to doors and managing keys via a communication network.

BACKGROUND OF THE INVENTION

**[0002]** Virtually all private residences, businesses and governments employ locks on all exterior doors and many interior doors to control physical access to premises and vehicles, and to protect valuable contents and occupants from outsiders. The technology of locks and related security products have developed to provide a very wide range of choices in security levels, locking mechanisms, key types and other features. Available "key" technologies include, among others, various kinds of mechanical keys, magnetically coded swipe cards, so-called "smart" cards with embedded microelectronic devices, plastic or metal cards coded with mechanical holes, short range radio frequency (RF) or infrared (IR) transmitters with coded signals, and various keypad arrangements requiring the user to input a predetermined unlocking code.

**[0003]** Presently, keys are generally associated with one or a few doors, and therefore, access to the keys, i.e., the use of the doors, is controlled by the owner of the premises or vehicle to which the door allows access. The current system of lock usage leads to a number of problems both for the owners of premises and vehicles with lockable doors and for individual users. Most individual users are forced to carry and manage a large number of mechanical keys anchor cards. Also, it is an issue to remember a number of passwords or keypad numbers and which key fits which lock, especially for keys which are used infrequently. Lost keys may result, in the case of mechanical keys, in a need to replace or re-key all locks with which the keys were associated. If a number of individual users have keys to a single door and one is lost, all key holders must be contacted and provided with new keys.

**[0004]** As well, passwords or keypad numbers can be inadvertently or deliberately revealed, thereby lessening security and usually resulting in a need to re-program the lock to accept a new code. Then, when code locks must be re-programmed, all authorized users must be informed of the new code and they must, therefore remember yet another code.

**[0005]** Also, keeping track of who has keys to which doors can be an issue and this becomes more complex, as in many business situations, the more doors and employees there are.

**[0006]** Further, if individuals are permitted to access some parts of a facility but not others, Then a multiplicity of keys is required, adding to the problem of key management for both business and individual. And temporary access to premises by, for example, cleaning staff or neighbours, is difficult to control and monitor and, thus, reduces security.

**[0007]** Access to premises in emergency or potential emergency situations, such as by fire departments in the

event of a fire alarm, usually requires forced entry, causing structural damage and consequent repair expenses.

**[0008]** Most businesses and many homes make use of monitored alarm systems in addition to door locks, requiring individual users both to carry keys for the premises and to remember alarm codes.

**[0009]** Access control systems exist that solve some of the problems by means of wired connections to the doors for which access is being controlled. Some of these systems can communicate between locations via wide area networks. Generally, such systems require special software and computer systems on or near the premises being protected. Often dedicated monitoring equipment and stations are required. These systems are costly to install and operate and are oriented towards larger organizations. These systems also do not extend to controlling access to locations where wired connections are impractical.

**[0010]** A number of other locking and access control systems have been devised. For example, it is known to employ wireless communication between a secure door and remote site in order to obtain authorization. While these systems are successful in solving some of the problems mentioned above, they are usually too costly or require too much technical support to be of use to private residences or small businesses. In addition, none of the technologies employed thus far address the problems of the individual user who must deal with a large number of keys and/or codes.

**[0011]** Accordingly, there is a need to provide an improved system and method for physical access control, in which most of the above conventional problems and disadvantages can be solved.

SUMMARY OF THE INVENTION

**[0012]** According to one aspect of the present invention, there is provided a door access control and key management system in which a number of doors and door users are involved. The system comprises (a) a communications network; (b) a door/key administering system for storing a key unique to each of the users, for storing an identification code unique to each of the doors, and for assigning access authorization to at least one user for each door, the door/key administering system being communicatively connected to the communications network; and (c) a door lock/control assembly mounted on each door for reading the key presented by the user, for verifying that the key has access authorization, and for operating the door in response to the authorization for access, the door lock/control assembly being communicatively connected to the door/key administering system via the communications network; (d) whereby a user can gain access to the doors authorized to the user with a unique key and each door can provide access to the user or users assigned thereto.

**[0013]** According to another aspect of the present invention, there is provided a method of controlling access to a plurality of doors by a plurality of door users via a communications network. The method comprises steps of: (a) storing a unique identification code for each of the doors in a server; (b) storing a unique key signature for each of the users in the server; (c) assigning to each door the unique keys having access authorization to the respective doors; (d)

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