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[Continued on next page]

(54) Title: KEY SAFE

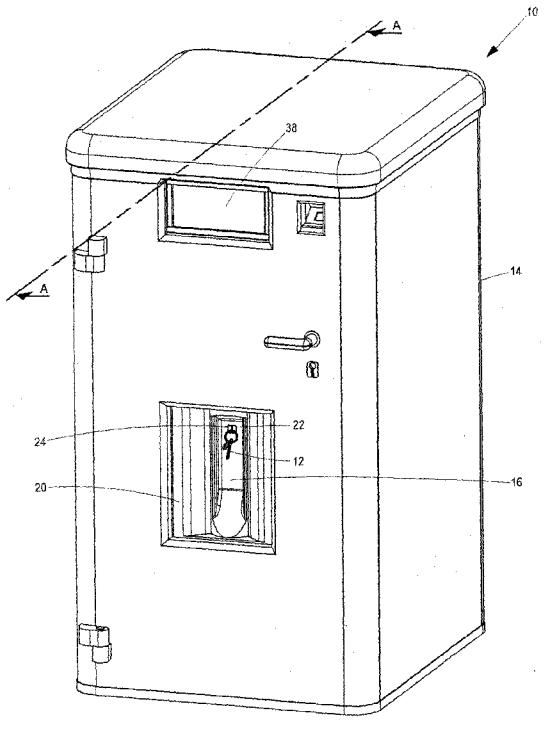

Figure 1

(57) Abstract: A key safe (10) includes a main container (14) defining an access port (20), an antechamber (16) and a primary hook (22) located within the antechamber (16). The antechamber (16) is movable between a first position in which a user is permitted access thereto and to the primary hook (22) from outside the main container (14) via the access port (20), and a second position in which the user is not permitted access to either the antechamber (16) or the primary hook (22) from outside the main container (14). The key safe (10) further includes a plurality of secondary hooks (26) located within the main container (14), which secondary hooks (26) are not directly accessible to a user. In use, transport means (18) transport keys between the primary hook (22) and a secondary hook (26) when the antechamber (16) is in the second position.

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KEY SAFE

BACKGROUND

The present invention relates to a key safe for securely receiving, storing and dispensing keys.

Various safes for storing keys and other items are known. For instance:

WO 2005/096236 "The management of key usage" to Wilken *et al* describes a safe with an access port and keys secured to a continuous chain that runs between a pair of sprockets to align a key with the access port;

US 5,172,829 "Automated key dispenser" to Dellicker describes a unit with a plurality of key holders for releasably securing keys, and means for a user to select a key to be released by the its key holder and transported by gravity to a dispensing hatch. US 6,505,754 "Apparatus for automated key retrieval and deposit" to Kenny *et al* goes a step further to include a container for receiving keys returned by users;

US 5,212,649 "Electronic robot key distributor" to Pelletier *et al* describes a safe with an access port and a cylinder located within the safe, the cylinder having compartments for storing keys and other valuables therein. The cylinder is rotatable and axially movable to align a selected compartment with the access port and permit access to the valuable contained therein to a user;

FR 2,613,411 to Fraysse describes a safe with an access port, a storage rack within the safe and means for conveying selected objects between its location on the storage rack and the access port; and

US 2004/0069572 "Device for storing and transferring products in small packets" to Anke *et al* describes a storage unit with an access hatch, a cylindrical array of storage compartments and means for moving items between the access hatch and a selected storage compartment. US 4,814,592 "Apparatus and method for storing and retrieving articles" to Bradt *et al* described a similar system for receiving, storing and dispensing videocassettes.

It is an object of the present invention to provide a safe that is specifically designed for receiving, storing and dispensing keys.

SUMMARY OF THE INVENTION

According to the present invention, a key safe includes:

a main container defining an access port;

an antechamber;

a primary hook located within the antechamber;

the antechamber being movable between a first position in which a user is permitted access thereto and to the primary hook from outside the main container via the access port, and a second position in which the user is not permitted access to either the antechamber or the primary hook from outside the main container;

a plurality of secondary hooks located within the main container, which secondary hooks are not directly accessible to a user; and

means to transport keys between the primary hook and a secondary hook when the antechamber is in the second position.

Typically, the key safe further includes a sensor for sensing whether a key is located on the primary hook when the antechamber is in the first position.

Generally, the secondary hooks are arranged in circular arrays.

Preferably, the key safe includes at least two axially displaced circular arrays of secondary hooks.

Typically, the transport means comprises an arm movable along the longitudinal axis of the circular arrays and rotatable about such longitudinal axis.

Generally, the arm defines a notch near its free end for locating a keyring associated with a key to be transported thereby therein.

Preferably, the free end of the arm includes two fingers sufficiently spaced from each other to receive a secondary or a primary hook therebetween. And, the notch is defined by the fingers. Alternatively, the free end of each of the primary and secondary hooks includes two fingers sufficient spaced to receive the free end of the arm therebetween.

Typically, the antechamber is rotatable between the first and second positions.

Generally, the key safe further includes means for identifying a key, which means may be an RFID reader located either within the antechamber or within the main container.

Preferably, the key safe further includes a database for associating each key with the secondary hook on which it is stored.

Typically, the key safe further includes input means for a user to select a key to be dispensed from the key safe.

Generally, each secondary hook is not movable relative to the main container.

Preferably, the antechamber with primary hook, the secondary hooks and the transport means are connected to a frame sized to fit within the main container.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a key safe according the invention with a key located on a primary hook within an antechamber (in a first position);

Figure 2 is a perspective view of the key safe in Figure 1 showing the interior of the safe;

Figure 3 is a perspective view of the key safe in Figure 1 with the antechamber in a second position and the key being transported between the primary hook and a secondary hook in the main container;

Figure 4 is a perspective view of the transport means depositing a key on a secondary hook;

Figure 5 is a perspective view of an enlarged portion of Figure 4; and

Figure 6 is a cross sectional side view of the key safe in Figure 1 along line A-A.

DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

With reference to Figures 1 to 6, a key safe 10 for receiving, storing and dispensing keys 12 includes a main container 14, an antechamber 16 and transport means 18.

The main container 14 is similar to a standard steel safe but with the hingedly connected front panel defining an access port 20.

The access port 20 frames the antechamber 16, which houses a primary hook 22. The antechamber 16 is rotatable about a longitudinal axis between: (i) a first position in which a user (not shown) is permitted access to the antechamber 16 and primary hook 22 from outside the main container 14 via the access port 20; and (ii) a second position in which the user is not permitted access to either the antechamber 16 or the primary hook 22.

A sensor 24 is associated with the primary hook 22 for sensing whether a key 12 is located thereon when the antechamber 16 is in the first position.

Nine circular arrays of secondary hooks 26 are arranged inside the main container 14, spaced axially from each other. In use, the secondary hooks 26 are fixed / not movable relative to the main container 14.

Means 18 to transport keys 12 is located inside the main container 14. The transport means 18 comprises a central shaft 28 that extends along the longitudinal axis of the arrays of secondary hooks 26 and a transverse arm 30 that is movable along and rotatable about the shaft 28.

With specific reference to Figure 5, the free end of the arm 30 terminates in a pair of fingers 32 spaced to receive the primary hook 22 or a secondary hook 26 therebetween. The fingers define a notch 34 on their operative upper surface near their free end, which notches 34 are sized and shaped to receive a keyring therein.

The transport means 18 can pick up a key 12 located on the primary hook 22 when the antechamber 16 is in the second position and deposit such key 12 on a secondary hook 26. Similarly, the transport means 18 can pick up the key 12 from the secondary hook 26 and deposit it on the primary hook 22 when the antechamber 16 is in the second position.

The antechamber 16 (with primary hook 22), secondary hooks 26 and transport means 18 are connected to a frame, which can be inserted into / removed from the main container 14 when the main container front panel is hingedly opened to permit access therein. With the frame inserted, the main container front panel is locked closed to prevent direct access to keys 12 secured on secondary hooks 26 within the main container 14 by a user located outside the main container 14 (irrespective whether the antechamber 16 is in the first or second position).

The key safe 10 further includes means 36 for identifying a key. The identifying means 36 is located in the main container 14 and is in the form of an RFID reader that communicates with an FRID tag on each key 12.

A database (not shown) stores the identity of each key 12 stored within the key safe 10 and associates it with a secondary hook 26 on which it hangs.

And, instructions to retrieve keys 12 from the key safe 10 are entered by a user (not shown) via input means 38 in the form of an LCD touch screen.

In use, and starting with Figures 1 and 2, a user (not shown) places a key 12 (with keyring and RFID tag) on the primary hook 22. The sensor 24 senses this, and causes the antechamber 16 to rotate from the first position to the second position. Turning to Figure 3, the transport means 18 then rotates and moves along the central shaft 28 such

that the fingers 34 flank the primary hook 22 and travel upwards to receive the key's 12 keyring within the notch 34 and raise the key 12 off the primary hook 22. The transport means 18 then moves the key 12 past the identifying means 36 to read the key's 12 unique identifier and send it to the database. The database associates the key 12 with a vacant secondary hook 26 and directs the transport means 18 (with key 12 hanging therefrom) towards the secondary hook 26 such that the fingers 34 flank the secondary hook 26 and travel downwards to deposit the key's 12 keyring thereon. The key 12 is now safely deposited within the key safe 10.

Should the user wish to retrieve a key 12, the user selects the key 12 using the input device 38. The antechamber 16 rotates from the first position to the second position and the database is interrogated to identify the secondary hook 26 associated with such key 12. The transport means 18 is then directed to approach the associated secondary hook 26 with its fingers 34 flanking the secondary hook 22 and travel upwards to receive the key's 12 keyring within the notch 34 and raise the key 12 off the secondary hook 26. The transport means 18 then moves the key 12 towards the primary hook 22 such that the fingers 34 flank the primary hook 22 and travels downwards to deposit the key's 12 keyring thereon. The antecamber 16 is then rotated back to the first position to permit the user access to the key 12.

It will be appreciated that although the hooks 22 and 26 and arm 30 have been described and illustrated in an arrangement whereby the fingers 32 of the arm 30 receive the hooks 22 and 26 therebetween, the arrangement can be reversed. In other words, each hook 22 and 26 could comprise a pair of fingers spaced from each other to receive the arm 30 therebetween.

It will also be appreciated that although the identifying means 36 has been described housed within the main container 14, it could alternatively be located within the antechamber 16.

CLAIMS

1. A key safe including:

a main container defining an access port;

an antechamber;

a primary hook located within the antechamber;

the antechamber being movable between a first position in which a user is permitted access thereto and to the primary hook from outside the main container via the access port, and a second position in which the user is not permitted access to either the antechamber or the primary hook from outside the main container;

a plurality of secondary hooks located within the main container, which secondary hooks are not directly accessible to a user; and

means to transport keys between the primary hook and a secondary hook when the antechamber is in the second position.

2. A key safe according to claim 1, further including a sensor for sensing whether a key is located on the primary hook when the antechamber is in the first position.

3. A key safe according to claim 2, wherein the secondary hooks are arranged in circular arrays.

4. A key safe according to claim 3, including at least two axially displaced circular arrays of secondary hooks.

5. A key safe according to claim 4, wherein the transport means comprises an arm movable along the longitudinal axis of the circular arrays and rotatable about such longitudinal axis.

6. A key safe according to claim 5, wherein the arm defines a notch near its free end for locating a keyring associated with a key to be transported thereby therein.

7. A key safe according to claim 6, wherein the free end of the arm includes two fingers sufficiently spaced from each other to receive a secondary or a primary hook therebetween.

8. A key safe according to claim 7, wherein the notch is defined by the fingers.

9. A key safe according to claim 6, wherein the free end of each of the primary and secondary hooks includes two fingers sufficient spaced to receive the free end of the arm therebetween.

10. A key safe according to claim either claim 8 or claim 9, wherein the antechamber is rotatable between the first and second positions.

11. A key safe according to either claim 9 or claim 10, further including means for identifying a key.

12. A key safe according to claim 11, wherein the identifying means is an RFID reader located either within the antechamber or within the main container.

13. A key safe according to claim 12, further including a database for associating each key with the secondary hook on which it is stored.

14. A key safe according to claim 13, further including input means for a user to select a key to be dispensed from the key safe.

15. A key safe according to claim 14, wherein each secondary hook is not movable relative to the main container.

16. A key safe according to claim 15, wherein the antechamber with primary hook, the secondary hooks and the transport means are connected to a frame sized to fit within the main container.

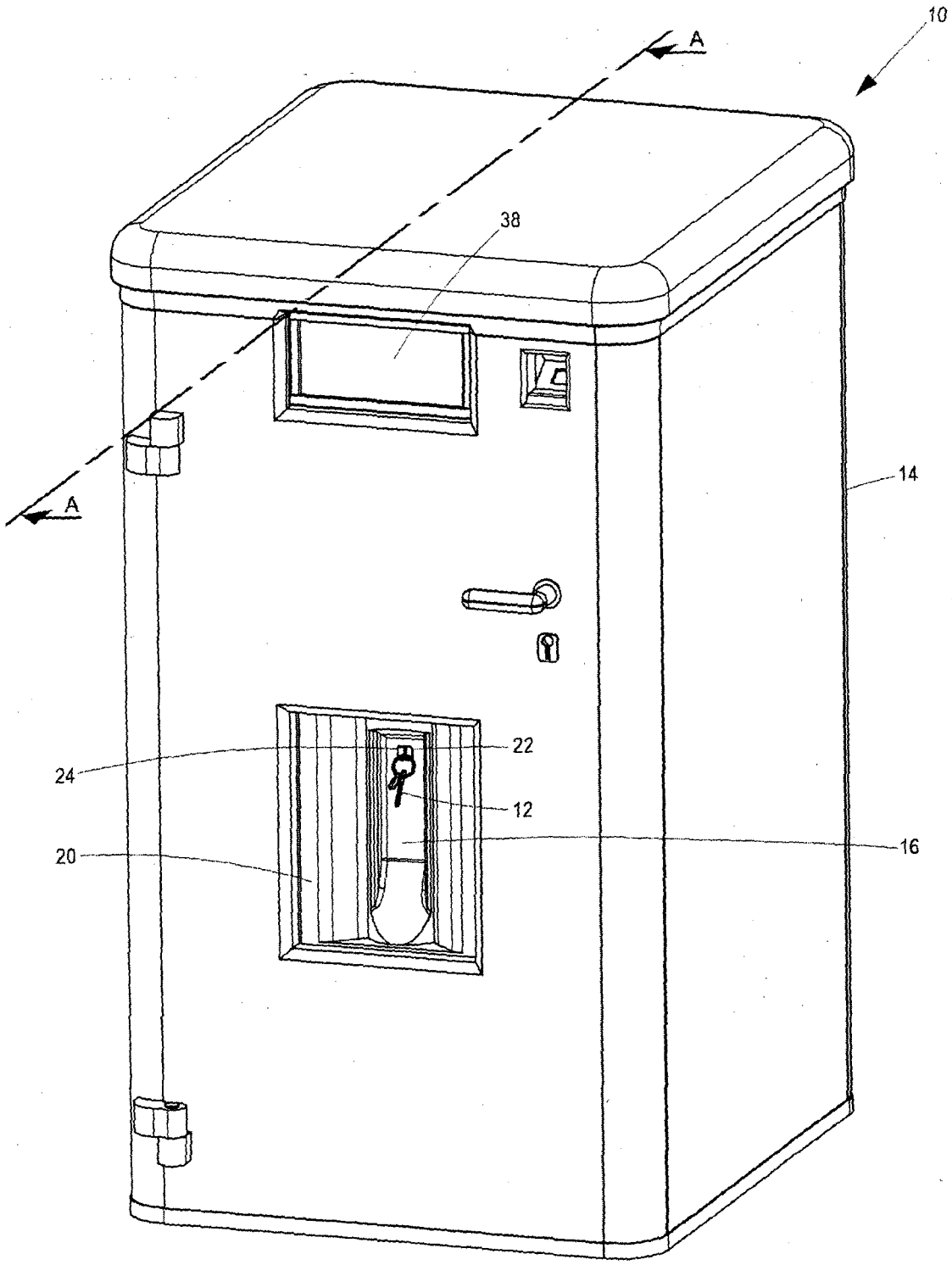

Figure 1

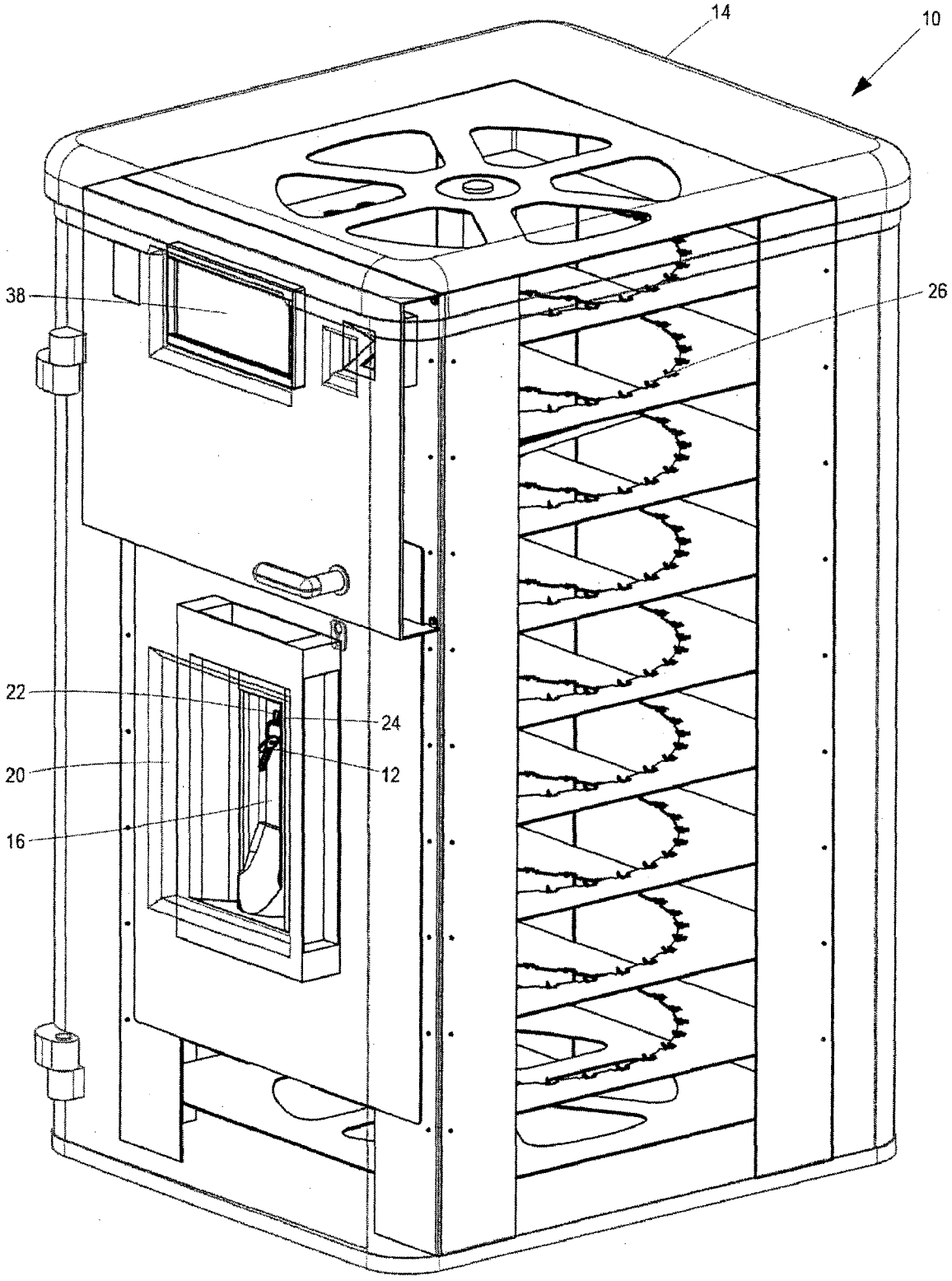

Figure 2

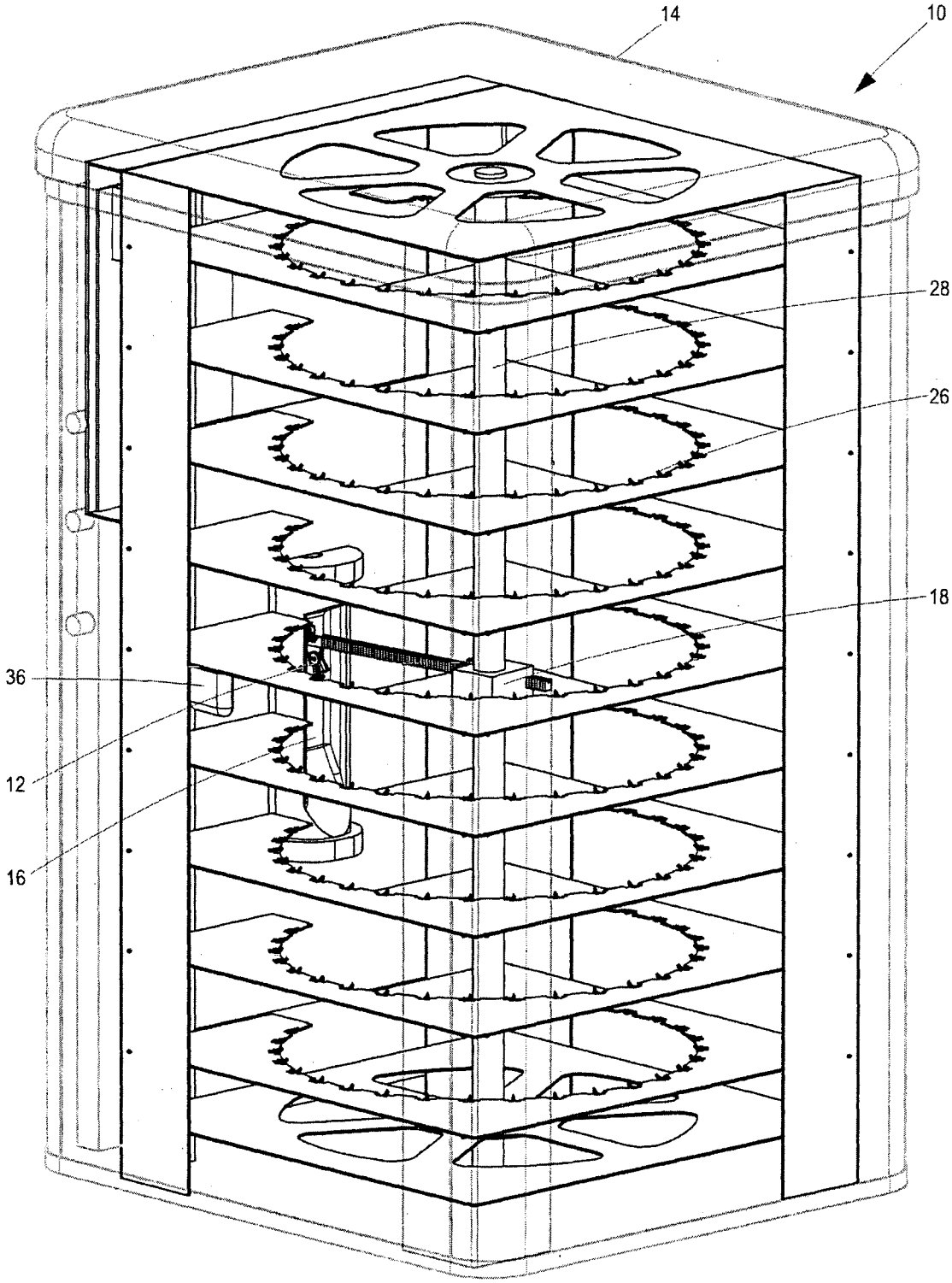

Figure 3

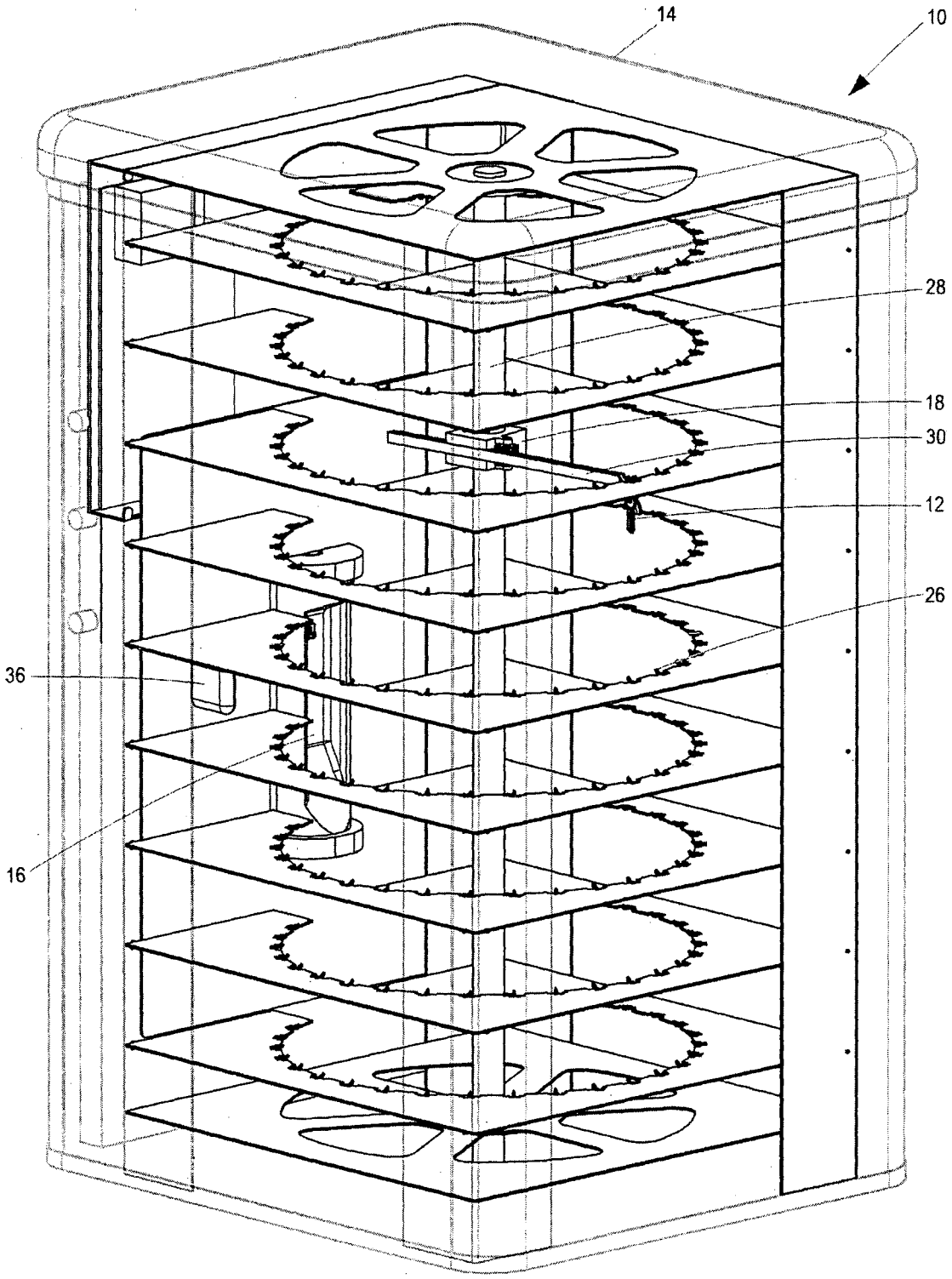

Figure 4

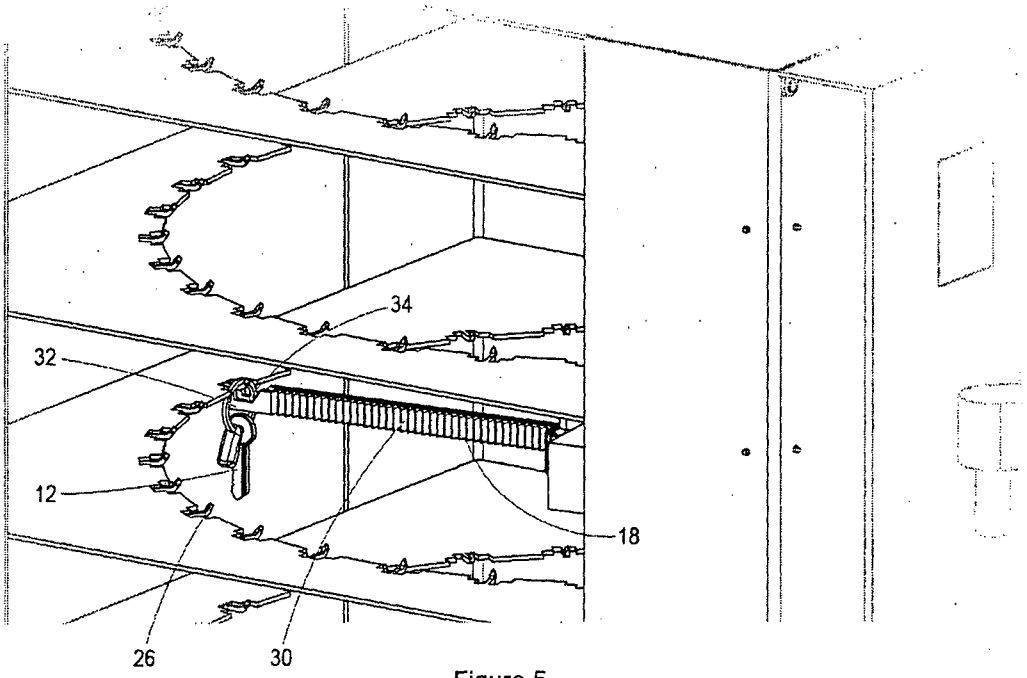

Figure 5

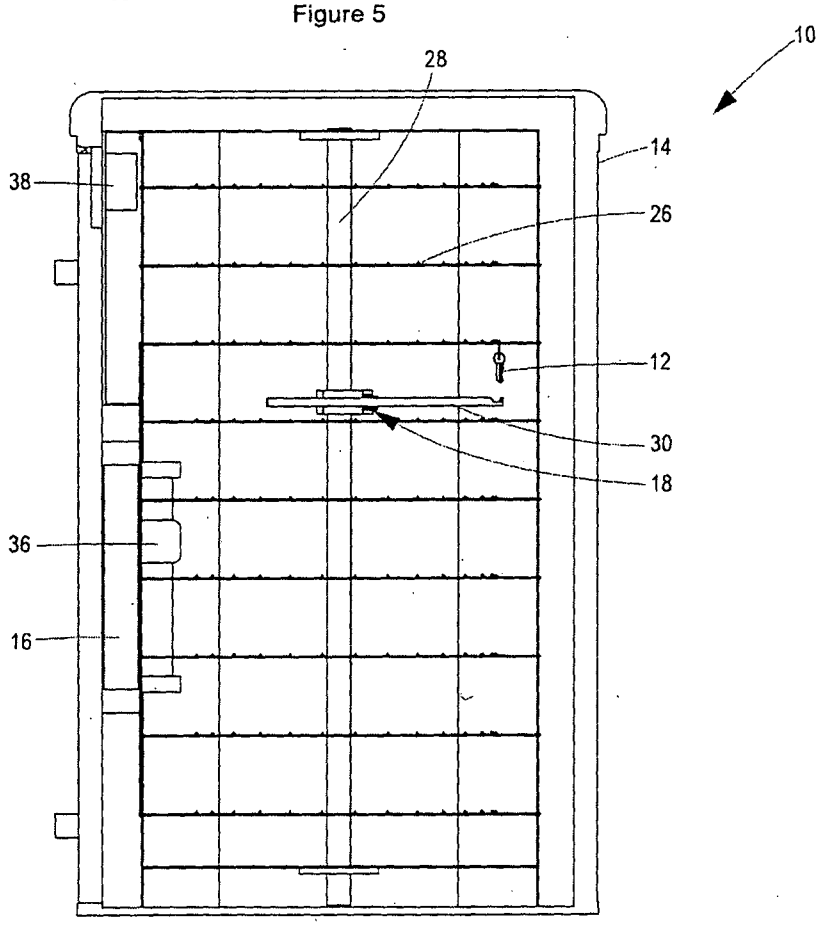

Figure 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT / ZA 2014/000007

A. CLASSIFICATION OF SUBJECT MATTER

IPC: ***G07F 11/64*** (2006.01); ***G07F 17/00*** (2006.01); ***G07F 7/00*** (2006.01); ***E05B 19/00*** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E05B, G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI, TXTE, TXTG

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2005096236 A1 (KEYSENTRY SECURITY SYSTEMS) 13 October 2005 (13.10.2005) abstract, figs. 1-5	1
A	US 5251782 A (CROSBY ET AL.) 12 October 1993 (12.10.1993) abstract, figs. 1-11	1
A	US 6505754 B1 (KENNY ET AL.) 14 January 2003 (14.01.2003) abstract, figs. 1-5	1
A	WO 9201273 A1 (COMPUTER DETECTION SYSTEMS PTY. LTD) 23 January 1992 (23.01.1992) abstract, figs. 1-7	1
A	FR 2729066 A1 (FITOUSSI) 12 July 1996 (12.07.1996) abstract, figs. 1-7	1

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 August 2014 (13.08.2014)	22 August 2014 (22.08.2014)
Name and mailing address of the ISA/AT	Authorized officer
Austrian Patent Office Dresdner Straße 87, A-1200 Vienna	RABONG G.
Facsimile No. +43 / 1 / 534 24-535	Telephone No. +43 / 1 / 534 24-463

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT / ZA 2014/000007

Patent document cited in search report			Patent family member(s)			Publication date
WO	A1	2005096236	WO	A1	2005096236	2005-10-13
US	A	5251782	US	A	5251782	1993-10-12
			US	A	5344042	1994-09-06
US	B1	6505754	US	B1	6505754	2003-01-14
WO	A1	9201273	WO	A1	9201273	1992-01-23
FR	A1	2729066	FR	A1	2729066	1996-07-12