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Pet toilet

Abstract

A driving device of a pet toilet is configured to drive a litter scoop to move in a litter box to separate a litter clump from the litter box, and the driving device includes a driving force arm and a driving source component. A first end of the driving force arm is rotatably connected to the litter scoop, and an opposite second end of the driving force arm is rotatably connected to the driving source component. The first end of the driving force arm is rotatable around the driving source component to move the opposite second end between two opposite ends of the litter box, thereby driving the litter scoop through the driving force arm to separate the litter clump from the litter box. The driving source component is further configured to drive the litter scoop to be lifted and move the lifted litter scoop out of the litter box.

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Background/Summary

CROSS REFERENCE TO THE RELATED APPLICATIONS (1) This application is the continuation application of International Application No. PCT/CN2023/089529, filed on Apr. 20, 2023, which is based upon and claims priority to Chinese Patent Application No. 202210426781.5, filed on Apr. 21, 2022, the entire contents of which are incorporated herein by reference.

TECHNICAL FIELD
(1) The present disclosure relates to the technical field of pet toilets, and in particular to a pet toilet.
BACKGROUND
(2) Pet owners usually provide dedicated pet toilets for their pets. For example, cat toilets are

provided to guide cats to excrete in a designated area. There is pet litter placed in the cat toilet, which can form a litter clump when the excrement is in a damp state, making it easy to clean the litter clump from the dry pet litter. Due to the odor of the pet excrement, the pet owner needs to timely remove the litter clump from the pet litter, otherwise the cat will not be willing to excrete in the cat toilet.

(3) At present, commonly used cat toilets with automatic cleaning function in the industry are mainly side drum type cat toilets, which drive the litter clump through a filter screen by rotating a litter container, thereby separating the pet litter and the litter clump. However, the side drum type cat toilet requires flipping the cat litter mixed with the litter clump, making the inner wall of the cat toilet easily contaminated with the excrement, thereby requiring regular cleaning of the inner wall of the cat toilet.

SUMMARY

(4) In view of this, it is necessary to provide a pet toilet to solve the problem that the inner wall of the side drum type cat toilet is easily contaminated with excrement. In the present disclosure, a litter scoop driving device drives a litter scoop to move inside a litter box so as to remove a litter clump from the litter box. The pet toilet using this litter scoop driving device can separate the litter clump from a pet litter without flipping the pet litter.

(5) A first aspect of the present invention provides a pet toilet, including: a litter box, configured to hold a pet litter; and a litter scoop driving device, located in the litter box, and configured to drive a litter scoop to move in the litter box to separate a litter clump from the litter box, where the litter scoop driving device includes a housing, a driving force arm, the litter scoop, and a guide rail; one end of the driving force arm is rotatably connected to the litter scoop, and the other opposite end of the driving force arm is rotatably connected to the housing; and the guide rail is directly or indirectly provided on the litter box.

(6) The litter scoop driving device further includes a motor unit; the motor unit includes a first motor, a second motor, and a third motor; the first motor is located on the housing; an output end of the first motor is connected to the driving force arm to drive the driving force arm to rotate relative to the housing; the second motor is located on the housing; an output end of the second motor is connected to the guide rail; the second motor is configured to drive the litter scoop driving device to move in a length direction of the guide rail, thereby driving the litter scoop to move between two opposite ends of the litter box; the third motor is located on the driving force arm; an output end of the third motor is connected to the litter scoop to drive the litter scoop to rotate relative to the driving force arm; under the action of the first motor, the litter scoop is lifted; under the action of the second motor, the litter scoop moves from one end of the litter box to the other end of the litter box; and under the action of the third motor, the litter scoop dumps the litter clump.

(7) A second aspect of the present invention provides a pet toilet, including: a litter box, configured to hold a pet litter; and a litter scoop driving device, located in the litter box, and configured to drive a litter scoop to move in the litter box to separate a litter clump from the litter box, where the litter scoop driving device includes a housing, a driving force arm, and the litter scoop; one end of the driving force arm is rotatably connected to the litter scoop, and the other opposite end of the driving force arm is rotatably connected to the housing; the driving force arm includes two rods that are relatively telescopic in an axial direction; and through relative telescopic motion of the two rods that are telescopic in the axial direction, an axial length of the driving force arm increases or decreases.

(8) The litter scoop driving device further includes a motor unit; the motor unit includes a first motor and a third motor; the first motor is located on the housing; an output end of the first motor is connected to the driving force arm to drive the driving force arm to rotate relative to the housing; the third motor is located on the driving force arm; an output end of the third motor is connected to the litter scoop to drive the litter scoop to rotate relative to the driving force arm; under the action of the first motor, the litter scoop is tilted and lifted; when the litter scoop is tilted and lifted, the

driving force arm extends, the litter scoop remains in abutting against a bottom of the litter box, and the litter scoop moves from one end of the litter box to the other end of the litter box; and under the action of the third motor, the litter scoop dumps the litter clump.

(9) A third aspect of the present invention provides a pet toilet, including: a litter box, configured to hold a pet litter; and a litter scoop driving device, located in the litter box, and configured to drive a litter scoop to move in the litter box to separate a litter clump from the litter box, where the litter scoop driving device includes a housing, a driving force arm, and the litter scoop; one end of the driving force arm is rotatably connected to the litter scoop, and the other opposite end of the driving force arm is rotatably connected to the housing; the driving force arm includes two rods that are axially connected and rotatable to change an angle; and through relative rotation of the two axial rods, the litter scoop remains continuously in abutting against a bottom of the litter box.

(10) The litter scoop driving device further includes a motor unit; the motor unit includes a first motor and a third motor; the first motor is located on the housing; an output end of the first motor is connected to the driving force arm to drive the driving force arm to rotate relative to the housing; the third motor is located on the driving force arm; an output end of the third motor is connected to the litter scoop to drive the litter scoop to rotate relative to the driving force arm; under the action of the first motor, the litter scoop is tilted and lifted; when the litter scoop is tilted and lifted, the angle between the two rods changes, the litter scoop remains in abutting against the bottom of the litter box, and the litter scoop moves from one end of the litter box to the other end of the litter box; and under the action of the third motor, the litter scoop dumps the litter clump.

(11) In the above pet toilet, the litter scoop is driven to move between the two opposite ends of the litter box to achieve the separation of the pet litter and the litter clump in the litter box, thereby completing the automatic cleaning of the pet toilet. The pet toilet can achieve automatic cleaning without flipping the litter box, so the side wall of the pet toilet is not easily contaminated with excrement. In addition, the litter scoop driving device uses a lifting method to move the litter scoop out of the litter box, reducing odors of the dumped litter clump moving to the litter box to affect pet excretion. In addition, since the driving force arm, the housing, and the litter scoop are all rotatably connected, the litter scoop can move to any position in the litter box. The design achieves high overall freedom and is suitable for various usage scenarios. For example, when the pet excretes, the litter scoop and the driving force arm is moved to a position above the litter box, without occupying the space for the pet to use in the litter box, reducing the impact of the litter scoop and the driving force arm on pet excretion. When the pet toilet starts automatically cleaning the litter clump, the litter scoop can clean various positions inside the litter box, reducing the probability of residual litter clumps and achieving thorough cleaning.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is an assembly view of a pet toilet according to an embodiment of the present disclosure;

(2) FIG. **2** is an exploded view of the pet toilet shown in FIG. **1**;

(3) FIG. **3** is a sectional view after a mounting shaft shown in FIG. **1** is fixed into a mounting hole;

(4) FIG. **4** is a schematic diagram showing that the mounting shaft shown in FIG. **3** is rotatable to detach from the mounting hole;

(5) FIG. **5** is an assembly view of a driving device shown in FIG. **1** in a working state;

(6) FIG. **6** is an assembly view of the driving device shown in FIG. **1** in a storage state;

(7) FIG. **7** is an exploded view of the driving device shown in FIG. **6**;

(8) FIG. **8** is a structural diagram showing that a driving force arm shown in FIG. **7** is a telescopic rod;

(9) FIG. **9** is an exploded view of a third driver shown in FIG. **7**; and

(10) FIG. **10** is a structural diagram of a sleeve shown in FIG. **9** from another perspective.
(11) Reference Numerals: **10**. pet toilet; **100**. litter box; **110**. outer litter box; **111**. connection notch; **112**. mounting hole; **113**. locking groove; **120**. inner litter box; **200**. litter scoop; **210**. sieve hole; **220**. rake body; **300**. collection device; **310**. collection opening; **400**. driving device; **410**. driving force arm; **411**. fixing hole; **412**. first rod; **413**. second rod; **420**. driving source component; **421**. housing; **4211**. mounting slot; **4212**. moving element; **422**. first driver; **4221**. first motor; **423**. second driver; **4231**. second motor; **4232**. gear; **430**. guide rail; **431**. moving slot; **432**. slot; **440**. third driver; **441**. sleeve; **442**. third motor; **4421**. hexagonal clamping hole; **443**. hexagonal shaft sleeve; **500**. cover plate; **510**. first end; **511**. mounting shaft; **520**. second end; **521**. locking element; **522**. handle groove; **530**. pet access hole; and **540**. litter drop hole.

DETAILED DESCRIPTION OF THE EMBODIMENTS

(12) To make the above objectives, features and advantages of the present invention more comprehensible, the specific implementations of the present invention are clearly and completely described below with reference to the drawings. Obviously, the specific details described below are only part of the embodiments of the present invention, and the present invention may also be implemented in many other embodiments different from those herein. All other embodiments obtained by those of ordinary skill in the art based on the embodiments of the present invention without creative efforts should fall within the protection scope of the present invention.
(13) It should be noted that when a component is fixed with the other component, the component may be fixed with the other component directly or via an intermediate component. When a component is connected with the other component, the component may be connected with the other component directly or via an intermediate component. The terms “vertical”, “horizontal”, “left”, and “right” and similar expressions used herein are just for illustrative purposes, and do not mean sole implementations.
(14) Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by those skilled in the technical field of the present invention. The terms mentioned herein are merely for the purpose of describing specific embodiments, rather than to limit the present invention.
(15) The present disclosure provides pet toilet **10**. Referring to FIG. **1**, the pet toilet **10** has an automatic cleaning function that can separate a pet litter from a litter clump inside the pet toilet **10**. The litter clump refers to a clumped litter formed by pet excrement and the pet litter. It is worth noting that the pet toilet **10** is applied to cat toilets, rabbit toilets, dog toilets, etc., and the specific application scenario of the pet toilet is not limited herein.
(16) Referring to FIG. **2**, the pet toilet **10** includes litter box **100**, litter scoop **200**, collection device **300**, and driving device **400**. The litter box **100** is configured to hold the pet litter. The litter scoop **200** is configured to separate a litter clump from the litter box **100**. The collection device **300** is configured to hold the litter clump. The driving device **400** is combined with the litter scoop **200** to form a litter scoop driving device. The driving device **400** is configured to drive the litter scoop **200** to move between two opposite ends of the litter box **100**, thereby achieving the separation of the pet litter and the litter clump in the litter box **100**. The driving device **400** is further configured to transport the separated litter clump to the collection device **300** outside the litter box **100** for collection, thereby completing the cleaning of the litter box **100**. It is worth noting that the driving device **400** can be produced and sold separately as an independent product or component. The driving device **400** produced and sold separately can be used in combination with other components in the pet toilet **10**.
(17) In an embodiment, the collection device **300** may only include a collection box. The collection box is provided with collection opening **310**, which is configured to receive the litter clump separated by the litter scoop **200**. In other embodiments, the collection device **300** may further include a bag delivery mechanism and a sealing mechanism (not shown in the figure). The bag delivery mechanism is configured to transport a waste bag to the collection opening **310**. The waste

bag transported to the collection opening **310** is configured to collect the litter clump separated by the litter scoop **200**. The sealing mechanism includes a fixed mounting bracket. The fixed mounting bracket is provided on collection opening **310**. The sealing mechanism is configured to heat-seal the waste bag passing through the collection opening **310** segment by segment, such that the tubular waste bag become waste bag packets connected one by one, making it easy to take and dispose of the waste bag and reduce odors. Alternatively, the collection device **300** can be a guide pipe provided therein with a crushing mechanism. The crushing mechanism is configured to receive and crush the litter clump separated by the litter scoop **200**. The guide pipe can guide the crushed litter clump to a sewer of a household toilet. Alternatively, the pet toilet may not be provided with the collection device **300**. Instead, the pet toilet **10** is placed next to the household toilet, and the driving device **400** directly removes the litter clump separated by the litter scoop **200** to the household toilet.

(18) The litter box **100** may include an outer litter box **110** and an inner litter box **120**. The inner litter box **120** is configured to hold the pet litter. A pet does its business in the inner litter box **120**. The inner litter box **120** and the collection device **300** are arranged opposite inside the outer litter box **110**. That is, the inner litter box **120** with the pet litter and the collection device **300** are arranged opposite inside the outer litter box **110**. To move the pet toilet **10**, it is only necessary to simply lift the outer litter box **110**, which is convenient for the user to move the pet toilet. It is worth noting that in this embodiment, "outside the litter box **100**" refers to "outside the inner litter box **120** for storing the pet litter", and the collection device **300** located in the outer litter box **120** is also considered as located outside the litter box **100**. An upper side of the inner litter box **120** is provided with an opening for the pet to enter. Alternatively, a side of the inner litter box is provided with an opening for the pet to enter (a corresponding position of the outer litter box **110** is provided with an opening that matches the inner litter box **120**). In addition, the inner litter box **120** can be separated from the outer litter box **110** by a lifting method. The inner litter box **120** can also be separated from the outer litter box **110** by a lateral pulling method. After the inner litter box **120** is separated, the inner litter box **120** can be used separately or cleaned. It is worth noting that the above pet entry methods and the separation methods of the inner litter box **120** can be combined arbitrarily. In other embodiments, the outer litter box **110** may be omitted. Alternatively, a partition can be provided inside a box body to divide the internal space of the box body into two relatively independent chambers, one of which serves as the litter box **100** and the other as the collection device **300**.

(19) Referring to FIGS. **3** and **4**, the pet toilet **10** may further include cover plate **500**. The cover plate **500** is configured to rotatably cover the outer litter box **110**. Through the cover plate **500**, the inner litter box **120** and the collection device **300** in the outer litter box **110** can be closed or opened. In addition, the cover plate **500** can be quickly disassembled and assembled with the outer litter box **110**. Specifically, the cover plate **500** includes first end **510** and second end **520** that are opposite to each other. Two opposite sides of the first end **510** are provided with mounting shafts **511**. Two opposite sides of the outer litter box **110** are provided with connection notches **111** and mounting holes **112**. The connection notch **111** is communicated with the mounting hole **112**. The mounting shaft **511** enters the mounting hole **112** through the connection notch **111** for clamping and fixing. The mounting shaft **511** can be detached from the mounting hole **112** through the connection notch **111**. A side of the second end **520** facing the outer litter box **110** is provided with one of locking element **521** and locking groove **113**, and the other of the locking element **521** and the locking groove **113** is provided at a side of the outer litter box **110** facing the cover plate **500** (as shown in FIG. **4**). The locking element **521** can be engaged with the locking groove **113**, thereby achieving relative fixation between the second end **520** and the outer litter box **110**. In addition, handle groove **522** can be provided at a side of the second end **520** facing away from the outer litter box **110**. The handle groove **522** facilitates the user to rotate the cover plate **500** around a connection between the mounting shaft **511** and the mounting hole **112**, thereby allowing the

cover plate **500** to close or open the inner litter box **120** and the collection device **300**.
(20) In an embodiment, a thickness of the mounting shaft **511** in a length direction (X-direction shown in FIG. **3**) is greater than a thickness of the mounting shaft **511** in a width direction (Y-direction shown in FIG. **3**). The thickness of the mounting shaft **511** in the width direction is compatible with the connection notch **111**. That is, the thickness of the mounting shaft **511** in the width direction is less than or equal to an opening size of the connection notch **111**, and the mounting shaft **511** can enter or leave the mounting hole **112** through the connection notch **111** in the width direction (as shown in FIG. **4**). The thickness of the mounting shaft **511** in the length direction is greater than the opening size of the connection notch **111**. The mounting shaft **511** cannot enter or leave the mounting hole **112** through the connection notch **111** in the length direction, but a diameter of the mounting hole **112** is greater than or equal to the thickness of the mounting shaft **511** in the length direction. Therefore, the mounting shaft **511** is rotatable in the mounting hole **112** (as shown in FIG. **3**). In this embodiment, to disassemble and assemble the cover plate **500** and the outer litter box **110**, the mounting shaft **511** needs to be rotated until it aligns with the connection notch **111** in the width direction. At this point, the mounting shaft **511** can quickly enter or detach from the mounting hole **112**. Before disassembly, the cover plate **500** needs to be rotated to a specific angle relative to the outer litter box **110**. When entering the mounting hole **112**, the mounting shaft **511** is rotated inside the mounting hole **112** until it aligns with the connection notch **111** in the length direction. At this point, the mounting shaft **511** is fixed inside the mounting hole **112** (as shown in FIG. **3**). In other embodiments, the outer litter box **110** may only be provided with the connection notch **111**. The opening size of the connection notch **111** is larger than the thickness of the mounting shaft **511** in any direction, that is, the mounting shaft **511** can freely enter or leave the connection notch **111**.
(21) Referring to FIG. **5**, in an embodiment, stopper **512** is provided at a side of the mounting shaft **511** away from the cover plate **500**. A size of the stopper **512** is larger than that of the mounting hole **112**. The stopper **512** is configured to prevent the mounting shaft **511** from accidentally slipping from the mounting hole **112** into the litter box **100**, thereby enhancing the stability of the connection between the mounting shaft **511** and the mounting hole **112**.
(22) In an embodiment, the cover plate **500** is provided with pet access hole **530** facing the inner litter box **120**. The pet can enter the inner litter box **120** for excretion through the pet access hole **530**. In addition, the cover plate **500** can further be provided with litter drop holes **540** around the pet access hole **530**. When the pet jumps out of the inner litter box **120** to the cover plate **500**, the pet litter carried out returns back to the inner litter box **120** or the collection device **300** through the litter drop holes **540**, thereby reducing the amount of pet litters carried out by the pet.
(23) The litter scoop **200** can be configured as rake body **220** with a plurality of sieve holes **210**. When the rake body **220** passes through a pet litter and litter clump mixture, the pet litter moves from one side of the rake body **220** to the other side of the rake body **220** through the sieve hole **210**. The litter clump with a relatively large volume cannot be screened through the sieve hole **210** to the same side of the rake body **220**, thereby separating the litter clump from the pet litter. In other embodiments, the litter scoop **200** can also be configured as a mechanical claw (not shown in the figure) for picking up the litter clump from the pet litter, thereby achieving the separation of the pet litter and the litter clump.
(24) The process that the driving device **400** drives the litter scoop **200** to remove the litter clump from the inner litter box **120** to the collection device **300** is described in detail below according to the drawings.
(25) Referring to FIG. **5**, the driving device **400** includes driving force arm **410** and driving source component **420**. One end of the driving force arm **410** is rotatably connected to the litter scoop **200**, and the other opposite end of the driving force arm **410** is rotatably connected to the driving source component **420**. The driving force arm **410** is preferably an L-shaped rod.
(26) The one end of the driving force arm **410** is rotatable around the driving source component

420 to move the other opposite end between the two opposite ends of the litter box **100**, thereby driving the litter scoop **200** through the driving force arm **410** to separate the litter clump from the litter box **100**. In addition, the driving source component **420** can further drive the driving force arm **410** to rotate so as to lift the litter scoop **200**. The lifted litter scoop **200** can move to the collection opening **310** located outside the litter box. The litter scoop **200** located at the collection opening **310** can rotate relative to the driving force arm **410** so as to dump the litter clump separated by the litter scoop **200** into the collection device **300**.

(27) It is worth noting that in order to completely separate the pet litter and the litter clump with the litter scoop **200**, when the other opposite end of the driving force arm **410** moves between the two opposite ends of the litter box **100**, the litter scoop **200** remains in abutting against a bottom of the inner litter box **120**. The contact is not an absolute contact. For example, in a contact case, there is a slight distance between the litter scoop **200** and the bottom of the inner litter box **120**, but it does not affect the separation of all pet litter and litter clump mixtures by the litter scoop **200**. In addition, when the driving force arm **410** moves between the two opposite ends of the litter box **100**, the litter scoop **200** can also move from one end of the inner litter box **120** in the length direction to the other opposite end thereof, that is, the litter scoop **200** can separate the pet litter at any position in the length direction of the inner litter box **120**.

(28) The driving force arm **410** rotates relative to the driving source component **420** to switch the pet toilet **10** between a working state and a storage state. In the working state, the litter scoop **200** abuts against the bottom of the litter box **102**. In the storage state, the driving force arm **410** rotates around the driving source component **420** until it is flush with the cover plate **500**, and the litter scoop **200** rotates around the driving force arm **410** until it is flush with the cover plate **500** (as shown in FIG. **6**). The driving force arm **410** and the litter scoop **200** as far away as possible from the inner litter box **120** to avoid occupying the pet excretion space and affecting pet excretion.

(29) Referring to FIG. **7**, in an embodiment, the driving source component **420** includes housing **421** and first driver **422**. The first driver **422** is provided in the housing **421**. An output end of the first driver **422** is connected to the driving force arm **410**, thereby driving the driving force arm **410** to rotate. Specifically, the housing **421** is provided with mounting slot **4211** for mounting the first driver **422**. The mounting slot **4211** is communicated with an exterior of the housing **421**. The first driver **422** is located in the mounting slot **4211**. The driving force arm **410** is fitted onto the first driver **422**, and the driving force arm **410** is rotatable within the mounting slot **4211**. The first driver **422** includes first motor **4221** and an adapter (not shown in the figure). An output end of the first motor **4221** is fixed to one end of the adapter in a circumferential direction. The driving force arm **410** is provided with a plurality of fixing holes **411** facing the first motor **4221** and arranged in a circumferential direction. The other end of the adapter is inserted into the fixing hole **411** of the driving force arm **410** for fixation.

(30) The movement of the other opposite end of the driving force arm **410** between the two opposite ends of the litter box **100** can be as follows: the housing **421** moves above the litter box **100**, thereby driving the driving force arm **410** provided on the housing **421** to move. Specifically, the driving device **400** further includes guide rail **430**. The guide rail **430** can be located at a side of the cover plate **500** facing the litter box **100**. The guide rail **430** and the cover plate **500** can be connected by a threaded means. The guide rail **430** and the cover plate **500** are provided with threaded holes, and the guide rail and the cover plate are connected through a threaded connector. Alternatively, the guide rail **430** can be integrally formed with the cover plate **500**. The housing **421** is movably provided on the guide rail **430**. The movable method can be as follows: one of the guide rail **430** and the housing **421** is provided with moving slot **431**, and the other of the guide rail **430** and the housing **421** is provided with moving element **4212**, and the moving element **4212** is engaged with the moving slot **431** and movable inside the moving slot **431**. The movement of the housing **421** on the guide rail **430** causes the driving force arm **410** to move between the two opposite ends of the litter box **100**. In other embodiments, the guide rail **430** may be provided on a

side wall of the litter box **100**.

(31) The driving device **400** further includes second driver **423**. The second driver **423** drives the housing **421** to move on the guide rail **430**. Specifically, the guide rail **430** is provided with a plurality of slots **432** in a length direction, and the second driver **423** is provided in the housing **421**. The second driver **423** includes second motor **4231** and gear **4232**. An output end of the second motor **4231** is connected to the gear **4232**. The gear **4232** can be exposed to the housing **421** and mesh with the slots **432**. The second motor **4231** drives the gear **4232** to move along the length direction of the guide rail **430**, thereby driving the housing **421** to move on the guide rail **430**. In other embodiments, gear **4232** can be replaced with a rubber wheel (not shown in the figure). In this embodiment, the guide rail **430** may not be provided with the slots **432**, and the rubber wheel directly abuts against the guide rail **430**. The output end of the second motor **4231** is connected to the rubber wheel. The second motor **4231** can drive the rubber wheel to move on the guide rail **430**, thereby driving the housing **421** to move on the guide rail **430**. Alternatively, the second driver **423** may include the second motor **4231** and a screw (not shown in the figure). The output end of the second motor **4231** is connected to one end of the screw, and the other end of the screw is connected to the housing **421**. The second motor **4231** drives the screw to push the housing **421** to move on the guide rail **430**. In this embodiment, the second driver **423** is provided on an inner wall of the litter box **100**.

(32) In an embodiment, at least one end of the guide rail **430** in the length direction is provided with notch **433**. The housing **421** can detach from the guide rail **430** through the notch **433**, allowing components such as the driving force arm **410** and the litter scoop **200** associated with the housing **421** to detach from the guide rail **430**. The design is convenient for the user to replace and maintain the parts, and after the driving device **400** and the litter scoop **200** are removed, the pet toilet **10** can still be used independently.

(33) The movement of the other opposite end of the driving force arm **410** between the two opposite ends of the litter box **100** can be as follows: the housing **421** is fixed above the litter box **100**, and the driving force arm **410** is rotatable relative to the housing **421** to change its length for moving. Specifically, the driving force arm **410** can be a telescopic rod (as shown in FIG. **8**). The driving force arm **410** includes first rod **412** and second rod **413**. The first rod **412** is provided with a telescopic chamber (not shown in the figure), and the second rod **413** is movable in the telescopic chamber. The first rod **412** is rotatably connected to the housing **421**. The second rod **413** is rotatably connected to the litter scoop **200**. When the litter scoop **200** moves between the two opposite ends of the litter box **100**, the second rod **413** moves correspondingly in the telescopic chamber to keep the litter scoop **200** in abutting against the bottom of the litter box **100**. Alternatively, the driving force arm **410** can be a folding rod (not shown in the figure). The driving force arm includes a third rod and a fourth rod. The third rod is rotatable relative to the fourth rod, such that the third rod is stacked on top of the fourth rod. The third rod is rotatably connected to the housing **421**. The fourth rod is rotatably connected to the litter scoop **200**. When the litter scoop **200** moves between the two opposite ends of the litter box **100**, the third rod and the fourth rod rotate accordingly to keep the litter scoop **200** in abutting against the bottom of the litter box **100**. It is worth noting that in the embodiment where the driving force arm **420** is a folding rod or a telescopic rod, a driver is provided inside the driving force arm **410** to drive the driving force arm **410** to rotate relative to the housing **421**, and the housing **421** may not be provided with the first driver **422**.

(34) Referring to FIG. **9**, in an embodiment, the driving device **400** further includes third driver **440**. The third driver **440** is located on the driving force arm **410**. An output end of the third driver **440** is connected to the litter scoop **200**. The third driver **440** is configured to drive the litter scoop **200** to rotate relative to the driving force arm **410**. Specifically, the third driver **440** includes sleeve **441** and third motor **442**. The sleeve **441** is fitted onto an output end of the third motor **442**, and the sleeve **441** is fixed to the output end of the third motor **442** in a circumferential direction. The fixed

connection in the circumferential direction can be achieved as follows. The output end of the third motor **442** is provided with hexagonal shaft sleeve **443**. The sleeve **441** faces the third motor **442** and is provided with hexagonal clamping hole **4411** (as shown in FIG. **10**). The hexagonal shaft sleeve **443** includes one end connected to the output end of the third motor **442** and the other end clamped into the hexagonal clamping hole **4411**. The sleeve **441** is fixedly connected to the litter scoop **200**. The fixed connection can be achieved as follows. The sleeve **441** and the litter scoop **200** are provided with threaded holes, and the relative fixed connection between the sleeve and the litter scoop is achieved through a threaded connector.

(35) In an embodiment, sensors (such as infrared sensors, photoelectric sensors, laser sensors, ultrasonic radar, and millimeter-wave radar) can be arranged inside the housing **421** to detect the states of the pet entering and exiting the pet toilet **10** and to detect its excretion.

(36) In an embodiment, the pet toilet **10** can further have a disinfection function to disinfect the pet litter in the litter box **100**. Specifically, the pet toilet **10** can achieve the disinfection function through an ultraviolet disinfection lamp. The ultraviolet disinfection lamp is located above the litter box **100**. For example, the ultraviolet disinfection lamp can be provided on the cover plate **500** directly above the litter box **100**. Alternatively, the ultraviolet disinfection lamp can be provided on an upper side wall of the litter box **100**. The ultraviolet disinfection lamp is configured to disinfect the pet litter. In other embodiments, the pet toilet **10** may further be provided with an automatic liquid spraying mechanism for spraying a disinfectant to disinfect the pet litter. In addition, the pet device **10** may further have an odor control function to remove odors from the litter box **100**, preventing excessive odors from affecting pet excretion. Specifically, activated carbon can be provided inside the litter box **100** to absorb odors, and an air freshener can also be sprayed into the litter box **100** to remove odors.

(37) In the pet toilet **10** using the above driving device, the driving device **400** drives the litter scoop **200** to move between the two opposite ends of the litter box **100**, achieving the separation of the pet litter and litter clump in the litter box **100**, thereby completing the automatic cleaning of the pet toilet **10**. The pet toilet **10** can achieve automatic cleaning without flipping the litter box, so the side wall of the pet toilet **10** is not easily contaminated with excrement. In addition, the pet toilet **10** uses a lifting method to lift the litter scoop **200** to the collection opening **310** of the collection device **300**. The collection device **310** is located at a position above the litter box **100**, increasing the capacity of the collection device **310** and reducing odors moving from the collection device **310** to the litter box **100** to affect pet excretion. In addition, since the driving force arm **410**, the driving source component **420**, and the litter scoop **200** are all rotatably connected, the litter scoop **200** can move to any position in the litter box **100**. The design achieves high overall freedom and is suitable for various usage scenarios. For example, when the pet excretes, the litter scoop **200** and the driving force arm **410** is moved to a position above the litter box **100**, without occupying the space for the pet to use in the litter box **100**, reducing the impact of the litter scoop **200** and the driving force arm **410** on pet excretion. When the pet toilet **10** starts automatically cleaning the litter clump, the litter scoop **200** can clean various positions inside the litter box **100**, reducing the probability of residual litter clumps and achieving thorough cleaning. After the litter clump is removed from the litter box **100**, the driving device **400** further drives the litter scoop **200** to reciprocate in the litter box **100** so as to level the pet litter in the litter box **100**, preventing the pet litter in the litter box **100** from concentrating in a specific position and affecting pet excretion.

(38) The technical characteristics of the above embodiments may be employed in arbitrary combinations. In an effort to provide a concise description of these embodiments, all possible combinations of all technical characteristics of the embodiments may not be described. However, these combinations of technical characteristics should be construed as disclosed in the description in case no contradiction occurs.

(39) The above embodiments are intended to illustrate several implementations of the present invention in detail, and they should not be construed as a limitation to the patentable scope of the

present invention. It should be pointed out that those of ordinary skill in the art may further make several modifications, substitutions and improvements without departing from the concept of the present invention, which should be covered by the scope of protection of the present invention. Therefore, the protection scope of the present invention should be subject to the claims.

Claims

1. A pet toilet, comprising: a litter box, configured to hold a pet litter; and a litter scoop driving device, located in the litter box, and configured to drive a litter scoop to move in the litter box to separate a litter clump from the litter box; wherein the litter scoop driving device comprises a housing, a driving force arm, the litter scoop, a guide rail, and a motor unit; a first end of the driving force arm is rotatably connected to the litter scoop, and an opposite second end of the driving force arm is rotatably connected to the housing; and the guide rail is directly or indirectly provided on the litter box; and the motor unit comprises a first motor, a second motor, and a third motor; the first motor is located on the housing; an output end of the first motor is connected to the driving force arm to drive the driving force arm to rotate relative to the housing; the second motor is located on the housing; an output end of the second motor is connected to the guide rail; the second motor is configured to drive the litter scoop driving device to move in a length direction of the guide rail, thereby driving the litter scoop to move between a first end and an opposite second end of the litter box; the third motor is located on the driving force arm; an output end of the third motor is connected to the litter scoop to drive the litter scoop to rotate relative to the driving force arm; under an action of the first motor, the litter scoop is lifted; under an action of the second motor, the litter scoop moves from the first end of the litter box to the opposite second end of the litter box; and under an action of the third motor, the litter scoop dumps the litter clump.
2. The pet toilet according to claim 1, wherein the second motor is connected to the guide rail through a gear, a rubber wheel or a screw, such that the litter scoop is movable from the first end of the litter box to the opposite second end of the litter box.
3. The pet toilet according to claim 1, wherein at least one end of the guide rail in the length direction is provided with a notch; the housing is configured to detach from the guide rail through the notch; and when the housing detaches from the guide rail through the notch, the litter scoop driving device detaches from the guide rail.
4. The pet toilet according to claim 1, wherein the housing is provided with a mounting slot for mounting the first motor; the mounting slot is communicated with an exterior of the housing; the first motor is located in the mounting slot; the driving force arm is fitted onto the first motor; and an end of the driving force arm is fitted onto the first motor and is rotatable within the mounting slot; and the litter scoop driving device further comprises an adapter; the output end of the first motor is fixed to a first end of the adapter in a circumferential direction; the driving force arm is provided with a plurality of fixing holes facing the first motor and arranged in a circumferential direction; and a second end of the adapter is inserted into a fixing hole of the plurality of fixing holes of the driving force arm for fixation.
5. The pet toilet according to claim 1, wherein the litter scoop driving device further comprises a sleeve; the sleeve is fitted onto the output end of the third motor; the sleeve and the output end of the third motor are fixed in a circumferential direction; and the sleeve is fixedly connected to the litter scoop.
6. The pet toilet according to claim 1, wherein the pet toilet comprises a cover plate; each of two opposite sides of the cover plate is provided with a mounting shaft; each of two sides of the litter box is provided with a connection notch and a mounting hole; the connection notch is communicated with the mounting hole; and the mounting shaft is provided in the mounting hole through the connection notch.
7. The pet toilet according to claim 6, wherein a thickness of the mounting shaft in a length

direction is greater than a thickness of the mounting shaft in a width direction; the thickness of the mounting shaft in the width direction is less than or equal to an opening size of the connection notch; the mounting shaft is configured to enter or detach from the mounting hole through the connection notch in the width direction; the thickness of the mounting shaft in the length direction is greater than the opening size of the connection notch; the mounting shaft is not configured to enter or detach from the mounting hole through the connection notch in the length direction; a diameter of the mounting hole is greater than or equal to the thickness of the mounting shaft in the length direction; and the mounting shaft is rotatable in the mounting hole.

8. The pet toilet according to claim 6, wherein the driving force arm is rotatable relative to the housing to switch the pet toilet between a working state and a storage state; in the working state, the litter scoop abuts against a bottom of the litter box; and in the storage state, the driving force arm rotates around the housing to be flush with the cover plate.

9. A pet toilet, comprising: a litter box, configured to hold a pet litter; and a litter scoop driving device, located in the litter box, and configured to drive a litter scoop to move in the litter box to separate a litter clump from the litter box; wherein the litter scoop driving device comprises a housing, a driving force arm, the litter scoop, and a motor unit; a first end of the driving force arm is rotatably connected to the litter scoop, and an opposite second end of the driving force arm is rotatably connected to the housing; the driving force arm comprises two rods, wherein the two rods are relatively telescopic in an axial direction; and through relative telescopic motion of the two rods, an axial length of the driving force arm increases or decreases; and the motor unit comprises a first motor and a third motor; the first motor is located on the housing; an output end of the first motor is connected to the driving force arm to drive the driving force arm to rotate relative to the housing; the third motor is located on the driving force arm; an output end of the third motor is connected to the litter scoop to drive the litter scoop to rotate relative to the driving force arm; under an action of the first motor, the litter scoop is tilted and lifted; when the litter scoop is tilted and lifted, the driving force arm extends, the litter scoop remains in abutting against a bottom of the litter box, and the litter scoop moves from a first end of the litter box to a second end of the litter box; and under an action of the third motor, the litter scoop dumps the litter clump.

10. The pet toilet according to claim 9, wherein the housing is provided with a mounting slot for mounting the first motor; the mounting slot is communicated with an exterior of the housing; the first motor is located in the mounting slot; the driving force arm is fitted onto the first motor; and an end of the driving force arm is fitted onto the first motor and is rotatable within the mounting slot; and the litter scoop driving device further comprises an adapter; the output end of the first motor is fixed to a first end of the adapter in a circumferential direction; the driving force arm is provided with a plurality of fixing holes facing the first motor and arranged in a circumferential direction; and a second end of the adapter is inserted into a fixing hole of the plurality of fixing holes of the driving force arm for fixation.

11. The pet toilet according to claim 9, wherein the litter scoop driving device further comprises a sleeve; the sleeve is fitted onto the output end of the third motor; the sleeve and the output end of the third motor are fixed in a circumferential direction; and the sleeve is fixedly connected to the litter scoop.

12. The pet toilet according to claim 9, wherein the pet toilet comprises a cover plate; each of two opposite sides of the cover plate is provided with a mounting shaft; each of two sides of the litter box is provided with a connection notch and a mounting hole; the connection notch is communicated with the mounting hole; and the mounting shaft is provided in the mounting hole through the connection notch.

13. The pet toilet according to claim 12, wherein a thickness of the mounting shaft in a length direction is greater than a thickness of the mounting shaft in a width direction; the thickness of the mounting shaft in the width direction is less than or equal to an opening size of the connection notch; the mounting shaft is configured to enter or detach from the mounting hole through the

connection notch in the width direction; the thickness of the mounting shaft in the length direction is greater than the opening size of the connection notch; the mounting shaft is not configured to enter or detach from the mounting hole through the connection notch in the length direction; a diameter of the mounting hole is greater than or equal to the thickness of the mounting shaft in the length direction; and the mounting shaft is rotatable in the mounting hole.

14. The pet toilet according to claim 12, wherein the driving force arm is rotatable relative to the housing to switch the pet toilet between a working state and a storage state; in the working state, the litter scoop abuts against the bottom of the litter box; and in the storage state, the driving force arm rotates around the housing to be flush with the cover plate.

15. A pet toilet, comprising: a litter box, configured to hold a pet litter; and a litter scoop driving device, located in the litter box, and configured to drive a litter scoop to move in the litter box to separate a litter clump from the litter box; wherein the litter scoop driving device comprises a housing, a driving force arm, the litter scoop, and a motor unit; a first end of the driving force arm is rotatably connected to the litter scoop, and an opposite second end of the driving force arm is rotatably connected to the housing; the driving force arm comprises two rods, wherein the two rods are axially connected and rotatable to change an angle; and through relative rotation of the two rods, the litter scoop remains continuously in abutting against a bottom of the litter box; and the motor unit comprises a first motor and a third motor; the first motor is located on the housing; an output end of the first motor is connected to the driving force arm to drive the driving force arm to rotate relative to the housing; the third motor is located on the driving force arm; an output end of the third motor is connected to the litter scoop to drive the litter scoop to rotate relative to the driving force arm; under an action of the first motor, the litter scoop is tilted and lifted; when the litter scoop is tilted and lifted, the angle between the two rods changes, the litter scoop remains in abutting against the bottom of the litter box, and the litter scoop moves from a first end of the litter box to a second end of the litter box; and under an action of the third motor, the litter scoop dumps the litter clump.

16. The pet toilet according to claim 15, wherein the housing is provided with a mounting slot for mounting the first motor; the mounting slot is communicated with an exterior of the housing; the first motor is located in the mounting slot; the driving force arm is fitted onto the first motor; and an end of the driving force arm is fitted onto the first motor and is rotatable within the mounting slot; and the litter scoop driving device further comprises an adapter; the output end of the first motor is fixed to a first end of the adapter in a circumferential direction; the driving force arm is provided with a plurality of fixing holes facing the first motor and arranged in a circumferential direction; and a second end of the adapter is inserted into a fixing hole of the plurality of fixing holes of the driving force arm for fixation.

17. The pet toilet according to claim 15, wherein the litter scoop driving device further comprises a sleeve; the sleeve is fitted onto the output end of the third motor; the sleeve and the output end of the third motor are fixed in a circumferential direction; and the sleeve is fixedly connected to the litter scoop.

18. The pet toilet according to claim 15, wherein the pet toilet comprises a cover plate; each of two opposite sides of the cover plate is provided with a mounting shaft; each of two sides of the litter box is provided with a connection notch and a mounting hole; the connection notch is communicated with the mounting hole; and the mounting shaft is provided in the mounting hole through the connection notch.

19. The pet toilet according to claim 18, wherein a thickness of the mounting shaft in a length direction is greater than a thickness of the mounting shaft in a width direction; the thickness of the mounting shaft in the width direction is less than or equal to an opening size of the connection notch; the mounting shaft is configured to enter or detach from the mounting hole through the connection notch in the width direction; the thickness of the mounting shaft in the length direction is greater than the opening size of the connection notch; the mounting shaft is not configured to

enter or detach from the mounting hole through the connection notch in the length direction; a diameter of the mounting hole is greater than or equal to the thickness of the mounting shaft in the length direction; and the mounting shaft is rotatable in the mounting hole.

20. The pet toilet according to claim 18, wherein the driving force arm is rotatable relative to the housing to switch the pet toilet between a working state and a storage state; in the working state, the litter scoop abuts against the bottom of the litter box; and in the storage state, the driving force arm rotates around the housing to be flush with the cover plate.