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(54) **COOKER HOOD AND POWER SUPPLY ARRANGEMENT THEREOF**

KÜCHENHAUBE UND STROMVERSORGUNGSANORDNUNG DAFÜR

HOTTE DE CUISINIÈRE ET SON AGENCEMENT D'ALIMENTATION ÉLECTRIQUE

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Description

Field of the invention

[0001] The present invention relates to a cooker hood or a kitchen extraction exhaust unit and a power supply arrangement thereof.

Prior art

[0002] American patent publication US2012/0052792 discloses a ventilation unit for installation in a ventilation system. The ventilation unit can include a motor coupled to a fan element and a power source. The ventilation unit can also include a calibration module having one of a voltage and current regulator for adjusting the performance of the ventilation unit based on at least one characteristic of the ventilation system. An AC mains supply is converted in a DC voltage and supplied to a DC motor via a controller.

[0003] International patent publication WO2006/092219 discloses a ventilation appliance embodied as an exhauster hood. A drive is present for generating an air flow, as well as an illumination device. A control unit controls the drive and the illumination device using galvanic separated pulse width modulated signals.

[0004] American patent publication US2014/076367 discloses a vapor cleaning apparatus for a range hood which generates high temperature vapor to melt dirty grease on both an exhaust fan and a fan housing. The apparatus has a control module which is electrically connected to a vapor cleaning module, an input module and a fan driver module. Also provided is a lighting unit power supply for powering lighting elements. When the control module executes the vapor cleaning mode, the heater heats the water into vapor and activates the fan driver module to drive a fan motor to blow the vapor to the fan housing.

[0005] DE 10 2005 010 984 A1 discloses a cooker hood having a motor driver and light driver connected to a controller through galvanic separating elements.

Summary of the invention

[0006] The present invention seeks to provide an improved cooker hood or kitchen extraction exhaust unit, in particular a power supply arrangement thereof, wherein the cooker hood comprises less electronic components and exhibits reduced electrical circuit complexity.

[0007] According to the present invention a cooker hood according to the type defined in the preamble above is provided, wherein the cooker hood comprises a mains supply, one or more lighting elements, and a lighting element driver connected to the mains supply and the one or more lighting elements, and an electronically commuted motor driving a fan, characterized in that a power supply terminal of the EC motor is directly connected to the mains supply and a control terminal of the EC motor is connected to a control unit, wherein the control unit is connected to a power supply output of the lighting element driver.

[0008] The cooker hood of the present invention exhibits reduced circuit complexity as the lightning element driver powers the control unit allowing the EC motor to be controlled and operated by the control unit, such as changing motor speed and hence fan speed of the cooker hood. Consequently, the cooker hood of the present invention does not require centralized power and control signal distribution in the form of a printed circuit board (PCB), sometimes referred to as a "power board". More specifically, in addition to the one or more lighting elements, the present invention allows the lighting element driver to be used for powering the control unit for controlling the EC motor, so that electrical circuit complexity of the cooker hood is significantly reduced as no separate feed is needed to power the control unit. In a practical embodiment the power supply output of the lighting element driver is an auxiliary power supply output for powering the control unit.

[0009] In an advantageous embodiment, the control unit is integrated with a user interface of the cooker hood, which further simplifies circuit complexity of the cooker hood. Electric power for the control unit and user interface need not be directly accessed from the mains supply terminal but can be extracted from the lighting element driver, where the control unit for operating the EC motor is readily operated through the user interface on the cooker hood.

[0010] To reduce power consumption of the cooker hood and to provide good lighting conditions under and around the cooker hood, an embodiment is provided wherein the one or more lighting elements are LED lighting elements, and the lighting element driver is a LED power supply or LED driver. In an advantageous embodiment the LED power supply may be a dimmable LED power supply.

[0011] In a further advantageous embodiment, the control unit is connected to the lighting element driver to control operating parameters of the lighting elements, so that a combined control of both the lighting and the EC motor is possible, circumventing the use of a further control unit for merely controlling the one or more lighting elements.

Short description of drawings

[0012] The present invention will be discussed in more detail below, using a number of exemplary embodiments, with reference to the attached drawings, in which

Figure 1 shows an embodiment of a prior art power supply arrangement for a cooker hood;

Figure 2 shows an embodiment, which is not part of the present invention, of a power supply arrangement utilizing a mains filter and standby relay for a cooker hood;

Figure 3 shows an embodiment of a power supply arrangement for a cooker hood according to the present invention; and

Figure 4 shows a schematic embodiment, which is not part of the present invention, of a cooker hood and a power supply arrangement thereof.

Detailed description of exemplary embodiments

[0013] Prior art cooker hoods or kitchen extraction exhaust units typically comprise an electric motor for driving a (suction) fan. The cooker hood may be operated by a user through e.g. a touch and/or mechanical interface on the cooker hood to operate one or more light elements and/or the fan. To provide power from a mains supply terminal at the cooker hood to the one or more lighting elements and/or the electric motor, and to distribute control signals for operating the cooker hood, a centralized power and control signal distribution unit is provided, sometimes called a "power board" in the form of a main printed circuit board (PCB).

[0014] Figure 1 shows an embodiment of a prior art power supply arrangement for a cooker hood. In the prior art embodiment depicted, a cooker hood typically comprises a power supply arrangement having an AC power supply terminal 26 connected to a power board (PWRB) 20 or main printed circuit board. The power board 20 is connected to a user interface (U/I) 24, a lighting element driver (LED DR) 22, and an electric motor (MTR) 21. The lighting element driver 22 is connected to one or more lighting elements such as one or more LED lamps 23. Furthermore, a main filter (MF) 25 is provided in the AC line from AC power supply terminal 26 to the power board 20.

[0015] As can be seen from Figure 1, the power board 20 is a central component of the power supply arrangement for a cooker hood from which power and control signals are distributed. Apart from the electric motor 21, the power board 20 is the most complex and expensive component of a cooker hood, and the power board 20 is also a relatively vulnerable component that is relatively expensive to repair. Furthermore, because the power board 20 distributes all power and control signals of the cooker hood, in case of a significant failure the entire cooker hood may become non-functional, e.g. both lighting elements and the electric motor may cease to be operational.

[0016] In view of the above drawbacks there is a need for a cooker hood exhibiting reduced engineering complexity and increased reliability, in particular a reduced electronic circuit complexity. Reducing electronic circuit complexity of the cooker hood not only reduces vulnerability to component failure but also reduces manufacturing costs.

[0017] Figure 2 shows an embodiment, which is not part of the present invention, of a power supply arrangement for a cooker hood. Figure 3 shows an embodiment of a power supply arrangement for a cooker hood according to the present invention. In the embodiments shown, the cooker hood comprises a mains supply terminal 6, or mains supply 6 for short, one or more lighting elements 3, and a lighting element driver (PWR) 4 connected to the mains supply terminal 6 and the one or more lighting elements 3. The cooker hood further comprises an electrical motor 2, in particular a brushless DC motor (or electronically commutated (EC) motor) 2 for driving a fan or having an integrated fan (not shown).

[0018] According to the present invention a power supply terminal of the EC motor 2 is directly connected to the mains supply terminal 6, and a control terminal of the EC motor 2 is connected to a control unit (CTRL/UI) 5, wherein the control unit 5 is connected to a power supply output of the lighting element driver 4.

[0019] As can be seen the cooker hood of the present invention efficiently and cleverly utilizes the lighting element driver 4 to power the control unit 5, which in turn is capable of supplying and/or receiving signals to/from the EC motor 2 for controlling operation thereof, e.g. changing speed. Most notably, the use of a power board 20 as depicted in Figure 1 is circumvented as the lighting element driver 4 already provides power to the one or more lighting elements 3 and so there is no need to feed the control unit 5 separately from the mains supply terminal 6. In a practical embodiment the power supply output of the lighting element driver 4 is an auxiliary power supply output (e.g. 12 Volt) for powering the control unit 5.

[0020] In an advantageous embodiment, the control unit 5 is integrated with a user interface of the cooker hood, so that the control unit 5 may be conveniently operated through the user interface, wherein the user interface presents to the user control buttons on how to operate the EC motor 2, e.g. changing speed of the fan. The user interface may be arranged at an accessible location at a front portion of the cooker hood, typically at a side portion or bottom portion at the front of the cooker hood. In an embodiment the one or more lighting elements 3 are LED lighting elements, and the lighting element driver 4 is a LED power supply, thereby reducing power consumption of the cooker hood. Even though the lighting element driver 4 may be a LED driver, the control unit 5 can be connected to and cooperate with any lighting element driver 4 required for a particular application.

[0021] In an advantageous embodiment the control unit 5 is connected to the lighting element driver 4 to control operating parameters of the one or more lighting elements (3), as indicated by the dashed line in the Figure 2 and 3 embodiments. In addition to control the EC motor 2 through the control unit 5, the one or more lighting elements 3 can also be operated by the control unit 5. This further reduces electrical circuit complexities and redundancies and eliminates the need for a power board 20 as outlined earlier.

[0022] In the embodiment of Figure 2, which is not part of the present invention, it is shown that the EC motor 2 is connected to the mains supply terminal 6 (bold lines). In an embodiment, which is not part of the present inven-

tion, the cooker hood may further comprise a standby relay 8 connected between the supply terminal of the EC motor 2 and the mains supply terminal 6, wherein a control input of the standby relay 8 is connected to the control unit 5. In this embodiment the control unit 5 provides additional control over power delivered to the EC motor 2 and may be arranged for e.g. temporarily connecting and disconnecting the EC motor 2 from the mains supply terminal 6. For example, the standby relay 8 may reduce standby and various parasitic losses within the EC motor 2 when in idle mode. As with control commands from the control unit 5 to the EC motor 2 for e.g. changing speed, the control unit 5 may therefore be arranged (dashed line) for controlling the standby relay 8 to further reduce electrical circuit complexity of the cooker hood and circumvent the need for a power board 20.

[0023] In the embodiment shown in Figure 2, which is not part of the present invention, the cooker hood comprises a mains filter 7 connected between the mains supply terminal 6 and the EC motor 2 and/or the lighting element driver 4. The mains filter 7 reduces e.g. noise and various EMI disturbances coming from the power grid into the electrical circuit of the cooker hood and also reduces noise and various EMI disturbances being injected into the power grid coming from the cooker hood.

[0024] As mentioned above, the control unit 5 allows the EC motor 2 to be controlled, e.g. allowing speed control of the fan. Without loss of generality, the type of control used for the EC motor 2 can be chosen to meet particular requirements and is not limited by the power delivered to the control unit 5 by the lighting element driver 4. For example, in an embodiment the control unit 5 is arranged to control an operating speed of the EC motor 2 (dashed line) using an analogue control signal or a pulse width modulated signal, so that it is possible to manufacture cooker hoods for different applications, price and quality ranges etc.

[0025] Figure 4 shows a schematic embodiment, which is not part of the present invention, of a cooker hood and a power supply arrangement thereof. In the schematic embodiment shown, the cooker hood 1 comprises a front portion or housing area 1a that comprises the control unit 5, which may be incorporated with a user interface. The cooker hood 1 further comprises an internal space 1b housing the EC motor 2 for driving a fan and the one or more lighting elements 3, such as LED, halogen lamps and the like. A top area 1c is provided to the cooker hood which comprises the mains supply terminal 6 and the lighting element driver 4, i.e. in general the electronic circuitry of the cooker hood 1.

[0026] According to the present invention, as shown in Figure 3, the power supply terminal of the EC motor 2 is directly connected to the mains supply terminal 6. In the specific embodiment shown in Figure 4, which is not part of the present invention, a first connector block 11 may be provided for connecting the EC motor 2, as wells as the lighting element driver 4, to the mains supply terminal 6. A second connector block 12 is provided to connect the control terminal of the EC motor 2 to the control unit 5, wherein the control unit 5 is connected to the power supply output of the lighting element driver 4 through the second connector block 12. In an embodiment, which is not part of the present invention, the power supply output of the lighting element driver 4 may be an auxiliary power supply output (e.g. 12 Volt) connected to the second connector block 12. In a further embodiment, which is not part of the present invention, the second connector bock 12 may be connected to a standby relay 8 for control thereof and a mains filter 7 may be provided connected to the first connector block 11.

[0027] In the embodiment of Figure 4, which is not part of the present invention, it is shown that various cable types may be utilized for connecting the components of the power supply arrangement for the cooker hood 1. For example, a 3-wire cable type 3p is provided to connect the EC motor 2 to the mains supply terminal 6, whereas a 2-wire cable type 2p is utilized for connecting the lighting element driver 4 to the mains supply terminal 6. The control unit 5/user interface is connected to the lighting element driver 4 and the EC motor 2 through a 6-wire cable 6p connected to the second connector block 12, which is connected to the lighting element driver 4 with a 4-wire cable type 4p. The EC motor 2 is connected to the second connector block 12 with a 2-wire cable type 2p.

[0028] Even though the embodiment of Figure 4 depicts a specific embodiment of the cooker hood 1, which is not part of the present invention, and in particular a power supply arrangement thereof, no centralized power board or PCB is used to separately feed the control unit 5 from the mains supply terminal 6. That is, the control unit 5 is powered by the lighting element driver 4 and there is no need to separately transform electrical power supplied at the mains supply terminal 6, e.g. using a separate inverter, for powering the control unit 5. The lighting element driver 4 already provides a suitable voltage and sufficient power for powering the control unit 5 in addition to the one or more lighting elements 3. In this way a complex, expensive and vulnerable power board can be dispensed with and as such electrical circuit complexity of the cooker hood 1 is reduced considerably, as well as manufacturing cost.

[0029] In light of the above disclosure the present invention further relates to a power supply arrangement for a cooker hood or kitchen extraction exhaust unit, wherein the power supply arrangement comprises a mains supply terminal 6, one or more lighting elements 3, a lighting element driver 4 connected to the mains supply terminal 6 and the one or more lighting elements 3. There is further provided an electronically commuted (EC) motor 2 driving a fan, wherein a power supply terminal of the EC motor 2 is directly connected to the mains supply terminal 6 and a control terminal of the EC motor 2 is connected to a control unit 5, wherein the control unit 5 is connected to a power supply output of the lighting element driver 4.

[0030] In conformity with the cooker hood 1 as disclosed above, the power supply arrangement circumvents the use of a power board or PCB for distributing power and/or control signals to/from a control unit 5, an EC motor 2 and a lighting element driver 4. Instead, the lighting element driver 4 can be utilized to provide power to the control unit 5, which is then able to communicate with the EC motor 2 and/or the one or more lighting elements 3 for control thereof. Electrical connections for power and control signal distribution is then realized with standard electrical cable types.

[0031] The scope of protection is defined in the appended claims.

Claims

1. Cooker hood, comprising a mains supply terminal (6), one or more lighting elements (3), a lighting element driver (4) connected to the mains supply terminal (6) and the one or more lighting elements (3), and an electronically commuted (EC) motor (2) driving a fan, **characterized in that** a power supply terminal of the EC motor (2) is directly connected to the mains supply terminal (6) and a control terminal of the EC motor (2) is connected to a control unit (5), wherein the control unit (5) is connected to a power supply output of the lighting element driver (4)

2. Cooker hood according to claim 1, wherein the control unit (5) is integrated with a user interface of the cooker hood

3. Cooker hood according to claim 1 or 2 wherein the one or more lighting elements (3) are LED lighting elements, and the lighting element driver (4) is a LED power supply

4. Cooker hood according to any one of claims 1 to 3, wherein the control unit (5) is connected to the lighting element driver (4) to control operating parameters of the lighting elements (3)

5. Cooker hood according to any one of claims 1 to 4, wherein the control unit (5) is arranged to control an operating speed of the EC motor (2) using an analogue control signal or a pulse width modulated signal

Patentansprüche

1. Dunstabzugshaube, die einen Netzanschluss (6), ein oder mehrere Leuchtelemente (3), eine Leuchtelementsteuerung (4), die mit dem Netzanschluss (6) und dem einen oder den mehreren Leuchtelementen (3) verbunden ist, und einen bürstenlosen Gleichstrommotor (EC-Motor) (2), der ein Gebläse antreibt, umfasst, **dadurch gekennzeichnet, dass** ein Netzteilanschluss des EC-Motors (2) direkt mit dem Netzanschluss (6) verbunden ist und dass ein Steueranschluss des EC-Motors (2) mit einer Steuereinheit (5) verbunden ist, wobei die Steuereinheit (5) mit einem Netzteilausgang der Leuchtelementsteuerung (4) verbunden ist.

2. Dunstabzugshaube nach Anspruch 1, wobei die Steuereinheit (5) mit einer Benutzerschnittstelle der Dunstabzugshaube einteilig ausgebildet ist.

3. Dunstabzugshaube nach Anspruch 1 oder 2, wobei das eine oder die mehreren Leuchtelemente (3) LED-Leuchtelemente sind und wobei die Leuchtelementsteuerung (4) ein LED-Netzteil ist.

4. Dunstabzugshaube nach einem der Ansprüche 1 bis 3, wobei die Steuereinheit (5) mit der Leuchtelementsteuerung (4) verbunden ist, um Betriebsparameter der Leuchtelemente (3) zu steuern.

5. Dunstabzugshaube nach einem der Ansprüche 1 bis 4, wobei die Steuereinheit (5) so ausgelegt ist, dass sie eine Betriebsgeschwindigkeit des EC-Motors (2) unter Verwendung eines analogen Steuersignals oder eines Signals mit Pulsweitenmodulation steuert.

Revendications

1. Hotte de cuisinière comprenant une borne d'alimentation secteur (6), un ou plusieurs éléments d'éclairage (3), un dispositif de commande d'élément d'éclairage (4) raccordé à la borne d'alimentation secteur (6) et à l'un ou plusieurs éléments d'éclairage (3), et un moteur (2) à commutation électronique (EC) entraînant un ventilateur, **caractérisé en ce qu'**une borne d'alimentation du moteur EC (2) est raccordée directement à la borne d'alimentation secteur (6) et une borne de commande du moteur EC (2) est raccordée à une unité de commande (5), dans laquelle l'unité de commande (5) est raccordée à une sortie d'alimentation du dispositif de commande d'élément d'éclairage (4).

2. Hotte de cuisinière selon la revendication 1, dans laquelle l'unité de commande (5) est intégrée avec une interface utilisateur de la hotte de cuisinière.

3. Hotte de cuisinière selon la revendication 1 ou 2, dans laquelle l'un ou plusieurs éléments d'éclairage (3) sont des éléments d'éclairage à LED, et le dispositif de commande d'éléments d'éclairage (4) est une alimentation pour LED.

4. Hotte de cuisinière selon l'une quelconque des re-

vendications 1 à 3, dans laquelle l'unité de commande (5) est raccordée au dispositif de commande d'éléments d'éclairage (4) pour commander les paramètres de fonctionnement des éléments d'éclairage (3).

5. Hotte de cuisinière selon l'une quelconque des revendications 1 à 4, dans laquelle l'unité de commande (5) est disposée pour commander une vitesse de fonctionnement du moteur EC (2) à l'aide d'un signal de commande analogique ou d'un signal modulé en largeur d'impulsion.

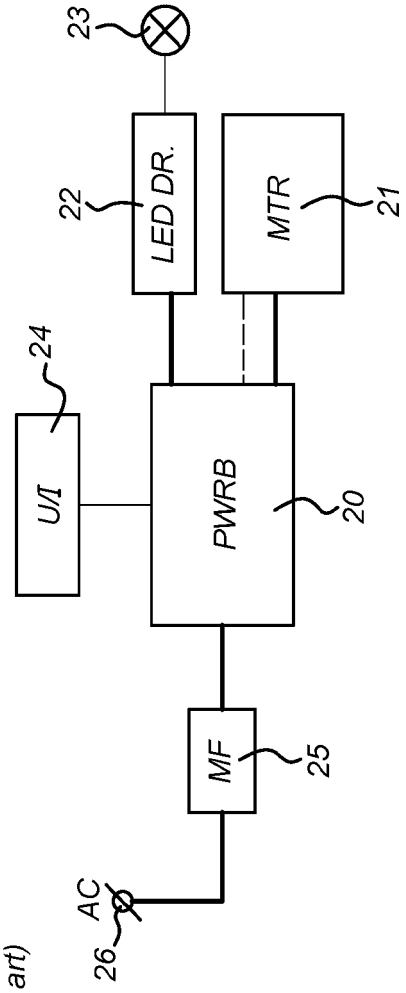

Fig. 1 (Prior art)

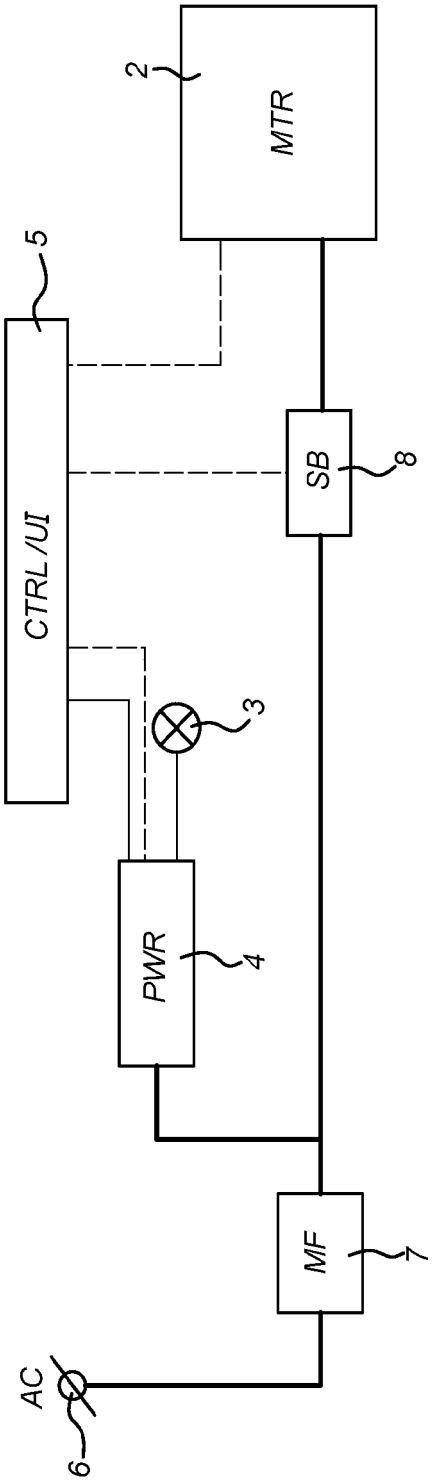

Fig. 2

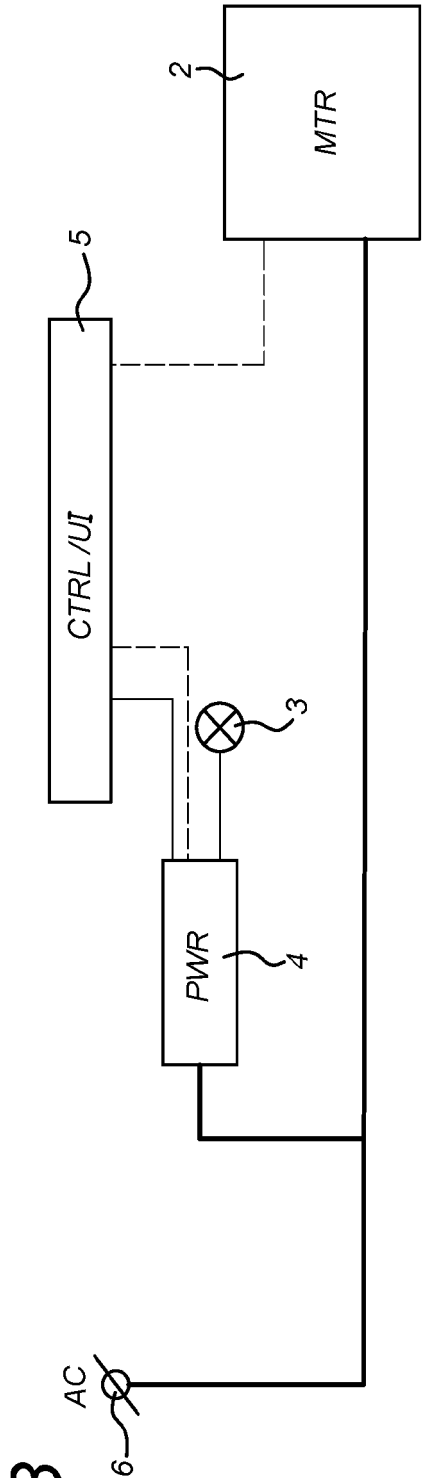
2
MTR
5
CTRL/UI
3
PWR
4
AC
6

Fig. 3

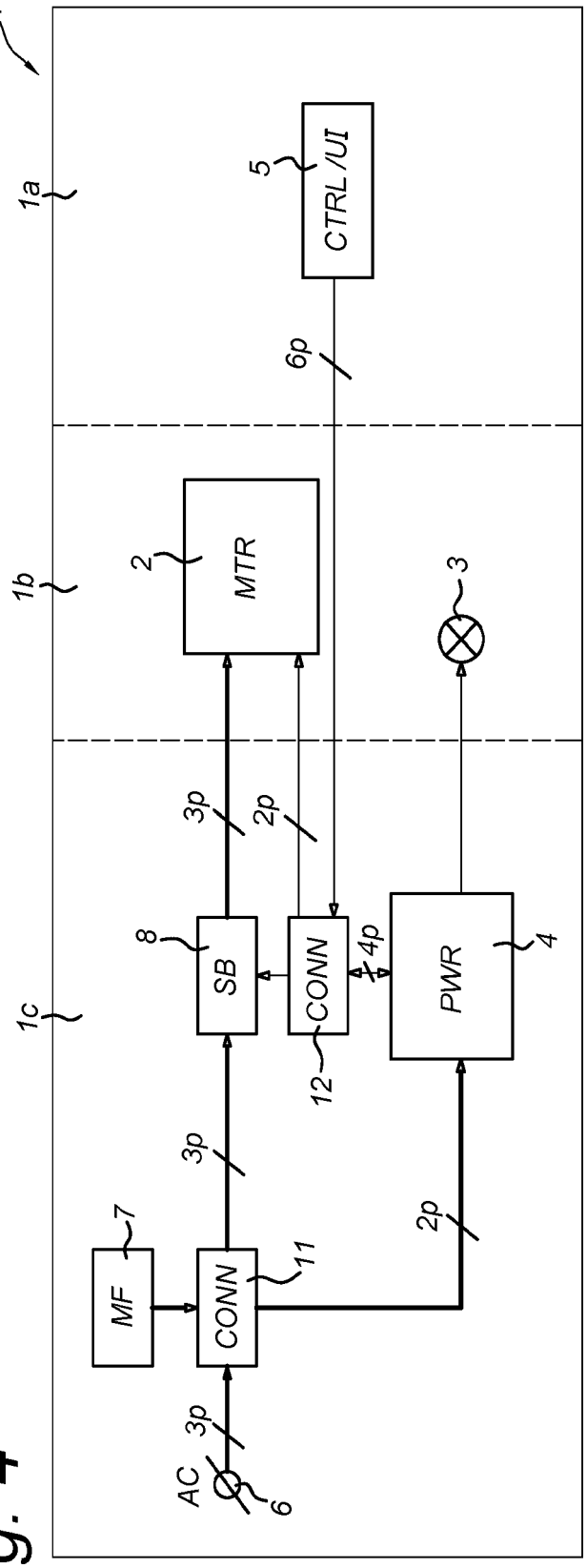
1
1a
5
CTRL/UI
6p
1b
2
MTR
3
3p
2p
8
SB
CONN
4p
PWR
4
1c
12
3p
2p
7
MF
CONN
11
AC
3p
6

Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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