US Patent & Trademark Office
Patent Public Search | Text View

United States Patent Application Publication 20250260146
Kind Code A1
Publication Date August 14, 2025
Inventor(s) MATSUO; Kensuke et al.

POWER STORAGE DEVICE

Abstract

A power storage device to be mounted on a vehicle includes a power storage unit, an inter-module fuse, a first external terminal, and a second external terminal. The power storage unit includes a first power storage module having a first electrode, and a second power storage module having a second electrode. The first electrode includes a first terminal electrically connected to the first external terminal, and a second terminal. The second electrode includes a third terminal electrically connected to the second external terminal, and a fourth terminal. The second terminal and the fourth terminal are electrically connected. The inter-module fuse is provided on an electrical path between the second terminal and the fourth terminal.

Inventors: **MATSUO; Kensuke (Seto-shi, JP), INOUE; Shigeyuki (Toyota-shi, JP), GOITSUKA; Shinya (Nisshin-shi, JP)**

Applicant: **TOYOTA JIDOSHA KABUSHIKI KAISHA** (Toyota-shi, JP)

Family ID: **96499318**

Assignee: **TOYOTA JIDOSHA KABUSHIKI KAISHA (Toyota-shi, JP)**

Appl. No.: **19/013298**

Filed: **January 08, 2025**

Foreign Application Priority Data

JP	2024-018782	Feb. 09, 2024

Publication Classification

Int. Cl.: **H01M50/583** (20210101); **B60L50/64** (20190101); **H01M10/653** (20140101); **H01M10/658** (20140101); **H01M50/209** (20210101); **H01M50/249** (20210101); **H01M50/258** (20210101); **H01M50/262** (20210101); **H01M50/296** (20210101)

U.S. Cl.:

CPC **H01M50/583** (20210101); **B60L50/64** (20190201); **H01M10/653** (20150401); **H01M10/658** (20150401); **H01M50/209** (20210101); **H01M50/249** (20210101); **H01M50/258** (20210101); **H01M50/262** (20210101); **H01M50/296** (20210101); H01M2200/103 (20130101); H01M2220/20 (20130101)

Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This nonprovisional application is based on Japanese Patent Application No. 2024-018782 filed on Feb. 9, 2024 with the Japan Patent Office, the entire contents of which are hereby incorporated by reference.

BACKGROUND

Field

[0002] The present disclosure relates to a power storage device.

Description of the Background Art

[0003] For example, Japanese Patent Laying-Open No. 2023-046977 discloses a power storage device including an upper case, a lower case, and a power storage unit having a plurality of power storage modules. The power storage modules include a plurality of secondary battery cells having smoke discharge ports, and are accommodated in a case (the upper case and the lower case).

SUMMARY

[0004] In a power storage device, it is considered that a fuse may be provided in a battery pack structure, for example, from the viewpoint of electrical protection.

[0005] For example, it is considered that the fuse may be disposed between an external terminal of the power storage device and power storage modules, as a safety device for preventing a high current exceeding specifications from flowing through an electronic device connected to the power storage device.

[0006] In the above-described power storage device, when a power storage module generates heat, an emission may be generated from the power storage module having generated heat.

[0007] The emission from the power storage module having generated heat may then cause a short circuit between the power storage module having generated heat and an adjacent power storage module, resulting in the formation of a short circuit in a power storage unit.

[0008] The fuse is provided between the external terminal and the power storage unit, and thus cannot perform the current interruption function even when the above-described short circuit is formed.

[0009] The present disclosure has been made in view of the above-described problem, and an object of the present disclosure is to provide a power storage device including a power storage unit having a plurality of power storage modules, in which the current interruption function is performed even when a short circuit is formed in the power storage unit.

[0010] A power storage device to be mounted on a vehicle, the power storage device including a power storage unit, an inter-module fuse, a first external terminal, and a second external terminal, wherein the power storage unit includes a first power storage module having a first electrode, and a second power storage module arranged adjacent to the first power storage module in a width direction and having a second electrode, the first electrode is disposed at one end of the power storage unit in the width direction, the first electrode includes a first terminal electrically connected to the first external terminal, and a second terminal, the second electrode is disposed at the other end of the power storage unit in the width direction, the second electrode includes a third terminal

electrically connected to the second external terminal, and a fourth terminal, the second terminal and the fourth terminal are electrically connected, and the inter-module fuse is provided on an electrical path between the second terminal and the fourth terminal.
[0011] The power storage device further includes a terminal fuse, wherein the terminal fuse is provided on an electrical path between the second external terminal and the third terminal.
[0012] The power storage device, wherein the power storage unit includes a coupling bracket that couples the first power storage module and the second power storage module, and the coupling bracket is formed to protrude upward from the first power storage module and the second power storage module.
[0013] The power storage device further includes a third power storage module, wherein the third power storage module is disposed, with respect to the power storage unit, in an arrangement direction intersecting the width direction, the third power storage module is disposed between the one end and the other end in the width direction, and the inter-module fuse is disposed at a position adjacent to the third power storage module in the width direction.
[0014] The power storage device, wherein a heat insulating material is disposed above the inter-module fuse.
[0015] The power storage device, wherein the heat insulating material is provided with an opening that communicates with a space in the power storage device.
[0016] The power storage device further includes a lower case, wherein the inter-module fuse is disposed on the lower case with a thermally conductive member interposed therebetween.
[0017] The foregoing and other objects, features, aspects and advantages of the present disclosure will become more apparent from the following detailed description of the present disclosure when taken in conjunction with the accompanying drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0018] FIG. **1** is a plan view schematically showing a power storage device according to the present embodiment.
[0019] FIG. **2** is a perspective view schematically showing a power storage module according to the present embodiment.
[0020] FIG. **3** is an exploded perspective view of the power storage module shown in FIG. **2**.
[0021] FIG. **4** is a side view schematically showing a power storage cell according to the present embodiment.
[0022] FIG. **5** is a perspective view schematically showing a power storage unit according to the present embodiment.
[0023] FIG. **6** is an enlarged perspective view of a coupling bracket portion shown in FIG. **5** and its periphery.
[0024] FIG. **7** is a cross-sectional view taken along the line VII-VII shown in FIG. **1**.
[0025] FIG. **8** is a cross-sectional view taken along the line VIII-VIII shown in FIG. **1**.
[0026] FIG. **9** is a cross-sectional view taken along the line IX-IX shown in FIG. **1**.
DESCRIPTION OF THE PREFERRED EMBODIMENTS
[0027] Embodiments of the present disclosure will be described with reference to the drawings. In the drawings referenced below, the same or corresponding members are denoted by the same numbers.
[0028] FIG. **1** is a plan view showing a power storage device according to the present embodiment. A length direction L, a width direction W, and an up-down direction H shown in FIG. **1** indicate the length direction, the width direction, and the up-down direction of the power storage device, respectively. A power storage device **100** is, for example, a device for storing electric power for

driving an electrically powered vehicle (not shown). Width direction W is an example of "first direction" in the present disclosure, and length direction L is an example of "second direction" in the present disclosure.

[0029] Power storage device **100** includes a case **10**, a power storage assembly **90**, busbars **40**, a junction box **50**, an external terminal **55**, and an inter-module fuse **70**.

[0030] Case **10** accommodates power storage assembly **90**, junction box **50**, a protective cover **60**, and inter-module fuse **70**. Case **10** includes a lower case **11** and an upper cover **12** (not shown). Case **10** forms the shell of power storage device **100**.

[0031] Lower case **11** is formed to open upward. When upper cover **12** is viewed at a distance in up-down direction H, upper cover **12** is formed to have the same outer shape as lower case **11**. Lower case **11** and upper cover **12** are connected to thereby form a space R**1**.

[0032] Lower case **11** includes a bottom plate and a peripheral wall formed to extend upward from an outer peripheral edge of the bottom plate. The peripheral wall includes a front wall and a rear wall arranged in length direction L, and a right side wall and a left side wall arranged in width direction W.

[0033] Power storage assembly **90** includes a plurality of power storage units **80** and a power storage module **21**. The plurality of power storage units **80** are disposed to be arranged in length direction L. Each power storage unit **80** includes one end surface and the other end surface arranged in width direction W. Each of the plurality of power storage units **80** includes power storage modules **20** arranged in width direction W, and a coupling bracket **30** that connects power storage modules **20** adjacent to each other in width direction W.

[0034] Power storage module **21** is disposed at a position adjacent to the plurality of power storage units **80** in length direction L. For example, power storage module **21** is provided rearward with respect to the plurality of power storage units **80**.

[0035] Power storage module **21** is disposed at the center of power storage unit **80** in width direction W. Thus, power storage module **21** is located between the one end surface and the other end surface of power storage unit **80** in width direction W.

[0036] Accordingly, there is a dead space formed by power storage unit **80** and power storage module **21**, at each position adjacent to power storage module **21** in width direction W.

[0037] Junction box **50** is provided at a position adjacent to power storage assembly **90** in length direction L. For example, junction box **50** is disposed forward with respect to power storage assembly **90**. Junction box **50** is disposed on the inner surface side of the front wall of lower case **11**.

[0038] External terminal **55** is provided on the front wall of lower case **11**, and external terminal **55** is provided on an outer surface of the front wall of lower case **11**.

[0039] Inter-module fuse **70** is disposed adjacent to power storage module **21** in width direction W.

[0040] The plurality of busbars **40** connect the plurality of power storage modules **20** to each other, and connect power storage module **20** and inter-module fuse **70**.

[0041] Power storage device **100** is connected to a power control unit (PCU) and the like of the electrically powered vehicle by a power line and the like connected to external terminal **55**.

[0042] FIG. **2** shows a perspective view schematically showing the power storage module according to the present embodiment. Power storage module **20** is in the shape of a rectangular parallelepiped formed to extend in width direction W. Power storage module **20** includes a module case **2** and an electrode **3**. Module case **2** has notches **2***a* and **2***b* at one end of a pair of wall surfaces arranged in width direction W. Electrode **3** includes a terminal **3***a* and a terminal **3***b*. Terminal **3***a* is exposed at notch **2***a* of module case **2**, and terminal **3***b* is exposed at notch **2***b* of module case **2**.

[0043] FIG. **3** shows an exploded perspective view of power storage module **20** shown in FIG. **2**. Power storage module **20** includes a plurality of power storage cells **1** accommodated in module case **2**.

[0044] FIG. **4** shows a side view of the power storage cell. Power storage cell **1** is formed to extend in width direction W. Power storage cell **1** has electrode terminals **1***a* and **1***b* at both ends in width direction W. In width direction W, electrode terminal **1***a* is disposed at one end of power storage cell **1**, and electrode terminal **1***b* is disposed at the other end of power storage cell **1**. For example, electrode terminal **1***a* is a positive terminal and electrode terminal **1***b* is a negative terminal.
[0045] Referring again to FIG. **3**, the plurality of power storage cells **1** are arranged in length direction L. When the plurality of power storage cells **1** are viewed at a distance in width direction W, electrode terminals **1***a* and electrode terminals **1***b* of power storage cells **1** are alternately arranged in length direction L.
[0046] In length direction L, one end of arranged electrode terminals **1***a* and **1***b* is electrode terminal **1***a*, and the other end is electrode terminal **1***b*. Electrode terminal **1***a* and electrode terminal **1***b* of adjacent power storage cells **1** are electrically connected in series by busbar **40**. In the plurality of power storage cells **1** electrically connected in series, electrode terminal **1***a* at one end of a conductive path corresponds to terminal **3***a* of power storage module **20**, and electrode terminal **1***b* at the other end corresponds to terminal **3***b* of power storage module **20**.
[0047] Module case **2** includes an upper frame **4**, a lower frame **5**, insulating covers **6***a* and **6***b*, and an end plate **7**.
[0048] Upper frame **4** is disposed to cover the plurality of power storage cells **1** from above. Upper frame **4** is provided with a plurality of gas discharge holes **4***a*. Gas generated from power storage cells **1** is discharged through gas discharge holes **4***a*.
[0049] Lower frame **5** is formed to cover lower surfaces and a pair of side surfaces arranged in length direction L of the plurality of power storage cells **1**. Lower frame **5** supports the plurality of power storage cells **1** from below. Lower frame **5** is formed to sandwich the plurality of power storage cells **1** in length direction L.
[0050] The pair of insulating covers **6***a* and **6***b* are disposed to sandwich the plurality of power storage cells **1** in width direction W.
[0051] Insulating cover **6***a* is disposed on the surface provided with electrode terminals **1***a* and **1***b* corresponding to terminals **3***a* and **3***b* in width direction W. When insulating cover **6***a* is viewed at a distance in width direction W, insulating cover **6***a* is formed to cover the plurality of power storage cells **1**, and additionally is provided with notches **2***a* and **2***b* to expose terminal **3***a* and terminal **3***b*.
[0052] Insulating cover **6***b* is disposed at a position facing insulating cover **6***a* with the plurality of power storage cells **1** interposed therebetween. When insulating cover **6***b* is viewed at a distance in width direction W, insulating cover **6***b* is formed to cover the plurality of power storage cells **1**.
[0053] End plate **7** is disposed adjacent to insulating cover **6***b* in width direction W.
[0054] FIG. **5** shows a perspective view of the power storage unit. Power storage unit **80** includes a pair of power storage modules **20** and coupling bracket **30**. Power storage module **20** are arranged in width direction W. Power storage unit **80** is formed so that insulating cover **6***a* is disposed at both ends in width direction W. Thus, in power storage unit **80**, end plates **7** of the pair of power storage modules **20** are arranged to face each other. In power storage unit **80**, the pair of power storage modules **20** are coupled by fastening the pair of end plates **7** facing each other to coupling bracket **30**.
[0055] FIG. **6** shows an extracted and enlarged perspective view of a portion formed by the pair of end plates, the coupling bracket, and bolts shown in FIG. **5**.
[0056] When end plate **7** is viewed at a distance in width direction W, end plate **7** is provided with notches **7***a* at its four corners. End plate **7** is provided with through holes **7***b* extending through notches **7***a* arranged in up-down direction H.
[0057] Coupling bracket **30** includes an upper member **31** and a pair of lower members **34**.
[0058] Upper member **31** is formed to extend in length direction L. Upper member **31** is formed to cover the pair of end plates **7** of power storage unit **80**. Upper member **31** includes a top plate **32** and a pair of end members **33**.

[0059] Top plate **32** is formed to extend in length direction L. Top plate **32** is formed to cover upper surfaces of end plates **7**.
[0060] The pair of end members **33** are arranged in length direction L. The pair of end members **33** are coupled by top plate **32**. End members **33** are disposed on upper surfaces of notches **7***a* of the pair of end plates **7**. Each of the pair of end members **33** is provided with two through holes **33***a* extending in up-down direction H.
[0061] Each of the pair of lower members **34** is located below each end member **33** and is formed to fit in notches **7***a* of end plates **7**. Each lower member **34** is provided with two female threads **34***a* extending in up-down direction H. A screw thread is formed on the side of a hole forming each female thread **34***a*.
[0062] FIG. **7** is a cross-sectional view taken along the line VII-VII shown in FIG. **1**. Through hole **7***b* of end plate **7**, through hole **33***a* of end member **33**, and female thread **34***a* of lower member **34** are coaxially formed.
[0063] A bolt **35** includes a bolt head **35***a* and a shaft **35***b*. Shaft **35***b* is inserted in a hole formed by through holes **7***b* and **33***a* and female thread **34***a*. Bolt **35** and lower member **34** are fastened with upper member **31** and end plate **7** interposed therebetween. Thus, the pair of end plates **7** are constrained by coupling bracket **30**.
[0064] The plurality of power storage modules **20** are supported by lower case **11** from below. Upper member **31** of coupling bracket **30** and end plate **7** are in contact with each other without a gap in up-down direction H.
[0065] An upper surface **32***a* of top plate **32** of coupling bracket **30** is formed above an upper surface **4***b* of upper frame **4**. Similarly, an upper surface **33***b* of end member **33** of coupling bracket **30** is formed above upper surface **4***b* of upper frame **4**. That is, upper surfaces **32***a* and **33***b* of coupling bracket **30** protrude upward from upper surface **4***b* of power storage module **20**. A heat insulating material **36** is disposed to fill a gap between upper cover **12** and top plate **32**. Heat insulating material **36** may be formed integrally with top plate **32**.
[0066] Referring again to FIG. **1**, busbars **40** electrically connect junction box **50**, inter-module fuse **70**, power storage assembly **90**, and external terminal **55** of power storage device **100**. Thus, in power storage device **100**, an electrical path is formed that terminates at a first external terminal **55***a* and a second external terminal **55***b*.
[0067] Specifically, busbar **40** electrically connects power storage units **80** arranged in length direction L. More specifically, busbar **40** electrically connects terminal **3***a* of power storage module **20** forming power storage unit **80** and terminal **3***b* of power storage module **20** adjacent thereto in length direction L.
[0068] In the plurality of power storage units **80** arranged in length direction L, a power storage unit **81** located at one end is connected to first external terminal **55***a* and second external terminal **55***b*. A power storage unit **82** located at the other end is electrically connected to power storage module **21**.
[0069] More specifically, in power storage unit **81**, terminal **3***a* of one power storage module **22** arranged in width direction W is electrically connected to first external terminal **55***a*, and terminal **3***b* of the other power storage module **23** arranged in width direction W is electrically connected to second external terminal **55***b*.
[0070] In power storage unit **82** located at the other end, terminal **3***b* of one power storage module **24** in width direction W is electrically connected to terminal **3***a* of power storage module **21**. Terminal **3***a* of the other power storage module **25** in width direction W is electrically connected to terminal **3***b* of power storage module **21**. Thus, power storage module **21** is provided on an electrical path formed by electrical connection between terminal **3***b* of power storage module **22** and terminal **3***a* of power storage module **23**.
[0071] Junction box **50** accommodates electrical devices such as an SMR and a fuse of power storage device **100**. In junction box **50**, for example, a terminal fuse **51** is provided. Terminal fuse

51 is provided on an electrical path between terminal **3***b* of power storage module **23** included in power storage unit **81** and second external terminal **55***b*. Terminal fuse **51** is blown when a closed circuit is formed by connection of a drive electronic device and the like to external terminal **55** and a high current flows through it.

[0072] Power storage device **100** further includes protective cover **60**. Protective cover **60** is provided to prevent conductive foreign substances from adhering to busbars **40**. Protective cover **60** is formed to extend in length direction L. Protective cover **60** is arranged in width direction W. Protective cover **60** is disposed to cover busbars **40** electrically connecting power storage units **80** to each other.

[0073] Inter-module fuse **70** is provided on an electrical path between terminal **3***b* of power storage module **21** and terminal **3***a* of power storage module **25**.

[0074] FIG. **8** shows a cross-sectional view taken along the line VIII-VIII shown in FIG. **1**.

[0075] Inter-module fuse **70** is accommodated in a fuse case **71**. Inter-module fuse **70** is fixed to a lower surface of fuse case **71**.

[0076] Fuse case **71** is formed to surround inter-module fuse **70** on four sides. Fuse case **71** may be provided with a ventilation hole (not shown) for inter-module fuse **70** to exchange heat with outside air of fuse case **71**. Fuse case **71** is disposed on lower case **11** with a thermally conductive member **72** interposed therebetween. Fuse case **71** includes a fixing member **73** formed to extend from fuse case **71**. Fixing member **73** couples fuse case **71** and a reinforcement member **11***a* fixed on lower case **11**. Thus, fuse case **71** is fixed on lower case **11**.

[0077] FIG. **9** shows a cross-sectional view taken along the line IX-IX shown in FIG. **1**. A heat insulating material **74** is disposed above fuse case **71**. A cover **75** is disposed above heat insulating material **74** to cover heat insulating material **74**. Heat insulating material **74** is provided with an opening **74***a*.

[0078] Opening **74***a* allows, in width direction W, a space R**2** in which fuse case **71** is covered with heat insulating material **74** and space R**1** formed by lower case **11** and upper cover **12** to communicate with each other.

[0079] Busbar **40** connected to inter-module fuse **70** is connected to electrode **3** through opening **74***a*.

[0080] In the embodiment described above, power storage device **100** disposes inter-module fuse **70** on the electrical path between power storage module **24** and power storage module **25**. With such a configuration, power storage device **100** can be provided that can interrupt a high current by blowing inter-module fuse **70** even when conduction occurs between power storage modules **20** adjacent to each other in width direction W in power storage unit **80** and a short circuit occurs in power storage device **100**.

[0081] In the embodiment described above, power storage unit **80** includes coupling bracket **30**. Upper member **31** of coupling bracket **30** and end plate **7** are in contact with each other without a gap in up-down direction H. With such a configuration, smoke discharged from gas discharge holes **4***a* in upper frame **4** can be restrained from passing between upper member **31** and end plate **7**. Thus, the flow of smoke in width direction W can be restrained in power storage unit **80**.

[0082] Upper surface **32***a* of top plate **32** of upper member **31** and upper surface **33***b* of end member **33** are located above upper surface **4***b* of upper frame **4**. With such a configuration, smoke discharged from gas discharge holes **4***a* in upper frame **4** can be restrained from passing above top plate **32** and end member **33**. Thus, the flow of smoke in width direction W can be restrained in power storage unit **80**.

[0083] In the embodiment described above, heat insulating material **36** is disposed to fill the gap between upper cover **12** and top plate **32**. With such a configuration, the flow of smoke in width direction W can be restrained in power storage unit **80**.

[0084] In the embodiment described above, power storage module **21** is disposed, in length direction L, at one end of the plurality of power storage units **80** arranged in length direction L.

Power storage module **21** is also located, in width direction W, between one end and the other end of power storage unit **80**. Further, inter-module fuse **70** is disposed at a position adjacent to power storage module **21** in width direction W. With such a configuration, dead space formed at the position adjacent to power storage module **21** in the width direction can be effectively used.
[0085] In the embodiment described above, heat insulating material **74** is disposed above inter-module fuse **70**. With such a configuration, inter-module fuse **70** can be protected from high-temperature discharged smoke generated from power storage module **20**.
[0086] Further, heat insulating material **74** is provided with opening **74***a* that allows space R**1** and space R**2** to communicate with each other. With such a configuration, cold air in space R**1** flows into space R**2** through opening **74***a*. Thus, inter-module fuse **70** can be cooled.
[0087] In the embodiment described above, inter-module fuse **70** is disposed on fuse case **71**. Fuse case **71** is disposed on lower case **11** with thermally conductive member **72** interposed therebetween. Lower case **11** has a higher thermal capacity than fuse case **71**. With such a configuration, heat of inter-module fuse **70** can be dissipated to lower case **11** through fuse case **71** and thermally conductive member **72**.
[0088] While the gap between upper cover **12** and top plate **32** is filled with heat insulating material **36** in the exemplary embodiment described above, the present disclosure is not limited as such. For example, there may be no heat insulating material **36**, and there may be a gap between upper cover **12** and top plate **32**. Instead, upper surface **32***a* of top plate **32** and upper surface **33***b* of end member **33** are each formed to be located above upper surface **4***b* of upper frame **4** of power storage module **20**. With such a configuration, smoke discharged from gas discharge holes **4***a* in upper frame **4** can be restrained from passing above coupling bracket **30**. Thus, the flow of smoke in width direction W can be restrained in power storage unit **80**.
[0089] Although the embodiments of the present disclosure have been described, it should be understood that the embodiments disclosed herein are illustrative and non-restrictive in every respect. The scope of the present disclosure is defined by the terms of the claims, and is intended to include any modifications within the scope and meaning equivalent to the terms of the claims.

Claims

1. A power storage device to be mounted on a vehicle, the power storage device comprising a power storage unit, an inter-module fuse, a first external terminal, and a second external terminal, wherein the power storage unit includes a first power storage module having a first electrode, and a second power storage module arranged adjacent to the first power storage module in a first direction and having a second electrode, the first electrode is disposed at one end of the power storage unit in the first direction, the first electrode includes a first terminal electrically connected to the first external terminal, and a second terminal, the second electrode is disposed at the other end of the power storage unit in the first direction, the second electrode includes a third terminal electrically connected to the second external terminal, and a fourth terminal, the second terminal and the fourth terminal are electrically connected, and the inter-module fuse is provided on an electrical path between the second terminal and the fourth terminal.
2. The power storage device according to claim 1, further comprising a terminal fuse, wherein the terminal fuse is provided on an electrical path between the second external terminal and the third terminal.
3. The power storage device according to claim 1, wherein the power storage unit includes a coupling bracket that couples the first power storage module and the second power storage module, and the coupling bracket is formed to protrude upward from the first power storage module and the second power storage module.
4. The power storage device according to claim 1, further comprising a third power storage module, wherein the third power storage module is disposed, with respect to the power storage unit, in a

second direction intersecting the first direction, the third power storage module is disposed between the one end and the other end in the first direction, and the inter-module fuse is disposed at a position adjacent to the third power storage module in the first direction.

5. The power storage device according to claim 1, wherein a heat insulating material is disposed above the inter-module fuse.

6. The power storage device according to claim 5, wherein the heat insulating material is provided with an opening that communicates with a space in the power storage device.

7. The power storage device according to claim 1, further comprising a lower case, wherein the inter-module fuse is disposed on the lower case with a thermally conductive member interposed therebetween.