



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
03.01.2018 Bulletin 2018/01

(51) Int Cl.:
A47G 29/14 (2006.01) A47G 29/16 (2006.01)

(21) Application number: **17178255.0**

(22) Date of filing: **28.06.2017**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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(30) Priority: **28.06.2016 BE 201605493**

(54) **DEVICE FOR RECEIVING AND/OR SENDING LETTERS AND PACKAGES AND
ELECTROMECHANICAL MODULE FOR THE SAME**

(57) The invention relates to devices for receiving and/or dispatching letters and parcels. The invention further relates to electromechanical modules for receiving and/or dispatching letters and parcels. The invention also

relates to methods for detecting letters and parcels. The invention additionally relates to devices for the detection of parcels.

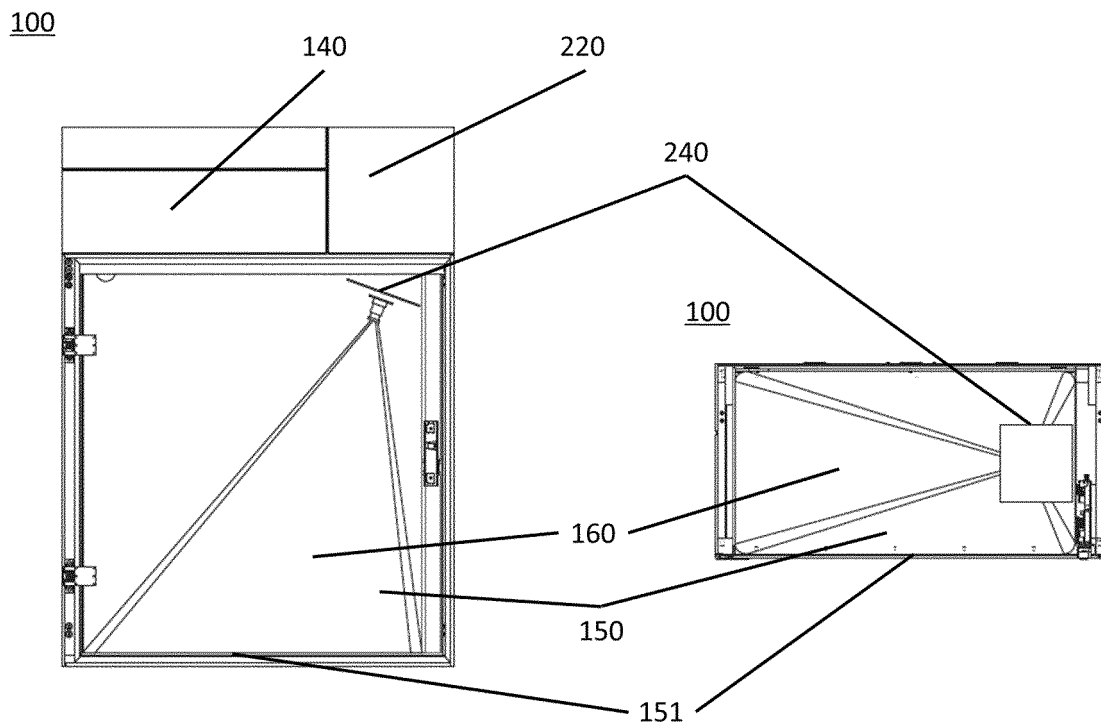


FIG. 5

Description**TECHNICAL FIELD**

[0001] The invention relates to devices for receiving and/or dispatching letters and parcels. The invention further relates to electromechanical modules for receiving and/or dispatching letters and parcels. The invention also relates to methods for detecting letters and parcels. In addition, the invention relates to devices for the detection of parcels.

TECHNOLOGICAL BACKGROUND TO THE INVENTION

[0002] With the steady rise in electronic trading, the need for systems for the unattended receipt and/or dispatch of parcels is increasing. After all, placed orders are often proffered to the home address of consumers during the day and during the week, when the same consumers are commonly at work. Furthermore, it is generally also very awkward for consumers to return products; often the products need to be taken for this purpose to a post office.

[0003] When orders are delivered to the home address of a consumer, and when the consumer is then not at home, placed orders are traditionally received by the neighbours. This solution is not ideal. In the first place, there is a loss of efficiency, because couriers need to find neighbours who are at home. In addition, nor is the privacy of consumers guaranteed when neighbours accept their parcels. Furthermore, it is not always possible for parcels to be delivered to the neighbours, for example when the neighbours are not at home.

[0004] In such a case, parcels are then commonly delivered to a collection point, for example to a collection point in a nearby supermarket. For the consumer this is a drawback, because he or she loses time in collecting the parcels at the collection point. For the parcel supplier, the extra visit to the supermarket also entails a further loss of efficiency. In order to offer a solution to the above problems, calls are increasingly being made for systems for the unattended receipt and/or dispatch of parcels. Existing systems are, however, expensive, non-robust, energy-inefficient and/or not particularly handy to use. The present invention offers a solution to at least one of these shortcomings.

SUMMARY

[0005] In a first aspect, the present invention provides an electromechanical module for driving a device for receiving and/or dispatching letters and parcels, which electromechanical module comprises the following components:

- a user interaction module;
- a communication module; and

- a locking/unlocking module, which comprises at least one electronic lock;

characterized in that the electromechanical module further comprises the following elements:

- a parcel detection module, which comprises one or more parcel detection units, wherein at least one parcel detection unit comprises an optical detection unit and one or more light sources; and
- a processor module, which is operatively connected to the user interaction module, the communication module, the locking/unlocking module and the parcel detection module.

[0006] In some preferential embodiments, the electromechanical module for driving a device for receiving and/or dispatching letters and parcels comprises the following components:

- a user interaction module;
- a communication module; and
- a locking/unlocking module, which comprises at least one electronic lock;

characterized in that the electromechanical module further comprises the following elements:

- a parcel detection module, which comprises one or more parcel detection units which detect parcels placed in a parcel compartment, wherein at least one parcel detection unit comprises an optical detection unit and one or more light sources; and
- a letter detection module, which detects letters deposited in a letter compartment; and
- a processor module, which is operatively connected to the user interaction module, the communication module, the locking/unlocking module, the parcel detection module and the letter detection module.

[0007] In some embodiments, the optical detection unit comprises a camera.

[0008] In some embodiments, the one or more light sources from the parcel detection module comprise one or more light-emitting diodes (LEDs).

[0009] In some embodiments, the user interaction module is chosen from the list containing the following user interaction modules: a matrix barcode reader, a linear barcode reader, a module for identification with radio waves (such as an RFID module, such as an NFC module, such as a bluetooth module) and/or a combination of a plurality of the preceding communication modules.

[0010] In some embodiments, the electromechanical module comprises a letter detection module.

[0011] In some embodiments, the electromechanical module comprises a power supply module. In some embodiments, the electromechanical module comprises a parcel indicator, the parcel indicator being operatively

coupled with the parcel detection module.

[0012] In some embodiments, the electromechanical module is configured to operate in at least two modes, including at least a sleep mode and a stand-by mode, wherein the electromechanical module further comprises an activatable on-off switch which is configured to, when activated, bring the electromechanical module from the stand-by mode into the sleep mode, or to bring the electromechanical module from the sleep mode into the stand-by mode.

[0013] In a further aspect, the present invention comprises a device for receiving and/or dispatching letters and parcels, wherein the device comprises the following elements:

- an electromechanical module according to one aspect of the present invention;
- a letter compartment;
- at least one parcel compartment; and
- a housing;

in which

- each parcel compartment comprises a parcel detection unit.

[0014] In some embodiments, each parcel compartment comprises walls, and for each parcel compartment it is the case that:

- the optical detection unit of the parcel detection unit is fastened to a first wall of the parcel compartment; and
- the one or more light sources of the parcel detection unit are fastened to a wall of the parcel compartment, which wall is adjacent to or opposite to the wall to which the optical detection unit of the parcel detection unit is fastened.

[0015] In some embodiments:

- the device has a front side and a rear side;
- the rear side is closed off by means of the housing;
- the front side is closed off by means of the housing, an opening for letters and one or more doors,
- the opening for letters gives access to the letter compartment;
- the doors of the one or more doors give access to one or more parcel compartments; and
- the front side comprises a rocker flap, wherein the rocker flap is hinge-fastened to the front of the device, and the rocker flap is configured to make the letter compartment accessible for letters.

[0016] In some embodiments, the device comprises two parcel compartments, a lowermost parcel compartment and an uppermost parcel compartment, wherein

- the lowermost parcel compartment is placed under the uppermost parcel compartment;
- the lowermost parcel compartment and the uppermost parcel compartment are separated or separable from each other with the aid of a flap,
- the flap is placeable into an open position and into a closed position;
- the lowermost and the uppermost parcel compartment are separated from each other by the flap when the flap is in the closed position; and
- the lowermost and the uppermost parcel compartment form a continuous space when the flap is in the open position.

[0017] In some embodiments, the letter compartment is contiguous to at least one parcel compartment, and the letter compartment is separated or separable from the parcel compartment with the aid of a flap, wherein the flap is raisable in the direction of the rear side of the device.

[0018] In a further aspect, the present invention provides a computer-implemented method for detecting a parcel in a parcel compartment with the aid of a parcel detection unit, wherein:

- the parcel detection unit comprises an optical detection unit and one or more light sources;
- the parcel detection unit is operatively connected to a processor module;

and wherein the method comprises the following steps:

- a. the registration of a calibration image with the aid of the optical detection unit, the calibration image comprising a representation of light emitted by the one or more light sources;
- b. the storage of the calibration image in a memory;
- c. the registration of a detection image with the aid of the optical detection unit, the detection image comprising a representation of light emitted by the one or more light sources, the light emitted by the one or more light sources being interacting or not with a parcel;
- d. the comparison of the detection image with the calibration image;
- e. the association of the detection image with the presence or with the absence of a parcel in the parcel compartment;

in which the parcel compartment preferably has a door, the door being provided with a door sensor being configured to detect the opening and closing of the door, and in which step c is preferably executed after the opening and/or closing of the door, more preferably after the closing of the door, still more preferably less than 5.0 minutes after the closing of the door, yet more preferably less than 1.0 minute after the closing of the door.

[0019] In a further aspect, the present invention com-

prises the use of a parcel detection unit, which comprises an optical detection unit and one or more light sources, for the detection of a parcel in a parcel compartment.

DESCRIPTION OF THE FIGURES

[0020]

Fig. 1 shows a device (100) according to the present invention for receiving and/or dispatching letters and parcels.

Fig. 2 shows a schematic representation of the components of an electromechanical module (200) and their operative connections according to the present invention.

Fig. 3 shows the rear side (110) of a device (100) for receiving and/or dispatching letters and parcels according to the present invention.

Fig. 4 shows three panels. Panel **A** shows a method for receiving letters. Panel **B** shows a method for receiving parcels. Panel **C** shows a method for the collection of letters and parcels.

Fig. 5 shows a device (100) for receiving letters and/or parcels.

[0021] Throughout the figures, same and/or similar reference symbols refer to same and/or similar elements. In particular throughout the figures, the following numbering is used: 100 - device for receiving and/or dispatching letters and parcels; 110 - rear side of the device; 120 - recess in the rear side of the device; 130 - wall coupling; 131 - projection with gripping hook; 132 - anchoring device; 140 - letter compartment; 150 - parcel compartment; 151 - bottom of the parcel compartment; 160 - field of vision; 200 - electromechanical module; 210 - power supply; 220 - smart module; 231 - lock; 232 - lock; 240 - camera; 241 - camera; 242 - camera; 300 - letterbox; 310 - rocker flap; 311 - opening for letters; 320 - flap; 400 - parcel compartment.

DETAILED DESCRIPTION

[0022] As further used in this text, the singular forms "a", "the" comprise both the singular and the plural form unless the context is clearly otherwise.

[0023] The terms "comprise", "comprises" as further used are synonymous with "inclusive (of)", "include" or "contain", "contains" and are inclusive or open and do not exclude additional, unnamed members, elements or method steps. The terms "comprise", "comprises" are inclusive of the term "contain".

[0024] The enumeration of numerical values on the basis of numerical ranges comprises all values and fractions within these ranges, as well as the cited end points.

[0025] The term "approximately", as used when reference is made to a measurable value such as a parameter, a quantity, a length of time, and so on, is meant to encompass variations of $\pm 10\%$ or less, preferably $\pm 5\%$

or less, more preferably $\pm 1\%$ or less, and still more preferably $\pm 0.1\%$ or less, of and from the specified value, insofar as the variations are practicable in the disclosed invention. It should be understood that the value to which the term "approximately" actually refers has also been disclosed.

[0026] All documents cited in the current specification are fully incorporated herein by means of reference.

[0027] Unless otherwise defined, all terms disclosed in the invention, inclusive of technical and scientific terms, have the meaning as commonly understood by a person skilled in the art. As a further guideline, definitions are incorporated for further clarification of terms which are used in the description of the invention.

[0028] In some aspects, the present invention comprises an electromechanical module for driving a device for receiving and/or dispatching letters and parcels. Generally, the present electromechanical modules are extremely suitable for installation in devices for receiving and/or dispatching letters and parcels. In particular the devices for receiving and/or dispatching letters and parcels can be made suitable for receiving and/or dispatching letters and parcels in the absence of a user.

[0029] Typically, the electromechanical module comprises the following components: a user interaction module, a communication module, and a locking/unlocking module, which comprises at least one electronic lock. Via the user interaction module, a code, for example, can be inputted or read in. The code is also termed a digital key. When the code conforms to a prespecified unlocking code, the electronic lock can be locked. The prespecified code can be called up, for example, via the communication module. In particular the prespecified code can be called up, for example, on a server remotely. Thus, parcels and/or letters can be very efficiently and expediently delivered and/or dispatched in the absence of a user.

[0030] Furthermore, the electromechanical module generally also comprises a parcel detection module. With the aid of a parcel detection module, a parcel can be detected, for example, in a parcel compartment of a device for receiving and/or dispatching letters and parcels. A parcel detection module comprises one or more parcel detection units.

[0031] Through the provision of a parcel detection unit in different parcel compartments, parcels in these different parcel compartments can be detected.

[0032] Typically, a parcel detection unit comprises an optical detection unit and one or more light sources or light projectors. An optical detection unit allows an object such as a parcel to be detected via light, for example light which has been reflected by the object and derives from the one or more light sources. The optical detection unit can comprise a CMOS or CCD sensor. The optical detection unit can also comprise one or more lenses, configured for the focusing of light emanating from the object.

[0033] Preferably, a parcel detection unit comprises a camera and one or more light sources. A camera is an example of an efficient and reliable optical detection unit.

However, alternative optical detection units without imaging can also be used (i.e. without the formation of image); for example based on the measurement of light transmission, based on the measurement of light reflection, and/or a combination thereof.

[0034] In particular for light transmission measurements, the one or more light sources are disposed in a way that their optical path is connected to the one or more corresponding light sensors, for example on opposite sides of the compartment. Accordingly, an object placed in the (parcel or letter) compartment will reduce and/or altogether stop the transmission of light from the light source to the corresponding light sensor and consequently register a detection of the object by the (parcel or letter) detection unit.

[0035] In particular for light reflectance measurements, the one or more light sources are disposed at an angle different from 180° relative to the one or more corresponding light sensors, for example side by side in the compartment, for example on a single side wall of the compartment. Alternatively, they (e.g. source and/or sensor) can also be placed on the same location as the camera. Accordingly an object placed in the (parcel or letter) compartment will change the amount of reflected light (e.g. intensity) collected by the corresponding light sensor and consequently register a detection of the object by the (parcel or letter) detection unit.

[0036] In some embodiments, the optical detection unit comprises a modulation unit configured for synchronous detection. During synchronous detection the light source's emission can be modulated based on a known frequency f_c (frequency modulation). By coupling the detection unit to the modulation frequency (e.g. with a noise cancelling unit), the reliability of the measured signals can be improved.

[0037] These are very efficient, reliable and user-friendly parcel detection units. In addition, the one or more light sources can further be configured to light up whenever the door of a parcel compartment is opened. In this way, the light sources acquire a dual purpose: in the first place, they form part of a parcel detection unit, and, in addition, they afford a user good visibility of the parcel compartment. Such dual functionality provides optimal ease of use at a minimal cost.

[0038] In addition, the electromechanical module also commonly comprises a processor module which is operatively connected to the other components of the electromechanical module. Thus the other components of the electromechanical module can be efficiently and reliably driven. The other components of the electromechanical module are, for example the user interaction module, the communication module, the locking/unlocking module and the parcel detection module.

[0039] An electromechanical module of this type is preferably installed in a device for receiving and/or dispatching letters and/or parcels. Thus letters and/or parcels can be efficiently and reliably delivered to a user, and/or dispatched by a user, when the user is not avail-

able to personally accept and/or dispatch the letters or parcels.

[0040] Furthermore, the present invention comprises a device for receiving and/or dispatching letters and/or parcels. Typically, the device comprises the following elements:

- an electromechanical module as herein described;
- a letter compartment;
- at least one parcel compartment; and/or
- a housing.

[0041] Typically, each parcel compartment comprises a parcel detection unit.

[0042] Such a device can be extremely efficiently and reliably used to receive and/or dispatch letters and parcels, in particular in the absence of the recipient and/or sender of the letters or parcels.

[0043] Furthermore, the present invention provides a method for detecting a parcel in a parcel compartment. Typically, for this detection, a parcel detection unit is used. Typically, the parcel detection unit comprises an optical detection unit. Preferably, the parcel detection unit comprises one or more light sources. Commonly, the parcel detection unit is operatively connected to a processor module.

[0044] The method typically comprises the following steps:

- a. the registration of a calibration image with the aid of the optical detection unit, the calibration image comprising a representation of light emitted by the one or more light sources;
- b. the storage of the calibration image in a memory;
- c. the registration of a detection image with the aid of the optical detection unit, the detection image comprising a representation of light emitted by the one or more light sources, the light emitted by the one or more light sources being broken by a parcel or not;
- d. the comparison of the detection image with the calibration image; and
- e. the association of the detection image with the presence or with the absence of a parcel in the parcel compartment.

[0045] In this way, a parcel in a parcel compartment can be efficiently and reliably detected. Thus it can likewise be efficiently and reliably examined whether a parcel has been effectively placed in the parcel compartment upon the delivery and/or dispatch of the parcel.

[0046] The present invention is further described in the following aspects:

In a first aspect, the present invention comprises an electromechanical module for driving a device for receiving and/or dispatching letters and parcels, which electromechanical module comprises the fol-

lowing components:

- a user interaction module;
- a communication module; and
- a locking/unlocking module, which comprises at least one electronic lock;

[0047] in which the electromechanical module further comprises the following elements:

- a parcel detection module, which comprises one or more parcel detection units, wherein at least one parcel detection unit comprises an optical detection unit and one or more light sources; and
- a processor module, which is operatively connected to the user interaction module, the communication module, the locking/unlocking module and the parcel detection module.

[0048] In some preferential embodiments, the electromechanical module for driving a device for receiving and/or dispatching letters and parcels comprises the following components:

- a user interaction module;
- a communication module; and
- a locking/unlocking module, which comprises at least one electronic lock;

in which the electromechanical module further comprises the following elements:

- a parcel detection module, which comprises one or more parcel detection units which detect parcels placed in a parcel compartment, wherein at least one parcel detection unit comprises an optical detection unit and one or more light sources; and a letter detection module, which detects letters deposited in a letter compartment; and
- a processor module, which is operatively connected to the user interaction module, the communication module, the locking/unlocking module, the parcel detection module and the letter detection module.

[0049] This electromechanical module can be installed in a device for receiving and/or dispatching letters and parcels. Thus, the device for receiving and/or dispatching letters and parcels can be made suitable for receiving and/or dispatching letters and parcels in the absence of the recipient and/or sender of the letters or parcels. In particular, parcel detection units which comprise an optical detection unit and one or more light sources allow a very robust detection of parcels. This is in contrast to parcel detection units which are based on a load cell. In particular parcel detection units which are based on a load cell are more prone to faults, in particular in the case of parcels having a low weight. Preferably, the user interaction module is configured to receive authentication

information from a user. In this way, ready access to a device for receiving and/or dispatching letters and parcels can be given to authorized persons. An example of an authorized person is a courier who delivers a parcel, or a recipient of a parcel, or a sender of a parcel, or a courier who collects a parcel. At the same time, this is an efficient, expedient and reliable way of denying unauthorized persons access to a device for receiving and/or dispatching letters and parcels. An example of an unauthorized person is a parcel thief.

[0050] In some embodiments, the electromechanical module comprises one or more user interaction modules. In this way, users can use the electromechanical module in a more flexible manner.

[0051] Preferably, all parcel detection modules comprise at least one optical detection unit and one or more light sources. In this way, parcels can be very efficiently, expediently, reliably and robustly detected in each parcel compartment in which a parcel detection module is installed. Preferably, the optical detection unit comprises a camera. Preferably, the processor module comprises a PCB, which comprises a processor. This benefits the cost-effectiveness of electromechanical modules according to the present invention.

[0052] In some embodiments, the locking/unlocking module comprises at least one electrically driven hinge. Thus a door of a parcel compartment of a device for receiving and/or dispatching letters and parcels can be efficiently and reliably opened with the locking/unlocking module.

[0053] A user interaction module is a module which is suitable for receiving information from a user, and/or for providing information to a user. User interaction modules are described in more detail later in this text.

[0054] A communication module is a module which is suitable for communicating with a server remotely. The communication can be realized with the aid of a connection such as an internet connection, telephone connection, or fax connection. The connection can be wireless or not.

[0055] In some embodiments, the communication module comprises a module which makes use of ISM (industrial, scientific and medical) radio wavelengths, and/or which makes use of UNB (Ultra Narrow Band) modulation. An example of a communication module which makes use of ISM wavelengths and UNB modulation is a SIGFOX module. A further example of a suitable communication module is a LORA module. Such modules allow communication to be made at a very low cost per sent message.

[0056] In some embodiments, the electromechanical module comprises a communication module which is integrated with the power supply module. This can be realized, for example, with the aid of "power line communication (PLC)" technology. In PLC technology, the communication is realized via the electricity network.

[0057] In some embodiments, the electromechanical module comprises a power supply module which is inte-

grated with a communication module. This can be realized, for example, with the aid of "power over ethernet (POE)" technology.

[0058] In this way, an electromechanical module can work fully (or partially) on a stand-alone basis, with only limited interposition, or even without interposition, of further hardware of a user.

[0059] Preferably, the communication module is configured and/or configurable to be operatively connected and/or connectable to a server remotely, which will be expounded upon later.

[0060] In some embodiments, the electromechanical module comprises one or more communication modules. This benefits the multipurpose usability of the electromechanical module. Furthermore, through the addition of redundancy, the reliability of the electromechanical module can also be increased. A locking/unlocking module is a module which is operatively connected to the processor module and which comprises at least one electronic lock. The electronic lock can be operatively connected to the door of a parcel compartment, for example, and can be configured, driven by the processor module, to open and close the door of the parcel compartment.

[0061] In some embodiments, the electromechanical module comprises one or more locking/unlocking modules. In this way, the electromechanical module can be used in small systems, medium-sized systems, or large systems. An example of a small system is a smart letterbox having one parcel compartment for a single-family dwelling. An example of a medium-sized system is a smart letterbox having three parcel compartments for an apartment block comprising three apartments. An example of a large system is a smart letterbox having n parcel compartments in an apartment block comprising n apartments, wherein n is greater than 3, 4, 8, 16, 32, 64, or 128. Preferably, for use in apartment blocks, at least one locking/unlocking module is provided per apartment.

[0062] A parcel detection module is a module which comprises one or more parcel detection units. When the electromechanical module is used in a smart letterbox having a plurality of parcel compartments, then preferably one parcel detection unit per parcel compartment is employed. This is an efficient use of resources.

[0063] A parcel detection unit is a device which is suitable for detecting parcels. The details of the parcel detection unit are given elsewhere in this document. Preferably, parcels are detected with a parcel detection unit as provided herein and/or according to a method for detecting parcels as provided herein. This method is explained elsewhere in this text in detail.

[0064] A processor module is a module which comprises a processor chip.

[0065] Preferably, the different components of the electromechanical module are operatively connected and/or connectable to one another by means of cabling. This is a very cost-effective way of connecting the different components of the electromechanical module one to another. Moreover, this can increase the security of the

electromechanical module, since wire connections can be better proof against external influences by comparison with wireless connections. In some embodiments, however, the different components of the electromechanical module are operatively connected to one another via a wireless connection. This can be an efficient and reliable way of connecting the different components of the electromechanical module one to another.

[0066] Typically, the user interaction module, the communication module, and the processor module are encompassed in a smart module. A smart module preferably likewise comprises a housing which encloses the user interaction module, the communication module, and the processor module. This can increase the modularity and the ease of use of the present electromechanical modules.

[0067] In some embodiments, the electromechanical module is operatively connectable and/or connected to a memory module.

[0068] In this way, information can be locally stored in the electromechanical module.

[0069] In some embodiments, the memory module comprises a SIM card (subscriber identity module). SIM cards are very cost-effective memory modules.

[0070] In some embodiments, the memory module comprises an internal memory which is installed in the electromechanical module. This increases the storage capacity of the memory module.

[0071] In some embodiments, the electromechanical module comprises both a removable memory and an internal memory. The removable memory is, for example, a SIM card. In this way, an electromechanical module can be provided with a very extensive memory, some parts of which can be mechanically removed. This can be an efficient and reliable way of transferring user-specific information, which can be stored on the removable memory, for example from one electromechanical module to another electromechanical module.

[0072] In some embodiments, the electromechanical module as herein described forms part of a kit, in which the kit comprises an electromechanical module and a memory module. In this way, an electromechanical module can be efficiently, rapidly, expediently and reliably installed.

[0073] In some embodiments, the one or more light sources from the parcel detection module comprise one or more light-emitting diodes (LEDs).

[0074] LED lighting can be a very space-efficient and energy-efficient and reliable light source; for example by comparison with conventional light sources. Thus the space-efficiency and energy efficiency of electromechanical modules according to the present invention is increased by the use of LEDs.

[0075] In some embodiments, the electromechanical module is operatively connected and/or operatively connectable to a SIM card.

[0076] In some embodiments, the user interaction module is chosen from the list comprising the following

user interaction modules: a matrix barcode reader, a linear barcode reader, a module for identification with radio waves (such as an RFID module, such as an NFC module, such as a bluetooth module), and a combination of a plurality of the preceding user interaction modules.

[0077] These user interaction modules allow a very efficient and reliable interaction between a user and an electromechanical module according to the present invention.

[0078] An example of a matrix barcode is a QR code. An example of a linear barcode is a traditional barcode. An example of a module for identification with radio waves is an RFID module. An example of a module for identification with radio waves is an NFC module. An example of a module for the identification with radio waves is a bluetooth module. However, there are also other modules for identification with radio waves, such as known by the person skilled in the art. The choice of module is determined on the basis of the desired range, centre frequency and band width. Consequently, a combination of modules can also be used, in order to obtain a wider user interaction surface.

[0079] In some embodiments, the user interaction module comprises a touch screen. With a touch screen, users can interact in a very intuitive way with the electromechanical module.

[0080] In some embodiments, the user interaction module comprises a matrix barcode reader, a linear barcode reader, and an RFID module.

[0081] In some embodiments, the user interaction module comprises a matrix barcode reader, a linear barcode reader and an NFC module. In some embodiments, the user interaction module comprises a matrix barcode reader, a linear barcode reader and a bluetooth module. In this way/these ways, users can interact very efficiently and expediently with the electromechanical module.

[0082] In some embodiments, the electromechanical module further comprises a letter detection module. In this way, letters which are deposited in the letter compartment can be efficiently and reliably detected.

[0083] Preferably, the letter detection module comprises a rocker flap sensor. This is a very cost-effective embodiment of a letter detection module. The letter detection module can however also comprise other sensors for the detection of letters, such as an optical detector.

[0084] In some embodiments, the electromechanical module further comprises a power supply module. This is an efficient and reliable way of powering an electromechanical module.

[0085] In some embodiments, the power supply module comprises a solar panel and a battery. Thus, power can be efficiently and reliably generated and stored in and/or for the electromechanical module.

[0086] In some embodiments, the power supply module comprises a connecting device for connection to mains voltage. This can be an efficient and reliable way of supplying power in the absence of sufficient sunlight.

[0087] In some embodiments, the power supply mod-

ule comprises both a solar panel and battery and a connecting device for connection to mains voltage. Thus, the electromechanical module can be efficiently provided with green electricity, whilst, at the same time, the connection to mains voltage offers a redundant electricity supply for periods of limited incidence of sunlight. At the same time, the solar cell and battery offer a redundant electricity supply device for when the electricity grid fails due to a power cut. Thus, the influence of power-related disruptions to the delivery and/or dispatch of parcels is minimized with the aid of electromechanical modules according to the present invention.

[0088] In some embodiments, the electromechanical module further comprises a parcel indicator, the parcel indicator being operatively coupled with the parcel detection module. In this way, a user can be efficiently, rapidly and reliably notified of the presence of a parcel.

[0089] The term "parcel indicator" as used herein refers to a device which is configured to indicate to a user whether or not a parcel is detected by the parcel detection module. A parcel indicator typically comprises a light-emitting element. This is a very intuitive embodiment of a parcel indicator. The light-emitting element is, for example, an LED (light-emitting diode). This is a very energy-efficient form of a light-emitting element. When the electromechanical module is installed in a letterbox which comprises a parcel compartment, then the parcel indicator is preferably configured to indicate whether or not a parcel is lying in the parcel compartment. It can thus be easily and efficiently established by a user that there is a parcel present in the parcel compartment.

[0090] In some embodiments, the parcel indicator comprises a light-emitting body which is configured to light up when there is a parcel lying in the parcel compartment, and to go out when there is no parcel lying in the parcel compartment.

[0091] Typically, the light-emitting body lights up only when there is a parcel lying in the parcel compartment and when a user has provided authentication. Thus, non-authorized persons cannot know whether or not a parcel is present in the parcel compartment. This improves the privacy of users and the security of parcels.

[0092] In some embodiments, the electromechanical module is configured to operate in at least two modes, including at least a sleep mode and a stand-by mode, wherein the electromechanical module further comprises an activatable on-off switch, which is configured to, when activated, bring the electromechanical module from the stand-by mode into the sleep mode, or to bring the electromechanical module from the sleep mode into the stand-by mode. Thus, the energy efficiency and reliability of an electromechanical module according to the present invention is increased.

[0093] The term "sleep mode" as used herein refers to a configuration of an electromechanical module in which energy is saved by deactivating one or more components of the electromechanical module. In some embodiments, all components of the electromechanical module are de-

activated in the sleep mode.

[0094] The term "stand-by mode" as used herein refers to a configuration in which, by comparison with the sleep mode, more components of the electromechanical module are activated.

[0095] The phrase "activatable on-off switch" as used herein refers to a switch which is configured to, when activated, switch the electromechanical module from the stand-by mode into the sleep mode or from the sleep mode into the stand-by mode.

[0096] In a further aspect, the present invention comprises a device for receiving and/or dispatching letters and parcels. Typically, the device comprises one or more elements chosen from the list comprising:

- an electromechanical module, preferably an electromechanical module according to the first aspect of the present invention or an embodiment thereof;
- a letter compartment;
- at least one parcel compartment; and
- a housing.

[0097] With the aid of such a device, parcels can be very efficiently, rapidly and reliably received and/or dispatched in the absence of a user.

[0098] Typically, at least one, preferably each parcel compartment, comprises a parcel detection unit. Parcels can thus be detected in each parcel unit. Thus, a user can know in which parcel compartment a delivered parcel and/or a parcel to be dispatched is placed. Also a courier can know whether there is still space in a specific parcel compartment for a parcel which is to be delivered. In addition, a user can in this way easily learn whether there is still space to dispatch a parcel in a parcel compartment.

[0099] Thus, the present invention comprises in its second aspect a device for receiving and/or dispatching letters and parcels, wherein the device comprises the following elements:

- an electromechanical module according to the first aspect of the present invention, or an embodiment thereof;
- a letter compartment;
- at least one parcel compartment; and
- a housing;

in which

- each parcel compartment comprises a parcel detection unit.

[0100] Such a device can be extremely efficiently and reliably used for receiving and/or dispatching letters and parcels, in particular in the absence of the recipient and/or sender of the letters or parcels. Also, such a device is very easy to install, even plug and play. Furthermore, a device according to the present invention is self-supporting. It is, as it were, a multipurpose stand-alone unit,

which can be placed at a variety of locations. Thus, the device can be placed, for example, on a driveway in front of the house of a user. Furthermore, the device can be placed, for example, on a wall of the house of an owner, or in the vicinity of the workplace of an owner.

[0101] In a home and/or business context, a device according to the present invention can also be used, for example, for the forwarding and/or delivery of personal documents.

[0102] The term "letter compartment" as used herein used refers to a compartment which is suitable for receipt and/or dispatch of letters.

[0103] The term "parcel compartment" as used herein refers to a compartment which is suitable for the receipt and/or dispatch of parcels. In some embodiments, one or more parcel compartments are configured to comprise one parcel. In some embodiments, one or more parcel compartments are configured to comprise a plurality of parcels. In some embodiments, a device for receiving and/or dispatching letters and/or parcels comprises one or more parcel compartments.

[0104] The term "housing" as used herein refers to a structural element of a device for receiving and/or dispatching letters and parcels, which structural element forms a mechanical barrier between the outside world and an electromechanical module, a letter compartment, and/or at least one parcel compartment.

[0105] In some embodiments, the locking/unlocking module and/or the cabling are encased in the housing. This can increase the ease of use.

[0106] In some embodiments, the parcel compartment is cooled, for example with the aid of a heat pump which is installed in the device for receiving and/or dispatching letters and parcels.

[0107] In some embodiments, each parcel compartment comprises walls, and for each parcel compartment it is the case that:

- the optical detection unit of the parcel detection unit is fastened to a first wall of the parcel compartment; and
- the one or more light sources of the parcel detection unit are fastened to a wall of the parcel compartment, which wall is adjacent to or opposite to the wall to which the optical detection unit of the parcel detection unit is fastened.

[0108] In this way, a parcel in a parcel compartment can be efficiently detected.

[0109] Preferably, the field of vision of the optical detection unit comprises the bottom of the parcel compartment. This increases the efficiency, reliability and robustness of the parcel detection. Preferably, the optical detection unit comprises a camera.

[0110] In some embodiments, the bottom of a parcel compartment comprises stainless steel. This ensures an excellent wear resistance and corrosion resistance of the bottom of the parcel compartment. In some embodi-

ments, the stainless steel is shaped as strips.

[0111] In some embodiments, the device is configured and/or configurable to be operatively connected to one or more central servers. Preferably, the connection is effected with a communication module, such as described above. Preferably, information on users, parcels, parcel compartments, and smart letterboxes is stored in an electronic memory contained in the one or more central servers.

[0112] Preferably, the one or more central servers are configured to assign renewable codes to users, parcels, and/or devices for receiving and/or dispatching parcels. This increases the security. Furthermore, shorter codes can in this way be used, so that the data traffic can be reduced. This also further improves the security. Preferably, the renewable codes comprise no identifier which is statically associated with a parcel compartment. This too improves the security. This also allows shorter codes, which reduces the data traffic for the same functionality.

[0113] In some embodiments, the doors are rotatably connected to the housing via one or more hinges. Preferably, the hinges are encased by the housing. Thus, a situation in which parcels are damaged by protruding components of the hinges can be avoided. Preferably, the opening for letters comprises a rocker flap. Thus, the letter compartment can be efficiently and reliably shielded from rain and wind. Preferably, each door gives access to one parcel compartment. This is an efficient use of resources. In some embodiments, the device comprises one parcel compartment. This is an efficient, expedient and reliable solution as regards position, optics. It is also a cost-effective solution when only one parcel at a time is delivered and/or dispatched. In some embodiments, the device comprises two parcel compartments. Thus, two parcels can easily be delivered and/or dispatched simultaneously. Preferably, the device has a front side and a rear side.

[0114] In some embodiments, one or more doors in the front side of the device give access to one or more parcel compartments. Thus, the one or more parcel compartments can be efficiently and reliably reached.

[0115] In some embodiments, an opening for letters in the front side of the device gives access to the letter compartment. Thus, the letter compartment is easily accessible for letters. In some embodiments, the front side comprises a rocker flap. Thus, the letter compartment is well shielded against rain and wind. Preferably, the rocker flap is hinge-fastened to the front side of the device. Thus, the rocker flap can easily be opened. Preferably, the rocker flap is configured to make the letter compartment accessible for letters. Thus, letters can be easily deposited in the letter compartment. Preferably, the rocker flap comprises a gripping edge. Thus, the rocker flap can be easily opened. Preferably, the rocker flap comprises a holder for a nameplate. Thus, name and address of a user can be effectively and efficiently portrayed on a device for receiving and/or dispatching letters and parcels according to the present invention.

[0116] Thus, in some embodiments:

- the device has a front side and a rear side;
- the rear side is closed off by means of the housing;
- the front side is closed off by means of the housing, an opening for letters and one or more doors,
- the an opening for letters gives access to the letter compartment;
- the doors of the one or more doors give access to one or more parcel compartments; and
- the front side comprises a rocker flap, wherein the rocker flap is hinge-fastened to the front of the device, and wherein the rocker flap is configured to make the letter compartment accessible for letters.

[0117] In this way, parcels and letters can be very efficiently and reliably delivered, dispatched and/or collected.

[0118] In some embodiments, the doors comprise glass. This can be a cost-effective embodiment of a door. In some embodiments, the doors have a thickness of 4.0 mm. This provides a good balance between mechanical strength and material usage. Preferably, the device is configured to be operatively and reversibly connectable to a SIM card via the rear side of the device.

[0119] In some embodiments, the device comprises two parcel compartments, a lowermost parcel compartment and an uppermost parcel compartment, wherein

- the lowermost parcel compartment is placed under the uppermost parcel compartment;
- the lowermost parcel compartment and the uppermost parcel compartment are separated or separable from each other with the aid of a flap,
- the flap is placeable in an open position and in a closed position;
- the lowermost and the uppermost parcel compartment are separated from each other by the flap when the flap is in the closed position; and
- the lowermost and the uppermost parcel compartment form a continuous space when the flap is in the open position.

[0120] In this way, the device can be efficiently configured for the receipt and/or dispatch of parcels of different sizes without wastage of space.

[0121] In some embodiments, the letter compartment is contiguous to at least one parcel compartment, and the letter compartment is separated or separable from the parcel compartment with the aid of a flap, wherein the flap is raisable in the direction of the rear side of the device.

[0122] Such a flap is generally only visible to a deliverer of a parcel. This can thus improve the privacy of a user.

[0123] Preferably, the flap comprises a handle. Thus, a user can effectively and efficiently open the flap. Preferably, the flap has to be opened manually by the owner of the device. This is a cost-effective construction. How-

ever, in some embodiments the flap can be opened and closed automatically. This can yield a time gain during the collection of letters.

[0124] In some embodiments, the flap is unlocked once a user has executed a specific authentication step. In some embodiments, the specific authentication step comprises the use of a digital key. In this way, access to the letter compartment can be granted to an owner of the device and access to the letter compartment can also be denied to users who have no authorization to read the letters, an example of such users being deliverers of parcels.

[0125] In some embodiments, the device further comprises a stand. In this way, the device can be effectively and efficiently positioned on the ground floor.

[0126] In some embodiments, the device further comprises a wall coupling, wherein

- the wall coupling is suitable for fastening to and/or to be fastened to a wall;
- the wall coupling is fastened or fastenable to the rear side of the letter compartment and/or to the rear side of one or more parcel compartments.

[0127] In this way, the device can be effectively and efficiently fastened to a wall.

[0128] In some embodiments, the connection between the wall coupling and the rear side of the device comprises a reversible connection. The reversible connection typically comprises an elongated recess in the rear side of the device, and a projection - with gripping hook - of the wall coupling. The projection - with gripping hook - of the wall coupling is configured to be slidable through the recess in the rear side of the device. The gripping hook of the projection interacts with the rear side of the device to form an obstruction against lateral translation of the device for receiving and/or dispatching letters and parcels, in the direction transversely to the wall coupling, and away from the wall coupling. This can facilitate the fastening of a device according to the present invention to a wall.

[0129] In some embodiments, the mechanical connection between the wall coupling and the device for receiving and/or dispatching letters and parcels comprises one or more anchoring devices, for example three anchoring devices. This can strengthen the mechanical connection between the wall coupling and the device for receiving and/or dispatching letters and parcels. Consequently, the device is also less easily displaceable, which increases the security of the parcels and the letters which are delivered and/or dispatched with the aid of the device.

[0130] In some embodiments, the anchoring device is chosen from the list comprising: screws, bolts and rivets. Thus, a very efficient and cost-effective anchorage can be obtained.

[0131] In a further aspect, the present invention comprises a method for detecting a parcel in a parcel compartment. Preferably, the parcel is detected with the aid

of a parcel detection unit. Thus, parcels can be very efficiently and reliably detected.

[0132] Typically, the parcel detection unit comprises an optical detection unit and one or more light sources.

This increases the efficiency and reliability of the parcel detection. With such a parcel detection unit, parcels can be detected more robustly by comparison with parcel detection units which are based on parcel detection with a load cell. In other words, parcel detection units which comprise an optical detection unit and one or more light sources are less prone to erroneous parcel detection than parcel detection units which are based on a load cell. Preferably, the optical detection unit comprises a camera. A camera is an example of an efficient and reliable optical detection unit. Alternative optical detection units can also, however, be used.

[0133] Typically, the parcel detection unit is operatively connected to the processor module. In this way, images which are detected by the optical detection unit can be efficiently and reliably processed.

[0134] Preferably, the third aspect of the present invention provides a computer-implemented method for detecting a parcel in a parcel compartment with the aid of a parcel detection unit, wherein:

- the parcel detection unit comprises an optical detection unit and one or more light sources;
- the parcel detection unit is operatively connected to a processor module;

and wherein the method comprises the following steps:

- a. the registration of a calibration image with the aid of the optical detection unit, the calibration image comprising a representation of light emitted by the one or more light sources;
- b. the storage of the calibration image in a memory;
- c. the registration of a detection image with the aid of the optical detection unit, the detection image comprising a representation of light emitted by the one or more light sources, the light emitted by the one or more light sources being interactive with a parcel or not;
- d. the comparison of the detection image with the calibration image;
- e. the association of the detection image with the presence or with the absence of a parcel in the parcel compartment;

[0135] in which the parcel compartment preferably has a door, the door being provided with a door sensor being configured to detect the opening and closing of the door, and in which step c is preferably executed after the opening and/or closing of the door, more preferably after the closing of the door, still more preferably less than 5.0 minutes after the closing of the door, yet more preferably less than 1.0 minute after the closing of the door.

[0136] In this way, parcels can be very efficiently de-

livered to, and/or dispatched by, a user, in the absence of the user. Parcels can thus be very robustly detected.

[0137] Preferably, this method is executed with the aid of an electromechanical module according to the present invention. This increases the efficiency and reliability of the method. Preferably, this method is executed with the aid of a device for receiving and/or dispatching letters and parcels according to the present invention. This increases the efficiency and reliability of the method.

[0138] In some embodiments, step d comprises the following sub-steps:

- d1. the determination of the difference between the calibration image and the detection image;
- d2. the comparison of the difference between the calibration image and the detection image with a threshold value;

and step e comprises one of the following sub-steps:

- e1. if the difference between the calibration image and the detection image is greater than, or is equal to, the threshold value, the execution of the step: the association of the detection image with the presence of a parcel in the parcel compartment by the processor module;
- e2. if the difference between the calibration image and the detection image is greater than, or is equal to, the threshold value, the execution of the step: the association of the detection image with the absence of a parcel in the parcel compartment by the processor module.

[0139] Thus, the efficiency, reliability and/or robustness of the detection can be improved.

[0140] In some embodiments:

- step d1 comprises the determination of the difference between the light intensity of one or more pixels of the calibration image with corresponding pixels of the detection image. Corresponding pixels are pixels which physically conform to one another in the image detection chip of the optical detection unit.
- step d2 comprises the comparison of the difference between the light intensity of one or more corresponding pixels.

[0141] Thus, parcels can be efficiently and reliably detected.

[0142] In some embodiments:

- step d1 comprises the summation of the light intensities of one or more pixels in the calibration image and the summation of the light intensity of one or more corresponding pixels in the detection image; and
- step d2 comprises the comparison of the summated light intensity of the one or more pixels of the cali-

bration image and the summated light intensity of the one or more corresponding pixels of the detection image.

[0143] Thus, parcels can be efficiently and reliably detected.

[0144] In a further aspect, the present invention comprises the use of a parcel detection unit, which comprises an optical detection unit and one or more light sources, for detecting a parcel in a parcel compartment. Thus, parcels can be very robustly and efficiently detected. Preferably, the optical detection unit is a camera.

[0145] Preferably, the parcel detection unit is a parcel detection unit as described above. In this way, parcels can be very reliably, accurately, efficiently and robustly detected.

[0146] In a further aspect, the present invention comprises the use of an electromechanical module according to an embodiment as herein described.

[0147] In a further aspect, the present invention comprises the use of a device for receiving and/or dispatching letters and parcels according to an embodiment as herein described.

25 EXAMPLES

[0148] In order to further illustrate the characteristics, advantages and particularities of this invention, a few preferential embodiments are explained in greater detail below with reference to the figures. It is clear that such an explanation must not be interpreted as a limitation for the scope of the invention as such, and in particular as expressed in the in the hereinafter following claims.

35 Example 1

[0149] By way of example, we refer to Fig. 1. Fig. 1 shows a device (100) for receiving and/or dispatching letters and parcels. The device comprises a letterbox (300), a parcel compartment (400), and an electromechanical module which comprises a smart module (220). The letterbox (300) comprises a rocker flap (310).

45 Example 2

[0150] By way of further example, we refer to Fig. 2. Fig. 2 shows a schematic representation of an electromechanical module (200). In particular different components of the electromechanical module (200) and their mutual operative connections are shown.

[0151] The electromechanical module comprises a smart module (220). The smart module is operatively connected to a power supply module (210). The power supply module provides power for the other components of the electromechanical module (200). Furthermore, the smart module (220) is operatively connected to two locks (231,232) and two cameras (241,242).

Example 3

[0152] By way of further example, we refer to Fig. 3. Fig. 3 shows a device (100), for receiving and/or dispatching letters and parcels and, in particular, a detail of the rear side (110) of this device (100). The rear side (110) of the device (100) comprises two recesses (120). The two recesses (120) are configured to form a connection, reversible or not, to a wall coupling (130). In particular the connection is formed with a projection with gripping hook (131), which forms part of the wall coupling (130). Furthermore, the wall coupling (130) is further connected to the rear side (110) of the device (100) with the aid of three anchoring devices (132).

Example 4

[0153] By way of further example, we refer to Fig. 4. Fig. 4 shows the use of a device (100) for receiving and/or dispatching letters (panel A) for the receipt and/or dispatch of parcels (panel B), and for the collection of letters and parcels (panel C). The receipt and/or dispatch of letters is realized by means of an opening for letters (311). The receipt and/or dispatch of parcels is realized in a parcel compartment (400). The collection of parcels is realized directly from the parcel compartment (400). The collection of letters is realized via a flap (320) between a letter compartment (not shown) and the parcel compartment (400).

Example 5

[0154] By way of further example, we refer to Fig. 5. Fig. 5 shows a device (100) for receiving and/or dispatching letters and parcels. The device (100) comprises a letter compartment (140), a parcel compartment (150), and a smart module (220). The letter compartment (140) comprises a camera (240). The field of vision (140) of the camera (240) comprises the bottom (151) of the parcel compartment (150). Thus, parcels can be reliably, accurately, efficiently and robustly detected.

Claims

1. Electromechanical module for driving a device for receiving and/or dispatching letters and parcels, which electromechanical module comprises the following components:
 - a user interaction module;
 - a communication module; and
 - a locking/unlocking module, which comprises at least one electronic lock;

characterized in that the electromechanical module further comprises the following elements:

- a parcel detection module, which comprises one or more parcel detection units which detect parcels placed in a parcel compartment, wherein at least one parcel detection unit comprises an optical detection unit and one or more light sources; and
- a letter detection module, which detects letters deposited in a letter compartment; and
- a processor module, which is operatively connected to the user interaction module, the communication module, the locking/unlocking module, the parcel detection module and the letter detection module.

2. Electromechanical module according to Claim 1, wherein the one or more light sources from the parcel detection module comprise one or more light-emitting diodes (LEDs).
3. Electromechanical module according to one of Claims 1 to 2, wherein the user interaction module is chosen from the list containing the following user interaction modules: a matrix barcode reader, a linear barcode reader, a module for identification with radio waves (such as an RFID module, such as an NFC module, such as a bluetooth module) and/or a combination of a plurality of the preceding user interaction modules.
4. Electromechanical module according to one of Claims 1 to 3, wherein the optical detection unit is a camera.
5. Electromechanical module according to one of Claims 1 to 4, which further comprises a power supply module.
6. Electromechanical module according to one of Claims 1 to 5, which further comprises a parcel indicator, the parcel indicator being operatively coupled with the parcel detection module.
7. Electromechanical module according to one of Claims 1 to 6, which is configured to operate in at least two modes, including at least a sleep mode and a stand-by mode, wherein the electromechanical module further comprises an activatable on-off switch which is configured to, when activated, bring the electromechanical module from the stand-by mode into the sleep mode, or to bring the electromechanical module from the sleep mode into the stand-by mode.
8. Use of the electromechanical module according to one of Claims 1 to 7 for driving a device for receiving and/or dispatching letters and parcels.
9. Device for receiving and/or dispatching letters and

parcels, wherein the device comprises the following elements:

- an electromechanical module according to one of Claims 1 to 7;
- a letter compartment;
- at least one parcel compartment; and
- a housing;

in which

- each parcel compartment comprises a parcel detection unit and walls.

- 10.** Device according to Claim 9, in which each parcel compartment comprises walls, and in which for each parcel compartment:

- the optical detection unit of the parcel detection unit is fastened to a first wall of the parcel compartment; and
- the one or more light sources of the parcel detection unit are fastened to a wall of the parcel compartment, which wall is adjacent to or opposite to the wall to which the optical detection unit of the parcel detection unit is fastened.

- 11.** Device according to one of Claims 9 or 10, in which

- the device has a front side and a rear side;
- the rear side is closed off by means of the housing;
- the front side is closed off by means of the housing, an opening for letters and one or more doors,
- the opening for letters gives access to the letter compartment;
- the doors of the one or more doors give access to one or more parcel compartments; and
- the front side comprises a rocker flap, wherein the rocker flap is hinge-fastened to the front of the device, and wherein the rocker flap is configured to make the letter compartment accessible for letters.

- 12.** Device according to one of Claims 10 to 11, which comprises two parcel compartments, a lowermost parcel compartment and an uppermost parcel compartment, wherein

- the lowermost parcel compartment is placed under the uppermost parcel compartment;
- the lowermost parcel compartment and the uppermost parcel compartment are separated or separable from each other with the aid of a flap,
- the flap is placeable into an open position and into a closed position;
- the lowermost and the uppermost parcel com-

partment are separated from each other by the flap when the flap is in the closed position; and

- the lowermost and the uppermost parcel compartment form a continuous space when the flap is in the open position.

- 13.** Device according to one of Claims 10 to 12, wherein the letter compartment is contiguous to at least one parcel compartment, and in which the letter compartment is separated or separable from the parcel compartment with the aid of a flap, wherein the flap is raisable in the direction of the rear side of the device.

- 14.** Computer-implemented method for detecting a parcel in a parcel compartment with the aid of a parcel detection unit, wherein:

- the parcel detection unit comprises an optical detection unit and one or more light sources;
- the parcel detection unit is operatively connected to a processor module;

and wherein the method comprises the following steps:

- a. the registration of a calibration image with the aid of the optical detection unit, the calibration image comprising a representation of light emitted by the one or more light sources;
- b. the storage of the calibration image in a memory;
- c. the registration of a detection image with the aid of the optical detection unit, the detection image comprising a representation of light emitted by the one or more light sources, the light emitted by the one or more light sources being interactive or not with a parcel;
- d. the comparison of the detection image with the calibration image;
- e. the association of the detection image with the presence or with the absence of a parcel in the parcel compartment;

in which the parcel compartment preferably has a door, the door being provided with a door sensor being configured to detect the opening and closing of the door, and in which step c is preferably executed after the opening and/or closing of the door, more preferably after the closing of the door, still more preferably less than 5.0 minutes after the closing of the door, yet more preferably less than 1.0 minute after the closing of the door.

- 15.** Method according to Claim 14, wherein step d comprises the following sub-steps:

- d1. the determination of the difference between the calibration image and the detection image;

d2. the comparison of the difference between the calibration image and the detection image with a threshold value;

and wherein step e comprises one of the following sub-steps: 5

e1. if the difference between the calibration image and the detection image is greater than, or is equal to, the threshold value, the execution of the step: the association of the detection image with the presence of a parcel in the parcel compartment by the processor module; 10

e2. if the difference between the calibration image and the detection image is greater than, or is equal to, the threshold value, the execution of the step: the association of the detection image with the absence of a parcel in the parcel compartment by the processor module. 15

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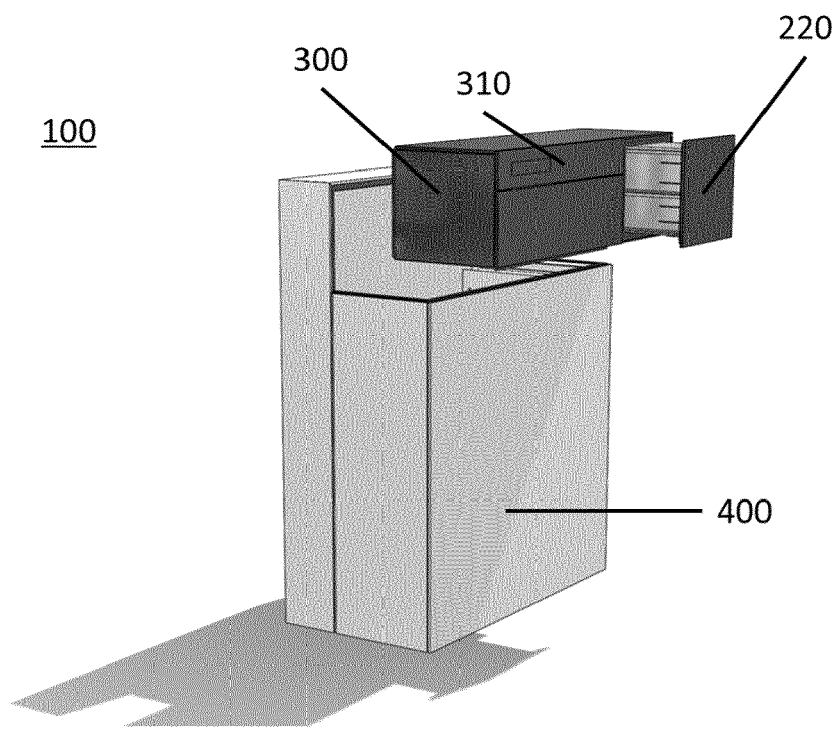


FIG. 1

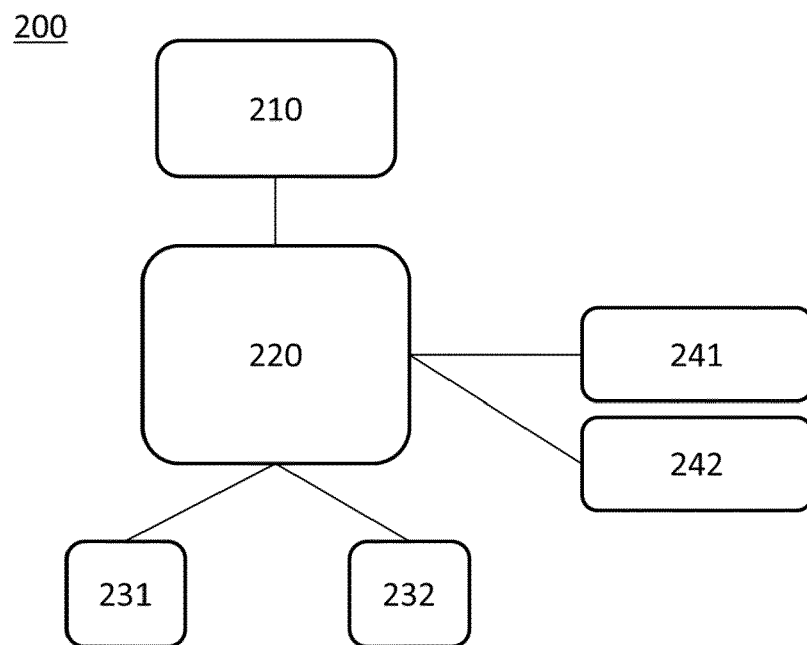


FIG. 2

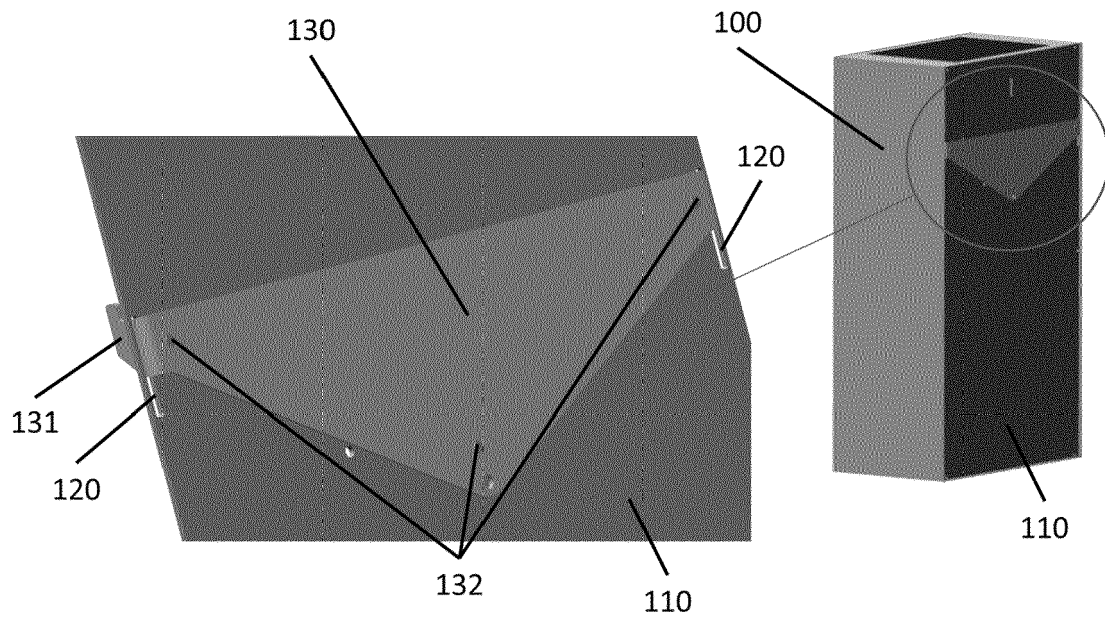


Fig. 3

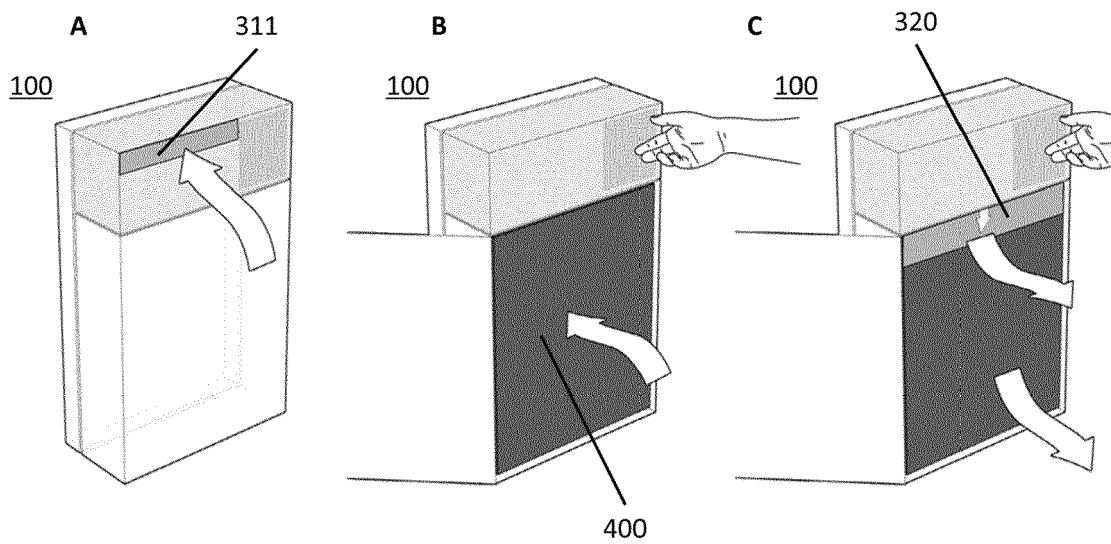


FIG. 4

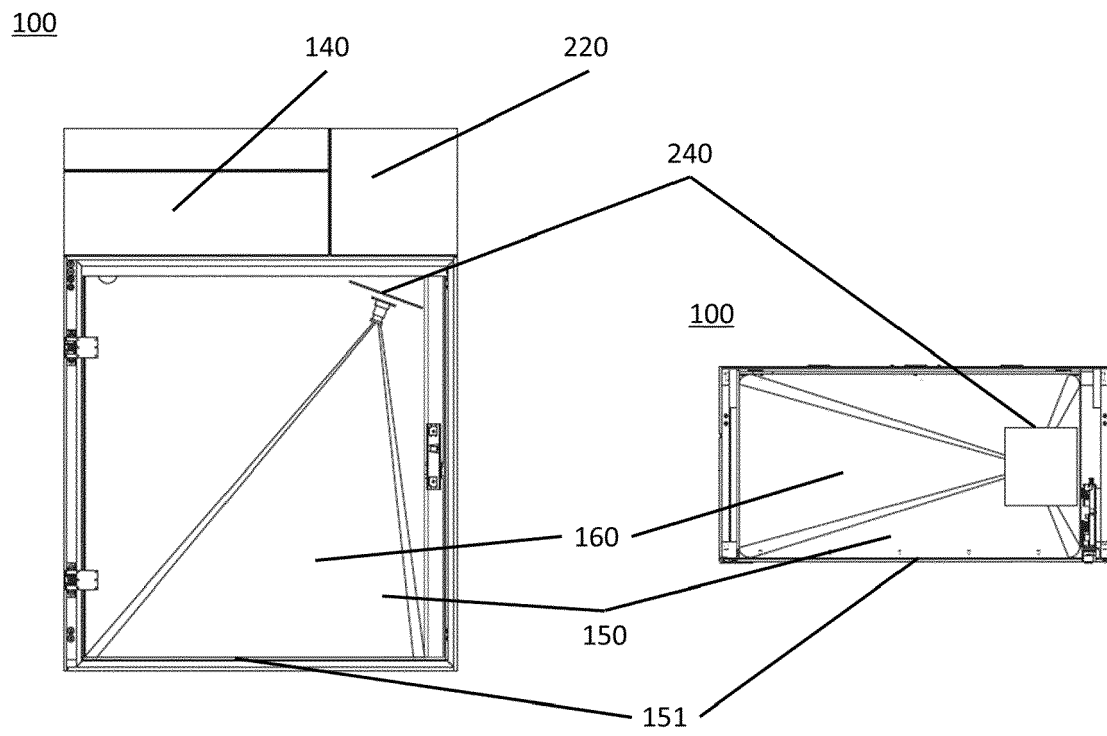


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 17 17 8255

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CA 2 932 874 A1 (SUZHOU DEWO SMART SYSTEM CO.) 4 June 2015 (2015-06-04)	1-7,14,15	INV. A47G29/14
Y	* page 13, lines 4-14; figures 7, 11a *	8-11,13	A47G29/16
	* page 21, lines 27-29 *		
	* page 25, line 27 *		

X	EP 2 835 078 A1 (COTTNER TECHNOLOGIES LTD) 11 February 2015 (2015-02-11)	1-6,8-13	
Y	* paragraphs [0042], [0066]; claim 4;	8-11,13	
A	figures 3, 7, 8 *	14	

X	US 2005/104730 A1 (YANG) 19 May 2005 (2005-05-19)	1-5,8,9,11	
	* figure 1 *		

The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 10 November 2017	Examiner Beugeling, Leo
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 17 8255

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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10-11-2017

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
CA 2932874	A1	04-06-2015	AU 2014357022 A1	23-06-2016
			CA 2932874 A1	04-06-2015
			CN 103584701 A	19-02-2014
			CN 106618124 A	10-05-2017
			CN 106724691 A	31-05-2017
			CN 106724692 A	31-05-2017
			CN 106820904 A	13-06-2017
			CN 106820906 A	13-06-2017
			CN 106820907 A	13-06-2017
			CN 106820908 A	13-06-2017
			CN 107048962 A	18-08-2017
			JP 2016538446 A	08-12-2016
			KR 20160093662 A	08-08-2016
			US 2016374494 A1	29-12-2016
			WO 2015078338 A1	04-06-2015

EP 2835078	A1	11-02-2015	NONE	

US 2005104730	A1	19-05-2005	NONE	
