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- (71) Applicant: ASSA ABLOY ENTRANCE SYSTEMS AB
[SE/SE]; Box 131, 261 22 Landskrona (SE).
- (72) Inventor: SÖDERQVIST, Sven-Gunnar; Bryggerivägen
56, 253 41 Vallåkra (SE).
- (74) Agent: ZACCO SWEDEN AB; P.O. Box 5581, Valhalla-
vägen 117N, 114 85 Stockholm (SE).
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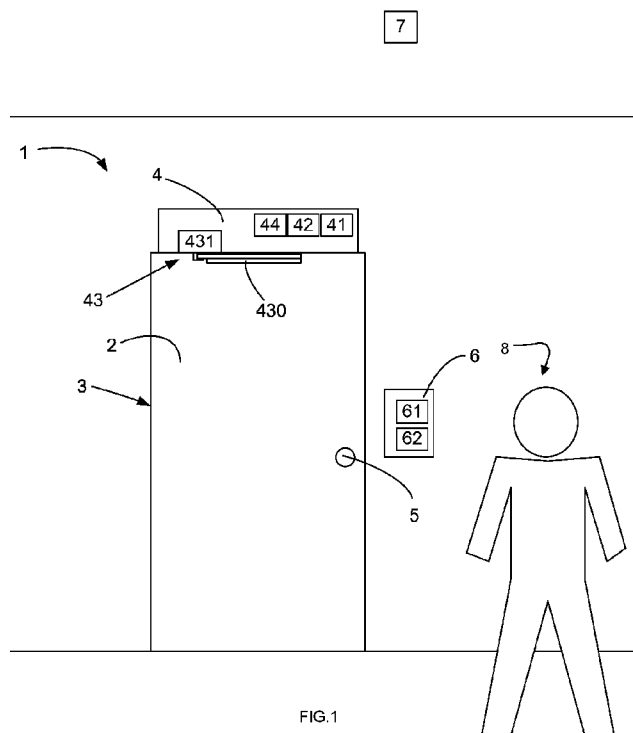


FIG. 1

(57) Abstract: The present disclosure relates to a door as-
sembly having integrated door operation control and access
control, and a method performed in the door assembly, com-
prising a door leaf movably arranged in a door opening, a
door operator for opening and closing the door leaf, a lock
unit for locking and unlocking the door leaf and an authen-
tication unit for input of authentication data associated with
a user requesting access through the door opening. The door
operator comprises a processing unit connected to the lock
unit and the authentication unit. The processing unit is con-
figured to receive the authentication data from the authen-
tication unit, determine that the authentication data comprises
data associated with a user which is allowed access through
the door opening, control unlocking of the lock unit based
on the determination of the authentication data from the au-
thentication unit, and control the opening and closing of the
door leaf.

DOOR OPERATOR WITH ACCESS CONTROL

TECHNICAL FIELD

The present disclosure relates to a door assembly with access control, and a method performed in the door assembly, wherein the door assembly comprises a door leaf movably arranged in a door opening, a door operator for opening and closing the door leaf, a lock unit for locking the door leaf and an authentication unit for input of authentication data associated with a user requesting access through the door opening.

10 BACKGROUND ART

A door assembly where the door leaf is opened by a user identifying her/himself, typically comprise a door leaf mounted in a door opening, a panel for identifying the user, an access controller for handling the verification of the user and a door operator for opening and closing the door leaf. The door leaf is also typically locked with a lock controlled by the access controller.

A traditional door assembly having access control is assembled by connecting a door operator with an access controller. The door operator controls the operation of the door leaf, such as opening and closing of the door leaf and movement of the door leaf in relation to personal safety arrangements, e.g. blocking sensors for preventing squeezing of fingers. The access controller verifies if access is allowed through the door opening based on authentication data provided to the access controller from the identifying panel combined with predetermined information regarding which users that have access. The access controller communicates with the door operator by a simple cabling e.g. due to that the access controller and the door operator typically are provided by different manufacturers and therefore the access controller has to be able to communicate with a variety of door operators and vice versa.

A person who is trying to obtain unauthorized access through the door may for example try to do so by tapping into the communication between the panel and the access controller, the lock and the panel or the access controller and the door operator. Furthermore, the

communication between the access controller and the door operator, as well as the other devices, is in general unencrypted making it easy for the person to influence the door operator to open the door for the unauthorized person.

Installation of a door assembly is often cumbersome since it requires wiring between the communicating devices and to prevent from possible intruders as much as possible it is important to make the wiring as inaccessible as possible.

Some of the drawbacks with door assemblies today are that they are not readily installed and easy to tamper with, as previously discussed.

10 SUMMARY OF THE INVENTION

An object of the present disclosure is to provide a door assembly with access control and a method which seek to mitigate, alleviate, or eliminate one or more of the above-identified deficiencies in the art and disadvantages singly or in any combination.

One object of the present disclosure is to achieve a simplified door assembly with access control. One object of the present disclosure is to obtain a door assembly with access control at a reduced cost. One object of the present disclosure is to achieve a simplified installation of a door assembly with access control. One object of the present disclosure is to improve the safety of a door assembly with access control.

These and further objects are achieved by the door assembly and the method. The disclosure provides for a door assembly with access control and a method for opening a door leaf for a user which is allowed access through a door opening.

The present disclosure is defined by the appended claims. Various advantageous embodiments of the disclosure are set forth by the appended claims as well as by the following description and the accompanying drawings.

The present disclosure relates to a door assembly having integrated door operation control and access control. The door assembly comprises a door leaf movably arranged in a door opening, a door operator for opening and closing the door leaf, a lock unit for locking and unlocking the door leaf, an authentication unit for input of authentication data associated

with a user requesting access through the door opening. The door operator comprises a processing unit connected to the lock unit and the authentication unit. The processing unit is configured to receive the authentication data from the authentication unit, determine that the authentication data comprises data associated with a user which is allowed access through the door opening, control unlocking of the lock unit based on the determination of the authentication data from the authentication unit, and control the opening and closing of the door leaf including to control the opening speed and the opening time of the door leaf. An advantage with this door assembly is that it has integrated control of the access handling and operation of the door, making the assembly effective in terms of signal handling and operation. The integrated control also makes it more difficult for an intruder to get unauthorised access through the door opening since the control signalling is minimised and thus the availability to compromise the signalling is minimized. The door assembly is also easy to install because of the minimized system with integrated control. The present disclosure provides a simplified door assembly with access control. The present disclosure reduces the number of parts in a door assembly with access control. The present disclosure reduces the cost for a door assembly with access control. The user is typically a pedestrian.

According to some aspects, the door operator comprises an opening and closing mechanism for opening and closing of the door leaf. Thus, the door operator opens and closes the door via the opening and closing mechanism.

According to some aspects, the opening and closing mechanism comprises a motor arranged to open and/or close the door leaf. In other words, the door leaf is opened by means of the motor so that a user which is allowed access through the door may pass.

According to some aspects, the control of the opening and closing of the door leaf comprises controlling the opening and closing mechanism.

According to some aspects, the authentication data from the authentication unit is encrypted. By encrypting the data sent between the authentication unit and the processing unit the security is increased. It will be harder for an intruder to obtain access through the door by tapping in to the communication between the authentication unit and the processing unit when the signalling between them is encrypted.

According to some aspects, the door operator comprises a memory unit. By providing a memory unit in the door operator, it can store any settings for the door assembly.

According to some aspects, the memory unit stores a predetermined list of allowed authentication data associated with users which are allowed access through the door opening.

5 Thus, when the processing unit receives authentication data from the authentication unit it may check the predetermined list of allowed users. If the authentication data indicates an allowed user, the door is unlocked.

According to some aspects, the door operator comprises a network unit configured to communicate with an electronic communication device for administration of allowed authentication data, which allowed authentication data comprises data associated with users which are allowed access through the door opening. By providing a network unit in the door operator, the door operator can communicate to external devices, such as a computer or a mobile phone, over a network. This allows for external devices to send information to the door operator. Thus, it is for example possible to update the door operator via an external electronic communication device. It also enables the external electronic device to receive troubleshooting data from the door operator.

According to some aspects, the authentication unit is arranged next to the door opening. Thereby, the authentication unit is easily accessible.

According to some aspects, the door assembly comprises that the door assembly is a swing door assembly.

The present disclosure relates to a method of integrated door operation control and access control for opening a door leaf for a user which is allowed access through a door opening, performed in a door assembly comprising a door leaf movably arranged in the door opening, a door operator for opening and closing the door leaf, a lock unit for locking and unlocking the door leaf, an authentication unit for input of authentication data associated with a user requesting access through the door opening. The door operator comprises a processing unit connected to the lock unit and the authentication unit. The method comprises:

- sending the authentication data from the authentication unit to the processing unit.

- receiving, in the processing unit, the authentication data from the authentication unit,
- determining, in the processing unit, that the authentication data comprises data associated with a user which is allowed access through the door opening,
- 5 - controlling, in the processing unit, unlocking of the lock unit based on the determination of the authentication data from the authentication unit, and
- controlling, in the processing unit, the opening and closing of the door leaf including controlling the opening speed and the opening time of the door leaf.

Thus, the method performed in the door operator integrates control of access handling and
10 the operation of the door, making the door assembly effective in terms of signal handling and operation. As discussed above, the integrated control also makes it more difficult for an intruder to get unauthorised access through the door opening since the control signalling is minimised and thus the availability to compromise the signalling is minimized. The door assembly is also easy to install because of the minimized system with integrated control.

15 According to some aspects, the method comprises:

- encrypting, in the authentication unit, the authentication data, and
- decrypting, in the processing unit, the authentication data.

Advantages with encryption have been previously discussed.

In other words, it is confirmed that authentication data comprises data associated with a user
20 which is allowed access through the door opening or not. The door leaf is then opened or not based on the determination.

According to some aspects, the determining comprises:

- comparing the authentication data with a predetermined list of allowed authentication data.

To compare the authentication data with the predetermined list of allowed authentication data is an effective way of determining whether a user is allowed access through the door or not. A list is also easy to maintain and to update.

According to some aspects, the controlling of the unlocking of the lock unit comprises:

- 5 - sending a lock control signal to the lock unit.

Thus, the processing unit handles the locking and unlocking of the door.

According to some aspects, the method comprises that the door operator comprises an opening and closing mechanism for opening and closing of the door leaf and the controlling of the opening and closing of the door leaf comprises:

- 10 - operating, in the processing unit, the opening and closing mechanism.

In other words, the processing unit of the door operator operates the opening and closing of the door.

BRIEF DESCRIPTION OF THE DRAWINGS

- 15 The foregoing will be apparent from the following more particular description of the example embodiments, as illustrated in the accompanying drawings in which like reference characters refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the example embodiments.

- 20 Figure 1 illustrates an example of a door assembly according to the present disclosure, with a closed door leaf,

Figure 2 illustrates the example of a door assembly illustrated in figure 1 with an open door leaf,

Figure 3 is a flow chart illustrating the proposed method according to the present disclosure.

DETAILED DESCRIPTION

Aspects of the present disclosure will be described more fully hereinafter with reference to the accompanying drawings. The assembly and method disclosed herein can, however, be realized in many different forms and should not be construed as being limited to the aspects set forth herein.

The terminology used herein is for the purpose of describing particular aspects of the disclosure only, and is not intended to limit the disclosure. As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise.

Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this disclosure belongs. It will be further understood that terms used herein should be interpreted as having a meaning that is consistent with their meaning in the context of this specification and the relevant art and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

The disclosure provides for a door assembly with access control and a method for opening a door leaf for a user 8 which is allowed access through the door opening. The door assembly 1 of figure 1 and 2 is a swing door assembly. According to some aspects the door assembly is a swing door assembly, a balance door assembly, a folding door assembly, a sliding door assembly, a revolving door assembly, a garage door assembly, or any other door assembly that is operated by a door operator, in particular a swing door assembly, a balance door assembly or a folding door assembly, such as a swing door assembly or a balance door assembly. Preferably, the door assembly is a swing door assembly.

The door assembly 1 comprises a door leaf 2 movably arranged in a door opening 3, a door operator 4 for opening and closing the door leaf, a lock unit 5 for locking the door leaf, an authentication unit 6 for input of authentication data associated with a user 8 requesting access through the door opening. Such a door assembly is shown in figures 1 and 2. The door leaf is according to some aspects movably arranged in the door opening between an open position, as shown in figure 2, and a closed position as shown in figure 1. The door leaf is

arranged to block the door opening when the door leaf is in a closed state. The door operator is typically arranged above the door opening. As one alternative, the door operator may be arranged on the door leaf, typically at the top of the door leaf. Alternatively, the door operator may be arranged under or on the side of the door opening. The door operator may be arranged in any position which allows for the door operator to open and close the door leaf. According to some aspects, the door operator comprises a door operator arm 430, which opens and closes the door leaf. The lock unit is a unit that locks and unlocks the door. The lock unit comprises a locking mechanism which physically locks and unlocks the door. The locking mechanism comprises a locking part, for example in the form of a movable latch or a movable strike plate. The locking part may for example be electromagnetically movable, e.g. by means of a solenoid or a motor. The locking mechanism is for example arranged on the door leaf but may also be arranged in a door frame of the door assembly. Alternatively, the lock mechanism may also be arranged above or below the door leaf and lock the door from above or below. The authentication unit is arranged in the vicinity of the door opening, such as next to the door opening, such as next to the door opening on the structure in which the door leaf is arranged, such as on the wall next to the door opening, or on the door leaf. The authentication unit is for example arranged so that it is easily accessible for a user who is authenticating herself/himself. The authentication unit is for example a pin code panel, a card reader or a biometric reader. The authentication unit is any kind of authentication unit where a user can authenticate herself/himself. Another term for authentication unit comprise identification unit. According to some aspects, the lock unit and the authentication unit is a combined unit. In other words, the lock unit and the authentication unit may be integrated.

The door opening may be an opening in a wall, fence or any structure in which a door is arranged.

The door operator 4 comprises a processing unit 41 connected to the lock unit 5 and to the authentication unit 6. The processing unit is configured to receive the authentication data from the authentication unit, to control unlocking of the lock unit based on the authentication data from the authentication unit, and to control the opening and closing of the door leaf 2. The processing unit is a single processing unit. The processing unit may comprise one or several processors or one or several cores. In the case of several processors, the processors work together as a unit and have a combined functionality. In other words, the processors do

not have separated functionalities but cooperate as one unit. The processing unit is typically connected to the lock unit and to the authentication unit with a wire suitable for sending electronic signals. According to some aspects, the processing unit controls the locking of the lock unit. The lock may be locked after the door leaf has been closed, e.g. after a
5 predetermined period after the door leaf has been closed.

According to some aspects, the processing unit is configured to open the door leaf when the lock unit has been unlocked. According to some aspects, the processing unit is configured to close the door leaf when the door leaf has been open during a predetermined period.

According to some aspects the processing unit is connected to the lock unit and the
10 authentication unit via a wireless connection suitable for sending electronic signals. The connection may also be a combination of wired and wireless connection. Examples of wireless connections are BluetoothTM, WiFi, Infrared or any kind of near field communication technology. According to some aspects the processing unit is directly connected to the lock unit and the authentication unit. Directly connected means that the processing unit is in direct
15 communication with the locking unit and the authentication unit. Direct communication may occur both via a wired connection or a wireless connection or a combination of both. In the case of wireless connection there will be a transceiver for the wireless signal on both the processing unit side and the lock unit and/or authentication unit side.

The processing unit 41 of a door operator 4 handles the operation of the door leaf 2 by
20 controlling for example the opening speed and the opening time of the door leaf. The opening speed is the speed of the door leaf during opening of the door leaf. The opening time is time during which the door leaf is open before the door leaf is closed by the door operator. The processing unit may also control the closing speed of the door leaf, which is the speed of the door leaf during closing of the door leaf. The processing unit may also handle information
25 from safety sensors on, or in the vicinity of, the door. Safety sensors are used to prevent for example pinching a person's fingers in the door or to close before a person has fully passed the door opening.

An advantage with this door assembly 1 is that it has integrated control of the operation of the door as well as control of the access of pedestrians through the door, making the assembly
30 effective in terms of signal handling and operation. The integrated control also makes it more

difficult for an intruder to get unauthorised access through the door opening since the control signalling is minimised and thus the availability to compromise the signalling is minimized. The door assembly is also easy to install because of the minimized system with integrated control. Integrated door operation control and access control means that the door operation control and the access control are integrated with each other. Both the door operation control and the access control are integrated in the processing unit.

Figure 3 illustrates a flow chart of a method performed in the door assembly 1. The method is for opening a door for a user 8 which is allowed access through the door opening 3. The method is performed in the above described door assembly comprising a door leaf 2 movably arranged in a door opening, a door operator 4 for opening and closing the door leaf, a lock unit 5 for locking and unlocking the door leaf, an authentication unit 6 for input of authentication data associated with a user requesting access through the door opening. The door operator comprises a processing unit 41 connected to the lock unit and the authentication unit.

The method comprises:

- sending S2 the authentication data from the authentication unit to the processing unit.
- receiving S3, in the processing unit, the authentication data from the authentication unit,
- controlling S6, in the processing unit, unlocking of the lock unit based on the authentication data from the authentication unit, and
- controlling S7, in the processing unit, the opening and closing of the door leaf.

In other words, the processing unit 41 is configured to receive S3 the authentication data, to control S6 the unlocking of the lock unit and to control S7 the opening and closing of the door.

According to some aspects, the authentication unit 6 comprises a sending unit 61 for sending the authentication data. The processing unit controls opening/closing of the door leaf. The processing unit receives an authentication signal from the authentication unit, unlocks the lock based on the authentication signal and also controls opening and closing of the door leaf.

The way that the processing unit is connected to the authentication unit and the locking unit has been previously described.

The method performed in the door operator 4 integrates control of the operation of the door and control of access through the door, making the door assembly 1 effective in terms of
5 signal handling and operation. The integrated control facilitates installation of a door assembly having access control because of the minimized system. As discussed above, the integrated control also makes it more difficult for an intruder to get unauthorised access through the door opening since the control signalling is minimised and thus the availability to compromise the signalling is minimized. According to some aspects, the processing unit controls the locking
10 of the lock unit. The lock may be locked after the door leaf has been closed, e.g. after a predetermined period after the door leaf has been closed.

For increasing the security of the door assembly 1, the authentication data from the authentication unit 6 is, according to some aspects, encrypted. According to some aspects, the method of the door assembly comprises:

- 15 - encrypting S1, in the authentication unit, the authentication data.

According to some aspects, the method of the door assembly comprises:

- decrypting S4, in the processing unit, the authentication data.

In other words, the processing unit 41 is configured to decrypt the encrypted authentication data from the authentication unit. According to some aspects, the authentication unit
20 comprises an encrypting unit 62 for encrypting. By encrypting the data sent between the authentication unit and the processing unit the security is increased. It will be harder for an intruder to obtain access through the door by tapping in to the communication between the authentication unit and the processing unit when the signalling between them is encrypted.

Encryption is for example performed by encrypting the authentication data using an
25 encryption key. The data cannot be read without a corresponding key for decrypting. The encryption of the authentication data may be performed using any encryption technique suitable for encrypting a data message. The encryption utilizes for example the eXtended Tiny Encryption Algorithm, XTEA. According to some aspects, the authentication unit is a card

reader for reading access cards. The authentication data present on the access card may be encrypted.

To determine whether or not to unlock the door, the method of the door assembly comprises, according to some aspects:

- 5 - determining S5, in the processing unit 41, that the authentication data comprises data associated with a user 8 which is allowed access through the door opening.

In other words, the processing unit is configured to determine that the authentication data allows access through the door opening. Thus, the processing unit 41 is configured to determine that the authentication data indicates that a user 8 which is allowed access through
10 door is the one authenticating herself/himself. In other words, it is confirmed that authentication data comprises data associated with a user which is allowed access through the door opening or not. The lock unit is then unlocked or not based on the determination. Specifically, the lock unit is unlocked if it is determined that the authentication data comprises data associated with a user which is allowed access through the door opening. Moreover, the
15 determining S5 comprises, according to some aspects:

- comparing S51 the authentication data with a predetermined list of allowed authentication data.

The processing unit 41 is configured to compare S51 the authentication data with the predetermined list of allowed authentication data. The lock unit is unlocked or not based on
20 the comparison. To compare the authentication data with a predetermined list of allowed authentication data is an effective way of determining whether a user 8 is allowed access through the door or not. A list is also easy to maintain and to update.

By providing a memory unit 42 in the door operator, it can store any settings for the door assembly and it may also store a list of allowed users. According to some aspects, the door
25 operator comprises a memory unit 42. The memory unit is connected to the processing unit 41. According to some aspects, the memory unit stores the predetermined list of allowed authentication data associated with users which are allowed access through the door opening. Thus, when the processing unit receives authentication data from the authentication unit it may check the authentication data against the predetermined list of allowed users. If the

authentication data indicates an allowed user according to the predetermined list, the door is unlocked.

The list of allowed authentication data is set by the door assembly owner. In other words, the owner of the door assembly may determine which authentication data allows access through the door. The list may be predetermined in the sense that when a user authenticates herself/himself at the authentication unit, the predetermined list of allowed authentication data should already be stored in the memory unit 42 of the door operator 4.

The controlling S6 of the unlocking of the lock unit comprises according to some aspects:

- sending S61 a lock control signal to the lock unit.

10 The processing unit 41 is configured to send the lock control signal to the lock unit. According to some aspects the controlling S6 also comprises locking of the lock unit by sending a lock control signal to the lock unit. Thus, the processing unit handles the locking and unlocking of the door. The processing unit may be configured to encrypt the lock signal. In such a case the lock unit is configured to decrypt the encrypted lock signal from the processing unit. The lock unit is configured to lock/unlock the lock based on the lock signal.

For increasing the security of the door assembly 1, the lock control signal from the processing unit 41 is, according to some aspects, encrypted. According to some aspects, the method of the door assembly comprises:

- encrypting, in the processing unit, the lock control signal, and
- 20 - decrypting, in the lock unit 5, the lock control signal.

In other words, the processing unit 41 is configured to encrypt the lock control signal and the lock unit is configured to decrypt the lock control signal. Advantages with encryption and a description of encryption have been previously described when discussing encryption of the authentication data.

25 The door operator opens and closes the door via an opening and closing mechanism 43 according to some aspects. Thus, the door operator comprises an opening and closing mechanism for opening and closing of the door leaf. The opening and closing mechanism comprises an arm 430 for opening and closing the door leaf. Also, according to some aspects,

the door assembly comprises that the opening and closing mechanism comprises a motor 431 arranged to open and/or close the door leaf. In other words, the door leaf is opened by means of the motor so that a user which is allowed access through the door may pass. When a user has authenticated herself/himself at the authentication panel, the door is automatically
5 opened for the user. Hence, the user does not need to open the door herself/himself. According to some aspects, the control of the opening and closing of the door leaf comprises controlling the opening and closing mechanism 43. The processing unit 41 is configured to control the opening and closing mechanism. The door leaf may be opened by the motor 431. The door leaf may be closed by the motor or by a spring biased during opening of the door leaf
10 by means of the motor. Alternatively, the door leaf may be closed by the motor and opened by a spring biased during closing of the of the door leaf by means of the motor.

The method comprises, according to some aspects, that the door operator comprises an opening and closing mechanism 43 for opening and closing of the door leaf and the controlling
S7 of the opening and closing of the door leaf comprises:

- 15 - operating S71, in the processing unit, the opening and closing mechanism.

The processing unit 41 is configured to operate the opening and closing mechanism. In other words, the processing unit of the door operator operates the opening and closing of the door.

In some installations of the door assembly there might be no need to have a high security from both sides of the door. In such a case an authentication unit may be provided on the
20 secured side and a button may be provided on the non-secured side of the door. A user who wishes to pass the door presses the button and the door is unlocked and opened. It is common in for example hospitals that a user is required to provide some kind of evidence of authentication at one side of a door to enter but only the press of a button is required to exit. The evidence of authentication is for example a pin code or an access card that is held or
25 swiped in a slit at the authentication unit. It may also be that the authentication unit comprises a biometric scanner which scans for example a fingerprint of the user. On the non-secured side, the button may be replaced by or combined with a motion sensor or a force sensor that senses pressure put on it by a user. The secured side may typically be outside a building or a room and the non-secured side may be the inside of a building or a room. When
30 the door installation is such that the user does not need to prove her/his identity to an

authentication unit, the data sent from the button/motion sensor or force sensor to the processing unit is, according to some aspects, a triggering signal instructing the processing unit to unlock and open the door. In other words, the processing unit controls the unlocking and opening and closing of the door leaf based on the triggering signal.

- 5 In an installation where a high security is required from both sides of the door, the door assembly may comprise two authentication units. One authentication unit is preferably arranged on one side of the door and one authentication unit is preferably arranged on the other side of the door. Each authentication unit is connected to the processing unit.

According to some aspects, the door assembly comprises that the door operator 4 comprises a
10 network unit 44 configured to communicate with an electronic communication device 7 for administration of allowed authentication data, which allowed authentication data comprises data associated with users which are allowed access through the door opening. By providing a network unit in the door operator, the door operator can communicate to external devices over a network. The electronic communication device 7 is for example a computer, a server, or
15 a mobile phone. It may be any type of electronic communication device which is able to communicate data over a network. This allows for external devices to send information to the door operator. Thus, it is for example possible to update the door operator via an external electronic communication device. It also enables the external electronic device to receive troubleshooting data from the door operator. The network unit communicates using for
20 example TCP/IP. According to some aspects, the method comprises to receive an update of the predetermined list of allowed authentication data from the electronic communication device 7 via the network unit.

According to some aspects, the communication between the network unit 44 and the electronic communication device 7 is encrypted. The communication between the door
25 operator 4 and the electronic communication device 7 is for example encrypted using Secure Sockets Layer, SSL, or Transport Layer Security, TLS. SSL uses a combination of encryption using public keys and symmetrical keys. An SSL session is always initiated by a handshake where the communicating devices agree on an encryption to use. After the handshake procedure a connection is established and data can be sent between the devices. The data is
30 encrypted using the keys that were agreed upon by the devices during the handshake

procedure. SSL may use several different methods of encryption, such as Data Encryption Standard, DES, Digital Signature Algorithm, DSA, Key Exchange Algorithm, KEA, Message-Digest algorithm 5, MD5, Rivest Cipher 2, RC2, Rivest Cipher4, RC4, Rivest, Shamir and Adleman encryption, RSA, Secure Hash Algorithm, SHA-1, SKIPJACK or Triple Data Encryption Standard, Triple-DES.

When the door operator 4 has access to a network, the processing unit may, according to some aspects, check the authentication data from the authentication unit 6 against data on a remote location over the network. It may for example be the case that the previously discussed predetermined list of allowed authentication data associated with users which are allowed access through the door opening is stored at a remote location. The processing unit determines whether or not authentication data is associated with users which are allowed access through the door opening by matching the authentication data against the data at the remote location over the network.

It should be appreciated that the flow diagram of figures 3 comprises some operations which are illustrated with a solid border and some operations which are illustrated with a dashed border. The operations which are comprised in a solid border are operations which are comprised in the broadest aspects of the disclosure. The operations which are comprised in a dashed line are aspects of the disclosure which may be comprised in, or a part of, or are further operations which may be taken in addition to the operations of the broader aspects of the disclosure. It should be appreciated that the operations need not be performed in order. Furthermore, it should be appreciated that not all of the operations need to be performed. Also, the functions or steps noted in the blocks can according to some aspects of the disclosure be executed continuously in a loop.

The description of the aspects of the disclosure provided herein have been presented for purposes of illustration. The description is not intended to be exhaustive or to limit aspects of the disclosure to the precise form disclosed, and modifications and variations are possible in light of the above teachings or may be acquired from practice of various alternatives to the provided aspects of the disclosure. The examples discussed herein were chosen and described in order to explain the principles and the nature of various aspects of the disclosure and its practical application to enable one skilled in the art to utilize the aspects of the disclosure in

various manners and with various modifications as are suited to the particular use contemplated. The features of the aspects of the disclosure described herein may be combined in all possible combinations of methods, apparatus, modules, systems, and computer program products. It should be appreciated that the aspects of the disclosure presented herein may be practiced in any combination with each other.

It should be noted that the word “comprising” does not necessarily exclude the presence of other elements or steps than those listed. It should further be noted that any reference signs do not limit the scope of the claims.

The various example embodiments described herein are described in the general context of method steps or processes, which may be implemented according to some aspects by a non-transitory computer readable medium, which, when executed on a processing unit, causes the processing unit to perform the method according to above. A computer-readable medium may include removable and non-removable memory unit 42 including, but not limited to, Read Only Memory, ROM, Random Access Memory, RAM, compact discs, CDs, digital versatile discs, DVD, etc. Generally, program modules may include routines, programs, objects, components, data structures, etc. that performs particular tasks or implement particular abstract data types. Computer-executable instructions, associated data structures, and program modules represent examples of program code for executing steps of the method disclosed herein. The particular sequence of such executable instructions or associated data structures represents examples of corresponding acts for implementing the functions described in such steps or processes.

In the drawings and specification, there have been disclosed exemplary aspects. However, many variations and modifications can be made to these aspects. Accordingly, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the embodiments being defined by the following claims.

CLAIMS

1. A door assembly (1) having integrated door operation control and access control, comprising a door leaf (2) movably arranged in a door opening (3), a door operator (4) for opening and closing the door leaf (2), a lock unit (5) for locking and unlocking the door leaf (2), an authentication unit (6) for input of authentication data associated with a user (8) requesting access through the door opening (3),

wherein the door operator (4) comprises a processing unit (41) connected to the lock unit (5) and the authentication unit (6),

wherein the processing unit (41) is configured to

receive the authentication data from the authentication unit (6),

determine that the authentication data comprises data associated with a user (8) which is allowed access through the door opening (3),

control unlocking of the lock unit (5) based on the determination of the authentication data from the authentication unit (6), and

control the opening and closing of the door leaf (2) including to control the opening speed and the opening time of the door leaf (2).

2. The door assembly according to claim 1, wherein the door operator (4) comprises an opening and closing mechanism (43) for opening and closing of the door leaf (2).

3. The door assembly according to claim 2, wherein the opening and closing mechanism (43) comprises a motor (431) arranged to open and/or close the door leaf (2).

4. The door assembly according to claim 2 or 3, wherein the control of the opening and closing of the door leaf (2) comprises controlling the opening and closing mechanism (43).

5. The door assembly according to any one of the preceding claims, wherein the authentication data from the authentication unit (6) is encrypted.

6. The door assembly according to any one of the preceding claims, wherein the door operator (4) comprises a memory unit (42).
7. The door assembly according to claim 6, wherein the memory unit (42) stores a predetermined list of allowed authentication data associated with users (8) which are allowed access through the door opening (3).
8. The door assembly according to any one of the preceding claims, wherein the door operator (4) comprises a network unit (44) configured to communicate with an electronic communication device (7) for administration of allowed authentication data, which allowed authentication data comprises data associated with users (8) which are allowed access through the door opening.
9. The door assembly according to any one of the preceding claims, wherein the authentication unit (6) is arranged next to the door opening (3).
10. The door assembly according to any one of the preceding claims, wherein the door assembly (1) is a swing door assembly (1).
11. A method of integrated door operation control and access control for opening a door leaf (2) for a user (8) which is allowed access through a door opening (3), performed in a door assembly (1) comprising a door leaf (2) movably arranged in the door opening (3), a door operator (4) for opening and closing the door leaf (2), a lock unit (5) for locking and unlocking the door leaf (2), an authentication unit (6) for input of authentication data associated with a user (8) requesting access through the door opening (3), wherein the door operator (4) comprises a processing unit (41) connected to the lock unit (5) and the authentication unit (6), wherein the method comprises:
 - sending (S2) the authentication data from the authentication unit (6) to the processing unit (41),
 - receiving (S3), in the processing unit (41), the authentication data from the authentication unit (6),
 - determining (S5), in the processing unit (41), that the authentication data comprises data associated with a user (8) which is allowed access through the door opening (3),

- controlling (S6), in the processing unit (41), unlocking of the lock unit (5) based on the determination of the authentication data from the authentication unit (6), and
- controlling (S7), in the processing unit (6), the opening and closing of the door leaf (2) including controlling the opening speed and the opening time of the door leaf (2).

5 12. The method according to claim 11, comprising:

- encrypting (S1), in the authentication unit (6), the authentication data, and
- decrypting (S4), in the processing unit (41), the authentication data.

13. The method according to claim 11 or 12, wherein the determining (S5) comprises:

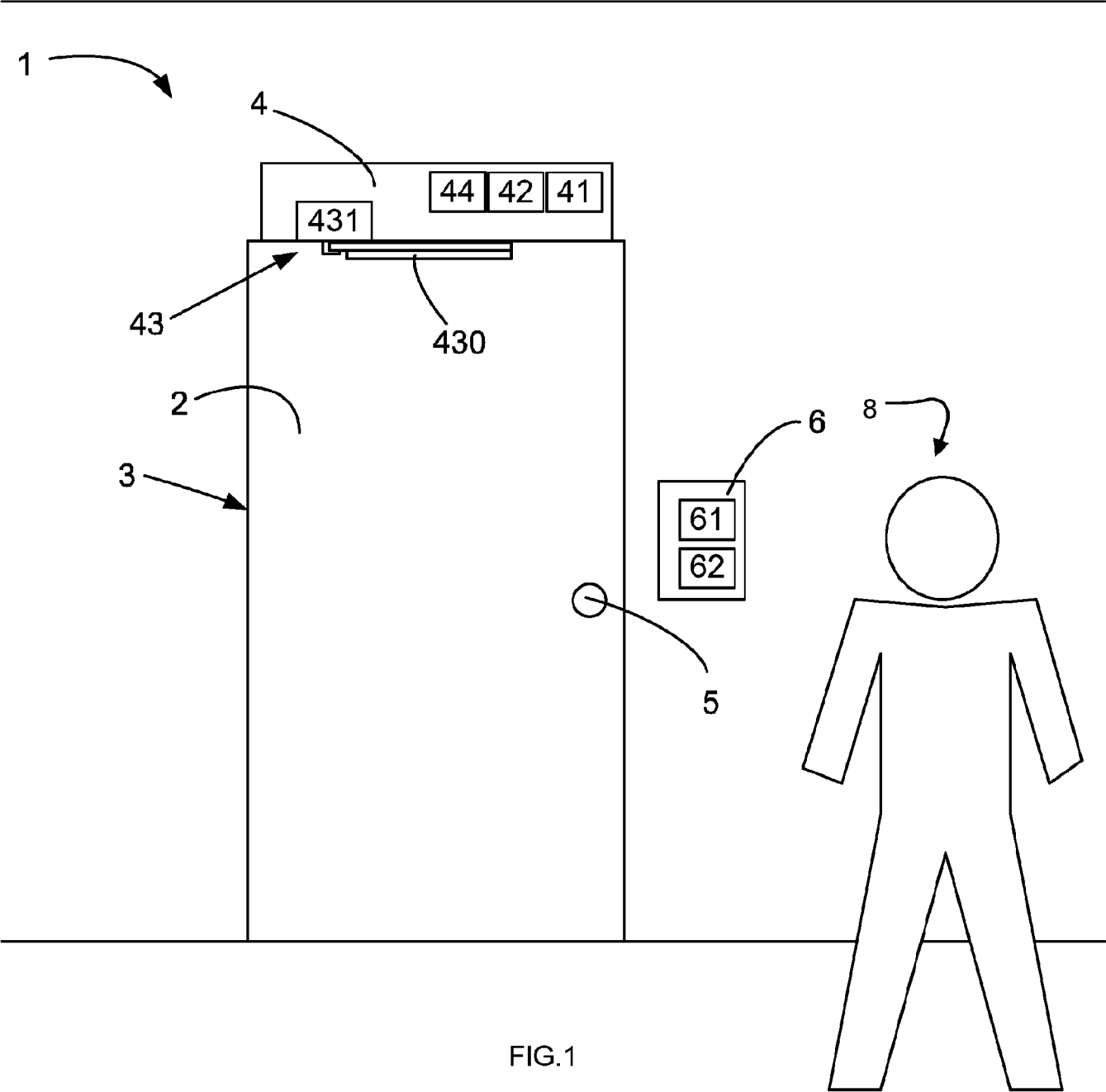
- comparing (S51) the authentication data with a predetermined list of allowed authentication data.

14. The method according to any one of claims 11 to 13, wherein the controlling (S6) of the unlocking of the lock unit (5) comprises:

- sending (S61) a lock control signal to the lock unit (5).

15 15. The method according to any one of claims 11 to 14, wherein the door operator (1) comprises an opening and closing mechanism (43) for opening and closing of the door leaf (2) and the controlling (S7) of the opening and closing of the door leaf (2) comprises:

- operating (S71), in the processing unit (41), the opening and closing mechanism (43).



7

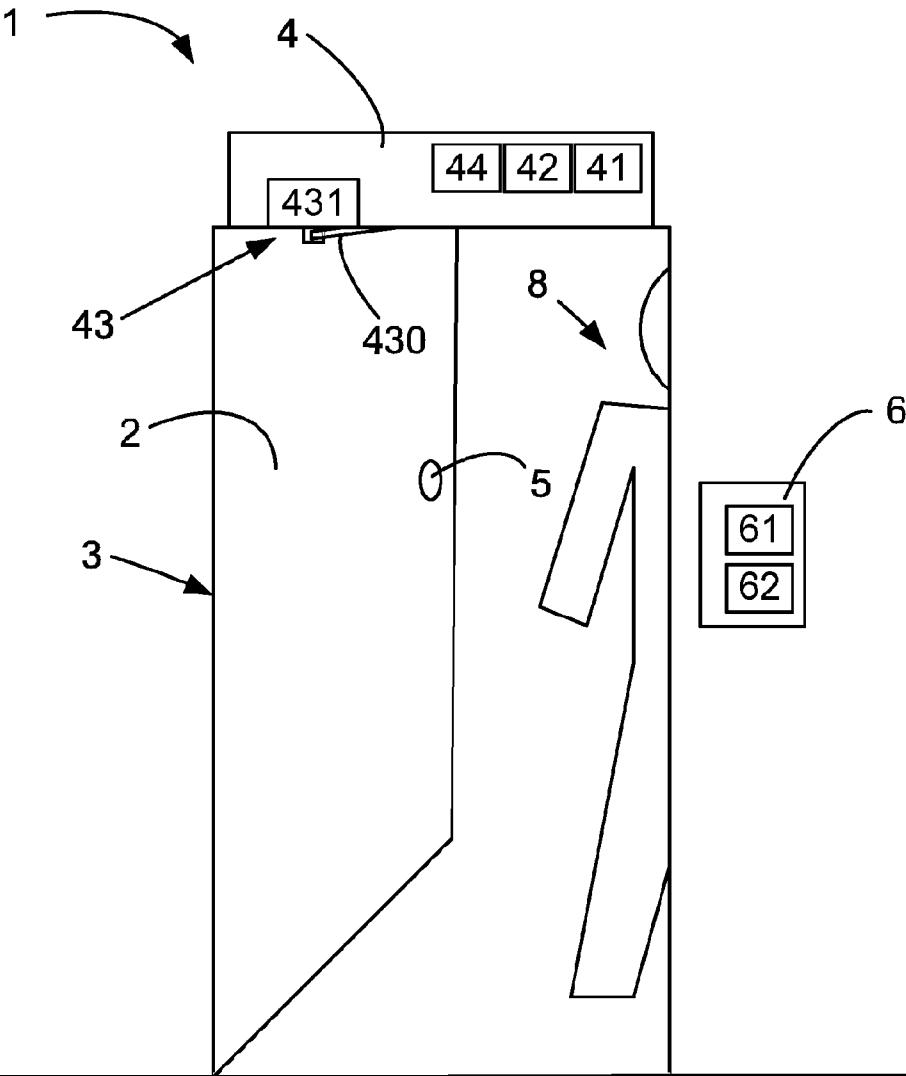


FIG.2

3/3

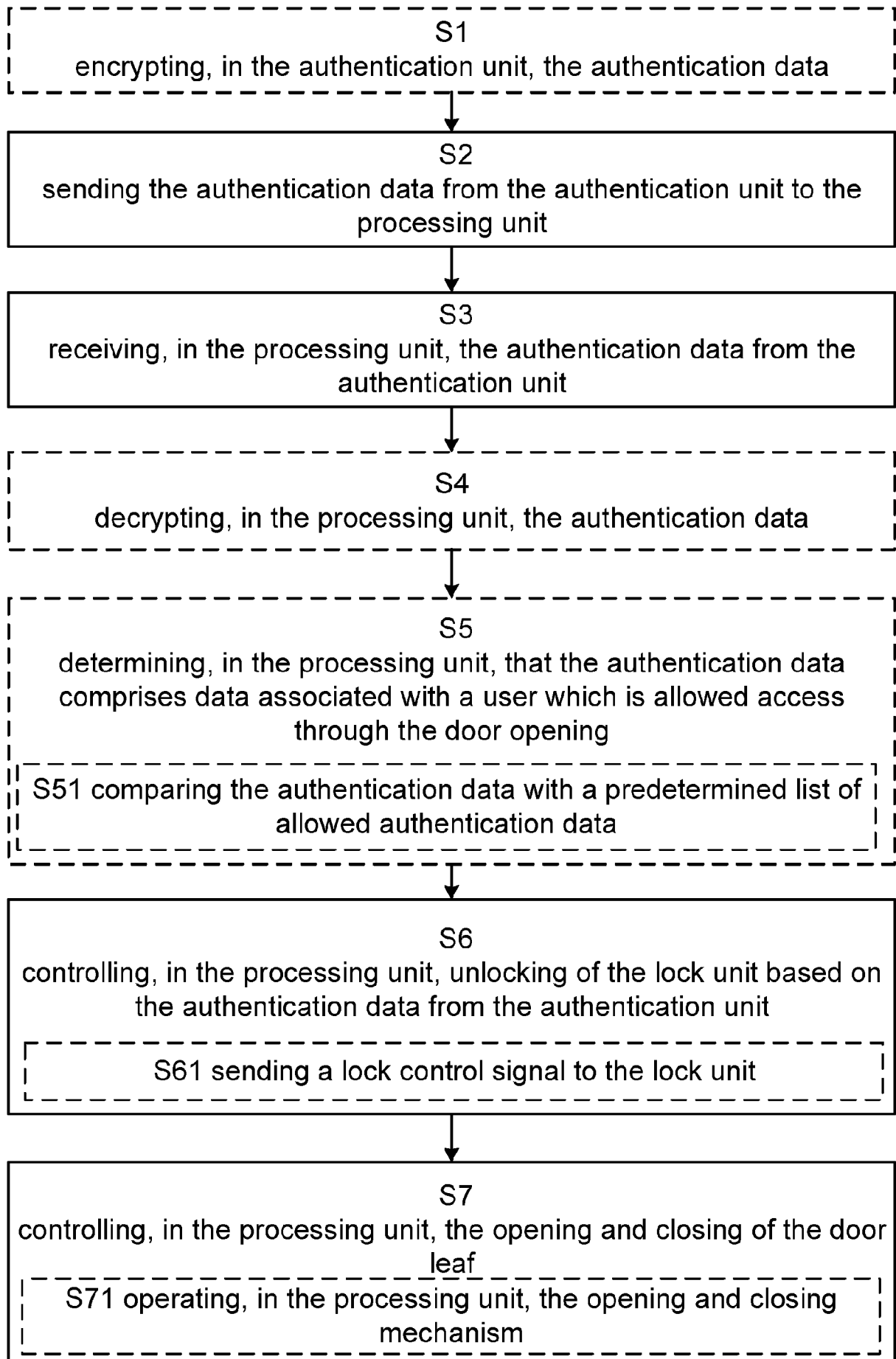


FIG.3

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/056238

A. CLASSIFICATION OF SUBJECT MATTER
INV. G07C9/00 E05F15/70
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)
G07C 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.
X	US 2011/016971 A1 (YULKOWSKI PATRICIA [US] ET AL) 27 January 2011 (2011-01-27) abstract paragraph [0006] - paragraph [0009] paragraph [0027] - paragraph [0056] paragraph [0066] - paragraph [0070] figures 2,4	1-15
X	----- EP 2 543 809 A2 (BROSE FAHRZEUGTEILE [DE]) 9 January 2013 (2013-01-09) abstract paragraph [0001] - paragraph [0022] paragraph [0025] - paragraph [0048] -----	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

3 June 2016

Date of mailing of the international search report

14/06/2016

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Teutloff, Ivo

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2016/056238

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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