



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.06.2020 Bulletin 2020/24

(51) Int Cl.:
E05B 47/00 (2006.01) **E05B 53/00 (2006.01)**
E05B 63/04 (2006.01) **E05B 47/02 (2006.01)**
E05B 39/04 (2006.01)

(21) Application number: **19213209.0**

(22) Date of filing: **03.12.2019**

(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:
KH MA MD TN

(71) Applicant: **Pindora Oy**
00180 Helsinki (FI)

(72) Inventors:
 • **Häkkinen, Juha**
00100 Helsinki (FI)
 • **Koski, Tuomas**
00150 Helsinki (FI)

(30) Priority: **03.12.2018 FI 20186036**

(74) Representative: **Papula Oy**
P.O. Box 981
00101 Helsinki (FI)

(54) **OPENING APPARATUS, DOOR OPENING ARRANGEMENT AND RELATED METHOD**

(57) An opening apparatus (1), arrangement and method for remote opening manual door lock (3) of a building. The apparatus comprises control unit (CU), a data communication unit (D) and an electrical actuator

(5, M) configured to open the door lock under control of the control unit. The control unit is configured to receive proximity sensing data from one or more proximity sensors (S, MS) for detecting opening state of the door.

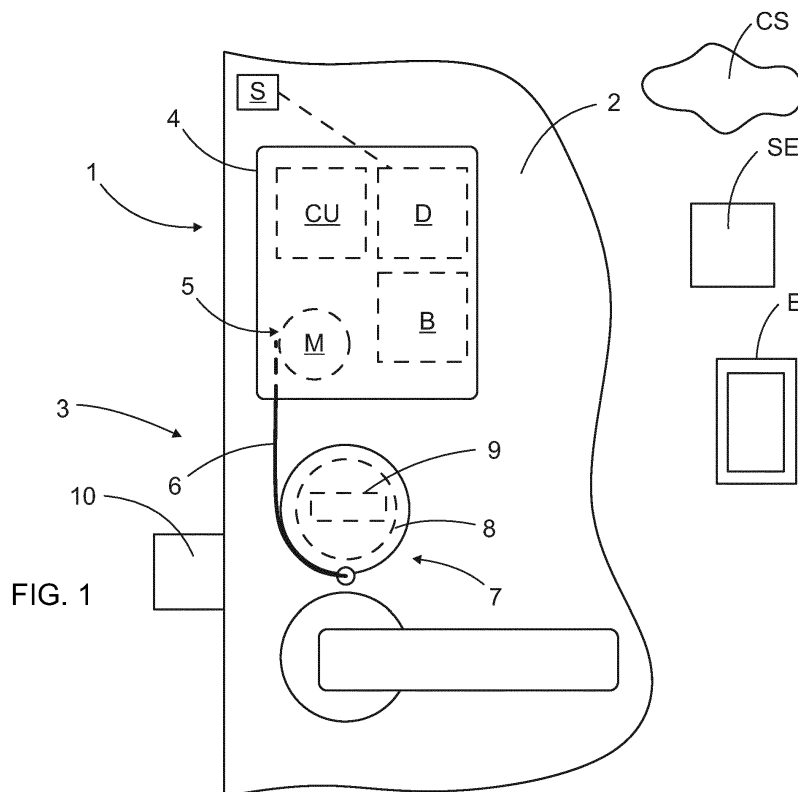


FIG. 1

Description

Background of the invention

[0001] The invention relates to an apparatus for remote opening a manually operable door lock connected to a door of a building or real estate.

[0002] The invention further relates to an arrangement and method of remote opening manual door locks of real estate and buildings.

[0003] The field of the invention is defined more specifically in the preambles of the independent claims.

[0004] Electrical controlled door locks are widely used because they can be opened under remote control. However, there are countless number of conventional manual door locks, which could be easily updated by means of an opening device mountable in connection with the locks. However, the present solutions have shown to include some disadvantages.

Brief description of the invention

[0005] An object of the invention is to provide a novel and improved opening apparatus, arrangement and method for remote opening a manual door lock of a building.

[0006] The apparatus according to the invention is characterized by the characterizing features of a first independent apparatus claim.

[0007] The arrangement according to the invention is characterized by the characterizing features of a second independent apparatus claim.

[0008] The method according to the invention is characterized by the characterizing features and steps of an independent method claim.

[0009] An idea of the disclosed solution is that a remote controllable opening device is mountable in connection with a mechanical door lock of a building. The opening device comprises one or more control units, which are configured to receive sensing data comprising data on proximity of a position of the door relative to a frame structure surrounding the door. In other words, the opening device is provided with information concerning the position of the door i.e. whether the door is closed, nearly closed, open or substantially open, for example. In some cases there is no need to sense accurately the opening position of a door leaf but instead, a more rough information may suffice. The control unit of the opening device may utilize the received proximity data in a versatile manner, as it is disclosed below in this document.

[0010] An advantage of the disclosed solution is that a conventional manually operable door lock may be updated to a remote operable lock, whereby there is no need to substitute the manual lock with an electronic door lock.

[0011] The disclosed lock opening apparatus may be arranged to almost any door locking system comprising a manual turning member. No modifications are required

to the door locks. The originally designed opening systems remain unchanged. Thus, the disclosed arrangement may be retrofitted to almost any door opening system. Further, mounting of the system is easy, quick and requires no skilled personal to do it. The apparatus may be relatively small in size, which also facilitates the mounting and retrofitting. The apparatuses may be delivered to the users as readily installable kits.

[0012] Further, when the opening apparatus is provided with the proximity sensing data, its operation may be controlled more accurately and effectively. Furthermore, the proximity sensing data allows additional features to be implemented by the opening device. All in all, the disclosed solution further improves use and suitability of the opening device.

[0013] According to an embodiment, the proximity data may comprise sensed data on distances (propagation time of reflected measuring signals), data on opening angle, magnitude of sensed physical effect (such as magnetic field), for example.

[0014] According to an embodiment, the opening apparatus comprises one or more proximity sensing devices for producing the mentioned data on proximity.

[0015] According to an embodiment, the opening apparatus is provided with one or more built-in or integrated proximity sensing devices, which are part of the basic configuration of the apparatus. Then the apparatus may be compact and esthetically attractive.

[0016] According to an embodiment, as an alternative to the previous embodiment, one or more proximity sensing devices external to the opening apparatus are implemented for producing the proximity detection data. Then the control unit is configured to receive the externally produced detection or sensing data and is configured to implement defined control and other measures in response to the received data. An advantage of this embodiment is that the external or separate sensing device may be positioned to a suitable sensing point and is not limited by the location of the opening apparatus. Further, the sensing device may be selected freely and may be easily replaced, if needed.

[0017] According to an embodiment, the opening apparatus comprises one or more proximity sensing devices for detecting presence of magnetic field.

[0018] According to an embodiment, as an alternative, or in addition to the magnetic field sensing device of magnetic switch, any other suitable proximity sensor and proximity sensing principle may be used. Thus, instead of sensing magnetic field other measurable or detectable features known by the physics may be utilized. Thus, the proximity sensor may be a range finder, laser scanner, Lidar, ultrasonic sensor, radar or Time of flight (ToF) camera, for example.

[0019] According to an embodiment, the sensing device for sensing the presence of the magnetic field is a magnetic switch. Magnetic switch or magnetic field detector is a reliable, simple and inexpensive device. Further, the sensor may operate without feeding external

electric energy.

[0020] According to an embodiment, the magnetic switch is a reed switch is an electrical switch operated by an applied magnetic field. It consists of a pair of contacts on ferromagnetic metal reeds in a hermetically sealed glass envelope. The contacts may be normally open, closing when a magnetic field is present, or normally closed and opening when a magnetic field is applied. The switch may be actuated by bringing a magnet near the switch. Once the magnet is pulled away from the switch, the reed switch will go back to its original position.

[0021] According to an embodiment, the magnetic switch is a Hall effect sensor, which is a transducer that varies its output voltage in response to a magnetic field. Hall effect sensor can be used for proximity switching.

[0022] According to an embodiment, the sensed proximity information is configured to be transmitted to the control unit, which is configured to implement control measures in response to the received data.

[0023] According to an embodiment, the control unit may be provided with one or more pre-defined control strategies for implementing the control actions.

[0024] According to an embodiment, the control unit may communicate with a user and may receive real-time control instructions and updates to previous control strategies.

[0025] According to an embodiment, the control unit may communicate with one or more external servers and computers, and may also utilize artificial intelligence (AI) when solving problems relating to controlling the situations.

[0026] According to an embodiment, the control unit is configured to determine status of the manual door lock in response to the detected proximity data. An advantage of this embodiment is that the opening apparatus is able to generate the status data also when the door is opened manually by using key or other non-electrical opening means.

[0027] According to an embodiment, the opening apparatus is provided with a door open/closed status detection feature, which is based on the detected proximity data. When the proximity is sensed by means of a magnetic sensor, then the status detection is based on detected presence or non-presence of the magnetic field.

[0028] According to an embodiment, the apparatus may generate passage control data even in situations when no electric means are used for opening the locking.

[0029] According to an embodiment, the control unit of the opening apparatus is provided with the above mentioned door opening status data. The control unit is configured to communicate the determined status data by means of the data communication unit to the at least one external electrical device. This way the produced data may be shared to desired users and devices and may thereby be utilized effectively. This also makes it possible to create ne use cases, information notifications and services.

[0030] According to an embodiment, a user application is executed in a remote electrical terminal device, and is configured to generate a status notification for a user in response to receiving the status data from the opening device.

[0031] According to an embodiment, a user application is configured to generate and update a log file comprising data on status and events of the door opening.

[0032] According to an embodiment, the control unit is configured to generate control commands to the actuator in response to the detected proximity data. The control unit is also configured to maintain the actuator and a latch of the door lock in an opened position until the detected proximity data is below a threshold value meaning that the door is in an opened state and there is no need to hold the latch inside no longer.

[0033] According to an embodiment, the proximity detection data may be utilized for generating control signals for actuator or motor control of the opening device.

[0034] According to an embodiment, electrical energy may be saved when the actuator is operable only as long as needed for the opening process. If the opening apparatus is a battery operated device, then this embodiment allows longer operational time for the opening apparatus.

[0035] According to an embodiment, when the proximity data is based on sensing magnetic field, then the control unit is configured to generate control commands to the actuator in response to the detected presence of the magnetic field, and the control unit is configured to maintain the actuator and a latch of the door lock in an opened position until the magnetic field disappears and there is no need to hold the latch inside no longer.

[0036] According to an embodiment, the apparatus comprises at least two proximity sensing devices, which are located on opposing sides of the apparatus whereby the apparatus is mountable both on right handed and left handed doors. This way there is no need to produce different apparatuses for right-handed and left-handed doors, whereby manufacturing costs may be decreased. Further, the user may mount the apparatus to all kind of doors and may later remove it and mount it to another type of door. Thereby the solution also simplifies the mounting.

[0037] According to an embodiment, the apparatus comprises a casing, which is configured to surround the control unit, the data communication unit and the actuator. Inside the casing is also mounted two proximity sensors on opposing vertical side areas of the structure covered by the casing. When the two or more sensors are mounted inside the casing, the apparatus may still be esthetically attractive. Further, the casing shields the sensors, and all the other inner components too.

[0038] According to an embodiment, the apparatus comprises a circuit board. The circuit board comprises proximity sensors on its two opposite sides. Modern sensors are so small in size that they can be mounted directly to the circuit board. When the sensors are mounted to the circuit board, they do not necessarily need any ded-

icated frame or support. Thus, the structure may be simple and light in weight. The circuit board may be dimensioned so that the at least two sensors may be mounted on its opposite vertical sides.

[0039] According to an embodiment, the opening apparatus is designed to be retrofitted in connection with the existing doors and door locks. The apparatus may be provided with a frame, which may be mounted on an inner surface of the door. The mounting may be done by means of mechanical fastening means, such as screws, or it may comprise adhesive fastening system. The apparatus may be easily mounted to nearly any door and may also be removed and remounted to another door. The opening apparatus comprises an adapter element by means of which opening forces generated by the apparatus can be directed to the existing mechanical turning members of the door locks.

[0040] According to an embodiment, the disclosed solution relates to an arrangement for remote opening a manual door lock of a building. The door opening arrangement comprises a door frame mounted to a wall structure of a building, and a door mounted to the door frame in a turnable manner by means of hinges. A manually operable door lock is mounted to the door, and an opening apparatus is configured to open the door lock under remote control. The mentioned opening apparatus is according to any one of the embodiments disclosed above.

[0041] According to an embodiment, the opening device is provided with one or more sensors for detecting magnetic flux or field. Then the door frame may be provided with at least one fixed magnet, which is configured to generate the magnetic field. The magnet is located at the opening apparatus, when the door is in a closed position.

[0042] According to an embodiment, the door frame is provided with at least one permanent magnet.

[0043] According to an embodiment, the solution relates to a method of remote opening a manual door lock of a building. The method comprises generating opening force by means of an electric actuator of an opening device retrofitted in connection with the manual door lock. The generated opening force is transmitted from the actuator to a manual turning member of the manual door lock for pulling a latch of the door lock towards its inside position. The method comprises also controlling the operation of the opening device by means of at least one control unit. The method further comprises providing the control unit with sensing data on position of the door relative to a door frame, and utilizing the received sensing data in control measures of the control unit.

[0044] According to an embodiment, the method comprises utilizing the received sensing data when controlling operation of the actuator. Thus, the proximity sensing data may be used for motor controlling.

[0045] According to an embodiment, the method comprises generating in the control unit passage control data in response to the received sensing data. History data of

the door opening may be stored for later use. The history data may also be analyzed and desired reports may be produced. A log file may be updated and desired notifications relating to door opening status and measures may be sent to selected electric addresses.

[0046] According to an embodiment, the disclosed solution may be implemented to open a front or street door lock, a lock of any other outside door or gate of an apartment building, office building, detached house or any other real estate object.

[0047] According to an embodiment, the disclosed solution provides a smart IoT (Internet of Things) robot to mechanically control actuation of a manually operable turning member of the door lock. The solution may comprise an IoT switch connected to the Internet and a remote controlled electrical actuator for generating opening force and movement for mechanical actuation of the manually operable door lock. The opening robot may be controlled via an app on a smart phone or other mobile device, or via a user interface on a personal computer, for example.

[0048] According to an embodiment, the actuator of the door lock opening apparatus or robot is configured to turn or rotate the turning member of the door lock.

[0049] According to an embodiment, the disclosed solution relates to a smart electrical device or IoT robot. The device opens electrical lock of a door after the person requesting the door opening has been authenticated, and a door opening signal has been detected. The authentication may be made using the person's mobile device, for example. The robot can be easily installed to any door opening system. The switch bot is equipped with an electronic motor and can be adjusted to any door locks having a manual opening member.

[0050] According to an embodiment, the control unit is in data communication with a user application implementing a password or pin code inquiry solution and configured to generate the first authentication signal when a password or pin code is accepted and access is granted.

[0051] According to an embodiment, the mentioned user application is implemented in a smart phone, communicator or other portable electrical terminal device, which is in wireless data communication with at least one server, the Internet service or cloud service.

[0052] According to an embodiment, the mentioned user application is implemented in a workstation or personal computer. Thus, the user application may also be implemented in non-portable electronic device.

[0053] According to an embodiment, the apparatus is an accessory kit allowing retrofitting the apparatus in connection with an existing door lock.

[0054] According to an embodiment, the apparatus is removably attachable on an inner surface of a door.

[0055] According to an embodiment, the apparatus comprises at least one electrical power storage. An advantage of the power storage is that mounting of the apparatus is facilitated when no electrical connections to electric network are needed. Then no authorized electri-

cian is needed to mount the apparatus.

[0056] According to an embodiment, the control unit is configured to receive sensing data comprising data on proximity of a position of the door relative to a frame structure surrounding the door. The control unit is configured to generate control signals for controlling the actuator in response to the received sensing data. The control unit may control the actuator to maintain the generated opening force until it is sensed that the door is open. In other words, the control unit may prolong the actuation of the actuator.

[0057] Further, the control unit may, alternatively or in addition to, adjust magnitude of the generated opening force in response the received sensing data. The control unit may be configured to increase the generated opening force in response to the received sensing data. In practice, the control unit may keep the actuator powered for a longer period of time and it may also direct greater electric current to the actuator for generating greater forces.

[0058] In case the control unit determines on the basis of the received sensing data that the door has not been opened, it may increase opening force and use greater force to allow the door opening. Sometimes seals of the door may make the opening of the door locking difficult. Also the lock itself may be stiff. Then the actuator may be configured to open the locking with force.

[0059] The control unit may be configured to take into account history data on previous opening situations and may compare the data to the current sensing data. In case difference to normal is detected, the control unit may be configured to communicate with the user and may request authorization for additional opening measures. The control unit may send a message to the user and may enquire about the status of the door in case the sensing data indicates that the door is still closed even if it should be already open.

[0060] The above disclosed use cases show that the sensing data may be utilized in a versatile manner for smart control of door lock opening.

[0061] The above disclosed embodiments and features may be combined in order to form suitable solutions that are needed.

Brief description of the figures

[0062] Some embodiments are described in more detail in the accompanying drawings, in which

Figure 1 shows schematically an opening apparatus for remote opening a conventional door lock, Figure 2 shows schematically the opening apparatus of Figure 1 after the door lock has been opened, Figure 3 is a schematic diagram of some alternative proximity sensors or apparatuses for producing proximity sensing data for the opening apparatus, Figure 4 is a schematic front view of two adjacent doors provided with the opening apparatuses and

wherein on the left is a right-handed door and on the right is a left-handed door, and

Figure 5 is schematic diagram of features relating to the operation of the disclosed opening apparatus.

[0063] For the sake of clarity, the figures show some embodiments of the disclosed solution in a simplified manner. In the figures, like reference numerals identify like elements.

Detailed description of some embodiments

[0064] Figure 1 discloses an opening apparatus 1 mounted on an inner side surface of a door 2 of a building or other real estate target. The opening apparatus 1 is intended for motorized opening of a mechanical door lock 3. The opening apparatus comprises a frame 4 and may also be provided with a cover or casing for protecting inner components. The opening apparatus 1 comprises an actuator 5, which may be an electric motor M or any other suitable device for generating needed opening force and movement. The generated opening movement is transmitted from the actuator 5 to an adapter 7 by means of an elongated and bendable transmission element 6, which may be a chain, wire or string, for example. Inside the adapter 7 may be a changeable inner piece 8, which has matching counter surfaces with outer surfaces of a turning member 9 of the lock 3. Then the adapter 7 is capable of transmitting the turning torque to the turning member 9. The opening apparatus 1 comprises a control unit CU for controlling operation of the apparatus 1. The opening apparatus 1 further comprise a data communication device D allowing communication between the control unit CU and one or more servers SE, electric terminal devices E and cloud services CS. The control unit CU is configured to receive proximity sensing data from one or more proximity sensors S. The detection data may be sent directly to the control unit CU or via the data communication device D. The sensor S may be integrated to the basic structure of the opening apparatus 1 or it may be located external to it.

[0065] In Figure 1 the opening apparatus 1 is in a rest position and a latch 10 is in its outmost position. In Figure 2 the opening device 1 has turned the turning member 9 clockwise in opening direction, whereby the latch 10 has moved towards its inner position and the lock 3 is open.

[0066] Further, the apparatus 1 may comprise an energy storage, such as a battery B.

[0067] Figure 3 discloses some possible alternatives for the proximity sensor S. The alternative sensor types have already been discusses above. It has been noted, that a magnetic switch MS suits very well for the purpose.

[0068] Figure 4 discloses two adjacent doors 2a, 2b which are both surrounded by door frames 11. Both doors 2a, 2b are turnable relative to the door frames 11 by means of hinges H. On inner side surfaces of the doors 2a, 2b are mounted opening devices 1 for opening manual locks 3 of the doors 2a, 2b. The opening devices 1

are provided with magnetic switches MS for detecting magnetic field of magnets 12 mounted to door frames 11. Magnitude of the detected magnetic field is proportional to the distance between the magnet 12 and the magnetic switch MS. The greater the distance between the magnet 12 and the magnetic switch MS is, the weaker is the detected magnetic field.

[0069] Figure 4 further discloses that the opening device 1 may comprise magnetic switches MS on its both lateral sides whereby the same apparatus may be mounted on right handed doors 2a and left handed doors 2b.

[0070] Let it be mentioned that the magnetic field is the area around a magnet in which there is magnetic force. The magnetic field is a vector field that describes the magnetic influence of electrical currents and magnetized materials. Both the strength and direction of a magnetic field varies with location.

[0071] In case the magnetic switches MS of Figure 4 are substituted with other proximity sensors, for example those mentioned in Figure 3, then there is no need for the magnets 12, of course. When the proximity sensor is an optical device, reflectors may be used on the door frames, if needed. Further, transmitter-receiver systems based on radio signals may also be used as proximity sensing means.

[0072] The proximity sensor S may be arranged to determine the door position relative to the door frame 11 or other fixed structures surrounding the monitored door 2. Thus, the opening device 1 may alternatively direct the detection or measuring signal towards a wall surface surrounding the door opening, or even towards a roof or floor.

[0073] Figure 5 discloses some operational issues of the opening apparatus. The apparatus detects by means of the proximity sensor S position of the door 1 relative to the door frame i.e. whether the door is closed, partly open or open. Generated proximity data is transmitted to the control unit CU, which may process the data and may send passage control data via the data communication device to one or more external apparatuses. Alternatively, the control unit CU may store the passage control data in a memory device of the opening device and may provide the passage control data in response to received request. Further, the control unit CU may generate control signals for controlling the actuator of the opening device.

[0074] The drawings and the related description are only intended to illustrate the idea of the invention. In its details, the invention may vary within the scope of the claims.

Claims

1. An opening apparatus (1) for remote controlling opening of a manually operable door lock (3) of a door (2) of a building, the apparatus (1) comprises:

at least one control unit (CU);
at least one data communication unit (D) for providing communication between the mentioned control unit (CU) and at least one external electric device (CS, SE, E);
an electrical actuator (5, M) configured to generate opening force under control of the control unit (CU);
an adapter (7) comprising a space capable of receiving a turning member (9) of the manual door lock (3) and also being capable of transmitting torque to the turning member (9); and
a bendable and elongated transmission element (6) arranged between the actuator (5, M) and the adapter (7) and configured to transmit the opening force from the actuator (5, M) to the adapter (7);

characterized in that

the control unit (CU) is configured to receive sensing data comprising data on proximity of a position of the door relative to a frame structure surrounding the door (2); and
the control unit (CU) is configured to generate control signals for controlling the actuator (5, M) in response to the received sensing data.

2. The apparatus as claimed in claim 1, **characterized in that**

the opening apparatus (1) comprises at least one proximity sensing device (S) for producing the mentioned data on proximity.

3. The apparatus as claimed in claim 1 or 2, **characterized in that**

the opening apparatus (1) comprises at least one proximity sensing device (S) for detecting presence of magnetic field.

4. The apparatus as claimed in claim 3, **characterized in that**

the sensing device (S) for sensing the presence of the magnetic field is a magnetic switch (MS).

5. The apparatus as claimed in any one of the preceding claims 1 - 4, **characterized in that**

the sensed proximity information is configured to be transmitted to the control unit (CU), which is configured to implement control measures in response to the received data.

6. The apparatus as claimed in any one of the preceding claims 1 - 5, **characterized in that**

the control unit (CU) is configured to determine status of the manual door lock (3) in response to the detected proximity data.

7. The apparatus as claimed in claim 6, **characterized in that**

the control unit (CU) is configured to communicate the determined status data by means of the data communication unit (D) to the at least one external electrical device (CS, SE, E).

8. The apparatus as claimed in any one of the preceding claims 1 - 7, **characterized in that**

the control unit (CU) is configured to generate control commands to the actuator (5, M) in response to the detected proximity data; and

the control unit (CU) is configured to maintain the actuator (5, M) and a latch (10) of the door lock (3) in an opened position until the detected proximity data is below a threshold value meaning that the door (2) is in an opened state and there is no need to hold the latch (10) inside no longer.

9. The apparatus as claimed in any one of the preceding claims 1 - 8, **characterized in that**

the apparatus (1) comprises at least two proximity sensing devices (S, MS, which are located on opposing sides of the apparatus (1) whereby the apparatus (1) is mountable both on right handed and left handed doors (2a, 2b).

10. The apparatus as claimed in any one of the preceding claims 1 - 9, **characterized in that**

the apparatus (1) is designed to be retrofitted in connection with the existing doors (2) and door locks (3).

11. A door opening arrangement comprising:

a door frame (11) mounted to a wall structure of a building;

a door (2) mounted to the door frame (11) in turnable manner by means of hinges (H);

a manually operable door lock (3) mounted to the door (2); and

an opening apparatus (1) configured to open the door lock (3) under remote control;

characterized in that

the opening apparatus (1) is according to any one of the preceding claims 1 - 10.

12. The arrangement as claimed in claim 11, **characterized in that**

the door frame (11) is provided with at least one fixed magnet (12), which is configured to generate magnetic field and is located near the opening apparatus (1), when the door (2) is in a closed position.

13. The arrangement as claimed in claim 12, **characterized in that**

the door frame (11) is provided with at least one permanent magnet (12).

14. A method of opening a manual door lock (3) of a door (2) of a building, wherein the method comprises:

generating opening force by means of an electric actuator (5, M) of an opening apparatus (1) retrofitted in connection with the manual door lock (3);

transmitting the generated opening force from the actuator (5, M) to a manual turning member (9) of the manual door lock (3) for pulling a latch (10) of the door lock (3) towards its inside position; and

controlling the operation of the opening apparatus (1) by means of at least one control unit (CU); **characterized by**

providing the control unit (CU) with sensing data on position of the door (2) relative to a door frame (11);

utilizing the received sensing data in control measures of the control unit (CU); and

utilizing the received sensing data when controlling operation of the actuator (5, M).

15. The method of claim 14, **characterized by** generating in the control unit (CU) passage control data in response to the received sensing data.

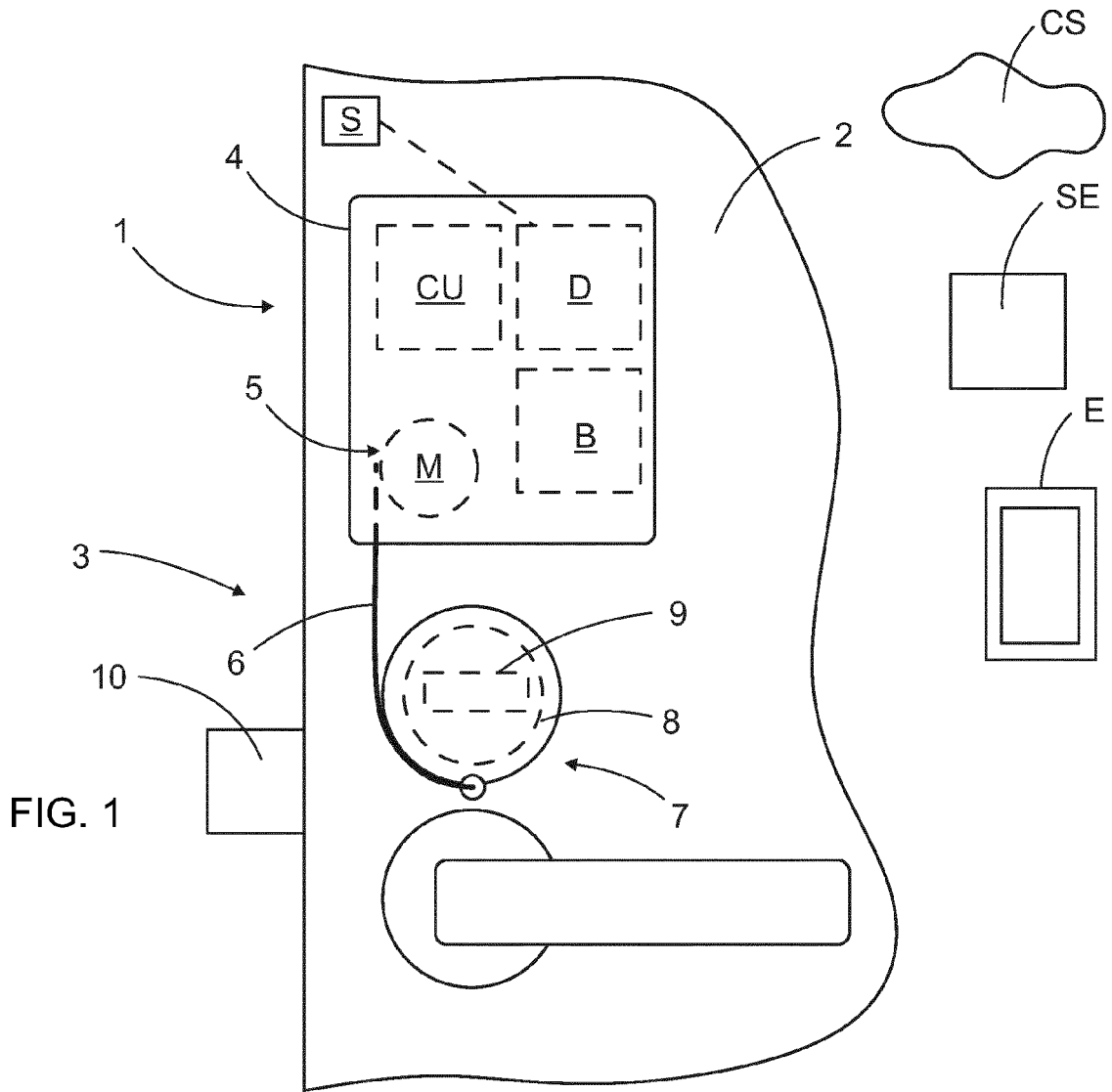


FIG. 1

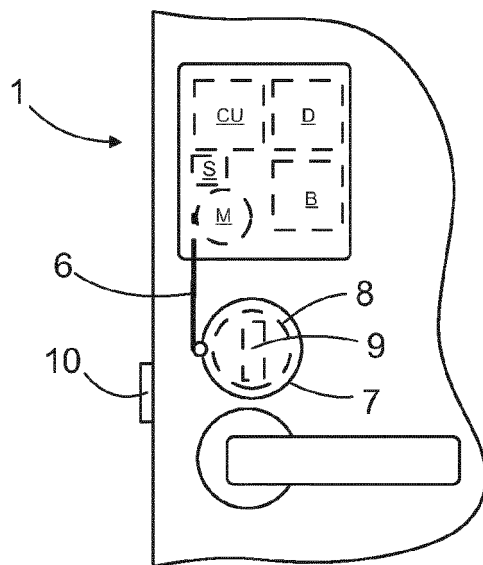


FIG. 2

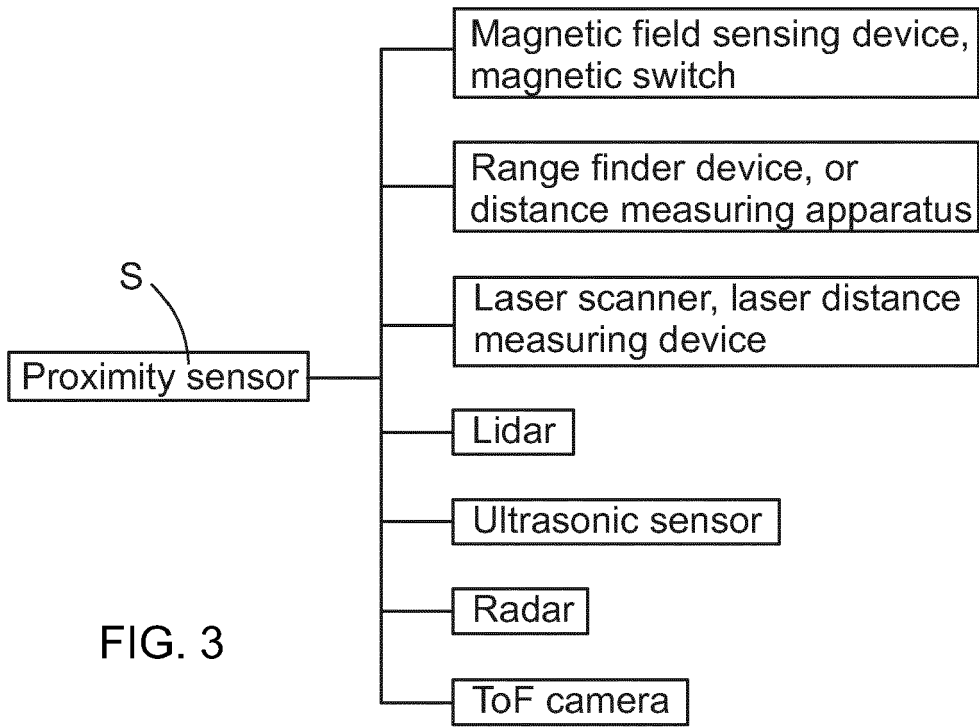


FIG. 3

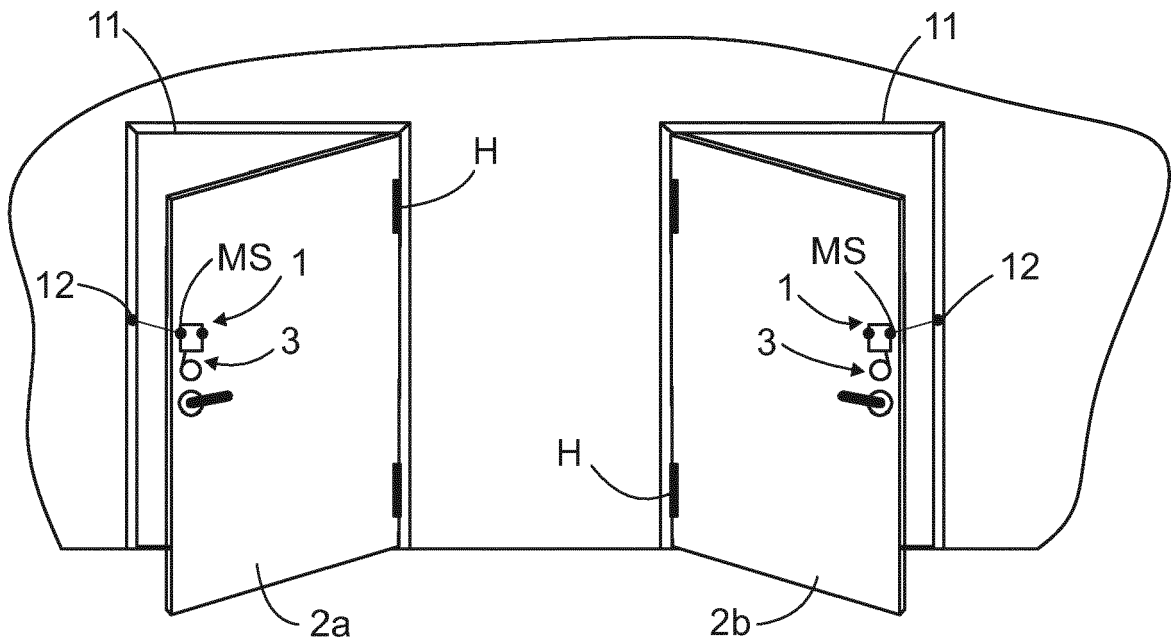


FIG. 4

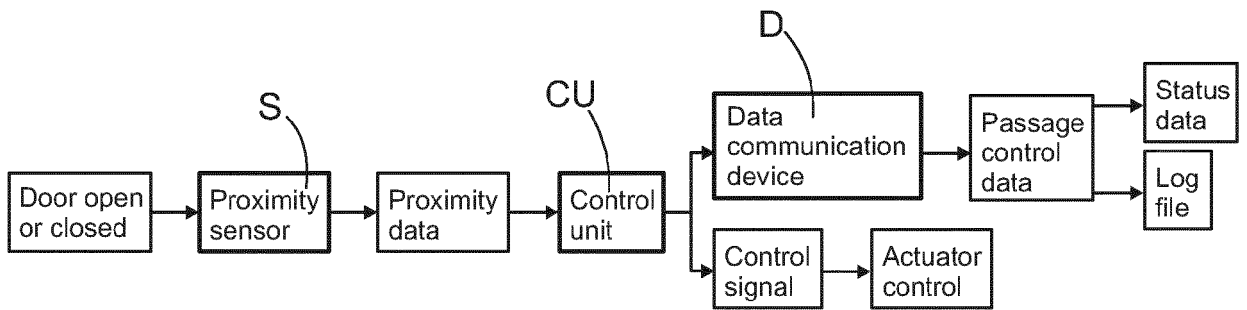


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 19 21 3209

5

10

15

20

25

30

35

40

45

50

55

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	US 6 357 805 B1 (HEBDA THOMAS J [US]) 19 March 2002 (2002-03-19) * column 2, line 25 - column 4, line 27; figures 1-7 *	1-14	INV. E05B47/00 E05B53/00 E05B63/04 E05B47/02
X	US 2017/002586 A1 (LEE DOMINICK S [US]) 5 January 2017 (2017-01-05) * paragraph [0050] - paragraph [0084]; figures 1-15 *	14,15	ADD. E05B39/04
A	US 2014/022054 A1 (BLIDING OLLE [SE] ET AL) 23 January 2014 (2014-01-23) * paragraph [0034] - paragraph [0037]; figures 1-7 *	1-5,7,8, 10-13	
X	US 2014/022054 A1 (BLIDING OLLE [SE] ET AL) 23 January 2014 (2014-01-23) * paragraph [0034] - paragraph [0037]; figures 1-7 *	14,15	
A	DE 198 00 304 A1 (FLIETHER KARL GMBH & CO [DE]) 8 July 1999 (1999-07-08) * column 2, line 12 - line 17; figures 1-7 *	1-8, 10-13	
A	DE 198 00 304 A1 (FLIETHER KARL GMBH & CO [DE]) 8 July 1999 (1999-07-08) * column 2, line 12 - line 17; figures 1-7 *	1,9,11, 14	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		17 April 2020	Pérez Méndez, José F
CATEGORY OF CITED DOCUMENTS			
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		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	

1
EPO FORM 1503 03.02 (P04C01)

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

EP 19 21 3209

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 The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-04-2020

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6357805 B1	19-03-2002	AU 2745601 A	24-04-2001
		US 6357805 B1	19-03-2002
		WO 0121911 A2	29-03-2001

US 2017002586 A1	05-01-2017	NONE	

US 2014022054 A1	23-01-2014	DK 2083396 T3	17-12-2012
		DK 201300075 U1	24-05-2013
		DK 201300119 U1	23-08-2013
		DK 201300133 U1	27-09-2013
		EP 1859415 A1	28-11-2007
		EP 2083396 A2	29-07-2009
		EP 2434463 A2	28-03-2012
		US 2007229257 A1	04-10-2007
		US 2009184801 A1	23-07-2009
		US 2010148921 A1	17-06-2010
		US 2014020437 A1	23-01-2014
		US 2014022054 A1	23-01-2014
		WO 2006098690 A1	21-09-2006

DE 19800304 A1	08-07-1999	NONE	

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82