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CELL SUPPLY DEVICE FOR SECONDARY BATTERY

Abstract

A cell supply device for a secondary battery includes a base plate on which first to third turntables, a positive electrode material tray, and a negative electrode material tray are installed, a cell elevating unit installed on an upper surface of the first turntable to move up and down, a cell supply member on which a cell adsorption unit configured to adsorb cells is installed, a first transport member provided with the second turntable installed at one side of the cell supply member, a cell transport tray on which the cells are stacked, and a slider unit installed on a lower surface of the cell transport tray, and a second transport member in which the cell elevating unit and the cell adsorption unit (**151**) are installed on the third turntable.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to and the benefit of Korean Patent Application No. 10-2024-0023959, filed on Feb. 20, 2024, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

1. Field of the Invention

[0002] The present invention relates to a cell supply device for a secondary battery, and more specifically, to a cell supply device for a secondary battery, which supplies cells to be stacked on a stacking unit by consecutively moving the cells one by one while rotating a plurality of turntables.

2. Discussion of Related Art

[0003] In general, a chemical battery is a battery including negative and positive electrode plates facing each other, a separator (membrane) located between the negative and positive electrode plates, and an electrolyte, and the capacity of storable energy is changed depending on materials forming the electrode plates and the electrolyte.

[0004] Such chemical batteries are classified into primary batteries, which have very slow charging reaction and are used only for one-time discharging, and secondary batteries, which may be reused through repeated charging and discharging, and recently, the use of the secondary batteries tends to be rapidly increased due to an advantage in that the secondary batteries are chargeable and dischargeable.

[0005] Due to the advantage, the secondary batteries are applied to various technical fields throughout the industry, and as an example, are widely used as energy sources for advanced electronic devices such as wireless mobile devices and are also attracting attention as energy sources for electric vehicles, which are being suggested as measures for solving problems of air pollution of conventional gasoline and diesel internal combustion engines using fossil fuels and the exhaustion of fossil fuels.

[0006] The secondary battery is configured in a form in which a positive electrode plate, a separator (membrane), and a negative electrode plate are sequentially stacked and immersed in an electrolyte solution, and there are two major methods for manufacturing a cell stack inside the secondary battery.

[0007] There are a first method of sequentially overlapping and then winding a negative electrode plate, a separator, a positive electrode plate, and a separator together to form a jelly-roll form and a second method of cutting the negative electrode plate and the positive electrode plate to required sizes and alternately stacking the negative electrode plate, the separator, the positive electrode plate, and the separator.

[0008] To manufacture high-capacity or large-sized secondary batteries, the second stacking method is advantageous in terms of battery lifetime and space efficiency and thus is increasingly adopted to electric vehicles.

[0009] There are several methods of manufacturing an internal cell (assembly of electrodes and separators) of the secondary battery using the stacking method.

[0010] FIG. **1** is a schematic view showing a cell stack inside a secondary battery manufactured by a Z-stacking method. FIG. **2** is a plan view showing a conventional apparatus for manufacturing a cell stack of a secondary battery using the Z-stacking method.

[0011] As shown in FIGS. **1** and **2**, a method of folding a continuous separator **3** in a zigzag shape and alternately stacking a negative electrode plate **1** and a positive electrode plate **2** between the folded separator is referred to as Z-folding & stacking or Z-stacking for short.

[0012] As disclosed in Korean Patent No. 10-1140447, as an apparatus for manufacturing an

internal cell of a secondary battery using a Z-stack method as described above, cell manufacturing apparatuses in which an apparatus for stacking materials such as electrode plates and separators and an apparatus for transporting electrode plates to stacking positions stack the materials while repeatedly performing linear reciprocating motion and vertical elevating motion have been most widely used in the past.

[0013] As shown in FIG. **2**, in such Z-folding & stacking manufacturing apparatuses, a negative electrode plate **1** and a positive electrode plate **2** are stack on individual tables T spaced apart from each other in a left-right direction, a stage **4** on which the negative electrode plate **1** and the positive electrode plate **2** are disposed is installed to reciprocate horizontally between the individual tables T, and a robot **5** alternately picks up and transports the negative electrode plate **1** and the positive electrode plate **2** on the tables T to be stacked on a folded and unfolded separator **3** on the stage **4**.

[0014] Since the conventional Z-stacking method requires much work time due to a long horizontal moving distance of the stage **4**, a problem of degrading productivity has occurred.

[0015] In addition, when an operating speed of the apparatus is increased to shorten a working time, vibrations and noise rapidly increase, making it impossible to secure the positional accuracy of the apparatus, and since the stacked materials are shaken while the stage **4** repeats reciprocating and stopping, there has been a problem in that the stacking precision between the electrodes inside the cell is not secured.

[0016] FIG. **3** is a view showing a cell stack process implemented in the conventional apparatus for manufacturing the cell stack.

[0017] Recently, in manufacturing a Z-folding stacked secondary battery cell stack, as disclosed in Korean Patent No. 10-2120403, a swing type cell stack method of manufacturing a cell stack by performing laterally reciprocating swinging on a stack table at a predetermined angle and alternately supplying and stacking a negative electrode plate and a positive electrode plate on a separator stacked on the stack table at both sides of the stack table is being used.

[0018] However, upon using the swing-type cell stack method such as the apparatus for manufacturing the secondary battery cell of the above registered patent, since the stack table rotates while tilting to both sides at a predetermined angle, there is a problem in that a large tension is applied to the separator stacked on the stack table, thereby causing damage to the separator and degrading stack precision.

[0019] In other words, conventionally, as shown in FIG. **3**, in a state in which a separator **3** is fixed on a stack table **10** by a plurality of clamp units **20**, the stack table **10** receives a negative electrode plate or a positive electrode plate from a transport device **30** by laterally rotating at a predetermined angle, and since the stack table **10** is in a state of being tilted at a predetermined angle with respect to the ground when the stack table **10** receives the negative electrode plate or the positive electrode plate, a large tension can be applied to an end of the separator **3** caught on the clamp unit **20** to cause damage to the separator **3** or in a severe case, the separator **3** can be torn to cause defects or the stop of work, thereby significantly degrading productivity.

[0020] In addition, when the stack table **10** receives and stacks the negative electrode plate or the positive electrode plate in the state of being tilted at the predetermined angle, there is a problem in that instantaneous slipping occurs due to a load, making it difficult to keep constant stacking positions.

[0021] Since a cell supply device used in the conventional cell manufacturing apparatus is moved using a robot arm, it takes a long time to work, resulting in the degradation of productivity of cell manufacturing.

RELATED ART DOCUMENTS

Patent Documents

[0022] (Patent Document 1) Korean Patent No. 10-1140447 (Patent Document 2) Korean Patent No. 10-2120403

[0023] (Patent Document 3) Korean Patent Application Publication No. 10-2023-0135936

SUMMARY OF THE INVENTION

[0024] The present invention is directed to providing a cell supply device for a secondary battery, which is capable of shortening a work time according to cell movement by consecutively supplying cells of a negative electrode material and positive electrode material stacked on a base plate by rotation of a turntable.

[0025] The present invention is also directed to providing a cell supply device for a secondary battery, which is capable of consecutively supplying cells without a delay time caused by a first transport member and a second transport member by alternately adsorbing the negative electrode material and the positive electrode material on a cell adsorption unit installed on the turntable.

[0026] According to an aspect of one embodiment of the present invention, there is provided a cell supply device for a secondary battery that includes a base plate (**110**) on which first to third turntables (**131**, **171**, and **191**) installed rotatably, a positive electrode material tray (**111**) on which a positive electrode material is stacked, and a negative electrode material tray (**121**) on which a negative electrode material is stacked are installed, a cell supply member (**130**) on which a cell elevating unit (**135**) installed on an upper surface of the first turntable (**131**) to move up and down so that cells (**113**) stacked on the positive electrode material tray (**111**) and the negative electrode material tray (**112**) are adsorbed, and a cell adsorption unit (**151**) configured to adsorb the cells (**113**) stacked on the positive electrode material tray (**111**) and the negative electrode material tray (**112**) by upward and downward movements of the cell elevating unit (**135**) are installed, a first transport unit (**170**) provided with a second turntable (**171**) installed at one side of the cell supply member (**130**), a cell transport tray (**173**) on which the cells (**113**) moved from the second turntable (**171**) are stacked, and a slider unit (**175**) installed on a lower surface of the cell transport tray (**173**) to adjust a position of the cell transport tray (**173**), and a second transport member (**190**) in which a cell elevating unit (**135**) and a cell adsorption unit (**151**) are installed on the third turntable (**191**) to move the cells (**113**) stacked on the cell transport tray (**173**) of the first transport cell (**170**) to a stack table.

[0027] The positive electrode material tray (**111**) on which the positive electrode material is stacked and the negative electrode material tray (**112**) on which the negative electrode material is stacked may be installed to be spaced a predetermined distance from each other on the base plate (**110**), the first turntable (**131**) may be installed to rotate horizontally at a predetermined height of the base plate (**110**), the second turntable (**171**) may be installed to rotate horizontally at a predetermined height of the base plate (**110**), and the third turntable (**191**) may be installed to rotate in a direction perpendicular to the base plate (**110**) to move the cells (**113**) stacked on the cell transport tray (**173**) of the second turntable (**171**).

[0028] A plurality of cell elevating units (**135**) may be radially installed on the first turntable (**131**) of the cell supply member (**130**) and the third turntable (**191**) of the second transport member (**190**) so that the cell adsorption unit (**151**) configured to adsorb the cells (**113**) may move up and down, and the cell adsorption unit (**151**) for adsorbing the cells (**113**) may be installed on the cell elevating unit (**135**) to move up and down.

[0029] In the cell elevating unit (**135**), an LM guide (**136**) and an LM cover (**137**) may be provided, and a slider block (**138**) may be installed inside the LM guide (**136**) and the LM cover (**137**) to be moved up and down by rotation of a motor (**141**) installed above the LM guide (**136**), a slider cover (**144**) may be installed on a front surface of the slider block (**138**), and a steel band (**143**) may be elastically installed between the slider block (**138**) and the slider cover (**144**) to block introduction of foreign substance into the LM guide (**136**), and in the cell adsorption unit (**151**), a vertical plate (**152**) may be installed on a front surface of the slider cover (**144**), a horizontal plate (**154**) may be installed on a lower surface of the vertical plate (**152**), a lower plate (**155**) may be installed on a lower surface of the horizontal plate (**154**), and an adsorption port (**157**) may be installed on a lower surface of the lower plate (**155**) to adsorb the cell (**113**).

[0030] The first transport member (**170**) may include the cell transport tray (**173**) radially installed on an upper surface of the second turntable (**171**) so that the cells (**113**) transported from the cell supply member (**130**) are stacked, and the slider unit (**175**) configured to adjust the cell transport tray (**173**) so that the cells (**113**) are placed on the cell transport tray (**173**) in a state of being aligned at a correct position.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] FIG. **1** is a schematic view showing a cell stack inside a secondary battery manufactured by a Z-stacking method.

[0032] FIG. **2** is a plan view showing a conventional apparatus for manufacturing a cell stack of a secondary battery using the Z-stacking method.

[0033] FIG. **3** is a view showing a cell stack process implemented in a conventional apparatus for manufacturing a cell stack.

[0034] FIG. **4** is a three-dimensional view showing a cell supply device for a secondary battery according to an exemplary embodiment of the present invention.

[0035] FIG. **5** is a three-dimensional view showing the cell supply device for a secondary battery according to the exemplary embodiment of the present invention.

[0036] FIG. **6** is a front view showing the cell supply device for a secondary battery according to the exemplary embodiment of the present invention.

[0037] FIG. **7** is a plan view showing the cell supply device for a secondary battery according to the exemplary embodiment of the present invention.

[0038] FIG. **8** is a three-dimensional view showing a cell supply member of the cell supply device for a secondary battery according to the exemplary embodiment of the present invention.

[0039] FIG. **9** is a three-dimensional view showing the cell supply member of the cell supply device for a secondary battery according to the exemplary embodiment of the present invention.

[0040] FIG. **10** is an exploded three-dimensional view showing the cell supply member of the cell supply device for a secondary battery according to the exemplary embodiment of the present invention.

[0041] FIG. **11** is an exploded three-dimensional view showing the cell supply member of the cell supply device for a secondary battery according to the exemplary embodiment of the present invention.

[0042] FIG. **12** is a three-dimensional view showing a slider unit of the cell supply device for a secondary battery according to the exemplary embodiment of the present invention.

[0043] FIG. **13** is an exploded three-dimensional view showing the slider unit of the cell supply device for a secondary battery according to the exemplary embodiment of the present invention.

[0044] FIG. **14** is a three-dimensional view showing the cell supply device for a secondary battery according to the exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0045] Hereinafter, embodiments of the present invention will be described in detail with reference to the accompanying drawings so that those skilled in the art to which the present invention pertains may easily carry out the present invention.

[0046] However, since the description of the present invention is only an embodiment for structural and functional description, the scope of the present invention should not be construed as limited by embodiments described herein.

[0047] For example, since embodiments can be modified in various ways and can have various forms, it should be understood that the scope of the present invention includes equivalents capable of realizing the technical spirit.

[0048] In addition, since the objects or effects presented in the present invention do not mean that a specific embodiment should include all or only such effects, the scope of the present invention should not be understood as limited thereby.
[0049] In the specification, the present embodiments are provided to make the disclosure of the present invention complete and fully convey the scope of the invention to those skilled in the art to which the present invention pertains. In addition, the present invention is only defined by the scope of the claims.
[0050] Therefore, in some embodiments, well-known components, well-known operations, and well-known technologies are not specifically described to avoid ambiguous construction of the present invention.
[0051] Meanwhile, the meaning of the terms described in the present invention is not limited to the dictionary meaning and should be understood as follows.
[0052] Unless otherwise defined, all terms used herein have the same meaning as commonly understood by those skilled in the art to which the present invention pertains.
[0053] Terms defined in commonly used dictionaries should be construed as consistent with the meaning they have in the context of the related technology and cannot be construed as having an ideal or excessively formal meaning unless clearly defined in the present invention.
[0054] Hereinafter, a cell supply device for a secondary battery according to an exemplary embodiment of the present invention will be described in detail with reference to the accompanying drawings.
[0055] The cell supply device for a secondary battery according to the exemplary embodiment of the present invention includes first to third turntables **131**, **171**, and **191** installed rotatably, a base plate **110** on which a positive electrode material tray **111** on which a positive electrode material is stacked and a negative electrode material tray **112** on which a negative electrode material is stacked are installed, a cell elevating unit **135** installed on an upper surface of the first turntable **131** to move up and down so that a cell stacked on the positive electrode material tray **111** and the negative electrode material tray **112** are adsorbed, a cell supply member **130** on which a cell adsorption unit **151** for adsorbing the cells **113** stacked on the positive electrode material tray **111** and the negative electrode material tray **112** by the upward and downward movements of the cell elevating unit **135** is installed, installed at one side of the cell supply member **130**, a cell transport tray **173** on which the cell **113** moved from the second turntable **171** is stacked, a first transport member **170** provided with a slider unit **175** installed on a lower surface of the cell transport tray **173** to adjust a position of the cell transport tray **173**, and a second transport member **190** on which the cell elevating unit **135** and the cell adsorption unit **151** are installed on the third turntable **191** to move the cell **113** stacked on the cell transport tray **173** of the first transport member **170** to a stack table.
[0056] FIG. **4** is a three-dimensional view showing a cell supply device for a secondary battery according to an exemplary embodiment of the present invention, FIG. **5** is a three-dimensional view showing the cell supply device for a secondary battery according to the exemplary embodiment of the present invention, FIG. **6** is a front view showing the cell supply device for a secondary battery according to the exemplary embodiment of the present invention, and FIG. **7** is a plan view showing the cell supply device for a secondary battery according to the exemplary embodiment of the present invention.
[0057] As shown in FIGS. **4** to **7**, the cell supply device of the present invention includes the base plate **110** on which the plurality of turntables **131**, **171**, and **191** are installed, the cell supply member **130** for moving the cells **113** stacked on the positive electrode material tray **111** and the negative electrode material tray **112** of the base plate **110** to the second turntable **171**, the first transport member **170** for temporarily stacking the cells **113** moved from the cell supply member **130**, and the second transport member **190** installed to rotate in a direction perpendicular to the first transport member **170**.

[0058] On the base plate **110**, the positive electrode material tray **111** on which the positive electrode material is stacked and the negative electrode material tray **112** on which the negative electrode material is stacked are installed to be spaced a predetermined distance from each other, the first turntable **131** is installed to rotate horizontally at a predetermined height of the base plate **110**, the second turntable **171** is installed to rotate horizontally at a predetermined height of the base plate **110**, and the third turntable **191** is rotatably installed in a direction perpendicular to the base plate **110** to move the cells **113** stacked on the cell transport tray **173** of the second turntable **171**.

[0059] The base plate **110** is formed as a flat plate with a predetermined size, and on the base plate **110**, the positive electrode material tray **111** on which the cell **113**, which is a positive electrode material, is stacked, is installed, and the negative electrode material tray **112** on which the cell **113**, which is a negative electrode material, is stacked is installed to be spaced a predetermined distance from the positive electrode material tray **111**.

[0060] In other words, the cells **113** are stacked on each of the positive electrode material tray **111** and the negative electrode material tray **112** to a predetermined height.

[0061] In addition, on the base plate **110**, the first turntable **131** for moving the cells **113** is installed to rotate horizontally, the second turntable **171** for temporarily stacking the cells **113** moved from the first turntable **131** is installed to rotate horizontally, and the third turntable **191** is installed to rotate in a vertical direction which is a direction perpendicular to the second turntable **171**.

[0062] The first turntable **131** is installed higher than the second turntable **171**. This allows a large amount of cells **113** to be stacked on the trays **111** and **112**, thereby reducing the number of processes of stacking the cells **113** on the trays **111** and **112** and thus shortening the work time.

[0063] A plurality of cell elevating units **135** are radially installed on the first turntable **131** of the cell supply member **130** and the third turntable **191** of the second transport member **190** to allow the cell adsorption unit **151** for adsorbing the cells **113** to move up and down, and the cell adsorption unit **151** for adsorbing the cells **113** is installed on the cell elevating unit **135** to move up and down.

[0064] The cell supply member **130** moves the cells **113** stacked on the trays **111** and **112** to the first transport member **170**, and the first transport member **170** rotates the cells **113** transported from the cell supply member **130** and supplies the cells **113** to the second transport member **190**.

[0065] In addition, the second transport member **190** supplies the cells placed on the first transport member **170** to the stack table (not shown).

[0066] In other words, the cell supply member **130** moves the cells **113** of the trays **111** and **112** to the first transport member **170**, the first transport member **170** rotates toward the second transport member **190**, and the second transport member **190** supplies the cells **113** to the stack table.

[0067] A plurality of cell elevating units **135** moving up and down so that the cells **113** are adsorbed and a plurality of cell adsorption units **151** for adsorbing the cells **113** are radially installed on the first turntable **131** and the third turntable **193** in the cell supply member **130** and the second transport member **190**.

[0068] The cell elevating unit **135** and the cell adsorption unit **151** installed on the cell supply member **130** and the second transport member **190** are the same, and thus will be described using the same names and the same reference numerals.

[0069] A first rotation motor **132** is installed on a lower surface of the first turntable **131** of the cell supply member **130**, and the first turntable **131** rotates at a constant speed.

[0070] A sliding groove portion **133** is formed in the first turntable **131** so that the cell elevating unit **135** may be installed radially.

[0071] Eight sliding groove portions **133** are formed in the first turntable **131**, and it goes without saying that eight or more sliding groove portions **133** may be formed if necessary.

[0072] FIG. **8** is a three-dimensional view showing a cell supply member of the cell supply device for a secondary battery according to the exemplary embodiment of the present invention, FIG. **9** is

a three-dimensional view showing the cell supply member of the cell supply device for a secondary battery according to the exemplary embodiment of the present invention, FIG. **10** is an exploded three-dimensional view showing the cell supply member of the cell supply device for a secondary battery according to the exemplary embodiment of the present invention, and FIG. **11** is an exploded three-dimensional view showing the cell supply member of the cell supply device for a secondary battery according to the exemplary embodiment of the present invention.

[0073] As shown in FIGS. **8** to **11**, in the cell elevating unit **135**, an LM guide **136** and an LM cover **137** are provided, a slider block **138** is installed inside the LM guide **136** and the LM cover **137** to be moved up and down by the rotation of a motor **141** installed above the LM guide **136**, a slider cover **144** is installed on a front surface of the slider block **138**, and a steel band **143** is elastically installed between the slider block **138** and the slider cover **144** to block the introduction of foreign substance into the LM guide **136**, and in the cell adsorption unit **151**, a vertical plate **152** is installed on a front surface of the slider cover **144**, a horizontal plate **154** is installed on a lower surface of the vertical plate **152**, a lower plate **155** is installed on a lower surface of the horizontal plate **154**, and an adsorption port **157** is installed on a lower surface of the lower plate **155** to adsorb the cell **113**.

[0074] The cell elevating unit **135** moves up and down the cell adsorption unit **151** installed thereunder, and the LM cover **137** is installed on a front surface of the LM guide **136**.

[0075] A slider block **138** is installed inside the LM guide **136** and the LM cover **137** to move up and down, a support block **139** is installed on an upper surface of the LM cover **137**, and a motor bracket **140** and a motor **141** are installed on an upper surface of the support block **139**.

[0076] An end cover **142** is installed on a lower surface of the LM cover **137**, and the steel band **143** for preventing the introduction of foreign substance into the LM guide **136** is installed on a front surface of the LM cover **137**.

[0077] The slider cover **144** is installed on the front surface of the slider block **138**, and the steel band **143** is elastically installed between the slider block **138** and the slider cover **144**.

[0078] Meanwhile, a vertical surface **138***a* is formed on the front surface of the slider block **138** at a predetermined height, an inclined surface **138***b* inclined at a predetermined angle is formed above and under the vertical surface **138***a*, and the vertical surface **138***a* and the inclined surface **138***b* are formed to allow the steel band **143** to be easily deformed so that the slider block **138** smoothly moves up and down.

[0079] A fixing plate **145** is installed on a rear surface of the LM guide **136**, a rear fixing angle **146** is installed on the fixing plate **145**, and a sensor bracket **147** is installed so that a sensor (not shown) for detecting the upward and downward movements of the slider block **138** may be installed on a side surface of the LM cover **137**.

[0080] In other words, the slider block **138** is moved up and down at an appropriate height by the sensor (not shown) installed on the sensor bracket **147**.

[0081] The cell adsorption unit **151** for adsorbing the cell **113** while moved up and down by the slider block **138** is installed on the front surface of the LM cover **137**.

[0082] The vertical plate **152** of the cell adsorption unit **151** is installed on the front surface of the slider cover **144**, a front reinforcement angle **153** is installed on a front surface of the vertical plate **152**, and the horizontal plate **154** is installed on a lower surface of the front reinforcement angle **153**.

[0083] The lower plate **155** with a predetermined thickness is installed on the lower surface of the horizontal plate **154**, and the adsorption port **157** is installed on the lower surface of the lower plate **155** by a fixing bolt **156**.

[0084] The adsorption port **157** adsorbs the cell **113** while contracted by the upward and downward movements of the slider block **138**.

[0085] In the cell supply member **130**, the cell adsorption unit **151** is moved down by the plurality of cell elevating units **135** radially installed on the first turntable **131**, and the cell adsorption unit

151 is moved up by the cell elevating unit **135** after adsorbing the cells **113** stacked on the trays **111** and **112**.

[0086] In addition, since the plurality of cell elevating units **135** are radially installed on the cell supply member **130**, the plurality of cell elevating units **135** adsorb and move the cell **113** stacked on the positive electrode material tray **111** and alternately adsorb the cells **113** stacked on the negative electrode material tray **112** to move the cells **113** to the first transport member **170**.

[0087] FIG. **12** is a three-dimensional view showing a slider unit of the cell supply device for a secondary battery according to the exemplary embodiment of the present invention, and FIG. **13** is an exploded three-dimensional view showing the slider unit of the cell supply device for a secondary battery according to the exemplary embodiment of the present invention.

[0088] As shown in FIGS. **12** and **13**, the first transport member **170** includes the cell transport tray **173** radially installed on an upper surface of the second turntable **171** so that the cells **113** transported from the cell supply member **130** may be stacked, and the slider unit **175** for adjusting the cell transport tray **173** so that the cells **113** may be placed on the cell transport tray **173** in a state of being aligned at a correct position.

[0089] The first transport member **170** temporarily stacks the cells **113** moved from the cell supply member **130**, and the first transport member **170** serves as a temporary bridge for moving the cells **113** moved from the cell supply member **130** to the second transport member **190**.

[0090] The second turntable **171** is installed to be rotated by a second rotational motor **172** above the base plate **110**, and the cell transport tray **173** for stacking the cells **113** moved from the cell supply member **130** is installed above the base plate **110**.

[0091] Eight cell transport trays **173** are radially installed in the same manner on the cell supply member **130** and the second transport member **190** in the second turntable **171**.

[0092] The slider unit **175** for adjusting a position of the cell transport tray **173** is installed on the lower surface of the cell transport tray **173**.

[0093] The slider unit **175** includes a first slider **179** and a second slider **185** to vertically and horizontally move the cell transport tray **173**, a lower adjustment plate moved by the first slider **179**, and an upper adjustment plate moved by the second slider **185**.

[0094] A first sliding hole **177** to which the first slider **179** is coupled is formed in the lower adjustment plate **176**, and a guide groove **184** is formed in each of both sides of the sliding hole **177** so that the lower adjustment plate **176** may be linearly moved by the first slider **179**.

[0095] A first driving motor **180** is provided on the first slider **179**, and a first transport shaft **181** rotated by the first driving motor **180** is installed.

[0096] In other words, the lower adjustment plate **176** is slid by the rotation of the first transport shaft **181** to move the cell transport tray **173**.

[0097] In addition, a second sliding hole **183** to which a second transport shaft **187** of the second slider **185** is coupled is formed in the upper adjustment plate **182**, and the guide groove **184** is formed in each of both sides of the second sliding hole **183** so that the upper adjustment plate **182** may be linearly moved.

[0098] A second driving motor **186** is provided on the second slider **185**, and a second transport shaft **187** rotated by the second driving motor **186** is coupled to the second sliding hole **183**.

[0099] Therefore, the lower adjustment plate **176** may be moved by the first slider **179** to move the cell transport tray **173**, and the upper adjustment plate **182** may be moved by the second slider **185** to move the cell transport tray **173**.

[0100] Therefore, a position of the cell transport tray **173** may be freely adjusted according to the position of the cell **113**.

[0101] The cells **113** stacked on the cell transport tray **173** may be rotated toward the second transport member **190** by the second turntable **171**, and the second transport member **190** may adsorb the cells **113** placed on the cell transport tray **173** and supply the cells **113** to the stack table **10** (see FIG. **3**).

[0102] Meanwhile, FIG. **14** shows the second transport member **190** according to another embodiment of the present invention, and a third turntable **191***a* of the second transport member **190** is formed in a linear shape. In other words, since two upper and lower cell elevating units **135** and the cell adsorption unit **151** are installed on the third turntable **191***a*, it is possible to secure a space in which a separator (not shown) may be supplied.
[0103] In this case, it goes without saying that the third turntable **191***a* is rotated at a faster speed than the second turntable **171** to move the cells **113** placed on the second turntable **171**.
[0104] As described above, by using a cell supply device for a secondary battery according to the present invention, cells of a positive electrode material and a negative electrode material can be alternately adsorbed and continuously moved by three turntables, and the cells are moved by a plurality of cell elevating units and cell adsorption units radially installed on the turntable, and thus it is possible to dramatically reduce a cell moving time, i.e., work time, and more quickly move the cells, thereby improving the productivity of the secondary battery.
[0105] Although the present invention implemented by the present inventors has been specifically described above according to embodiments, it goes without saying that the present invention is not limited to the embodiments and can be changed variously without departing from the gist of the present invention.

Claims

1. A cell supply device for a secondary battery, comprising: a base plate (**110**) on which a positive electrode material tray (**111**) on which a positive electrode material is stacked and a negative electrode material tray (**121**) on which a negative electrode material is stacked are installed; a cell supply member (**130**) on which a first turntable (**131**) installed to rotate horizontally at one side of the base plate (**110**), a cell elevating unit (**135**) installed on an upper surface of the first turntable (**131**) to move up and down so that cells (**113**) stacked on the positive electrode material tray (**111**) and the negative electrode material tray (**112**) are adsorbed, and a cell adsorption unit (**151**) configured to adsorb the cells (**113**) stacked on the positive electrode material tray (**111**) and the negative electrode material tray (**112**) by upward and downward movements of the cell elevating unit (**135**) are installed; a first transport unit (**170**) provided with a second turntable (**171**) installed on the base plate (**110**) to rotate horizontally in the same manner as the first turntable (**131**) of the cell supply member (**130**), a cell transport tray (**173**) on which the cells (**113**) moved from the second turntable (**171**) are stacked, and a slider unit (**175**) installed on a lower surface of the cell transport tray (**173**) to adjust a position of the cell transport tray (**173**); and a second transport member (**190**) provided with a third turntable (**191**) installed to rotate in a direction perpendicular to the second turntable (**171**), and a cell elevating unit (**135**) and a cell adsorption unit (**151**) installed on the third turntable (**191**) to move the cells (**113**) stacked on the cell transport tray (**173**) of the first transport cell (**170**) to a stack table.
2. The cell supply device of claim 1, wherein the positive electrode material tray (**111**) on which the positive electrode material is stacked and the negative electrode material tray (**112**) on which the negative electrode material is stacked are installed to be spaced a predetermined distance from each other on the base plate (**110**), the first turntable (**131**) is installed to rotate horizontally at a predetermined height of the base plate (**110**), the second turntable (**171**) is installed to rotate horizontally at a predetermined height of the base plate (**110**), and the third turntable (**191**) is installed to rotate in a direction perpendicular to the base plate (**110**) to move the cells (**113**) stacked on the cell transport tray (**173**) of the second turntable (**171**).
3. The cell supply device of claim 1, wherein a plurality of cell elevating units (**135**) are radially installed on the first turntable (**131**) of the cell supply member (**130**) and the third turntable (**191**) of the second transport member (**190**) so that the cell adsorption unit (**151**) configured to adsorb the cells (**113**) moves up and down, and the cell adsorption unit (**151**) for adsorbing the cells (**113**) is

installed on the cell elevating unit (**135**) to move up and down.

4. The cell supply device of claim 1, wherein in the cell elevating unit (**135**), an LM guide (**136**) and an LM cover (**137**) are provided, and a slider block (**138**) is installed inside the LM guide (**136**) and the LM cover (**137**) to be moved up and down by rotation of a motor (**141**) installed above the LM guide (**136**), a slider cover (**144**) is installed on a front surface of the slider block (**138**), and a steel band (**143**) is elastically installed between the slider block (**138**) and the slider cover (**144**) to block introduction of foreign substance into the LM guide (**136**), and in the cell adsorption unit (**151**), a vertical plate (**152**) is installed on a front surface of the slider cover (**144**), a horizontal plate (**154**) is installed on a lower surface of the vertical plate (**152**), a lower plate (**155**) is installed on a lower surface of the horizontal plate (**154**), and an adsorption port (**157**) is installed on a lower surface of the lower plate (**155**) to adsorb the cell (**113**).

5. The cell supply device of claim 1, wherein the first transport member (**170**) includes the cell transport tray (**173**) radially installed on an upper surface of the second turntable (**171**) so that the cells (**113**) transported from the cell supply member (**130**) are stacked, and the slider unit (**175**) configured to adjust the cell transport tray (**173**) so that the cells (**113**) are placed on the cell transport tray (**173**) in a state of being aligned at a correct position.