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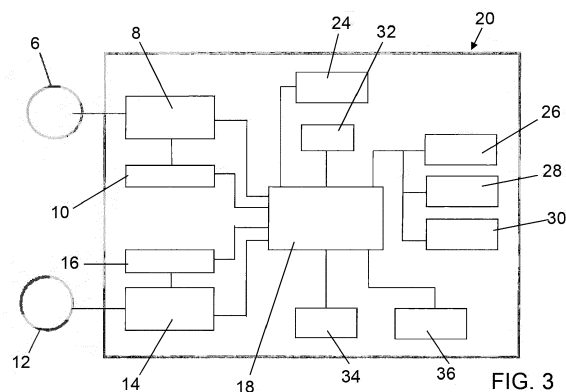
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(54) **INFRASTRUCTURE FOR CONTROLLING AND MOVING A BLADE CLOSURE OF A PERGOLA OR THE LIKE**

(57) An infrastructure for controlling and moving a blade closure (2) of a pergola or the like, said infrastructure comprises:

- a first motor (6) for the translating movement of said blades (2) between a first stroke-end position, wherein the blades are unfolded in open configuration, and a second stroke-end position, wherein the blades are packed in closed configuration,
- a second motor (12) for the rotating movement of said blades (2) about a longitudinal axis thereof between a first stroke-end position, wherein the blades are arranged spaced apart parallel from one another, and a second stroke-end position, wherein the blades substantially are coplanar to one another with the longitudinal edges in contact,
- a microcontroller (18) for managing said first (6) and second motor (12), characterized in that it also comprises:
 - detection means (10, 16) of the supply current of said first and second motor (6, 12) and corresponding control units (8, 14) of the supply current of said first and second motor (6, 12), said detection means (10, 16) and said control circuits (8, 14) being connected with said microcontroller (18),
- and in that:
 - said first motor (6) and said second motor (12) are provided with internal stroke ends which are associated with said control units (8, 14) to control the supply current to be sent to the first and second motor (6, 12) input,
 - said microcontroller (18) is programmed to manage said first and second motor (6, 12) on the basis of what is

detected by said detection means (10, 16) of the supply current so as to enable the operation of said first motor (6) only when said second motor (12) is in said first stroke-end position, and to enable the operation of said second motor (12) only when said first motor is in said first stroke-end position.



Description

[0001] The present invention relates to an infrastructure for controlling and moving a blade closure of a pergola or the like.

[0002] So-called "pergolas" are known, which practically consist of rigid support structures generally having parallelepiped shape and involved on the top wall, and sometimes also on the side walls, by movable blade closures. Each closure comprises a plurality of parallel blades, which may be moved both by translating movement perpendicular to the longitudinal axis thereof, to pass from an unfolded or closed condition to a packed or open position, and by rotating motion about the longitudinal axis thereof to be oriented according to the shielding effect which is to be obtained therewith. In particular, in this latter case, they may be simultaneously oriented for an angular range slightly less than 90° in order to pass from a substantially coplanar arrangement for intercepting the light to a substantially parallel arrangement for letting the light pass.

[0003] Pergolas are also known, such as the one described in AU 2007 237309, in which the blades are solely moved rotatingly about the longitudinal axis thereof, without the possibility of being moved in a translating manner.

[0004] In the present description, translation is used to define the movement which causes the blades to pass from an open configuration (blades unfolded) to a closed configuration (blades packed) and vice versa, while rotation is used to define the movement which causes the blades to be orientated about the longitudinal axis thereof to allow more or less light to pass therebetween.

[0005] Again in known drive systems of the blades of a pergola, there is a need to create coordination between the translating and rotating movements in that the blades may be oriented only when they are unfolded, and i.e. they have taken on an open configuration, while they may not be oriented when they are completely or partly packed, and i.e. they have taken on a closed configuration.

[0006] At the same time, the translation of the blades should be allowed only when they are arranged parallel to one another, while it should be avoided when the blades are oriented differently.

[0007] In known blade movement systems of one pergola, the two separate translating and rotating movements are obtained with separate electrical motors, which are controlled by a control unit through a single board in which separate control units are provided for the two motors.

[0008] The conditioning of the movements of the two motors is obtained with traditional mechanical sensors, which are located at the end positions both of the translating movement of the blades and of the rotating movement thereof.

[0009] For example, EP 2868833 describes a pergola in which the cover is defined by a plurality of blades and in which both the motor for the translating movement of

the blades and the motor for the rotating movement of the blades are managed by a same control unit. Moreover, two position sensors which are conveniently mounted on the support structure of the pergola, and therefore are external to the two motors, are provided for detecting if the blades are coplanar (and therefore in the closed condition) and if the cover is in the open condition (i.e. if the blades are unfolded and spaced apart from one another), respectively. These sensors then generate corresponding signals which are sent to the control unit which is conveniently installed inside an upright of the support structure of the pergola.

[0010] To obtain the required coordination in the operation of the two motors, the position sensors are to be connected to the control unit, to which the two motors are also connected, and this requires a series of wire assemblies which may require a laborious installation and even more laborious modifications in the infrequent case in which the position of the control unit is to be moved.

[0011] All these problems are significantly magnified with the current tubular motors, which are provided with internal stroke ends which are more difficult to access to make the electrical connections required with the control unit.

[0012] It is the object of the present invention to eliminate these drawbacks and to propose an infrastructure for controlling and moving the blade closure of a pergola or the like, which reduces the number of wire assemblies required.

[0013] It is another object of the invention to propose an infrastructure which is simple to install and safe and reliable to operate.

[0014] It is another object of the invention to propose an infrastructure which may be obtained and configured in a simple, quick and affordable manner.

[0015] It is another object of the invention to propose an improved and/or alternative infrastructure with respect to traditional ones.

[0016] These objects, both individually and in any combination thereof, and others which will become apparent from the description below are achieved according to the invention, with an infrastructure with the characteristics indicated in claim 1 and with a pergola according to claim 14.

[0017] The present invention is hereinbelow further clarified in a preferred embodiment thereof, which is described by mere way of non-limiting example, with reference to the accompanying drawings, in which:

Figure 1 shows a perspective diagrammatical view of a pergola, to which there is applied a blade closure which is controlled and moved with an infrastructure according to the invention,

Figure 2 shows a detail of the orientation system of the blades of the pergola,

Figure 3 shows the block diagram of the infrastructure according to the invention, and

Figure 4 shows the electronic diagram of certain details in figure 3, in greater detail.

[0018] As shown in the drawings, the infrastructure according to the invention may be used to control the two motors which perform the translating and rotating movements of a blade closure of a pergola or the like.

[0019] More specifically, with reference to the drawings, the blades 2 of pergola 4 are actuated in translation by a first motor 6 through a first control unit 8 to which first detection means 10 of the current supplying the motor itself, are associated.

[0020] Moreover, the blades 2 are actuated in rotation about the longitudinal axis thereof, by a second motor 12 through a second control unit 14 to which second detection means 16 of the current supplying the motor itself, are associated.

[0021] The two motors 6 and 12 are provided with internal stroke ends which are electrically connected with the respective control units 8 and 14, which control the supply current to be sent to the input of said motors. In particular, each motor is connected to the respective control unit so that at the stroke-end positions thereof, the corresponding control unit interrupts the current which supplies the motor itself.

[0022] The two management units 8, 14 and the respective detection means 10, 16 of the current absorbed by the motors 6 and 12 are connected to a microcontroller 18. In greater detail, the detection means 10, 16 of the current which supplies the motor comprise sensors which measure the absorption of current by the motor itself.

[0023] In particular, the control units 8 and 14 comprise suitable electronic circuits which control and/or interrupt the supply current 39 to be sent to the input of the corresponding motors 6 and 12.

[0024] In greater detail, as shown in fig. 4 for the first motor 6 (but it is also understood that this also applies in corresponding manner to the second motor 12), the electronic circuit of the control unit 8 comprises a first relay 40, which is associated with the "open" terminal for the rotation of the motor in a first direction, and a second relay 41, which is associated with the "close" terminal for the rotation of the motor itself in the opposite direction. Preferably, a third safety relay 42 is also provided, associated with the terminal of the common of motor 6.

[0025] Associated with the terminal of the common of motor 6, preferably in series with the third relay 42, is sensor 10 which detects the current absorption by the motor itself. In particular, this sensor 10 is galvanically isolated between input and output and furthermore, the output thereof is connected to microcontroller 18 by means of an operational amplifier 44.

[0026] The two management units 8, 14, the respective detection means 10, 16 and microcontroller 18 are installed or incorporated in a same electronic board 20. Advantageously, such an electronic board 20 is applied to or incorporated in the control unit for managing the whole infrastructure or pergola.

[0027] Associated with the microcontroller 18 itself is also a radio receiver 24, by means of which controls may be imparted to the microcontroller itself by means of a remote control.

[0028] Advantageously, the infrastructure according to the invention also comprises detection sensors of specific atmospheric quantities which are connected to the microcontroller 18 input in order to automatically affect the operation of the infrastructure.

[0029] In greater detail, an input 26 for an external rain sensor, an input 28 for an external wind sensor and/or an input 30 for an external temperature sensor are connected to microcontroller 18.

[0030] Advantageously, a memory 32 configured to store therein the position data of the motors 6 and 12 and the remote control codes, is also connected to microcontroller 18.

[0031] Advantageously, a programming button 34 and a plurality of cabled control buttons 36 are associated with microcontroller 18.

[0032] Microcontroller 18 is configured to act on the corresponding control units 8 and 14 on the basis of the supply current values detected by said detection means 10 and 16, and to selectively enable/disable the operation of said first motor 6 or said second motor 12.

[0033] Preferably, enabling the operation of each motor is performed by sending a suitable signal at the common terminal of each motor, while the successive actuation of each motor is performed by sending a suitable signal at the "open" or "close" terminal of the motor itself. Conveniently, the motors 6, 12 cannot be actuated in the "open" or "close" direction unless they were enabled to operate beforehand by means of the sending of a suitable signal at the common terminal of the corresponding motor.

[0034] In particular, it is understood that when said first 6 and second motor 12 are enabled to operate, they are in a state in which a suitable successive control, which is imparted via radio and is connected by receiver 12, or is imparted via cable by means of a corresponding button 36, may induce the actuation of the corresponding motor. In a corresponding manner, when said first 6 and second motor 12 are disabled to operate, they are in a state in which they cannot be actuated in any manner, not even if a corresponding control should be imparted.

[0035] The operation of the infrastructure according to the invention is as follows.

[0036] In a first condition, the blades 2 are unfolded, and i.e. they are arranged in open configuration (cfr solid lines in fig. 2) and they are oriented so as to be parallel to one another.

[0037] In this configuration, the first motor 6 is at open stroke end and in such a condition, the corresponding first unit 10 is actuated to control the interruption of the supply current to the first motor 6. Then, the detection means 10 detect the interruption of the current supply to the first motor 6 and send a corresponding signal to microcontroller 18 which enables the second motor 12 to

operate so that a suitable control imparted via radio and collected by receiver 24 or imparted via wire by means of a corresponding button 36, may actuate the rotating movement of the blades 2 in the desired manner between the two stroke-end positions thereof, which correspond to the substantially parallel arrangement of the blades 2 and to the substantially coplanar arrangement thereof.

[0038] In these two positions, corresponding to the respective end strokes of the second motor 12, the second unit 14 is actuated to control the interruption of the supply current to the second motor 12. Then, the second detection means 16 detect the interruption of the current supply to the second motor 12 and send a corresponding signal to microcontroller 18.

[0039] In particular, only when microcontroller 18 receives the interruption signal of the current supply to the second motor 12 from the second detection means 16 following the reaching of the stroke-end position corresponding to the parallel arrangement of the blades 2 does the microcontroller itself enable the first motor 6 to operate so that when it receives a suitable control, via radio or via cable as seen above, it actuates the translating movement of said blades 2 - which were previously arranged parallel to one another - in the direction of the packing thereof.

[0040] In this step, as soon as the first motor 6 has started the packing manoeuvre of the blades 2, microcontroller 18 disables the operation of the second motor 12, which therefore can no longer move the blades in the direction of the rotation thereof, not even if a corresponding control should be imparted.

[0041] Essentially, microcontroller 18 is programmed so that:

- only the interruption of current to the first motor 6 following the reaching of the stroke-end position corresponding to the configuration of unfolded blades enables the operation of the second motor 12, and
- only the interruption of current to the second motor 12 following the reaching of the stroke-end position corresponding to the arrangement of parallel blades enables the operation of the first motor 6.

[0042] The infrastructure according to the invention is particularly advantageous with respect to traditional solutions because:

- it does not have any position sensors to be mounted on the support structure of the pergola,
- due to the use of the strokes ends inside the motors, the fact that the management units thereof and of the detection means are mounted on an electronic board associated with the control unit, and also due to the method of coordinating the operation of the two motors by means of specifically programming the microprocessor, all the cable connections required in traditional solutions are significantly reduced, with significant system simplifications both

during the step of first installation and in the case of possible movement of the control unit; in particular, in the infrastructure according to the invention there conveniently is a need for one wire assembly alone in order to connect each motor with the corresponding management unit provided on the electronic board installed and/or incorporated in the control unit.

Claims

1. An infrastructure for controlling and moving a blade closure (2) of a pergola or the like, said infrastructure comprises:

- a first motor (6) for the translating movement of said blades (2) between a first stroke-end position, wherein the blades are unfolded in open configuration, and a second stroke-end position, wherein the blades are packed in closed configuration,
- a second motor (12) for the rotating movement of said blades (2) about a longitudinal axis thereof between a first stroke-end position, wherein the blades are arranged spaced apart parallel from one another, and a second stroke-end position, wherein the blades substantially are coplanar to one another with the longitudinal edges in contact,
- a microcontroller (18) for managing said first (6) and second motor (12), **characterized in that** it also comprises:
- detection means (10, 16) of the supply current of said first and second motor (6, 12) and corresponding control units (8, 14) of the supply current of said first and second motor (6, 12), said detection means (10, 16) and said control circuits (8, 14) being connected with said microcontroller (18),

and in that:

- said first motor (6) and said second motor (12) are provided with internal stroke ends which are associated with said control units (8, 14) to control the supply current to be sent to the first and second motor (6, 12) input,
- said microcontroller (18) is programmed to manage said first and second motor (6, 12) on the basis of what is detected by said detection means (10, 16) of the supply current so as to enable the operation of said first motor (6) only when said second motor (12) is in said first stroke-end position, and to enable the operation of said second motor (12) only when said first motor is in said first stroke-end position.

2. An infrastructure according to claim 1, **characterized in that** said first and second motors (6, 12) are provided with internal mechanical stroke ends.
3. An infrastructure according to claim 1, **characterized in that** said first and second motors (6, 12) are provided with internal electronic stroke ends.
4. An infrastructure according to one or more of the preceding claims, **characterized in that** said microcontroller (18) is programmed to manage said first and second motors (6, 12) through said control units (8, 14).
5. An infrastructure according to one or more of the preceding claims, **characterized in that** said microcontroller (18), said control units (8, 14) of the supply current to be sent to said motors (6, 12) and said detection means (10, 16) of the supply current of said motors (6, 12) are installed and/or incorporated in a same electronic board (20).
6. An infrastructure according to one or more of the preceding claims, **characterized in that** said motors (6, 12) are electrically connected only with said control units (8, 14) provided in said electronic board (20).
7. An infrastructure according to one or more of the preceding claims, **characterized in that** said control units (8, 14) comprise electronic circuits for controlling and/or interrupting the supply current to be provided to the respective motor (6, 12) input.
8. An infrastructure according to one or more of the preceding claims, **characterized in that** said stroke ends inside the motors (6, 12) are associated with said control units (8, 14) to control the interruption of current to be sent to the motor input when said motor (6) reaches a stroke-end position.
9. An infrastructure according to one or more of the preceding claims, **characterized in that** said microcontroller (18) is connected to a radio control receiver (24) of said first and second motors (6, 12).
10. An infrastructure according to one or more of the preceding claims, **characterized in that** sensors (26, 28, 30) of external meteorological quantities are connected to said microcontroller (18).
11. An infrastructure according to the preceding claim, **characterized in that** said sensors of external meteorological quantities comprise an external sensor of rain (26), and/or of wind (28) and/or of temperature (30).
12. An infrastructure according to one or more of the preceding claims, **characterized in that** wire control buttons (36) of said first and second motors (6, 12) are connected to said microcontroller (18).
13. An infrastructure according to one or more of the preceding claims, **characterized in that** a memory (32) for storing the position data of said first and second motors (6, 12) and remote control codes is connected to said microcontroller (18).
14. A pergola comprising a blade closure which is moved and controlled with an infrastructure according to one or more of the preceding claims.
15. A pergola according to the preceding claim, **characterized in that** it does not comprise any sensors for detecting the position of said blades (2).

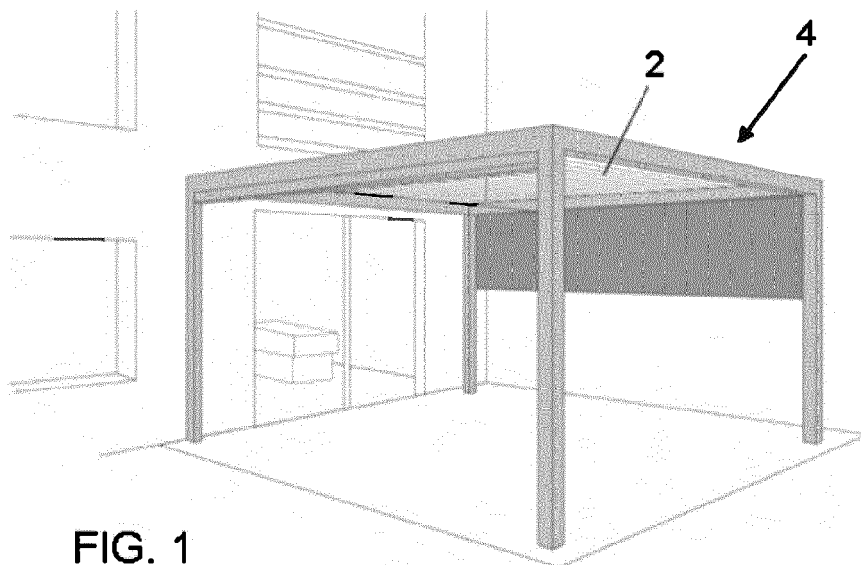


FIG. 1

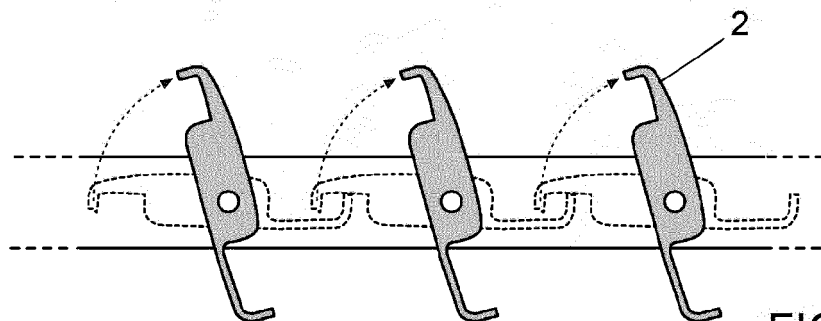


FIG. 2

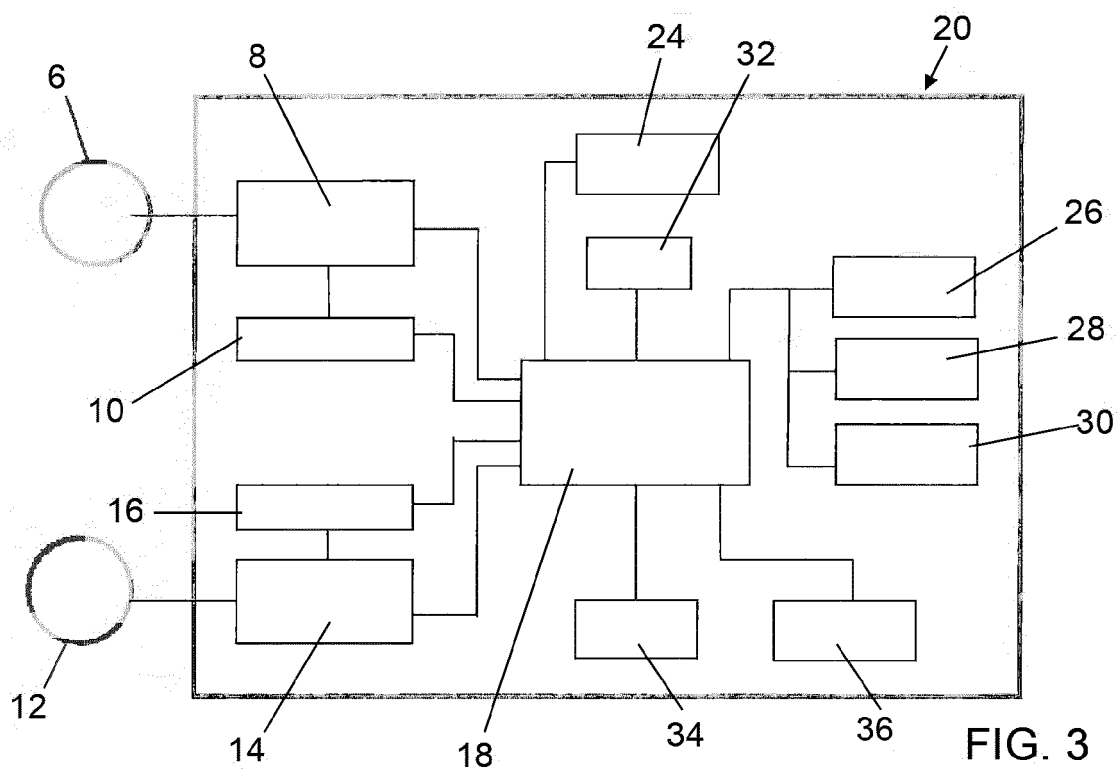
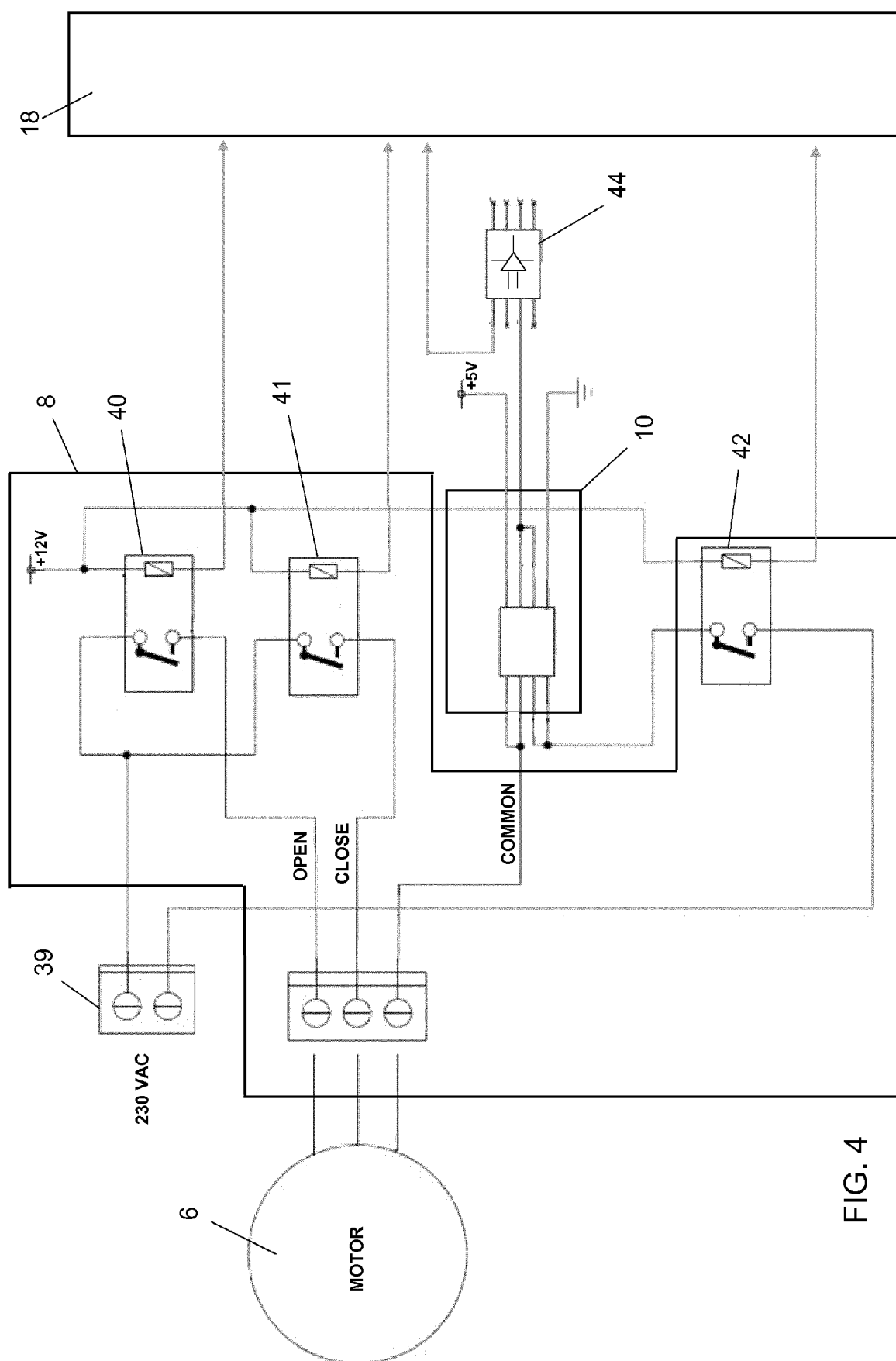


FIG. 3





EUROPEAN SEARCH REPORT

Application Number
EP 16 20 7180

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			E04F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 22 May 2017	Examiner Cornu, Olivier
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22-05-2017

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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