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CHARGING STATION FOR PERSONAL MOBILITY DEVICE

Abstract

A charging station for a personal mobility device, which is a station for receiving a personal mobility device including a front wheel, a rear wheel, and a charging module, comprises: a plurality of power transfer modules each of which includes a wireless transmission coil; a frame in which the plurality of power transfer modules are accommodated; a control unit which is mounted to the frame; and a wheel slope which is disposed at the frame and on which the front wheel of the personal mobility device is seated, wherein, when the front wheel of the personal mobility device is positioned on the wheel slope, the power transfer modules and the charging module come into contact with each other. The charging station can safely store personal mobility devices.

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Background/Summary

TECHNICAL FIELD

[0001] The present disclosure relates to a charging station for personal mobility devices capable of simultaneously storing and charging a personal mobility device.

BACKGROUND ART

[0002] A personal mobility device is a single-person means for transportation using electricity, which may include an electric wheel, an electric kickboard, an electric bicycle, and an ultra-compact electric vehicle.

[0003] The electric kickboard, which is often used as a personal mobility device, may include a skateboard-shaped body portion, a support bar extending upward from the body portion, a handle extending from opposite sides of the support bar, and wheels rotatably mounted to the body portion and the support bar.

[0004] A recent personal mobility device includes a motor configured to provide rotational power and a battery configured to supply power to the motor.

[0005] Conventionally, there is a problem that personal mobility devices are left on the street after use, which hinders the movement of pedestrians and vehicles. In addition, since the personal mobility devices cannot be charged immediately after use, personnel who collect the personal mobility devices for charging or replace the batteries is needed, resulting in difficulties in maintenance.

[0006] In order to solve this, charging stations have been studied, but a conventional station is a modular type station, in which only one personal mobility device is mounted, and therefore the stations must be assembled one by one on site, which requires installation time.

[0007] In addition, since the stations are installed individually, it is necessary to install a distribution box for each station separately and to connect the stations to each other by wiring on site, which is cumbersome, and the stations are installed individually and are easily damaged due to weak rigidity.

DISCLOSURE

Technical Task

[0008] It is an object of the present disclosure to provide a charging station capable of simultaneously storing and charging a personal mobility device.

[0009] It is another object of the present disclosure to provide a charging station with a simplified structure to reduce installation and manufacturing costs.

[0010] It is a further object of the present disclosure to provide a charging station having a structure in which a charging module is in tight contact with a power transmission module when a personal mobility device is mounted in the station.

Technical Solutions

[0011] The present disclosure provides a charging station for receiving a personal mobility device including a front wheel, a rear wheel, and a charging module, the charging station including a plurality of power transmission modules each including a wireless transmission coil, a frame

configured to receive the plurality of power transmission modules, a controller mounted in the frame, and a wheel slope located at the frame, the wheel slope being configured to allow the front wheel of the personal mobility device to be seated thereon, wherein the power transmission module and the charging module are in contact with each other when the front wheel of the personal mobility device is located on the wheel slope.

[0012] The wheel slope may include a first inclined surface extending upward and a second inclined surface extending downward from the first inclined surface, and the power transmission module and the charging module may be in contact with each other when the front wheel of the personal mobility device is located on the second inclined surface.

[0013] The first inclined surface of the wheel slope may have a tapered shape with a large width at a lower part and a small width at an upper part.

[0014] The wheel slope may further include a sidewall formed at a side surface of each of the first inclined surface and the second inclined surface so as to obliquely extend upward and outward.

[0015] The power transmission module may include a module case configured to receive the transmission coil, a module box hingedly coupled to left and right sides of the module case, the module box being fixed to the frame, and an elastic portion located between a rear surface of a lower part of the module case and the module box, and when the personal mobility device is located on the second inclined surface, the elastic portion may be compressed and a front surface of the module case may be tilted downward.

[0016] When current in the transmission coil changes, the power transmission module may determine that the charging module is coupled in place and may provide a notification to a user.

[0017] The notification may be provided visually or audibly using one of a lamp located at an upper part of the frame and a speaker located at the power transmission module.

[0018] The power transmission module may further include a magnet coupled to a ferromagnetic body or a magnet located at the charging module of the personal mobility device.

[0019] The charging station may further include a stem holder located above the power transmission module, the stem holder being configured to receive a stem of the personal mobility device.

[0020] The frame may include an upper frame extending in a horizontal direction, the upper frame including a plurality of receiving portions configured to receive the power transmission modules, a pair of vertical frames located on opposite sides of the upper frame, and a lower frame configured to connect the pair of vertical frames to each other, the wheel slope being fixed to the lower frame.

[0021] The controller may include a control box located in the frame, an earth leakage breaker located in the control box, the earth leakage breaker being configured to detect earth leakage and cut off power, and a power distribution module configured to provide external power to the plurality of power transmission modules.

Advantageous Effects

[0022] A charging station for personal mobility devices according to the present disclosure may safely store personal mobility devices.

[0023] In addition, the present disclosure may facilitate the movement of pedestrians and vehicles, since the personal mobility devices are stored and on standby in a set place.

[0024] In addition, the charging station is capable of performing charging simultaneously with storage, whereby the need for separate collection may be eliminated, and batteries can be charged immediately, whereby the time available for use may be increased.

[0025] In addition, the charging station of the present disclosure has the advantage that a plurality of storage portions is integrated to secure rigidity and the charging station is easy to install.

[0026] In addition, since a power distribution unit is located in the station, the power distribution unit is not exposed to rain, etc., whereby the risk of electric shock is low and durability is excellent.

[0027] Effects obtainable from the present disclosure are not limited by the above mentioned

effects, and other unmentioned effects can be clearly understood from the above description by those having ordinary skill in the technical field to which the present disclosure pertains.

Description

DESCRIPTION OF DRAWINGS

[0028] FIG. **1** is a perspective view showing a charging station according to an embodiment of the present disclosure.

[0029] FIG. **2** is an exploded perspective view showing the charging station according to the embodiment of the present disclosure.

[0030] FIG. **3** is a front view and a plan view showing embodiments of the charging station of the present disclosure.

[0031] FIG. **4** is a view showing the state in which a personal mobility device is mounted in the charging station according to the embodiment of the present disclosure.

[0032] FIG. **5** is an exploded view showing a power transmission module of the charging station according to the embodiment of the present disclosure and a charging module of a personal mobility device.

[0033] FIG. **6** is a side view and a sectional view showing the power transmission module of the charging station according to the embodiment of the present disclosure.

[0034] FIGS. **7** and **8** are views showing the state in which a personal mobility device is mounted in the charging station according to the embodiment of the present disclosure.

[0035] FIG. **9** is a view showing the flow of force by which the charging module of the personal mobility device comes into tight contact with the power transmission module of the charging station according to the embodiment of the present disclosure.

[0036] FIGS. **10** and **11** are views showing the disposition of the power transmission module and the charging module in the state in which the personal mobility device is mounted in the charging station according to the embodiment of the present disclosure.

[0037] FIG. **12** is a view showing a controller of the charging station according to the embodiment of the present disclosure.

BEST MODE FOR DISCLOSURE

[0038] Description will now be given in detail according to exemplary embodiments disclosed herein, with reference to the accompanying drawings. For the sake of brief description with reference to the drawings, the same or equivalent components may be provided with the same reference numbers, and description thereof will not be repeated. In general, a suffix such as “module” and “unit” may be used to refer to elements or components. Use of such a suffix herein is merely intended to facilitate description of the specification, and the suffix itself is not intended to give any special meaning or function. In the present disclosure, that which is well-known to one of ordinary skill in the relevant art has generally been omitted for the sake of brevity. The accompanying drawings are used to help easily understand various technical features and it should be understood that the embodiments presented herein are not limited by the accompanying drawings. As such, the present disclosure should be construed to extend to any alterations, equivalents and substitutes in addition to those which are particularly set out in the accompanying drawings.

[0039] It will be understood that although the terms first, second, etc. may be used herein to describe various elements, these elements should not be limited by these terms. These terms are generally only used to distinguish one element from another.

[0040] It will be understood that when an element is referred to as being “connected with” another element, the element can be directly connected with the other element or intervening elements may also be present. In contrast, when an element is referred to as being “directly connected with”

another element, there are no intervening elements present.
[0041] A singular representation may include a plural representation unless it represents a definitely different meaning from the context.
[0042] Terms such as “include” or “has” are used herein and should be understood that they are intended to indicate an existence of several components, functions or steps, disclosed in the specification, and it is also understood that greater or fewer components, functions, or steps may likewise be used.
[0043] FIG. **1** is a perspective view showing a charging station **100** according to an embodiment of the present disclosure, and FIG. **2** is an exploded perspective view showing the charging station **100** according to the embodiment of the present disclosure.
[0044] The charging station **100** of the present disclosure is a charging station for charging a personal mobility device **200**, wherein the personal mobility device **200** refers to a mobility device used by a single person and includes a shared mobility device.
[0045] While there are many types of personal mobility devices **200** depending on the number and disposition of wheels and the shape of a frame **110**, the electric mobility device **200** receivable in the charging station **100** of the present disclosure includes a front wheel, a rear wheel **222**, and a battery configured to provide power. For example, there is an electric kickboard or an electric bicycle.
[0046] The electric mobility device **200** includes a battery such that the electric mobility device is driven using electricity, and when the battery is depleted, the battery needs to be collected so as to be replaced or charged and installed again. Therefore, there is a problem that labor is consumed and when the battery is depleted, the battery cannot be used until the battery is collected and charged.
[0047] In addition, regulations on electric mobility devices **200** left on the roadside have recently been strengthened, resulting in laws and regulations restricting parking spaces for the electric mobility devices **200**. There is a problem that the electric mobility devices **200** are easily tipped over and damaged by wind or external impact during parking.
[0048] Accordingly, the present disclosure provides a charging station **100** capable of charging an electric mobility device **200** while receiving the electric mobility device **200** in a designated space such that the electric mobility device **200** can be charged directly while the electric mobility device **200** is parked in a safe manner, thereby reducing labor costs.
[0049] Consequently, the electric mobility device received in the charging station **100** such that the battery can be charged may include a charging module **230**.
[0050] As shown in FIG. **1**, the charging station **100** of the present disclosure may receive a plurality of personal mobility devices **200**. The personal mobility device **200** in the form shown in FIG. **1** is a kickboard type personal mobility device **200** including a first frame **211** including a stem **213** extending in a vertical direction and having a handle **214** located at an upper end and a front wheel **221** coupled to a lower end and a second frame **212** including a footrest having a rear wheel **222** coupled thereto.
[0051] In addition to the kickboard type personal mobility device, other forms of personal mobility devices, such as a bicycle, may also be received, but for convenience of description, the personal mobility device **200** will be described hereinafter on the basis of the electric kickboard type personal mobility device.
[0052] The charging station **100** of the present disclosure includes a power transmission module **130**, a frame **110**, a controller **160**, and a wheel slope **120**. The power transmission module **130** is connected to the charging module **230** of the personal mobility device **200** to charge the battery of the personal mobility device **200**, wherein wired connection is possible, but the present embodiment may include a power transmission module **130** and a charging module **230** using a wireless charging method.
[0053] The frame **110** may include a lower frame **114** fixed to the floor, a vertical frame **113** extending from the lower frame **114** in the vertical direction, and an upper frame **111** connected to

an upper part of the vertical frame **113** and extending in a horizontal direction, the upper frame being configured to allow a plurality of power transmission modules **130** to be located therein.
[0054] The plurality of power transmission modules **130** may be provided in the horizontally extending upper frame **111** to receive a plurality of personal mobility devices **200**.
[0055] As receiving portions configured to receive the personal mobility devices **200** are integrally configured, it is advantageous in terms of durability, and it is possible to shorten the installation time by installing the personal mobility devices **200** at once without installing and connecting a plurality of stations successively.
[0056] For convenience of description, the direction shown in FIG. **1** is referred to as a front surface and the opposite direction is referred to as a rear surface. The front surface may include an opening to expose a plurality of power transmission modules **130**.
[0057] The vertical frames **113** may be provided in a pair at opposite ends of the charging station **100** in the horizontal direction, as shown in FIG. **1**, or may be further disposed between the respective receiving portions. An identification number or QR code **119** may be disposed on a side surface of the vertical frame **113** to identify the charging station **100**.
[0058] The lower frame **114** may fix the frame **110** to the floor, and a wheel slope **120** on which the wheel of the personal mobility device **200** is seated may be mounted in the lower frame. The width of the lower frame **114** in a forward-rearward direction may be greater than that of the upper frame **111** for stable support.
[0059] The wheel slope **120** may have a predetermined width for the front wheel **221** of the personal mobility device **200** to be seated, and may include an inclined surface. The movement of the front wheel **221** along the inclined surface naturally serves to guide the personal mobility device **200** to be received in the charging station **100**.
[0060] FIG. **3** is a plan view showing embodiments of the charging station **100** of the present disclosure. The wheel slope **120** may be disposed vertically, as shown in (a), or obliquely, as shown in (b). Depending on the size of the installation space, different types may be used.
[0061] (a) has a small width in the horizontal direction but a large length in the forward-rearward direction, which may be difficult to install if the width of a walkway is small. In this case, installing the wheel slope **120** obliquely as in (b) has the advantage that the length in the forward-rearward direction is decreased and the length of the personal mobility device **200** protruding from the charging station **100** is also less than in the embodiment of (a).
[0062] Since the disposition of the power transmission module **130** varies depending on the disposition of the charging station, the shape of an opening of the upper frame **111** may vary. and the horizontal length of each of the upper frame **111** and the lower frame **114** may also vary.
[0063] Since a second inclined surface **123** is related to the position of the power transmission module **130**, the shape of the wheel slope **120** may also vary depending on the direction of disposition of the personal mobility device **200**.
[0064] The wheel slope **120** of the present disclosure may include a first inclined surface **121**, an apex **122**, and a second inclined surface **123** in a direction from the front to the rear. The first inclined surface **121** may ascend from the front to the rear, the first inclined surface may be stopped at the apex **122**, and the second inclined surface **123** may descend therefrom.
[0065] The first inclined surface **121** may have a tapered shape that is wide at the entrance and gradually narrows toward the apex to allow the front wheel **221** to move along the wheel slope **120**.
[0066] The wheel slope **120** may have sidewalls **125** to prevent the front wheel **221** of the personal mobility device **100** from deviating from the wheel slope in a lateral direction. The sidewalls **125** may be formed by bending the wheel slope **120**, as shown in FIG. **2**, or may be formed using the lower frame.
[0067] A coupling portion **124** extending farther rearward than the second inclined surface **123** to fix the wheel slope **120** to the lower frame **114** may be further included. Since the coupling portion **124** is located farther rearward than the second inclined surface **123**, the front of the part of the

front wheel in contact with the floor is located at the coupling portion.
[0068] Consequently, the sidewall **125** of the coupling portion **124** may protrude higher than the other portions, as shown in FIG. **2**.
[0069] FIG. **4** is a view showing the state in which the personal mobility device **200** is mounted in the charging station **100** according to the embodiment of the present disclosure.
[0070] When a user pushes the personal mobility device **200** such that the front wheel **221** of the personal mobility device **200** rolls over the first inclined surface **121**, the personal mobility device **200** moves from position **200-1** to position **200-2**, and the front wheel **221** passes through the apex **122** of the wheel slope **120** roll along the second inclined surface **123**. In the state in which the front wheel **221** is located on the second inclined surface **123**, the charging module **230** of the personal mobility device **200** comes into contact with the power transmission module **130**.
[0071] At this time, a stem holder **145** configured to hold the stem **213** such that the personal mobility device **200** does not tilt may be further provided. The stem holder may be located above the power transmission module **130** and may protrude farther than the power transmission module **130** in the forward direction.
[0072] The stem of the personal mobility device **200** is tilted as shown in FIG. **4**, and the stem holder **145** may include a stem groove **145***a* and stem guides **145***b* protruding from the left and right sides of the stem groove **145***a*.
[0073] FIG. **5** is an exploded view showing the power transmission module **130** of the charging station **100** according to the embodiment of the present disclosure and the charging module **230** of the personal mobility device **200**. (a) is an exploded view of the power transmission module **130** of the charging station **100**, and (b) is an exploded view of the charging module **230** of the personal mobility device **200**.
[0074] The power transmission module **130** and the charging module **230** may include coils for transmitting and receiving power, respectively, and may include a board portion **134** configured to control the same.
[0075] The power transmission module **130** includes a module case **131** and a transmission coil **133** and a board portion **134** mounted on the module case **131**.
[0076] In the present embodiment, the transmission coil **133** may include a TX contact portion **131***a* mounted on a front surface of the module case **131** and in contact with the charging module **230** while covering the transmission coil **133**. The TX contact portion **131***a* may include a guide protrusion configured to guide a charging coil **233** of the charging module **230** so as to be located in alignment with the transmission coil **133**.
[0077] The module case **131** may further include a plurality of rear covers **131***b* and may be further provided with a waterproof member **132** for waterproofing between the rear covers **131***b* and the module case **131**.
[0078] A speaker **135** may be further provided for notification as needed, and the speaker **135** may output a notification sound upon detecting touch of the charging module **230**.
[0079] The power transmission module **130** may further include a magnet **137**, which may be magnetically coupled to a magnet or a ferromagnetic body **237** of the charging module **230** such that the charging coil **133** of the charging module **230** can be fixed in place.
[0080] The charging module **230** shown in (b) may include a fixing bracket **239** fixed to the frame **110** of the personal mobility device **200** and a housing **231** configured to receive the charging coil **233** and the board portion **234**.
[0081] However, the power transmission module **130** and the charging module **230** must be in tight contact for charging, and since the personal mobility device **200** is of various types, the angle of the stem to which the charging module **230** is fixed may vary from product to product. In addition, if the personal mobility device **200** is twisted when seated in the charging station **100** or if the floor on which the rear wheel **222** is located is tilted, the angle of the stem at the bottom surface varies.
[0082] In consideration of these situations, the power transmission module **130** may be configured

to move within a predetermined range.
[0083] FIG. **6** is a side view and a sectional view showing the power transmission module **130** of the charging station **100** according to the embodiment of the present disclosure.
[0084] The difference in the horizontal position between the front wheel **221** and the charging module **230** located on the stem **213** may vary from one product to another, but the charging station **100** of the present disclosure does not specify the position of the front wheel **221**, it is sufficient for the front wheel **221** to be located on the second inclined surface **123**, and since the charging module **230** is received when the charging module comes into contact with the power transmission module **130**, the position of the power transmission module **130** in the forward-rearward direction does not need to change.
[0085] However, the power transmission module may be configured to rotate about a horizontal axis to adjust the tilted angle. The module case **131** may include a pivoting shaft **138** protruding from opposite side surfaces, and may further include a module box **116** to which the pivoting shaft **138** is coupled and in which the power transmission module **130** is received.
[0086] The module box **116** is a basket-shaped member inserted into the opening in the upper frame **111**, wherein a front surface of the module box is open and the power transmission module **130** is located in a rear part of the module box. The rotation axis **138** of the power transmission module **130** is inserted into recesses located at opposite side surfaces of the module box **116**, and the power transmission module **130** is rotatable.
[0087] As shown in FIG. **2**, the module box **116** may include a recess corresponding to the stem groove **145***a* of the stem holder **145** in consideration of the position of the stem **213** of the personal mobility device **200**.
[0088] The module box **116** may be further provided at an upper surface and a lower surface thereof with recesses, and the recess in the lower surface may be located farther rearward than the recess in the upper surface.
[0089] Meanwhile, an elastic portion **139** may be further included to provide force to push the power transmission module **130** in the forward direction such that the power transmission module **130** is in tight contact with the charging module **230**. When force is applied at the front surface of the power transmission module **130**, the elastic portion **139** may be deformed but provides tension to push the power transmission module **130** in the forward direction.
[0090] The present embodiment is an embodiment in which the power transmission module **130** is basically disposed in the vertical direction and the elastic portion **139** is disposed on a rear surface of a lower part of the power transmission module. Generally, since the stem **213** of the personal mobility device **200** is disposed in the state in which a lower part of the stem protrudes, the elastic portion that pushes the rear surface of the lower part of the power transmission module **130** in the forward direction allows the power transmission module **130** to tilt along the inclined surface of the charging module **230** and to return to the original shape thereof when the personal mobility device **200** is removed.
[0091] FIGS. **7** and **8** are views showing the state in which the personal mobility device **200** is mounted in the charging station **100** according to the embodiment of the present disclosure. FIG. **7** is a side view of the charging module **230** at the beginning of contact with the power transmission module **130**, and FIG. **8** is a sectional view showing the charging module **230** in tight contact with the power transmission module **130**.
[0092] As shown in FIG. **7**, the front wheel **221** of the personal mobility device **200** moves along the second inclined surface **123** toward the rear of the charging station **100**, and one point of the charging module **230** contacts one point of the power transmission module **130**.
[0093] If the angle of the power transmission module **130** does not change, the charging coil **133** of the charging module **230** and the transmission coil **133** of the power transmission module **130** are not aligned with each other and no charging is performed, but the power transmission module **130** of the present disclosure may rotate at an inclination corresponding to the angle of the charging

module **230** and the angle may change as shown in (b) of FIG. **8**.
[0094] As shown in (a) of FIG. **8**, the personal mobility device **200** may move a little farther toward the rear of the charging station **100** along the second inclined surface **123**, and the power transmission module **130** may be rotated to be aligned with the charging module **230** in tight contact while having the same angle as the charging module, as shown in (b) of FIG. **8**.
[0095] FIG. **9** is a view showing the flow of force by which the charging module **230** of the personal mobility device **200** comes into tight contact with the power transmission module **130** of the charging station **100** according to the embodiment of the present disclosure.
[0096] Force F**0** oriented in the direction of gravity by the weight of the personal mobility device **200** is changed in direction by the second inclined surface **123**, and force F**2** is generated in which the charging module **230** presses the power transmission module **130** in the forward-rearward direction by force F**1** changed by the inclined surface.
[0097] The power transmission module **130** rotates and tilts in a direction corresponding to the direction of force F**2** and comes into tight contact with the charging module **230**.
[0098] The user may push the personal mobility device **200** only until the front wheel **221** of the personal mobility device **200** is located at the apex **122** of the wheel slope **120**, which naturally brings the charging module **230** into tight contact with the power transmission module **130** and charging may occur.
[0099] FIGS. **10** and **11** are views showing the disposition of the power transmission module **130** and the charging module **230** in the state in which the personal mobility device **200** is mounted in the charging station **100** according to the embodiment of the present disclosure. If the floor surface on which the rear wheel **222** is located is tilted, the charging module **230** and the power transmission module **130** may be misaligned with each other.
[0100] Referring to FIG. **10**, if the floor surface on which the rear wheel **222** is located is tilted or depressed so as to be located lower than the charging station **100**, the stem **213** of the personal mobility device **200** is further inclined from the vertical direction.
[0101] In this case, the position of the front wheel on the second inclined surface **123** is also slightly farther rearward. The power transmission module **130** is tilted slightly more than the normal alignment (see FIG. **8**) and the charging module **230** is located lower than the power transmission module **130**.
[0102] For example, if the floor angle is 6 degrees, the charging module **230** is located about 7.2 mm lower than in (b) of FIG. **8**.
[0103] Meanwhile, even when the personal mobility device is received in the charging station **100** with the stem **213** disposed to tilt in a direction different from the direction of the wheel slope **120** although the floor surface is not tilted, the tilt of the stem **213** becomes greater, whereby a similar result may occur.
[0104] FIG. **11** is a view showing the case where the floor surface at which the rear wheel **222** is located is tilted so as to be higher than the charging station **100**. The stem **213** is tilted less and the power transmission module **130** is not tilted as much as in the situation of FIG. **8**.
[0105] As a result, the charging module **230** is located higher than the power transmission module **130**. For example, if the floor angle is 6 degrees, the charging module **230** is located about 7.2 mm farther upward than in (b) of FIG. **8**.
[0106] In the case of FIGS. **10** and **11**, charging is possible within a certain range, and a notification may be provided to the user to dispose the charging module at a correct position if the charging module is tilted beyond an allowable range.
[0107] The notification may be provided through the speaker **135** of the power transmission module **130** or a lamp **150** located at an upper side of the frame **110**. That is, the lamp **150** may be illuminated blue when the charging module is disposed at the correct position and red when the position is incorrect and charging is not possible.
[0108] Whether the charging module **230** is disposed at the correct position may be determined by

detecting a change in the magnetic field of the transmission coil **133** of the power transmission module **130**. Once there is a change in the magnetic field, it may be determined that the personal mobility device **200** has been received and it may be determined that the charging module **230** is disposed at the correct position to provide sufficient power for charging.

[0109] Alternatively, a separate sensor may be used to detect whether the personal mobility device **200** has been received. For example, a pressure sensor may be provided on the wheel slope **120** to determine that the personal mobility device **200** has been received when the personal mobility device **200** is on the wheel slope **120**, and may provide charging and notification.

[0110] FIG. **12** is a view showing the controller of the charging station according to the embodiment of the present disclosure.

[0111] Referring to FIGS. **2** and **12**, the controller **160** of the present disclosure is connected to each of the power transmission modules **130** to control the plurality of power transmission modules **130** and may be mounted in the frame **110**.

[0112] A conventional charging station **100** is configured to receive only one personal mobility device **200**, and a controller **160** configured to connect and control a plurality of charging stations **100** is separately provided. The charging stations **100** are connected to each other via a cable extending through the bottoms of the charging stations or exposed on the ground, which presents aesthetic or safety issues.

[0113] However, the charging station **100** of the present disclosure has a cable disposed in the frame **110** to control each power transmission module **130**. The controller **160** may detect the number of personal mobility devices **200** received in the charging station and transmit available receiving spaces to a server.

[0114] The controller **160** may be located in the control box **161** in the frame **110**, and may include a power meter **166** configured to measure the power consumed, an AC/DC converter **167** configured to convert the power supplied, and an earth leakage breaker **165** configured to detect earth leakage and cut off power.

[0115] Conventionally, the earth leakage breaker is located outside the frame **110** to connect the plurality of charging stations **100**, which may easily cause earth leakage, but the earth leakage breaker **165** of the present disclosure is less likely to cause earth leakage even in weather such as rain.

[0116] A power distribution module **163** configured to appropriately distribute power to the power transmission modules **130** may be provided, and a communication module **162** for connection with the server may also be provided.

[0117] The charging station **100** for personal mobility devices **200** according to the present disclosure may safely store the personal mobility devices **200**.

[0118] In addition, the present disclosure may facilitate the movement of pedestrians and vehicles, since the personal mobility devices **200** are stored and on standby in a set place.

[0119] In addition, the charging station **100** is capable of performing charging simultaneously with storage, whereby the need for separate collection may be eliminated, and the batteries can be charged immediately, whereby the time available for use may be increased.

[0120] In addition, the charging station **100** of the present disclosure has the advantage that a plurality of storage portions is integrated to secure rigidity and the charging station is easy to install.

[0121] In addition, since a power distribution unit is located in the station, the power distribution unit is not exposed to rain, etc., whereby the risk of electric shock is low and durability is excellent.

[0122] The above detailed description should not be construed as being limitative in all terms, but should be considered as being illustrative. The scope of the present invention should be determined by reasonable analysis of the accompanying claims, and all changes in the equivalent range of the present invention are included in the scope of the present invention.

Claims

1. A charging station for receiving a personal mobility device comprising a front wheel, a rear wheel, and a charging module, the charging station comprising: a plurality of power transmission modules each comprising a wireless transmission coil: a frame configured to receive the plurality of power transmission modules: a controller mounted in the frame: and a wheel slope located at the frame, the wheel slope being configured to allow the front wheel of the personal mobility device to be seated thereon, wherein the power transmission module and the charging module are in contact with each other when the front wheel of the personal mobility device is located on the wheel slope.
2. The charging station of claim 1, wherein the wheel slope comprises: a first inclined surface extending upward: and a second inclined surface extending downward from the first inclined surface, and the power transmission module and the charging module are in contact with each other when the front wheel of the personal mobility device is located on the second inclined surface.
3. The charging station of claim 2, wherein the first inclined surface of the wheel slope has a tapered shape with a large width at a lower part and a small width at an upper part.
4. The charging station of claim 3, wherein the wheel slope further comprises a sidewall formed at a side surface of each of the first inclined surface and the second inclined surface so as to obliquely extend upward and outward.
5. The charging station of claim 2, wherein the power transmission module comprises: a module case configured to receive the transmission coil: a module box hingedly coupled to left and right sides of the module case, the module box being fixed to the frame; and an elastic portion located between a rear surface of a lower part of the module case and the module box, and when the personal mobility device is located on the second inclined surface, the elastic portion is compressed and a front surface of the module case is tilted downward.
6. The charging station of claim 1, wherein, when current in the transmission coil changes, the power transmission module determines that the charging module is coupled in place and provides a notification to a user.
7. The charging station of claim 6, wherein the notification is provided visually or audibly using one of a lamp located at an upper part of the frame and a speaker located at the power transmission module.
8. The charging station of claim 1, wherein the power transmission module further comprises a magnet coupled to a ferromagnetic body or a magnet located at the charging module of the personal mobility device.
9. The charging station of claim 1, further comprising a stem holder located above the power transmission module, the stem holder being configured to receive a stem of the personal mobility device.
10. The charging station of claim 1, wherein the frame comprises: an upper frame extending in a horizontal direction, the upper frame comprising a plurality of receiving portions configured to receive the power transmission modules: a pair of vertical frames located on opposite sides of the upper frame; and a lower frame configured to connect the pair of vertical frames to each other, the wheel slope being fixed to the lower frame.
11. The charging station of claim 1, wherein the controller comprises: a control box located in the frame: an earth leakage breaker located in the control box, the earth leakage breaker being configured to detect earth leakage and cut off power: and a power distribution module configured to provide external power to the plurality of power transmission modules.