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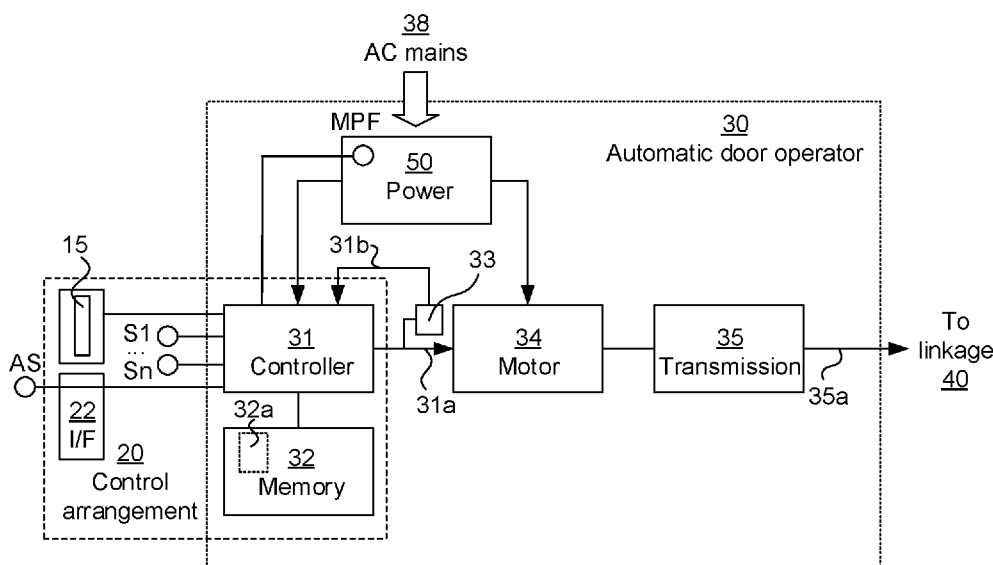


Fig 2

(57) Abstract: An automatic door operator (30) is disclosed for use in an entrance system (1) that has a movable door member (10) being operable between a closed position (18) which prevents human access, and an open position (19) which admits human access. The automatic door operator (30) has an electric motor (34), a power supply (42) for connection to AC mains (38) and coupled for supplying power to the electric motor (34), a battery (45) for supplying power to the electric motor (34), a first sensor function (15; S1) configured for detecting that a person wishes to pass through the entrance system, a second sensor function (MPF; AS) configured for detecting an emergency situation, and a controller (31) having a normal operating mode and an evacuation mode. In the normal operating mode, the controller is responsive to the first sensor function (15; S1) and configured for controlling actuation of the motor (34) to generate torque for causing the door member (10) in the entrance system (1) to move from the closed position (18) to the open position (19). The controller (31) is further responsive to the second sensor function (MPF; AS) to enter the evacuation mode, in which



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the controller (31) is configured for controlling actuation of the motor (34) to generate torque for causing the door member (10) in the entrance system (1) to move from the closed position (18) to the open position (19) and maintain in the open position even when there is an AC mains power failure, the motor (34) then being power supplied by the battery (45).

AUTOMATIC ENTRANCE SYSTEM WITH BATTERY-DRIVEN EVACUATION MODE

TECHNICAL FIELD

5 The present invention generally relates to entrance systems that have a movable door member which is operable by an automatic door operator between a closed position which prevents human access, and an open position which admits human access. More specifically, the present invention relates to an automatic door operator being operable in a normal operating mode and an evacuation mode. The
10 present invention also relates to an entrance system comprising such an automatic door operator.

BACKGROUND

 Entrance systems having automatic door operators are frequently used for
15 providing automatic opening and closing of one or more movable door members in order to facilitate entrance and exit to buildings, rooms and other areas. The door members are often swing doors. Other types of entrance systems have, for instance, sliding door or revolving doors.

 In swing door-based entrance systems, there is at least one swing door member
20 having a door leaf. The door leaf is pivotally hinged to a door frame to allow opening of the swing door member from a closed position to an open position, as well as for allowing closing of the swing door member from the open position to the closed position. A motorized automatic door operator is included in the entrance system and is capable of causing opening of the swing door member. A linkage in the form of a
25 mechanical arm system connects the automatic door operator to the door leaf of the swing door member.

 The purpose of automatic door operators in swing door-based entrance systems is to provide automatic opening of the swing door member in various possible applications. Such applications include, for instance, facilitating a disabled person's
30 access to his or her private home, providing access through entrance ports or internal doors at healthcare buildings, office premises, industries or retail stores, providing comfort access to hotel rooms, etc. In the normal operating mode, the automatic door

operator typically operates responsive to a sensor function that detects that a person wishes to pass through the entrance system, wherein an electric motor is actuated to cause opening of the swing door member. The sensor function may include an activity sensor (such as an IR or radar sensor), or a manual actuator (such as a door-open push
5 button), or a combination thereof.

The automatic door operator causes opening of the swing door member by the electric motor which generates torque that is transferred to the swing door member via the linkage. The operation of the electric motor is controlled by a controller in the automatic door operator. Since an entrance system with an automatically operated
10 swing door member is a potentially hazardous environment for people and objects that might be hit or jammed by the moving swing door member, an entrance system needs to satisfy various technical standard requirements, the purpose of which is to safeguard that the operation of the swing door member is performed in an accurately controlled manner.

One particular safety concern is the risk of people getting trapped on the inside
15 of the premise in an emergency situation, such as a fire hazard, earthquake, criminal attack, etc. The emergency situation may become even more severe if there is a mains power failure, i.e. interruption in the AC mains power supply that normally drives the electric motor and other components of the automatic door operator. To this end, some
20 applications of entrance systems are required to have an evacuation mode, in which the swing door member may be forced open (and kept open) when an emergency situation occurs. A prior art approach of obtaining an evacuation mode is to provide the automatic door operator with a mechanical spring which is normally kept tensioned (preloaded) by the electric motor when the swing door is in the closed position. In the
25 event of a mains power failure, the electric motor will not be able to generate any torque and cannot withstand the preload of the mechanical spring, which will extend to release its stored mechanical energy, which is transferred to the swing door member via the linkage and causes mechanical opening of the swing door member. This is sometimes referred to as *forced-open functionality*, or *inverse function*.

30 The present inventor has realized that the prior art approach has several disadvantages. A swing door member normally spends most of its time in the closed position during the normal operating mode (which is the prevailing operating mode

during long periods of time). The electric motor will constantly have to counteract the preload of the mechanical spring to keep it compressed such that the door is maintained in its closed position. The torque needed for this represents a substantial consumption of electric energy over time, and moreover causes mechanical wear of the electric motor.

- 5 Also, a mechanical spring has a rather high component cost and may require maintenance and regular ocular inspection.

Accordingly, the present inventor has realized that there is room for improvements in the field of automatic entrance systems.

10 SUMMARY

An object of the present invention is therefore to provide one or more improvements when it comes to automatic door operators being operable in a normal operating mode and an evacuation mode in an entrance system.

- Accordingly, a first aspect of the present invention is an automatic door
15 operator for use in an entrance system that comprises a movable door member being operable between a closed position which prevents human access, and an open position which admits human access. The automatic door operator comprises an electric motor, a power supply for connection to AC mains and coupled for supplying power to the electric motor, a battery for supplying power to the electric motor, a first sensor
20 function configured for detecting that a person wishes to pass through the entrance system, a second sensor function configured for detecting an emergency situation, and a controller having a normal operating mode and an evacuation mode.

- In the normal operating mode, the controller is responsive to the first sensor function and configured for controlling actuation of the motor to generate torque for
25 causing the door member in the entrance system to move from the closed position to the open position.

- The controller is further responsive to the second sensor function to enter the evacuation mode, in which the controller is configured for controlling actuation of the motor to generate torque for causing the door member in the entrance system to move
30 from the closed position to the open position and maintain in the open position even when there is an AC mains power failure, the motor then being power supplied by the battery.

The provision of such an automatic door operator will solve or at least mitigate one or more of the problems or drawbacks identified in the background section of this document, as will be clear from the following detailed description section and the drawings.

- 5 In advantageous embodiments of the automatic door operator, the battery is coupled for charging by the power supply.

The second sensor function may comprises means for receiving an external incoming alarm signal, or a detector for detecting a mains power failure of the AC mains, or a combination thereof.

- 10 Advantageous embodiments of the automatic door operator further comprise a battery monitor configured to monitor a status of the battery.

Beneficially, the battery monitor may be configured to monitor the status of the battery by performing the following procedure regularly:

- connecting an electric load across the terminals of the battery,
15 measuring a voltage drop in the terminal voltage of the battery,
 if the measured voltage drop exceeds a threshold value, generating an alarm,
and

 disconnecting the electric load from the terminals of the battery.

- Additionally, or alternatively, the battery monitor may be configured to
20 monitor the status of the battery by performing the following procedure:
 measuring and recording the terminal voltage of the battery continuously,
 making a trend analysis of a long-term development of the recorded terminal
voltage, and

- if the trend analysis indicates a certain deviation from satisfactory battery
25 condition, generating an alarm.

The battery monitor may advantageously be configured to generate the alarm by performing one or more of the following actions:

- providing a local visual alarm at the entrance system,
 providing a local audible alarm at the entrance system, and
30 sending an alarm signal to a remote receiver over a wireless or wired
communication interface.

A second aspect of the present invention is an entrance system that comprises a movable door member being operable between a closed position which prevents human access, and an open position which admits human access, and an automatic door operator as defined above for the first aspect of the present invention.

5 The provision of such an entrance system will solve or at least mitigate one or more of the problems or drawbacks identified in the background section of this document, as will be clear from the following detailed description section and the drawings.

10 The movable door member may advantageously be a swing door member having a door leaf (but other alternatives are also possible). Hence, the entrance system may further comprise a linkage connected to the automatic door operator and the door leaf for transferring torque generated by the motor to the door leaf.

The aforementioned first sensor function may include at least one of an activity sensor and a manual actuator.

15 In addition to the first and second sensor functions, the entrance system may comprise a safety sensor function for monitoring a zone at or near the door leaf for presence or activity of a person or object. The controller of the automatic door operator may be further configured, in the normal operating mode, to receive monitoring data from the safety sensor function, and if the monitoring data indicates presence or activity
20 of a person or object in the monitored zone, refrain from controlling the motor to cause movement of the door member or control the motor to stop an ongoing movement of the door member.

Embodiments of the invention are defined by the appended dependent claims and are further explained in the detailed description section as well as in the drawings.

25 It should be emphasized that the term “comprises/comprising” when used in this specification is taken to specify the presence of stated features, integers, steps, or components, but does not preclude the presence or addition of one or more other features, integers, steps, components, or groups thereof. All terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless
30 explicitly defined otherwise herein. All references to “a/an/the [element, device, component, means, step, etc.]” are to be interpreted openly as referring to at least one instance of the element, device, component, means, step, etc., unless explicitly stated

otherwise. The steps of any method disclosed herein do not have to be performed in the exact order disclosed, unless explicitly stated.

A reference to an entity being “designed for” doing something, or “capable of” doing something in this document is intended to mean the same as the entity being
5 “arranged for”, “configured for” or “adapted for” doing this very something, and vice versa.

BRIEF DESCRIPTION OF THE DRAWINGS

Objects, features and advantages of embodiments of the invention will appear
10 from the following detailed description, reference being made to the accompanying drawings.

Figure 1 is a schematic block diagram of an embodiment of an entrance system having a swing door member and an automatic door operator.

Figure 2 is a schematic block diagram of an automatic door operator according
15 to one embodiment.

Figure 3 is a schematic block diagram of a power unit in the automatic door operator.

Figure 4 illustrates movement of the swing door member from a shut closed position to a swung open position.

20 Figure 5 illustrates movement of the swing door member from the swung open position to the shut closed position.

DETAILED DESCRIPTION OF EMBODIMENTS

Embodiments of the invention will now be described with reference to the
25 accompanying drawings. The invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. The terminology used in the detailed description of the particular embodiments
30 illustrated in the accompanying drawings is not intended to be limiting of the invention. In the drawings, like numbers refer to like elements.

Figure 1 is a schematic front view of a swing door-based entrance system. The entrance system 1 comprises a swing door member 10 having a door leaf 12.

The swing door member 10 is pivotally supported at a vertical edge 14 by hinges 16 for allowing opening of the swing door member 10 from a closed position to an open position, as well as for allowing closing of the swing door member 10 from the open position to the closed position. The swing door member 10 is hence supported by a door frame 11 for pivotal motion around a rotational axis 18 which is coincident with the hinges 16.

The entrance system 1 comprises a motorized automatic door operator 30 capable of causing opening of the swing door member 10. A linkage (arm mechanism) 40 connects the automatic door operator 30 to the door leaf 12 of the swing door member 10. The door operator 30 may be arranged in conjunction with the door frame 11 and is typically a concealed overhead installation in or at the door frame 11 (hence, the linkage mechanism 40 and automatic door operator 30 are normally not as visible to the naked eye as appears to be the case in Figure 1).

The automatic door operator 30 may be triggered by sensor equipment in the entrance system 1. In Figure 1, such sensor equipment is indicated as a first sensor function S1 and may include one or more activity sensors (e.g. IR or radar based sensors) being adapted to detect an approaching user and accordingly trigger the automatic door operator 30 to open the swing door member 10. Alternatively, the automatic door operator 30 may be triggered by a user actuating a door-open push button 15, or similar actuator, hence acting as the first sensor function. Combinations are of course also possible, as is the case in Figure 1. The entrance system 1 will typically also allow the user to open or close the swing door member 10 by pulling or pushing a door handle 13 by manual force, i.e. without using the motorized automatic door operator 30.

The automatic door operator 30 may provide automatic opening of the swing door 10 in various possible applications. Such applications include, for instance, facilitating a disabled person's access to his or her private home, providing access through entrance ports or internal doors at healthcare buildings, office premises, industries or retail stores, providing comfort access to hotel rooms, etc.

Figure 4 illustrates the opening of the swing door member 10 in one embodiment of the entrance system 1 from a shut closed position 18 to a swung open position 19. The opening movement is indicated by an arrow 2. As can be seen in

Figure 4, during the opening 2 of the swing door member 10, the door leaf angle α will span from about 0° to about 90° . In other embodiments, the swung open position may be at a door leaf angle α different from about 90° , such as for instance about 180° .

Figure 5 correspondingly illustrates the closing of the swing door member 10 of the entrance system 1 from the swung open position 19 to the shut closed position 18. The closing movement is indicated by an arrow 3. As can be seen in Figure 5, during the closing 3 of the swing door member 10, the door leaf angle α will span from about 90° to about 0° . In other embodiments where the swung open position is at a door leaf angle α different from about 90° , such as for instance about 180° , the door leaf angle α will of course start spanning from such other door leaf angle α .

To avoid dangerous situations where a present, approaching or departing person or object (including but not limited to pets or articles brought by the person) might be hit or jammed by the door leaf 12 of the swing door member 10, a safety sensor function S2 may be provided, implemented as a sensor unit mounted to the door leaf 12. at an appropriate position on the surface of the door leaf 12. As can be seen in Figure 2, such a position is often at an uppermost part of the door leaf 12.

The purpose of the safety sensor function S2 is to monitor a zone PD, or volume, at or near the door leaf 12 for presence or activity of a person or object. If a person or object is detected in the monitored zone, the automatic door operator 30 shall not be allowed to move the swing door member 10 in a direction in which the swing door member 10 may hit or jam that person or object. Accordingly, the automatic door operator 30 is configured to receive monitoring data from the safety sensor S2. If the monitoring data indicates presence or activity of a person or object in the monitored zone, the automatic door operator 30 is configured to refrain from driving a motor of the automatic door operator 30 to cause movement of the swing door member 10, and/or force the motor to stop an ongoing movement of the swing door member 10.

Reference is now made to Figure 3 which illustrates an embodiment of the automatic door operator 30 in more detail. The automatic door operator 30 comprises an electric motor 34, being connected to a transmission 35. An output shaft 35a of the transmission 35 rotates upon activation of the motor 34 and is connected to the linkage 40. The linkage 40 translates the motion of the output shaft 35a into an opening motion

of the door leaf 12 with respect to the door frame 11 (c.f. opening movement 2 in Figure 4).

The automatic door operator 30 also comprises a control arrangement 20 including a controller 31 which is configured for performing different functions of the automatic door operator 30. One or more of these functions relates to opening of the door leaf 12 with respect to the door frame 11. Accordingly, the controller 31 has a control output 31a connected to the motor 34 for controlling the actuation thereof.

In addition to the controller 31, the control arrangement 20 comprises a number n of sensor functions, including or consisting of the aforementioned first sensor function (activity sensor S1 and/or door-open push button 15) as well as safety sensor S2. The sensor functions are operatively connected with the controller 31 to report detection results or measurement readings to the controller 31.

A revolution counter 33, such as an encoder or other angular sensor, is provided at the motor 34 to monitor the revolution of a motor shaft of the motor 34. The revolution counter 33 is connected to an input 31b of the controller 31. The controller 31 is configured to use one or more readings of the revolution counter 33, typically a number of pulses generated as the motor shaft rotates, for determining a current angular position, e.g. door leaf angle α , of the door leaf 12 of the swing door member 10.

The controller 31 may be implemented in any known controller technology, including but not limited to microcontroller, processor (e.g. PLC, CPU, DSP), FPGA, ASIC or any other suitable digital and/or analog circuitry capable of performing the intended functionality.

The controller 31 has an associated memory 32. The memory 32 may be implemented in any known memory technology, including but not limited to E(E)PROM, S(D)RAM or flash memory. In some embodiments, the memory 32 may be integrated with or internal to the controller 31. As seen at 32a, the memory 32 may store program instructions for execution by the controller 31, as well as temporary and permanent data used by the controller 31.

The automatic door operator 30 has a power unit 50 that supplies power to the electric motor 34, controller 31 and other components of the automatic door operator 30. The power unit 50 is shown in more detail in Figure 3. An AC/DC converter 42, such as a switch mode power supply (SMPS), is coupled to AC mains 38 at an input end

and supplies internal DC power 39 to the electric motor 34, controller 31, etc, at an output end.

The embodiment of the automatic door operator 30 shown in Figure 3 is designed for forced-open functionality (a.k.a. inverse function) in an evacuation mode.

- 5 Unlike prior art approaches, the evacuation mode is not based on the provision of a preloaded mechanical spring. Instead, the power unit 50 has been extended to implement the forced-open functionality (inverse function) in evacuation mode. This will now be explained in more detail.

- 10 In addition to the power supply (AC/DC converter) 42, which is coupled for supplying power to the electric motor 34, the power unit 50 comprises a battery 45 that may also supply power to the electric motor 34, more specifically in the evacuation mode of the automatic door operator 30. In the disclosed embodiment of Figure 3, the battery 45 is coupled for charging by the power supply 42. In other embodiments, the battery 45 may be charged by other means, such as external battery charging equipment.
- 15 In yet other embodiments, the battery 45 may not be rechargeable at all. Preferably, however, the battery 45 is a rechargeable battery made from, for instance, lithium-ion (Li-ion), lithium-ion polymer (Li-ion polymer), nickel-metal hydride (NiMH), nickel-cadmium (NiCd) or lead-acid technology.

- 20 In addition to the aforementioned first sensor function 15; S1 (which is configured for detecting that a person wishes to pass through the entrance system 1), the automatic door operator 30 comprises a second sensor function MPF; AS configured for detecting an emergency situation. As previously explained, the controller 31 has a normal operating mode and an evacuation mode. It is recalled that in the normal operating mode, the controller 31 is responsive to the first sensor function 15; S1 and
- 25 configured for controlling actuation of the motor 34 to generate torque for causing the door member 10 in the entrance system 1 to move from the closed position 18 to the open position 19.

- 30 The controller 31 is further responsive to the second sensor function MPF; AS to enter the evacuation mode. In the evacuation mode, the controller 31 is configured for controlling actuation of the motor 34 to generate torque for causing the door member 10 in the entrance system 1 to move from the closed position 18 to the open position 19 and maintain in the open position even when there is an AC mains power

failure, i.e. an interruption in the power provided as AC mains 38. This is possible, since the electric motor 34 will then be power supplied by the battery 45.

In advantageous embodiments, such as the ones illustrated in Figures 2 and 3, the second sensor function comprises a detector MPF for detecting a mains power failure of the AC mains 38. As can be seen in Figures 2 and 3, the detector MPF of the second sensor function may be included in the power module 50, for instance in the power supply 42.

In these or other advantageous embodiments, the second sensor function may comprise means for receiving an external incoming alarm signal AS, such as a signal from a smoke detector, fire heat detector, remote alarm center, etc. To this end, the automatic door operator 30 may have a wired or wireless communication interface 22 for receiving the external incoming alarm signal AS (see Figure 2). The interface 22 may, for instance, be compliant with GSM, UMTS, LTE, D-AMPS, CDMA2000, FOMA, TD-SCDMA, TCP/IP, Ethernet, Bluetooth, WiFi (e.g. IEEE 802.11, wireless LAN), Near Field Communication (NFC), RF-ID (Radio Frequency Identification), Infrared Data Association (IrDA), without limitation and in any combination.

Advantageous embodiments of the automatic door operator 30, such as the ones illustrated in Figures 2 and 3, further comprise a battery monitor 44 configured to monitor a status of the battery 45.

The battery monitor 44 may be configured to monitor the status of the battery 45 by performing the following procedure:

connecting an electric load 46 (such as a resistor having a suitable ohmic value) across the terminals of the battery 45,

measuring a voltage drop in the terminal voltage of the battery 45,
if the measured voltage drop exceeds a threshold value, generating an alarm,
and

disconnecting the electric load 46 from the terminals of the battery 45.

The connecting and disconnecting of the electric load 46 across the terminals of the battery 45 may be achieved by controlling a switch 47 to close and open, respectively.

The procedure outlined above is advantageously performed regularly, such as for instance once a day, every 48 hours, once a week, every two weeks, monthly, etc, or generally at any desired periodicity.

Alternatively or additionally, the battery monitor 44 may be configured to
5 monitor the status of the battery 45 by performing the following procedure:

measuring and recording the terminal voltage of the battery 45 essentially continuously;

making a trend analysis of a long-term development of the recorded terminal voltage, and

10 if the trend analysis indicates a certain deviation from satisfactory battery condition, generating an alarm.

“Essentially continuously” shall be understood in this context to mean that the measuring and recording of the terminal voltage of the battery 45 may occur at a desired periodicity which is typically much short than the “regularly” periodicity
15 referred to above, and which for instance may be every second, minute, hour, etc.

In some embodiments, the battery monitor 44 is configured to generate the alarm by providing a local visual alarm 48a at the entrance system 1, such as by turning on a light or lamp, or giving a notice on a display screen.

Alternatively or additionally, the battery monitor 44 may be configured to
20 generate the alarm by providing a local audible alarm 48b at the entrance system 1, such as by actuating an acoustic horn or playing a digital sound on an electronic device.

Alternatively or additionally, the battery monitor 44 may be configured to generate the alarm by sending an alarm signal 48c to a remote receiver over the wireless or wired communication interface 22.

25 The functionality performed in accordance with the present invention as described herein may be seen as an alternative inventive aspect in the form of a method of operating an entrance system 1 having a movable door member 10 and an automatic door operator 30. The steps of such a method may contain the different pieces of functionality as described in this document for the structural components of the entrance
30 system 1.

The invention has been described above in detail with reference to embodiments thereof. However, as is readily understood by those skilled in the art,

other embodiments are equally possible within the scope of the present invention, as defined by the appended claims. It is recalled that the invention may generally be applied in or to an entrance system having one or more movable door member not limited to any specific type. The or each such door member may, for instance, be a

5 swing door member, a revolving door member, a sliding door member, an overhead sectional door member, a horizontal folding door member or a pull-up (vertical lifting) door member.

CLAIMS

1. An automatic door operator (30) for use in an entrance system (1) that comprises a movable door member (10) being operable between a closed position (18) which prevents human access, and an open position (19) which admits human access, the automatic door operator (30) comprising:
- an electric motor (34);
 - a power supply (42) for connection to AC mains (38) and coupled for supplying power to the electric motor (34);
 - a battery (45) for supplying power to the electric motor (34);
 - a first sensor function (15; S1) configured for detecting that a person wishes to pass through the entrance system;
 - a second sensor function (MPF; AS) configured for detecting an emergency situation; and
 - a controller (31) having a normal operating mode and an evacuation mode, wherein, in the normal operating mode, the controller is responsive to the first sensor function (15; S1) and configured for controlling actuation of the motor (34) to generate torque for causing the door member (10) in the entrance system (1) to move from the closed position (18) to the open position (19), and
 - wherein the controller (31) is further responsive to the second sensor function (MPF; AS) to enter the evacuation mode, in which the controller (31) is configured for controlling actuation of the motor (34) to generate torque for causing the door member (10) in the entrance system (1) to move from the closed position (18) to the open position (19) and maintain in the open position even when there is an AC mains power failure, the motor (34) then being power supplied by the battery (45).
2. The automatic door operator (30) as defined in claim 1, wherein the battery (45) is coupled for charging by the power supply (42).
3. The automatic door operator (30) as defined in claim 1 or 2, wherein the second sensor function (MPF; AS) comprises means for receiving an external incoming alarm signal (AS).

4. The automatic door operator (30) as defined in any preceding claim, wherein the second sensor function (MPF; AS) comprises a detector (MPF) for detecting a mains power failure (MPF) of said AC mains (38).

5 5. The automatic door operator (30) as defined in any preceding claim, further comprising a battery monitor (44) configured to monitor a status of the battery (45).

6. The automatic door operator (30) as defined in claim 5, wherein the battery monitor (44) is configured to monitor the status of the battery (45) by performing the
10 following procedure regularly:

connecting an electric load (46) across the terminals of the battery (45);
measuring a voltage drop in the terminal voltage of the battery (45);
if the measured voltage drop exceeds a threshold value, generating an alarm;

and

15 disconnecting the electric load (46) from the terminals of the battery (45).

7. The automatic door operator (30) as defined in claim 5 or 6, wherein the battery monitor (44) is configured to monitor the status of the battery (45) by performing the following procedure:

20 measuring and recording the terminal voltage of the battery (45) continuously;
making a trend analysis of a long-term development of the recorded terminal voltage; and

if the trend analysis indicates a certain deviation from satisfactory battery condition, generating an alarm.

25

8. The automatic door operator (30) as defined in claim 6 or 7, wherein the battery monitor (44) is configured to generate the alarm by performing one or more of the following actions:

providing a local visual alarm (48a) at the entrance system (1);

30 providing a local audible alarm (48b) at the entrance system (1); and

sending an alarm signal (48c) to a remote receiver over a wireless or wired communication interface (22).

9. An entrance system (1) comprising:
a movable door member (10) being operable between a closed position (18)
which prevents human access, and an open position (19) which admits human access;
and
5 an automatic door operator (30) as defined in any of claims 1-8.
10. The entrance system (1) as defined in claim 9, wherein the movable door
member (10) is a swing door member (10) having a door leaf (12).
- 10 11. The entrance system (1) as defined in claim 10, further comprising:
a linkage (40) connected to the automatic door operator (30) and the door leaf
(12) for transferring torque generated by the motor (34) to the door leaf (12).
12. The entrance system (1) as defined in claim 11, wherein the first sensor
15 function (15; S1) includes at least one of an activity sensor (S1) and a manual actuator
(15).
13. The entrance system (1) as defined in any of claims 10-12, comprising, in
addition to said first and second sensor functions, a safety sensor function (S2) for
20 monitoring a zone (PD) at or near the door leaf (12) for presence or activity of a person
or object.
14. The entrance system (1) as defined in claim 13, wherein the controller (31)
of the automatic door operator (30) is further configured, in the normal operating mode,
25 to:
receive monitoring data from the safety sensor function (S2); and
if the monitoring data indicates presence or activity of a person or object in the
monitored zone (PD), refrain from controlling the motor (34) to cause movement of the
door member (10) or control the motor (34) to stop an ongoing movement of the door
30 member (10).

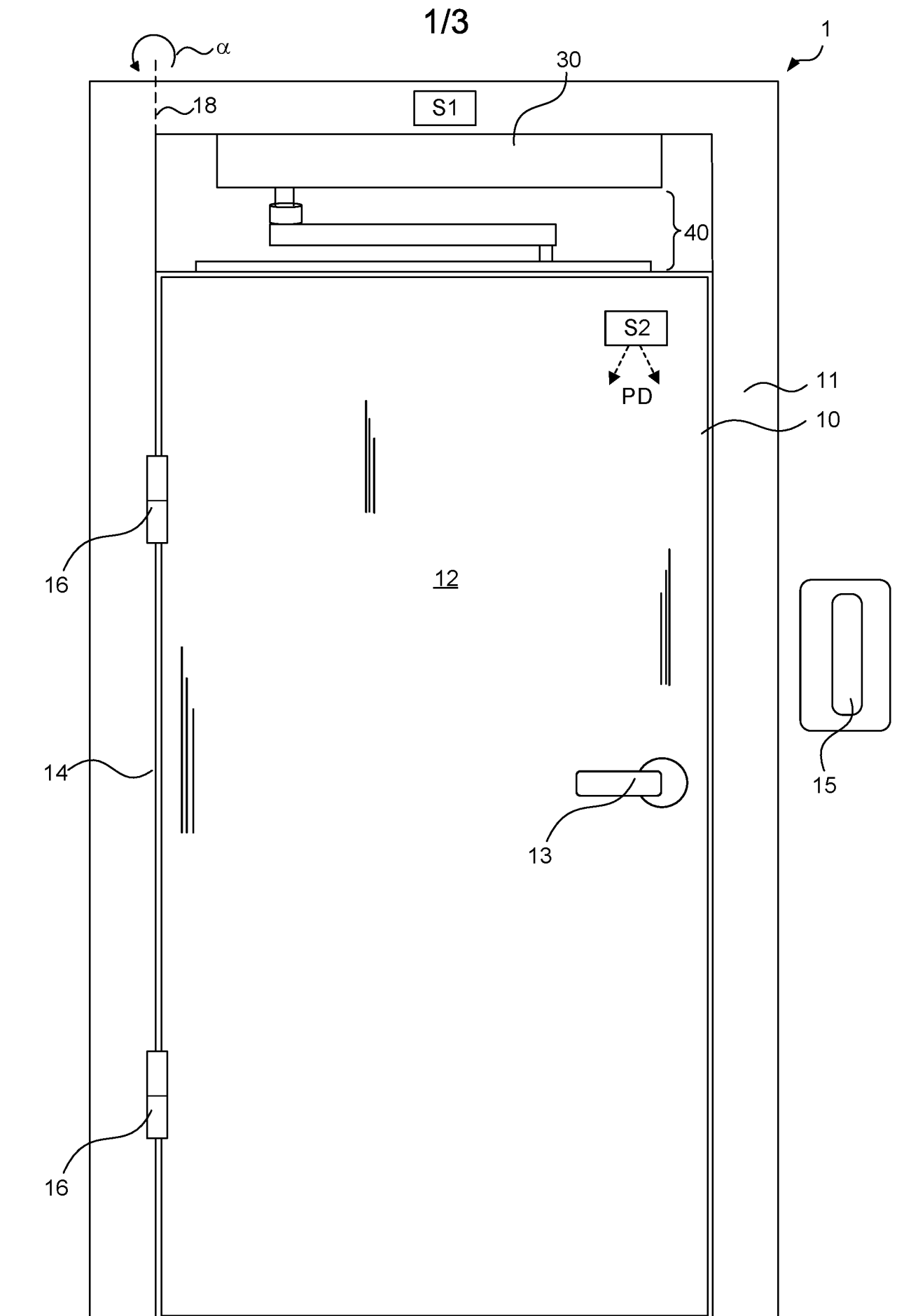


Fig 1

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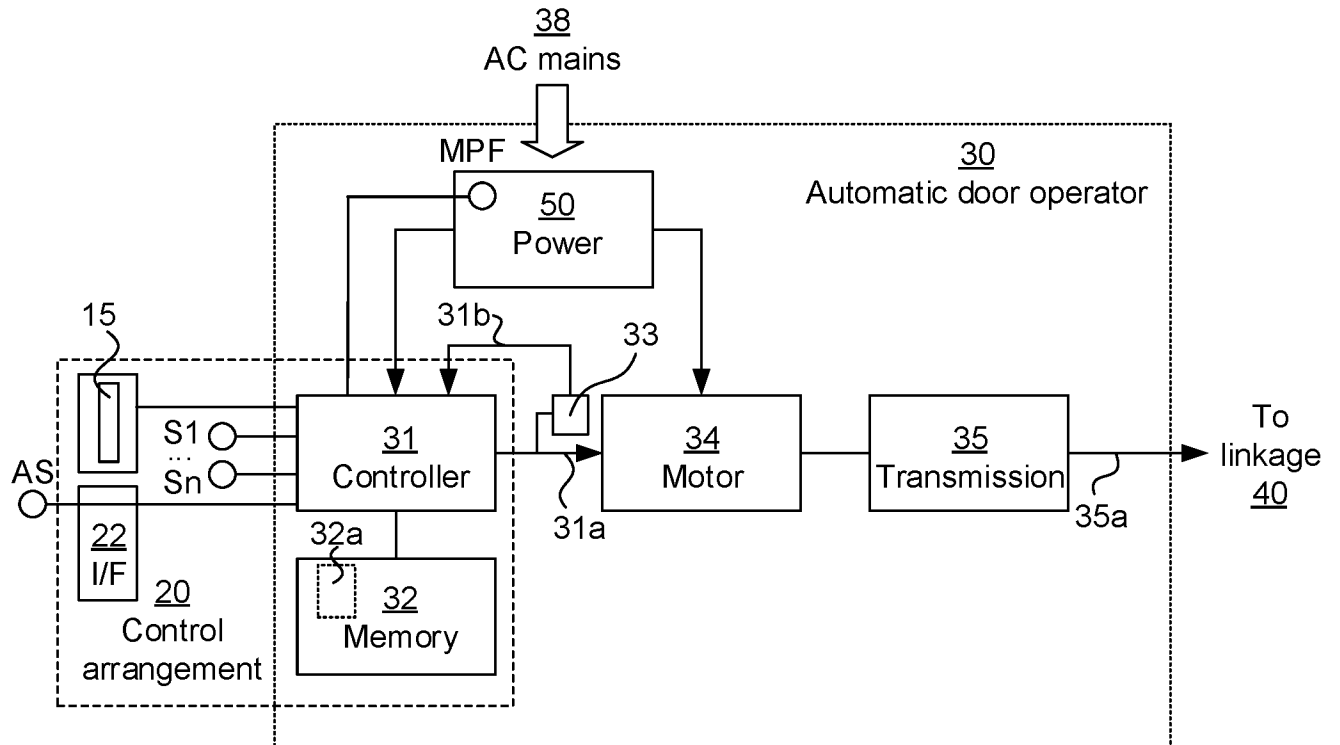


Fig 2

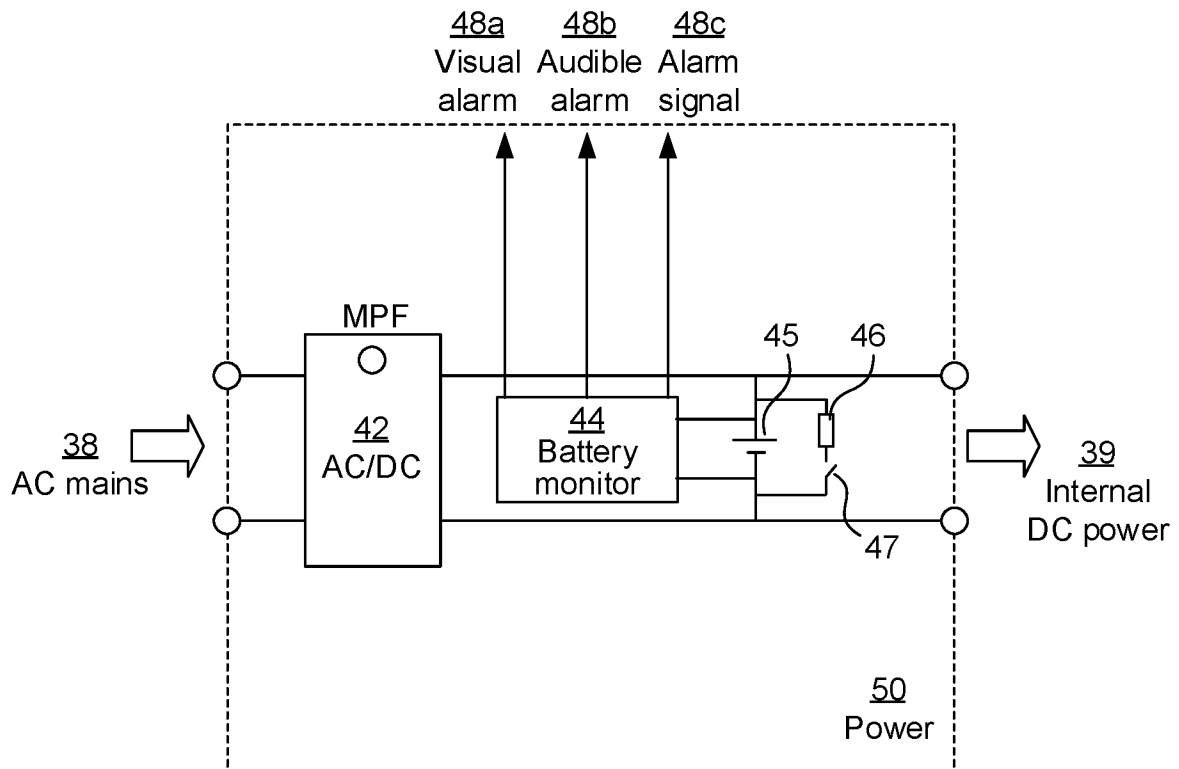
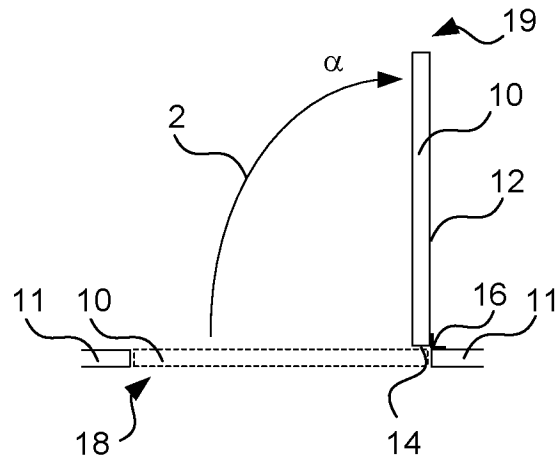
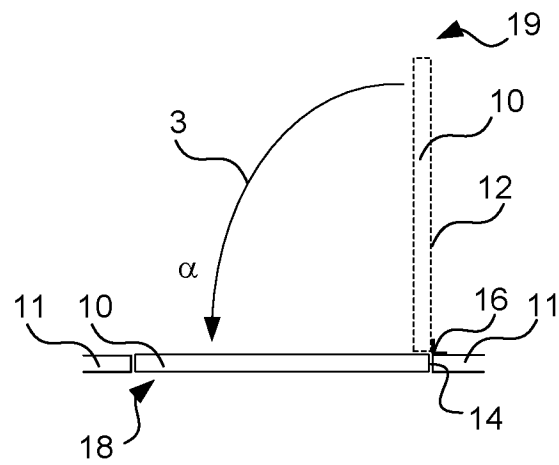


Fig 3

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*Fig 4**Fig 5*

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2020/065459

A. CLASSIFICATION OF SUBJECT MATTER
INV. E05F15/611 E05F15/72 E05F15/73
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E05F

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

10 August 2020

Date of mailing of the international search report

21/08/2020

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INTERNATIONAL SEARCH REPORT

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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International application No

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