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## (54) Safety box assembly

(57) The present invention relates to a safety box assembly (1) comprising a cylindrical revolving carrousel (2), made up of at least one floor, divided in sectors with box (3) carrier opening, each floor comprising at least a false armour-plated opening (4), an outer armour plated structure (1, 2), provided with a number of movable doors (8) corresponding to the number of floors provided on the carrousel (2), in order to allow the access to the box (3) bearing openings of each floor, of a control terminal (9) allowing to the use to interact with the assembly, motion means (9, 11, 12, 13, 15, 16, 21) for the carrousel floors, motion means (18, 19, 20) for the access doors (8), and computer means, provided with a suitable software, to control said motion means on the basis of the instructions introduced within the control terminal.

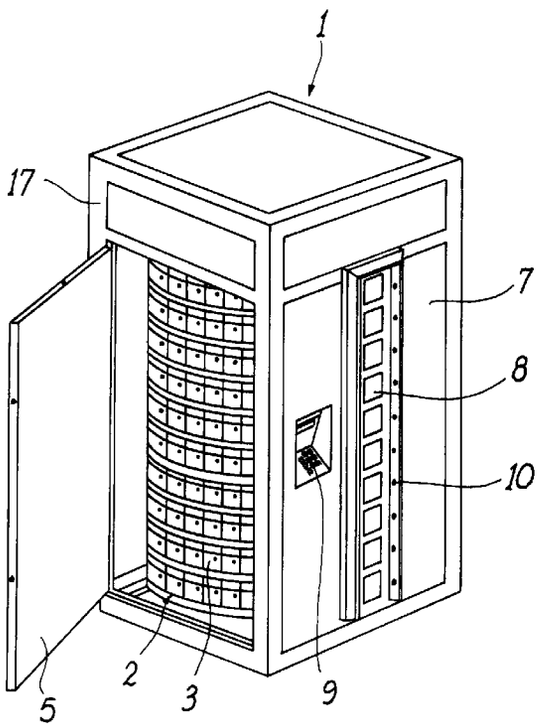


FIG. 2

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## Description

The present invention relates to a safety box assembly.

More particularly, the invention concerns an assembly allowing to include a rather high number of safety boxes in a limited space, further allowing the individual managing of the same in the maximum safety and flexibility conditions.

With the solution proposed according to the present invention an automatic management system for safety boxes is provided, said system allowing to the user to autonomously manage a safety box space contained within an armour-plated structure placed in the opening of a suitable space of a bank, post office, railway station, hotel, etc.

As it is well known, up today the bank boxes were called "safety boxes" since they were placed within the vault of the bank, a place that was deemed to be inviolable.

However, many cases occurred of criminals that got in the vault and that forced all the boxes, often using very simple tools, hidden to the view of the guards and people.

In order to face these events, safety boxes contained within safes provided in the vault have been adopted.

In any case, this kind of solution involves the very long routine of accompanying the client within the vault, and opening and closing the box with two keys, so that the management of the safety boxes is not so much advantageous.

Recently, the expansionist politic of the banks had the aim of reaching a more widespread presence on the market, this aim to be reached by the opening of little bank counters, called "light bank counters", that are able to offer the greater number of "self service" duties, thus reducing the work of the personnel just to the consulting and the acquisition of new clients.

In an attempt to speed up and modernise all the services, self-management attempts have been made also for the safety box service.

The solution adopted provides traditional boxes placed in a suitable room from which robotized mechanical arms remove and transport the boxes near to the space destined to the client.

However, these systems, that are enough complicated, are not convenient as far as the management is concerned and furthermore requires large spaces and great investment difficult to be ammortized.

The solution proposed according to the present invention is included in this context, said solution allowing to overcome the above mentioned drawbacks, giving at the same time a modern, safe and easily self-manageable service that occupies a little space and requires investments ammortizable in a short time.

It is therefore specific object of the present invention a safety box assembly comprising a cylindrical revolving carrousel, made up of at least one floor, divided in sectors with a box bearing opening, each floor comprising at least a false armour-plated opening, an outer armour plated structure, provided with a number of movable doors corresponding to the number of floors provided on the carrousel, in order to allow the access to the box bearing openings of each floor, of a control terminal allowing to the user to interact with the assembly, motion means for the carrousel floors, motion means for the access doors, and computer means, provided with a suitable software, to control said motion means on the basis of the instructions introduced within the control terminal.

According to the invention, said carrousel comprises a plurality of floors that can be all provided with equal sectors with box bearing opening or they can be realized with different sectors, so that the carrousel has safety boxes of different sizes, said access doors being provided in number and sizes corresponding to the floors and to the kind of openings provided in each floor.

Still according to the invention, said sectors with box bearing opening provide fixed boxes or removable boxes that can be introduced within the opening.

Preferably, each one of said boxes is provided with a safety lock of the expansion piles kind.

Said false opening of each floor is preferably closed by a steel plate.

The armour-plated structure is preferably comprised of a steel frame, with an internally bolted panels and with an armour-plated door for the access to the carrousel for its maintenance, the motion means of the carrousel being provided above the armour-plated structure.

According to a preferred embodiment of the assembly according to the invention, each one of said doors is moved by a ratiomotor connected with said computer means, provided with safety means locking the closure of the door in case of any impediment.

Particularly, said safety means can be made up of a spring and release joint.

Further, in correspondence of each one of said doors further safety means can be provided, particularly a photoelectric cell.

The control terminal, directly connected to the computer means, will preferably comprise a keyboard, and/or a magnetic card reader and/or a display.

Still according to the invention, said motion means of the carrousel can be comprised of a ratiomotor, connected with the rotation axis of the carrousel, by a gear and chain system and an electromechanical decoder, a control logic card and safety system control cards.

Preferably, according to the invention, the access to the safety box of the user is subordinated to the introduction of three codes, one of which is directly set out by the user, the assembly providing that each time an operation is finished the armour-plated false opening is brought in correspondence of the relevant door.

The present invention will be now described for illustrative but not limitative purposes according to its preferred embodiments, with particular reference to the figures of the enclosed drawings, wherein:

figure 1 is a perspective view of a safety box assembly according to the invention;

figure 2 shows the assembly of figure 1 with the access armour-plated door open;

figure 3 shows the assembly of figure 1 with the upper portion broken away; and

figure 4 shows the assembly of figure 1 exploded.

Making reference to the figures of the enclosed drawings, it can be noted that the safety box assembly, generically indicated with the reference number 1, is comprised of a steel structure sheathed with armour-plated panels.

Said armour-plated panels are internally fixed by bolts so that externally it is impossible to act on the bolts to force the assembly 1.

Within the assembly 1 a cylindrical carrousel 2 provided with more than one floor is housed, said carrousel being divided in sectors - openings suitable to contain the safety boxes 3, as well as a row of false openings 4, that will be described in greater detail in the following.

The access to the carrousel 2 is possible through an access armour-plated door 5.

Each one of the safety boxes is provided with a frontal element having a safety lock with vertical expansion piles.

One of the walls of the steel structure, specifically the wall 7, provides a row of superimposed access doors 8, in order to be able to have access to the single boxes 3, according to the formality that will be described in the following. Always on this wall 7, a keyboard 9 with display or control terminal is provided.

Each one of the doors 8 is realized with vertical frames having an accident prevention photoelectric cell 10 that in case of any kind of obstacle, due for example to fingers or hands, stops the closure of the door that will go back in order to repeat after the operation.

In the upper part of the steel structure, the mechanisation and the managing electronic components of the system are contained.

Particularly, in the embodiment shown in the figure, a ratiomotor 11, for the motion of the rotation axis 12 of the carrousel 2, by gears 13 connected by a chain, is shown.

By the reference 14 an electromechanical decoder is indicated, while by the reference 15 the PLC logic card is indicated and with the reference 16 the safety system cards. The axis 12 of the carrousel 2 rotates on rugged step bearings.

Coming now to describe in greater detail the steel structure, it comprises a strong steel frame 17, upon which panels are mounted, said panels being, as already said, innerly fixed by bolts.

The armour-plated door 5 allows to access within the structure to make the maintenance of the opening automatism of the outer doors 8.

The sectors - openings for the safety boxes 3 have a trapezoidal shape and are placed on different floors of the revolving carrousel 2. Obviously, the number of the floors can be varied and the same floors can all have the same height or different heights according to the cases, with the number of sectors for each floor variable in function of the needing and of the kind of box; further, also the boxes 3 can be all the same or they can be different.

The false opening 4 sector of the floor cannot be used as safety box bearing sector and is frontally closed by a steel plate.

In the solution shown for illustrative but not limitative purposes in the enclosed figures, each floor is divided in 24 sectors, 23 of which form the box 3 openings, while the last one is the safety sector that will be placed behind the row of superimposed doors 8 when the assembly 1 is in the rest position.

The dimensions of the doors 8 correspond to those of the box 3 bearing openings of the relevant whole floor. The door 8, made up of a very thick steel plate, opens and closes laterally sliding within the wall 7, by an automated and software managed control. The mechanisation of each door 8 is comprised of an endless screw operated by a ratiomotor 19 by a spring and release joint 20.

When the assembly 1 according to the invention is in the rest position, none of the box 3 bearing openings is placed behind the row of superimposed doors 8, since the false openings 4 row closed by a steel plate is provided behind said doors 8.

Each box 3 is provided with a safety lock 6 having vertical offset expansion piles, said piles fixing in the structure of the carrousel 2. Therefore, each box 3 opening can be considered as a little safe.

The motor is operated by the PLC logic card 15 by a command sent by the personal computer, after that the computer has checked that the data digitised on the keyboard 9 correspond to the combination of the three data previously stored within its memory.

The electromechanical decoder 14 by means of a position reader 21, allows the stop of the motor and thus the motion of the carrousel 2, when the sector indicated by the user by the control terminal 9 is placed in correspondence of the row of doors 8 opening on the front side of the wall 7.

Contemporaneously, by the stop of the motor, the PLC logic card 15 operates the ratiomotor 19 corresponding to the indicated floor, said ratiomotor opening, by an endless screw 18, the door 8 horizontally slidable.

When the user of the service pushes on the keyboard 9 the end operation push button, the logic card 15, upon indication of the personal computer, starts again the ratiomotor 19 to close again the door 8 by the endless screw 18.

As already said, said screw 18 is connected with the axis of the ratiomotor 19 by means of a spring and release joint 20 (clutch), moving in an "idle" position in case during the closure the door 8 encounters any obstacle;

during the release motion of the joint (idle clutch) also a microswitch inverting the rotation direction of the ratiomotor 19 is operated.

In this way, any obstacle encountered during the closure of the door 8, by the action on the spring and bringing the joint in the release point (idle) and contemporaneously inverting the rotation direction of the ratiomotor 19, the door 8 is brought back in the opening position. Contemporaneously, also the photoelectric cell 10 operates locking and inverting the motion direction of the ratiomotor 19.

After three attempts, if the obstacle has not been removed, the system gives an alarm.

After the closure of the door 8, the personal computer by the PLC logic card 15 starts again the ratiomotor 11 which moves the carrousel 2 bringing the safety sector again behind the row of doors 8, i.e. the sector with the false openings 4 closed by the steel plate.

All the working of the assembly according to the present invention is managed by the software which, by a personal computer (not shown) and the logic card 15 (PLC) makes the operations being activated after having recognised the data set out by the user on the keyboard 9 with display.

All the managing sector of the safety box assembly, except for the keyboard, is provided in the upper part of the steel structure, well separated from the below sector containing the carrousel 2 with the box 3 bearing openings, so that any eventual maintenance intervention (excluded the replacement of the ratiomotors 19 for the automation of the doors 8) can be carried out without having access to the inner sector and thus without the need of opening the armour-plated door 5.

The management modes of the assembly that will be now described are illustrative, being understood that different operative modes can be set out, with a different software, without departing from the scope of the invention.

To the user renting the box 3 opening an access pre-code is given, said code being then deleted and replaced by the personal secret code.

The user, after he knows said pre-code and has the key of the safety lock 6 of the box rent, has access to the system by the following operations:

- on the keyboard 9 with display provided on the wall 7 he digits the number of the box allotted, the number of the floor of the carrousel 2 where the box 3 is provided and the precode he has received;

- by the display 9, the user is requested to digit a personal code that will replace the access pre-code and that, from now on, will allow him the self-management of its box 3 opening; (the system memorises the secret code set out by the user, coupling the same with the box 3 number and with the floor number, working out a specific secret code);

- the user checks on the display of the control terminal 9 the exactness of the set out data and pushes the operation confirmation push button.

From now on, only if the system recognises that the three data set out by the user correspond to the previously stored combination and coupled with the self-worked out fourth code, will operate bringing the box 3 opening called in correspondence of the door 8, that will open.

The user is able to open the box 3 by the key he already has.

Once finished the withdrawal and/or deposit operations, the user closes the box 3, withdraws the key and pushes on the end of operation button of the keyboard 9.

The system provides to close again the door 8 and to bring back the user box in the safe position, leaving false openings 4 provided with steel plate behind the doors 8.

In case the user lingers in the operations other than a reasonable period of time, varying on the basis of the specific needing, a warning horn and or a light signaller put into evidence to the user that the time allowed for the operations is lapsed.

If the user after having closed his box 3 opening, forgets to push the end of the operation push button, once passed the time mentioned above, the system will provide to close the door in any case and to bring back the box 3 opening in a safe position.

Further, the management software makes a complete control of the system every 10 minutes, indicating by an alarm eventual working irregularities. This alarm system, even remote, operates in any case for any irregularity.

The solution proposed according to the present invention allows to reach a remarkable series of important advantages with respect to the solutions available up to now.

Particularly, the safety box assembly according to the invention allows to obtain the following advatages:

- provide a high number of box openings within a small sized armour-plated structure;

- it is possible to provide it in "view", although in a space reachable only by a personal card like Bancomat, so that it is impossible for the criminals to work hidden by the walls and in any case without been seen by the guards;

- it is impossible to contemporaneously have at disposal all the boxes. In fact, they must specifically called and are provided behind the access doors one each time;

- it is impossible to have access to the single boxes without the electronic consent obtainable by the digitisation of codes, one of which is secret, directly set

out by the user;

- difficulty to unhinge the access doors to the boxes, said doors being realized by a steel plate with high thick, laterally slidable within the armour-plated structure and without any point or projection to be used and behind which in the rest position no safety box is provided, but a further steel plate;

- difficulty to unhinge the opening or box doors that practically are little safes provided with safety lock having offset, vertically expansible piles, which fix within the armour-plated structure;

- possibility to give a new "daily" service", i.e. the temporary withdrawal and transport of the box out of the bank. For example: withdrawal of a suitably sized safety box containing the jewels to be used for one night, or important documents to be consulted during the day, said box perfectly conforming as a safe door to an armour-plated opening provided in a wall at home or in the office.

The present invention has been described for illustrative but not limitative purposes according to its preferred embodiments, but it is to be understood that variation and/or modifications can be introduced by those skilled in the art without departing from the relevant scope as defined in the enclosed claims.

**Claims**

1. Safety box assembly characterized in that it comprises a cylindrical revolving carrousel, made up of at least one floor, divided in sectors with a box bearing opening, each floor comprising at least a false armour-plated opening, an outer armour plated structure, provided with a number of movable doors corresponding to the number of floors provided on the carrousel, in order to allow the access to the box bearing openings of each floor, of a control terminal allowing to the use to interact with the assembly, motion means for the carrousel floors, motion means for the access doors, and computer means, provided with a suitable software, to control said motion means on the basis of the instructions introduced within the control terminal.

2. Safety box assembly according to claim 1, characterized in that said carrousel comprises a plurality of floors that can be all provided with equal box bearing opening sectors or they can be realized with different sectors, so that the carrousel has safety boxes of different sizes, said access doors being provided in number and sizes corresponding to the floors and to the kind of opening provided in each floor.

3. Safety box assembly according to one of the preceding claims, characterized in that said sectors with box bearing opening provide fixed boxes.

4. Safety box assembly according to one of the claims 1 or 2, characterized in that said sector with box bearing opening provide removable boxes that can be introduced within the opening.

5. Safety box assembly according to one of the preceding claims, characterized in that said boxes are provided with a safety lock of the expansion piles kind.

6. Safety box assembly according to one of the preceding claims, characterized in that said false opening of each floor is closed by a steel plate.

7. Safety box assembly according to one of the preceding claims, characterized in that the armour-plated structure is comprised of a steel frame, with an internally bolted panels and with an armour-plated door for the access to the carrousel for its maintenance, the motion means of the carrousel being provided above the armour-plated structure.

8. Safety box assembly according to one of the preceding claims, characterized in that each one of said doors is moved by a ratiomotor connected with said computer means, provided with safety means locking the closure of the door in case of any impediment.

9. Safety box assembly according to one of the preceding claims, characterized in that said safety means are made up of a spring and release joint.

10. Safety box assembly according to claim 9, characterized in that in correspondence of each one of said doors further safety means are provided, particularly a photoelectric cell.

11. Safety box assembly according to one of the preceding claims, characterized in that the control terminal, directly connected to the computer means, comprises a keyboard, and/or a magnetic card reader and/or a display.

12. Safety box assembly according to one of the preceding claims, characterized in that said motion means of the carrousel are comprised of a ratiomotor, connected with the rotation axis of the carrousel, by a gear and chain system and an electromechanical decoder, a control logic card and safety system control cards.

13. Safety box assembly according to one of the pre-

ceding claims, characterized in that the access to the safety box of the user is subordinated to the introduction of three codes, one of which is directly set out by the user, the assembly providing that each time an operation is finished the armour-plated false opening is brought in correspondence of the relevant door.

**14.** Safety box assembly according to each one of the preceding claims, substantially as illustrated and described.

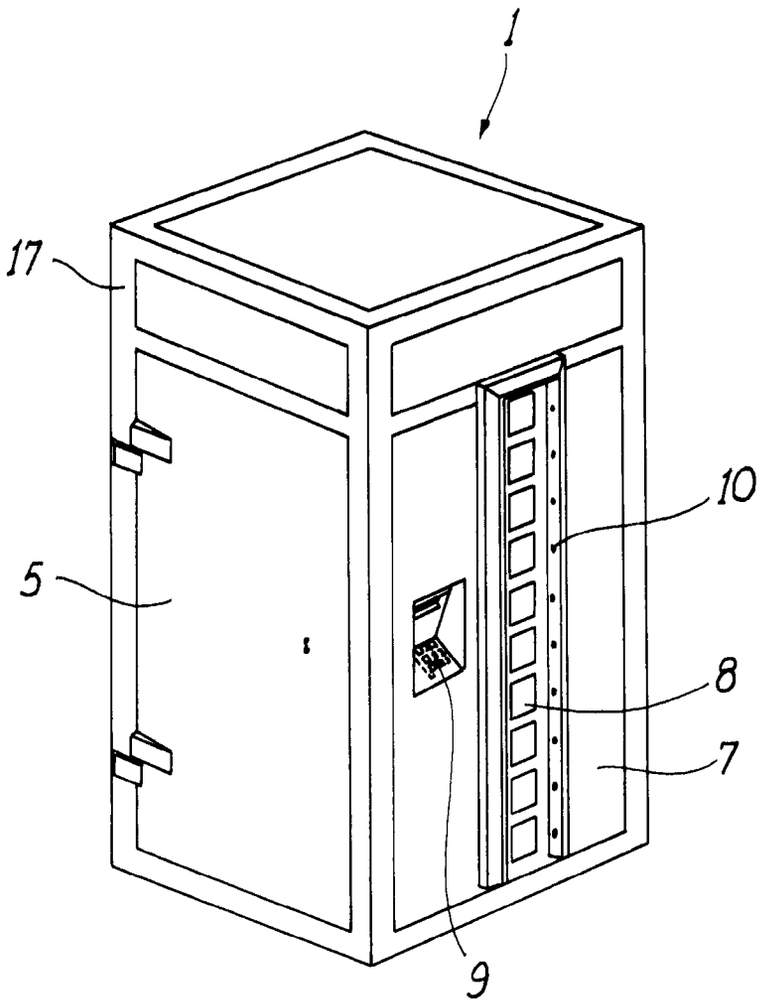


FIG. 1

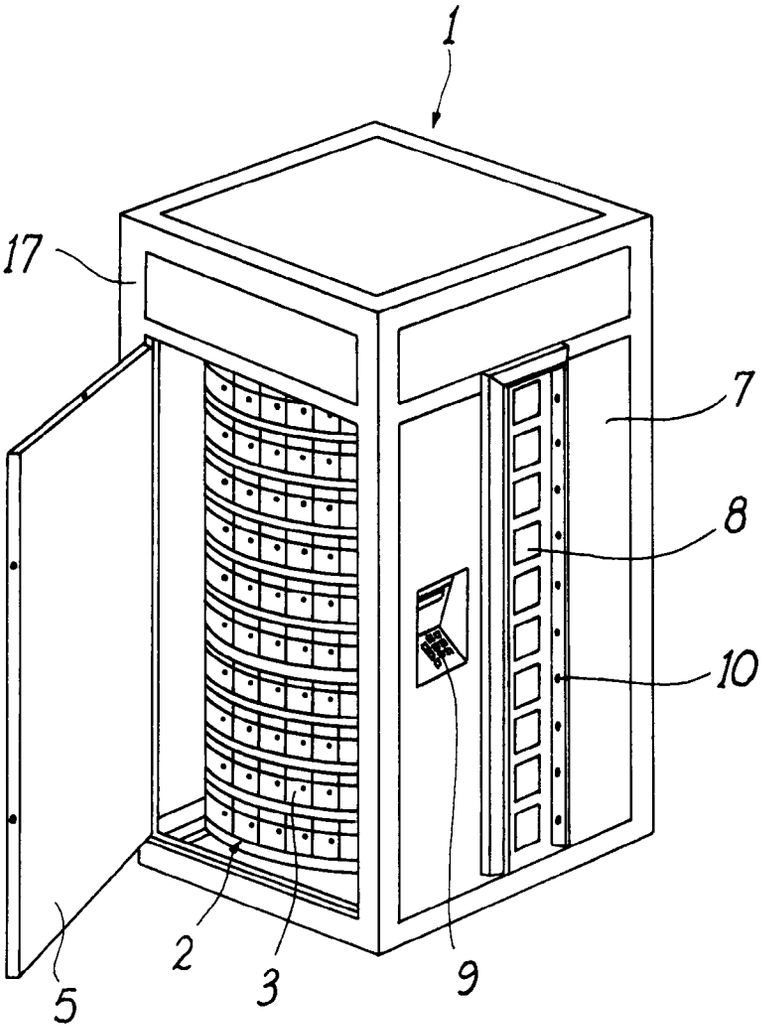


FIG. 2

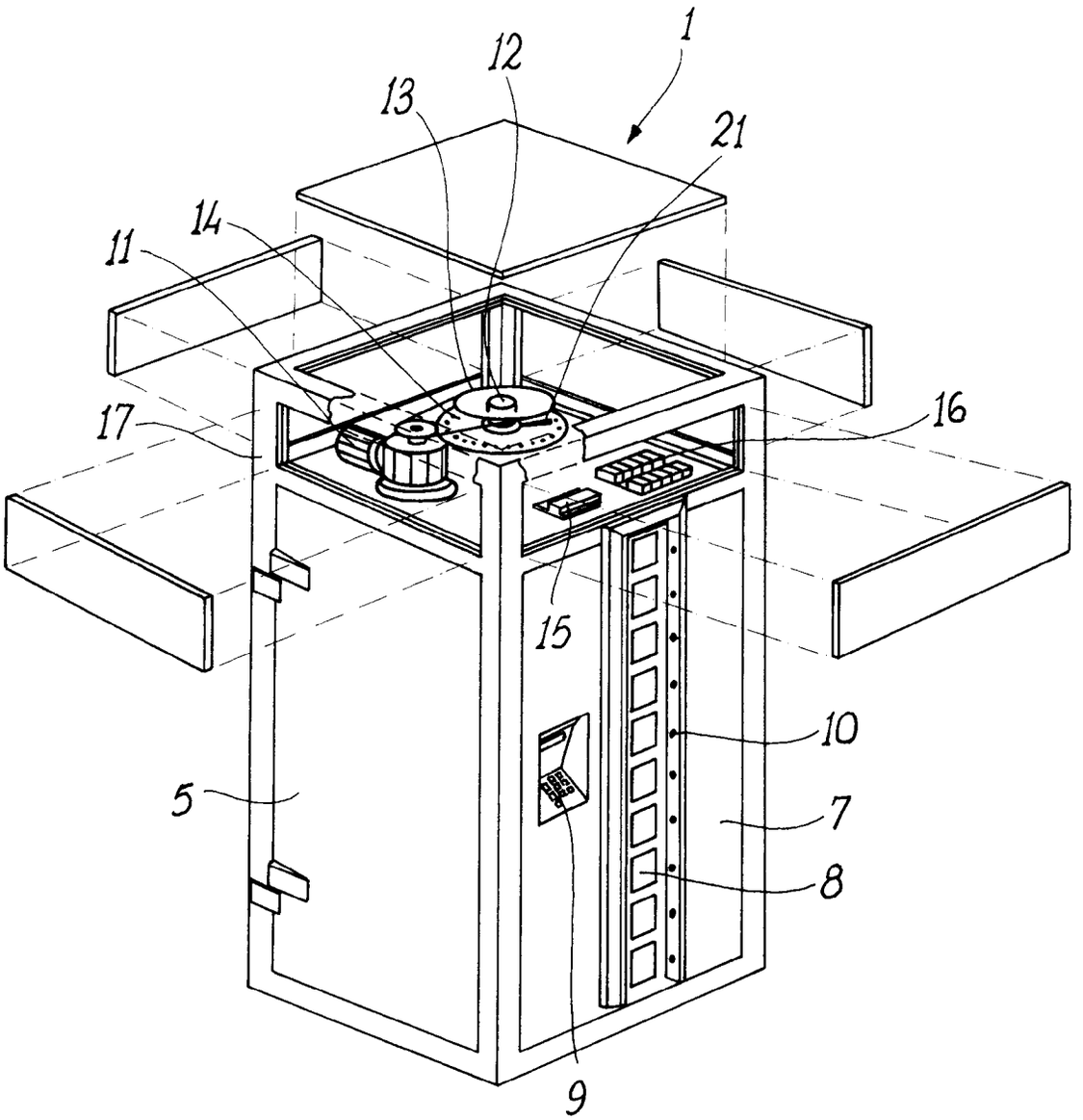


FIG. 3

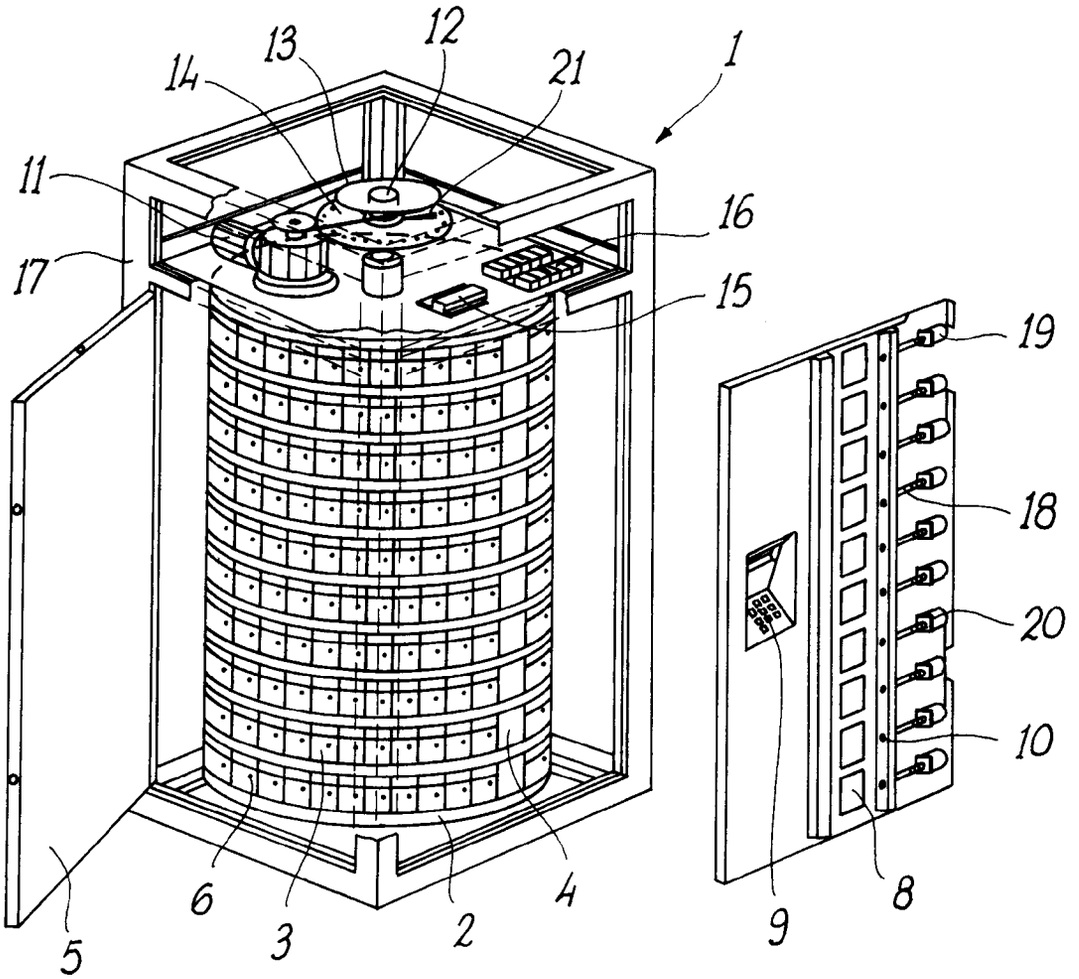


FIG. 4

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# EUROPEAN SEARCH REPORT

Application Number
EP 95 83 0393

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
|---|---|---|---|
| A | EP-A-0 051 048 (PRETINI)<br>* page 5, paragraph 3 - page 7, paragraph 2; figures 3-5 *<br>--- | 1,3 | E05G1/06 |
| A | EP-A-0 140 839 (LOCHER)<br>* page 3, line 30 - page 6, line 19; figures 1,2 *<br>----- | 1,2,8, 10,11 | |
| | | | TECHNICAL FIELDS SEARCHED (Int.Cl.6)<br>E05F<br>E05G |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 2 January 1996 | Van Kessel, J |

CATEGORY OF CITED DOCUMENTS

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