(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 604 720 A2**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
05.02.2020 Bulletin 2020/06

(21) Application number: **18778239.6**

(22) Date of filing: **02.04.2018**

(51) Int Cl.:
E05B 47/00 *(2006.01)* ***E05D 15/52*** *(2006.01)*
E05D 15/06 *(2006.01)* ***E05F 15/00*** *(2015.01)*

(86) International application number:
PCT/ES2018/000041

(87) International publication number:
WO 2018/178425 (04.10.2018 Gazette 2018/40)

(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

(30) Priority: **31.03.2017 ES 201700348**

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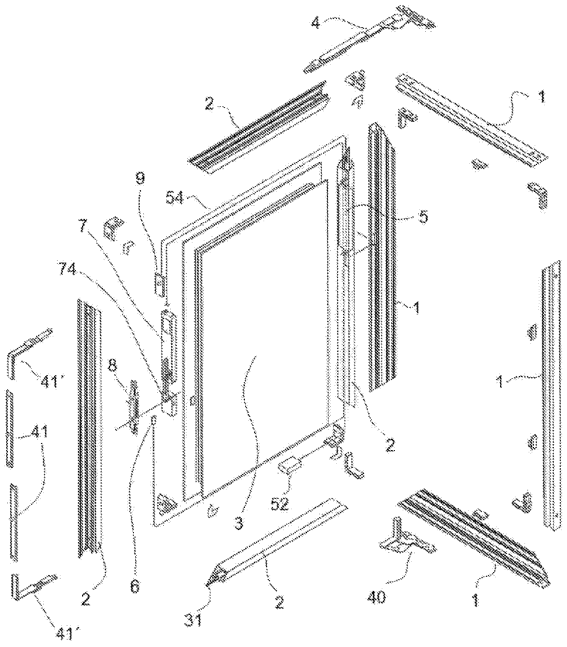
(54) MOTORISED CLOSURE SYSTEM AND METHOD

(57) The invention relates to a motorised closure system and to an actuation method associated with said system, intended for openable, tilt-and-turn and sliding enclosures, with visible or concealed profiles, wherein the enclosure assembly is formed by continuous surfaces, flat surfaces and surfaces without handles or projections, the entire system being managed by a control module that receives signals from an optical sensor and a magnetic sensor, and wherein the control module interprets the signals and sends actuation instructions to a motorised locking module connected to a pulling piece that moves a logically operated fitting which comprises a series of positioning latches for turning movement, for tilting movement and for sliding movement, and which can also include a motorised movement module, said elements of the system and the electrical and electronic connection thereof being concealed and protected.

Fig.1



EP 3 604 720 A2

Description

Field of the invention

[0001] This invention relates to a motorised closure system, specifically intended for enclosures formed by glazed surfaces, practicable opening, tilt-and-turn and sliding, in which the whole of the enclosure is constituted by continuous, flat surfaces without handles or protrusions with the carpentry seen or hidden, the entire system being managed by a control module in connection with a series of sensors, allowing the opening mode desired by the user, and also managing to respect the water-tightness of the enclosure.

[0002] In turn, this invention defines an opening and closure method based on a system whose characteristics are similar to those of the previous motorised closure system.

[0003] The field of application of this invention is the industrial sector related to the production, distribution and marketing of enclosure systems, mainly the sector related to windows, and more specifically with tilt-and-turn and sliding windows.

State of the art

[0004] Enclosure systems are known, not only in the industrial sector of manufacturers, distributors and traders of this type of enclosures, but also to the general public. As is known, conventional enclosures are constituted by a side frame that has a system that allows an axis of rotation alternative to the conventional swing, so the closure and opening system consists of a crank with which you can choose to open the window around a horizontal or vertical axis, or in any case by a sliding or slide movement.

[0005] As an example we highlight the patent EP2080863, which defines a system of fittings for tilt-and-turn windows, but the common problem of all this type of enclosures is that, after time, in any sudden act of manoeuvring the crank, or similar manual device, the system is disengaged and breaks the turning system. These systems are generally composed of a plurality of small elements such as springs or levers, or as in the case of said EP208Q863 of internal slats, so that the fact of the breakage or disengagement of the crank generates drawbacks not only financial, to repair the damaged parts, or to totally change the entire window, but generates security problems, and generates problems with comfort, water-tightness or soundproofing of the room where the enclosure is placed.

[0006] In order to solve this problem, the need arises to develop enclosures that do not require manual controls or actuations, for which the patent DE102010058352 is highlighted, which discloses the existence of a closure system for building doors that is actuated by a motor and it has an evaluation element that manages the authorisations of electronic keys of the different users of said door, so that when the key approaches a sensor, said evaluation element allows or not the opening of the door. This document introduces the possibility of not needing a actuation handle, but the assemblies of the opening system elements of this application are not admissible in a door, among other reasons because a door only swings around a vertical axis and cannot oscillate around a horizontal axis, and neither can it have the option of performing both movements interchangeably, that is to make a tilt-and-turn or sliding movement. In this sense, in DE102010056352, the communication between the evaluation unit and the closure is done internally by the door body, and there is no means of controlling whether the door is open or closed, which does not solve the problem of security, since although it analyses if there is permission, it does not guarantee closure after opening, it does not have any sensor that ensures the closure, nor does it solve the problems in the comfort and water-tightness of the room where the door is placed. In addition, as advanced, the means of this invention differ from those of DE102010058352 and the application of said means is incompatible between both enclosures.

[0007] In this sense, solutions that incorporate radiofrequency means stand out, such as patent US8023224, which discloses a system composed of a door with a radiofrequency mechanism which, in conjunction with a wireless remote tool or key, allows the opening of said door. This solution presents the same problem as the previous enclosure, although it includes elements such as video surveillance cameras or lighting devices aimed at improving the security of the environment.

[0008] It is also worth highlighting another type of opening systems, for example the conventional entrance doors to public transport or public spaces consisting of sliding enclosures such as that disclosed in EP0822310; solutions as defined in patent JP2013159129, which discloses an intelligent opening system for vehicle gates; or what is set out in JPH10136819, which discloses a pet door, all of which consist of a sensor that detects the presence of the user or the pet and allows the opening of the enclosure, or which also solves the possibility of not needing handles, but neither the fittings are compatible due the type of enclosure, nor does it solve the problems of detecting the opening or closure of the door, sealing is not achieved as in the case of the doors in shops or public transport, and even in the case of the pet door it requires a complementary sensor to be incorporated.

[0009] Taking into account the existing records in the state of the art, it can be said that there are automatic closure systems, but they are defined for doors or enclosures that do not allow a multi-option system of movements, as is the case with tilt-and-turn or sliding windows, in addition those existing systems do not analyse the situation after the opening of said door, and finally it should be noted that for the type of tilt-and-turn windows there is no register that incorporates an autonomous and motorised opening system.

[0010] Due to the foregoing, this invention resolves that

cranks and actuation elements can be dispensed with and the technical problem related to the breakages of manual elements such as conventional handles or cranks for this type of enclosures, whether doors or windows, resolves the security problem derived from said breaks and presents the improvements that an autonomous detection system has, and allows the detection of the opening or closure situation of said enclosure which solves problems both security problems, comfort or water-tightness of the room where the enclosure is located.

Description of the invention

[0011] The invention relates to a motorised closure system intended for enclosures, both doors and windows, in which the conventional fitting of a conventional window is transformed by an electronic system completed by an electro-mechanical system capable of transmitting he desire and will of the user to open or close the enclosure element, without physical contact with the enclosure and without the need for the system to require handles or cranks. In this way, an enclosure formed by continuous, flat surfaces with no protrusions, no entrances, or protrusions is obtained, leaving the actuation mechanisms like the rest of the transformed or hidden structural elements.

[0012] The enclosure system in this invention comprises the conventional elements for this type of enclosures, such as perimeter and interior carpentry, made up of visible profiles that are fixed to the enclosure gap; these profiles may be of different materials such as PVC or aluminium; or systems of profiles or hidden carpentry, in which it is the leaf itself that hides the enclosure profiles or glass; the leaf itself or glass of the enclosure; the upper and lower brackets or compasses that allow movement with respect to the leaves and their profiles; and the plurality of bolted blocking or closure fittings, both in the form of a flat plate and in the form of a square; the characteristic elements of this new invention being:

- a control module, consisting of a programmable motherboard supporting the system management electronics, electrically fed directly to the conventional power grid, and having a secondary power supply based on an accumulator;

- at least one optical sensor, which allows the reflection of light of an emitting diode on a receiving diode, whose functionality is to detect the user when he approaches the hand or any other object to said sensor This sensor is connected to the control module and sends the appropriate signals when it detects the user;

- a blocking module, connected to the control module, and composed of a control unit that receives the instructions from the control module, and has a reduction gear and a system actuation motor;

- a drive piece in connection with the motorised unit, whose displacement is conditioned by the motor of the blocking module, and which uses the fitting profile itself as a guide;

- a logical manoeuvring fitting, in connection with the drive piece, and which has at least two enclaves where it is positioned due to the movement of the drive piece, an enclave being the one destined for the opening action in swing mode, and another enclave intended for the opening action in oscillating mode, or an enclave for the displacement action with respect to a guideline in the case of slide or sliding opening. This logical manoeuvring fitting is in connection with the plurality of bolted fittings in such a way that the movement of said logical manoeuvring fitting determines the state of closure or release of the closures or bolts;

- at least one magnetic sensor, which is responsible for interpreting and detecting the state of the window, that is, if it is open or closed, and in which said magnetic sensor is connected to the control module, which in turn is connected to the motorised module, in such a way that the control module interprets the signal received from the magnetic sensor and sends the appropriate order to the motorised module; and

- the electrical-electronic interconnection that communicates between them, which is centralised in the control module, and internally runs through the internal carpentry of the window along its profiles.

[0013] Additionally, the invention can incorporate a displacement module for certain types of enclosures, connected to the control module and composed of a controller unit that receives the instructions from the control module, and has a reduction gear and a system actuation motor that can move a skate with which the leaf is displaced.

[0014] In one embodiment of the invention, the system operates as follows. The user activates the system by means of the passage of the hand, or another object, that allows the detection of the optical sensor of the window, thus generating the actuation order Said detection derives in a signal or order that is transmitted to the control module. The control module receives the order and transmits to the motorised module the commissioning order, in such a way that it pushes the drive piece that uses the profile itself as a guide and that moves the logical manoeuvring fitting, which is connected to the rest of bolted closure elements linked along the perimeter of the enclosure profile.

[0015] At this point it is important to define that, depending on the exposure of the user to the optical sensor, the control module sends to the motorised module an opening signal in swing mode, an opening of oscillating mode or an opening in slide/sliding mode. It should also

be re-emphasised that the magnetic sensor detects if the enclosure is in an open or closed position, so it also sends said signal to the control module, which once interpreted in the control module sends the corresponding instruction to the motorised module.

[0016] In any case, returning to the sending of the signal that defines the opening mode, when the signal sent is that the enclosure is opened in a tilting mode, the logical manoeuvring fitting is moved to a first enclave, so that the bulls of the closure elements are released, and at that time there is a pressure on the rubber bands located between the leaf and the frame that causes a relative displacement between the leaf and the frame enough to allow the leaf to be loose and open in rocker mode.

[0017] When the opening signal is of the oscillating mode, the exposure time to the optical sensor is long enough for the motor to push the drive and logical manoeuvring fitting to the first enclave, and the optical sensor continues to send the signal of exposure to the control module which interprets that the desired opening mode is the oscillating mode, therefore it sends the order to the motorised module to continue working until the logical manoeuvring fitting is positioned in the second enclave. This is possible because when the exposure to the optical sensor continues for a long time and the first enclave has been exceeded, the magnetic sensor continues to understand that the window is not open, and therefore does not stop the motor, continuing the movement until it is carried up the second enclave, allowing the opening in tilt mode, since it unlocks the compass, reaching the end of the motor travel, which results in the motor stopping and therefore at that time the actions are terminated, and leave the actions different closure pieces also free to enable such movement.

[0018] In other embodiments, such as for a sliding opening, when the control module interprets that the desired opening mode is the sliding mode, according to the structure of the enclosure itself, it sends the order to the displacement module and it moves the fitting or skate, in this case horizontally guided to a section of toothed belt located in the tread of each frame, said rail being anchored at its ends as a zipper, although this zipper can be replaced by a threaded rod that acts as an auger or spindle. In another embodiment, the one that dispenses with the displacement module, the regulation of the opening of the enclosure, either in the tilt opening mode, in the swing opening mode, and even for the coupling for enclosures with sliding type displacement, is through the manual action of the user.

[0019] When the enclosure, for example, a window, is open, regardless of whether it corresponds to a swing, tilt or shift position, mode controlled by the magnetic sensor, the necessary actuation for the closure it is such that the user You must proceed to move the leaf, closing the window, until it is housed in the frame. At that time, the magnetic sensor considers that the leaf is closed, and the start order of the manoeuvre motor is originated, in the reverse direction of the opening, and whose final effects are the movement of the bolts of the leaf in their places of accommodation in the frame, giving rise, derived from the geometry of them, a pressure of the sealing rubber of the enclosure.

[0020] Once the end of travel has been reached, there is an overexertion of the motor that generates its stop, called electronic clutch. The physical actions required are of very little effort for the user, since it only means keeping the leaf just a few seconds, not pressing it in any way.

[0021] In the event that the enclosure is not perfectly closed, the magnetic sensor does not send a signal to the stopping motor, so the user can detect if there has been a fault in the closure of the enclosure, for example, a window.

[0022] It should be noted that the sequence of the different openings is programmed on the programmable motherboard and in conjunction with or through the optical sensor.

[0023] Finally, for constructive reasons, mainly the size of the glass or the definition of the profiles, the location of certain elements of the system, such as the magnetic sensor or the control module, may vary in their location, as well as the electrical connection. These possible variations must also be taken into account since the profiles in which these elements are housed are sometimes subject to significant wind load and other horizontal thrusts defined by regulations.

[0024] Once the system is defined, the general stages of the opening method will be defined for any of the enclosure types defined in this invention, the System being defined by the following stages:

a) the optical sensor detects the user;
b) the optical sensor sends a detection signal to the control module;
c) the control module sends an opening order to the motorised module;
d) the motorised module displaces the drive piece;
e) the drive piece modifies the position of the logical fitting until it reaches the first swinging opening mode enclave; this modifies the location of the plurality of the bolted fittings of the enclosure's carpentry;
f) the optical sensor sends a signal to the control module as to whether or not it detects the user and sends a signal to the control module;
g) the magnetic sensor detects the position of the window and sends a signal to the control module;
h) the control module analyses said signals and sends a motorised module instruction;
i) the drive piece modifies the position of the logical fitting according to the indications of the motor module; this modifies the location of the plurality of bolted fittings of the carpentry's enclosure;
j) the magnetic sensor checks that the window is open and sends a signal to the control module;
k) the control module sends the stop instruction to the motor module.

[0025] For the embodiments that have a displacement module, the stages follow with which the control module sends the instruction to the displacement module; the magnetic sensor checks that the enclosure is open and sends a signal to the control module; and the control module sends the stop instruction to the displacement module.

[0026] At this point it should be noted that, for example, when in stage f) the optical sensor does not detect the user; the magnetic sensor detects whether the enclosure is open or not; if the magnetic sensor detects that the enclosure is open, it sends a signal to the control module; the control module sends a stop instruction to the motor module; and therefore the enclosure is open in a swing or sliding mode depending on the configuration of the fitting and the carpentry of said enclosure.

[0027] If when in stage f) the optical sensor detects the user, the optical sensor sends a signal to the control module, the control module gives an order to the motorised module to proceed with the opening, the logical fitting arrives at the second enclave; the magnetic sensor sends a signal of whether the enclosure is open or not; the enclosure is open, the magnetic sensor sends a signal to the control module; the control module sends a stop instruction to the motor module; and the enclosure is open in oscillating mode.

[0028] For the closure of the system, in an embodiment in which the displacement module is dispensed with, the procedure is just the reverse, and is based on positioning the leaf in the frame so that the magnetic sensor detects said opening position, and the control module send the instructions to the motorised module in the opposite direction to that of the opening.

Brief description of the drawings

[0029] In order to complete the description that is being made and in order to help a better understanding of the characteristics of the invention, a set of drawings is attached as an integral part thereof, where the following has been represented by way of illustration and is not exhaustive:

Fig. 1 is a perspective representation of the motorised blocking system in an exploded tilt-and-turn window

Fig. 2 is a schematic representation of the interconnection between the different elements that make up the closure system.

Fig. 3 is a perspective representation of the motorised closure system in a tilt-and-turn window different from that of the first figure, said window being mounted.

Fig. 4 is a perspective representation of the motorised blocking system in an exploded sliding window.

Fig. 5 is a schematic representation of the interconnection between the different elements that form the motorised closure system required for the last two figures.

Preferred embodiment of the invention

[0030] Figure 1 is the representation of the preferred embodiment of the motorised closure system object of this invention. In this figure it can be seen that the tilt-and-turn window enclosure system formed by the following elements:

- the perimeter carpentry (1) of the window, consisting of horizontal and vertical profiles that are assembled together by means of squares, and that are fixed to the enclosure hole;
- the internal carpentry (2) of the window, which is protected by sheet (3) or enclosure glass, also constituted by conventional profiles, and which in its outer perimeter can have a rubber (31) that ensures the water-tightness of the assembly; the sheet itself (3) or window pane;
- the upper square or compass (4), which has the arm that allows movement with respect to a vertical axis, and which also has an articulating plate that allows movement with respect to a horizontal axis;
- the lower square or compass (40) that allows movement with respect to a vertical axis, in connection with the upper compass (4);
- the plurality of blocking or closure fittings in the form of both flat bolted plate (41) and in the form of a bolted square (41 '), and distributed along the perimeter of the internal carpentry (2) of the window;
- a control module (5), made up of a programmable motherboard for supporting the system management electronics, with a power supply means for direct connection to the conventional electrical network (52), and which has a secondary power supply; and that it is also integrated into the internal carpentry (2) of the window;
- an optical sensor (6), which allows the reflection of the light of an emitting diode on a receiving diode, the function of which is to detect the user when his hand or any other object approaches said sensor; said optical sensor (6) is connected to the control module (5) and sends it the appropriate signals when it detects the user;
- a blocking module (7), connected to the control module (5), and composed of a control unit that receives the instructions from the control module (5), and has

a reduction gear and a system actuation motor;

- a drive piece (74) in connection with the blocking module (7) whose displacement is determined by the motor of the motorised module;

- a logical manoeuvring fitting (8), in connection with the drive piece (74), and which has at least two enclaves where it is positioned due to the movement of the drive piece, one enclave intended for the action of opening in swing mode, and a second enclave intended for the action of opening in oscillating mode. This logical manoeuvring fitting (8) is in connection with the plurality of bolted fittings (41, 41') in such a way that the movement of said logical manoeuvring fitting determines the state of closure or release of the closures or bolts;

- a magnetic sensor (9), which is responsible for interpreting and detecting the state of the window, that is, if it is open or closed, and in which said magnetic sensor (9) is connected to the control module (5), which in turn is connected to the blocking module (7), such that the control module (5) interprets the signal received from the magnetic sensor (9) and sends the appropriate order to the blocking module (7); and

- the electrical-electronic connection (54) that communicates between them and is centralised in the control module (5).

[0031] Figure 2 is a schematic representation of the interconnection between the different elements that make up the motorised system. In said figure it can be seen how the control module (5) is in connection with the optical sensor (6) and the magnetic sensor (9), so that it receives the signals from both sensors, interprets them thanks to the board programmable base (51) for the support of the system management electronics, which has a power supply (52) directly connected to the conventional power grid, and which has a secondary power supply (53); and how the instructions from the interpretation of the data made by the motherboard (51) are sent to the blocking module (7), where the control unit (71) that receives said instructions and interprets them to operate the multiplier (72) and the motor (73) of the system, which displaces the drive piece (74) and modifies the position of the logical manoeuvring hardware (8) to the corresponding enclave, depending on whether the movement of the final window is oscillating, swing or sliding. It should be noted at this point that the sequence of the different openings is programmed on the programmable motherboard (51) and in conjunction with the optical sensor (6).

[0032] Figure 3 is a representation of another embodiment of the invention, in which a window that is also oscillating-swing has its elements configured in a different position, such as that the control module (5) is located in the lower horizontal profile of the perimeter carpentry (1), or that the blocking module (7) is in the upper horizontal profile of the internal carpentry (2) of the window alongside the logical manoeuvring fitting (8), but which in this case incorporates a displacement module (75), connected to a guide skate (78) which allows the motorised displacement of said leaf.

[0033] Figure 4 is a representation of another embodiment of the invention, in this case a sliding or slide enclosure, which also has its elements configured in a different position from the previous embodiments, such as that the control module (5) is located in the upper horizontal profile of the perimeter carpentry (1), or that the blocking module (7) is in a lateral profile of the internal carpentry (2) of the window, while in this case it also incorporates a displacement module (75), connected which allows the motorised movement of the guided leaf along rails as a guide skate (78). It is highlighted in turn that, in this particular embodiment, the slide enclosure allows the movement of both leaves, therefore, this invention allows the system to be implemented in each leaf and therefore these previously highlighted elements are found in both sliding leaves.

[0034] Figure 5 is a schematic representation of the interconnection between the different elements that form the motorised closure system for its second embodiment, which incorporates a displacement module (75), connected with the control module (5), and composed of a controller unit (751) that receives the instructions from the control module (5), and has a reduction gear (752) and a motor (753) connected to a guide skate (78) or guiding element with which it moves or move the leaf.

Claims

1. Motorised closure system, intended for glazed enclosures with visible or hidden profiles, in which the whole of the enclosure is formed by continuous, flat surfaces without handles, there being a plurality of blocking fittings in the form of a flat bolted plate (41) and/or in the form of a bolted square (41 ') arranged along the entire perimeter of the carpentry or profiles of the enclosure; **characterised in that** it has:

   - a control module (5), made up of a programmable motherboard (51) for supporting the system management electronics, which is electrically powered, and is integrated into the carpentry of the enclosure;
   - at least one optical sensor (8), which allows the reflection of the light of an emitting diode onto a receiving diode, and is in connection with the control module (5);
   - a blocking module (7), connected to the control module (5), and composed of a control unit (71) that receives the instructions from the control module (5), and has a reduction gear (72) and

a system actuation motor (73);
- a drive piece (74) in connection with the blocking module (7) whose displacement is determined by the motor of the blocking module (73);
- a logical manoeuvring fitting (8) connected to the drive piece (74) and in connection with the plurality of bolted fittings (41, 41') in such a way that the movement of said logical manoeuvring fitting (8) determines the state of closure or release of the closures or bolts;
- at least one magnetic sensor (9) connected to the control module (5); <*** Amendments in claim 1 based on claims 6 to 9 and p.10, 1.10 - 21 ***> and
- the electrical-electronic connection (54) that intercommunicates the foregoing elements and that, being centralised in the control module (5), is arranged internally along the carpentry and enclosure profiles.

2. Motorised closure system, according to the characteristics of claim 1, **characterised in that** a displacement module (75) made up of a consoling unit (751) that receives the instructions from the control module (5) is connected to the control module (5), and has a reduction gear (752) and a motor (753) connected to a guide skate (76).

3. Motorised closure system, according to the characteristics of claim 1, **characterised in that** the control module (5) is electrically powered by electrical power supply means (52) directly connected to the conventional electrical grid.

4. Motorised closure system, according to the characteristics of claims 1 and 3, **characterised in that** the control module (5) is electrically powered by a secondary power source (53).

5. Motorised closure system, according to the characteristics of claim 4, **characterised in that** the secondary power source (53) is an accumulator.

6. Motorised closure system, according to the characteristics of claim 1, **characterised in that** the logical manoeuvring fitting (8) has at least two positioning enclaves.

7. Motorised closure system, according to the characteristics of claim 6, **characterised in that** the logical manoeuvring fitting (8) has a positioning enclave for opening the enclosure in swing mode.

8. Motorised closure system, according to the characteristics of claim 6, **characterised in that** the logical manoeuvring fitting (8) has a positioning enclave for opening the enclosure in oscillating mode.

9. Motorised closure system, according to the characteristics of claim 6, **characterised in that** the logical manoeuvring fitting (8) has a positioning enclave for opening the enclosure in sliding mode.

10. Motorised closure system, according to the characteristics of claim 1, **characterised in that** the sequence of the different openings of the enclosure is programmed in the programmable motherboard (51).

11. Method of actuating the motorised closure system previously defined in the foregoing claims, **characterised in that** it comprises the following stages:

a) the optical sensor (6) detects the user;
b) the optical sensor (6) sends a detection signal to the control module (5) where the authorisation is validated;
c) the control module (5) sends an order to open to the blocking module (7);
d) the blocking module (7) moves the drive piece (74);
e) the drive piece (74) modifies the position of the logical fitting(8) until it reaches the first enclave, modifying the location of the plurality of bolted fittings (41 ,41 ') of the enclosure's carpentry;
f) the optical sensor (8) sends a signal to the control module (5) as to whether or not it detects the user and sends a signal to the control module (5);
g) the magnetic sensor (9) detects the position of the window and sends a signal to the control module (5);
h) the control module (5) analyses said signals and sends a blocking module instruction (7);
i) the drive piece (74) modifies the position of the logical fitting (8) according to the indications of the blocking module (7), modifying the location of the plurality of bolted fittings (41, 41 ') of the carpentry's enclosure;
j) the magnetic sensor (9) checks that the window is open and sends a signal to the control module (5); and
k) the control module (5) sends the stop instruction to the blocking module (7).

12. Method of actuation of the closure system, according to the characteristics of claim 11, **characterised in that** stage k) is implemented with the control module (5) sending an actuation instruction to the displacement module (75); the magnetic sensor (9) checks that the enclosure is open and sends a signal to the control module (5); and the control module (5) sends the stop instruction the displacement module (75).

13. Method of actuation of the closure system, according

to the characteristics of claims 11 and 12, **characterised in that** for the closure and blocking of the system said stages are reversed.

Fig.1

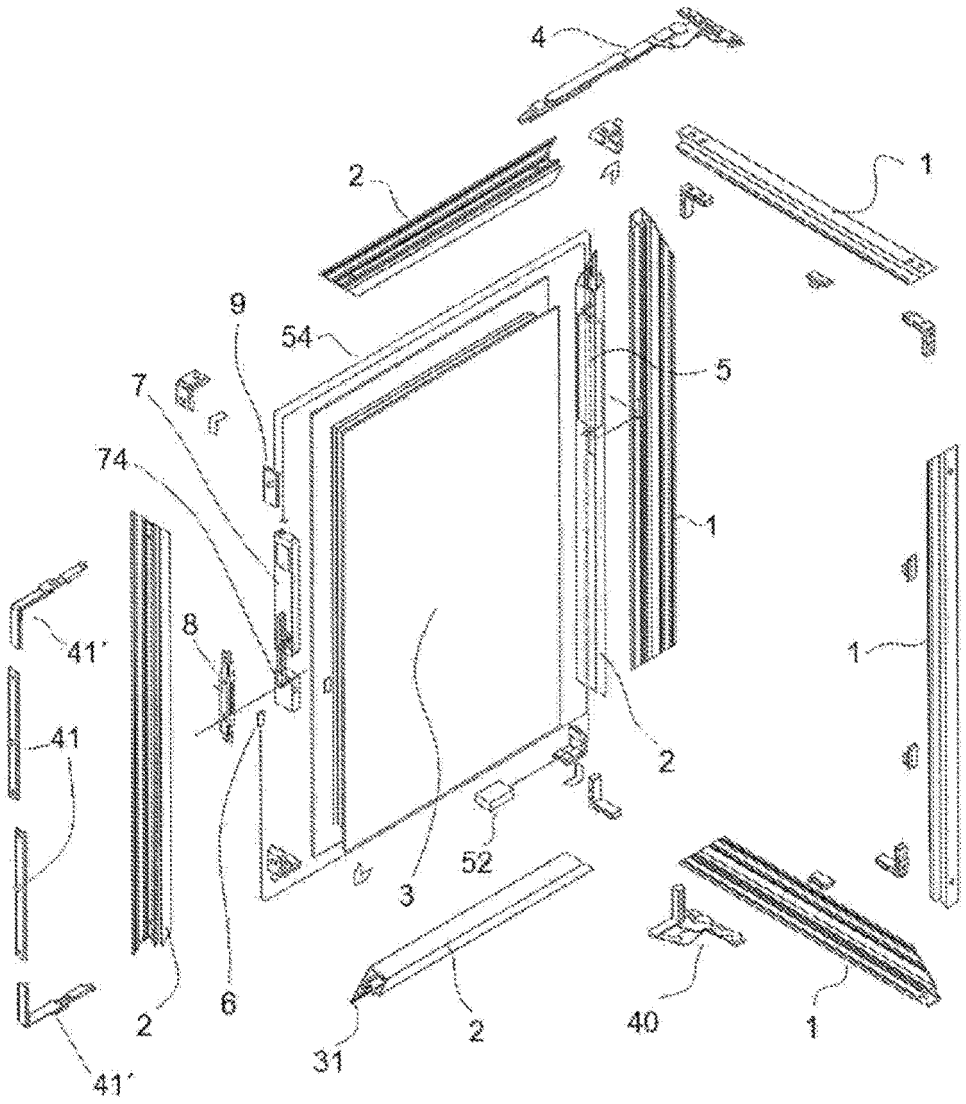


Fig.2

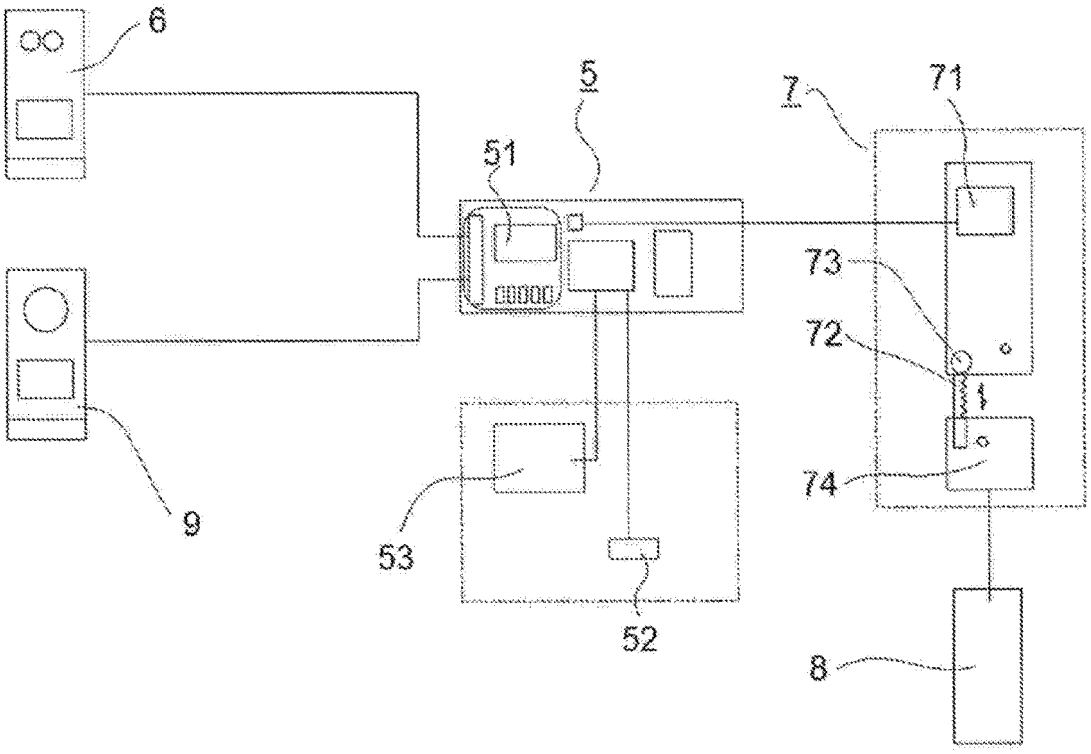


Fig.3

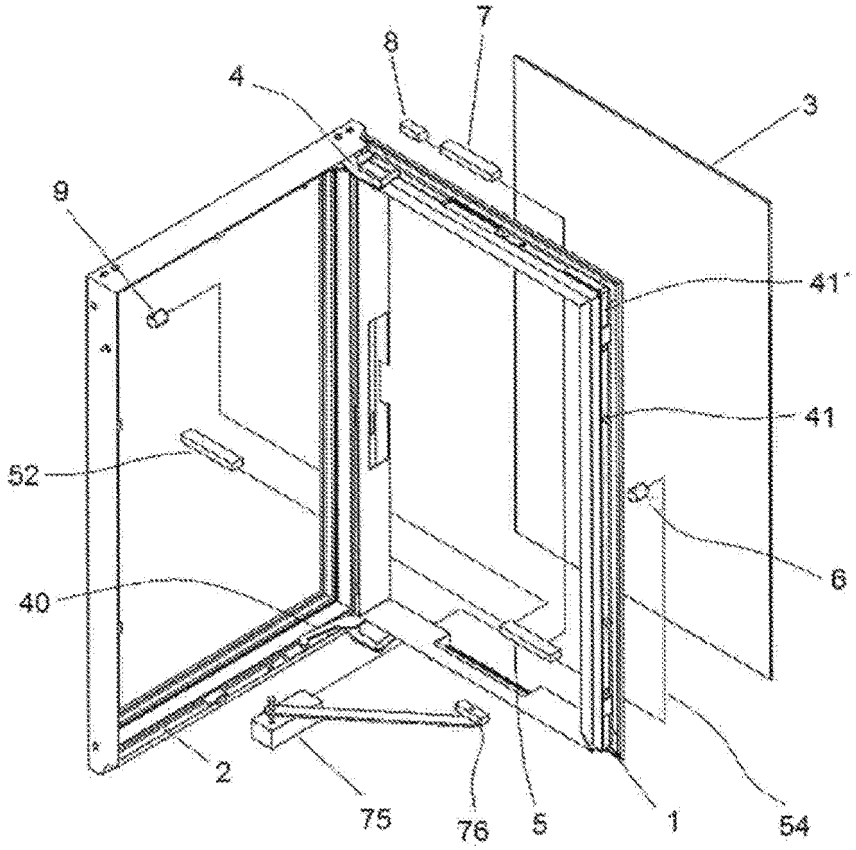


Fig.4

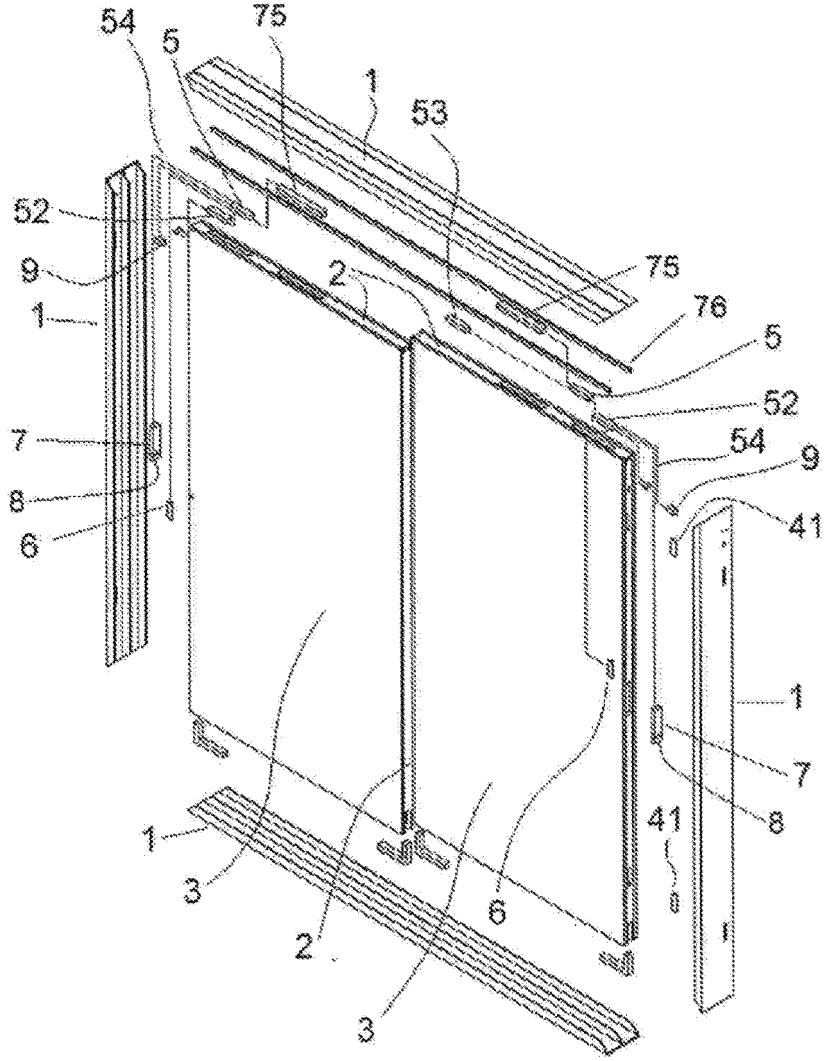
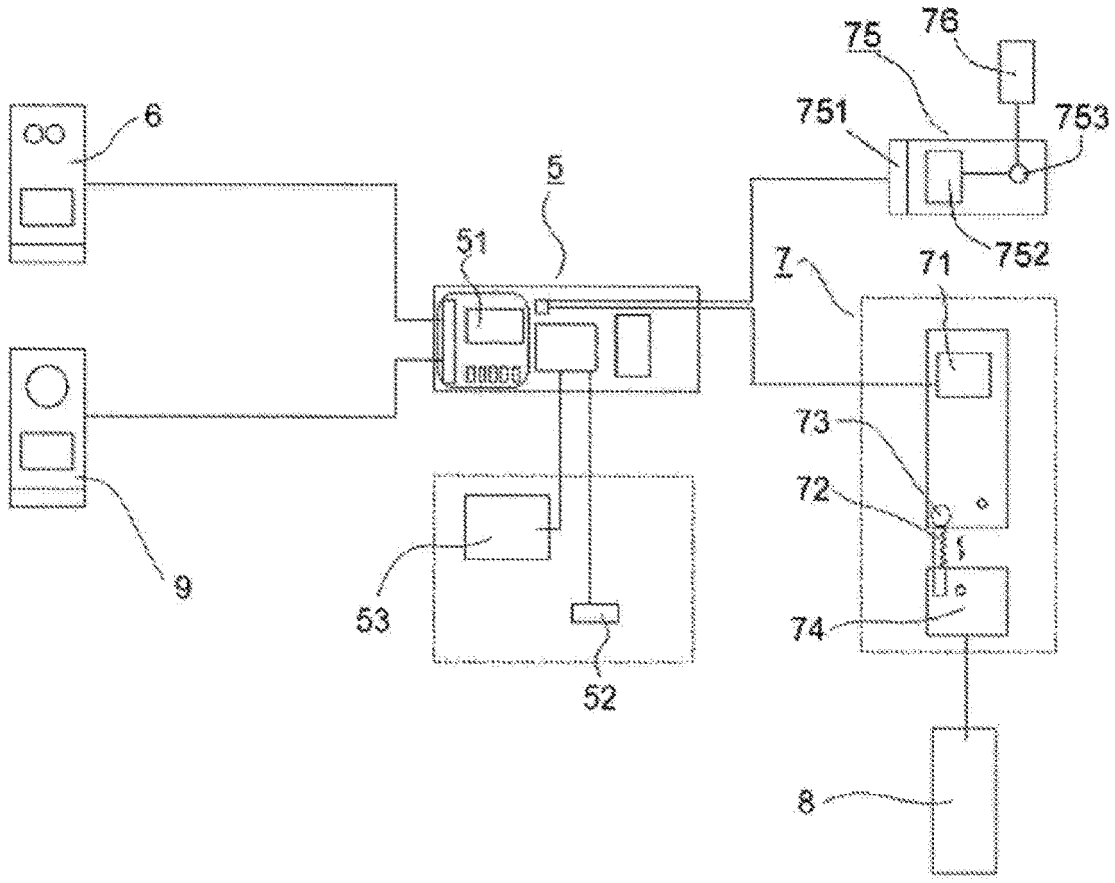


Fig.5



REFERENCES CITED IN THE DESCRIPTION

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