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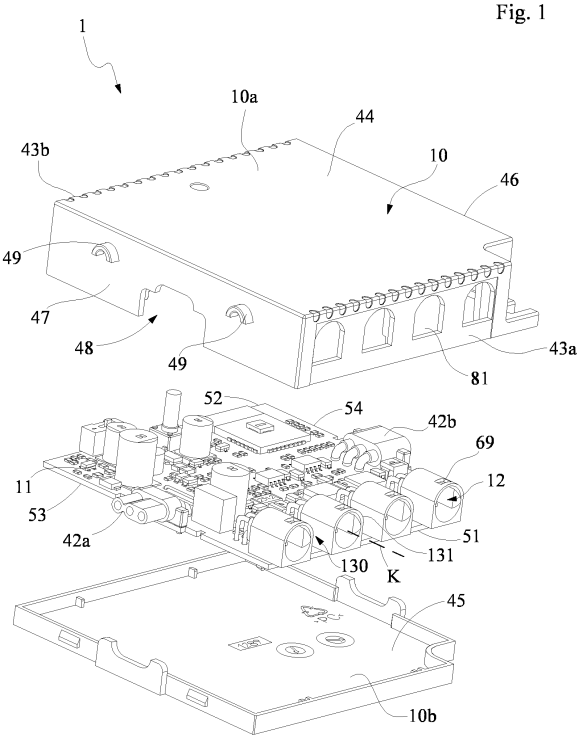
(54) DISTRIBUTOR DEVICE AND POWER SUPPLY SYSTEM COMPRISING SAID DISTRIBUTOR DEVICE

(57) A distributor device (1) comprising a printed circuit board (11) and at least one connector (12) connected to said printed circuit board (11) and comprising a plurality of assembly holes (121) and a plurality of conductive terminals (122). At least two assembly holes (121) are spaced apart along a first direction (X1) and at least two assembly holes (121) are spaced apart along a second direction (X2). The connector (12) comprises a first side (123) and a second side (124), said sides (123, 124) being arranged in sequence along the first direction (X1) and at least two assembly holes (121) are positioned in the first side (123) and at least two assembly holes (121) are positioned in the second side (124). At least one connector (12) is a power connector configurable in a first configuration (13), which delivers a first level of supply voltage, or in a second configuration (14), which delivers a second level of supply voltage, or in a third configuration (15), which delivers both the first and second level of supply voltage. The distributor device (1) includes at least one power connector configured in the third configuration (15), or at least two power connectors one of which is configured in the first configuration (13) and the other is configured in the second configuration (14).

Fig. 1



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Description

[0001] The present invention relates to a distributor device, in particular of the type that can be connected to a control driver platform for electrical and/or electronic apparatuses. These apparatuses may for example be lighting apparatuses, particularly of the LED type. The present invention also relates to a power supply system comprising said distributor device.

[0002] The control driver platform for electrical and/or electronic apparatuses (referred to hereafter as control driver platform or driver platform, for simplicity's sake) can be connected to the mains supply, e.g. via a power cable, and supply power to the distributor device connected thereto. The distributor device (hereinafter also referred to as "distributor", for simplicity's sake) can then supply the power it receives from this driver platform to the electrical and/or electronic apparatus connected thereto. The electrical and/or electronic apparatus to be powered may hereafter also be referred to as "apparatus", for simplicity's sake.

[0003] The distributor device can be configured as a module that can be removably connected to the control driver platform. Examples of a driver platform and a distributor configured as a module are described in international patent application WO2020234798A1.

[0004] Distributors of the prior art can supply power at a single output voltage level, typically 12V or 24V. This results in the need to connect the apparatus to the correct distributor device: for example, if the apparatus supports 12V it must be connected to the distributor that supplies 12V voltage, and if the apparatus supports 24V it must be connected to the distributor that supplies 24V voltage. This can make installation tasks complex, as care must be taken to choose the distributor device compatible with the apparatus to be powered. This can cause space problems, as two different distributors are required to connect both 12V and 24V apparatuses. In addition, the need to install two separate distributors can cause an increase in installation costs.

[0005] Generally, known distributors can provide the apparatus with either an electrical transmission or a signal transmission. Therefore, two different distributor devices must be used to provide both electrical and signal transmission. This can lead to an increase in installation time, energy consumed and complexity of connection between devices. The problem underlying the present invention is that of providing a distributor device which is structurally and functionally designed to overcome, at least in part, one or more of the drawbacks complained about above with reference to the cited known art. In particular, an object of the present invention is to provide a distributor that is particularly versatile and allows for simplified installation of the electrical and/or electronic apparatuses connected thereto.

[0006] Another object of the invention is to provide a distributor device that allows apparatuses supporting different levels of supply voltage to be supplied.

[0007] A further object of the invention is to provide a distributor configured to connect particularly easily to a control driver platform.

[0008] These and other objects are at least partially solved by the distributor device of the present invention.

[0009] In a first aspect thereof, the present invention concerns a distributor device comprising a printed circuit board and at least one connector, connected to said printed circuit board. The connector comprises a plurality of assembly holes and a plurality of conductive terminals, each conductive terminal being positioned at a respective assembly hole. At least two assembly holes are spaced apart along a first direction and at least two assembly holes are spaced apart along a second direction. The connector comprises a first side and a second side, said sides being arranged in sequence along the first direction. At least two assembly holes are placed in the first side and at least two assembly holes are placed in the second side.

[0010] At least one connector of the distributor is a power connector, configurable in:

- a first configuration, wherein two assembly holes in the first side are provided with respective conductive terminals, the conductive terminals being connectable to an electric power supply unit to provide, at the output of the power connector configured in the first configuration, a first level of supply voltage, or
- a second configuration, wherein two assembly holes in the second side are provided with respective conductive terminals, the conductive terminals being connectable to the electric power supply unit to provide, at the output of the power connector configured in the second configuration, a second level of supply voltage, or
- a third configuration, wherein both two assembly holes in the first side and two assembly holes in the second side are provided with respective conductive terminals, the conductive terminals being connectable to the electric power supply unit to provide, at the output of the power connector configured in the third configuration, both the first and second levels of supply voltage.

[0011] Preferably, the distributor device includes:

- at least one power connector configured in the third configuration, or
- at least two power connectors one of which is configured in the first configuration and the other is configured in the second configuration.

[0012] For simplicity's sake, hereinafter the power connector configured in the first configuration may be referred to as "first connector", the power connector configured in the second configuration as "second connector", and the power connector configured in the third configuration as "third connector".

[0013] Preferably, the first connector provides the first level of supply voltage and the second connector provides the second level of supply voltage. Preferably, the third connector provides both the first and second level of supply voltage at the same time.

[0014] This enables the distributor device according to the invention to provide output power at two different levels of supply voltage. Thanks to this, it is possible to connect to the distributor device both apparatuses supporting the first supply voltage level and devices supporting the second supply voltage level. This simplifies installation work and limits space requirements and costs, as with just one distributor device it is possible to supply both types of apparatus, i.e. apparatuses that can be supplied with the first level of supply voltage and apparatuses that can be supplied with the second level of supply voltage.

[0015] In particular, by connecting the apparatus to the first connector, it can be supplied with the first level of supply voltage; by connecting the apparatus to the second connector, it can be supplied with the second level of supply voltage; by connecting the apparatus to the third connector, it can be supplied with the first and/or second level of supply voltage.

[0016] A distributor connector connected to the electric power supply unit is thus configured as a power connector, which in turn can be configured in the first or second or third configuration, depending on the connection of its conductive terminals to the electric power supply unit and the arrangement of its conductive terminals in the respective assembly holes.

[0017] In a second aspect thereof, the present invention concerns a power supply system comprising the distributor device that is the subject matter of the invention and a control driver platform that can be connected to that distributor device. Preferably, said driver platform comprises the electric power supply unit configured to supply both the first and second power supply voltage values to the distributor device.

[0018] This eliminates the need for conversion modules in the distributor, simplifying the design, improving energy efficiency and centralising control, making the system more compact and flexible.

[0019] In at least one of the aforesaid aspects, the present invention may have one or more of the characteristics described below.

[0020] Preferably, the apparatus that can be connected to the distributor connector is a lighting apparatus, even more preferably LED.

[0021] In a first embodiment, the distributor comprises at least one power connector, where this power connector is the third connector. By making both levels of supply voltage available, the third connector further simplifies connection operations, as it allows power to be supplied to both apparatuses supporting the first level of supply voltage and apparatuses supporting the second level of supply voltage, without the need to ascertain which connector supplies the first or second level of supply voltage. The third connector allows complex apparatuses to be powered requiring both the first and second level of supply voltage.

[0022] In a second embodiment, the distributor comprises at least two power connectors, where these power connectors are the first connector and the second connector. Depending on the level of supply voltage supported by the apparatus, the latter can be connected to the first or the second connector.

[0023] In further embodiments, the distributor can advantageously comprise both the third connector and at least one between the first and second connector. Preferably the distributor comprises the first, second and third connector. This configuration results in a particularly versatile and at the same time cost-effective distributor.

[0024] Preferably, two assembly holes in the second side of the first connector have no conductive terminals.

[0025] Advantageously, two assembly holes in the first side of the second connector have no conductive terminals.

[0026] Preferably, the connectors are positioned at one edge of the printed circuit board. In some embodiments, the connectors can also be positioned on an additional edge of the printed circuit board. Preferably, the connectors are positioned at opposing edges of the printed circuit board. Desirably, there are at least four connectors on one edge of the printed circuit board.

[0027] According to a preferred embodiment, the first level of supply voltage may be 12V and the second level of supply voltage can be 24V, or vice versa.

[0028] The use of 12V and 24V voltages makes the distributor compatible with a wide range of lighting apparatus, especially LEDs, ensuring compatibility with industry standards and increased energy efficiency.

[0029] In accordance with a preferred embodiment, the distributor device comprises a connection element configured to receive the first and second levels of supply voltage from the electric power supply unit. Preferably, the conductive terminals of the power connector are connected to it in such a way that:

- the output of the power connector configured in the first configuration provides the first level of supply voltage,
- the output of the power connector configured in the second configuration provides the second level of supply voltage,
- the output of the power connector configured in the third configuration provides both the first and second level of supply voltage.

[0030] The connection element provides a simple and direct connection to the driver platform, reducing wiring complexity and improving modularity and system maintenance.

[0031] Preferably, the distributor comprises three conductive elements: a first conductive element configured to receive the first level of supply voltage from the electric

power supply unit; a second conductive element configured to receive the second level of supply voltage from the electric power supply unit; a third conductive element configured to receive the ground from the electric power supply unit.

[0032] Preferably, the three conductive elements are electrically connected to the conductive terminals of the power connector in such a way that the first, second or third configuration of the power connector is obtained.

[0033] Preferably, the conductive terminals of the first connector are electrically connected to the first and third conductive element of the connection element, so that the first power level is delivered.

[0034] Preferably, the conductive terminals of the second connector are electrically connected to the second and third conductive element of the connection element, so that the second power level is delivered.

[0035] Preferably, the conductive terminals of the third connector are electrically connected to the first, second and third conductive element of the connection element, so that both the first and second power levels are delivered.

[0036] Preferably, the three conductive elements of the distributor are electrically connected to the connection element of the distributor, configured to receive the levels of supply voltage and ground from the electric power supply unit.

[0037] The connection element can preferably be positioned at an edge of the printed circuit board, even more preferably on an edge where there are no connectors.

[0038] In a preferred embodiment, the connection element of the distributor allows the distributor to be connected to the driver platform, which comprises the electric power supply unit. This connection enables the conductive elements of the distributor to be powered, as described above, via the electric power supply unit of the driver platform. In this embodiment, it is advantageous for the printed circuit board of the distributor to be configured as an electronic board.

[0039] In an alternative embodiment, the electric power supply unit is integrated on the printed circuit board of the distributor. In this case, the conductive terminals of the power connector are electrically connected to this integrated electric power supply unit, so that the first, second and third configurations of the power connector are obtained. In this embodiment, the distributor can be free from the connection element. In this embodiment, the printed circuit board of the distributor can be configured as an electronic board. The electronic board may, for example, comprise a microprocessor.

[0040] In accordance with a preferred embodiment, the at least two assembly holes spaced apart along the first direction and the at least two assembly holes spaced apart along the second direction share a common assembly hole. Preferably, the first and second directions are orthogonal to each other. In this way, a particularly compact connector can be achieved. Furthermore, this simplifies the implementation steps to obtain such a connector.

[0041] According to a preferred embodiment, the connector comprises two assembly holes spaced apart along the first direction and two assembly holes spaced apart along the second direction. In other words, the connector may preferably comprise four assembly holes, two of which are positioned at the first side and two of which are positioned at the second side. In this way, a particularly advantageous compromise between space and cost can be achieved.

[0042] Preferably, the two assembly holes aligned along the first direction are positioned at the two assembly holes aligned along the second direction. It is advantageous that the distance between two assembly holes in the first direction is essentially equal to the distance between two assembly holes in the second direction. In this way, an essentially square distribution of the four assembly holes can be achieved. This provides a particularly stable connection to the apparatus.

[0043] In accordance with a preferred embodiment, the distributor connector comprises a body that includes an outer wall and an inner wall, said outer wall being configured to define a housing in which the inner wall is positioned, and the assembly holes being formed on said inner wall. This allows the conductive terminals from potential impacts. It is preferable that the connector body has essentially the same shape and size for each of the distributor connectors. This simplifies the operations for making the connector itself.

[0044] The outer wall is advantageously tubular in shape and extends along a longitudinal axis. Desirably, the conductive terminals extend parallel to said longitudinal axis. The inner wall preferably extends substantially perpendicular to the longitudinal axis of said outer wall.

[0045] Preferably, the first and second direction can be defined on the inner wall. Even more preferably, it is possible to define the first and second direction on an outer surface of said inner wall, where said outer surface may be the surface facing the outside of the distributor.

[0046] Preferably, the first and second side of the connector can be identified on the inner wall. Desirably, the two sides can be separated by a centreline of the inner wall, said centreline being advantageously parallel to the second direction and passing through the longitudinal axis of the outer wall.

[0047] According to a preferred embodiment, at least one connector of the distributor is a signal connector configurable in:

- a fourth configuration wherein both two assembly holes in the first side and two assembly holes in the second side are provided with respective conductive terminals, the conductive terminals being connectable to an RGB unit to provide, at the output of the signal connector configured in the fourth configuration, a control signal related to RGB colour management, or

- a fifth configuration wherein two assembly holes in the first side are provided with respective conductive terminals and an assembly hole in the second side is provided with a respective conductive terminal, the conductive terminals being connectable to a signal control unit to provide, at the output of the signal connector configured in the fifth configuration, a control signal related to the control of a function.

[0048] Preferably, the distributor device includes at least one signal connector configured in the fourth configuration and/or at least one signal connector configured in the fifth configuration.

[0049] In this way, the distributor is able to provide both an electrical transmission, via the power connector, and a signal transmission, via the signal connector. This makes it possible to provide electrical transmission or signal transmission via a single distributor, reducing installation time, energy consumed and complexity of connection between the distributor and the apparatuses, with respect to the prior art.

[0050] The signal connector configured in the fourth configuration is electrically connected to the RGB unit. This makes it possible to adjust the lighting colour, for example, when the apparatus connected to the distributor is configured as a lighting fixture.

[0051] For simplicity's sake, the signal connector configured in the fourth configuration can be abbreviated to "fourth connector" below.

[0052] The signal connector configured in the fifth configuration is electrically connected to the signal control unit. This makes it possible, for example, to interface the distributor with a sensor, such as an infrared sensor, capacitive sensor or motion detector. In this case, the signal related to the control of a function, provided at the output of the signal connector configured in the fifth configuration, may include operations such as switching on, switching off or dimming, automatically or manually, a device connected to the distributor, e.g. a lighting fixture.

[0053] For simplicity's sake, the signal connector configured in the fifth configuration can be abbreviated to "fifth connector" below.

[0054] Preferably, an assembly hole in the second side of the fifth connector has no respective conductive terminal.

[0055] A distributor connector is thus configured as a signal connector configured in the fourth or fifth configuration, depending on the connection of its conductive terminals to the RGB unit or signal control unit, and the arrangement of its conductive terminals in the respective assembly holes.

[0056] Preferably, the connection element of the distributor is configured to receive control signals from the RGB unit and/or the signal control unit. Preferably, such control signals will be provided at the output of the signal connector.

[0057] Preferably, the conductive terminals of the fourth connector are electrically connected to the connection element of the distributor in such a way that the control signals for RGB colour management received by the RGB unit are transmitted to the output of said fourth connector.

[0058] Preferably, the conductive terminals of the fifth connector are electrically connected to the connection element of the distributor so as to transmit the control signals related to the control of a function received by the signal control unit to the output of said fifth connector.

[0059] Preferably, the lighting apparatus can be connected to the power connector, in the first, second or third configuration, and/or to the signal connector, in the fourth and/or fifth configuration.

[0060] In a preferred embodiment, the distributor can be connected to a control device, which comprises the RGB unit and/or signal control unit. Preferably, this connection allows control signals to be transmitted from the RGB unit and/or the control unit of the control device to the distributor, and the latter provides them to the output of the fourth and/or fifth connector. Preferably, the connection between distributor and control device is made via the connection element of the distributor. Preferably, control signals from the RGB unit and/or the control unit of the control device are provided to the connection element of the distributor, electrically connected to the fourth and/or fifth connector.

[0061] In this embodiment, it is advantageous for the printed circuit board of the distributor to be configured as an electronic board. Preferably, the control device is connected to both the driver platform and the distributor, even more preferably so that it is interposed between the driver platform and the distributor. Preferably, the control device is configured as a module that can be removably connected to the control driver platform, as will be described later.

[0062] In an alternative embodiment, the RGB unit and/or the signal control unit are integrated on the printed circuit board of the distributor. In this case, the conductive terminals of the signal connector are electrically connected to this RGB unit and/or signal control unit, so as to obtain the fourth or the fifth configuration of the signal connector. In this embodiment, the distributor can be free from the connection element. In this embodiment, the printed circuit board of the distributor can be configured as an electronic board. The electronic board may, for example, comprise a microprocessor.

[0063] According to a preferred embodiment, the distributor comprises both the fourth connector, connected to the RGB unit, and the fifth connector, connected to the signal control unit. In this way, a particularly versatile and complete distributor can be obtained, capable of supplying apparatuses with both the first and second level of supply voltage, as well as being able to control colouring aspects of lighting apparatuses, and to be able to automatically control the switching on and off of an apparatus by means of sensors.

[0064] It is preferable that the power connector body has essentially the same shape and size as the signal

connector body. This simplifies the production process of connectors and promotes their standardisation, reducing their cost and facilitating their integration into the distributor.

[0065] In accordance with a preferred embodiment, the distributor connector comprises a fail-safe coupling structure (hereafter also referred to as "coupling structure" for simplicity's sake).

[0066] Preferably, the power connector comprises a first fail-safe coupling structure and the signal connector comprises a second fail-safe coupling structure, said second fail-safe coupling structure being different from the first fail-safe coupling structure. This facilitates the connection between the distributor and the apparatus, preventing the apparatus from being accidentally connected to an unsuitable distributor connector.

[0067] Preferably, the coupling structure comprises a protrusion. This protrusion desirably extends from the outer wall of the connector towards the housing. Preferably, the protrusion is positioned at the first side of the connector.

[0068] It is advantageous that the second coupling structure of the fourth connector is different from the second coupling structure of the fifth connector. This further reduces the risk of incorrectly connecting an apparatus to the distributor.

[0069] According to a preferred embodiment, the distributor is configured as a removably connectable module to the control driver platform, and comprises a hollow body, in which the circuit board is housed, said body including an opening through which the respective connector can be accessed. This distributor configuration is particularly versatile in that the distributor, not being integrated into the control driver platform, can be connected and disconnected to said driver platform as required.

[0070] It is advantageous for each connector to be positioned at a respective opening in the distributor body. This makes it particularly easy to access the respective connector.

[0071] Preferably, the distributor configured as a module can be directly connected to the control driver platform. In this way, a particularly compact configuration can be achieved, in which the distributor and said driver platform are, for example, placed side by side. This connection is preferably made via the distributor connection element, which is configured to connect the distributor directly to said driver platform. In alternative embodiments, this connection can be made by means of an electrical connection cable interposed between the distributor and said driver platform. In this way, the distributor and the control driver platform can be positioned in different places, as required.

[0072] In an embodiment of the invention, the apparatus can be connected directly to the distributor. In this case, an apparatus connector is configured to be connected directly to the distributor connector. This type of apparatus connector may hereafter be referred to as a "compatible connector".

[0073] Preferably, the compatible connector of the apparatus is configured with a shape complementary to that of the distributor connector to which it is to be connected. This makes the connection between these connectors particularly stable.

[0074] Desirably, the compatible connector of the apparatus is configured to fit either the first or the second fail-safe coupling structure, so that it can be connected to either the power connector or the signal connector.

[0075] It is advantageous that the connector of the distributor is a female connector and the compatible connector of the apparatus is a male connector. This makes the connection operations between the apparatus and the distributor even easier.

[0076] In further embodiments of the invention, the distributor may comprise at least one accessory. This accessory can, for example, be configured as an extension or a converter. This accessory is advantageously interposed between the distributor connector and an apparatus to be powered. In this case, the connector of the apparatus is not connected directly to the distributor connector, but is connected to the accessory and the latter is connected to the distributor connector. In some embodiments there may be several accessories interposed in series between the distributor connector and an apparatus to be powered.

[0077] In accordance with a preferred embodiment, the accessory is configured as an extension. This extension preferably includes an electrical power cable, a first connection element and a second connection element, wherein said cable comprises a first end, to which the first connection element is connected, and a second end, to which the second connection element is connected, said first connection element being configured to be connected to the connector of the distributor and said second connection element being configured as said connector. This further increases the versatility of the distributor, as the second connection element of the extension connected to the distributor can be positioned so that it protrudes outwards from a place that is difficult to reach. The compatible connector of the apparatus can then be connected to this second connection element, without the need to access this place that is difficult to reach.

[0078] Preferably, the first connection element of the extension is configured with a shape complementary to that of the distributor connector to which it is to be connected. This makes the connection particularly stable.

[0079] Desirably, the first connection element is configured to fit either the first or the second fail-safe coupling structure, so that it can be connected to either the power connector or the signal connector.

[0080] It is desirable that the second connection element of the extension be configured as the connector of the distributor to which the extension is connected. This implies, for example, that this second connection element and this connector have the same assembly hole arrangement, the same positioning of the conductive

terminals, the same fail-safe coupling structure, etc. The compatible connector of the apparatus can be connected to this second connection element.

[0081] It is advantageous that the first connection element of the extension is a male connector and the distributor connector is a female connector. The second female connection element of the extension preferably has the same configuration as the female connector of the distributor to which the extension is connected. The male compatible connector of the apparatus can be connected to this second female connection element.

[0082] According to a preferred embodiment, the accessory is configured as a converter. This converter includes a first conversion element and a second conversion element, said first conversion element being configured to be connected to the connector of the distributor and said second conversion element being configured to receive a non-compatible connector of an electrical and/or electronic apparatus to be powered. Using the converter, it is also possible to connect apparatuses to the distributor which do not have a connector configured to be directly connected to the distributor's connector, thus making the distributor compatible with various types of apparatuses on the market. The converter can also be called an adapter.

[0083] A "non-compatible connector" of an apparatus means a connector that is not configured to be directly connected to the distributor connector.

[0084] Preferably, the converter is configured in a first configuration (hereafter "first converter", for simplicity's sake) or in a second configuration (hereafter "second converter", for simplicity's sake). Advantageously, the first converter can be connected to the first connector, so that the first level of supply voltage can be output. Desirably, the second converter can be connected to the second connector, so that the second level of supply voltage can be output.

[0085] Preferably, the first conversion element is configured with a shape complementary to that of the distributor connector to which it is to be connected. This makes the connection particularly stable.

[0086] Desirably, the first conversion element is configured to fit either the first or the second fail-safe coupling structure, so that it can be connected to either the power connector or the signal connector.

[0087] It is advantageous that the distributor connector is a female connector and the first conversion element is a male connector.

[0088] Preferably, the second conversion element of the converter is a female connector and the non-compatible connector of the apparatus is a male connector.

[0089] The distributor connector is preferably a female connector that can receive a male connector. This male connector is advantageously configured to be inserted into and electrically connectable to the female connector of the distributor. Said male connector can be the compatible connector of the apparatus, the first connection element of the extension or the first conversion element of the converter. Therefore, the characteristics of the male connector described in this description can apply to both the compatible connector of the apparatus, the first connection element of the extension and the first conversion element of the converter.

[0090] The compatible connector of the apparatus, the first connection element of the extension and the first conversion element of the converter are preferably configured to fit either the first or the second fail-safe coupling structure. In this way, it is possible to connect the apparatus only to the power connector or only to the signal connector of the distributor, avoiding unintentional connection of the apparatus to the wrong distributor connector.

[0091] Preferably, the compatible connector of the apparatus, the first connection element of the extension and the first conversion element of the converter comprise a respective groove configured to receive the protrusion of the coupling structure.

[0092] In a preferred embodiment, the distributor can be connected to the control driver platform, which can be connected to a power supply network to provide power to the connected distributor device. The control driver platform can advantageously supply the distributor with both the first and second level of supply voltage.

[0093] Preferably, the driver platform comprises a body in which a printed circuit board is housed on which the following are assembled:

- a power socket to connect said driver platform to an electric power supply network,
- the electric power supply unit that receives the electrical energy from the power socket, converts it and supplies it as an output to power the distributor.

[0094] Preferably, the driver platform comprises a first conductor to provide the first level of supply voltage, a second conductor to provide the second level of supply voltage and a third conductor to provide ground. Preferably, the first conductive element of the distributor and the first conductor of the driver platform are electrically connectable to each other, the second conductive element of the distributor and the second conductor of the driver platform are electrically connectable to each other, and the third conductive element of the distributor and the third conductor of the driver platform are electrically connectable to each other. Through this electrical connection and the electrical connection between the conductive terminals of the power connector and the three conductive elements of the distributor, the three types of power connector configuration can be achieved easily and effectively.

[0095] Preferably, the power supply unit implements a transformation protocol configured to convert the input voltage from the mains into an output voltage intended to supply the distributor. An embodiment of such a driver platform is described in international patent application WO2020234798A1.

[0096] Preferably, the driver platform is configured to distribute a total output power, with a nominal power, e.g. 72W, up to a maximum value, e.g. 120W.

[0097] Preferably, the driver platform is configured to convert the AC input voltage, supplied by the mains supply, to DC output voltage, simultaneously at both the first and second level of supply voltage. Preferably, the power supply network can supply the driver platform with a voltage comprised between 100V and 240V AC, e.g. 220V.

[0098] In a preferred embodiment, the electric power supply unit of the driver platform is configured to convert the incoming AC voltage, supplied by the power supply network, into DC voltage at the second level of supply voltage (e.g. 24V). Preferably, the driver platform comprises an additional circuit, configured for example as a DC-DC converter, which receives this voltage at the second level of supply voltage (e.g. 24V) at the output of the electric power supply unit and converts it to a voltage at the first level of DC supply voltage (e.g. 12V), thus making both levels of supply voltages available simultaneously at the output of the driver platform.

[0099] Preferably, the driver platform is configured to distribute an overall output power regardless of the required level of supply voltage at the output. In other words, the power output is shared between the two levels of supply voltage (e.g. 12V and 24V), while keeping the overall power management unchanged.

[0100] According to a preferred embodiment, the control driver platform comprises a connection unit configured to interface with the connection element of the distributor device, so as to supply said distributor device with both the first and second level of power.

[0101] This enables a direct and reliable connection between the driver platform and the distributor device, simplifying their integration and improving the overall efficiency of power transfer.

[0102] Preferably, the first, second and third conductors of the driver platform converge in the driver platform connection unit, which is configured to transmit the levels of supply voltage and ground to the connection element of the distributor device. Preferably, through the connection between the connection unit of the distributor and the connection unit of the driver platform, the first conductive element of the distributor interfaces with the first conductor of the driver platform, the second conductive element of the distributor interfaces with the second conductor of the driver platform and the third conductive element of the distributor interfaces with the third conductor of the driver platform.

[0103] Preferably, the connection element of the distributor and the connection unit of the driver platform are shaped so as to be coupled with a shaped coupling.

[0104] In some embodiments, the distributor connection element can be configured as a connection plug and the connection unit can be configured as a connection socket. Preferably, this distributor connection plug is configured to be plugged into the connection socket of the control driver platform.

[0105] In alternative embodiments, the distributor connection element can be configured as a connection socket and the control driver platform connection unit can be configured as a connection plug.

[0106] In accordance with a preferred embodiment, the power supply system comprises a control device connectable to the distributor device, this control device comprising the RGB unit, configured to provide the distributor device with a control signal related to RGB colour management, and/or the signal control unit, configured to provide the distributor device with a control signal related to the control of a function.

[0107] Thanks to this, the management of control signals can be centralised, reducing the complexity of the distributor and simplifying the system architecture.

[0108] Preferably, the control device is configured as a module that can be removably connected to the control driver platform. This module is preferably configured in a manner substantially corresponding to that described with reference to the distributor device configured as a module.

[0109] Preferably, both the distributor and the control device are configured as modules. As a result, the system is modular, allowing for greater flexibility in the installation, maintenance and possible replacement or upgrade of individual components. Preferably, the control device as a module is interposed between the driver platform and the distributor as a module.

[0110] According to a preferred embodiment, the power supply system comprises a lighting apparatus that can be connected to a connector of the distributor device.

[0111] The power supply system that comprises the lighting apparatus can be called a lighting system. The use of lighting apparatuses, particularly LEDs, allows the low voltage of the system (12V and 24V) to be exploited for greater energy efficiency, operational safety and better compatibility with the control of advanced functions such as dimming and colour management.

[0112] Preferably, the lighting apparatus can be powered via the power connector of the distributor device.

[0113] Preferably, the lighting apparatus is adjustable via the signal connector of the distributor device.

[0114] In an embodiment, the printed circuit board of the distributor includes the electric power supply unit and the conductive terminals of at least one power connector are connected to the electric power supply unit of the printed circuit board. The power connector can be configured in the first, second or third configuration. Preferably, the distributor device includes:

- at least one power connector configured in the third configuration, or
- at least two power connectors one of which is configured in the first configuration and the other is configured in the second configuration.

[0115] According to an embodiment, the printed circuit

board of the distributor comprises a signal unit and the conductive terminals of at least one signal connector are connected to the signal unit of the printed circuit board. Preferably, the signal unit comprises the RGB unit and the fourth connector is connected to the RGB unit. Preferably, the signal unit comprises the signal control unit and the fifth connector is connected to the signal control unit.

[0116] The characteristics and advantages of the invention will become clearer from the detailed description of preferred embodiments thereof shown, by way of non-limiting example, with reference to the accompanying drawings wherein:

Figure 1 is an exploded view of an embodiment of the distributor device according to the invention;
Figures 2A-2E show possible embodiments of the distributor device connector;
Figure 3 is a perspective view of an embodiment of the distributor comprising accessories;
Figures 4A-4E and 5A-5E show details of possible embodiments of a distributor device extension at the first and second connection element, respectively;
Figures 6A-6C show a rear perspective view, a front detail and a rear perspective view of a first embodiment of the converter, respectively;
Figures 7A-7B show a rear perspective view and a front detail of a second embodiment of the converter, respectively;
Figure 8 shows an embodiment of the power supply system covered by the invention. In the examples in the figures, a distributor device is collectively referred to as 1 and a power supply system as 100, made in accordance with the present invention.

[0117] In the embodiment shown in Figure 8, the distributor device 1 is configured as a module that can be removably connected to a control driver platform 2 for electrical and/or electronic apparatuses. The control driver platform 2 can be connected to the mains supply, e.g. via a power cable, and supply power to the distributor device 1 connected thereto. The distributor device 1 can then supply the power it receives from this driver platform 2 to a device connected thereto.

[0118] The distributor device 1 comprises a printed circuit board 11 which includes a plurality of connectors 12, connected to said printed circuit board 11. The connectors 12 can be placed at a first edge 51 of the printed circuit board 11. In the embodiment shown in Figures 1 and 3, the distributor 1 comprises four connectors 12 positioned at said first edge 51. In other embodiments, the connectors 12 can also be placed on a second edge 52 of the printed circuit board 11. Preferably, the first 51 and the second 52 edges are opposed to each other. It is advantageous that four connectors 12 are positioned at the first edge 51 and four connectors 12 are positioned at the second edge 52. In the examples shown in the figures, the printed circuit board 11 is configured as an electronic board.

[0119] The distributor 1 may comprise a connection element 42a, adapted to connect the distributor 1 directly to said driver platform 2. The connection element 42a may preferably be positioned at a third edge 53 of the printed circuit board 11. Said connection element 42a can be configured as a connection plug, configured to be plugged into a connection socket provided on the control driver platform 2. The connection plug and the connection socket are preferably shaped to be coupled with a shape coupling. In alternative embodiments, the connection element of the distributor 1 can be configured as a connection socket configured to receive a connection plug provided on the control driver platform 2.

[0120] Preferably, the distributor 1 can comprise an additional connection element 42b configured to be connected to an additional module. This additional module can, for example, be configured as a control module, a Bluetooth module, a smart music module, a voice control module, an R.F. module, a Human Centric Lighting module and a Zigbee module, etc. This makes it possible to connect a plurality of modules in series, preferably side by side. The additional connection element 42b may preferably be positioned at a fourth edge 54 of the printed circuit board 11. It is advantageous that the third 53 and fourth 54 edges are opposed to each other. The additional connection element 42b can be configured as a connection socket configured to receive a connection plug provided on the additional module.

[0121] The distributor 1 comprises a hollow body 10 in which the printed circuit board 11 is housed. The body 10 includes a plurality of openings 81 through which the respective connectors 12 can be accessed. Each connector 12 can be positioned at a respective opening 41 of the body 10 of the distributor 1.

[0122] The body 10 of the distributor 1 can have a box shape. The body 10 may comprise a first side wall 43a, a second side wall 43b, an upper wall 44, a lower wall 45, a front wall 46 and a rear wall 47. In the embodiment shown in Figures 1 and 3, the first side wall 43a comprises four openings 41. Each opening 41 is positioned at a respective connector 12. In alternative embodiments, in which the connectors 12 are positioned on opposing edges of the printed circuit board 11, the second side wall 43b may also comprise openings 41 at the respective connectors 12. The rear wall 47 may comprise an additional opening 48 through which the connection element 42a may project outwards from the body 10. Preferably, the front wall 46 comprises a further opening 48 through which the second connection element 42b can project outwards from the body 10.

[0123] The rear wall 47 may preferably comprise a pair of protuberances 49 shaped to fit into respective recesses (not shown) of the control driver platform 2. In this way, a stable connection between the control driver platform 2 and the distributor 1 can be achieved.

[0124] Advantageously, the front wall 46 may comprise recesses conformed to be coupled with protuberances of

an additional module. This results in a particularly stable coupling between two modules.

[0125] The body 10 may preferably comprise an upper shell 10a and a lower shell 10b.

[0126] The examples in Figures 2A-2E show possible embodiments of the connector 12 of the distributor device 1.

[0127] Each connector 12 comprises a plurality of assembly holes 121 and a plurality of conductive terminals 122, each conductive terminal 122 being positioned at a respective assembly hole 121.

[0128] The connector 12 of the distributor 1 can comprise a body 130. The body 130 of the connector 12 has substantially the same shape and size for each of the connectors 12 of the distributor 1, as can be seen in Figures 2A-2E.

[0129] The body 130 may include an outer wall 131 and an inner wall 132. The outer wall 131 is configured to define a housing 133 in which the inner wall 132 is positioned. The assembly holes 121 are preferably formed in said inner wall 132.

[0130] The outer wall 131 is advantageously tubular in shape, even more preferably cylindrical, and extends along a longitudinal axis K. The inner wall 132 preferably extends substantially perpendicular to the longitudinal axis K of said outer wall 131. The conductive terminals 122 extend parallel to said longitudinal axis K.

[0131] On the inner wall 132, preferably on the outer surface 139 of said inner wall 132, a first X1 and a second X2 direction can be defined. Said directions X1, X2 are preferably perpendicular to each other.

[0132] At least two assembly holes 121 are spaced apart along the first direction X1 and at least two assembly holes 121 are spaced apart along the second direction X2. Each connector 12 comprises a first side 123 and a second side 124, said sides 123, 124 being arranged in sequence along the first direction X1. At least two assembly holes 121 are positioned in the first side 123 and at least two assembly holes 121 are positioned in the second side 124.

[0133] Preferably, the first side 123 and the second side 124 can be identified on the inner wall 132. The two sides 123, 124 can be separated by a centreline M of the inner wall 132, said centreline M being advantageously parallel to the second direction X2 and passing through the longitudinal axis K of the outer wall 131.

[0134] Desirably, the body 130 of the connector 12 comprises coupling elements 137 configured to engage the connector 12 to the printed circuit board 11. Preferably, the coupling elements 137 comprise ends 138 projecting outwards. This provides a snap connection between the connector 12 and the printed circuit board 11.

[0135] Preferably, at least two assembly holes 121 spaced apart along the first direction X1 and at least two assembly holes 121 spaced apart along the second direction X2 share a common assembly hole 121.

[0136] In the preferred embodiments shown in the figures, the connector 12 comprises two assembly holes 121 spaced apart along the first direction X1 and two assembly holes 121 spaced apart along the second direction X2. The connector 12 preferably comprises four assembly holes 121, two of which are positioned at the first side 123 and two of which are positioned at the second side 124. Preferably, the two assembly holes 121 aligned along the first direction X1 are positioned at the two assembly holes 121 aligned along the second direction X2. It is advantageous that the distance D1 between the two assembly holes 121 in the first direction X1 is essentially equal to the distance D2 between two assembly holes 121 in the second direction X2. This allows an essentially square distribution of the four assembly holes 121.

[0137] The plurality of connectors 12 comprises at least one power connector whose conductive terminals 122 are connectable to an electric power supply unit. The power connector can be configured in a first or second or third configuration. Hereafter, the power connectors will be called first connector 13, second connector 14 and third connector 15 respectively, for simplicity's sake. Thus, a connector 12 of the distributor 1 connected to the electric power supply unit is configured as a power connector, which may in turn be configured in the first or second or third configuration, depending on the connection of the conductive terminals 122 to the electric power supply unit and their arrangement in the respective assembly holes 121.

[0138] The first connector 13, shown in the example in Figure 2A, comprises two assembly holes 121 in the first side 123 provided with respective conductive terminals 122 and two assembly holes 121 in the second side 124 without respective conductive terminals 122.

[0139] The second connector 14, shown in the example in Figure 2B, comprises two assembly holes 121 in the second side 124 provided with respective conductive terminals 122 and the two assembly holes 121 in the first side 123 without respective conductive terminals 122.

[0140] The third connector 15, shown in the example in Figure 2C, comprises two assembly holes 121 in the first side 123 provided with respective conductive terminals 122 and two assembly holes 121 in the second side 124 also provided with respective conductive terminals 122.

[0141] The distributor 1 may comprise at least one third connector 15. Alternatively, the distributor 1 may comprise at least two power connectors, one of which is the first connector 13 and the other is the second connector 14. In a further embodiment, the distributor 1 may comprise the third connector 15 and at least one of the first 13 and the second connector 14.

[0142] Preferably, the first connector 13 can provide a first level of supply voltage and the second connector 14 can provide a second level of supply voltage. It is advantageous that the third connector 15 can provide both the first and second level of supply voltage. Desirably, the first level of supply voltage can be 12V and the second level of supply voltage can be 24V, or vice versa.

[0143] The conductive terminals 122 of the first connector 13 may be connected to the electric power supply unit to supply the first level of supply voltage to the output of the first connector 13.

[0144] The conductive terminals 122 of the second connector 14 can be connected to the electric power supply unit to supply the second level of supply voltage to the output of the second connector 14.

[0145] The conductive terminals 122 of the third connector 15 can be connected to the electric power supply unit to provide the first and second level of supply voltage to the output of the third connector 15.

[0146] In preferred embodiments, the connection element 42a of the distributor 1 is configured to receive the first and second level of supply voltage from the electric power supply unit. The conductive terminals of the power connector are connected to this connection element 42a in such a way that:

- the first level of supply voltage is provided at the output of the first connector 13,
- the second level of supply voltage is provided at the output of the second connector 14,
- both the first and second level of supply voltage are provided at the output of the third connector.

[0147] In a preferred embodiment, as in the example shown in Figure 8, the connection element 42a of the distributor 1 allows the distributor 1 to be connected to the driver platform 2, which comprises the electric power supply unit. This connection allows conductive elements of distributor 1 to be powered via the electric power supply unit of the driver platform 2. These conductive elements are electrically connected to the conductive terminals 122 of the power connector in order to obtain the first, second or third configuration of the power connector. In this embodiment, the printed circuit board of the distributor 1 can be configured as an electronic board.

[0148] In alternative embodiments, the printed circuit board 11 of the distributor 1 may include the electric power supply unit. In this case, the conductive terminals 122 of the power connector are electrically connected to the integrated electric power supply unit on the printed circuit board 11, so that the first, second and third configurations of the power connector are obtained. In this embodiment, the distributor 1 can be free from the connection element 42a. In this embodiment, the printed circuit board 11 of the distributor 1 can be configured as an electronic board. The electronic board may, for example, comprise a microprocessor.

[0149] In a preferred embodiment, at least one connector 12 is a signal connector configurable in a fourth or fifth configuration. Hereafter, the signal connectors will be called fourth connector 16 and fifth connector 17, respectively, for simplicity's sake. A distributor connector 1 is thus configured as a signal connector configured in the fourth or fifth configuration, depending on the connection of the conductive terminals 122 to the RGB unit or the signal control unit, and the arrangement of the conductive terminals 122 in the respective assembly holes 121. The fourth connector 16, shown in the example in Figure 2D, comprises two assembly holes 121 in the first side 123 provided with respective conductive terminals 122 and two assembly holes 121 in the second side 124 also provided with respective conductive terminals 122.

[0150] The fifth connector 17, shown in the example in Figure 2E, comprises two assembly holes 121 in the first side 123 provided with respective conductive terminals 122 and two assembly holes 121 in the second side 124 one of which is provided with a respective conductive terminal 122 and the other is free from a respective conductive terminal 122.

[0151] The conductive terminals 122 of the fourth connector 16 can be connected to an RGB unit to provide a control signal for RGB colour management at the output of the fourth connector 16.

[0152] The conductive terminals 122 of the fifth connector 17 can be connected to a signal control unit in order to provide a control signal to the fifth connector output 17 to control a function.

[0153] In some embodiments, the distributor device 1 includes at least one signal connector configured in the fourth configuration 16 and/or at least one signal connector configured in the fifth configuration 17.

[0154] In a preferred embodiment, the connection element 42a of the distributor 1 allows the distributor 1 to be connected to a control device (not shown), which includes the RGB unit and/or signal control unit. This connection enables control signals to be provided to the connection element 42a of the distributor 1 via the RGB unit and/or the signal control unit of the control device. Preferably, the control device is connected to both the driver platform 2 and the distributor 1, even more preferably so that it is interposed between the driver platform 2 and the distributor 1. The control device can be configured as a module that can be removably connected to the control driver platform 2. This module is preferably configured in a manner substantially corresponding to what is described with reference to the distributor device 1 configured as a module.

[0155] In an alternative embodiment, the RGB unit and/or the signal control unit are integrated on the printed circuit board 11 of the distributor 1. In this case, the conductive terminals 122 of the signal connector are electrically connected to the RGB unit and/or the signal control unit in order to obtain the fourth 16 or fifth 17 configuration of the signal connector. In this embodiment, the distributor 1 can be free from the connection element 42a. In this embodiment, the printed circuit board 11 of the distributor 1 can be configured as an electronic board. The electronic board may, for example, comprise a microprocessor.

[0156] The apparatus to be powered can be connected directly to the distributor 1. In this case, the apparatus comprises a compatible connector 21, i.e. configured to be connected directly to the connector 12 of the distri-

butor 1, as shown in the example in Figure 3. The apparatus may comprise a power supply cable 20 that includes a first and a second end. The first end can be connected to the connector 21 of the apparatus and the second end can be connected to the apparatus. The electric power cable 20 may comprise a plurality of electric cables, e.g. sheathed.

[0157] The compatible connector 21 of the apparatus can be configured with a shape complementary to that of the connector 12 of the distributor 1 to which it is to be connected.

[0158] The example in Figure 3 shows three accessories of the distributor 1, namely an extension 30 and two converters 40.

[0159] The extension 30 may include a power supply cable 33, a first connection element 31 and a second connection element 32. This cable 33 may comprise a first end, to which the first connection element 31 is connected, and a second end, to which the second connection element 32 is connected. The first connection element 31 is configured to be connected to the connector 12 of the distributor 1 and said second connection element 32 is configured as said connector 12. The compatible connector 21 of the apparatus can be connected to this second connection element 32.

[0160] The first connection element 31 of the extension 30 can be configured with a shape complementary to that of the connector 12 of the distributor 1 to which it is to be connected.

[0161] The converter 40 may include a first conversion element 41 and a second conversion element 42. The first conversion element 41 is configured to be connected to the connector 12 of the distributor 1 and the second conversion element 42 is configured to receive a non-compatible connector 49 of the apparatus.

[0162] The first conversion element 41 of the converter 40 can be configured with a shape complementary to that of the connector 12 of the distributor 1 to which it is to be connected.

[0163] The converter 40 can have a substantially tubular shape. The conversion elements 41, 42 can be positioned at opposing ends of the converter 40.

[0164] The converter 40 can be configured in a first configuration ("first converter", for simplicity's sake), best shown in the examples in Figures 6A-6C, or in a second configuration ("second converter", for simplicity's sake), best shown in the examples in Figures 7A-7B. The first converter 40 can be connected to the first connector 13, so that the first level of supply voltage can be output, e.g. 12V. The second converter 40 can be connected to the second connector 14, so that the second level of supply voltage can be output, e.g. 24V.

[0165] In the examples shown in the figures, the connector 12 of the distributor 1 is a female connector that can receive a male connector. This male connector is configured to be pluggable into and electrically connectable to the female connector of the distributor 1. Said male connector may be the compatible connector 21 of the apparatus, the first connection element 31 of the extension 30 or the first conversion element 41 of the converter 40.

[0166] In the examples shown in Figures 4A-4E, the first connection element 31 of the extension 30 is a male connector that can be connected to the female connector of the distributor 1.

[0167] In the examples shown in Figures 5A-5E, the second connection element 32 of the extension 30 is a female connector and has the same configuration as the female connector of the distributor 1 to which the extension 30 is connected.

[0168] In the examples in Figures 4A and 5A, the first male connection element 31, which can be connected to the first connector 13 of the distributor 1, and the second connection element 32, which is configured as the first female connector 13 of the distributor 1, are shown, respectively.

[0169] In the examples in Figures 4B and 5B, the first male connection element 31, which can be connected to the second female connector 14 of the distributor 1, and the second connection element 32, which is configured as the second female connector 14 of the distributor 1, are shown, respectively.

[0170] In the examples in Figures 4C and 5C, the first male connection element 31, which can be connected to the third connector 15 of the distributor 1, and the second connection element 32, which is configured as the third female connector 15 of the distributor 1, are shown, respectively.

[0171] In the examples in Figures 4D and 5D, the first male connection element 31, which can be connected to the fourth connector 16 of the distributor 1, and the second connection element 32, which is configured as the fourth female connector 16 of distributor 1, are shown, respectively.

[0172] In the examples in Figures 4E and 5E, the first male connection element 31, which can be connected to the fifth connector 17 of the distributor 1, and the second connection element 32, which is configured as the fifth female connector 17 of the distributor 1, are shown, respectively.

[0173] The male connector can comprise four cavities 61 configured to receive respective conductive terminals 122 of the female connector 12 of the distributor 1. Conductive elements 62 configured to make contact with respective conductive terminals can be provided within the cavities 61 once the male connector is connected to the female connector. For example, in the embodiment shown in Figure 4A, the two upper cavities 61 of the male connector have respective conductive elements 62 inside them; when the male connector is connected to the first female connector 13 of the distributor, these conductive elements 62 come into contact with respective conductive terminals 122 of the first connector 13. Similar considerations can be made, with the necessary changes, for the remaining embodiments shown in Figures 4B-4E.

[0174] The male connector may comprise a fastener, configured to connect male connector to female connector. In the embodiments shown in the figures, the fastener may include a protrusion 68 which may be received in a respective hole 69 formed in the outer wall of the female connector 12 of the distributor 1.

[0175] The examples in Figures 5A-5E show embodiments of the second connection element 32 of the extension 30, configured as the connector 12 of the distributor 1 to which the first connection element 31 is connected. For example, in the embodiment shown in Figure 5A, the second female connection element 32 comprises conductive terminals 67 positioned at the top which correspond to the conductive terminals 122 of the first female connector 13 to which the first male connection element 31 is connected. Similar considerations can be made, with the necessary changes, for the remaining embodiments shown in Figures 5B-5E.

[0176] In the examples in Figures 3, 6A-6C, 7A and 7B, the first conversion element 41 of the converter 40 is a male connector and the second conversion element 42 of the converter 40 is a female connector. In the example in Figure 3, it can be seen that the non-compatible connector 49 on the apparatus is a male connector that can be connected to the second conversion element 42.

[0177] The power connector of the distributor 1 may comprise a first fail-safe coupling structure 71. In particular, the first 13, the second 14 and the third connector 15 comprise a respective first fail-safe coupling structure 71. The signal connector comprises a second fail-safe coupling structure 72 different from the first fail-safe coupling structure 71. In particular, the fourth 16 and fifth connector 17 comprise a respective first fail-safe coupling structure 71.

[0178] The coupling structure 71, 72 comprises protrusions 73 which may extend from the outer wall 131 of the connector 12 towards the housing 133 and which may be located at the first side 123 of the connector 12.

[0179] In the examples of Figures 2A-2C, the first 13, the second 14 and the third connector 15 have the same first coupling structure 71 wherein the protrusion 73 is at a left side 78 of the connector 12.

[0180] In the example in Figure 2D, the fourth connector 16 has a second coupling structure 72 wherein the protrusion 73 is at a right side 79 of the connector 12.

[0181] In the example in Figure 2E, the fifth connector 17 has a second coupling structure 72 wherein the protrusion 73 is positioned centrally on the connector 12.

[0182] The compatible connector 21 of the apparatus, the first connection element 31 of the extension 30 and the first conversion element 41 of the converter 40 are preferably configured to fit either the first 71 or the second fail-safe coupling structure 72.

[0183] In the examples of Figures 4A-4C, the first connection element 31 of the extension cable 30 comprises a groove 77 positioned on a right side of the first connection element 31, so that the protrusion 73 positioned on the left side 78 of the first 13, the second 14 and the third connector 15 can be inserted into this groove 77, when the first connection element 31 is connected to the first 13, the second 14 or the third connector 15.

[0184] In the example of Figure 4D, the first connection element 31 of the extension 30 comprises a groove 77 positioned on a left side of the first connection element 31, so that the protrusion 73 positioned on the right side 79 of the fourth connector 16 can be inserted into this groove 77, when the first connection element 31 is connected to the fourth connector 16.

[0185] In the example of Figure 4E, the first connection element 31 of the extension 30 comprises a groove 77 positioned centrally in the first connection element 31, so that the protrusion 73 positioned centrally on the fifth connector 17 can be inserted into this groove 77, when the first connection element 31 is connected to the fifth connector 17.

[0186] The second connection element 32 of the extension can have the same coupling structure 71, 72 as the connector 12 of the distributor 1 to which the extension 30 is connected. For example, in the embodiment of Figure 5A, the second connection element 32 comprises the first coupling structure 71 of the first connector 13. Similar considerations can be made, with the necessary changes, for the remaining embodiments shown in Figures 5B-5E.

[0187] In the embodiments of the converter 40 shown in Figures 6A-6C, 7A and 7B, the first conversion element 41 comprises a groove 77 (positioned on a right side 74 of the first conversion element 41 when viewing Figures 6B and 7B frontally), so that the protrusion 73 positioned on the left side 78 of the first 13, second 14 and third connector 15 is insertable into said groove 77 when the first conversion element 41 is connected to the first 13, second 14 or third connector 15.

[0188] In the example shown in Figure 8, an embodiment of the power supply system 100 is shown, comprising the distributor 1 and the control driver platform 2 that can be connected to the distributor device 1. The platform 2 comprises the electric power supply unit configured to supply both the first and second supply voltage values to the distributor device 1.

[0189] The control driver platform 2 can be connected to a power supply network to supply power to the distributor device 1 connected thereto, either with the first or second level of supply voltage.

[0190] Preferably, the driver platform 2 comprises a body 3 in which a printed circuit board is housed on which the following are assembled:

- a power socket to connect said driver platform to an electric power supply network,
- the electric power supply unit that receives the electrical energy from the power socket, transforms it and supplies it as an output to power the distributor 1.

[0191] The control driver platform 2 comprises a connection unit 4 configured to interface with the connection

element 42a of the distributor device 1, so as to supply said distributor device 1 with both the first and second level of power.

[0192] Preferably, the connection element 42a of the distributor 1 and the connection unit 4 of the driver platform 2 are shaped so as to be coupled with a shaped coupling.

[0193] The connection element 42a of the distributor 1 can be configured as a connection plug, as shown in the examples in Figures 1, 3 and 8, and the connection unit 4 can be configured as a connection socket. The connection plug of the distributor 1 is configured to be plugged into the connection socket of the control driver platform 2, preferably via a shape coupling.

[0194] According to a preferred embodiment, the power supply system 100 comprises a lighting apparatus that can be connected to a connector 12 of the distributor 1.

Claims

1. A distributor device (1) comprising:

a printed circuit board (11) and
at least one connector (12), connected to said printed circuit (11) and
comprising a plurality of assembly holes (121) and a plurality of conductive terminals (122), each conductive terminal (122) being positioned at a respective assembly hole (121),
wherein at least two assembly holes (121) are spaced apart in a first direction (X1) and at least two assembly holes (121) are spaced apart in a second direction (X2),
wherein the connector (12) comprises a first side (123) and a second side (124), said sides (123, 124) being arranged in sequence along the first direction (X1),
wherein at least two assembly holes (121) are positioned in the first side (123) and at least two assembly holes (121) are positioned in the second side (124),
wherein at least one connector (12) is a power connector configurable in:

• a first configuration (13) wherein two assembly holes (121) in the first side (123) are provided with respective conductive terminals (122), the conductive terminals (122) being connectable to an electric power supply unit to provide, at the output of the power connector configured in the first configuration (13), a first level of supply voltage, or
• a second configuration (14) wherein two assembly holes (121) in the second side (124) are provided with respective conductive terminals (122), the conductive terminals (122) being connectable to the electric power supply unit to provide, at the output of the power connector configured in the second configuration (14), a second level of supply voltage, or
• a third configuration (15), wherein both two assembly holes (121) in the first side (123) and two assembly holes (121) in the second side (124) are provided with respective conductive terminals (122), the conductive terminals (122) being connectable to the electric power supply unit to provide, at the output of the power connector configured in the third configuration (15), both the first and second levels of supply voltage,

said distributor device (1) including:
• at least one power connector configured in the third configuration (15),
or
• at least two power connectors, one of which is configured in the first configuration (13) and the other is configured in the second configuration (14).

2. The distributor device (1) according to the preceding claim, where the first level of supply voltage is 12V and the second level of supply voltage is 24V, or vice versa.

3. The distributor device (1) according to any one of the preceding claims, comprising a connection element (42a) configured to receive the first and second levels of supply voltage from the electric power supply unit, wherein the conductive terminals (122) of the power connector (12) are connected to the connection element (42a) such that:

• the output of the power connector configured in the first configuration (13) provides the first level of supply voltage,
• the output of the power connector configured in the second configuration (14) provides the second level of supply voltage,
• the output of the power connector configured in the third configuration (15) provides both the first and second levels of supply voltage.

4. The distributor device (1) according to any one of the preceding claims, wherein the at least two assembly holes (121) spaced apart along the first direction (X1) and the at least two assembly holes (121) spaced apart along the second direction (X2) have an assembly hole (121) in common, and wherein the first direction (X1) and the second direction (X2) are orthogonal to each other.

5. The distributor device (1) according to any one of the

preceding claims, wherein the connector (12) comprises two assembly holes (121) spaced apart along the first direction (X1) and two assembly holes (121) spaced apart along the second direction (X2).

6. The distributor device (1) according to any one of the preceding claims, wherein the connector (12) comprises a body (130) which comprises an outer wall (131) and an inner wall (132), said outer wall (131) being configured to define a housing (133), in which the inner wall (132) is positioned, and wherein the assembly holes (121) are formed in the inner wall (132).

7. The distributor device (1) according to any one of the preceding claims, wherein at least one connector (12) is a signal connector configurable in:

- a fourth configuration (16) wherein both two assembly holes (121) in the first side (123) and two assembly holes (121) in the second side (124) are provided with respective conductive terminals (122), the conductive terminals (122) being connectable to an RGB unit to provide, at the output of the signal connector configured in the fourth configuration (16), a control signal related to RGB colour management, or
- a fifth configuration (17) wherein two assembly holes (121) in the first side (123) are provided with respective conductive terminals (122) and an assembly hole (121) in the second side (124) is provided with a respective conductive terminal (122), the conductive terminals (122) being connectable to a signal control unit to provide, at the output of the signal connector configured in the fifth configuration (17), a control signal related to the control of a function;

said distributor device (1) including at least one signal connector configured in the fourth configuration (16) and/or at least one signal connector configured in the fifth configuration (17).

8. The distributor device (1) according to the preceding claim, wherein the power connector comprises a first fail-safe coupling structure (71) and the signal connector comprises a second fail-safe coupling structure (72), said second fail-safe coupling structure (72) being different from the first fail-safe coupling structure (71).

9. The distributor device (1) according to any one of the preceding claims, configured as a module which can be removably connected to a control driver platform (2), and which comprises a hollow body (10) in which the printed circuit board (11) is received, said body (10) including an opening (41), through which it is possible to access the respective connector (12).

10. The distributor device (1) according to any one of the preceding claims, comprising an extension (30) which includes an electric supply cable (33), a first connection element (31) and a second connection element (32), wherein said cable (33) comprises a first end, to which the first connection element (31) is connected and a second end to which the second connection element (32) is connected, said first connection element (31) being configured to be connected to the connector (12) and said second connection element (32) being configured as said connector (12).

11. The distributor device (1) according to any one of the preceding claims, comprising a converter (40) which includes a first conversion element (41) and a second conversion element (42), said first conversion element (41) being configured to be connected to the connector (12) and said second conversion element (42) being configured to receive a non-compatible connector (49) of an electrical and/or electronic apparatus.

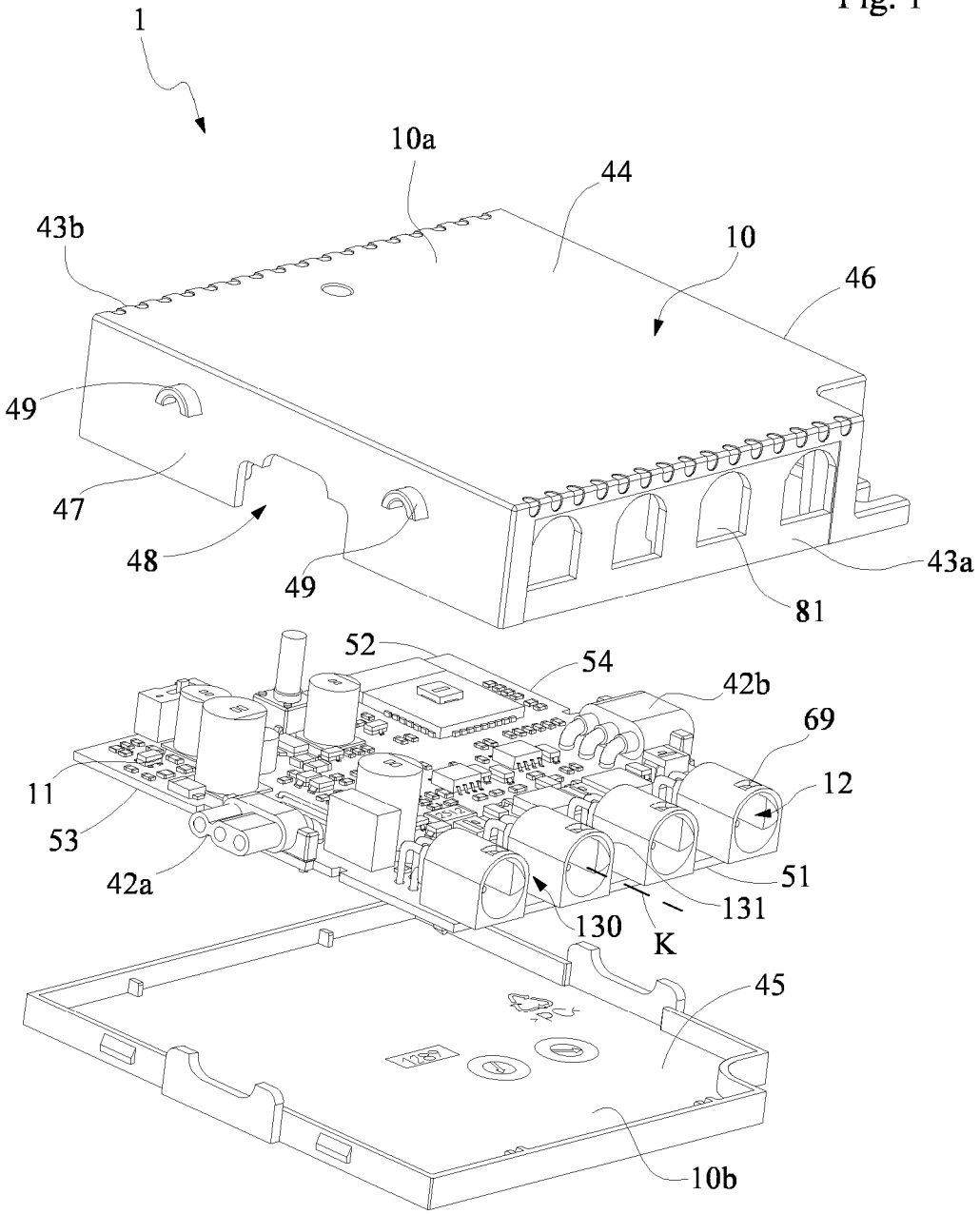
12. A power supply system (100) comprising the distributor device (1) according to any one of the preceding claims and a control driver platform (2) connectable to the distributor device (1), said platform (2) comprising the electric power supply unit configured to provide both the first and second supply voltage values to the distributor device (1).

13. The power supply system (100) according to the preceding claim, wherein the control driver platform (2) comprises a connection unit (4) configured to interface with the connection element (42a) of the distributor device (1), so as to supply said distributor device (1) with both the first and the second level of power.

14. The power supply system (100) according to claim 12 or 13, comprising a control device connectable to the distributor device (1), said control device comprising an RGB unit, configured to provide the distributor device (1) with a control signal related to RGB colour management, and/or a signal control unit, configured to provide the distributor device (1) with a control signal related to the control of a function.

15. The power supply system (100) according to any one of claims 12 to 14, comprising a lighting apparatus connectable to a connector (12) of the distributor device (1).

Fig. 1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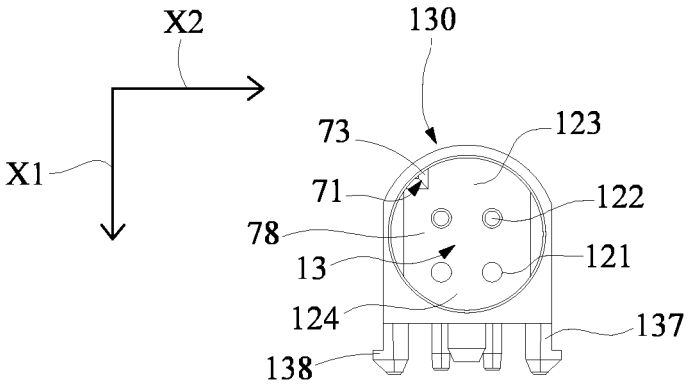


Fig. 2A

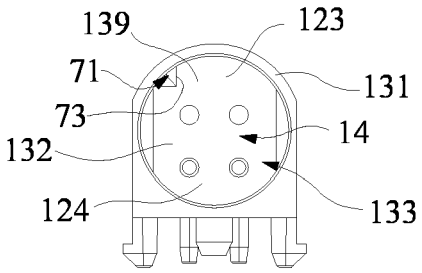


Fig. 2B

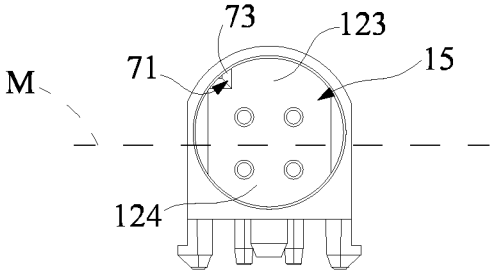


Fig. 2C

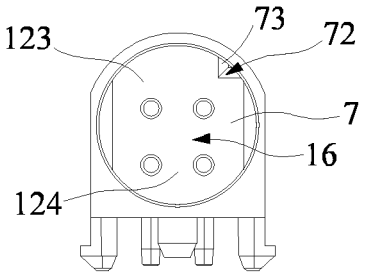


Fig. 2D

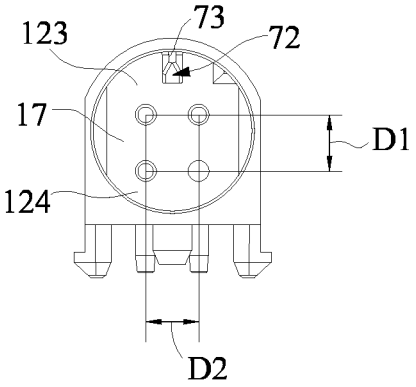


Fig. 2E

Fig. 3

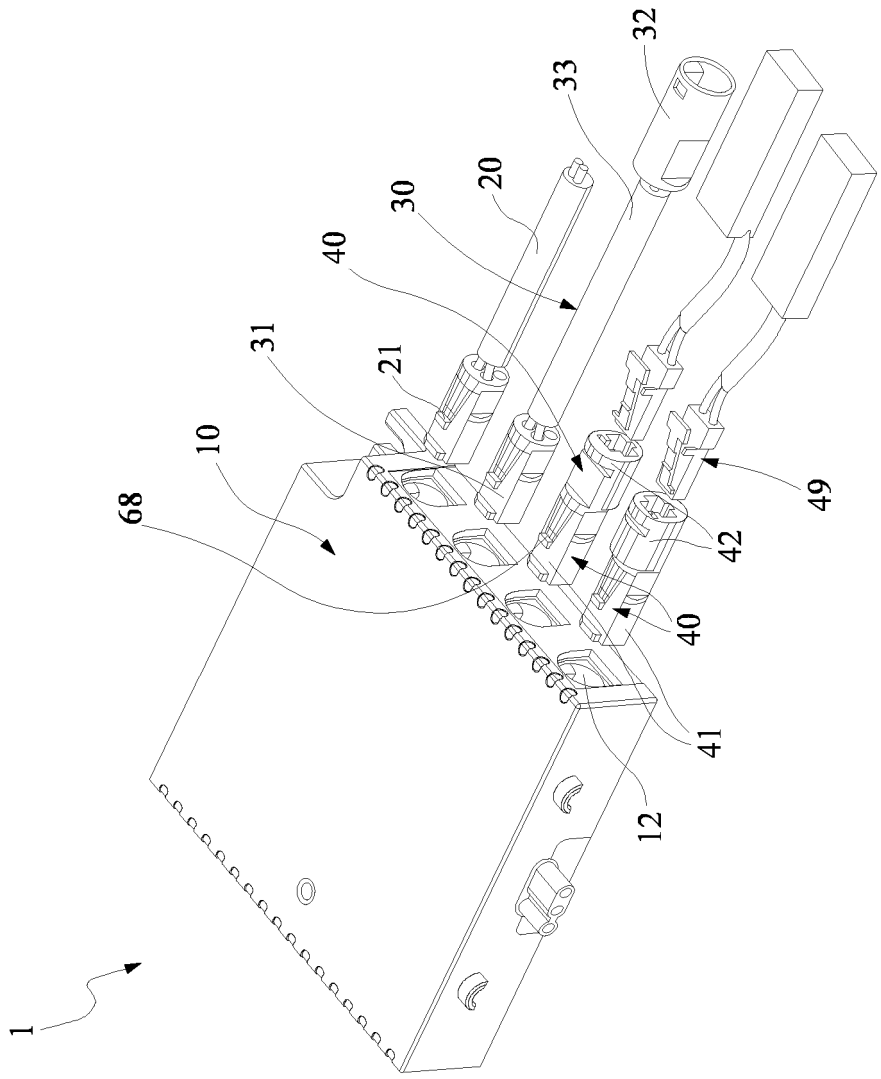


Fig. 4A

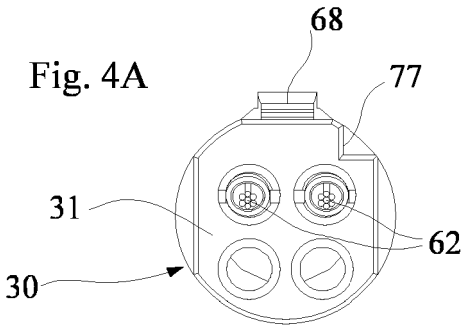


Fig. 4B

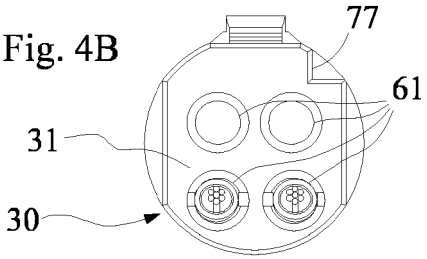


Fig. 4C

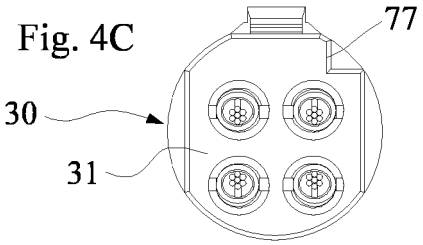


Fig. 4D

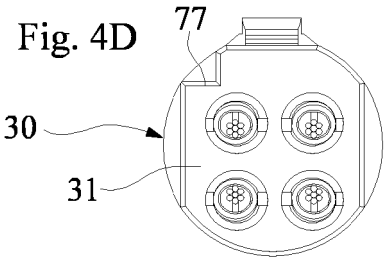


Fig. 4E

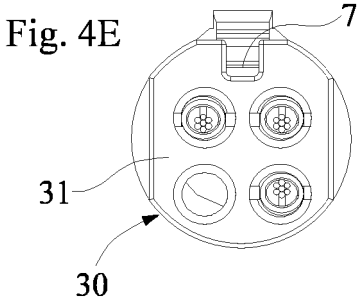


Fig. 5A

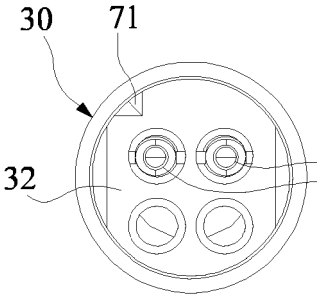


Fig. 5B

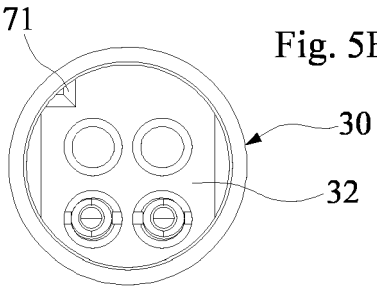


Fig. 5C

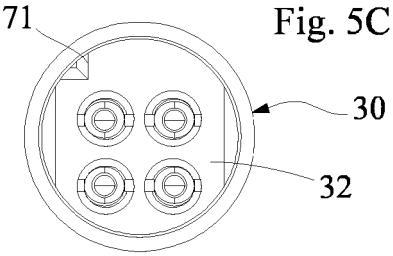


Fig. 5D

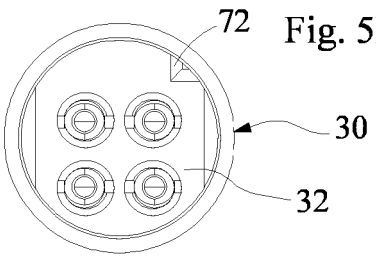


Fig. 5E

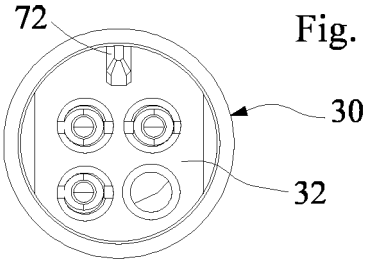


Fig. 6A

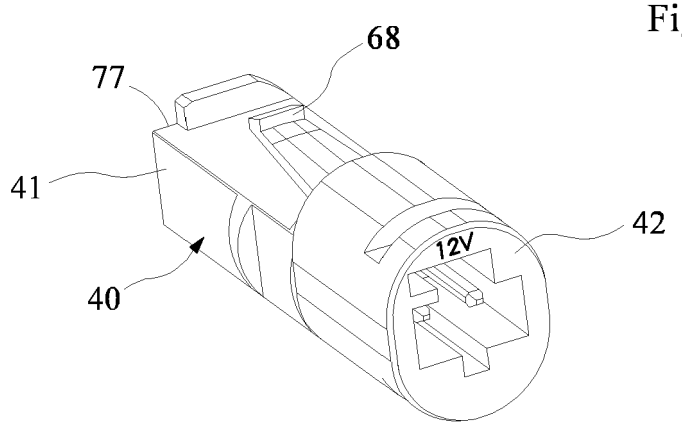


Fig. 6B

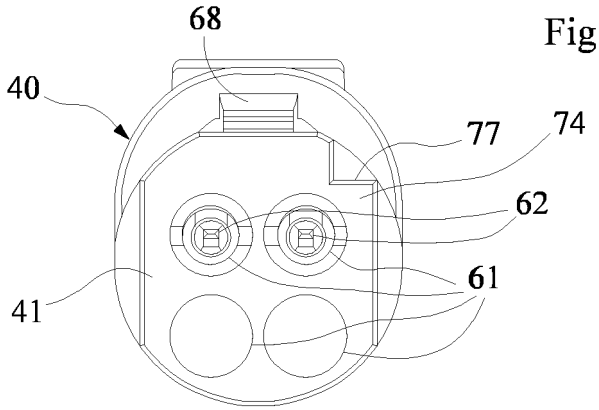


Fig. 6C

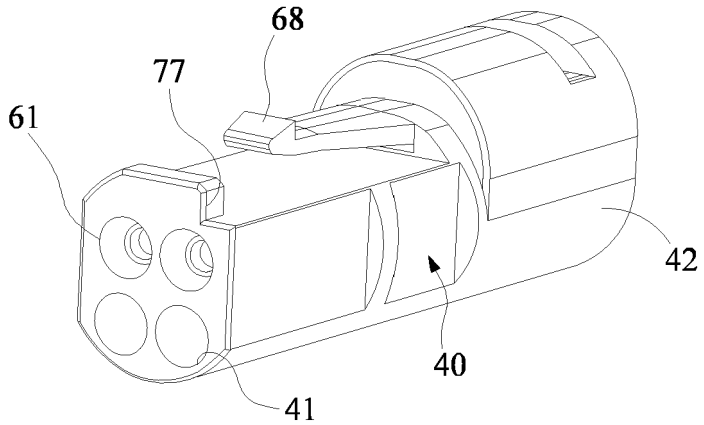


Fig. 7A

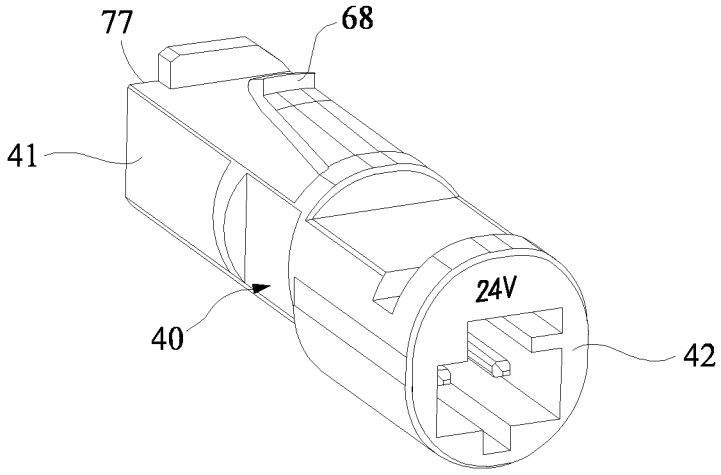
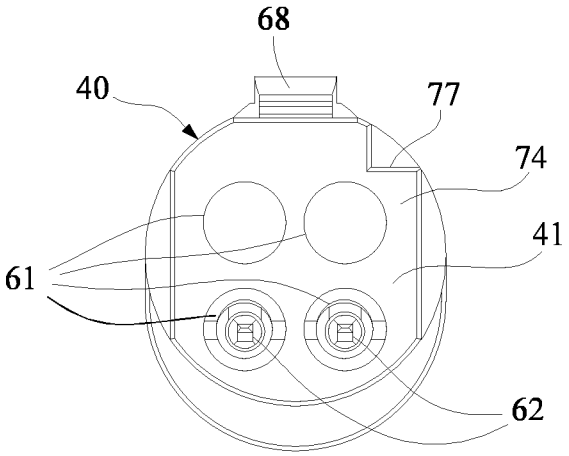


Fig. 7B



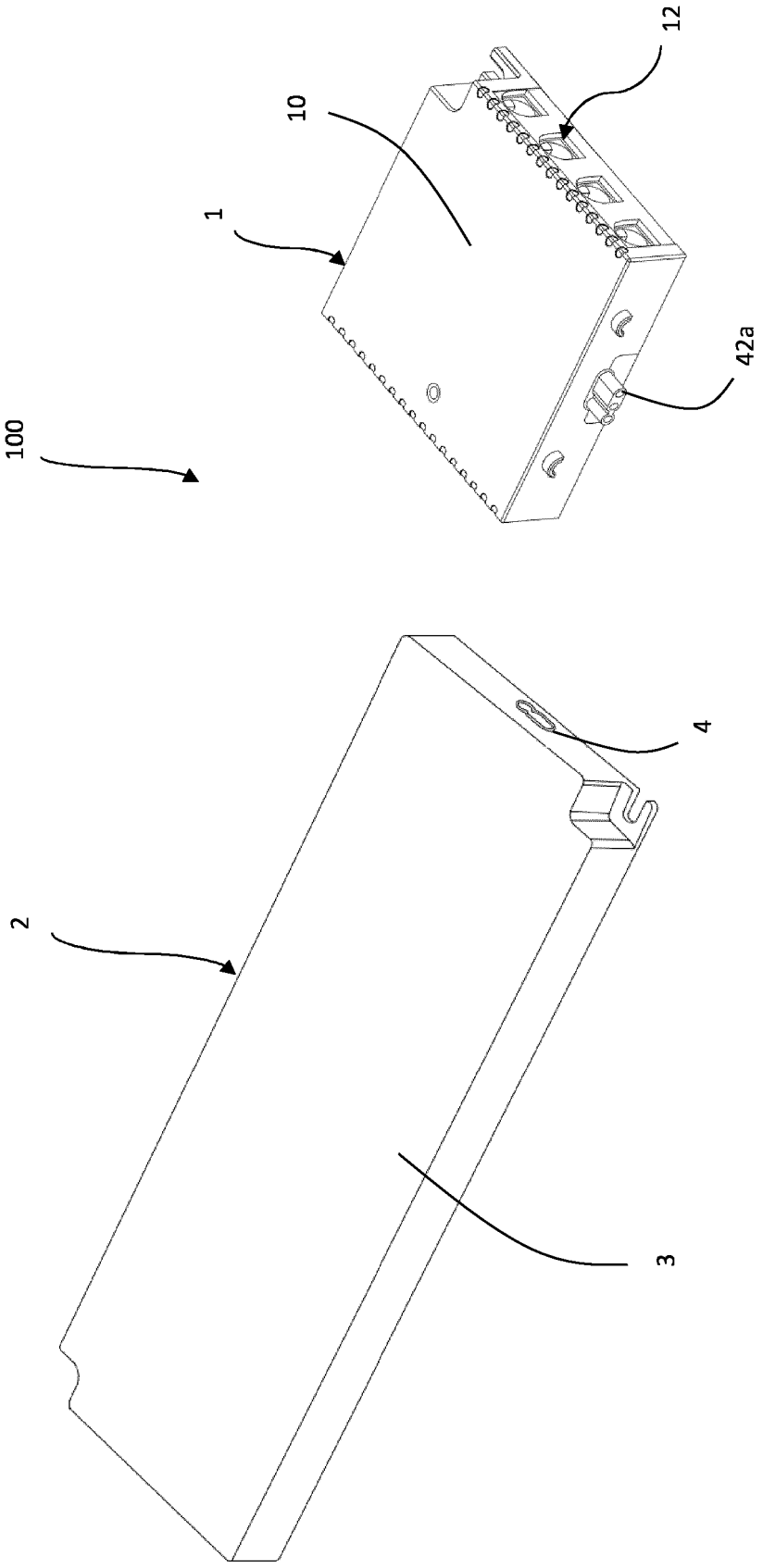


Fig.8

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Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 24 21 6966

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 900 684 A (LAM PHILLIP [US]) 4 May 1999 (1999-05-04)	1	INV. H01R27/02
A	* figures 1, 6 * * column 1, line 62 - column 2, line 35 * * column 2, line 67 - column 3, line 38 * -----	2-15	H01R29/00 H05B45/00

TECHNICAL FIELDS SEARCHED (IPC)

H01R
H05B

The present search report has been drawn up for all claims

1

Place of search	Date of completion of the search	Examiner
The Hague	22 April 2025	Galary, Grzegorz

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
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D : document cited in the application
L : document cited for other reasons
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22-04-2025

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5900684 A	04-05-1999	NONE	

EPO FORM P0459

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

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