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(72) Inventors:  
• **BORSOI, Luigi**  
**31012 CAPPELLA MAGGIORE (TV) (IT)**  
• **COLLOVINI, Roberto**  
**31100 TREVISO (IT)**

(74) Representative: **Braidotti, Andrea**  
**Praxi Intellectual Property S.p.A.**  
**Via F. Baracca, 5/A**  
**30173 Venezia (IT)**

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(71) Applicant: **Teleco Automation S.R.L.**  
**31100 Treviso (IT)**

(54) **AN IMPROVED DEVICE AND AN IMPROVED APPARATUS FOR A PERGOLA OR A SIMILAR INSTALLATION**

(57) Device (1) for the control of lighting elements and/or other electrical users, said device (1) being configured to be installed in a longitudinally developing orientable closing element (30), preferably in the shape of a slat, of a pergola installation (100) or similar, said pergola installation (100) or similar being of the type comprising a load-bearing structure (2) which is provided, on at least one wall, with slats (3) and at least one orientable closing element (30), said device being characterized in that it comprises:

- a casing (11) which is configured to be removably insertable and housed, entirely or mostly, in a seat (40) obtained at a longitudinal end of said orientable closing

element (30),

and wherein inside said casing (11) of said device (1) are arranged and housed:

- at least one power supply for the lighting elements and/or for other electrical users,  
- at least one control unit for the lighting elements and/or for other electrical users, said control unit being connectable via wireless and/or by wire with said lighting elements and/or with other electrical users,  
- a receiver connected and/or incorporated in said control unit to receive command signals from the outside to control, on the basis of these, said lighting elements and/or other electrical users.

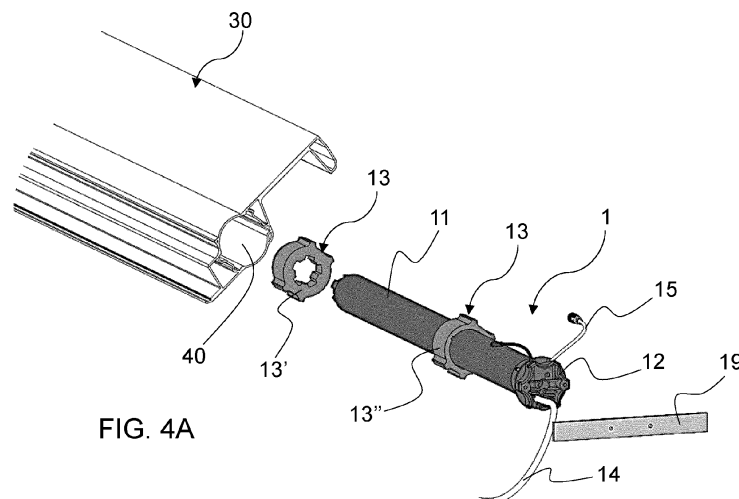


FIG. 4A

## Description

### TECHNICAL FIELD

**[0001]** The present invention concerns a device to be installed in a longitudinally developing orientable closing element of, preferably in a slat element, of a pergola or similar installation. The device is configured and intended for the control of external lighting elements and/or other electrical users, to be installed on the installation itself or even in its vicinity.

**[0002]** The present invention also concerns an apparatus, to be installed in a longitudinally developing orientable closing element, preferably in a slat element, of a pergola or similar installation, to carry out the rotational movement of the slats and also for the control of external lighting elements and/or other electrical users, to be installed on the installation itself or even in its vicinity.

**[0003]** The present invention also concerns a pergola or similar installation wherein, in a longitudinally developing orientable closing element, preferably in a slat element, a device for controlling external lighting elements and/or other electrical users is installed.

### STATE OF THE ART

**[0004]** The so-called "pergolas" are known, which are made up of rigid support structures with mobile slat closures on the upper wall and sometimes also on the side walls.

**[0005]** In particular, each pergola generally comprises a plurality of parallel, substantially rigid slats, which can be simultaneously oriented around their longitudinal axis and are stackable. More in detail, the slats can be moved both in a translational motion perpendicular to their longitudinal axis, to move from an unfolded or closed condition to a packed or open condition, and in a rotary motion around their longitudinal axis to be oriented according to the screening effect to be achieved with them. In particular, in the latter case, they can be simultaneously oriented for an angular excursion of just under 90°, in order to be able to pass from a substantially coplanar arrangement for interception of light to a substantially parallel arrangement for passage of the light.

**[0006]** The orientation movements of the slats (but the same also applies to the translation movements to cause their packing/distancing) are generally obtained with a motor which is generally controlled via direct current, both in speed and in the limit switch positions, by an electronic board that commands the motor to stop when a predetermined value of the current absorbed by the motor itself at the limit switch positions is exceeded, or when a certain count is reached with motors equipped with encoders.

**[0007]** Again in the known systems for motorizing the slats of a pergola it is necessary to create coordination between the translation and rotation movements, in the sense that only when the slats are unfolded, i.e. they have assumed an open configuration, can they be ori-

ented, while they cannot be oriented when they are completely or partially packed, i.e. they have assumed a closed configuration.

**[0008]** At the same time, the translation of the slats must be allowable only when they are arranged in parallel to each other, while it must be preventable when the slats are differently oriented.

**[0009]** In the known systems for moving the slats of a pergola, the two distinct movements of translation and rotation are obtained with distinct electric motors, controlled by a control unit through a single board, wherein distinct control units are provided for the two motors.

**[0010]** The conditioning of the movements of the two motors is obtained with traditional mechanical sensors, which are located at the extreme positions of both the translation movement of the slats and their rotation movement.

**[0011]** Currently, both of these motors are installed on the pergola support structure.

**[0012]** US2014/175240 describes a drive mechanism for the slats of a canopy which includes a linear actuator, housed within a containment casing, and mounted on the support structure of the canopy.

**[0013]** EP2868833 describes a pergola wherein the covering is defined by a plurality of slats and wherein the motor for the translational movement of the slats and the motor for the rotational movement of the slats are both managed by the same control unit and are mounted on the support structure of the pergola. Furthermore, two position sensors are provided which are conveniently mounted on the support structure of the pergola, and are therefore external to the two motors, to respectively detect whether the slats are coplanar (and therefore in a closed condition) and whether the cover is in an open condition (i.e. if the slats are unfolded and spaced apart). These sensors then generate corresponding signals which are sent to the control unit which is appropriately installed inside an upright of the support structure of the pergola. To obtain the necessary coordination in the operation of the two motors, the position sensors must be connected to the control unit, to which the two motors are also connected, and this requires a series of wiring, which may require laborious installation and even more laborious modification interventions, in the not infrequent case wherein the control unit needs to be moved.

**[0014]** All these problems are significantly accentuated with current tubular motors, which are equipped with internal limit switches, which are more difficult to access to establish the necessary electrical connections with the control unit.

**[0015]** WO2022/084872 shows a pergola construction comprising a frame wherein transverse elements are positioned, each having a support element for the structural connection to the frame and a slat that can rotate with respect to the support element; the transverse elements are mobile between a closed condition, wherein they are packed, and an open condition wherein they are distributed along the frame. This solution involves the passage

of a plurality of cables on the sides of the transversal elements, which requires a laborious installation and, furthermore, involves the use of a plurality of cable guides which are fixed between two successive transversal elements and together form part of a cable guide to guide a cable from the frame to at least one of the transversal elements.

**[0016]** The current market need is to equip pergolas with lights which can be used to illuminate the surface beneath the slats and/or to constitute courtesy lights and/or to create lighting effects, in particular RGB effects. To date, this need is satisfied in pergola installations by applying these lights, preferably LED lights, to the support structure of the pergola. However, all this entails the need to create a lighting system with dedicated components which, together with the lights themselves, must be applicable to the support structure of the pergola. In particular, a power supply and control unit for the lights must be provided, which in known solutions is external or inserted inside the uprights and/or crosspieces of the pergola support structure. Furthermore, these are solutions with a certain installation complexity.

**[0017]** Furthermore, the current market need is to provide an audio system at the pergola installation, in particular for music reproduction. Currently, this need is satisfied with dedicated audio systems which are completely independent and separated, both in terms of power supply and control, from the pergola installation at which music reproduction and diffusion, or other audio signals in general, are requested.

**[0018]** In the context of roller blinds, tubular motors provided with an output for powering the lights and therefore motors wherein the light power supply unit is integrated into the motor itself are also known. However, this solution presents some limitations given that the lights are powered by low voltage (12 or 24Vdc) and the power that can be supplied from the light output of the motor can only power a small quantity/number of lights.

#### OBJECTS OF THE INVENTION

**[0019]** The object of the invention is to propose a control device for lighting elements and/or other electrical users for a pergola or similar installation which eliminates all the drawbacks found in known solutions.

**[0020]** Another object of the invention is to propose a device with particularly small dimensions.

**[0021]** Another object of the invention is to propose a device that is simple to install, even by non-specialized personnel,

**[0022]** Another object of the invention is to propose a device that is easy to program and manage.

**[0023]** Another object of the invention is to propose a device that can also be controlled remotely from a smartphone both to control the operation of the control device itself and to verify the correct execution of the commands received.

**[0024]** Another object of the invention is to propose a

device which can be obtained in a simple, rapid and low-cost manner.

**[0025]** Another object of the invention is to propose an apparatus for the rotational motion of the slats of a pergola installation and for the control of lighting elements and/or other electrical users which is simple to install, easy to program and manage, as well as realizable simply, quickly and at low cost.

**[0026]** Another object of the invention is to propose an apparatus that can also be used in cases wherein the installation of external control units is difficult.

**[0027]** Another object of the invention is to propose a device or apparatus that is an improvement and/or alternative to traditional ones.

**[0028]** Another object of the invention is to propose a pergola or similar installation equipped with a control device for the lighting elements which has particularly small dimensions, which is simple and quick to assemble and install, easy to program and manage, as well as realizable simply, quickly and at low cost.

#### SUMMARY OF THE INVENTION

**[0029]** All these objects and others that will result from the following description, both individually and in any combination thereof, are achieved, according to the invention with a device according to claim 1 and also by an apparatus according to claim 4.

#### DESCRIPTION OF THE FIGURES

**[0030]** The present invention is further clarified below in some of its preferred practical embodiments, reported for purely illustrative and non-limiting purposes, with reference to the attached drawings, wherein:

- |           |  |
|-----------|--|
| Figure 1  | shows a perspective view of a pergola installation provided with slats moved in a controlled manner by means of an apparatus according to the invention,   |
| Figure 2  | shows a perspective view of an orientable closing element, shaped like a slat, of the installation in fig. 1 and wherein an apparatus according to a first embodiment of the invention is inserted/housed in said element, |
| Figure 3A | shows a side view of a device according to the invention, being part of the apparatus in fig. 2, for the control of lighting elements and/or other electrical users,   |
| Figure 3B | shows a side view of a motorization device, being part of the apparatus in fig. 2, for the rotation of the slats,  |
| Figure 4A | shows an exploded perspective view of a detail of the device in fig. 3A which is inserted at a first end of the orientable closing element of fig. 2,  |
| Figure 4B | shows an exploded perspective view of a  |

- detail of the device in fig. 3B inserted at the other (second/opposite) end of the orientable closing element in fig. 2,
- Figure 5 shows a perspective view of a pergola installation provided with slats moved in a controlled manner by means of an apparatus according to the invention,
- Figure 6 shows a perspective view of an orientable closing element, shaped like a slat, of the installation in fig. 5 and wherein an apparatus according to a second embodiment of the invention is inserted/housed in said element,
- Figure 7A shows a side view of a device according to the invention, being part of the apparatus in the embodiment of fig. 6, for the control of lighting elements and/or other electrical users,
- Figure 7B shows a schematic side view of an enlarged detail of the motorization device, being part of the apparatus in the embodiment of fig. 6, for the rotation of the slats,
- Figure 8 shows an exploded perspective view of the second embodiment of the apparatus according to the invention which is inserted at the same longitudinal end of the orientable closing element of fig. 6,
- Figure 9 shows a perspective view of a pergola installation provided with slats moved in a controlled manner by means of an apparatus according to the invention and wherein a series of photovoltaic panels are mounted on a slat,
- Figure 10A shows an exploded perspective view of a detail of the slat with the photovoltaic panels wherein a device according to the invention is inserted, being part of the first embodiment of the apparatus, for controlling the lighting elements and/or other electrical users,
- Figure 10B shows an exploded perspective view of a detail of the slat with the photovoltaic panels wherein a motorization device is inserted, being part of the first embodiment of the apparatus, for the rotation of the slats.

#### DETAILED DESCRIPTION OF THE INVENTION AND OF SOME PREFERRED EMBODIMENTS

**[0031]** As can be seen from the figures, the apparatus according to the invention, indicated globally with the reference number 10, is configured and intended to be mounted - in the illustrated example - in a pergola installation 100 comprising a load-bearing structure and view of a plurality of slats 3 which are orientable around their longitudinal axis.

**[0032]** The apparatus 10 is configured to cause the

movement of the slats 3 of the pergola installation 100 and also to control lighting elements and/or other electrical users.

**[0033]** In particular, the apparatus 10 for the movement of the rotation of the slats 3 of the pergola installation 100 and for the control of lighting elements and/or other electrical users, includes:

- a control device 1 of lighting elements and/or other electrical users, and also
- a motorization device 80 to vary the orientation/rotation, around the respective longitudinal development axis, of the orientable closing element 30 and also of the slats 3 of the pergola installation 100.

**[0034]** Conveniently, the pergola installation 100, wherein the apparatus 10 is mounted, can be substantially of the traditional type.

**[0035]** In particular, the pergola installation 100 includes a load-bearing structure 2, preferably of a substantially parallelepiped shape, which is provided on at least one wall (for example the upper wall and sometimes also on the side walls) with slats 3 or equivalent mobile closing elements. More in detail, the installation 100 includes a plurality of parallel slats 3, which can be simultaneously oriented around their longitudinal axis, and which are possibly packable.

**[0036]** Conveniently, the slats 3 can be moved with a rotary motion around their longitudinal axis to be oriented according to the screening effect that is desired to be achieved with them. Conveniently, they can be simultaneously oriented for an angular excursion of approximately  $90^\circ - 270^\circ$ , in order to be able to pass from a substantially coplanar arrangement for intercepting light to a substantially parallel arrangement suitable for allowing the passage of light.

**[0037]** Conveniently, the slats 3 can be shaped like a lamina (i.e. wherein the thickness is much lower than the other two dimensions) and/or can be defined by longitudinally developing closing elements, having any conformation of their cross section, and configured so as to be able to rotate around their axis of longitudinal development so as to be able to assume at least one arrangement wherein they prevent or in any case limit the penetration of light.

**[0038]** Preferably, the slats 3 can also be moved with a translational motion perpendicular to their longitudinal axis, to thus pass from an unfolded or closed condition to a packed or open condition. Conveniently, for this purpose, in the pergola installation 100 they can be provided motorization means and motion transmission means (not shown) configured to move the slats 3 with translational motion perpendicular to their longitudinal axis, to thus pass from an unfolded or closed condition to a packed or open condition of the pergola installation 100.

**[0039]** In the present description the term translation will be used to define the movement that leads the slats 3 to pass from an open configuration (unfolded slats) to

a closed configuration (packed slats) and vice versa, while the term rotation will be used to define the movement that leads to orienting the slats 3 around their longitudinal axis to allow more or less light to pass between them.

**[0040]** Preferably, in the covering installation 100 only a rotational movement of the slats 3 can be provided, or a translation and also rotation movement of the slats 3 can be provided.

**[0041]** Conveniently, lighting elements (not shown) are mounted on the pergola installation 100 and/or on another external structure surrounding said installation. Advantageously, the lighting elements can be mounted on any component of the pergola installation 100 and in any position thereof. More specifically, the lighting elements can be mounted on the load-bearing structure 2 and/or on the slats 3.

**[0042]** Conveniently, the lighting elements comprise light sources and, preferably, are LED strips that define monochromatic and/or RGB light sources.

**[0043]** In particular, the lighting elements are made up of at least one LED strip which includes a set of LED diodes, i.e. electronic components which emit light when powered by electricity. Conveniently, the LED diodes are fixed - preferably by welding - on a printed circuit board (PCB), preferably flexible, which performs the functions of support and electrical connection. Advantageously, the LED diodes of the LED strip can be configured to emit monochromatic light or they can be of the RGB type.

**[0044]** Advantageously, as described in more detail below, the lighting elements are connected - preferably by means of electrical connection cables/conductive wires 15 - to the control device 1 housed inside the orientable closing element 30. Preferably, the conductive cables 15 for electrical connection can run inside the components of the pergola installation 100 (and in particular inside the load-bearing structure 2) and, therefore, are hidden from a view from the outside.

**[0045]** The pergola installation 100 includes at least one orientable closing element 30 having longitudinal development and which is orientable/rotatable around its longitudinal development axis. In particular, the orientable closing element 30 is mounted on the load-bearing structure 2 at at least one wall to be shaded. Advantageously, the orientable closing element 30 cooperates with the other slats 3 to obtain the shading effect. Preferably, the slats 3 comprise said at least one orientable closing element 30.

**[0046]** Preferably, the orientable closing element 30 is of the slat type.

**[0047]** Conveniently, inside the pergola installation 100, the orientable closing element 30 is configured to act as a slat.

**[0048]** Preferably, the orientable closing element 30 has the same shape as the other slats 3 of the pergola installation 100.

**[0049]** Preferably, the orientable closing element 30 has the same dimensions as the other slats 3 of the per-

gola installation 100.

**[0050]** Preferably, the orientable closing element 30 and the slats 3 of the pergola installation 100 are substantially the same as each other.

5 **[0051]** Preferably, the orientable closing element 30 and the slats 3 of the pergola installation 100 are obtained by extrusion.

**[0052]** Conveniently, the orientable closing element 30 and the slats 3 of the pergola installation 100 can be made of metallic or polymeric (plastic) material.

10 **[0053]** Conveniently, the orientable closing element 30 and the slats 3 of the pergola installation 100 do not perform a complete rotation (i.e. 360°) around the respective longitudinal development axis. Preferably, the orientable closing element 30 and the slats 3 of the pergola installation 100 perform a rotation of an angle equal to or less than approximately 270° around the respective longitudinal development axis.

15 **[0054]** As mentioned, the apparatus 10 according to the invention includes:

- the control device 1 of lighting elements and/or other electrical users, and also
- the motorization device 80 to vary the orientation/rotation, around the respective longitudinal development axis, of the orientable closing element 30 and also of the slats 3 of the pergola installation 100.

25 **[0055]** The control device 1 includes a casing 11 which is removably inserted inside a seat 40 obtained at the first longitudinal end of the orientable closing element 30.

**[0056]** Preferably, in a possible embodiment, the casing 11 of the control device 1 can have a tubular shape.

30 **[0057]** Preferably, in another possible embodiment, the casing 11 of the control device 1 can have a box-like shape, in particular substantially parallelepiped-like.

35 **[0058]** Preferably, the motorization device 80 comprises an electric motor. Preferably, the motorization device 80 comprises a motor configured to provide a rotary motion as an output. Preferably, the motorization device 80 provides an output rotation at a particularly low number of revolutions per minute, for example of approximately 1 - 3 revolutions/minute.

40 **[0059]** In particular, the motorization device 80 of the apparatus 10 is installed inside the orientable closing element 30 to cause the rotary movement of said slats 3, i.e. to define the movement which leads to orienting the slats 3 around their axis longitudinal to let more or less light pass between them. Furthermore, the motorization device 80 of the apparatus 10 can be electronically connected with a further (second) motorization device (not shown) which is configured to implement the translational movement which causes the slats 3 to pass from the open configuration (slats unfolded) to the configuration closed (packed blades). Conveniently, in the pergola installation 100 there is also a motion transmission and conversion system (not shown) configured to transform the rotary motion produced at the output from the motor-

ization device 80 of the apparatus 10 into a rotary movement of all the slats 3 around its longitudinal axis.

**[0060]** The apparatus 10 is inserted and housed inside the orientable closing element 30 and, in particular, both the control device 1 and the motorization device 80 - which, in their combination, define the apparatus 10 - are inserted and housed (at least in part) inside the same orientable closing element 30.

**[0061]** Conveniently, in a (first) possible embodiment of the apparatus 10 (see fig. 2, 3A and 4A), the control device 1 is removably inserted in idle mode (i.e. in such a way as to decouple the rotation of the control element orientable cover 30 from the control device 1) inside said seat 40 obtained at the first longitudinal end of the orientable closing element 30. Conveniently, in a (first) possible embodiment of the apparatus 10 (see fig 2, 3A and 4A), the motorization device 80 is removably inserted inside a further seat 41 which is obtained at the other second/opposite longitudinal end of the orientable closing element 30.

**[0062]** Conveniently, in a (first) possible embodiment of the apparatus 10 (see fig. 2, 3A and 4A), the control device 1 also acts as a support for the orientable closing element 30 at a first longitudinal end of that element.

**[0063]** Conveniently, in a (first) possible embodiment of the apparatus 10 (see fig. 2, 3A and 4A), the motorization device 80 also acts as a support for the orientable closing element 30 at the other (second /opposite) longitudinal end of said element.

**[0064]** Conveniently, in another (second) possible embodiment of the apparatus 10 (see fig. 6, 7A and 8), the control device 1 is removably inserted inside said seat 40 so as to rotate with the orientable closing element 30. Conveniently, in another (second) possible embodiment of the apparatus 10 (see fig. 6, 7A and 8), the control device 1 and the motorization device 80 are removably inserted inside the same seat 40 obtained at the first longitudinal end of the orientable closing element 30.

**[0065]** Conveniently, in another (second) possible embodiment of the apparatus 10 (see fig. 6, 7A and 8), the control device 1 does not act as a support for the orientable closing element 30 but rather only acts as container for the power supply and/or control components of lighting elements and/or other electrical users.

**[0066]** Conveniently, in another (second) possible embodiment of the apparatus 10 (see fig. 6, 7A and 8), it is such that:

- the control device 1 is inserted in the same seat 40 as the motorization device 80, and
- the control device 1 is inserted in said seat 40 previously with respect to the motorization device 80, therefore the control device 1 is positioned in said seat more internally than the motorization device 80, and
- the control device 1 does not act as a support for the orientable closing element 30 but rather only acts as a container for the power supply and/or control com-

ponents of lighting elements and/or other electrical users, and

- the motorization device 80 also acts as a support for the orientable closing element 30 at the other (second/opposite) longitudinal end of said element.

**[0067]** Conveniently, in a first possible embodiment of the apparatus 10 (see fig. 2, 3A, 3B, 4A and 4B), the motorization device 80 is inserted and housed at one end of the orientable closing element 30 to vary the orientation/rotation, around the respective axis of longitudinal development, of the orientable closing element 30 and also of the slats 3 of the pergola installation 100, while at the other end of the orientable closing element 30 the control device 1 of the lighting elements and/or other electrical users is inserted and housed. Conveniently, in this case, the orientable closing element 30 can comprise:

- at a first end thereof, at least a first cavity which defines the seat 40 for the insertion and housing of the control device 1, and
- at the other (second) end, which is opposite to the first end, at least a second cavity which defines a further seat 41 for the insertion and housing of the motorization device 80.

**[0068]** Preferably, in a possible embodiment, the orientable closing element 30 can comprise a through opening which passes through it from one longitudinal end to the other, thus defining said first cavity and said second cavity.

**[0069]** Preferably, in another possible embodiment, the orientable closing element 30 does not have a through opening that passes through it from one longitudinal end to the other and, therefore, the first cavity and the second cavity are not connected to each other, but rather they are separated by an internal separation section.

**[0070]** Conveniently, the control device 1 can include a casing 11 which is removably inserted entirely or mostly inside the seat 40 obtained at the first longitudinal end of the orientable closing element 30.

**[0071]** Preferably, in a possible embodiment, the casing 11 can have a tubular shape.

**[0072]** Preferably, in another possible embodiment, the casing 11 can have a box-like shape, in particular substantially parallelepiped-like.

**[0073]** Conveniently, the electronic components for powering and controlling the lighting elements and/or other electrical users are contained inside the casing 11.

**[0074]** Conveniently, the control device 1 according to the invention comprises a power supply, a control unit and a receiver which is connected or incorporated into said unit.

**[0075]** Preferably, the power supply for the lighting elements and/or other electrical users is housed inside the casing 11 of the control device 1.

**[0076]** Preferably, an electric transformer for lighting

elements operating at low voltage can be housed inside the casing 11 of the control device 1.

**[0077]** Preferably, the control unit (e.g. a processor) for the lighting elements and/or other electrical users is also housed inside the casing 11 of the control device 1. In particular, the control unit can be connected via wireless and/or via wire with said lighting elements and/or with other electrical users. More in detail, the control unit is connected to an output interface, provided outside the casing 11, an interface which in turn is connected to the lighting elements and/or to other electrical users. Conveniently, the connection between the control unit (housed inside the casing, and therefore inside the orientable covering element) and the output interface (positioned outside the tubular shaft), as well as between the latter and the lighting elements is obtained by means of at least one conductive cable 15 for the electrical connection and transmission of electrical signals. Preferably, said at least one conductive cable 15 for the electrical connection passes through the head 12.

**[0078]** Preferably, the drivers for the command/communication with the output interface connected to the lighting elements and/or other electrical users are implemented in the control unit of the control device 1.

**[0079]** Inside the casing 11 there is also provided the receiver which is connected, via wireless and/or by wire, with the outside to receive command signals from the outside to control, on the basis of these, said lighting elements and/or other electrical users.

**[0080]** Advantageously, the receiver is of the wireless type, preferably radio. Conveniently, through the receiver the control unit of the control device 1 can receive from an external transmitter, and in particular from a remote control or even from a smartphone or from other traditional wireless devices in general, command signals for the lighting and/or other electrical users. Conveniently, for this purpose, the receiver is connected and/or incorporated into the electronic circuit of the control unit to be operationally connected with the control/communication drivers of the output interface connected to the lighting elements and/or other electrical users.

**[0081]** Advantageously, the receiver can be connected via radio to other traditional sensors (for example of wind, snow, rain, temperature, etc.) present in the environment.

**[0082]** The receiver can advantageously be replaced by a transceiver, preferably radio, which in addition to sending corresponding command signals to the lighting elements and/or other electrical users can remotely communicate the status of the elements themselves and, preferably, also the operating parameters or the possible presence of anomalies or malfunctions. In particular, to this end, the transceiver, in addition to controlling/communicating via its receiver side with the output interface connected to the lighting elements and/or other electrical users, can transmit signals on the status of the same lighting elements via the transmitter side. In essence, conveniently, in this way the user can remotely control, for example via a smartphone or similar, the switching

on, off and adjustment of the lighting elements and/or other electrical utilities and can receive, always with the smartphone, information about their current status. Conveniently, the transceiver is connected and/or incorporated into the electronic circuit of the control unit to be operationally connected with the control/communication drivers of the output interface connected to the lighting elements and/or other electrical users.

**[0083]** Advantageously, the power supply housed in the casing 11 can be powered from the outside, preferably it is powered directly through a power cable 14 connected to an external electrical source (preferably to the main). Preferably, for this purpose, the head 12 can be crossed by said power cable 14.

**[0084]** The apparatus 10 also includes one or more batteries which, conveniently, can be housed inside the casing 11 of the control device 1 and/or inside the further casing 81 of the motorization device 80. Conveniently, said at least one battery can also be inserted inside the seat 40 or said further seat 41, but externally with respect to the casing 11 of the control device 1 and/or externally with respect to the further casing 81 of the motorization device 80.

**[0085]** Conveniently, the power supply housed in the casing 11 of the control device 1 can be powered by one or more batteries.

**[0086]** Advantageously, on the side wall of the casing 11 a first door can be provided to access the inside of the casing itself from the outside, for example to be able to access - if provided - the rechargeable battery. Advantageously, a second door can also be provided on the orientable cover element 30 to access the first door obtained in the casing 11. Conveniently, it is understood that the first door of the casing 11 and the second door of the orientable cover element 30 face each other.

**[0087]** Conveniently, the apparatus 10 can include one or more photovoltaic panels 44 which are electrically connected to the control device 1 to thus provide the electrical energy to power the lighting elements and/or other electrical users.

**[0088]** Conveniently, the photovoltaic panels 44 could be electrically connected to the motorization device 80, to thus provide the electrical energy to power the electric motor provided in said motorization device.

**[0089]** Preferably, said at least one photovoltaic panel 44 can be mounted on a slat 3 of the pergola installation and, in particular, can be mounted on the orientable closing element 30. Conveniently, the photovoltaic panels 44 may not be mounted on the orientable cover 30 and/or on the slats 3, for example they could be mounted on the load-bearing structure 2.

**[0090]** Conveniently, said at least one battery can be rechargeable with one or more photovoltaic panels 44 which, preferably, can be mounted externally on the same orientable closing element 30 wherein the control device 1 is inserted and/or can be mounted on other slats 3 of the pergola installation 100. In particular, the photovoltaic panels 44 can be electronically connected with at

least one battery, which is housed inside the casing 11 of the control device 1 and/or which is housed inside the seat 40 but externally with respect to the casing 11, to thus recharge at least one power battery of the control device 1. Conveniently, the photovoltaic panels 44 can be electronically connected with at least one battery, which is housed inside the further casing 81 of the motorization device 80 and/or which is housed inside the seat 40 or the further seat 41 but externally with respect to the further casing 81 of the motorization device 80, to thus recharge at least one power battery of the motorization device 80.

**[0091]** Advantageously, by using the photovoltaic panels 44, the control device 1 and/or the motorization device is/are independent of the external electrical network. In particular, using the photovoltaic panels 44 and, preferably, said at least one battery, the assembly comprising the orientable closing element 30 with the apparatus 10, which is installed inside said element, defines a unit which is completely autonomous and independent from an electrical point of view.

**[0092]** Conveniently, the casing 11 is entirely inserted and housed inside the orientable closing element 30.

**[0093]** Preferably, in one of its possible embodiments (see fig. 2, 3A and 4A), the control device 1 includes a head 12 which is associated with one end (the outermost one) of the casing 11 and which is configured to allow the constraint to the load-bearing structure 2 of the pergola installation 100, thus allowing said device 1 to act as a support for said orientable closing element 30 at the first end of said element. More preferably, the head 12 is configured to allow the constraint to a bracket 19 which is fixed to the load-bearing structure 2 of the pergola installation 100.

**[0094]** Preferably, the control device 1 comprises at least one adapter 13, more preferably a pair of adapters, which is configured to support the casing 11 inside said seat 40 obtained at a (first) longitudinal end of the orientable closing element 30.

**[0095]** Advantageously, between the casing 11 and the seat, obtained in the orientable closing element 30, for the insertion of the control device 1, the adapters 13 are interposed to support the casing 11 inside the seat itself.

**[0096]** Preferably, a pair of support adapters 13 is provided, spaced apart from each other, and positioned so that:

- a first adapter 13' is positioned or in any case is closer to the innermost end of the casing 11,
- a second 13" adapter is positioned or in any case is closer to the outermost end of the casing 11.

**[0097]** Preferably, in a possible embodiment (see fig. 2, 3A and 4A), both the first adapter 13' and the second adapter 13" are of the non-pulled type and, in particular, are mounted idly on the casing 11, that is, in such a way as to decouple the rotation of the orientable closing ele-

ment 30 from the casing 11, thus allowing said element 30 to rotate around its longitudinal development axis while the casing 11 remains fixed/stationary. Conveniently, the first adapter 13' can be associated by form coupling with an idle pinion that protrudes from the internal end of the casing 11, thus allowing said element 30 to rotate around its longitudinal development axis while the casing 11 remains fixed/stopped.

**[0098]** Conveniently, it is understood that the shape and dimensions of the casing 11 are not linked to those of the corresponding reception seat 40 obtained in the orientable closing element 30 although they must evidently be compatible with them. In particular, the casing 11 has a shape and size suitable to allow its insertion and housing inside the reception seat 40. Conveniently, the stability of the position of the casing 11 inside the seat 40 is obtained by means of the adapters 13.

**[0099]** The motorization device 80 includes a further casing 81 which is removably inserted inside the further seat 41 obtained at the second longitudinal end of the orientable closing element 30. Preferably, said further casing 81 has a tubular shape.

**[0100]** Conveniently, the further casing 81 is entirely inserted and housed inside the orientable closing element 30.

**[0101]** Preferably, the motorization device 80 includes a further head 82 which is associated with one end (the outermost one) of the further casing 81 and which is configured to allow attachment to the load-bearing structure 2 of the pergola installation 100, thus allowing said motorization device 80 to act as a support for said orientable closing element 30 at said second/opposite longitudinal end of said element 30. More preferably, the further head 82 is configured to allow the constraint to a further bracket 89 which is fixed to the load-bearing structure 2 of the pergola installation 100.

**[0102]** Preferably, the motorization device 80 comprises at least one further adapter 83, more preferably a pair of further adapters.

**[0103]** Advantageously, the adapters 83 are interposed between the further casing 81 and the further seat for the insertion of the motorization device 80, which is obtained in the orientable closing element 30, to support the further casing 81 inside the seat itself.

**[0104]** Preferably, a pair of further support adapters is provided, spaced from each other, and positioned so that:

- a first further adapter 83' is positioned or in any case is closer to the innermost end of the further casing 81,
- a second adapter 83" is positioned or in any case is closer to the outermost end of the further casing 81, i.e. it is close to the further head 82.

**[0105]** Inside the further casing 81 of the motorization device 80 there is housed an electric motor, preferably a tubular electric motor, which is configured to rotate the said orientable closing element 30 around its longitudinal development axis.



**[0106]** Preferably, said first further adapter 83' is a pulling adapter.

**[0107]** From the innermost end of the further casing 81 comes out an output shaft driven in rotation by the electric motor which is coupled, via said first further adapter 83', to the further seat of the orientable closing element 30 so as to cause the rotation of the latter. In particular, the rotating output shaft of the electric motor, a shaft which protrudes from the further casing 81, is made integral in rotation with the orientable closing element 30 so as to cause its rotation. Preferably, for this purpose, said first further adapter 83' acts as a pulling adapter and is shaped like a ring with an innermost profile, which is configured to define a form coupling with the rotating output shaft of the electric motor or with a pinion mounted on said shaft, and with an outermost profile configured to define a form coupling within the further seat 41.

**[0108]** Preferably, said further second adapter 83" is of the non-pulled type and, in particular, is mounted in idle mode on the further casing 81, i.e. in such a way as to decouple the rotation of the orientable closing element 30 from the casing 81, allowing thus allowing said element 30 to rotate around its longitudinal development axis while the casing 81 remains fixed.

**[0109]** Conveniently, it is understood that the shape and dimensions of the further casing 81 are not linked to those of the corresponding further receiving seat 41 obtained in the orientable closing element 30 although they must evidently be compatible with them. In particular, the further casing 81 has a shape and dimensions suitable to allow its insertion and housing inside said further seat 41. Conveniently, the stability of the position of the casing 81 inside said further seat 41 is obtained through the further adapters 83.

**[0110]** Preferably, the further head 82 is crossed by a further power cable 84 for the electric motor housed inside the further casing 81.

**[0111]** Preferably, both the head 12 and the adapters 13 of the control device 1 have a shape similar respectively to that of the further head 82 and of the further adapters 83 of the motorization device 80, but unlike those they have the sole function of idle support of the orientable closing element 30 at its end opposite to that of insertion of the motorization device 80.

**[0112]** Preferably, the casing 11 of the control device 1 is the same (in terms of shape and dimensions) as the further casing 81 of the motorization device 80.

**[0113]** Preferably, said at least one adapter 13 for the casing 11 and said at least one adapter 83 for the further casing 81 have the same conformation of the external annular profile. More preferably, the first adapter 13', the second adapter 13", the first further adapter 83' and the second further adapter 83" all have the same conformation of the external annular profile, to thus engage in a corresponding shape coupling (thus as described above for the various embodiments) inside the seat 40 and/or the further seat 41, and can have a different conformation of the internal annular profile, to thus allow insertion

(more preferably by defining a shape coupling engagement) of different parts and/or components, such as for example the casing 11 with a rectangular section for the two adapters 13' and 13" of fig. 8, the casing 11 of circular section for the adapter 13" of fig. 4A, the further casing 83 of circular section for the adapter 83" of fig. 4B, the output shaft or motor pinion for the first further adapter 83', an idle shaft or pinion for the first adapter 13' of FIG. 4A.

**[0114]** Preferably, said at least one adapter 13 for the casing 11 and/or said at least one adapter 83 for the further casing 81 have a conformation of the external annular profile such as to define, once they are inserted respectively within the seat 40 and/or further seat 41, passages for the electrical cables that come out from the respective casings.

**[0115]** Conveniently, in a second possible embodiment (see fig. 6, 7A and 7B), both the control device 1 of the lighting elements and/or other electrical users and the motorization device 80 to vary the orientation/rotation, around the respective axis of longitudinal development, of the orientable closing element 30 and also of the slats 3 of the pergola installation 100 are inserted in the same seat 40 which is obtained at the same end of the orientable closing element 30.

**[0116]** Conveniently, in this case, the orientable closing element 30 can include, at one of its longitudinal ends, a single cavity which thus defines a single/same housing seat 40 for both the control device 1 and the motorization device 80. Conveniently, said same seat 40 is configured (both in terms of dimensions and shape) to house both the control device 1 and the motorization device 80.

**[0117]** Conveniently, in this second embodiment of the apparatus 10 (see fig. 6, 7B and 8), the motorization device 80 can include all the characteristics, either considered alone or in any combination thereof, described above with reference to the first embodiment of the apparatus 10.

**[0118]** Conveniently, in this second possible embodiment of the apparatus 10 (see fig. 6, 7A and 8), the control device 1 can include all the characteristics, either considered alone or in any combination thereof, described above with reference to the first embodiment of the apparatus 10, with the exception of the fact that the two support adapters 13' and 13" are of the pulled type. In particular, in this case, the two support adapters 13' and 13" are fixed internally to the casing 11 and are configured to define a form coupling within the seat 40 so as to rotate the casing 11 together with the orientable closing element 30. Therefore, in this embodiment, the control device 1 - which is inserted inside the same seat 40 internally and previously with respect to the motorization device 80 - rotates by an angle equal to or less than 270° with respect to the longitudinal development axis of the orientable closing element 30 wherein both devices are inserted.

**[0119]** Conveniently, the power cable 14 and the conductive cable 15 for connection and transmission of electrical signals towards the lighting elements and/or other

electrical users can respectively pass through the two opposite bases of the casing 11, or (in a version which is not shown) can pass through the same base of the casing 11.

**[0120]** Conveniently, in a possible embodiment (see fig. 8), the seat 40 - which is defined at one end of the orientable closing element 30 and which is configured for the insertion and housing of the control device 1 (and in particular of its casing 11) - is also shaped (for example by providing a longitudinal groove 42 open towards the seat 40) for the passage of the power cable 14 and/or the cable 15, and in particular to allow the passage from an innermost area of the orientable closing element 30 towards the longitudinal end of the latter.

**[0121]** Conveniently, both for the first embodiment and for the second embodiment of the apparatus 10, the orientable closing element 30 acts as a container for inserting/housing both the control device 1 which is configured and intended for control of the lighting elements and/or other electrical users, both of the motorization device 80 which is configured and intended to vary the orientation/rotation, around the respective longitudinal development axis, of the orientable closing element 30 and also of the 3 slats of the pergola installation 100.

**[0122]** Preferably, in a possible embodiment, the motorization device 80 can comprise a further control unit wherein the control drivers of the electric motor housed inside the further casing 81 of said motorization device 80 are implemented.

**[0123]** Preferably, in a possible embodiment, the control unit of the control device 1 of the lighting elements and/or other electrical users is also configured to control the electric motor housed in said further casing 81 of said motorization device 80 and, furthermore, the control unit of the control device 1 is electronically connected with said electric motor of said motorization device 80. In particular, in the control unit of the control device 1 of the lighting elements and/or other electric users, the command drivers of the electric motor housed in the motorization device 80 can be implemented. Conveniently, for this purpose, there can be a further wire/cable that connects the control unit housed in the control device 1 to the electric motor housed inside the further tubular casing 81 of the motorization device 80.

**[0124]** The present invention also concerns only the control device 1 of the lighting elements and/or other electrical users which is inserted inside the orientable closing element 30. Conveniently, this control device 1 is configured to be inserted at a seat 40 obtained at one end of the orientable closing element 30. Preferably, this control device 1 is configured to be housed entirely or mostly inside a seat obtained at one end of the orientable closing element 30.

**[0125]** Advantageously, at least one acoustic diffuser can be associated with the pergola installation 100 (i.e. an electroacoustic transducer which transforms the electrical signal of an audio/sound amplifier into sound). Conveniently, the acoustic diffuser comprises at least one

speaker for the reproduction of different frequencies, preferably for the linear and precise reproduction of the entire audible frequency spectrum. Conveniently, the control device 1 can comprise at least one amplifier intended to be connected via cable or wirelessly to an acoustic diffuser and which is configured to amplify the audio signals received at the input and to send the audio signals thus amplified to said at least one acoustic diffuser.

**[0126]** The present invention also concerns a pergola installation 100 comprising a plurality of slats 3 and an orientable closing element 30, preferably shaped like the other/remaining slats 3, and wherein an apparatus 10 as described above in its essential and preferential characteristics is installed inside the orientable closing element 30.

**[0127]** Conveniently, the orientable closing element 30 can be mounted, among the other slats 3, in a substantially central area or at one of the opposite sides of the installation 100 (i.e. at the first or last slat 3 of the shading wall).

**[0128]** From what has been said it is clear that the control device and/or the apparatus according to the invention are particularly advantageous as they are simple and quick to install, and are also effortlessly and easily controllable and settable from outside.

**[0129]** The apparatus or control device according to the present invention has been described here in particular with reference to its application in a pergola, however it is intended that it can be used in any covering and/or closing installation with orientable longitudinal closing elements.

**[0130]** The present invention has been illustrated and described in some of its preferred embodiments, but it is understood that executive variations may be made to them in practice, without however departing from the scope of protection of the present patent for industrial invention.

## Claims

1. Device (1) for the control of lighting elements and/or other electrical users, said device (1) being configured to be installed in a longitudinally developing orientable closing element (30), preferably in the shape of a slat, of a pergola installation (100) or similar, said pergola installation (100) or similar being of the type comprising a load-bearing structure (2) which is provided, on at least one wall, with slats (3) and at least one orientable closing element (30), said device being **characterized in that** it comprises:

- a casing (11) which is configured to be removably insertable and housed, entirely or mostly, in a seat (40) obtained at a longitudinal end of said orientable closing element (30),

and wherein inside said casing (11) of said device (1) are arranged and housed:

- at least one power supply for the lighting elements and/or for other electrical users,
- at least one control unit for the lighting elements and/or for other electrical users, said control unit being connectable via wireless and/or by wire with said lighting elements and/or with other electrical users,
- a receiver connected and/or incorporated in said control unit to receive command signals from the outside to control, on the basis of these, said lighting elements and/or other electrical users.

2. Device according to claim 1, **characterized in that** it comprises at least one adapter (13, 13', 13'') configured to support the casing (11) inside said seat (40) obtained at a longitudinal end of said orientable closing element (30).

3. Device according to one or more of the previous claims, **characterized in that** it comprises a head (12) which is associated with one end of the casing (11) and which is configured to allow attachment to the load-bearing structure (2) of said pergola installation (100) or similar, thus allowing said device (1) to act as a support for said orientable closing element (30).

4. Apparatus (10) to be mounted in a pergola installation (100) or similar, said pergola installation (100) being of the type comprising a load-bearing structure (2) which is provided, on at least one wall, with slats (3) and at least one orientable closing element (30), said apparatus being configured to cause the movement of the slats (3) of the pergola installation (10) and also to control lighting elements and/or other electrical users, said apparatus being **characterized in that** it comprises:

- a device (1), according to one or more of the previous claims, for controlling lighting elements and/or other electrical users, and also
- a motorization device (80) comprising an electric motor and configured to vary the orientation/rotation, around the respective longitudinal development axis, of the orientable closing element (30) and also of the slats (3) of the pergola installation (100).

and **characterized in that** both the control device (1) and the motorization device (80) are inserted and housed, at least in part, inside the same orientable closing element (30).

5. Apparatus (10) according to the previous claim,

**characterized in that** the control device (1) is removably inserted in an idle mode inside a seat (40) obtained at a longitudinal end of the orientable closing element (30).

6. Apparatus (10) according to claim 4, **characterized in that** the control device (1) is removably inserted inside a seat (40), obtained at a longitudinal end of the orientable closing element (30), so as to rotate with the orientable closing element (30), preferably by an angle equal to or less than 270° around the longitudinal development axis of said orientable closing element (30).

7. Apparatus (10) according to one or more of the previous claims, **characterized in that:**

- said control device (1) is removably inserted inside a seat (40) obtained at a first longitudinal end of the orientable closing element (30),
- said motorization device (80) is removably inserted inside a further seat (41) obtained at the other longitudinal end, which is opposite to said first longitudinal end, of the orientable closing element (30).

8. Apparatus (10) according to one or more of claims 4 - 6, **characterized in that** said control device (1) and said motorization device (80) are removably inserted inside the same seat (40) which is obtained at a first longitudinal end of the orientable closing element (30).

9. Apparatus (10) according to one or more of the previous claims, **characterized in that:**

- said motorization device (80) includes a further casing (81) inside which is housed said electric motor configured to carry out the rotation of said orientable closing element (30) around its longitudinal development axis,
- the control unit of the control device (1) of the lighting elements and/or other electrical users is also configured to control the electric motor housed in said further casing (81) of said motorization device (80),
- the control unit of the control device (1) is electronically connected with said electric motor of said motorization device (80).

10. Apparatus according to one or more of the previous claims, **characterized in that** it includes at least one photovoltaic panel (44) which is mounted on said orientable closing element (30).

11. Apparatus according to one or more of the previous claims, **characterized in that** it comprises at least one photovoltaic panel (44) which is electrically con-

connected to the control device (1), to thus provide the electrical energy to power the lighting elements and/or of other electrical users, and/or is electrically connected to the motorization device (80), to thus provide the electrical energy to the electric motor of said motorization device (80). 5

12. Apparatus according to one or more of the previous claims, **characterized in that** it includes at least one battery for electrical power supply: 10

- via the control device (1), of the lighting elements and/or other electrical users, and/or
- of the motor of the motorization device (80) 15

and **in that** it comprises at least one photovoltaic panel (44) which is electronically connected to said at least one battery for its electrical recharging.

13. Apparatus according to one or more of the previous claims, **characterized in that** it comprises: 20

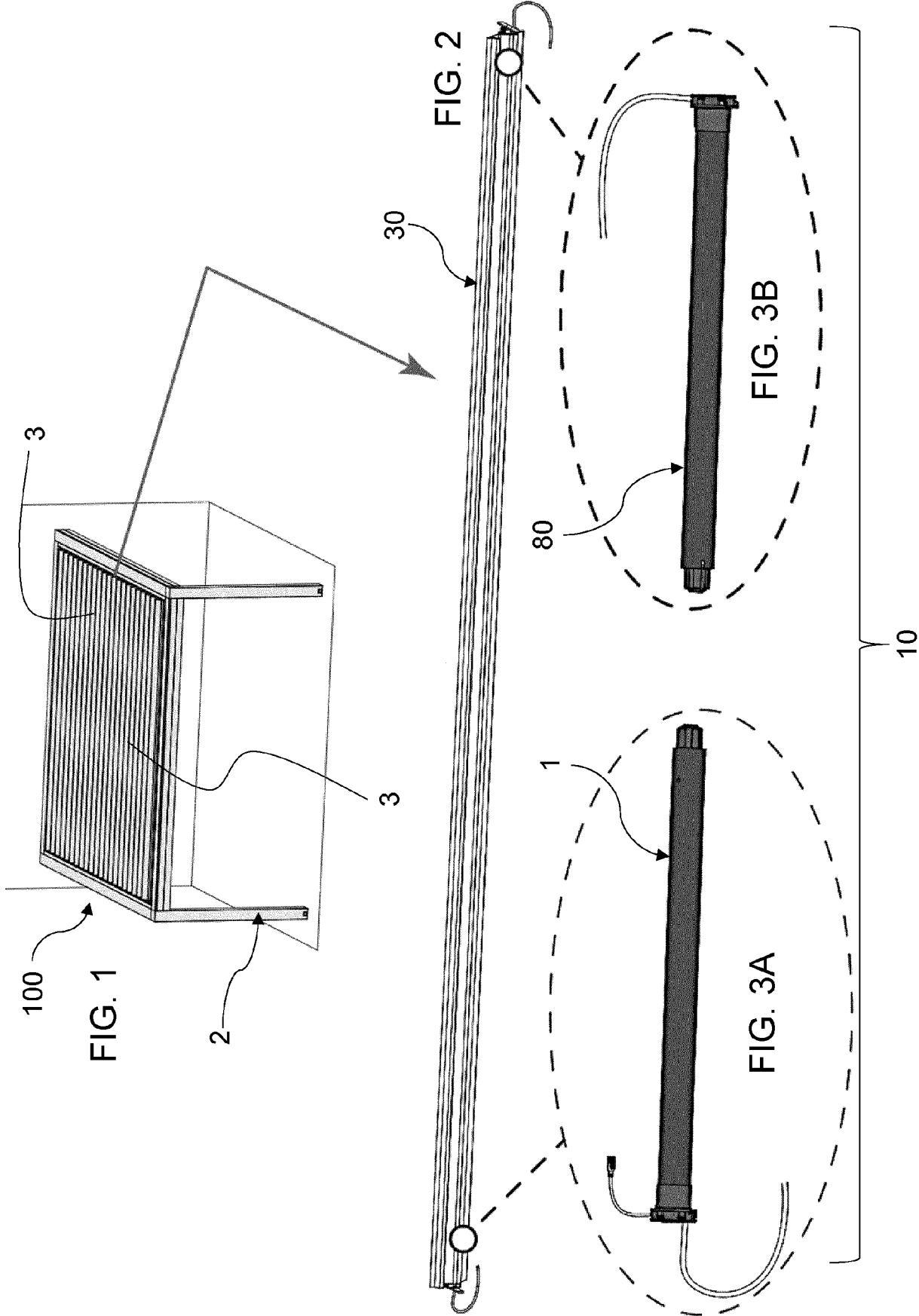
- at least one adapter (13, 13', 13'') configured to support the casing (11) of the control device (1) inside said seat (40), 25
- at least one further adapter (83, 83', 83'') configured to support the further casing (81) of the motorization device (80) inside said seat (40) or inside said further seat (41), 30

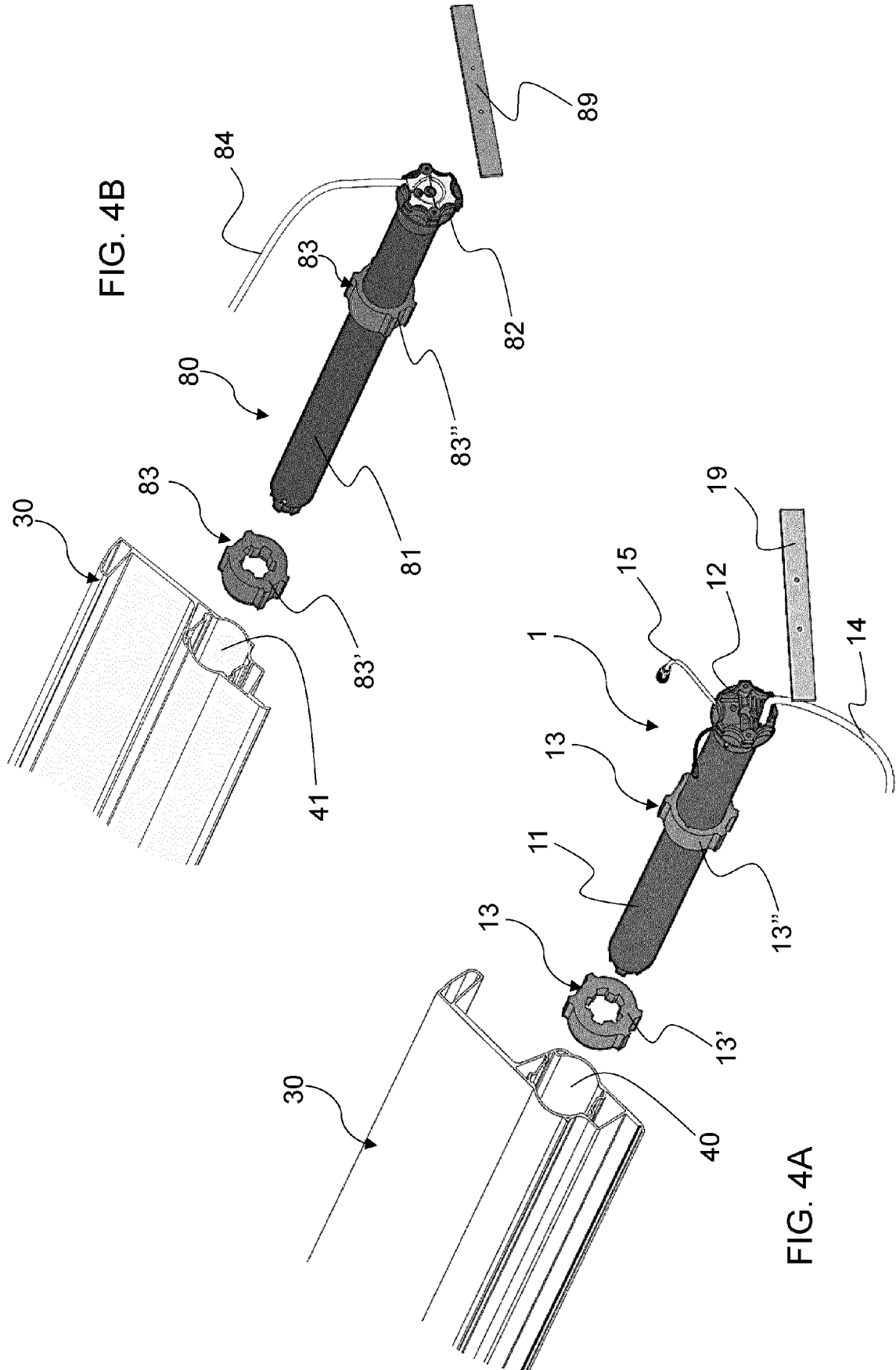
and **in that** said at least one adapter (13, 13', 13'') and said at least one further adapter (83, 83', 83'') have the same external annular profile conformation.

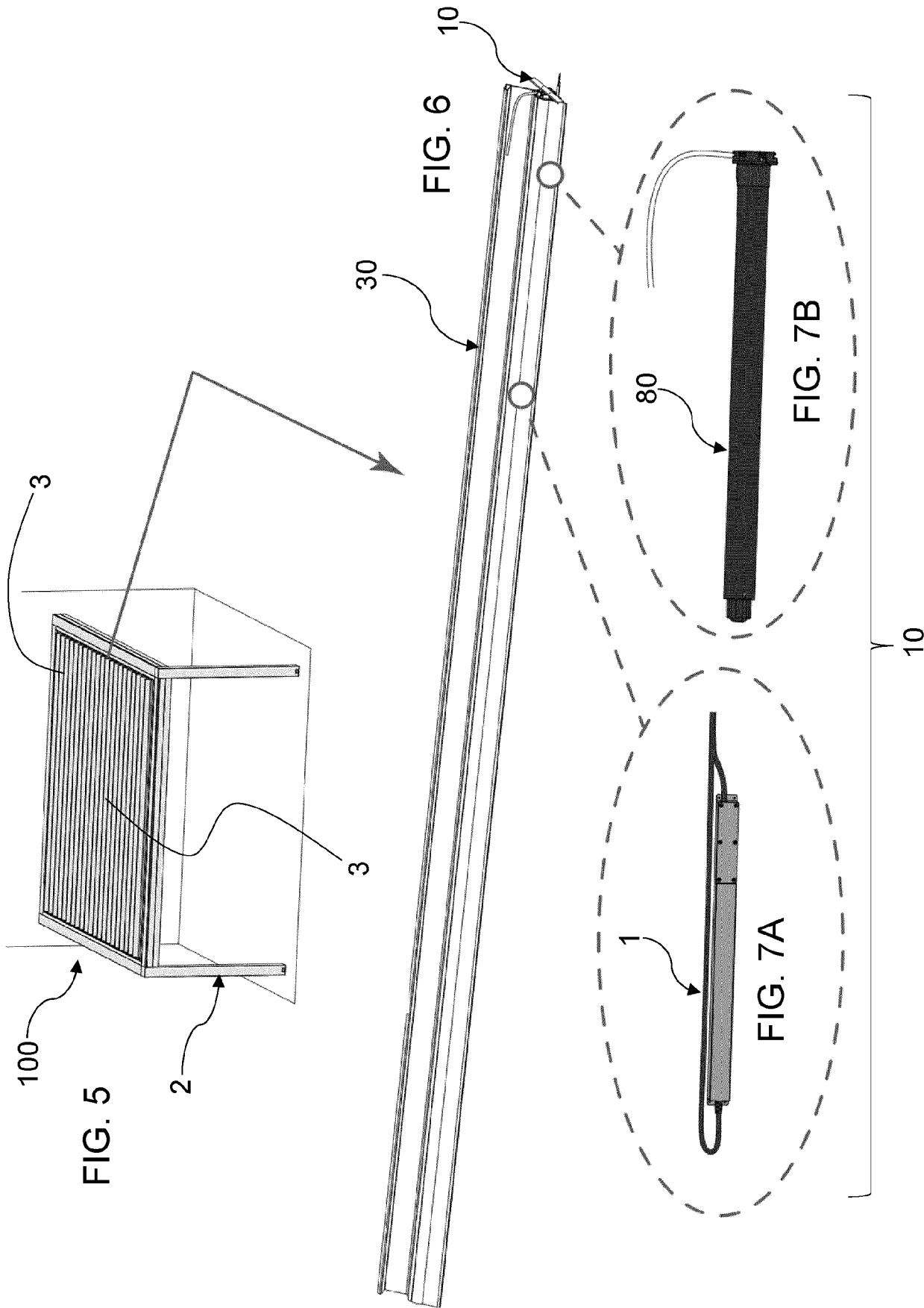
14. Apparatus according to one or more of the previous claims, **characterized in that** said motorization device (80) includes a further head (82) which is associated with one end of the further casing (81) and which is configured to allow the constraint to the load-bearing structure (2) of the pergola installation (100), thus allowing said motorization device (80) to act as a support for said orientable closing element (30). 35 40

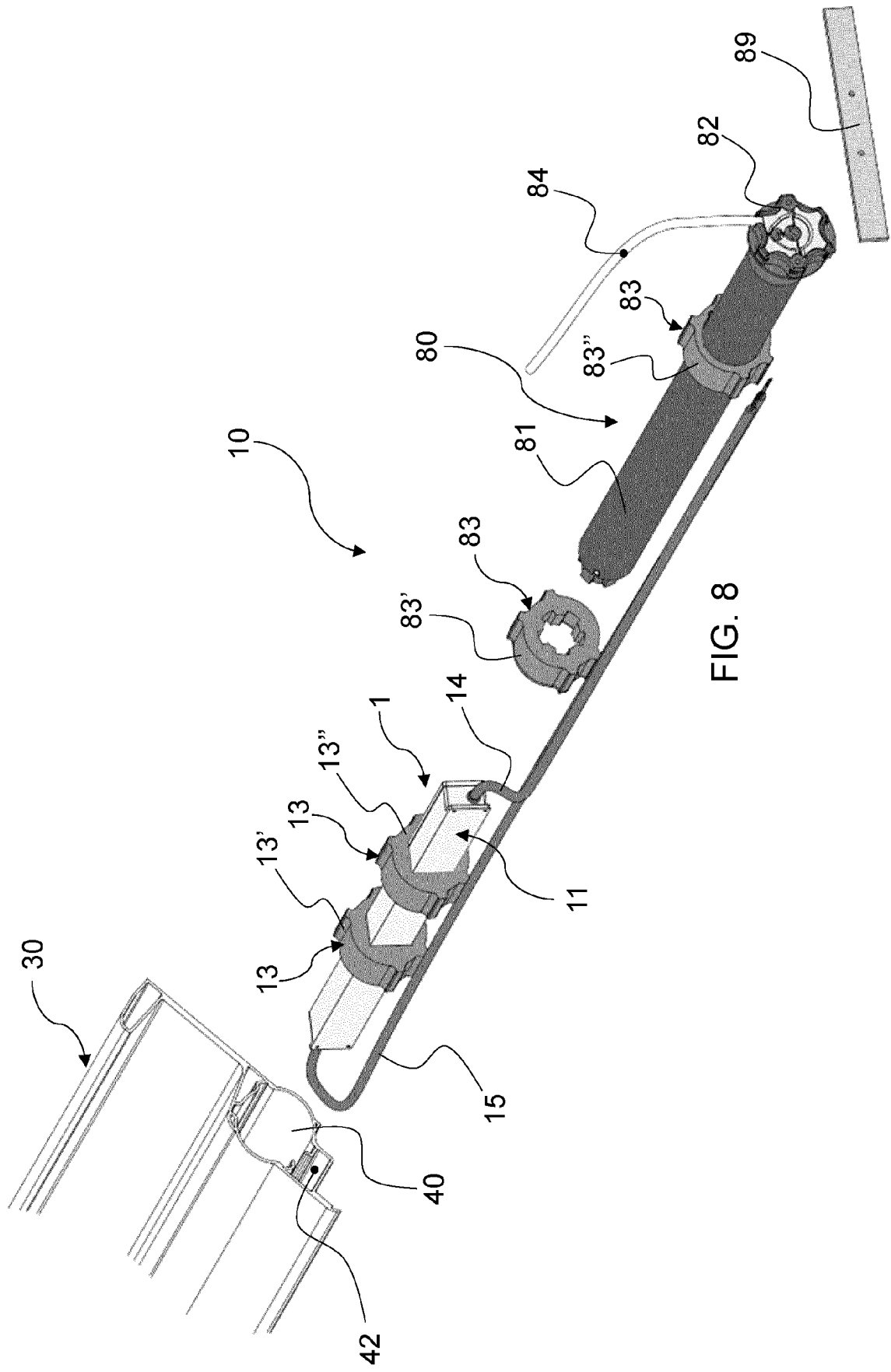
15. Pergola installation (100) or similar of the type comprising a load-bearing structure (2) which, on at least one wall, is provided with slats (3) and at least one orientable closing element (30), preferably said orientable closing element (30) being shaped like the other slats (3) of said installation, said installation being **characterized in that** it comprises an apparatus (10) according to one or more of claims 4 to 14 which is inserted and housed, at least in part, inside said orientable closing element (30). 45 50

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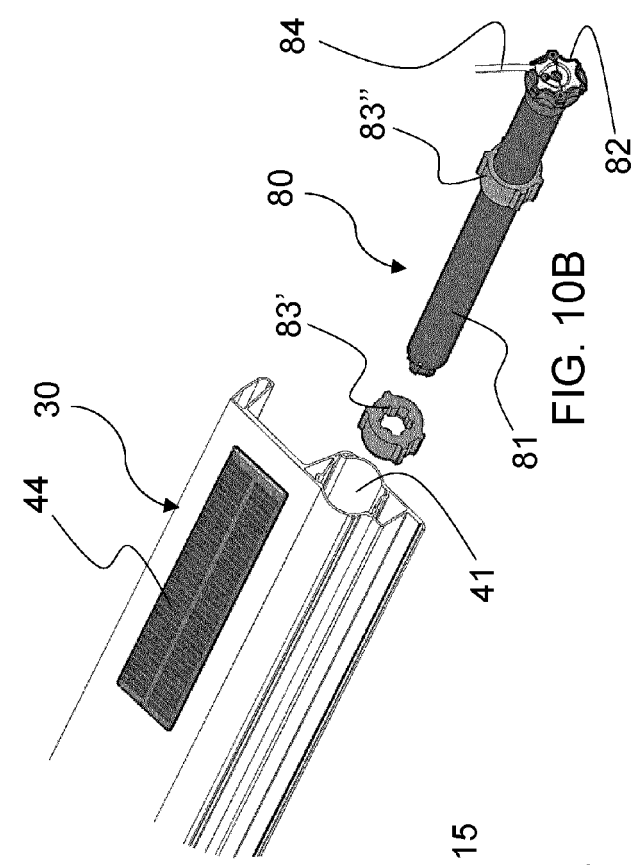
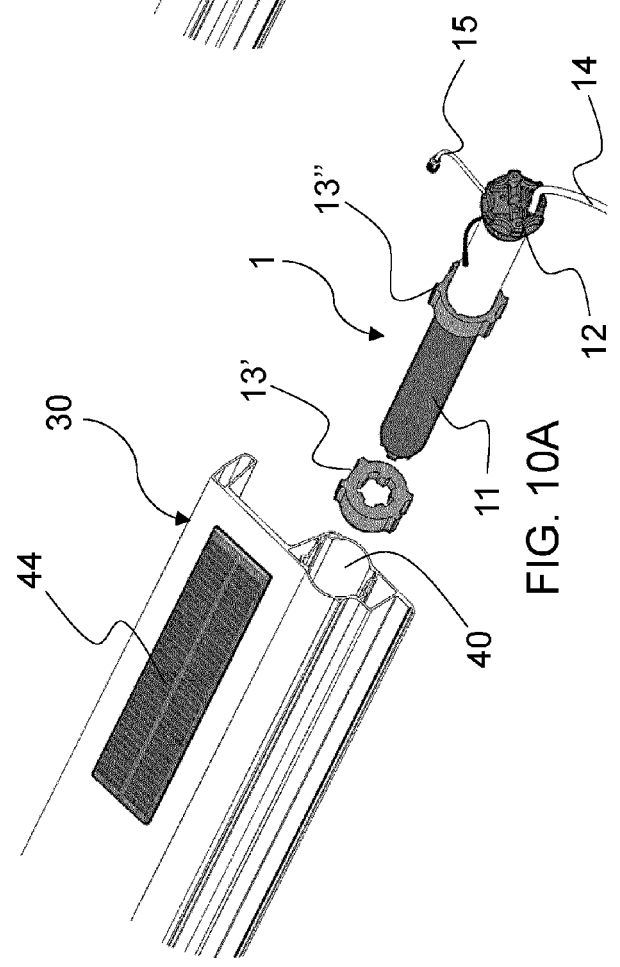
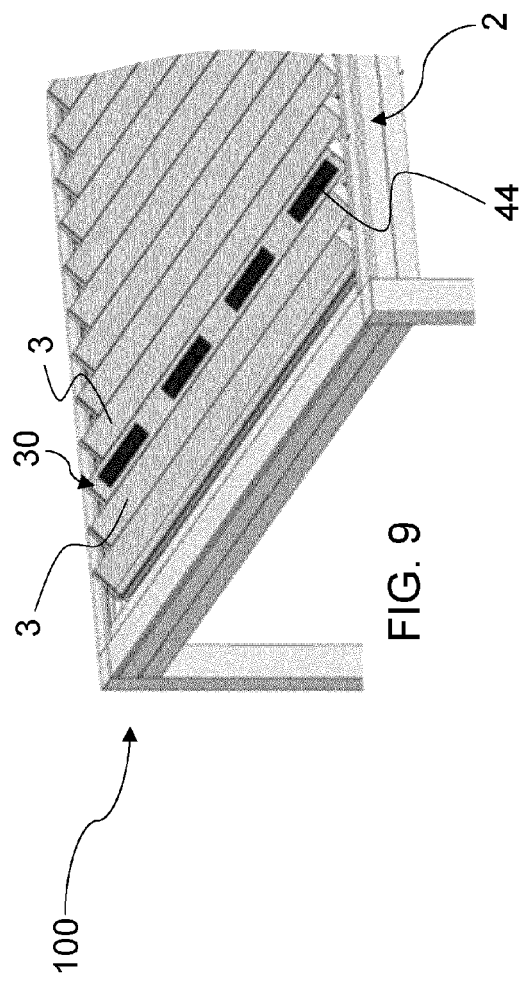














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Application Number

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>18 October 2024</b>	Examiner <b>Kofoed, Peter</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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