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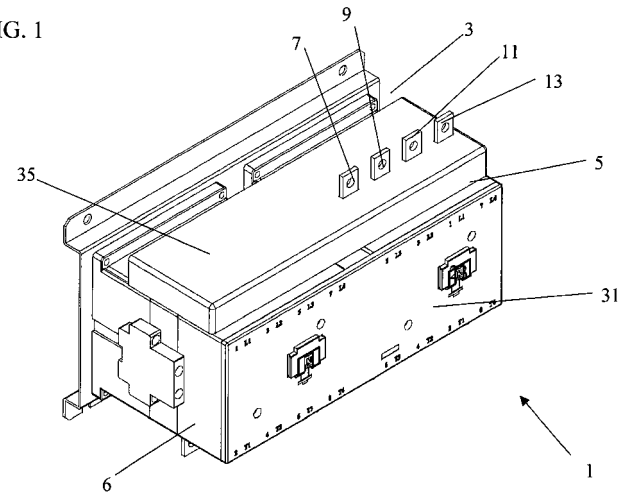
(54) Electro-mechanical switching component with electro-magnetic control for electricity-generating units or emergency generators

(57) A switching component of electric lines with electro-magnetic control (1) is described, for electricity-generating units or emergency electric energy generators, comprising: at least one metallic base (3); at least one first four-pole actuating member with electro-magnetic control (5) equipped with eight respective terminals, four terminals (7, 9, 11, 13) for connecting to users, one of which (7) is a neutral pole, and four terminals (X, Y, W, Z) for connecting with a generator, one of which (Z) is a neutral pole, and at least one second four-pole actuating member with electro-magnetic control (6) equipped with four respective terminals (15, 17, 19, 21) for connection to mains, one of which (15) is a neutral pole, wherein the first and the second actuating member (5, 6) are assembled on the metallic base (3) and rigidly mutually interconnected, being enclosed by a front protecting element (31), that joins the first and the second actuating member (5, 6); wherein the first and the second actuating member (5, 6) are assembled with the power connections for switching between mains and electricity-generating unit or emergency generator and the neutral pole (13) of the first actuating member (5) is connected to the neutral pole of the second actuating member (6) through first connecting means (23), the second pole (11) of the first actuating member (5) is connected to the second pole of the second actuating member (6) through second connecting means (25), the third pole (9) of the first actuating member (5) is connected to the third pole of the second actuating member (6) through third connecting means (27), and the fourth pole (7) of the first actuating member (5) is connected to the fourth pole of the second actuating member (6) through fourth connecting means (29).

FIG. 1



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Description

[0001] The present invention refers to a switching component of electric lines with electro-magnetic control to be assembled also on electricity-generating units and/or emergency electric energy generators.

[0002] The generators of electric energy actuated by internal combustion engines, commonly called electricity-generating units, and other emergency generating systems, are connected to users through electric switching devices, composed of two manual sectioning devices or with remotely-controlled electro-magnetic control. Such devices are installed in an electric cabinet with the suitable connections to perform switching, arranged by the operator responsible for assembling.

[0003] The devices with electro-magnetic control are composed of many components and need a mechanical assembling and en electric wiring, with consequent increase, for higher powers, of overall sizes and weight of the sheet cabinet that must contain them.

[0004] Object of the present invention is solving the current art problems, by providing a single component with reduced global sizes, comprising the function of remote electro-magnetic control and of possible manual control, to be provided to the panel assembling operator, making his assembling easy and comfortable and reducing overall sizes and weight of the electric panel.

[0005] The subject matter of the invention, called "magnetic changeover", is a single electro-mechanical component to which mains cables, emergency generator cables and users cables are directly connected.

[0006] The improvements of use and the advantages of the invention, as will result from the following description, are obtained with the electro-mechanical assembly as claimed in claim 1. Preferred embodiments and non-trivial variations of the present invention are the subject matter of the dependent claims.

[0007] It will be immediately obvious that numerous variations and modifications (for example related to shape, sizes, arrangements and parts with equivalent functionality) can be made to what is described, without departing from the scope of the invention as appears from the enclosed claims.

[0008] The present invention will be better described by some preferred embodiments thereof, provided as a nonlimiting example, with reference to the enclosed drawings, in which:

Figure 1 is a front perspective view of a preferred embodiment of the electro-mechanical component of the present invention;

Figure 2 is a front view of the electro-mechanical component of Figure 1 from which the upper protection has been removed;

Figure 3 is a front perspective view of the electro-mechanical component of Figure 2; and

Figure 4 is a front perspective view of a further preferred embodiment of the electro-mechanical component of the present invention.

[0009] With reference to the Figures, the switching component with electro-magnetic control 1, suitable for electricity-generating units or emergency electric energy generators, substantially comprises:

at least one metallic base 3, comprising the holes for fastening the component;

- at least one first four-pole actuating member with electro-magnetic control 5 equipped with eight respective terminals, four terminals 7, 9, 11, 13 for connection to users, one of which 7 is a neutral pole, and four terminals X, Y, W, Z for connection to the generator, one of which Z is a neutral pole, and at least one second four-pole actuating member with electro-magnetic control 6 equipped with four respective terminals 15, 17, 19, 21 for connection to mains, one of which 15 is a neutral pole, wherein the first and the second actuating member (5, 6) are assembled on the metallic base 3 and mutually rigidly interconnected, being enclosed by a front protecting element 31, that joins the first and the second actuating member (5, 6) and by interposing the mechanical interlock. The front protection 31 also comprises indications of the phases to be connected to the respective terminals.

[0010] Such terminals are designated for each device, in compliance with IEC standards, with letters L1, L2, L3 for the three supply phases and L4 for the neutral, and with letters T1, T2, T3 for the three user phases and T4 for the neutral.

[0011] In the herein described arrangement, in order to make the compact configuration characteristic of the invention, the terminals of the first and second four-pole driving members 5, 6 are connected by power connections for switching between mains and electricity-generating unit, keeping on the right position of every one the terminals for connecting to the neutral (this allows keeping, for the connecting cable to neutral, the standard position of electric installations typically with neutral on the right).

[0012] The further power connections are: the neutral 13 of the right actuating member 5 is connected to the neutral pole of the left actuating member 6 through a first connecting component 23, the second pole 11 of the right actuating member 5 is connected to the second pole of the left actuating member 6 through a second connecting component 25, the third pole 9 of the right actuating member 5 is connected to the third pole of the left actuating member 6 through a third connecting component 27, and the fourth pole 7 of the right actuating member 5 is connected to the fourth pole of the left actuating member 6 through a fourth connecting component 29.

[0013] In a preferred, but absolutely not limiting, embodiment of the present invention, the position of the respective neutral poles Z of the switching members 5, 6

is, as shown, the right one with respect to the other poles and by looking at the component 1 on its front side.

[0014] The first, second, third and fourth connecting components 23, 25, 27, 29 can be composed of straps bolted to the poles, as shown in Figures 2 and 3, or fastened with other mechanical means.

[0015] Moreover, the terminals of the poles 15, 17, 19, 21 of the actuating member on mains side 5 and the terminals X, Y, W, Z of the actuating member on generator side 6 can receive a mantle-type terminal with IP20 protection for the direct connection of cables.

[0016] The actuating member on mains side can be equipped with a magnetic coupling device (not shown) suitable to keep the closing position of the poles without consuming energy, guaranteeing the service continuity also in case of malfunction and/or interruption of a coil and/or anomalous mains voltage drops.

[0017] Moreover, every actuating member can be equipped with a magnetic coupling device suitable to keep the closing position of the poles without consuming energy, guaranteeing the service continuity also in case of malfunction and/or interruption of a coil and/or anomalous mains voltage drops.

[0018] With the two above arrangements, equipped with magnetic coupling on left and/or right actuating members, it is possible to insert a mechanism 33 suitable to perform, with a manual action, the alternative closure, on mains side or on generator side of the device, in case of lack of auxiliary supply to coils or their malfunction or interruption.

[0019] The inventive electro-mechanical switching component 1 can be provided in a panel with protected execution according to reference IEC standard, fastened onto the internal metallic plate, also comprising a DIN raceway for assembling auxiliary components; on the door of the same hood, a recess is obtained with a removable front panel adapted to receive control elements.

[0020] Finally, the poles 7, 9, 11, 13 of the right actuating member for connection to users can be composed of terminals with copper band of a suitable length to assemble through-amperometric transformers for measuring the delivered energy.

[0021] For the electric signaling of the opened-closed position of each one of the two actuating members, at least one auxiliary contact with insulated normally-opened / normally-closed poles is assembled on the right and left sides of the switching member. The normally-closed auxiliary contact assembled on both sides of the subject of the invention is used for electrically interlocking the two actuating members jointly with the mechanical interlock assembled thereon, guaranteed a double safety lock against the chance of simultaneous supply of the two actuating members.

[0022] The inventive electro-mechanical switching component 1 can be provided with an electronic card for controlling the supply of the coils of the two actuating members for continuously monitoring the status of the control voltage and is able to recognise the potential risks such as out-of-range voltages or mechanical preventions to closure that would imply a damage to the coils.

[0023] Moreover, the electro-mechanical switching component 1 of the invention can have three power poles without neutral.

[0024] Finally, the electro-mechanical switching component 1 of the invention can also comprise the device 35 for protecting from accidental contact with the live actuating members 5, 6.

Claims

1. Switching component of electric lines with electromagnetic control (1) for electricity-generating units or emergency electric energy generators, **characterised in that** it comprises:

   - at least one metallic base (3);
   - at least one first four-pole actuating member with electro-magnetic control (5) equipped with eight respective terminals, four terminals (7, 9, 11, 13) for connecting to users, one of which (7) is a neutral pole, and four terminals (X, Y, W, Z) for connecting with a generator, one of which (Z) is a neutral pole, and at least one second four-pole actuating member with electro-magnetic control (6) equipped with four respective terminals (15, 17, 19, 21) for connection to mains, one of which (15) is a neutral pole, wherein the first and the second actuating member (5, 6) are assembled on the metallic base (3) and rigidly mutually interconnected, being enclosed by a front protecting element (31), that joins the first and the second actuating member (5, 6);
   - wherein the first and the second actuating member (5, 6) are assembled with the power connections for switching between mains and electricity-generating unit or emergency generator and the neutral pole (13) of the first actuating member (5) is connected to the neutral pole of the second actuating member (6) through first connecting means (23), the second pole (11) of the first actuating member (5) is connected to the second pole of the second actuating member (6) through second connecting means (25), the third pole (9) of the first actuating member (5) is connected to the third pole of the second actuating member (6) through third connecting means (27), and the fourth pole (7) of the first actuating member (5) is connected to the fourth pole of the second actuating member (6) through fourth connecting means (29).

2. Electro-mechanical switching component (1) according to claim 1, **characterised in that** the position of the respective neutral poles (7, 15, Z) of the two actuating members (5, 6) is the one on the right

with respect to the other poles and looking at the component (1) on its front side.

3. Electro-mechanical switching component (1) according to claim 1, **characterised in that** it has three power poles without neutral.

4. Electro-mechanical switching component (1) according to claim 1, **characterised in that** said first, second, third and fourth connecting means (23, 25, 27, 29) are composed of copper straps or cables.

5. Electro-mechanical switching component (1) according to claim 1, **characterised in that** it further comprises a protecting element (35) from the accidental contact with live actuating members (5, 6).

6. Electro-mechanical switching component (1) according to claim 1, **characterised in that** the terminals of the poles for connecting to mains and emergency unit are of a type with mantle with IP20 protection.

7. Electro-mechanical switching component (1) according to claim 1, **characterised in that** it is further equipped with a magnetic coupling device on the actuating member on mains side, adapted to keep the service continuity without energy consumption and also in case of malfunction of a coil and/or anomalous mains voltage drops.

8. Electro-mechanical switching component (1) according to claim 7, **characterised in that** it is further equipped with a magnetic coupling device on generator side adapted to keep the service continuity without energy consumption and also in case of malfunction of a coil and/or anomalous mains voltage drops.

9. Electro-mechanical switching component (1) according to claim 7 or 8, **characterised in that** it is further equipped with at least one mechanism (33) adapted to be used together with the magnetic coupling device for the manual closure of the actuating members (5, 6) in case of lack of auxiliary supply or coil failure.

10. Electro-mechanical switching component (1) according to claim 1, **characterised in that** it is further equipped with at least one hood in protected execution according to reference IEC standards comprising a metallic plate with the electro-mechanical component (1) assembled thereon, with a raceway for assembling auxiliary components, and equipped with a recess with removable front panel adapted to receive control elements.

11. Electro-mechanical switching component (1) according to claim 1, **characterised in that** the terminals (7, 9, 11, 13) for connecting users of the first actuating member (5) are composed of terminals whose length is suitable for assembling amperometric through-transformers.

12. Electro-mechanical switching component (1) according to claim 1, **characterised in that** it has a normally-opened signalling contact for each one of the driving members for signalling the closure state of the main contacts (1).

13. Electro-mechanical switching component (1) according to claim 1, **characterised in that** it is equipped with an electronic circuit for controlling the supply of the coils of the two actuating members in order to continuously monitoring the voltage status and prevent possible damages to the coils.

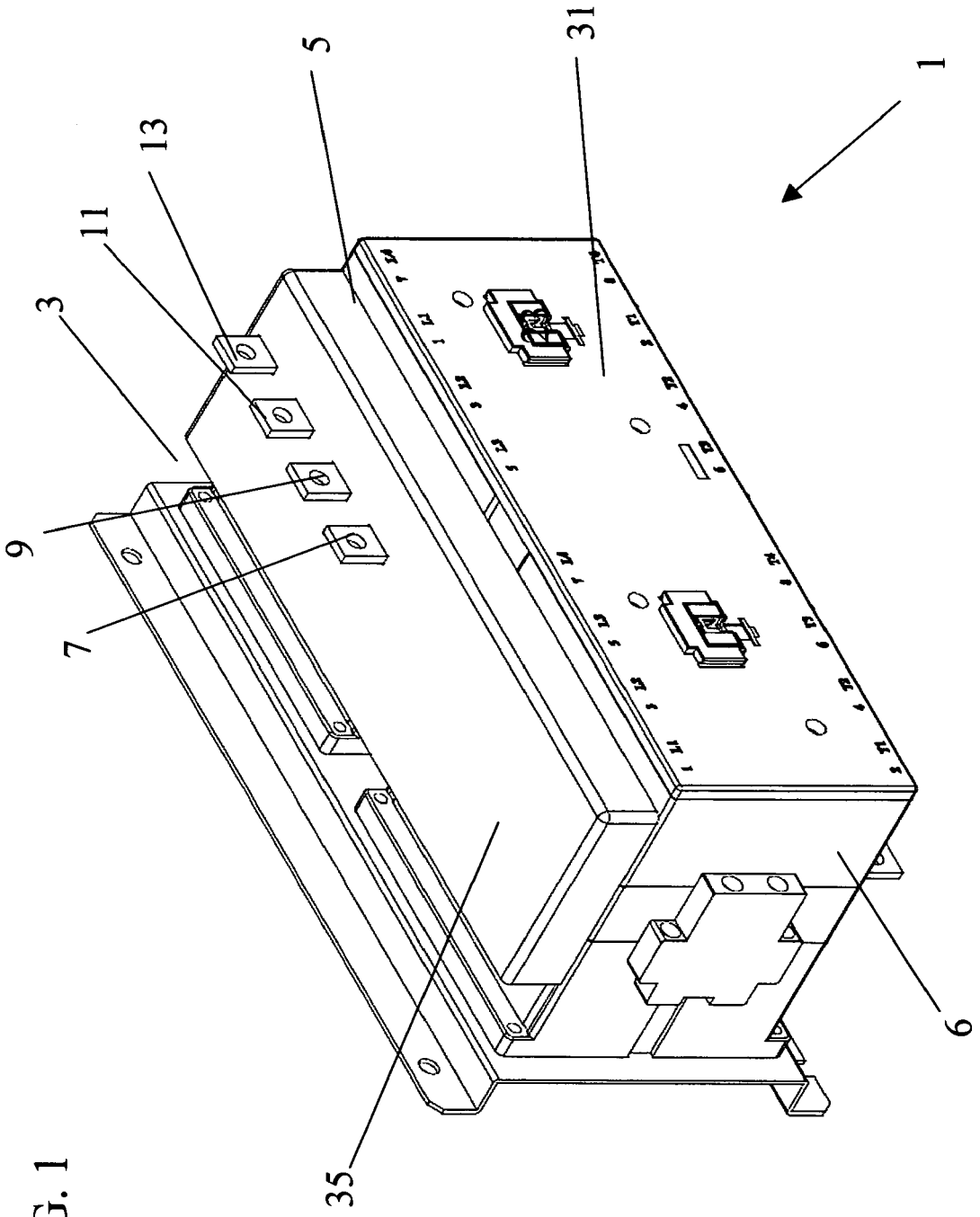

FIG. 1

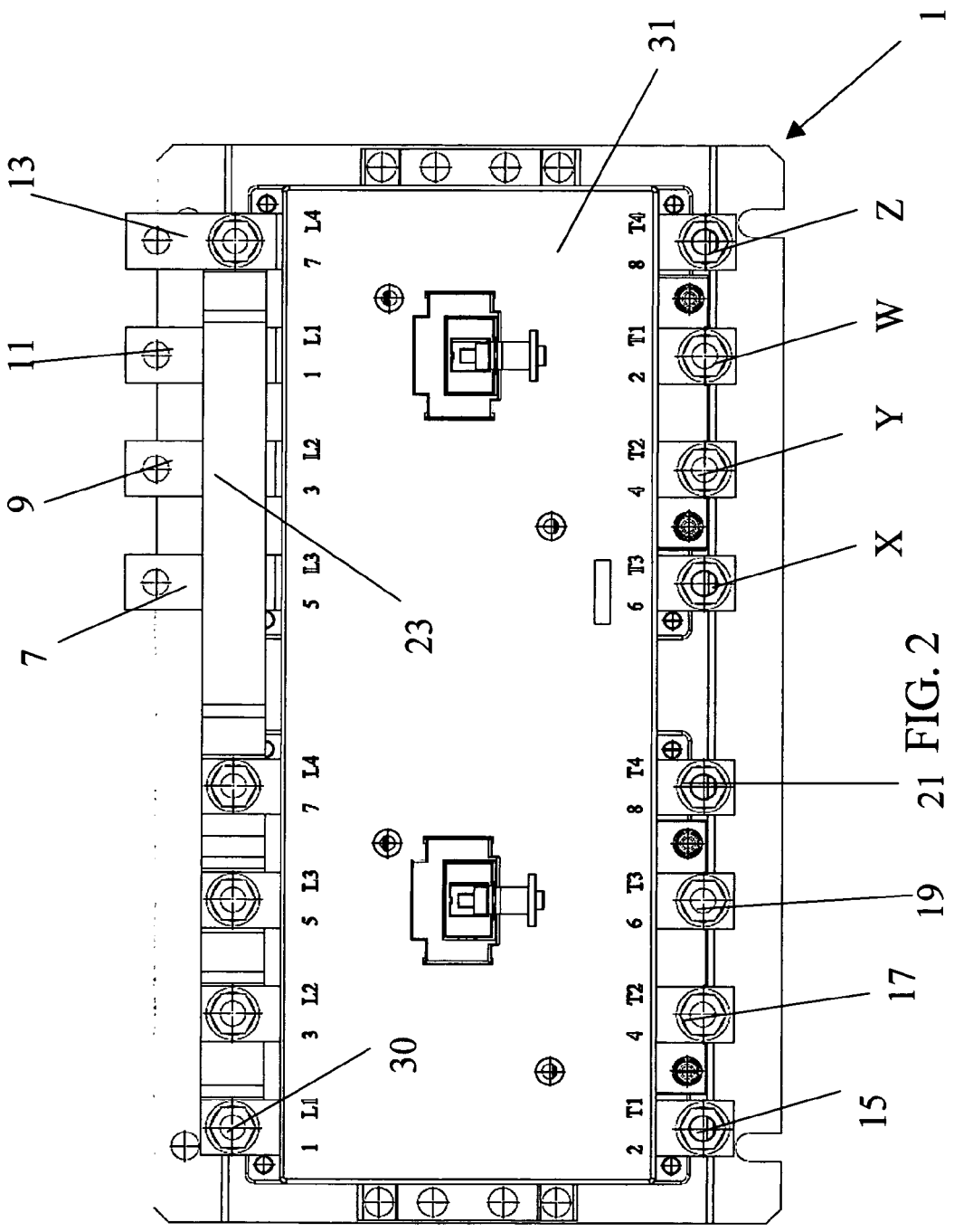

FIG. 2

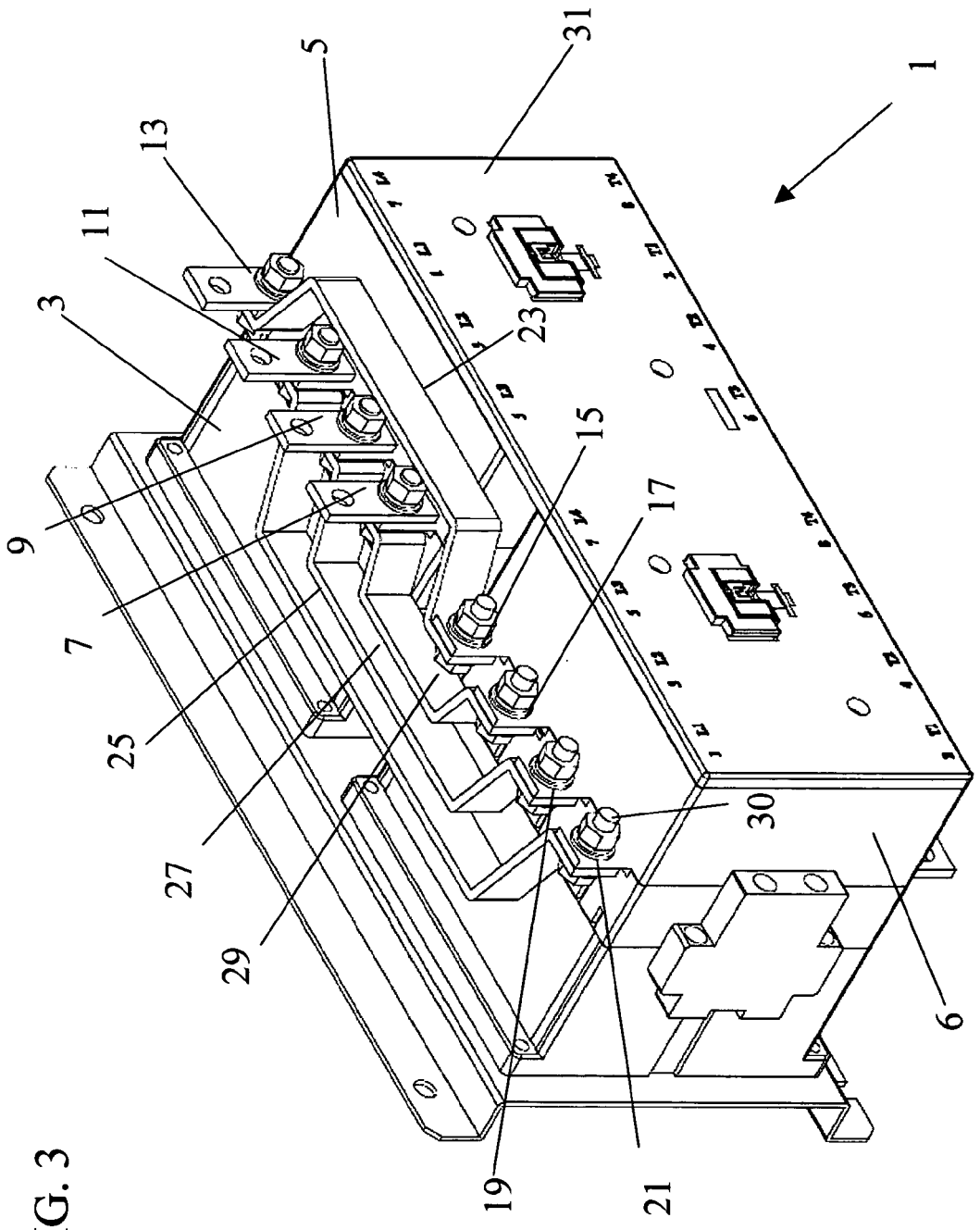

FIG. 3

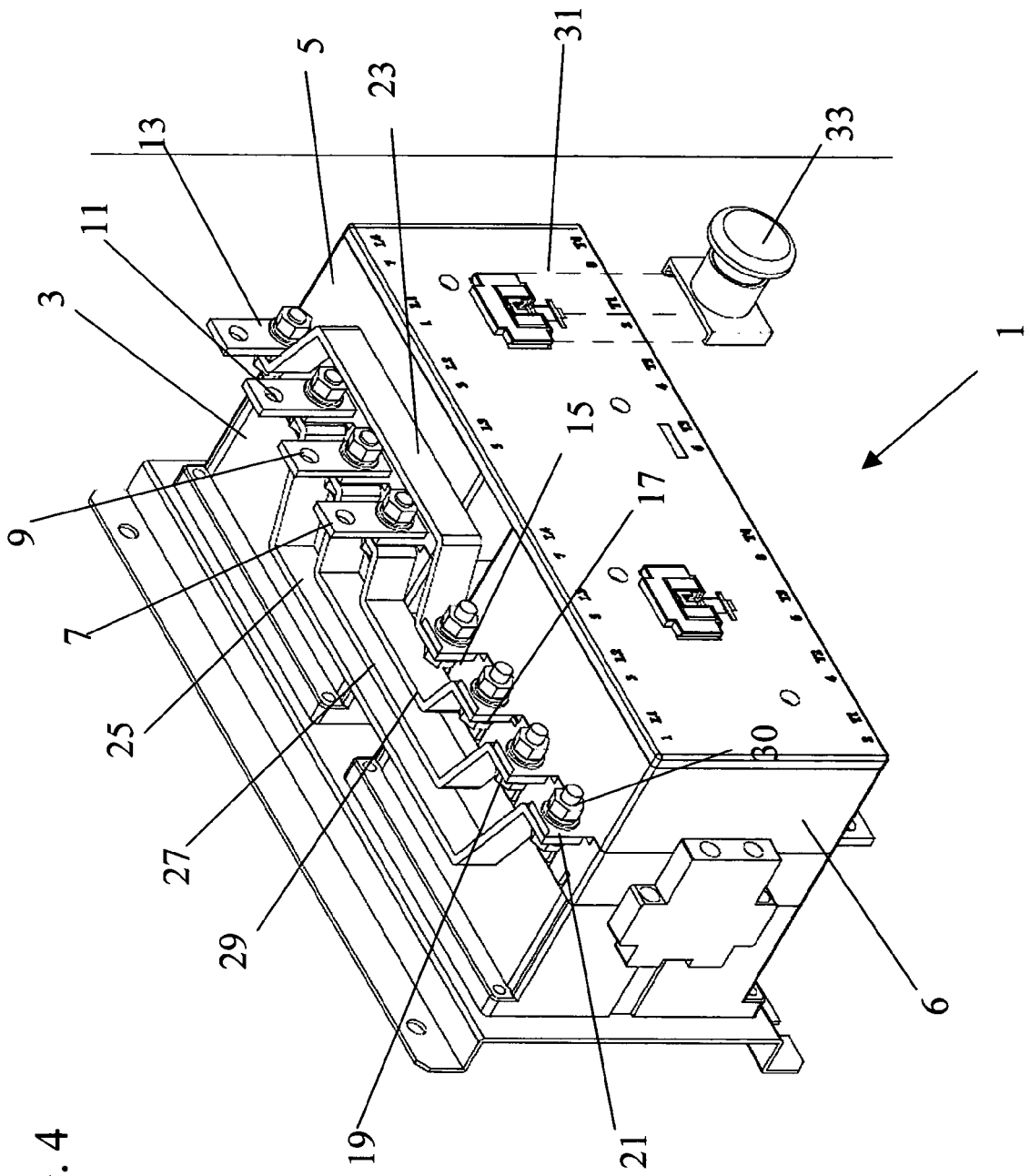

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 10 42 5337

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TECHNICAL FIELDS SEARCHED (IPC)

H01H
H02B
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 March 2011	Ernst, Uwe

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