US 20250266536A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2025/0266536 A1**

LEE (43) **Pub. Date: Aug. 21, 2025**

(54) **SECONDARY BATTERY**

(71) Applicant: **SAMSUNG SDI CO., LTD.**, Yongin-si (KR)

(72) Inventor: **Hyun Soo LEE**, Yongin-si (KR)

(21) Appl. No.: **18/673,301**

(22) Filed: **May 23, 2024**

(30) **Foreign Application Priority Data**

Feb. 15, 2024 (KR) 10-2024-0021562

Publication Classification

(51) **Int. Cl.**

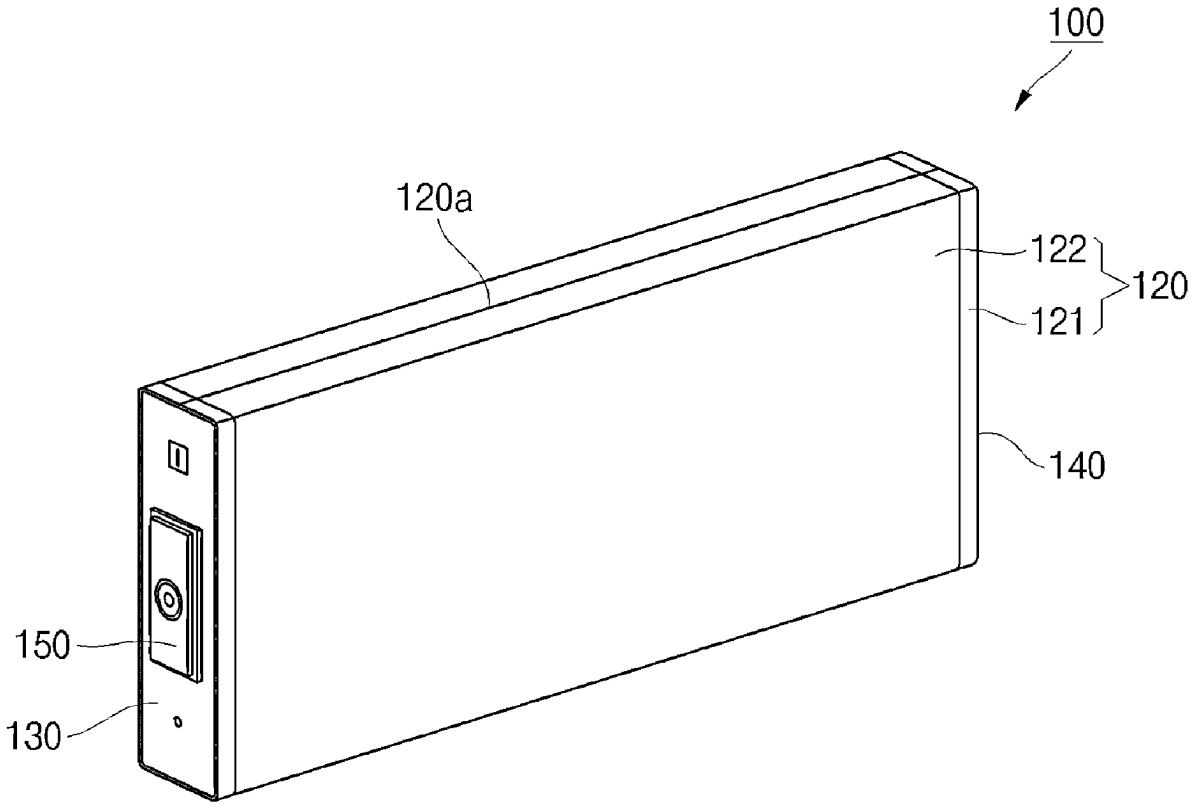
H01M 50/119	(2021.01)
H01M 50/103	(2021.01)
H01M 50/15	(2021.01)
H01M 50/169	(2021.01)
H01M 50/548	(2021.01)
H01M 50/553	(2021.01)

(52) **U.S. Cl.**

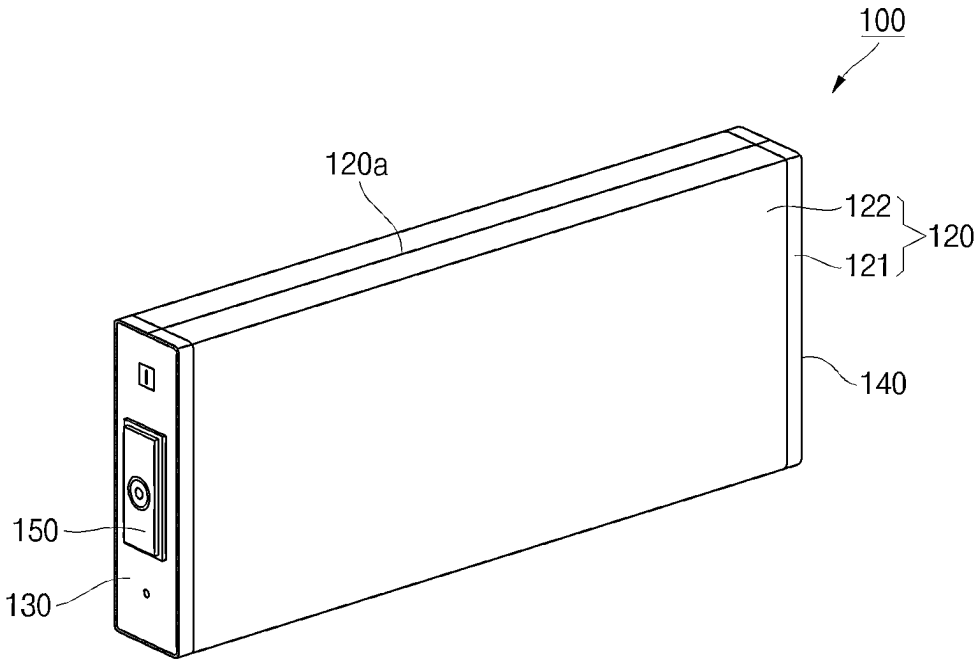
CPC ***H01M 50/119*** (2021.01); ***H01M 50/103*** (2021.01); ***H01M 50/15*** (2021.01); ***H01M 50/169*** (2021.01); ***H01M 50/548*** (2021.01); ***H01M 50/553*** (2021.01)

(57) **ABSTRACT**

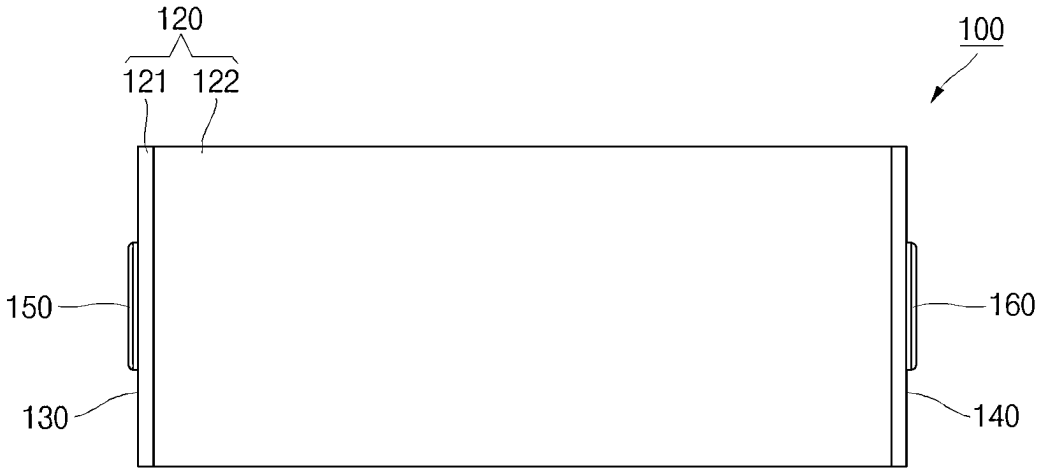
The secondary battery according to an embodiment includes an electrode assembly comprising a first electrode plate, a second electrode plate, and a separator interposed between the first electrode plate and the second electrode plate. A can with ends open accommodates the electrode assembly A first side plate seals a first open end of the can and a second side plate seals the second open end of the can. The can comprises a first metal and a second metal formed on an outer surface of the first metal, the first side plate and the second side plate are coupled to the first metal, a thermal conductivity of the first metal is greater than a thermal conductivity of the second metal.



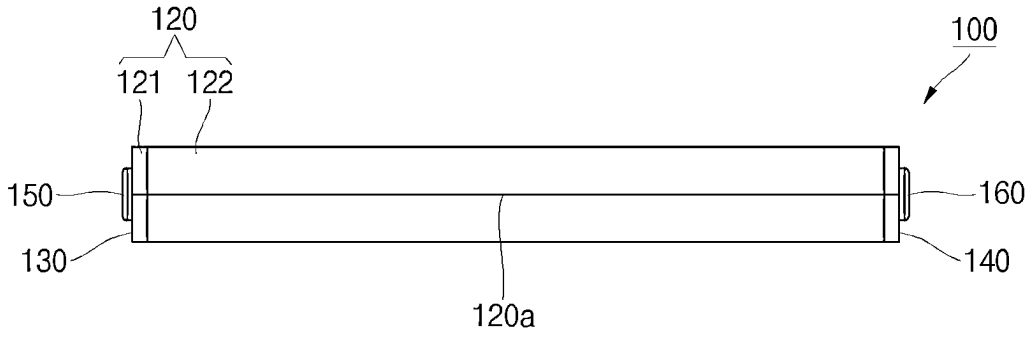
【Fig. 1】



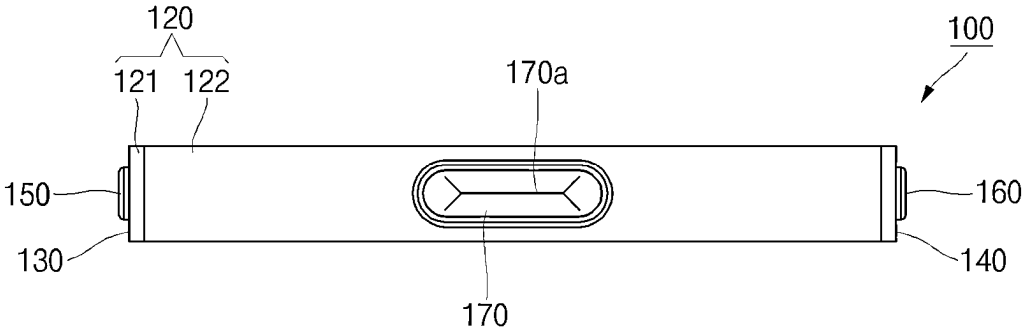
【 Fig. 2】



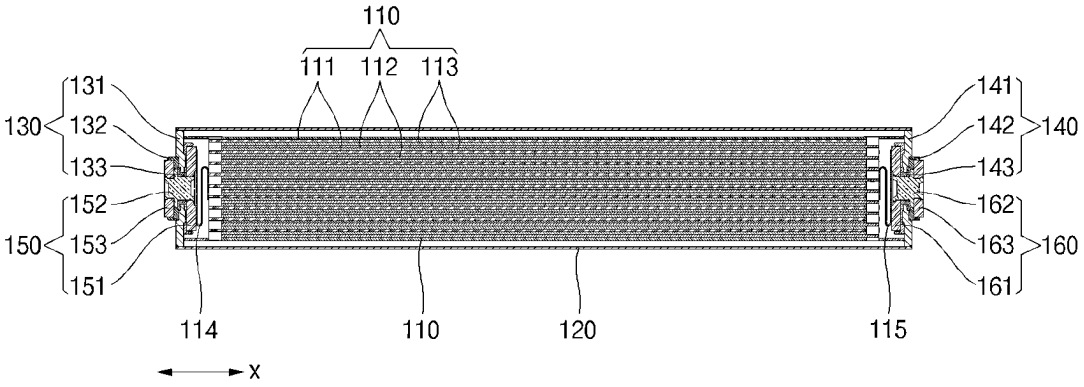
【 Fig. 3】



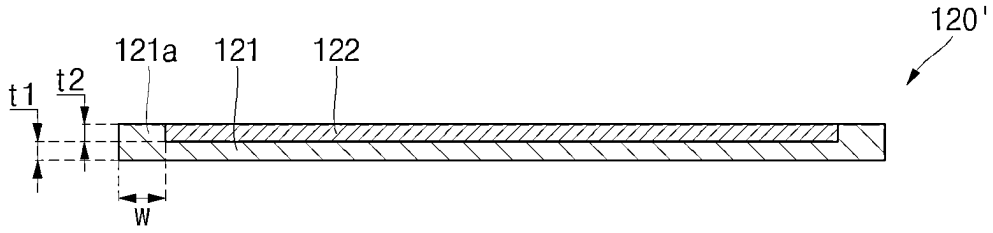
【 Fig. 4】



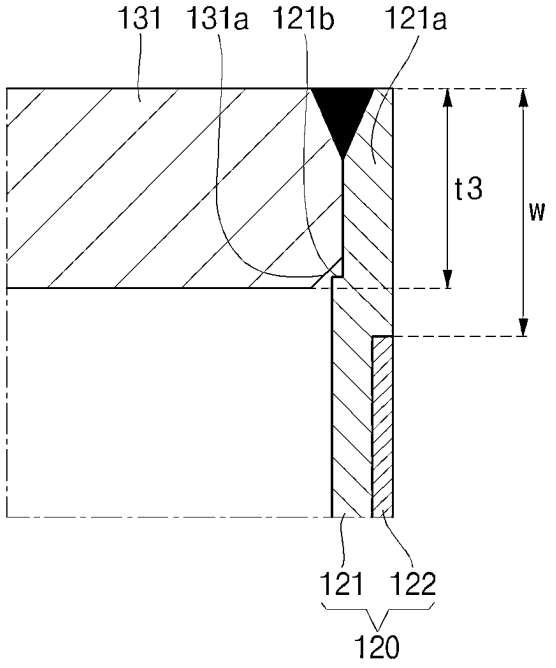
【 Fig. 5】



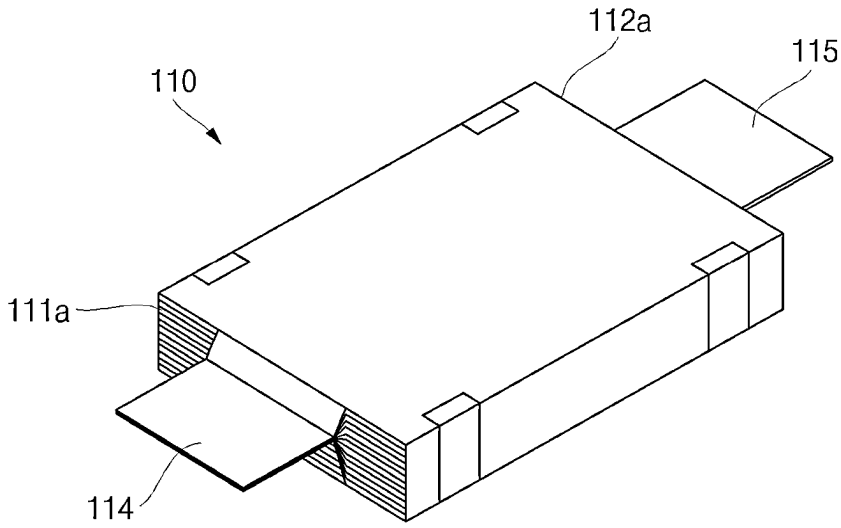
【 Fig. 6】



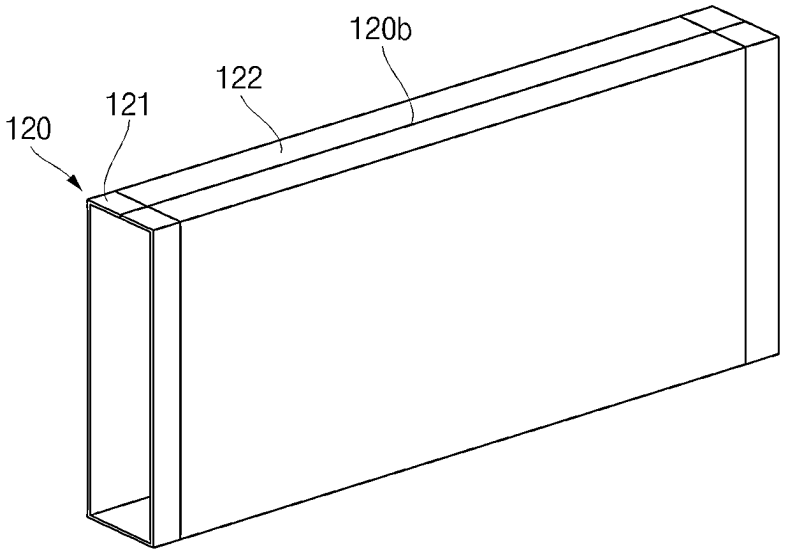
【 Fig. 7】



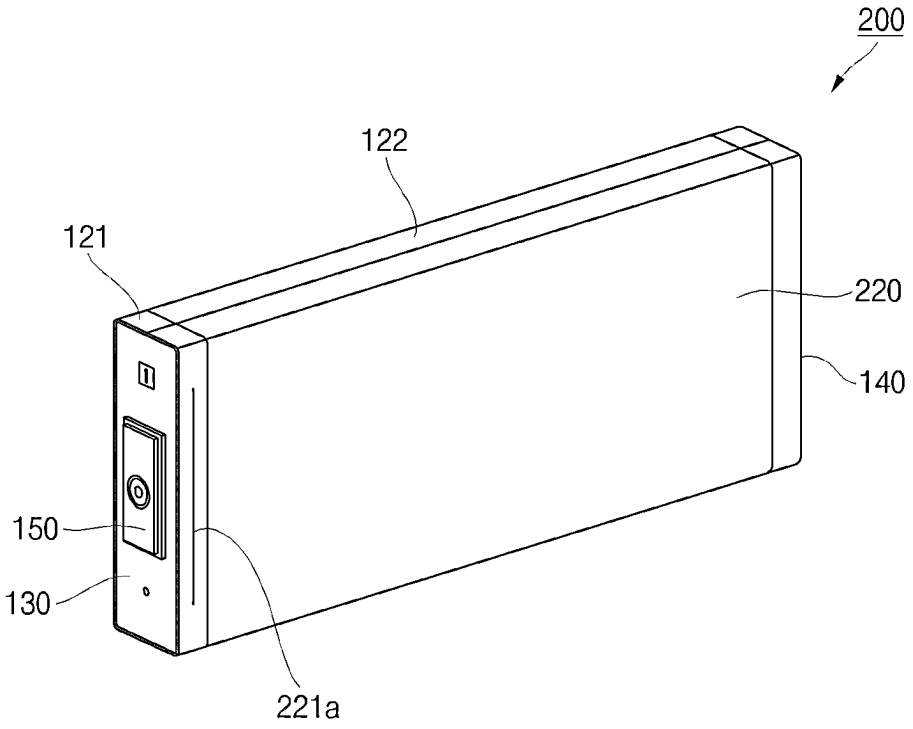
【 Fig. 8】



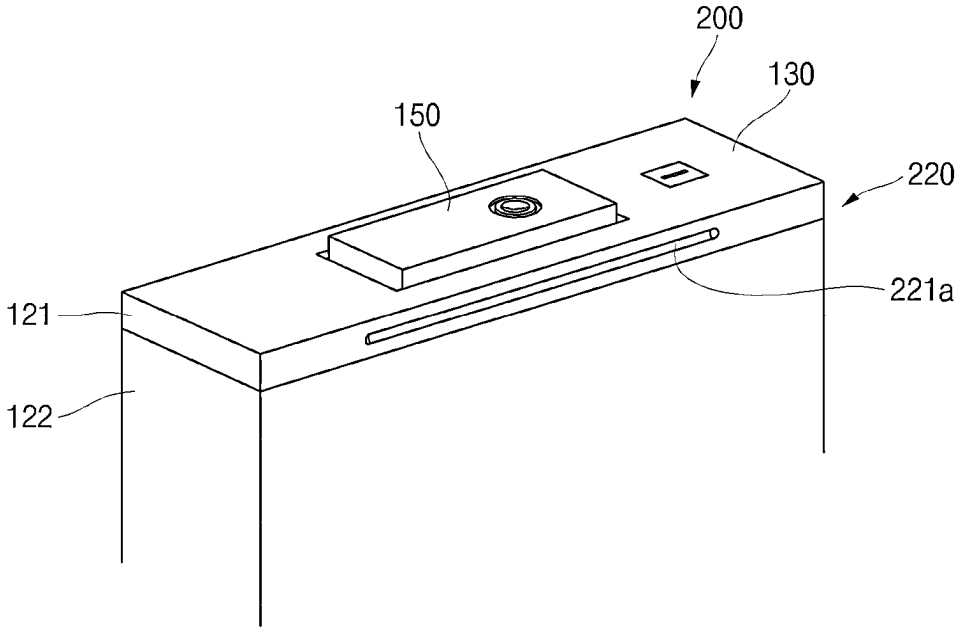
【 Fig. 9】



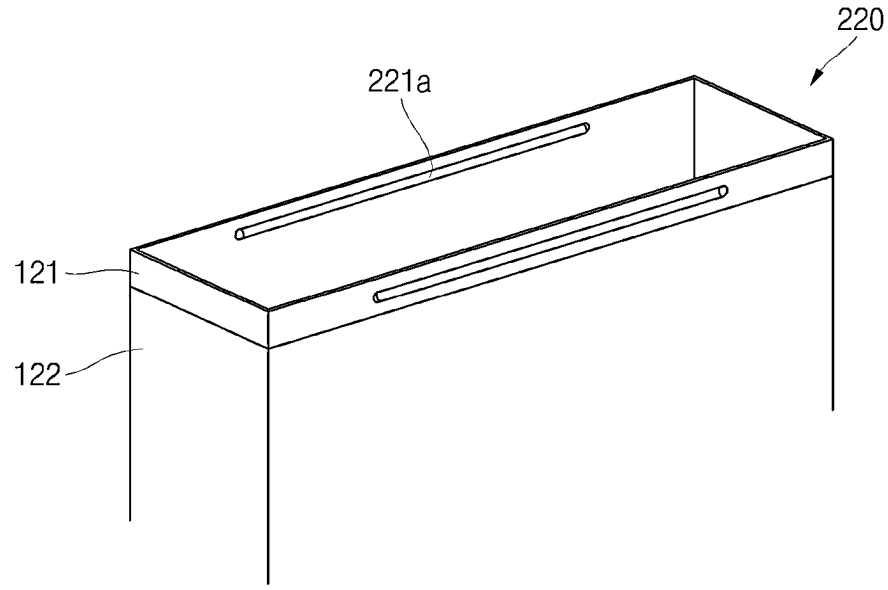
【 Fig. 10】



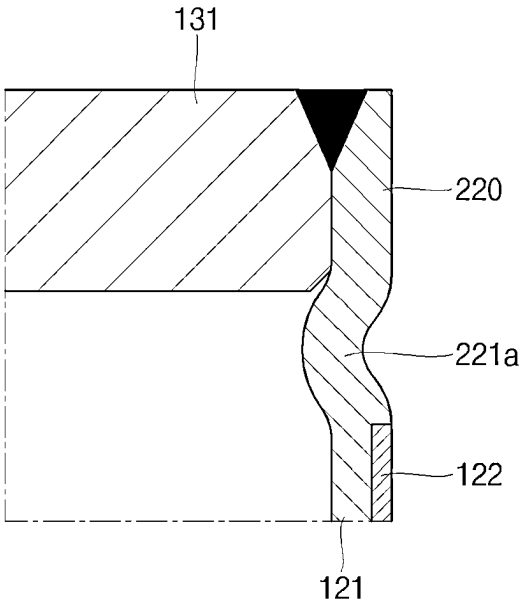
【 Fig. 11a】



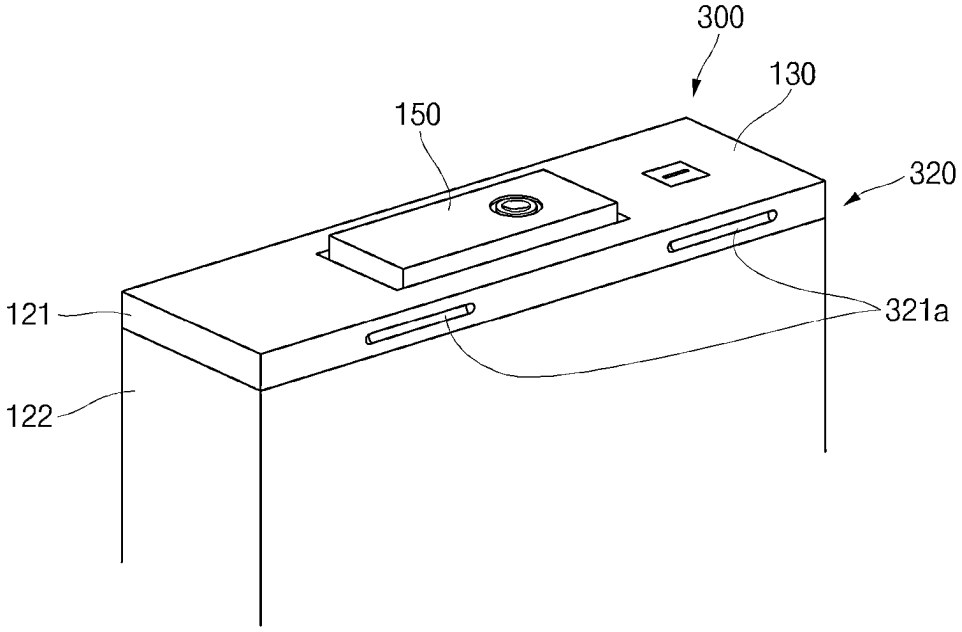
【 Fig. 11b】



【 Fig. 12】



【 Fig. 13】



SECONDARY BATTERY

CROSS-REFERENCE TO THE RELATED APPLICATION

[0001] The present application claims priority to and the benefit of Korean Patent Application No. 10-2024-0021562, filed on Feb. 15, 2024, in the Korean Intellectual Property Office, the entire disclosure of which is incorporated herein by reference.

BACKGROUND

1. Field

[0002] Embodiments relate to a secondary battery.

2. Description of the Related Art

[0003] Unlike primary batteries that are not designed to be recharged, secondary (or rechargeable) batteries are batteries that are designed to be discharged and recharged. Low-capacity secondary batteries are used in portable, small electronic devices, such as smart phones, feature phones, notebook computers, digital cameras, and camcorders. Large-capacity secondary batteries are widely used as power sources for driving motors in hybrid vehicles and electric vehicles and for storing power (e.g., home and/or utility scale power storage). A secondary battery may be divided into a cylindrical shape, a square shape, or a pouch type (or a polymer type) according to its appearance. A prismatic battery may be formed by embedding an electrode assembly and an electrolyte in a can, and placing a cap plate on the can. The electrode assembly includes a positive electrode plate, a negative electrode plate, and a separator therebetween.

[0004] The information disclosed in this section is provided only for enhancement of understanding of the background of the disclosure and therefore it may contain information that does not form the prior art.

SUMMARY

[0005] Embodiments provide a secondary battery capable with improved weldability of its can, and the can is prevented from melting when an event occurs.

[0006] The secondary battery according to the embodiment includes an electrode assembly comprising a first electrode plate, a second electrode plate, and a separator interposed between the first electrode plate and the second electrode plate; a can accommodating the electrode assembly, the can being open at a first end and open at a second end that is opposite to the first end; a first side plate for sealing the first end of the can; and a second side plate for sealing the second end of the can, wherein the can comprises a first metal and a second metal formed on an outer surface of the first metal, wherein the first side plate and the second side plate are coupled to the first metal of the first side plate, wherein a thermal conductivity of the first metal is greater than a thermal conductivity of the second metal.

[0007] In addition, a thickness of the first metal is greater than or equal to a thickness of the second metal.

[0008] In addition, the first metal forms an inner surface of the can and part of an outer surface of the can, the second metal forms a part of the outer surface of the can, an edge of the first metal is thicker than a thickness of the second metal, the outer surface of the first metal has a step part formed by the edge, and the second metal is embedded in the step part.

[0009] In addition, a part of the outer surface of the first metal and an outer surface of the second metal are coplanar.

[0010] In addition, the step part is a first step part and a second step part is formed on the inner surface of the edge of the first metal.

[0011] In addition, the secondary battery includes a first side terminal and a second side terminal, and one of the first side terminal and the second side terminal is coupled to the second step part.

[0012] In addition, an area of the first side plate or the second side plate coupled to the second step part comprises a chamfer region.

[0013] In addition, a diameter of the first side plate or a diameter of the second side plate is reduced by the chamfer region.

[0014] In addition, a protrusion is formed on the inner surface of the can, and the protrusion supports a surface of the first side plate or a surface of the second side plate.

[0015] In addition, a groove corresponding to the protrusion is formed on the outer surface of the can.

[0016] In addition, the protrusion comprises a plurality of protrusions spaced apart from each other.

[0017] In addition, the can is formed in a pipe shape or in a bent plate shape.

[0018] In addition, a melting point of the second metal is greater than a melting point of the first metal.

[0019] In addition, the first metal and the second metal comprise different metals.

[0020] In addition, the groove is formed in the first metal.

[0021] In addition, an area of the second metal forming part of the outer surface of the can is greater than an area of the first metal forming part of the outer surface of the can.

[0022] In addition, an area of the first or second side plate coupled to the protrusion comprises a chamfer region.

[0023] In addition, the protrusion is formed at the edge of the first metal.

[0024] In addition, a thickness of the first side plate or the second side plate is less than a length of the edge of the first metal.

[0025] In addition, the can is formed by coupling two rectangular tubes.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] The accompanying drawings, which are incorporated in this specification, illustrate preferred embodiments and serve to further illustrate the technical ideas of the disclosure in conjunction with the detailed description of exemplary embodiments that follows, and the disclosure is not to be construed as limited to what is shown in such drawings. In the drawings:

[0027] FIG. **1** is a perspective view of a secondary battery according to an embodiment.

[0028] FIG. **2** is a side view of the secondary battery according to the embodiment.

[0029] FIG. **3** is another side view of the secondary battery according to the embodiment.

[0030] FIG. **4** is a bottom view of the secondary battery according to the embodiment.

[0031] FIG. **5** is a sectional view of the secondary battery

[0032] according to the embodiment.

[0033] FIG. **6** is a sectional view of a base material of a case of the secondary battery according to the embodiment.

[0034] FIG. **7** is an enlarged view of a coupling section of a side plate and a can of the secondary battery according to the embodiment.

[0035] FIG. **8** is a perspective view of an electrode assembly of the secondary battery according to the embodiment.

[0036] FIG. **9** is a perspective view of a can of the secondary battery according to the embodiment.

[0037] FIG. **10** is a perspective view of a secondary battery according to another embodiment.

[0038] FIG. **11***a* is a partial perspective view of the secondary battery according to another embodiment.

[0039] FIG. **11***b* is a perspective view of a can of the secondary battery according to another embodiment.

[0040] FIG. **12** an enlarged view of a coupling section of a side plate and a can of the secondary battery according to another embodiment.

[0041] FIG. **13** is a partial perspective view of the secondary battery according to another embodiment.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0042] Hereinafter, embodiments of the present disclosure will be described, in detail, with reference to the accompanying drawings. The terms or words used in the present specification and claims are not to be limitedly interpreted as general or dictionary meanings and should be interpreted as meanings and concepts that are consistent with the technical idea of the present disclosure on the basis of the principle that an inventor can be his/her own lexicographer to appropriately define concepts of terms to describe his/her invention in the best way.

[0043] The embodiments described in this specification and the configurations shown in the drawings are only some of the embodiments of the present disclosure and do not represent all of the technical spirit, aspects, and features of the present disclosure. Accordingly, it should be understood that there may be various equivalents and modifications that can replace or modify the embodiments described herein at the time of filing this application.

[0044] It will be understood that when an element or layer is referred to as being "on," "connected to," or "coupled to" another element or layer, it may be directly on, connected, or coupled to the other element or layer or one or more intervening elements or layers may also be present. When an element or layer is referred to as being "directly on," "directly connected to," or "directly coupled to" another element or layer, there are no intervening elements or layers present. For example, when a first element is described as being "coupled" or "connected" to a second element, the first element may be directly coupled or connected to the second element or the first element may be indirectly coupled or connected to the second element via one or more intervening elements.

[0045] In the figures, dimensions of the various elements, layers, etc. may be exaggerated for clarity of illustration. The same reference numerals designate the same elements. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items. Further, the use of "may" when describing embodiments of the present disclosure relates to "one or more embodiments of the present disclosure." Expressions, such as "at least one of" and "any one of," when preceding a list of elements, modify the entire list of elements and do not modify the individual elements of the list. When phrases such as "at least one of A, B and C, "at least one of A, B or C," "at least one selected from a group of A, B and C," or "at least one selected from among A, B and C" are used to designate a list of elements A, B and C, the phrase may refer to any and all suitable combinations or a subset of A, B and C, such as A, B, C, A and B, A and C, B and C, or A and B and C. As used herein, the terms "use," "using," and "used" may be considered synonymous with the terms "utilize," "utilizing," and "utilized," respectively. As used herein, the terms "substantially," "about," and similar terms are used as terms of approximation and not as terms of degree, and are intended to account for the inherent variations in measured or calculated values that would be recognized by those of ordinary skill in the art.

[0046] It will be understood that, although the terms first, second, third, etc. may be used herein to describe various elements, components, regions, layers, and/or sections, these elements, components, regions, layers, and/or sections should not be limited by these terms. These terms are used to distinguish one element, component, region, layer, or section from another element, component, region, layer, or section. Thus, a first element, component, region, layer, or section discussed below could be termed a second element, component, region, layer, or section without departing from the teachings of example embodiments.

[0047] Spatially relative terms, such as "beneath," "below," "lower," "above," "upper," and the like, may be used herein for ease of description to describe one element or feature's relationship to another element(s) or feature(s) as illustrated in the figures. It will be understood that the spatially relative terms are intended to encompass different orientations of the device in use or operation in addition to the orientation depicted in the figures. For example, if the device in the figures is turned over, elements described as "below" or "beneath" other elements or features would then be oriented "above" or "over" the other elements or features. Thus, the term "below" may encompass both an orientation of above and below. The device may be otherwise oriented (rotated 90 degrees or at other orientations), and the spatially relative descriptors used herein should be interpreted accordingly.

[0048] The terminology used herein is for the purpose of describing embodiments of the present disclosure and is not intended to be limiting of the present disclosure. As used herein, the singular forms "a" and "an" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "includes," "including," "comprises," and/or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0049] Also, any numerical range disclosed and/or recited herein is intended to include all sub-ranges of the same numerical precision subsumed within the recited range. For example, a range of "1.0 to 10.0" is intended to include all subranges between (and including) the recited minimum value of 1.0 and the recited maximum value of 10.0, that is, having a minimum value equal to or greater than 1.0 and a maximum value equal to or less than 10.0, such as, for example, 2.4 to 7.6. Any maximum numerical limitation

recited herein is intended to include all lower numerical limitations subsumed therein, and any minimum numerical limitation recited in this specification is intended to include all higher numerical limitations subsumed therein. Accordingly, Applicant reserves the right to amend this specification, including the claims, to expressly recite any sub-range subsumed within the ranges expressly recited herein. All such ranges are intended to be inherently described in this specification such that amending to expressly recite any such subranges would comply with the requirements of 35 U.S.C. § 112 (a) and 35 U.S.C. § 132 (a).

[0050] References to two compared elements, features, etc. as being "the same" may mean that they are "substantially the same". Thus, the phrase "substantially the same" may include a case having a deviation that is considered low in the art, for example, a deviation of 5% or less. In addition, when a certain parameter is referred to as being uniform in a given region, it may mean that it is uniform in terms of an average.

[0051] Throughout the specification, unless otherwise stated, each element may be singular or plural.

[0052] Arranging an arbitrary element "above (or below)" or "on (under)" another element may mean that the arbitrary element may be disposed in contact with the upper (or lower) surface of the element, and another element may also be interposed between the element and the arbitrary element disposed on (or under) the element.

[0053] In addition, it will be understood that when a component is referred to as being "linked," "coupled," or "connected" to another component, the elements may be directly "coupled," "linked" or "connected" to each other, or another component may be "interposed" between the components".

[0054] Throughout the specification, when "A and/or B" is stated, it means A, B or A and B, unless otherwise stated. That is, "and/or" includes any or all combinations of a plurality of items enumerated. When "C to D" is stated, it means C or more and D or less, unless otherwise specified.

[0055] Hereinafter, a secondary battery according to an embodiment will be described with reference to the drawings.

[0056] FIG. **1** is a perspective view of a secondary battery according to an embodiment. FIGS. **2** and **3** is a side views of the secondary battery according to the embodiment. FIG. **4** is a bottom view of the secondary battery according to the embodiment. FIG. **5** is a sectional view of the secondary battery according to the embodiment.

[0057] Referring to FIGS. **1** to **5**, the secondary battery **100** according to an embodiment may include an electrode assembly **110**, a can **120**, a first side plate **130**, a second side plate **140**, a first side terminal **150**, and a second side terminal **160**. The electrode assembly **110** is disposed in the can **120**. Thus, the electrode assembly **110** is not shown in FIGS. **1-4**.

[0058] The electrode assembly **110** may include a first electrode plate **111**, a second electrode plate **112**, and a separator **113**.

[0059] The first electrode plate **111** may be a negative electrode plate. The first electrode plate **111** may include a conductive metal thin plate. For example, the first electrode plate **111** may include a negative electrode current collector plate and a negative electrode active material coated on the negative electrode current collector plate. The negative electrode current collector plate may include copper or nickel (foil or mesh). The first electrode plate **111** may include a negative electrode coating portion coated with the negative electrode active material and a negative electrode uncoated portion not coated with the negative electrode active material. The negative electrode active material may include a carbon-based material, Si, Sn, tin oxide, tin alloy composite, a transition metal oxide, lithium metal nitride, or a metal oxide.

[0060] The second electrode plate **112** may be a positive electrode plate. The second electrode plate **112** may include a conductive metal thin plate. For example, the second electrode plate **112** may include a positive electrode current collector plate and a positive electrode active material coated on the positive electrode current collector plate. The positive electrode current collector plate may include aluminum (foil or mesh). The second electrode plate **112** may include a positive electrode coating portion coated with a positive electrode active material and a positive electrode uncoated portion not coated with the positive electrode active material. The positive electrode active material may include a chalcogenide compound. For example, the positive electrode active material may include a composite metal oxide such as $LiCoO_2$, $LiMn_2O_4$, $LiNiO_2$, and $LiNiMnO_2$.

[0061] The separator **113** may be interposed between the first electrode plate **111** and the second electrode plate **112**. The first electrode plate **111** and the second electrode plate **112** may be prevented from being electrically short-circuited by the separator **113**. The separator **113** may include a porous polymer such as polyethylene, polypropylene, or polyethylene and polypropylene.

[0062] The can **120** may accommodate the electrode assembly **111** together with an electrolyte. The can **120** may include two plate-shaped members including a bent portion. The corners of the plate-shaped members may face each other by the bent portion. The can **120** is formed by welding the corner **120***a*. Accordingly, the can **120** may have a shape in which a space is formed therein and both ends are opened. A first side plate **130** and a second side plate **140** may be coupled to the ends of the can **120**. Accordingly, both ends of the can **120** may be sealed.

[0063] A safety vent **170** may be formed on one surface of the can **120**. When gas is generated inside the can **120**, pressure may increase inside of the can **120** as a result of the gas. The safety vent **170** may be punctured as a result of the increased pressure to thereby discharge gas. Accordingly, it is possible to prevent the secondary battery **100** from exploding. The safety vent **170** may include a notch **170***a* that facilitates the puncture. The safety vent **170** may be fixed by overlap welding.

[0064] The can **120** may include a plurality of metals. For example, the can **120** may include a first metal **121** and a second metal **122**. The first metal **121** may be disposed in the inner and outer surface of the can **120**. The first metal **121** may include a metal having high thermal conductivity. The second metal **122** may be disposed in the outer surface of the can **120**. The second metal **121** may include a metal having a high melting temperature. For example, the first metal **121** may include aluminum. The second metal **122** may include stainless steel. The multi-layered metal may be called a clad. The can may maintain high thermal conductivity on the inner surface thereof and prevent melting on the outer surface thereof by the multi-layered metal. Accordingly, weldability between the can **120** and the side plates **130** and **140** may be improved by the first metal **121**. Also, when an

event occurs in the can **120**, the can **120** may not melt because of the second metal **122**. The structure and welding coupling of the can **120** will be described below.

[0065] The first side plate **130** may be formed in a square plate shape corresponding to the open end of the can **120**. The first side plate **130** may be welded to one end of the can **120** to seal the can **120**.

[0066] The first side plate **130** may include a first cap plate **131**, a first coupling member **132**, and a first sealing gasket **133**. The first cap plate **131** may have a flat square plate shape. The first cap plate **131** may seal the left opening **121** of the can **120**.

[0067] The first coupling member **132** and the first seal gasket **133** may be disposed between the outer surface of the first cap plate **131** and the first side terminal **150**. The first coupling member **132** may be in close contact with the first cap plate **131**. The first coupling member **132** may be in close contact with the first seal gasket **133**. The first coupling member **132** and the first seal gasket **133** may include an insulating material. The first cap plate **131** and the first side terminal **150** may be insulated from each other by the first coupling member **132** and the first seal gasket **133**.

[0068] The second side plate **140** may be formed in a square plate shape corresponding to the open other end of the can **120**. The other end is opposite to the one end. The second side plate **140** may be welded to the other end of the can **120** to seal the can **120**.

[0069] The second side plate **140** may include a second cap plate **141**, a second coupling member **142**, and a second seal gasket **143**. The configurations are similar to those of the first side plate **140**.

[0070] The first side terminal **150** is electrically connected to the uncoated portion (negative electrode uncoated portion) of the first electrode plate **111**, and is exposed to outside of the battery **100** through the first side plate **130**. Thus, the first side terminal **150** may be a negative electrode terminal. The first side terminal **150** may include a first inner plate **151**, a first terminal post **152**, and a first outer plate **153**.

[0071] The first side terminal **150** may include metal. The first side terminal **150** may be electrically connected to a first electrode tab **114**.

[0072] The first inner plate **151** may be located on an inner side of the first cap plate **131**. The first outer plate **153** may be located on an outer side of the first cap plate **131**. The first coupling member **132** may be disposed between the first outer plate **153** and the first cap plate **131**. The first sealing gasket **133** may be disposed between the first terminal post **152** and the first cap plate **131**. The first sealing gasket **133** may be disposed between the first inner plate **151** and the first cap plate **131**. The first terminal post **152** penetrates the first cap plate **131**. Accordingly, the first terminal post **152** may be coupled to the first outer plate **153** on an outer side of the first cap plate **131**. Also, the first terminal post **152** may be coupled to the first inner plate **151** on an inner side of the first cap plate **131**. The first inner plate **151** may be welded and coupled to the first electrode tab **114** from the inside thereof.

[0073] The first terminal post **152** may be inserted and coupled through the first inner plate **151**. For example, the first terminal post **152** may be riveted and/or welded from one surface thereof in a state of being inserted into the terminal hole of the first inner plate **151**. The first terminal post **152** may have a pillar shape protruding and extending to the outwardly from the first cap plate **131**.

[0074] The first outer plate **153** may include a terminal hole penetrating through the first outer plate **153** between opposite surfaces. The first terminal post **152** may pass through the terminal hole of the first outer plate **153** to be riveted and/or welded.

[0075] The second side terminal **160** may be electrically connected to the uncoated portion (positive electrode uncoated portion) of the second electrode plate **112**. The second side terminal **160** may be exposed to outside of the battery **100** through the second side plate **140**. Thus, the second side terminal **160** may be a positive terminal. An insulating member may be disposed between the second side terminal **160** and the second side plate **140** to prevent an electrical short circuit.

[0076] The second side terminal **160** may include a second inner plate **161**, a second terminal post **162**, and a second outer plate **163**. A structure of the second side terminal **160** is similar to that of the first side terminal **150**.

[0077] Hereinafter, the structure and coupling of the can **120** of the secondary battery **100** according to the embodiment will be described in detail.

[0078] FIG. **6** is a sectional view of a base material of a can of the secondary battery according to the embodiment. FIG. **7** is an enlarged view of a coupling section of a side plate and a can of the secondary battery according to the embodiment. FIG. **8** is a perspective view of an electrode assembly of the secondary battery according to the embodiment. FIG. **9** is a perspective view of a can of the secondary battery according to the embodiment.

[0079] Referring to FIG. **6**, the can **120** may be formed using a base material **120'**. The base material **120'** may include a first metal **121** and a second metal **122**. The second metal **122** may be coupled to an outer surface of the first metal **121**. The second metal **122** may be surrounded by the edge **121***a* of the first metal **121**. In detail, the edge **121***a* of the first metal **121** may be formed to a set length w. The second metal **122** may be disposed in the inner region (first step part) formed by the edge **121***a*. Accordingly, the second metal **122** may be embedded in the first metal **121**. However, embodiments are not limited thereto. The second metal **122** may be disposed such that a surface of the second metal **122** is coplanar with the edge **121***a*. In detail, the first metal **121** may have a first thickness t**1**. The edge **121***a* may protrude to a second thickness t**2**. The second metal **122** may also have the second thickness t**2**. Accordingly, when viewed from its side, the base material **120'** may have a flat plate shape.

[0080] Also, the first thickness t**1** may be greater than or equal to the thickness of the second metal. Accordingly, the thermal conductivity of the can **120** may be increased by the first metal **121**.

[0081] Referring to FIG. **7**, a stepped portion **121***b* may be formed by processing the base material **120'**. The first side plate **130** may be coupled in a state of being supported by the stepped portion **121***b*. In detail, the inner diameter of the base material **120** may be reduced by the stepped portion **121***b*. Accordingly, the first cap plate **131** of the first side plate **130** may be supported by the stepped portion **121***b*. Subsequently, welding may be performed along the boundary between the first cap plate **131** of the first site plate **130** and the first metal **121**. Accordingly, the first side plate **130** may be fixed to the can **120**. In addition, the first side plate **130** may seal an end of the can **120**.

[0082] To this end, a thickness t**3** of the first cap plate **131** of the first side plate **130** may be greater than a depth from the end portion of the first side plate **130** to the stepped portion **121***b*. A chamfer region **131***a* may be formed at an inner end portion of the first side plate **130**. Accordingly, the coupling force between the first side plate **130** and the can **120** may be increased. The length w of the first metal **121** may be longer than the thickness t**3** of the first side plate **130**. Accordingly, when the first side plate **130** is coupled, it is possible to prevent a pressure due to coupling from being applied to the second metal **122**. Accordingly, the position of the second metal **122** may be maintained in a fixed state, and deformation of the can **120** may be prevent.

[0083] As described above, the secondary battery **100** according to the embodiment may include a can **120** including a first metal **121** and a second metal **122**. The second metal **122** may be disposed on the outer surface of the first metal **121**. Accordingly, weldability between the can and the side plates **131** and **132** may be increased by the first metal **121**. Also, the can **120** is not melted at a high temperature due to the second metal **122**, and thus stability of the battery **100** may be improved.

[0084] Hereinafter, the coupling relationship between the electrode assembly and the can will be described in detail.

[0085] Referring to FIG. **8**, the electrode assembly **110** may include a first electrode tab **114** and a second electrode tab **115**. The first electrode tab **114** may be a current collecting tab formed by an extension of the uncoated portion **111***a* of the first electrode plate. The second electrode tab **115** may be a current collecting tab formed by an extension of the uncoated portion **112***a* of the second electrode plate. However, the embodiment is not limited thereto. The first electrode tab **114** and the second electrode tab **115** may be separate tabs coupled to the uncoated portions **111***a* and **112***a*. The first electrode tab **114** and the second electrode tab **115** may protrude from opposite sides of the electrode assembly **110**.

[0086] Referring to FIG. **9**, the can **120** may have a rectangular parallelepiped shape which is open at both sides. In detail, the can **120** may have the shape of a rectangular tube. The can **120** may be formed by processing the base material **120'**. In detail, the base material **120'** may be bent a plurality of times. Accordingly, a rectangular tube shape as shown in FIG. **9** may be formed. Accordingly, the can **120** may have a boundary line **120***b* with ends facing each other. Also, the second metals **122** formed on the outer surface may contact at the boundary line **120***b*. Also, the first metals **121** positioned at the edges may contact each other. By welding along the boundary line **120***b*, a side surface of the can **120** may be sealed.

[0087] The electrode assembly **110** may be inserted through both opening portions of the can **120**. Subsequently, the side plates **130** and **140** may be coupled to the can **120** to seal the can **120**.

[0088] Hereinafter, a secondary battery according to another embodiment will be described.

[0089] FIG. **10** is a perspective view of a secondary battery according to another embodiment. FIG. **11***a* is a partial perspective view of the secondary battery according to another embodiment. FIG. **11***b* is a perspective view of a can of the secondary battery according to another embodiment. FIG. **12** an enlarged view of a coupling section of a side plate and a can of the secondary battery according to another embodiment.

[0090] Referring to FIGS. **10** to **12**, the secondary battery **200** according to another embodiment may include the electrode assembly, the can **220**, the first side plate **130**, the second side plate **140**, the first side terminal **150**, and the second side terminal (not shown in FIGS. **10** to **12**). The same reference numerals are assigned to the same elements as those of the previous embodiment. Hereinafter, differences from the previous embodiment will be mainly described.

[0091] The can **220** may include the first metal **121** and the second metal **122**. The can **220** may include a protrusion **221***a*. The protrusion **221***a* may protrude inward from at least one side adjacent to the side plates **130** and **140**. The protrusion **221***a* may be formed through a plastic process such as pressing in a direction from outside to the inside of the can **220**. The protrusion **221***a* may correspond to the step part **121***b* (second step part) of the previous embodiment. That is, when the can **120** is processed, a separate step part **121***b* is not formed. Instead, the protrusion **221***a* may be formed by applying an external force such as pressing from outside of the can **220**. Thus, the protrusion **221***a* may be formed in a simpler manner than the step part **121***b*. Subsequently, the side plates **130** and **140** may be supported by the protrusions **221***a* at opposite ends of the battery **200**.

[0092] Referring to FIG. **12**, the first side plate **130** may be welded while being supported by the protrusion **221***a*. The can **220** does not include separate stepped portion. Therefore, the upper end thickness of the can **220** may be ensured with a desired size. Thus, welding becomes easy, and desired welding strength may be ensured.

[0093] Hereinafter, a secondary battery according to another embodiment will be described.

[0094] FIG. **13** is a partial perspective view of the secondary battery according to another embodiment.

[0095] Referring to FIG. **13**, the secondary battery **300** according to another embodiment includes the electrode assembly, a can **320**, the first side plate **130**, the second side plate (not shown in FIG. **13**), the first side terminal **150**, and the second side terminal (not shown in FIG. **13**). The same reference numerals are assigned to the same elements as those of the previous embodiment. Hereinafter, differences from the previous embodiment will be mainly described.

[0096] The can **320** may include the first metal **121** and the second metal **122**. The can **320** may include a plurality of protrusions **321***a*. The protrusions **321***a* may protrude inward from at least one side adjacent to the side plates **130** and **140**.

[0097] The protrusions **321***a* may be formed through plastic processing such as pressing from outside to the inside of the can **320**. The protrusions **321***a* may correspond to the protrusion **221***a* of the previous embodiment. However, in this case there are a plurality of the protrusions **321***a* on each side at each end of the battery **300**. An external force such as pressing may be applied to a plurality of regions of the can **320** to thereby form the protrusions **321***a*. Accordingly, the protrusions **321***a* may be formed by a simple method. Subsequently, the side plates **130** and **140** may be supported by the protrusions **321***a*.

[0098] The protrusions **321***a* may be formed in a minimum region of the can **320** to support the side plates **130** and **140**. Accordingly, welding strength may be improved. Also, the strength of the can **320** may be maintained as much as possible.

[0099] The secondary battery according to the embodiment may include a can including a plurality of metals. Accordingly, weldability between the can and the side plate may be improved. In addition, when an event occurs in the can, it is possible to prevent the can from melting.

[0100] Also, the secondary battery according to the embodiment may include a can including a protrusion. The protrusion may be formed by modifying the shape of the can above. The side plate above may be fixed by the protrusion. Accordingly, the can may be easily manufactured. In addition, weldability between the can and the side plate may be improved.

[0101] The above is only one embodiment for implementing a secondary battery according to the disclosure, the disclosure is not limited to the above embodiment, and there is a technical spirit of the disclosure to the extent that various modifications can be made by anyone having ordinary skill in the art to which the disclosure pertains without departing from the gist of the disclosure as claimed in the following claims.

What is claimed is:

1. A secondary battery comprising:

an electrode assembly including a first electrode plate, a second electrode plate, and a separator interposed between the first electrode plate and the second electrode plate;

a can accommodating the electrode assembly, the can being open at a first end and open a second end that is opposite to the first end;

a first side plate sealing the first end of the can; and

a second side plate sealing the second end of the can,

wherein the can comprises a first metal and a second metal formed on an outer surface of the first metal,

wherein the first side plate and the second side plate are coupled to the first metal of the first side plate, and

wherein a thermal conductivity of the first metal is greater than a thermal conductivity of the second metal.

2. The secondary battery as recited in claim **1**, wherein a thickness of the first metal is greater than or equal to a thickness of the second metal.

3. The secondary battery as recited in claim **1**, wherein the first metal forms an inner surface of the can and part of an outer surface of the can,

wherein the second metal forms a part of the outer surface of the can,

wherein an edge of the first metal is thicker than a thickness of the second metal,

wherein an outer surface of the first metal has a step part formed by the edge, and

wherein the second metal is embedded in the step part.

4. The secondary battery as recited in claim **1**, wherein a part of the outer surface of the first metal and an outer surface of the second metal are coplanar.

5. The secondary battery as recited in claim **3**, wherein the step part is a first step part, and

wherein a second step part is formed on an inner surface of the edge of the first metal.

6. The secondary battery as recited in claim **5**, wherein the secondary battery includes a first side terminal and a second side terminal, and

wherein one of the first side terminal and the second side terminal is coupled to the second step part.

7. The secondary battery as recited in claim **6**, wherein an area of the first side plate or the second side plate coupled to the second step part comprises a chamfer region.

8. The secondary battery as recited in claim **7**, wherein a diameter of the first side plate or a diameter of the second side plate is reduced by the chamfer region.

9. The secondary battery as recited in claim **3**, wherein a protrusion is formed on the inner surface of the can,

wherein the protrusion supports a surface of the first side plate or a surface of the second side plate.

10. The secondary battery as recited in claim **9**, wherein a groove corresponding to the protrusion is formed on an outer surface of the can.

11. The secondary battery as recited in claim **9**, wherein the protrusion comprises a plurality of protrusions spaced apart from each other.

12. The secondary battery as recited in claim **1**, wherein the can is formed in a pipe shape or in a bent plate shape.

13. The secondary battery as recited in claim **1**, wherein a melting point of the second metal is greater than a melting point of the first metal.

14. The secondary battery as recited in claim **1**, wherein the first metal and the second metal comprise different metals.

15. The secondary battery as recited in claim **10**, wherein the groove is formed in the first metal.

16. The secondary battery as recited in claim **3**, wherein an area of the second metal forming part of the outer surface of the can is greater than an area of the first metal forming part of the outer surface of the can.

17. The secondary battery as recited in claim **9**, wherein an area of the first or second side plate coupled to the protrusion comprises a chamfer region.

18. The secondary battery as recited in claim **9**, wherein the protrusion is formed at the edge of the first metal.

19. The secondary battery as recited in claim **3**, wherein a thickness of the first side plate or the second side plate is less than a length of the edge of the first metal.

20. The secondary battery as recited in claim **1**, wherein the can is formed by coupling two rectangular tubes.

* * * * *