

(19)



LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Économie

(11)

N° de publication :

LU500235

(12)

BREVET D'INVENTION**B1**

(21)

N° de dépôt: LU500235

(51)

Int. Cl.:
H01M 10/48, H01M 10/61

(22)

Date de dépôt: 02/06/2021

(30)

Priorité:

(72)

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(43)

Date de mise à disposition du public: 02/12/2021

(74)

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Date de délivrance: 02/12/2021

(73)

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ENERGY STORAGE DEVICE.

(57)

An energy storage device, including a container, an energy storage battery pack and a power converter module accommodated in the container. The container is provided with an accommodation space accommodating the energy storage battery pack and the power converter module, a plurality of double-doors, and a canopy; the plurality of double-doors are arranged at one side of the container; the canopy is arranged at one end of the container; the energy storage battery pack includes a plurality of battery clusters connected in parallel and arranged at intervals; the plurality of battery clusters are accommodated at one side of the accommodation space near the double-doors; each battery cluster directly faces one double-door; and the power converter module is accommodated at one end of the accommodation space near the canopy, and used for performing alternating current(AC)/direct current (DC) conversion and connecting the energy storage battery pack into a power grid.

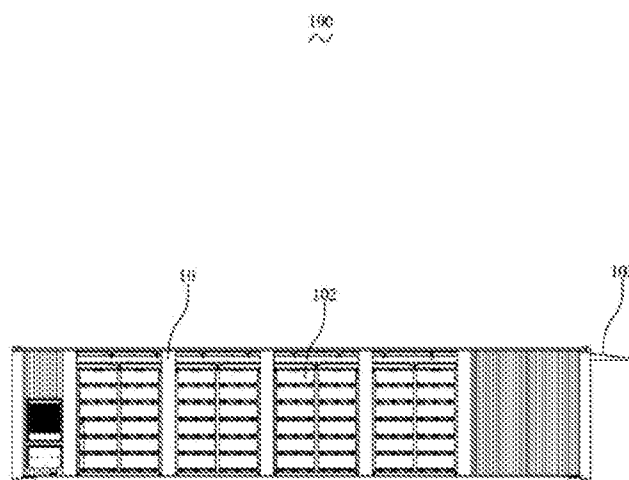


FIG. 1

DESCRIPTION**ENERGY STORAGE DEVICE****TECHNICAL FIELD**

The present invention relates to the technical field of energy storage equipment, in particular to an energy storage device.

BACKGROUND OF THE PRESENT INVENTION

The battery energy storage system is a general technology which can be widely applied to the fields of power grid, pulse power and the like. The battery energy storage system can be used for peak-load shifting in the power grid to meet the power supply demands of the urban distribution network in different periods and regions when power consumption peaks and valleys occur, and can be used for charging pulse capacitors in the field of pulse power; and the mechanical and acoustic characteristics produced by the discharge of the pulse capacitors are widely applied to the geological exploration, construction waste recovery, sewage treatment, shale gas mining and other industries. In the prior art, large battery energy storage systems usually take containers as carriers of energy storage batteries to facilitate mobile transportation. However, the energy storage batteries are relatively large in volume and weight, and thus are not easy to be loaded into the containers.

In view of this, it is necessary to provide an energy storage device to overcome the above defects.

SUMMARY OF THE PRESENT INVENTION

The purpose of the present invention is to provide an energy storage device, and aims to facilitate the loading of an energy storage battery pack in the energy storage device by modifying a container.

To achieve the above purpose, the present invention provides an energy storage device, which includes a container as well as an energy storage battery pack and a power converter module which are accommodated in the container. The container is provided with an accommodation space for accommodating the energy storage battery pack and the power converter module, a plurality of double-doors for communicating the accommodation space with the outside, and a canopy; the plurality of double-doors are arranged at one side of the container; and the canopy is arranged at one end of the container. The energy storage battery pack includes a plurality of battery clusters which are connected in parallel and arranged at intervals; the plurality of battery clusters are accommodated at one side of the accommodation space near the double-doors; and each battery cluster directly faces one double-door. The power converter module is accommodated at one end of the accommodation space near the canopy, and used for performing alternating current (AC)/direct current (DC) conversion and connecting the energy storage battery pack into a power grid.

Further, the side of the energy storage battery pack far away from the double-doors is spaced from an inner wall of the container to form an overhaul channel.

Further, the energy storage device also includes electrical connection components, which are fixed on the inner wall of the container, located above the overhaul channel, and used for connecting the plurality of battery clusters in parallel and then electrically connecting the battery clusters with the power converter module.

Further, the power converter module includes two bidirectional energy storage converters; and the bidirectional energy storage converters are electrically connected with the same number of battery clusters through the electrical connection components. Each electrical connection component includes a plurality of parallel copper bars; each battery cluster includes at least two battery modules; and each parallel copper bar connects the battery modules in one battery cluster in parallel and then is electrically connected with the corresponding bidirectional energy storage

converter.

Further, the energy storage device also includes a battery management system which is electrically connected with the energy storage battery pack, the power converter module and the electrical connection components for controlling a working state of the energy storage device.

Further, the battery management system is provided with an air conditioning component. The air conditioning component is accommodated at one end of the accommodation space far away from the power converter module, and is provided with an air supply duct which is located above the energy storage battery pack and fixed on the inner wall of the container for heating or cooling the energy storage battery pack.

Further, the battery management system is also provided with a fire-fighting component which includes a fire-fighting pipeline and a plurality of alarms arranged on the fire-fighting pipeline; and the fire-fighting pipeline is connected with the inner wall of the container and located above the energy storage battery pack. The plurality of alarms correspond to the plurality of battery clusters one by one; and the fire-fighting pipeline is provided with at least one spray nozzle for spraying fire extinguishing substances above each battery cluster.

In the energy storage device provided by the present invention, the double-doors are arranged on the container so that the energy storage battery pack can be mounted on the container through the double-doors. Thus, the installation of the energy storage battery pack is more simple and rapid, and the maintenance and replacement of the energy storage battery pack are also facilitated.

To make the above purposes, features and advantages of the present invention more obvious and understandable, the preferred embodiments of the present invention will be described in detail below in combination with the accompanying drawings as follows.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front view of an energy storage device provided by the present invention;

Fig. 2 is a top view of the energy storage device shown in Fig. 1;

Fig. 3 is a circuit connection diagram of the energy storage device shown in Fig. 1; and

Fig. 4 is an enlarged view of region A shown in Fig. 2.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

To make purposes, technical solutions and beneficial technical effects of the present invention clearer, the present invention will be further described in detail with reference to the accompanying drawings and specific embodiments. It should be understood that the specific embodiments illustrated in the description are used for only explaining the present invention, rather than limiting the present invention.

Referring to Figs. 1-4, the present invention provides an energy storage device 100 which is mainly used for facilitating the installation of an energy storage battery pack.

In an embodiment of the present invention, the energy storage device 100 includes a container 10, as well as an energy storage battery pack 20 and a power converter module 30 which are accommodated in the container 10. The container 10 is provided with an accommodation space 101 for accommodating the energy storage battery pack 20 and the power converter module 30, a plurality of double-doors 102 for communicating the accommodation space 101 with the outside, and a canopy 103; the plurality of double-doors 102 are arranged at one side of the container 10; and the canopy 103 is arranged at one end of the container 10. The energy storage battery

pack 20 includes a plurality of battery clusters 201, which are connected in parallel and arranged at intervals; the plurality of battery clusters 201 are accommodated at one side of the accommodation space 101 near the double-doors 102; and each battery cluster 201 directly faces a double-door 102. The power converter module 30 is accommodated at one end of the accommodation space 101 near the canopy 103, and used for performing AC/DC conversion and connecting the energy storage battery pack 20 into a power grid 200.

It is understandable that the double-doors 102 can serve as windows through which the energy storage battery pack 20 enters the container 10, so that each battery cluster 201 can be conveniently loaded into the container 10 through the corresponding double-door 102 by using tools such as forklifts, thereby shortening the time for mounting the energy storage battery pack 20. Meanwhile, the double-doors 102 can also serve as maintenance and replacement windows of the energy storage battery pack 20, so that workers do not have to maintain and replace the energy storage battery pack 20 in the narrow container 10. The canopy 103 plays a role of blocking rain. It should be explained here that, for the convenience of the workers to check or operate the working state of the power converter module 30, an access door (not shown) for the workers to enter and exit is further arranged at one end of the container 10 provided with the power converter module 30, and the canopy 103 is used for preventing the access door from being corroded by rain and rusted.

Further, the side of the energy storage battery pack 20 far away from the double-doors 102 is spaced from an inner wall of the container 10 to form an overhaul channel 104. The overhaul channel 104 provides a space for the workers to perform daily overhaul on the energy storage battery pack 20, thereby facilitating the workers to check the working state of the energy storage battery pack 20.

More specifically, the energy storage device 100 further includes electrical connection components 40 which are fixed on the inner wall of the container 10 and located above the overhaul channel 104. The electrical connection components 40

connect the plurality of battery clusters 201 in parallel and then are electrically connected with the power converter module 30. It is understandable that the electrical connection components 40 are arranged above the overhaul channel 104. On one hand, the workers can wire and overhaul circuits conveniently to find out problems in time, and on the other hand, the electrical connection components 40 can be far away from the energy storage battery pack 20 to improve the safety performance. For example, the electrical connection components 40 can be disconnected rapidly when the energy storage battery pack 20 goes wrong, or the use of the energy storage battery pack 20 will not be affected by defective spark of the electrical connection components 40.

In the present embodiment, the power converter module 30 includes two bidirectional energy storage converters 301; and the bidirectional energy storage converters 301 are electrically connected with the same number of battery clusters 201 through the electrical connection components 40. Correspondingly, each electrical connection component 40 includes a plurality of parallel copper bars 401; each battery cluster 201 includes at least two battery modules 2011; and each parallel copper bar 401 connects the battery modules 2011 in one battery cluster 201 in parallel and then is electrically connected with the corresponding bidirectional energy storage converter 301.

Further, the energy storage device 100 further includes a battery management system 50 which is electrically connected with the energy storage battery pack 20, the power converter module 30 and the electrical connection components 40 for controlling the working state of the energy storage device 100. For example, the battery management system 50 can be used for monitoring a voltage state and a temperature state of each battery module 2011 during working to prevent the battery module 2011 from being over-charged, over-discharged and over-heated. The battery management system 50 can also be used for automatically controlling the working state of the power converter module 30, so that AC of the power grid 200 is converted into DC in low power consumption periods and then is charged into the energy

storage battery pack 20, or DC of the energy storage battery pack 20 is converted into the AC in high power consumption periods and then is inputted into the power grid 200 for use.

Preferably, to prevent the battery module 2011 from being over-heated, the battery management system 50 is provided with an air conditioning component 501. The air conditioning component 501 is accommodated at one end of the accommodation space 101 far away from the power converter module 30, and is provided with an air supply duct 5011 which is located above the energy storage battery pack 20 and fixed on the inner wall of the container 10 for heating or cooling the energy storage battery pack 20. It should be noted here that the power converter module 30 will also generate a large amount of heat when working, so a distance between the air conditioning component 501 and the power converter module 30 should be as long as possible to prevent the heat generated by the power converter module 30 from interfering with the cooling effect of the air conditioning component 501.

Meanwhile, to prevent the battery module 2011 from causing safety accidents of fire or explosion due to overheating, the battery management system 50 is further provided with a fire-fighting component 502 which includes a fire-fighting pipeline 5021 and a plurality of alarms 5022 arranged on the fire-fighting pipeline 5021; and the fire-fighting pipeline 5021 is connected with the inner wall of the container 10 and located above the energy storage battery pack 20. The plurality of alarms 5022 correspond to the plurality of battery clusters 201 one by one; and the fire-fighting pipeline 5021 is provided with at least one spray nozzle 5023 for spraying fire extinguishing substances above each battery cluster 201. In the present embodiment, the alarms 5022 are used for detecting temperature and smoke information in the container 10 to detect whether the battery module 2011 has a potential fire hazard; and the battery management system 50 is used for controlling a switch of the spray nozzle 5023 according to the detection information of the alarms 5022.

The present invention is not only limited to the illustration in the description and the embodiments, so other advantages and modifications can be realized easily by those skilled in the art. Therefore, the present invention is not limited to specific details, representative equipment, and graphical examples shown and described herein without departing from the spirit and scope of general concepts defined by claims and equivalent scopes.

CLAIMS

1. An energy storage device, comprising a container as well as an energy storage battery pack and a power converter module which are accommodated in the container, wherein the container is provided with an accommodation space for accommodating the energy storage battery pack and the power converter module, a plurality of double-doors for communicating the accommodation space with the outside, and a canopy; the plurality of double-doors are arranged at one side of the container; and the canopy is arranged at one end of the container; the energy storage battery pack comprises a plurality of battery clusters which are connected in parallel and arranged at intervals; the plurality of battery clusters are accommodated at one side of the accommodation space near the double-doors; each battery cluster directly faces one double-door; and the power converter module is accommodated at one end of the accommodation space near the canopy, and used for performing alternating current (AC)/direct current (DC) conversion and connecting the energy storage battery pack into a power grid.

2. The energy storage device according to claim 1, wherein the side of the energy storage battery pack far away from the double-doors is spaced from an inner wall of the container to form an overhaul channel.

3. The energy storage device according to claim 2, further comprising electrical connection components which are fixed on the inner wall of the container, located above the overhaul channel, and used for connecting the plurality of battery clusters in parallel and then electrically connecting the battery clusters with the power converter module.

4. The energy storage device according to claim 3, wherein the power converter

module comprises two bidirectional energy storage converters; the bidirectional energy storage converters are electrically connected with the same number of battery clusters through the electrical connection components; each electrical connection component comprises a plurality of parallel copper bars; each battery cluster comprises at least two battery modules; and each parallel copper bar connects the battery modules in one battery cluster in parallel and then is electrically connected with the corresponding bidirectional energy storage converter.

5. The energy storage device according to claim 4, further comprising a battery management system which is electrically connected with the energy storage battery pack, the power converter module and the electrical connection components for controlling a working state of the energy storage device.

6. The energy storage device according to claim 5, wherein the battery management system is provided with an air conditioning component; and the air conditioning component is accommodated at one end of the accommodation space far away from the power converter module, and is provided with an air supply duct which is located above the energy storage battery pack and fixed on the inner wall of the container for heating or cooling the energy storage battery pack.

7. The energy storage device according to claim 6, wherein the battery management system is also provided with a fire-fighting component which comprises a fire-fighting pipeline and a plurality of alarms arranged on the fire-fighting pipeline; the fire-fighting pipeline is connected with the inner wall of the container and located above the energy storage battery pack; the alarms correspond to the battery clusters one by one; and the fire-fighting pipeline is provided with at least one spray nozzle for spraying fire extinguishing substances above each battery cluster.

Patentansprüche

1. Energiespeichervorrichtung, dadurch gekennzeichnet, umfassend einen Container sowie einen Energiespeicherbatteriesatz und ein Umsetzermodule, die in dem Container aufgenommen sind;

dass der Container mit einem Stauraum für den Energiespeicherbatteriesatz und das Umsetzermodule, mehrerer Doppeltüren zur Kommunikation des Stauraums mit der Außenwelt und einem Regenschutz versehen ist, wobei die mehreren Doppeltüren auf einer Seite des Containers angeordnet sind, und der Regenschutz an einem Ende des Containers angeordnet ist;

dass der Energiespeicherbatteriesatz mehrere parallel geschaltete und voneinander beabstandete Batteriecluster umfasst, und die mehreren Batteriecluster auf einer den Doppeltüren zugewandten Seite des Stauraums aufgenommen sind, und jeder Batteriecluster gerade einer der Doppeltüren gegenüberliegt;

dass das Umsetzermodule an einem dem Regenschutz zugewandten Ende des Stauraums aufgenommen ist, und das Umsetzermodule zur AC/DC-Wandlung dient und der Energiespeicherbatteriesatz an das Stromnetz angeschlossen ist.

2. Energiespeichervorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass der Abstand zwischen der von den Doppeltüren abgewandten Seite des Energiespeicherbatteriesatzes und der Innenwand des Containers einen Inspektionskanal bildet.

3. Energiespeichervorrichtung nach Anspruch 2, dadurch gekennzeichnet, ferner umfassend eine elektrische Anschlussanordnung, wobei die elektrische Anschlussanordnung an der Innenwand des Containers befestigt ist und sich oberhalb des Inspektionskanals befindet, und die elektrische Anschlussanordnung nach dem Parallelschalten mehrerer Batteriecluster elektrisch mit dem Umsetzermodule verbunden ist.

4. Energiespeichervorrichtung nach Anspruch 3, dadurch gekennzeichnet, dass das Umsetzermodule zwei bidirektionale Energiespeicherumsetzer umfasst, und jeder bidirektionale Energiespeicherumsetzer über die elektrische Anschlussanordnung elektrisch mit der gleichen Anzahl von Batterieclustern verbunden ist;

dass die elektrische Anschlussanordnung mehrere parallel geschaltete Kupferstangen umfasst, und jeder Batteriecluster mindestens zwei Batteriemodule umfasst, wobei

jede parallel geschaltete Kupferstange nach dem Parallelschalten der Batteriemodule in einem Batteriecluster elektrisch mit dem entsprechenden bidirektionalen Energiespeicherumsetzer verbunden ist.

5. Energiespeichervorrichtung nach Anspruch 4, dadurch gekennzeichnet, ferner umfassend ein Batteriemanagementsystem, wobei das Batteriemanagementsystem elektrisch mit dem Energiespeicherbatteriesatz, dem Umsetzermodule und der elektrischen Anschlussanordnung verbunden ist, um den Arbeitszustand der Energiespeichervorrichtung zu steuern.

6. Energiespeichervorrichtung nach Anspruch 5, dadurch gekennzeichnet, dass das Batteriemanagementsystem mit einer Klimaanlagebaugruppe versehen ist, wobei die Klimaanlagebaugruppe an einem vom Umsetzermodule abgewandten Ende des Stauraums aufgenommen ist, und die Klimaanlagebaugruppe mit einem Luftzufuhrkanal versehen ist, der sich oberhalb des Energiespeicherbatteriesatzes befindet und an der Innenwand des Containers befestigt ist, um den Energiespeicherbatteriesatz zu erhitzen oder abzukühlen.

7. Energiespeichervorrichtung nach Anspruch 6, dadurch gekennzeichnet, dass das Batteriemanagementsystem ferner mit einer Feuerbekämpfungsanordnung versehen ist, wobei die Feuerbekämpfungsanordnung eine Feuerbekämpfungsleitung und einen an der Feuerbekämpfungsleitung angeordneten Alarm umfasst, wobei die Feuerbekämpfungsleitung mit der Innenwand des Containers verbunden ist und sich oberhalb des Energiespeicherbatteriesatzes befindet, der Alarm in Eins-zu-Eins-Korrespondenz mit dem Batteriecluster steht, und die Feuerlöschleitung oberhalb jedes Batterieclusters mit mindestens einem Sprinkler zum Versprühen von Feuerlöschmaterial versehen ist.

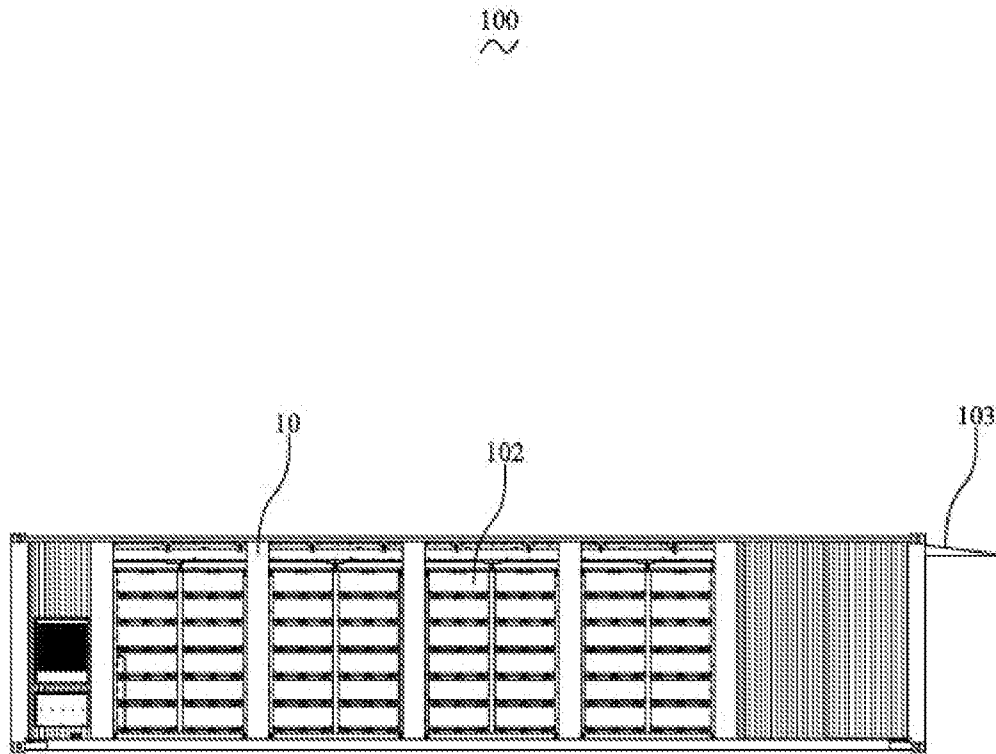


FIG. 1

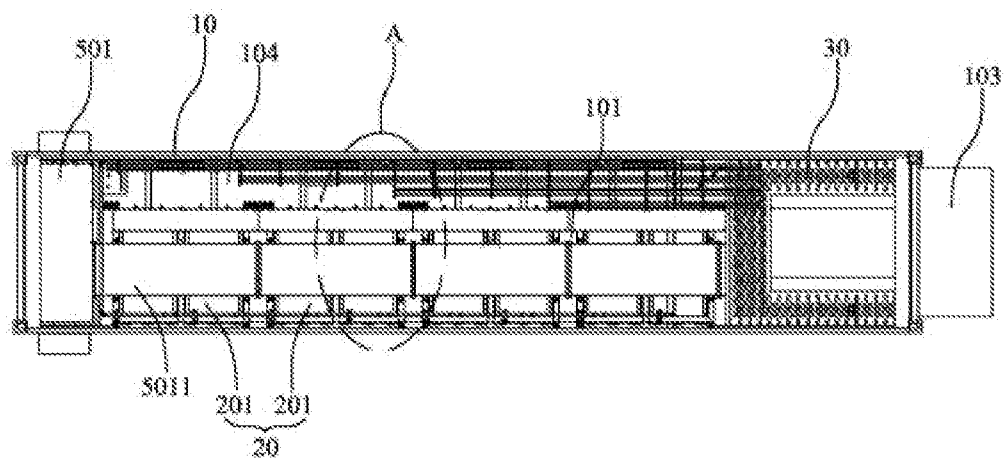


FIG. 2

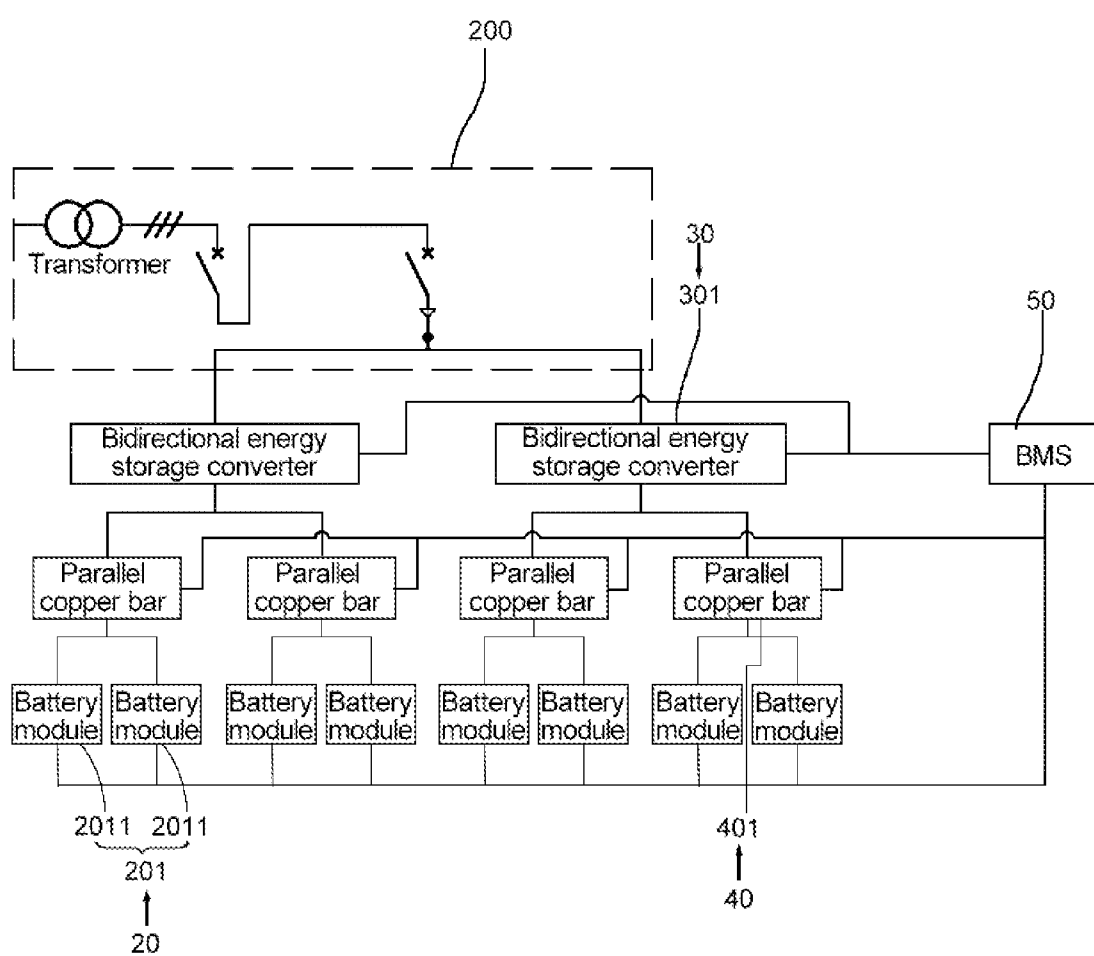


FIG. 3

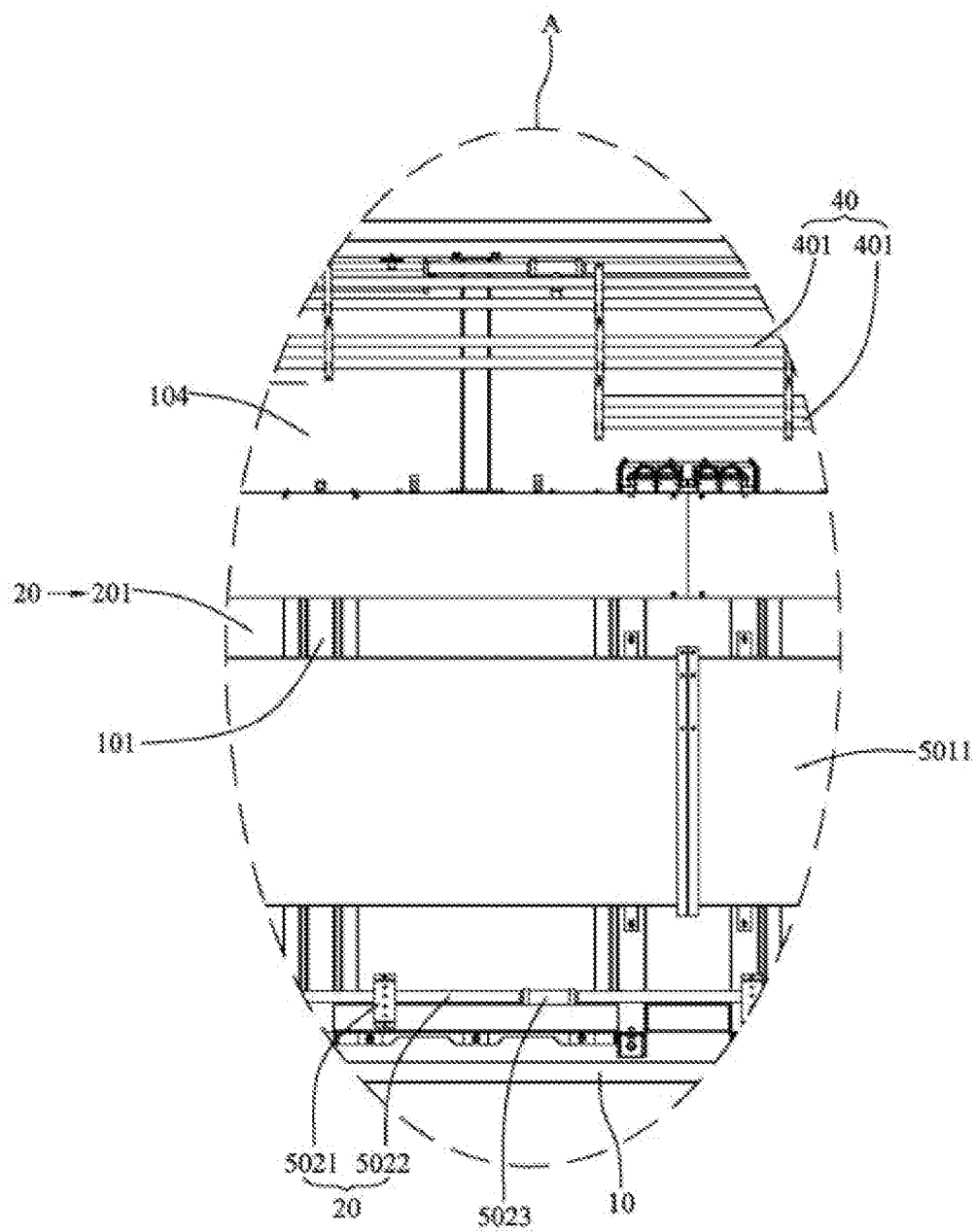


FIG. 4