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• **Perez Cano, Baldomero**
08430 LA ROCA DEL VALLES (ES)

(74) Representative: **Morgades y Manonelles, Juan Antonio**
C/ Rector Ubach, 37-39, bj. 2a
08021 Barcelona (ES)

(71) Applicant: **Gave Electro. S.L**
08430- La Roca del Vallès (ES)

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- Amended claims in accordance with Rule 137(2) EPC.
- A request for addition in the description has been filed pursuant to Rule 139 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 3.).

(72) Inventors:
• **Carrión Soriano, Sebastián**
08430 LA ROCA DEL VALLES (ES)

(54) **LIGHT-SIGNALLING SYSTEM FOR ELECTRIC CONTROL AND COMMAND DEVICES**

(57) This invention consists in a light-signalling system built into electric control and command devices to show the position and/or status of the installation, machine or circuit it controls, which using signals external

or internal to the control and switching device, carries out changes in the lighting according to programmed parameters, using a lighting mode change system which receive these signals.

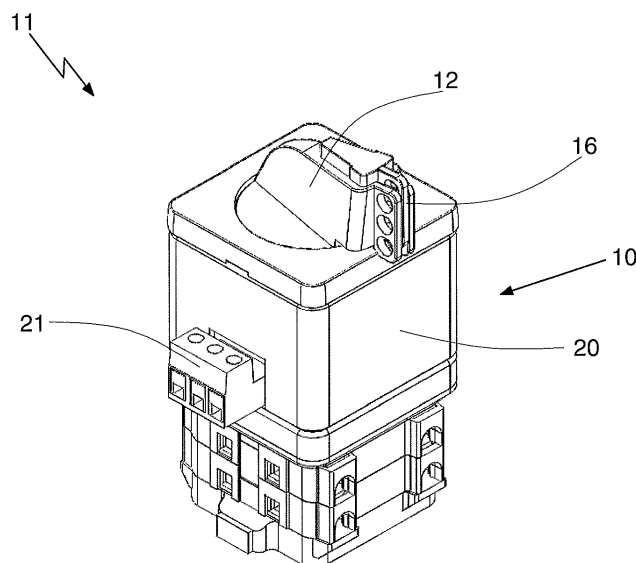


Fig. 1

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Description

Object of the Invention.

[0001] This invention consists in a light-signalling system built into electric control and command devices to show the position and/or status of the installation, machine or circuit it controls.

State of the Art:

[0002] There are and have been different types of control switches on the market that have an illumination module and which can therefore be considered state of the art with regard to the invention.

[0003] These control switches govern other main power switches, using lights to identify the status of the circuits by means of lighting systems.

[0004] This solution for viewing the control of other switches makes integration of a light module in a circuit switch costly and complex.

[0005] In addition, current solutions to see the status of elements of machines in the circuit controlled by the device normally required the use of a column with different light indicators so as to view the operating parameters of the installation, machine or circuit, resulting costly and complex to install. In addition, current systems to see the status of switches (On or Off) required the installation of pilot lights with the resulting installation cost and the need to be in the proximity in order to see their status (On or Off).

Scope of the Invention:

[0006] This invention aims to provide a light-signalling system, in combination with a switch, corresponding to a control with fitted lights, which by using signals that are external or internal to the command-switch assembly, make changes in the lighting mode according to programmed parameters, so that it is possible to signal either the position of the control, status of the installation, machine or circuit, or both options at once and in a simple and economic manner.

Description of the Invention:

[0007] This invention is materialised in a light-signalling system that can be fitted to electrical control devices, mainly to switching devices, with an illuminated control device that carries out a change in lighting according to the signals captured internally or received from outside, according to the configuration of the module that governs the parameters for the changes of this type of lighting. As said above, these signals can be internal, such as the detection of the functional position of said control, and/or external signals such as the impulses generated by elements that indicate the status of elements in the installation, machine or circuit it is connected to.

[0008] For each of these states and/or positions, a certain lighting mode is established, either no lighting, lit in a certain colour, flashing or even acoustic devices can be fitted to add sound to the signals received.

[0009] The light-signalling module is fitted to the control device with means to disconnect it in case of maintenance.

[0010] The light-signalling module has a system for changing the lighting mode, which receives at least one signal from components external or internal to the light-signalling and switching module, connected to said lighting changing system, which, according to the programming of its electronic circuits, will implement a certain type of lighting. This connection can be direct for internal signals or through a module connection terminal strip for external signals.

[0011] Each of the signals in the lighting mode change system is associated to a certain lighting mode, according to the needs of the installation, machine or circuit, the change in lighting mode happens automatically whenever there is a signal. These changes can be switching on or off the lighting, changing the colour of the light, flashing the light or even changing colour while flashing, as well as acoustic signals.

[0012] Configuration of lighting modes governed by the lighting mode change system is carried out according to the user's criteria, and the lighting mode assigned to each of the signals received by the system can be changed according to needs. This configuration is carried out by programming the electronic circuit in the lighting mode change system.

[0013] If the signal connected to the lighting mode change system is internal, this signal will preferably correspond to the signal generated by the means to detect the position of the control, therefore, according to its position, these means for detecting position will send a signal that will depend on the position, so that when the lighting mode change system receives the signal, it will change the lighting to the pre-established configuration for this new position.

[0014] If one or more external signals are connected to the lighting mode change system, they will connect preferably through an exterior terminal strip, with the elements that act as controllers of the status of the installation, machine or circuit, such as PLCs, thermocouples or any other element generating a sustained electrical impulse, so as to indicate the status, excess temperature, status of a motor connected to a circuit, etc., several of them can be connected to the lighting mode change system, each of them having preferably an input on the terminal strip, and for each signal received from each of them, the lighting mode change system has an assigned lighting mode, by programming the electronic circuit. The external terminal strip will have as many connections as signals are to be received in the lighting mode change system.

[0015] The lighting mode change system can in turn have at least one internal signal connection correspond-

ing to the means for detecting the position of the control, and at least one connection to components external to the control device and the lighting module.

[0016] These lighting modes can be accompanied by an acoustic effect produced by means built into the lighting module, as a complement to the illuminated signals.

[0017] The configuration of the lighting mode change system can be reprogrammed to change the association of each of the inputs of the external or internal signals to the assigned lighting mode.

[0018] In this manner we have the light-signalling system comprising a casing that contains means to attach to the switching device, with a control that enables the lighting mode produced by the interior lighting devices to be viewed, governed by at least one system to change the lighting mode that has at least one signal input, which can be either internal and/or external to the switch assembly and the lighting module. This enables the user to have information on the status of the installation, machine or circuit where it is installed in a simple and economic manner, configuring the lighting modes emitted by the module according to the user's specifications and replacing complex and costly systems with columns of light signals or pilot light installations.

[0019] This module can be made as a modular system, in which the lighting module is designed to fit to different standard switches, although this needs the incorporation of an extension of the control shaft to attach to the movement with the control device shaft.

[0020] Thanks to its modular nature, there is a possibility of wiring the lighting module, outside an electrical switch, lighting the desired signal in the final installation of the equipment.

[0021] The switch control is preferably made of material that lets light through it, normally plastic, to allow the installation of means to generate light inside the module, and which can be transmitted by means of the control, lighting up the control for each of its positions. Other solutions are possible, as long as this lighting is provided and the changes in lighting mode can be seen by the user.

[0022] The means for lighting are preferably LEDs located in their specific housing. The LEDs are fitted in such a manner to ensure that the failure of one of them will not affect the safety of the installation or the failure of the module itself, falsifying the visual information provided by the device, so there are several series of parallel LEDs, so that in case of a failure, the module will still light up. This considerably increases the life of the device and its safety in comparison to current devices.

[0023] The switch control that the signalling module is incorporated into may incorporate means to carry out physical locking of the position by means of a padlock or similar element, to insure that the control position cannot be altered.

[0024] The operating procedure incorporated into the light signal module for electric control devices, is based on its connection in the installation, machine or circuit, so that the system for changing the lighting mode will

execute actions on the lights. The different functional positions of the control, corresponding to the physical positions, are assigned a specific lighting mode and they are the means to detect the position of the control, and/or the impulses of the elements of the circuit that register its status, those that act sending signals about the lighting mode change module.

[0025] In this manner and according to the aforementioned characteristics, from a functional point of view the inherent advantages of attaching the present lighting signal module to an electrical control device, with the aforementioned resources, are the following:

- Reduction of build complexity and cost of the module.
- Information on the position of the control device, replacing conventional pilot lights.
- Information on the status of the installation, machine or circuit and its components in a single light indicator, replacing more complex columns of indicators.
- Module directly detecting the position so that failure of interpretation due to early change of the manoeuvre can be avoided.
- A much greater life cycle for the product, by introducing LEDs as a lighting element.
- Simple maintenance: can be exchanged for other similar modules easily.

Description of the drawings.

[0026]

Figure 1 is a perspective view of the electric control and command device with the light-signalling module fitted.

Figure 2 is a perspective view of the light-signalling module detached and without the control or the switch shaft.

Figure 3 is a composition/operation diagram of the lighting mode change system with internal signal inputs.

Figure 4 is a composition/operation diagram of the lighting mode change system with external signal inputs.

Figure 5 is a composition/operation diagram of the lighting mode change system with external and internal signal inputs.

Description of an embodiment of the invention.

[0027] In one of the preferred embodiments of the invention, as can be seen in Figures 1 and 2, the light-signalling module (10) is fitted to a switch (11), which executes the operations carried out by the control (12).

[0028] The light-signalling system (10) has means for attachment (15), normally fasteners, allowing it to be detached from the switch (11) for maintenance or replacement. To attach it, the switch shaft must coincide with

the control shaft (12) of the light-signalling module (10), as well as with the rest of elements that depend on each other.

[0029] The light-signalling module (10) comprises a casing (20) made of plastic material or the like, covering the elements inside the module (10).

[0030] One of its sides houses the control (12) that operates the switch (11) functions. This control (12) is formed by a component that in this embodiment is triangular in section, although other shapes are possible, where the inner and outer faces of the control (12) are made in such a way that they are translucent, so that light emitted by the series of LEDs (18) that act as means of lighting can be clearly seen and which are in the housing (19).

[0031] The series of LEDs (18) are housed (19) inside the casing (20), in areas where the light can be transmitted to the control (12). The LEDs (18) are commonly distributed so that they form different series of several LEDs (18), these series are placed in parallel, providing extended service life to the module (10) and guaranteeing correct operation.

[0032] These series of LEDs (18) are powered and governed by the lighting mode change system (13), which has an electronic circuit (14) that receives the signals, which in this first embodiment (as shown in Figure 3) are only internal to the switch (11) and light-signalling assembly (10), such as the signals received by the means (22) for detecting the control position, which correspond to sensors strategically placed in the operating positions of the control (12), which emit a sustained electrical impulse when the control is positioned over a strategic position of the detecting sensor, such as for example those carried out by the magnetic sensors. These signals of each of the positions of the control (12) activate the lighting change system (13), the lighting modes programmed in the circuit (14), activating the LEDs (18) with a certain colour, turning off the lights, flashing and/or producing a sound with the sound creation resources (23).

[0033] In a second embodiment of the invention, as shown in Figure 4, the system for changing the lighting mode (13) stems from an aerial connection (21) by means of a terminal strip, that is connected to the circuit (14), and to these connections (21) of the terminal strip the components (24) of the installation that control or enable the user to know the status of the installation, such as PLCs, thermocouples, or any other element generating a sustained electrical impulse are connected, indicating the status, excessive temperature, the state of a motor connected to the circuit, lack of power of any component, etc.

[0034] The moment a signal is received from one of the inputs of the connection (21), the circuit (14) is programmed to execute a specific lighting mode in the LEDs (18), which on receiving another signal, will change to this new mode of lighting. Like in the first embodiment, a sound can be produced from the sound production devices (23). This associates the type of signal, its input,

and the programming of changes in lighting mode.

[0035] Finally, in a third embodiment of the invention, as can be seen in Figure 5, the lighting mode change system incorporates internal and external signals, the external ones coming from the connection (21) through the terminals strip to which the components (24) of the installation are connected, detectors (22) of control (12) position are also connected to the circuit (14). Its operation, similar to the previous, allows the functions of the previous two embodiments to be integrated into a single one, where it is possible to grant signalling priorities to internal signals or vice versa, associating different lighting modes (colours, absence of lighting, flashing and/or sounds) to each of these signals.

[0036] Like the previous claims, the electronic circuit (14) can be designed to operate connected to a DC or AC circuit.

[0037] The switch (11) incorporates means for the physical locking (16) of the position of the control (12), by means of padlocks or similar devices.

[0038] Having sufficiently described this invention using the Figures attached, it is easy to understand that any changes judged to be suitable may be made, whenever these changes do not alter of the essence of the invention summarised in the following claims.

Claims

1. - "**LIGHT-SIGNALLING SYSTEM FOR ELECTRIC CONTROL AND COMMAND DEVICES**" used fitted or connected to the electrical control and command devices for circuits, which have means of lighting that can light up the control, **characterised in that** the lighting module comprises at least one system for changing the lighting mode, that executes this change in the means for lighting according to signals or impulses received, where this lighting mode change system has at least one signal input, which can be either internal or external to the control and command assembly and the light-signalling device assembly, where the signal input is connected to a programmable electronic circuit with lighting modes associated to each signal.
2. - "**LIGHT-SIGNALLING SYSTEM FOR ELECTRIC CONTROL AND COMMAND DEVICES**" according to the claim 1, **characterised in that** The lighting mode change system has at least one internal signal connection corresponding to the means for detecting the position of the control.
3. - "**LIGHT-SIGNALLING SYSTEM FOR ELECTRIC CONTROL AND COMMAND DEVICES**" according to the claim 1, **characterised in that** the lighting mode change system has at least one connection to external components to the control and command device assembly and the light-signalling module,

and which indicate installation status parameters by means of an external signal that reaches the electronic circuit of the lighting mode change system through this connection.

4. - "**LIGHT-SIGNALLING SYSTEM FOR ELECTRIC CONTROL AND COMMAND DEVICES**" according to the claim 3, **characterised in that** the lighting mode change system has an external terminal strip for connecting external components to the control and command device and a light-signalling module, with as many connections as signals are to be received.
5. - "**LIGHT-SIGNALLING SYSTEM FOR ELECTRIC CONTROL AND COMMAND DEVICES**" according to the claim 1, **characterised in that** the lighting mode change system has in turn at least one connection for internal signals corresponding to the means for detecting the position of the control, and also at least one connection to external components to the control and command device and the light-signalling module, and which indicate installation status parameters by means of an external signal that reaches the electronic circuit of the lighting mode change system through this connection.
6. - "**LIGHT-SIGNALLING SYSTEM FOR ELECTRIC CONTROL AND COMMAND DEVICES**" according to the claim 1, **characterised in that** the lighting mode change system executes the mode of lighting in the lights by establishing a certain colour, absence of colour and flashing of the chosen colour, all configured in the programmable electronic circuit, according to the signal received and the input received.
7. - "**LIGHT-SIGNALLING SYSTEM FOR ELECTRIC CONTROL AND COMMAND DEVICES**" according to the claim 2, **characterised in that** the means for detecting the position of the control are sensors that emit electrical signals when the control is located over them.
8. - "**LIGHT-SIGNALLING SYSTEM FOR ELECTRIC CONTROL AND COMMAND DEVICES**" according to the claim 1, **characterised in that** the light-signalling module has means for creating sounds, connected to the electronic circuit of the lighting mode change system.
9. - "**LIGHT-SIGNALLING SYSTEM FOR ELECTRIC CONTROL AND COMMAND DEVICES**" according to the claim 1, **characterised in that** the light-signalling module has attaching and detaching means to the electrical control and command device.
10. - "**LIGHT-SIGNALLING SYSTEM FOR ELECTRIC CONTROL AND COMMAND DEVICES**" according

to the claim 1, **characterised in that** the light-signalling module has a locking system of the control position.

- 5 11. - "**LIGHT-SIGNALLING SYSTEM FOR ELECTRIC CONTROL AND COMMAND DEVICES**" according to the claim 1, **characterised in that** the light-signalling module has two or more series of LEDs to provide lighting, placed in parallel.
- 10 12. - "**LIGHT-SIGNALLING SYSTEM FOR ELECTRIC CONTROL AND COMMAND DEVICES**" according to the claim 7, **characterised in that** the sensors emitting electrical signals when the control is located over them, are magnetic sensors.
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Amended claims in accordance with Rule 137(2) EPC.

20 **1. LIGHT-SIGNALLING SYSTEM FOR SWITCHES**, which have means of lighting that can light up the control, **characterised in that** the lighting module disposes of a mechanism for attaching to or detaching it from a switch, where said attachment to a switch is made including an extension of the control shaft to extend its action on the switch connection box through the module, directly or indirectly through a clutch system, that it comprises at least one system for changing the lighting mode, that executes this change in the means for lighting according to signals or impulses received, where this lighting mode change system has at least one signal input, which can be either internal or external to the control and command assembly and the light-signalling device assembly, where the signal input is connected to a programmable electronic circuit with lighting modes associated to each signal.

30 **2. LIGHT-SIGNALLING SYSTEM FOR SWITCHES** according to the claim 1, **characterised in that** The lighting mode change system has at least one internal signal connection corresponding to the means for detecting the position of the control.

35 **3. LIGHT-SIGNALLING SYSTEM FOR SWITCHES** according to the claim 1, **characterised in that** the lighting mode change system has at least one connection to external components to the switch and the light-signalling module, and which indicate installation status parameters by means of an external signal that reaches the electronic circuit of the lighting mode change system through this connection.

40 **4. LIGHT-SIGNALLING SYSTEM FOR SWITCHES** according to the claim 3, **characterised in that** the lighting mode change system has an external terminal strip for connecting external components to the

switch and a light-signalling module, with as many connections as signals are to be received.

5. LIGHT-SIGNALLING SYSTEM FOR SWITCHES

according to the claim 1, **characterised in that** the lighting mode change system has in turn at least one connection for internal signals corresponding to the means for detecting the position of the control, and also at least one connection to external components to the switch and the light-signalling module, and which indicate installation status parameters by means of an external signal that reaches the electronic circuit of the lighting mode change system through this connection.

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6. LIGHT-SIGNALLING SYSTEM FOR SWITCHES

according to the claim 1, **characterised in that** the lighting mode change system executes the mode of lighting in the lights by establishing a certain colour, absence of colour and flashing of the chosen colour, all configured in the programmable electronic circuit, according to the signal received and the input received.

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7. LIGHT-SIGNALLING SYSTEM FOR SWITCHES

according to the claim 2, **characterised in that** the means for detecting the position of the control are sensors that emit electrical signals when the control is located over them.

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8. LIGHT-SIGNALLING SYSTEM FOR SWITCHES

according to the claim 1, **characterised in that** the light-signalling module has means for creating sounds, connected to the electronic circuit of the lighting mode change system.

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9. LIGHT-SIGNALLING SYSTEM FOR SWITCHES

according to the claim 1, **characterised in that** the light-signalling module has a locking system of the control position.

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10. LIGHT-SIGNALLING SYSTEM FOR SWITCHES

according to the claim 1, **characterised in that** the light-signalling module has two or more series of LEDs to provide lighting, placed in parallel.

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11. LIGHT-SIGNALLING SYSTEM FOR SWITCHES

according to the claim 7, **characterised in that** the sensors emitting electrical signals when the control is located over them, are magnetic sensors.

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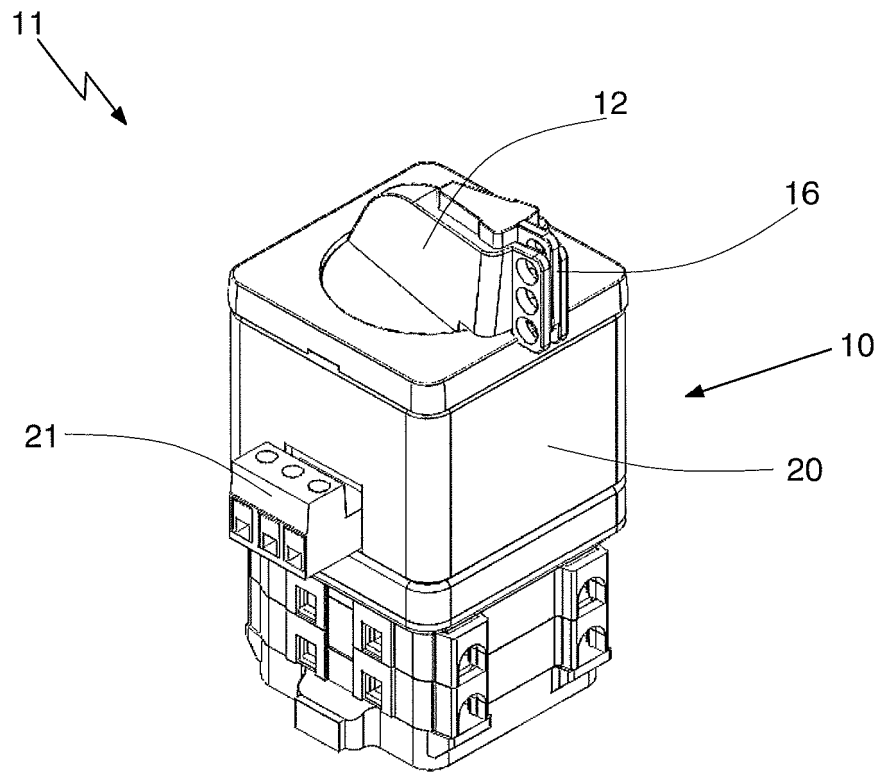


Fig. 1

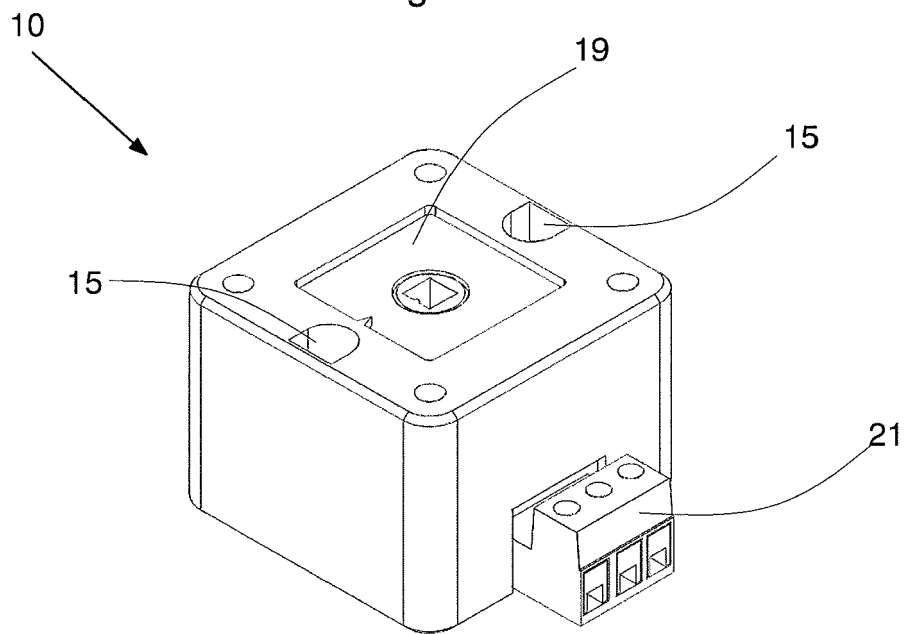


Fig. 2

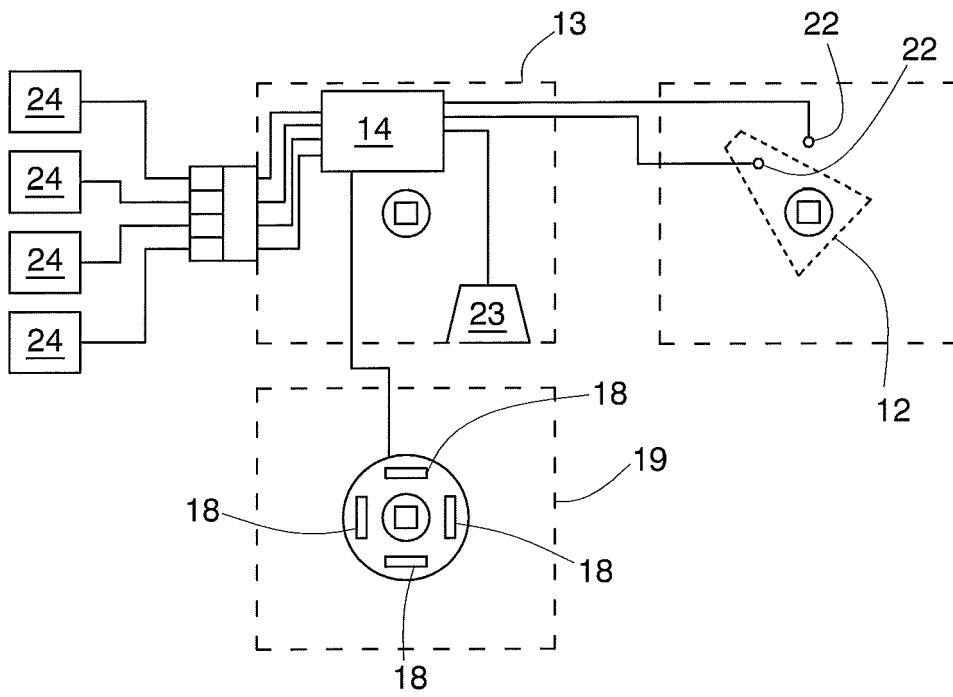


Fig. 5



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Application Number
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<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			

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