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(54) **Method for opening elements installed in buildings and independent control unit for opening and closing said elements suited to implement said opening method.**

Verfahren und Antriebseinheit zur Steuerung von Schliesselementen innerhalb eines Gebäudes

Procédé et dispositif d'entraînement pour des éléments de fermeture des bâtiments

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EP 2 003 278 B1

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Description

[0001] The invention concerns a method for opening elements that are installed in buildings.

[0002] In the following description the term "opening element" means any opening structure installed in buildings, like for example a skylight.

[0003] In particular, the invention concerns a method for opening skylights and similar elements that are installed in buildings to let in light and air and that are operated via electric motors powered with direct current supplied by batteries of electric accumulators with photovoltaic recharge.

[0004] The invention concerns also an independent control unit for opening and closing the above mentioned skylights, of the type comprising a battery of electric accumulators with photovoltaic recharge, suited to carry out the opening of said skylights according to the method described above.

[0005] It is known that suitable opening elements, commonly called skylights, are installed on the roofs of buildings to let in light and ensure air change in the rooms.

[0006] According to the known technique, each skylight comprises a dome delimited by a frame applied to a base arranged on the perimeter of an opening made in the structure of the building.

[0007] If the dome can be opened, the frame can even be hinged to the base and actuator means connected to the frame provide for opening and closing the skylight by rotating the dome around the hinge means.

[0008] In some applications, the actuator means comprise a direct current electric motor that is powered and controlled by an independent unit provided with batteries of accumulators with photovoltaic recharge.

[0009] The opening and closing of the skylight are manually controlled by the user via a button or remote control, while closing can also be performed automatically via atmospheric sensors that detect the presence of rain or wind.

[0010] The above mentioned skylights offer the advantage of operating independently, since they can work even in case of absence or interruption of the mains electricity supply.

[0011] However, these skylights also pose the recognized drawback represented by the fact that in case of running down of the accumulators, it is impossible to open and close them.

[0012] This may happen, for example, due to repeated opening and closing manoeuvres manually carried out by the user at short intervals or caused by the activation of the wind or rain sensors.

[0013] However, one of the most frequent causes of the running down of the accumulators is the high electricity consumption of the rain sensors.

[0014] It is known, in fact, that in the presence of rain the sensor that detects it closes the skylight if it is open or prevents its opening if it is closed.

[0015] Since the rain sensor is activated also by the

presence of humidity, it is associated with a resistor that keeps it at a temperature sufficient to prevent the formation of frost or dew over it.

[0016] In fact, the sensor would consider the presence of frost or dew as if it were rain and consequently the independent unit that feeds and controls the skylight would not execute an opening command given by the user.

[0017] To prevent this from occurring, according to the known technique when the skylight is closed the resistor is constantly fed and this obviously reduces the duration of the accumulator charge.

[0018] Furthermore, if the skylight is also opened and closed repeatedly at short intervals and, even worse, in atmospheric conditions unfavourable to the photovoltaic generation that would recharge the accumulators, these may easily run down.

[0019] It is clear that in this case it is impossible to operate the motors and thus open the skylight if this is closed or close it if it is open.

[0020] If the latter situation occurs in case of rain, it is particularly dangerous for the involved rooms and the objects contained therein.

[0021] Another recognized drawback lies in that the independent opening and closing units of known type do not signal the charge status of the accumulators to the user in any way, with the risk of the skylight remaining open or closed after the last opening or closing operation without the user being aware of that.

[0022] Document DE 20 2006 009694 U1 shows a door, window or roller blind control system in which the control system has a CPU with several input and output connections, a logic arithmetic program, a timer, several drive devices, a controller, a switch connected to a controller, a sensor device, a peripheral device, a monitor and an input monitoring controller connected to the central processing unit.

[0023] Document DE 23 63 978 A1 shows a dome or skylight having a mobile cover and supported by a ring shaped element. The apparatus comprises a switching member that controls an actuator which opens or closes the dome or skylight. The apparatus also comprises a wind and a rain sensor connected to this switching member and sending signals to the actuator.

[0024] The present invention intends to overcome the drawbacks listed above.

[0025] In particular, it is a first object of the invention to develop a method for opening skylights operated by electric motors controlled by wind and rain sensors and powered by batteries of electric accumulators with photovoltaic recharge that compared to the known art makes it possible to reduce power absorption.

[0026] It is another object of the invention to carry out an independent control unit for opening and closing skylights of the type described above that is suitable for implementing said opening method.

[0027] It is another, yet not the least object of the invention to ensure that the operation of the skylights is

more reliable, in both the opening and the closing stage, than the operation of equivalent skylights constructed according to the known art.

[0028] The objects described above are achieved by a method for opening skylights according to the contents of the main claim, to which the reader should refer for the sake of brevity.

[0029] Other details of the invention are described in the dependent claims.

[0030] Advantageously, the opening method and the independent unit that implements it, which are the subjects of the present invention, allow the accumulator charge to be extended.

[0031] Still advantageously, the opening method and the independent control unit that implements it make the operation of the skylights to which they are applied more reliable.

[0032] In particular, advantageously, the invention makes it possible to limit the risk of the skylight remaining open or closed after the opening and closing manoeuvres due to the running down of the accumulators.

[0033] Still advantageously, said method and said independent control unit can be applied to skylights of known type even if they have already been installed.

[0034] The objects and advantages described above will be highlighted in greater detail in the description of a preferred embodiment of the invention that is supplied as an indicative, non-limiting example, with reference to the enclosed drawings, wherein:

- Figures from 1 to 4 schematically show an opening element in different stages of the opening manoeuvre carried out according to the method of the invention;
- Figure 1 a shows a detail of Figure 1;
- Figure 5 shows the independent unit that controls the opening of the element, said unit also being the subject of the present invention.

[0035] The opening method that is the subject of the invention is described below making reference to Figures from 1 to 4 that schematically show different positions of an opening element, in the case at hand a skylight indicated as a whole by 1.

[0036] The above mentioned opening method can be applied to any type of opening element and not only to a skylight.

[0037] Furthermore, in the following description the term "skylight" must be intended as a synonym of "opening element".

[0038] The skylight, as shown in the above mentioned Figures 1 to 4, comprises a cover 2 provided with a frame 2a hinged to a base 3 that delimits an opening A made in a building indicated as a whole by B.

[0039] The cover 2 is connected to an electric opening and closing motor 4 operated via control means, indicated as a whole by 10 and comprising:

- manual control means, indicated as a whole by 5, comprising, for example, a switch or a remote control 5a;
- automatic control means, indicated as a whole by 6, comprising a first sensor 6' for detecting the presence of rain, provided with electric heating means 7, and a second sensor 6'' for detecting the presence of wind.

[0040] In particular, the first sensor 6' is "active" in the presence of rain or simply humidity and analogously the second sensor 6'' is "active" in the presence of wind.

[0041] Following the same principle, the sensors are "inactive" if there is no rain or humidity or wind, respectively.

[0042] An independent control unit, indicated as a whole by 8 and electrically connected to the electric motor 4 and to the automatic control means 6 is responsible for opening and closing the cover 2 of the opening element 1.

[0043] In particular, the term "active" means that the sensor detects the presence of rain, humidity or wind and does not enable the independent control unit 8 to open the cover 2.

[0044] Vice versa, the term "inactive" means that the sensors enable the independent control unit 8 to open the cover 2.

[0045] According to the method that is the subject of the invention, to open the cover 2 of the opening element 1 it is necessary to perform the following operations:

- verifying whether the sensors 6' and 6'' are active or not;
- if both the sensors 6', 6'' are inactive, which means that there is no rain or humidity or wind, starting the electric motor 4 to open the cover 2 completely;
- if the first sensor 6' is active, which means that there is rain or humidity, and the second sensor 6'' is inactive, which means that there is no wind, starting the electric motor 4 to lift the cover 2 to a predefined height X from the base 3;
- stopping the motor 4.

[0046] If the first sensor 6' is active, which means that there is rain or humidity, and the second sensor 6'' is inactive, which means that there is no wind, after lifting the cover 2 to the predefined height X from the base and stopping the electric motor 4, according to the method the following operations are to be performed:

- powering the electric heating means 7 of the first sensor 6';
- interrupting power supply to said electric heating means 7 after a predefined interval;
- starting the electric motor 4 to open the cover 2 completely if the first sensor 6' is inactive, which means that there is no rain or humidity;
- stopping the electric motor 4.

[0047] If after interruption of power supply to the electric heating means **7** the first sensor **6'** is humid, the cover **2** remains lifted from the base **3** and remains in this position until the user closes it by means of the control provided for this purpose.

[0048] According to an operation variant, if after interruption of power supply to the electric heating means **7** the first sensor **6'** is humid, the cover **2** is automatically closed, immediately or after a predefined interval.

[0049] The method of the invention includes the use of the independent control unit, indicated as a whole by **8** and represented in detail in Figure 5, which comprises a programmable logic unit **9** and an independent power supply unit indicated as a whole by **11**, and which is connected to the electric motor **4** and the electric motor control means, indicated as a whole by **10**.

[0050] The independent control unit **8** preferably but not necessarily comprises a casing **8a** which encloses the programmable logic unit **9** and the independent power supply unit **11** and in which it is possible to identify:

- a first port **12** for connection to the electric motor **4**;
- a second port **13** for connection to the automatic control means **6** of the electric motor **4**.

[0051] Furthermore, the programmable logic unit **9** is connected to the connection ports **12** and **13** and to the manual control means **5** of the electric motor **4**, while the independent power supply unit **11** is connected to the programmable logic unit **9**, to the automatic control means **6** and to the electric motor **4**.

[0052] In particular, in the first port **12** it is possible to identify a first contact **12a** connected to the programmable logic unit **9** through a first conductor **14** and a second contact **12b** connected to the output **11a** of the independent power supply unit **11** through a second conductor **15**.

[0053] A fuse **16** is arranged in series to the second conductor **15**.

[0054] As far as the second port **13** is concerned, in said port it is possible to identify a first contact **13a** and a second contact **13b** connected via an external line **17** to the automatic control means **6**, in particular to the first rain or humidity sensor **6'** and to the second wind sensor **6''**.

[0055] Both the above mentioned contacts **13a**, **13b** are also connected via an internal line **18** to the programmable logic unit **9** through the interposition of a communication interface **19**.

[0056] In the second port it is possible to identify also a third contact **13c** that is connected to the independent power supply unit **11** through a third conductor **20** and a fourth contact **13d** connected to the power supply neutral wire.

[0057] The presence of a radio receiver **21** interposed between the manual control means **5** and the programmable logic unit **9** allows opening and closing of the opening element through the manual control means **5** that in this case consist of a remote control **5a** to be used by

the operator.

[0058] According to a different embodiment of the invention, the radio receiver **21** may even not be provided and the manual control means **5** may comprise buttons directly connected to the programmable logic unit **9**.

[0059] The independent power supply unit **11** comprises a battery of electric accumulators **22** electrically connected to an electronic management unit **23** that checks the charge status of the above mentioned accumulators **22** as ensured by the presence of a photovoltaic panel **24** to which it is connected via a first connection line **25**.

[0060] It is evident that the photovoltaic panel **24** can be placed in any position.

[0061] Preferably, but not necessarily, the accumulators **22** are arranged in a remote position with respect to the independent control unit **8**, in which case a second connection line **26** electrically connects them to the electronic management unit **23**.

[0062] A third connection line **27** connects the electronic management unit **23** to the programmable logic unit **9** through the interposition of a regulating unit **30**.

[0063] It can also be noted that the electronic management unit **23**, the regulating unit **30** and the programmable logic unit **9** are connected to the power supply neutral wire.

[0064] In particular, the programmable logic unit **9** is of the type known per se and available on the market and is programmed in such a way as to signal any status of insufficient charge of the accumulators through suitable acoustic or luminous indicators **31** or other types of indicator.

[0065] In practice, when the user wants to open the cover **2** of the opening element, he/she uses the manual control means **5** and sends the opening signal to the programmable logic unit **9**.

[0066] The latter, based on a program previously installed therein, first of all checks whether the sensors **6'** and **6''** are active or inactive.

[0067] If the second sensor **6''** is active, this means that there is wind and in this case the programmable logic unit **9**, independently of the condition of the first sensor **6'** and therefore independently of the presence of rain or humidity, prevents power supply to the motor **4** and thus the cover **2** remains closed as shown in Figure 1.

[0068] Vice versa, if both sensors are inactive, this means that there is no wind, rain or humidity and in this case the programmable logic unit **9** allows power supply to the motor **4** until the cover **2** has been opened completely, as shown in Figure 4.

[0069] If, on the contrary, the first sensor **6'** is active and the second sensor **6''** is inactive, this means that there is rain or humidity and in this case the programmable logic unit **9** allows power supply to the motor **4** for a time sufficient to lift the cover **2** to the predefined height **X** from the base **3** in order to arrange it in the configuration shown in Figures 2 and 3.

[0070] The electric motor **4** is then stopped and the programmable logic unit **9** permits power supply to the

electric heating means 7 of the first sensor 6' through electric energy provided by the independent power supply unit 11.

[0071] The electric heating means 7 of the first sensor 6' are powered for a lapse of time that is predefined on programming of the programmable logic unit 9 and is sufficient to ensure the evaporation of any frost or dew present on the first sensor 6'.

[0072] If after said lapse of time the first sensor 6' results to be dry, the programmable logic unit 9 supplies power again to the electric motor 4 for a time sufficient to allow the complete opening of the cover 2 that is thus brought to the open position shown in Figure 4.

[0073] If, on the contrary, the first sensor 6' is wet, the programmable logic unit 9 does not allow the motor 4 to be started and consequently the cover 2 remains locked in the lifted position with respect to the base 3, as can be observed in Figures 2 and 3.

[0074] According to an operation variant, after the predefined heating time has elapsed, if the first sensor 6' still detects the presence of humidity, the programmable logic unit 9 may authorize the start of the motor 4 in order to bring the cover 2 back to the closed position, as shown in Figure 1.

[0075] The object of making the charge of the accumulators 22 last longer is thus achieved, since the electric heating means 7 of the first rain sensor 6', which are the elements characterized by the highest power absorption, are powered only for a limited lapse of time, only after the partial lifting of the cover 2.

[0076] Therefore, the battery of accumulators 22 supplies power only for a limited time, and this differentiates the invention from the systems of known type, where the electric heating means of the rain sensor are constantly powered.

[0077] In this way, the charge of the accumulators is preserved.

[0078] Furthermore, the presence of the indicators 31 reduces the risk of putting the system out of order due to the unexpected running down of the battery of accumulators 22.

[0079] According to the above, it is thus clear that the method for opening elements and the independent control unit for opening and closing said elements that are the subjects of the present invention actually achieve all the set objects.

[0080] Obviously, any operation variants of the method described and construction variants of the independent control unit that implements said method, not described in the text and not represented in the drawings, must all be considered protected by the present patent, provided that they fall within the scope of the following claims.

[0081] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of exam-

ple by such reference signs.

Claims

1. Method for opening the cover (2) of an opening element (1) installed in buildings of the type comprising:

- a base (3) that delimits an opening (A) made in a building (B);
- a cover (2) hinged to said base (3);
- at least one electric motor (4) for opening and closing said cover (2);
- manual means (5; 5a) for controlling said electric motor (4);
- automatic means (6) for controlling said electric motor (4), comprising at least one first sensor (6') for detecting the presence of rain or humidity, provided with electric heating means (7), and a second sensor (6'') for detecting the presence of wind;
- an independent control unit (8) **electrically connected to the electric motor and to the automatic control means** for opening and closing said cover (2),

characterized in that it comprises the following operations:

- verifying whether the sensors (6', 6'') are active or not;
- if both sensors (6', 6'') are inactive, which means that there is no rain or humidity or wind, starting said electric motor (4) to open said cover (2) completely;
- if said first sensor (6') is active, which means that there is rain or humidity, and said second sensor (6'') is inactive, which means that there is no wind, starting said electric motor (4) to lift said cover (2) to **a predefined height (X) from said base (3);**
- stopping said motor (4) **in the intermediate position in order to let the light into the building and to ensure air change even in case of rain.**

2. Method according to claim 1), **characterized in that** if said first sensor (6') is active, which means that there is rain or humidity, and said second sensor (6'') is inactive, which means that there is no wind, after said lifting of said cover (2) to said predefined height (X) from said base (3) and after said electric motor (4) has been stopped, the following operations are to be carried out:

- starting power supply to said electric heating means (7) of said first sensor (6');
- interrupting power supply to said electric heat-

- ing means (7) after a predefined interval;
 - starting said electric motor (4) to open said cover (2) completely if said first sensor (6') is inactive, which means that there is no rain or humidity.
3. Method according to claim 2), **characterized in that** said cover (2) remains lifted from said base if after said interruption of said power supply to said heating means (7) said first sensor (6') is humid.
4. Method according to claim 2), **characterized in that** said cover (2) is closed again if after said interruption of said power supply to said heating means (7) said first sensor (6') is humid.
5. Method according to claim 1), **characterized in that** said independent control unit (8) comprises:
- at least one first port (12) for connection to said electric motor (4);
 - at least one second port (13) for connection to said automatic control means (6) of said electric motor (4);
 - at least one programmable logic unit (9) connected to said connection ports (12, 13) and to said manual control means (5, 5a) of said electric motor (4);
 - at least one independent power supply unit (11) connected to said programmable logic unit (9), to said automatic control means (6) and to said electric motor (4).
6. Method according to claim 5), **characterized in that** said first port (12) **comprises**:
- a first contact (12a) connected to said programmable logic unit (9) via a first conductor (14);
 - a second contact (12b) connected to said independent power supply unit (11) via a second conductor (15).
7. Method according to claim 6), **characterized in that** a fuse (16) is arranged in series to said second conductor (15).
8. Method according to claim 5), **characterized in that** said second port (13) **comprises**:
- a first contact (13a) and a second contact (13b) connected to said automatic control means (6) via an external line (17) and to said programmable logic unit (9) via an internal line (18);
 - a third contact (13c) connected to said independent power supply unit (11) via a third conductor (20);
 - a fourth contact (13d) connected to the power supply neutral wire.
9. Method according to claim 8), **characterized in that** a communication interface (19) is interposed between said second port (13) and said programmable logic unit (9).
10. Method according to claim 5), **characterized in that** a radio receiver (21) is interposed between said manual control means (5) and said programmable logic unit (9).
11. Method according to claim 10), **characterized in that** said manual control means (5) consist of a remote control (5a).
12. Method according to claim 5), **characterized in that** said manual control means (5) consist of buttons.
13. Method according to claim 5), **characterized in that** said independent power supply unit (11) comprises:
- one or more electric accumulators (22);
 - at least one photovoltaic panel (24);
 - at least one electronic unit (23) for managing the charge of said accumulators (22) in which it is possible to identify a first line (25) for connection to said photovoltaic panel (24), a second line (26) for connecting said accumulators to said photovoltaic panel (24) and a third line (27) for connection to said programmable logic unit (9).
14. Method according to claim 13), **characterized in that** said independent power supply unit (11) also comprises a regulating unit (30) electrically inserted in said third line (27) between said electronic management unit (23) and said programmable logic unit (9).
15. Method according to claim 14), **characterized in that** the neutral wire of the power supply connects said electronic management unit (23), said regulating unit (30) and said programmable logic unit (9).

Patentansprüche

1. Methode zum Öffnen des Deckels (2) eines Elements (1), das geöffnet werden kann und in Gebäuden installiert ist, Folgendes umfassend:
- eine Basis (3), die eine Öffnung (A) in einem Gebäude (B) definiert;
 - einen Deckel (2), der an besagter Basis (3) angelenkt ist;
 - wenigstens einen Elektromotor (4) zum Öffnen und Schließen des besagten Deckels (2);
 - manuelle Steuermittel (5; 5a) für besagten Elektromotor (4);

- automatische Steuermittel (6) für besagten Elektromotor (4), wenigstens einen ersten Sensor (6') zur Erfassung von Regen oder Feuchtigkeit mit elektrischen Heizmitteln (7) und einen zweiten Sensor (6'') zur Erfassung von Wind umfassend;
- ein unabhängiges, elektrisch mit dem Elektromotor und den automatischen Steuermitteln zum Öffnen und Schließen des besagten Deckels (2) verbundenes Steuergerät (8),

dadurch gekennzeichnet, dass sie folgende Schritte umfasst:

- Feststellung des aktiven oder inaktiven Zustands der Sensoren (6', 6'');
 - wenn beide Sensoren (6', 6'') inaktiv sind, was bedeutet, dass kein Regen oder Feuchtigkeit oder Wind vorhanden sind, Anlassen des besagten Elektromotors (4) zur vollständigen Öffnung des besagten Deckels (2);
 - wenn der besagte erste Sensor (6') aktiv ist, was bedeutet, dass Regen oder Feuchtigkeit vorhanden sind, und der besagte zweite Sensor (6'') inaktiv ist, was bedeutet, dass kein Wind vorhanden ist, Anlassen des besagten Elektromotors (4) zum Anheben des besagten Deckels (2) auf eine vorbestimmte Höhe (X) von der besagten Basis (3);
 - Anhalten des besagten Motors (4) in der Zwischenposition, um Licht in das Gebäude einfallen zu lassen und den Luftaustausch auch bei Regen zu erlauben.
2. Methode gemäß Patentanspruch 1), **dadurch gekennzeichnet, dass**, wenn der erste Sensor (6') aktiv ist, was bedeutet, dass Regen oder Feuchtigkeit vorhanden sind, und der besagte zweite Sensor (6'') inaktiv ist, was bedeutet, dass kein Wind vorhanden ist, nach dem besagten Anheben des besagten Deckels (2) auf die besagte vorbestimmte Höhe (X) von der besagten Basis (3) und nachdem der Elektromotor (4) angehalten wurde, folgende Schritte auszuführen sind:
- Aufnahme der Stromversorgung der besagten elektrischen Heizmittel (7) des besagten ersten Sensors (6');
 - Unterbrechung der Stromversorgung der besagten elektrischen Heizmittel (7) nach einem vorbestimmten Intervall;
 - Anlassen des besagten Elektromotors (4) zum vollständigen Öffnen des besagten Deckels (2), wenn der besagte erste Sensor (6') inaktiv ist, was bedeutet, dass kein Regen oder Feuchtigkeit vorhanden sind.
3. Methode gemäß Patentanspruch 2), **dadurch ge-**

kennzeichnet, dass der besagte Deckel (2) von der besagten Basis angehoben bleibt, wenn nach der besagten Unterbrechung der besagten Stromversorgung der besagten Heizmittel (7) der besagte erste Sensor (6') feucht ist.

4. Methode gemäß Patentanspruch 2), **dadurch gekennzeichnet, dass** der besagte Deckel (2) wieder geschlossen wird, wenn nach der besagten Unterbrechung der besagten Stromversorgung der besagten Heizmittel (7) der besagte erste Sensor (6') feucht ist.

5. Methode gemäß Patentanspruch 1), **dadurch gekennzeichnet, dass** das besagte unabhängige Steuergerät (8) Folgendes umfasst:

- wenigstens einen ersten Port (12) zur Verbindung an den besagten Elektromotor (4);
- wenigstens einen zweiten Port (13) zur Verbindung an die besagten, automatischen Steuermittel (6) des besagten Elektromotors (4);
- wenigstens eine programmierbare Logikeinheit (9), die an die besagten Verbindungsports (12, 13) und an die besagten, manuellen Steuermittel (5, 5a) des besagten Elektromotors (4) angeschlossen ist;
- wenigstens eine unabhängige Stromversorgungseinheit (11), die an die besagte programmierbare Logikeinheit (9), an die besagten, automatischen Steuermittel (6) und an den besagten Elektromotor (4) angeschlossen ist.

6. Methode gemäß Patentanspruch 5), **dadurch gekennzeichnet, dass** der besagte erste Port (12) Folgendes umfasst:

- einen ersten Kontakt (12a), der über einen ersten Leiter (14) mit der besagten, programmierbaren Logikeinheit (9) verbunden ist;
- einen zweiten Kontakt (12b), der über einen zweiten Leiter (15) mit der besagten, unabhängigen Stromversorgungseinheit (11) verbunden ist.

7. Methode gemäß Patentanspruch 6), **dadurch gekennzeichnet, dass** eine Sicherung (16) in Reihe an den besagten zweiten Leiter (15) angeschlossen ist.

8. Methode gemäß Patentanspruch 5), **dadurch gekennzeichnet, dass** der besagte zweite Port (13) Folgendes umfasst:

- einen ersten Kontakt (13a) und einen zweiten Kontakt (13b), die über eine externe Leitung (17) an die besagten automatischen Steuermittel (6) und über eine interne Leitung (18) an die besag-

- te programmierbare Logikeinheit (9) angeschlossen sind;
 - einen dritten Kontakt (13c), der über einen dritten Leiter (20) an die besagte unabhängige Stromversorgungseinheit (11) angeschlossen ist;
 - einen vierten Kontakt (13d), der an den Versorgungs-Nullleiter angeschlossen ist.
9. Methode gemäß Patentanspruch 8), **dadurch gekennzeichnet, dass** eine Kommunikationsschnittstelle (19) zwischen dem besagten, zweiten Port (13) und der besagten, programmierbaren Logikeinheit (9) positioniert ist. 10
10. Methode gemäß Patentanspruch 5), **dadurch gekennzeichnet, dass** zwischen den besagten, manuellen Steuermitteln (5) und der besagten, programmierbaren Logikeinheit (9) ein Funkempfänger (21) positioniert ist. 20
11. Methode gemäß Patentanspruch 10), **dadurch gekennzeichnet, dass** die besagten, manuellen Steuermittel (5) aus einer Fernbedienung (5a) bestehen. 25
12. Methode gemäß Patentanspruch 5), **dadurch gekennzeichnet, dass** die besagten, manuellen Steuermittel (5) Knöpfe sind.
13. Methode gemäß Patentanspruch 5), **dadurch gekennzeichnet, dass** die besagte unabhängige Stromversorgungseinheit (11) Folgendes umfasst: 30
- einen oder mehrere Stromakkumulatoren (22);
 - wenigstens ein Solarmodul (24); 35
 - wenigstens ein elektronisches Steuergerät (23) für die Ladung der besagten Akkumulatoren (22), in dem eine erste Leitung (25) zum Anschluss an das besagte Solarmodul (24) identifiziert werden kann, eine zweite Leitung (26) zum Anschluss der besagten Akkumulatoren an das besagte Solarmodul (24) und eine dritte Leitung (27) zum Anschluss an die besagte programmierbare Logikeinheit (9). 40
14. Methode gemäß Patentanspruch 13), **dadurch gekennzeichnet, dass** die besagte unabhängige Stromversorgungseinheit (11) auch eine Regeleinheit (30) umfasst, die elektrisch in die besagte dritte Leitung (27) zwischen dem besagten, elektronischen Steuergerät (23) und der besagten, programmierbaren Logikeinheit (9) eingefügt ist. 50
15. Methode gemäß Patentanspruch 14), **dadurch gekennzeichnet, dass** der Nullleiter der Stromversorgung das besagte elektronische Steuergerät (23), die besagte Regeleinheit (30) und die besagte programmierbaren Logikeinheit (9) verbindet. 55

Revendications

1. Méthode pour l'ouverture de la couverture (2) d'un élément ouvrable (1) installé dans des bâtiments du type comprenant:

- une base (3) qui délimite une ouverture (A) d'un édifice (B);
- un couvercle (2) relié avec charnières à ladite base (3);
- au moins un moteur électrique (4) pour ouvrir et fermer ledit couvercle (2);
- des moyens manuels (5; 5a) pour contrôler ledit moteur électrique (4);
- des moyens automatiques (6) pour contrôler ledit moteur électrique (4), comprenant au moins un premier capteur (6') pour détecter la présence de pluie ou d'humidité, doté de moyens électriques de chauffage (7), et un deuxième capteur (6'') pour détecter la présence de vent;
- une unité de contrôle indépendante (8) reliée électriquement au moteur électrique et aux moyens de contrôle automatiques pour ouvrir et fermer ledit couvercle (2),

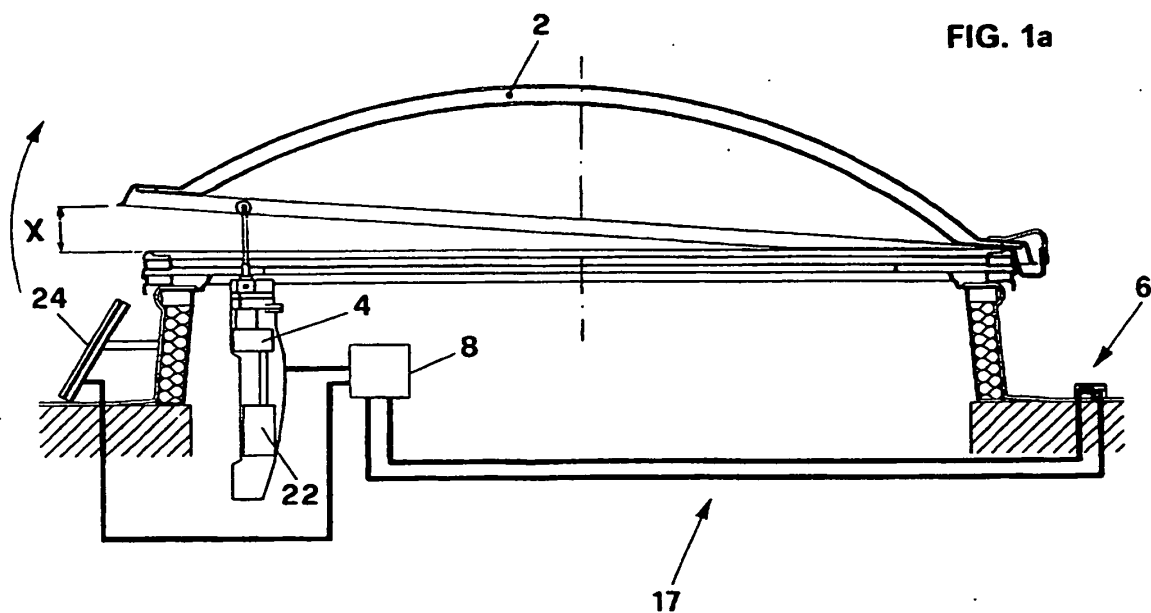
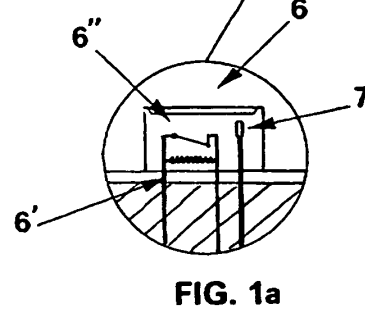
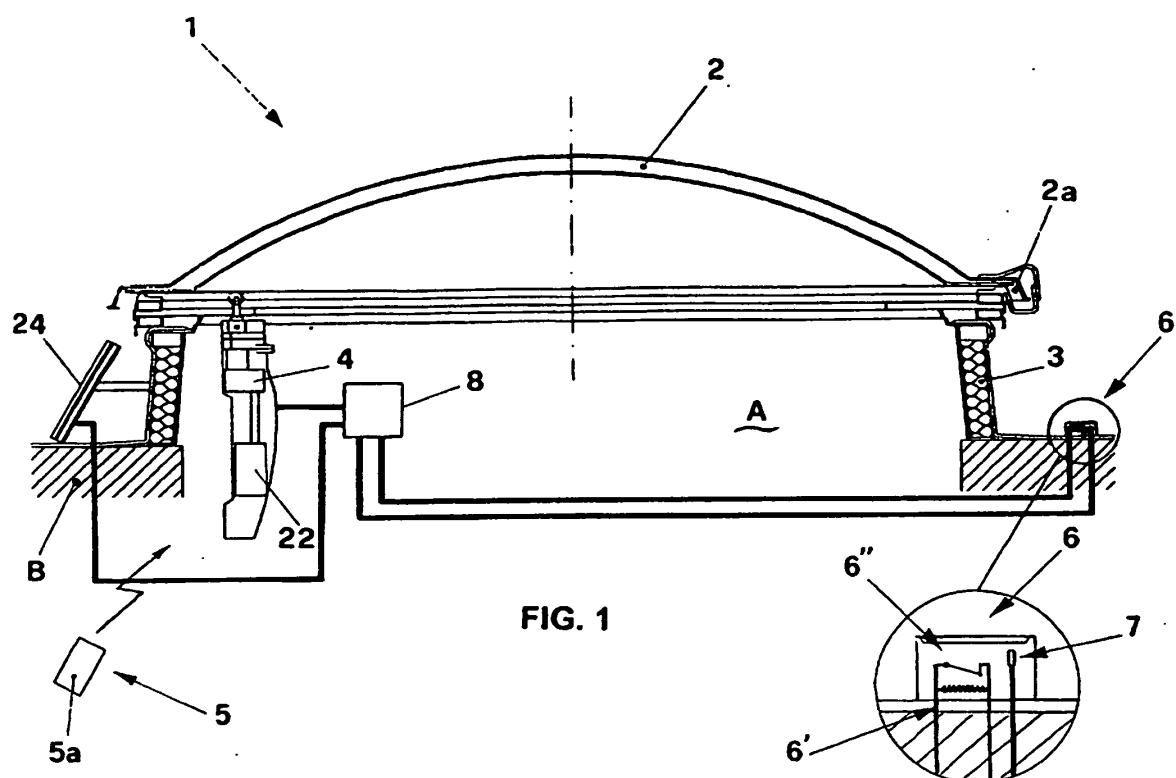
caractérisée en ce qu'elle comprend les opérations suivantes:

- vérifier si les capteurs (6', 6'') sont actifs ou non;
- si les deux capteurs (6', 6'') sont désactivés, c'est-à-dire qu'il n'y a pas de pluie ou d'humidité ou de vent, démarrer ledit moteur électrique (4) pour ouvrir complètement ledit couvercle (2);
- si ledit premier capteur (6') est actif, c'est-à-dire qu'il y a de la pluie ou de l'humidité, et ledit deuxième capteur (6'') est désactivé, c'est-à-dire qu'il n'y a pas de vent, démarrer ledit moteur électrique (4) pour soulever ledit couvercle (2) à une hauteur prédéfinie (X) de ladite base (3);
- arrêter ledit moteur (4) dans la position intermédiaire pour faire entrer la lumière dans l'édifice et pour assurer le changement de l'air même s'il pleut.

2. Méthode selon la revendication 1), **caractérisée en ce que** si ledit premier capteur (6') est actif, c'est-à-dire qu'il y a de la pluie ou de l'humidité, et ledit deuxième capteur (6'') est désactivé, c'est-à-dire qu'il n'y a pas de vent, après ledit levage dudit couvercle (2) à ladite hauteur prédéfinie (X) de ladite base (3) et après l'arrêt dudit moteur électrique (4), les opérations suivantes doivent être effectuées:

- alimenter lesdits moyens électriques de chauffage (7) dudit premier capteur (6');
- couper le courant auxdits moyens électriques de chauffage (7) après un intervalle prédéfini;

- démarrer ledit moteur électrique (4) pour ouvrir complètement ledit couvercle (2) si ledit premier capteur (6') est désactivé, c'est-à-dire qu'il n'y a pas de pluie ou d'humidité.
3. Méthode selon la revendication 2), **caractérisée en ce que** ledit couvercle (2) reste soulevé de ladite base, si après ladite interruption dudit courant auxdits moyens de chauffage (7), ledit premier capteur (6') est humide.
4. Méthode selon la revendication 2), **caractérisée en ce que** ledit couvercle (2) est fermé de nouveau si après ladite interruption dudit courant auxdits moyens de chauffage (7), ledit premier capteur (6') est humide.
5. Méthode selon la revendication 1), **caractérisée en ce que** ladite unité de contrôle indépendante (8) comprend:
- au moins une première porte (12) pour la connexion audit moteur électrique (4);
 - au moins une deuxième porte (13) pour la connexion auxdits moyens automatiques de contrôle (6) dudit moteur électrique (4);
 - au moins une unité logique programmable (9) reliée auxdites portes de connexion (12, 13) et auxdits moyens manuels de contrôle (5, 5a) dudit moteur électrique (4);
 - au moins une unité indépendante d'alimentation électrique (11) reliée à ladite unité logique programmable (9), auxdits moyens automatiques de contrôle (6) et audit moteur électrique (4).
6. Méthode selon la revendication 5), **caractérisée en ce que** ladite première porte (12) comprend:
- un premier contact (12a) relié à ladite unité logique programmable (9) par un premier conducteur (14);
 - un deuxième contact (12b) relié à ladite unité indépendante d'alimentation électrique (11) par un deuxième conducteur (15).
7. Méthode selon la revendication 6), **caractérisée en ce qu'un** fusible (16) est disposé en série audit deuxième conducteur (15).
8. Méthode selon la revendication 5), **caractérisée en ce que** ladite deuxième porte (13) comprend:
- un premier contact (13a) et un deuxième contact (13b) reliés auxdits moyens automatiques de contrôle (6) par une ligne externe (17) et à ladite unité logique programmable (9) par une ligne interne (18);
- un troisième contact (13c) relié à ladite unité indépendante d'alimentation électrique (11) par un troisième conducteur (20);
- un quatrième contact (13d) relié au fil neutre de courant.
9. Méthode selon la revendication 8), **caractérisée en ce qu'une** interface de communication (19) est interposée parmi ladite deuxième porte (13) et ladite unité logique programmable (9).
10. Méthode selon la revendication 5), **caractérisée en ce qu'un** récepteur radio (21) est interposé entre lesdits moyens manuels de contrôle (5) et ladite unité logique programmable (9).
11. Méthode selon la revendication 10), **caractérisée en ce que** lesdits moyens manuels de contrôle (5) se composent d'une commande à distance (5a).
12. Méthode selon la revendication 5), **caractérisée en ce que** lesdits moyens manuels de contrôle (5) se composent de boutons.
13. Méthode selon la revendication 5), **caractérisée en ce que** ladite unité de indépendante d'alimentation électrique (11) comprend:
- un ou plusieurs accumulateurs électriques (22);
 - au moins un panneau photovoltaïque (24);
 - au moins une unité électronique (23) pour la gestion de la charge desdits accumulateurs (22) dans laquelle on peut identifier une première ligne (25) pour la connexion audit panneau photovoltaïque (24), une deuxième ligne (26) pour la connexion desdits accumulateurs audit panneau photovoltaïque (24) et une troisième ligne (27) pour la connexion à ladite unité logique programmable (9).
14. Méthode selon la revendication 13), **caractérisée en ce que** ladite unité indépendante d'alimentation électrique (11) comprend aussi une unité de régulation (30) insérée électriquement dans ladite troisième ligne (27) entre ladite unité électrique de gestion (23) et ladite unité logique programmable (9).
15. Méthode selon la revendication 14), **caractérisée en ce que** le fil neutre de courant relie ladite unité électrique de gestion (23), ladite unité de régulation (30) et ladite unité logique programmable (9).



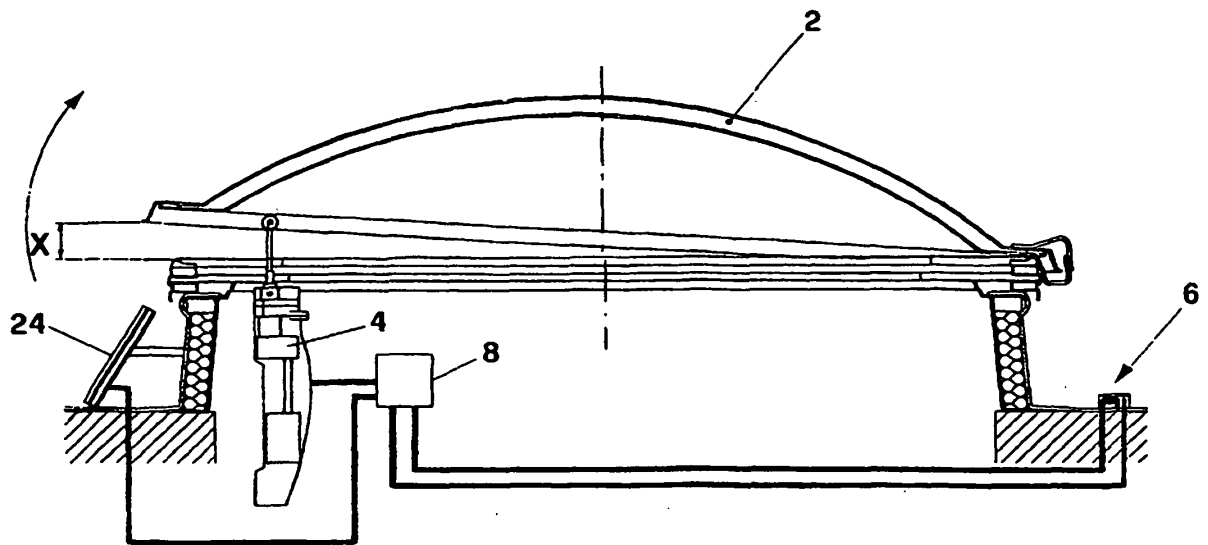


FIG. 3

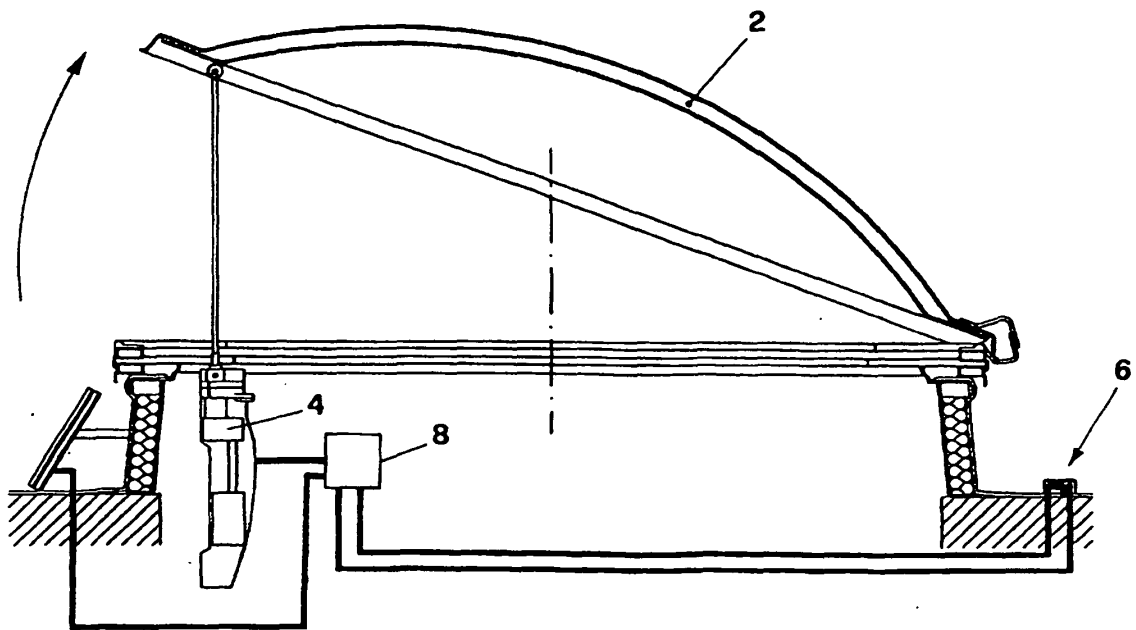


FIG. 4

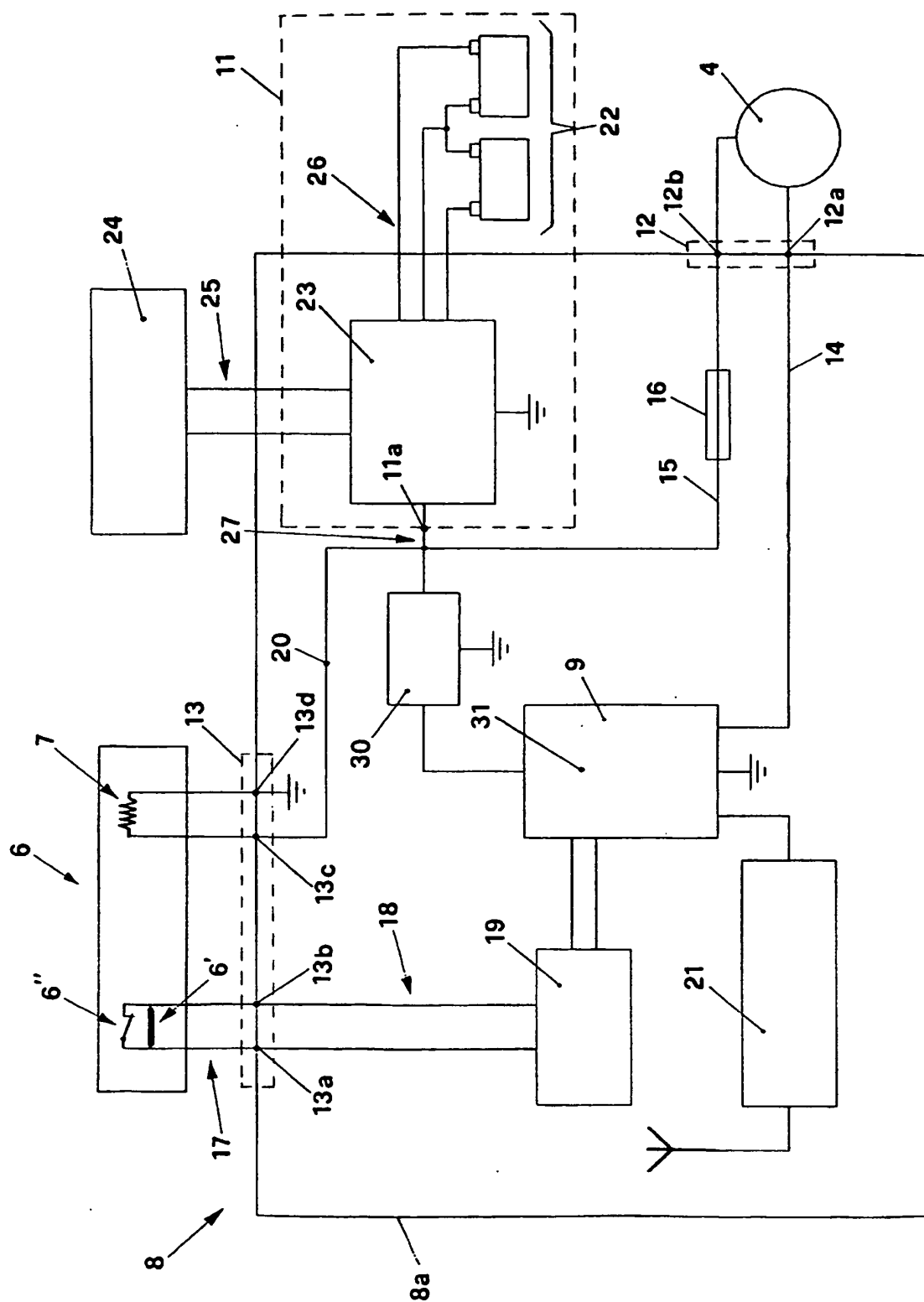


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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