

Description

An Automatic Canopy Tilting Mechanism and An Unmanned Vehicle

Technical Field

The present utility model relates to the technical field of logistics transportation, in particular to an automatic canopy tilting mechanism and an unmanned vehicle.

Background Art

In the transportation industry, with the development of science and technology, in order to save labor costs, unmanned vehicles are gradually employed as main transportation means for express delivery and cargo transportation. Specifically, in the express delivery and logistics industry, express parcels are generally loaded in box cages on unmanned vehicles for transportation. However, such box cages may be easily affected by bad weather such as rain and snow. In rainy or snowy weather, it is unable to use unmanned vehicles to finish the delivery of express parcels and ensure the transportation safety of express parcels and other goods.

Therefore, there is an urgent need for an automatic canopy tilting mechanism, which is applicable to the transportation conditions of unmanned vehicles, has a simple structure and is simple to operate, and can avoid the adverse effect of rain and snow during transportation.

Contents of the Invention

The present utility model aims to provide an automatic canopy tilting mechanism and an unmanned vehicle, which are provided with a rainproof function that can open and close the canopy automatically, avoid the adverse effect of bad weather during transportation, and have a simple structure, high reliability and high stability, and a

relatively low manufacturing cost.

In order to achieve the above-mentioned object, the present utility model employs the following technical solution:

An automatic canopy tilting mechanism, comprising:

a canopy module comprising a frame and a canopy cloth covering the frame, wherein the canopy cloth is configured to cover a transport box cage on an unmanned vehicle, and one end of the frame close to the head of the unmanned vehicle is configured to be rotatably connected with the unmanned vehicle, another end of the frame close to the tail of the unmanned vehicle is provided with a first roller, and a bottom surface of the frame is provided with a first slide rail that extends along a length direction of the unmanned vehicle; and

a tilting module configured to fix the transport box cage on the unmanned vehicle, wherein a second slide rail is disposed on a side surface of the tilting module, a second roller is disposed at the top of the side surface of the tilting module, the second roller is configured to abut against the frame and slide on the first slide rail, and the first roller is configured to slidably engage with the second slide rail when the second roller slides out of the first slide rail toward a direction close to the tail of the unmanned vehicle.

As an optional technical solution of the automatic canopy tilting mechanism, a collision prevention stop is provided at the bottom of the side surface of tilting module, and a third roller is provided on the collision prevention stop, wherein the third roller is configured to slidably engage with the first slide rail when the first roller slides toward a direction close to the third roller till the third roller abuts against the frame.

As an optional technical solution of the automatic canopy tilting mechanism, the

bottom surface of the frame is further provided with a shock absorbing pad.

As an optional technical solution of the automatic canopy tilting mechanism, the frame is further provided with a locking member, which is configured to lock a relative position between the frame and the tilting module to prevent the frame from rotating when the canopy module covers the transport box cage on the unmanned vehicle in parallel.

An unmanned vehicle, comprising a vehicle head and a load-bearing vehicle body, wherein the vehicle head is connected with the load-bearing vehicle body, and one end of the load-bearing vehicle body away from the vehicle head is a tail; the unmanned vehicle further comprises the automatic canopy tilting mechanism as described in any of the above technical solutions; the frame is rotatably connected with the top of one side of the vehicle head close to the load-bearing vehicle body, and a rotational axis of the frame is parallel to a body width direction of the unmanned vehicle; and the tilting module is movably arranged on the load-bearing vehicle body.

As an optional technical solution of the unmanned vehicle, the frame is connected with the vehicle head via a hinge.

As an optional technical solution of the unmanned vehicle, the bottom surface of the tilting module is provided with a rotating part, the tilting module is configured to be selectively and rotatably connected with the end of the load-bearing vehicle body close to the tail of the vehicle via the rotating part, and the rotational axis of the tilting module is parallel to the body width direction of the unmanned vehicle.

As an optional technical solution of the unmanned vehicle, the tilting module is slidably arranged on the load-bearing vehicle body in the length direction of the unmanned

vehicle, and the end of the load-bearing vehicle body close to the tail of the vehicle is provided with a stop; and the tilting module is configured to turn relative to the load-bearing vehicle body when the tilting module slides till the rotating part abuts against the stop.

As an optional technical solution of the unmanned vehicle, the load-bearing vehicle body is provided with a third slide rail, and the bottom surface of the tilting module is provided with a fourth roller, and the fourth roller is configured to slidably engage with the third slide rail.

As an optional technical solution of the unmanned vehicle, a collision prevention stop is provided at the bottom of the side surface of the tilting module, and the tilting module can slide till the collision prevention stop abuts against a side of the vehicle head close to the load-bearing vehicle body. The present utility model has the following beneficial effects:

the present utility model provides an automatic canopy tilting mechanism and an unmanned vehicle including the automatic canopy tilting mechanism. The automatic canopy tilting mechanism comprises a canopy module and a tilting module, wherein the canopy module comprises a frame and a canopy cloth covering the frame, the canopy cloth is configured to cover a transport box cage on the unmanned vehicle during use, so as to protect the cargo against rain and provide a rainproof function to the unmanned vehicle, which can avoid the adverse effect of bad weather such as rain and snow during transportation; the end of the frame close to the head of the unmanned vehicle is to be rotatably connected with the unmanned vehicle, and the rotational axis of the frame is parallel to the body width direction of the unmanned vehicle; the end of

the frame close to the tail of the unmanned vehicle is provided with a first roller, and the bottom surface of the frame is provided with a first slide rail that extends along a length direction of the unmanned vehicle; the tilting module is movably arranged on the load-bearing vehicle body for fixing the transport box cage on the unmanned vehicle, a second slide rail is disposed on a side surface of the tilting module, and a second roller is disposed at the top of the side surface of the tilting module. When the automatic canopy tilting mechanism is in a loading state, the tilting module starts to operate and turn under the driving of a motor; when the tilting module turns to a certain angle, it can abut against the frame, jack up the canopy module, and slide on the first slide rail by means of the second roller; the first roller can slidably engage with the second slide rail when the second roller slides out of the first slide rail toward a direction close to the tail of the unmanned vehicle, till the tilting module is perpendicular to the load-bearing vehicle body, the automatic canopy tilting mechanism is transited into an unloading state. In that way, the canopy module can be opened and closed automatically by means of the movement and tilting of the tilting module without any additional sensor or control. The present disclosure has a simple structure and is convenient to operate, without affecting the loading and unloading of the transport box cage, and the present disclosure has high reliability and high stability, and a relatively low manufacturing cost.

Description of Drawings

Fig. 1 is a schematic structural diagram of the canopy module of an automatic canopy tilting mechanism provided in a specific embodiment of the present utility model;

Fig. 2 is a schematic structural diagram illustrating the operation of the automatic

canopy tilting mechanism of an unmanned vehicle provided in a specific embodiment of the present utility model; and

Fig. 3 is a schematic structural diagram illustrating the automatic canopy tilting mechanism of the unmanned vehicle in an unloading state in the embodiment of the present utility model.

In the figures:

100 - canopy module; 110 - frame; 111 - hinge; 112 - first roller; 113 - first slide rail; 114 - shock absorbing pad; 120 - canopy cloth;

200 - tilting module; 201 - second slide rail; 202 - second roller; 210 - collision prevention stop; 211 - third roller; 220 - fourth roller;

900 - unmanned vehicle; 910 - vehicle head; 920 - load-bearing vehicle body.

Embodiments

The present utility model will be further described below in detail in specific embodiments with reference to the accompanying drawings. It can be understood that the specific embodiments described herein are only intended to explain the present utility model rather than limit the present utility model in any way. In addition, it should be noted that only the parts related to the present utility model are shown in the accompanying drawings for the convenience of description, rather than all structures.

In the description of the present utility model, unless otherwise specified and defined explicitly, the terms “interconnect”, “connect”, “fix”, etc. shall be interpreted in their broad meanings. For example, a connection may be a fixed connection, a detachable connection, or an integral connection; it may be a mechanical connection or an electrical connection; it may be a direct connection or an indirect connection via an

intermediate medium, or it may be an internal communication between two elements or an interaction relationship of the two elements. Those having ordinary skills in the art should comprehend the specific meanings of the above-mentioned terms in the present utility model in their context.

In the present utility model, unless otherwise specified and defined explicitly, a first feature being “above” or “below” a second feature may comprise that the first feature directly contacts the second feature, or may comprise that the first feature contacts the second feature through another feature rather than directly contacts the second feature.

In addition, a first feature being “above” or “over” a second feature may comprise that the first feature is right above or diagonally above the second feature, or may only represent that the elevation of the first feature is higher than that of the second feature.

A first feature being “below” or “under” a second feature may comprise that the first feature is right below or diagonally below the second feature, or may only represent that the elevation of the first feature is lower than that of the second feature.

In the description of the present utility model, the orientational or positional relations indicated by terms “above”, “below”, “right”, and “left”, etc., are based on the orientational or positional relations indicated in the accompanying drawings. They are only intended to ease the description and simplify the operation rather than indicate or imply that the involved device or component must be in a specific orientation or must be constructed and operated in a specific orientation. Therefore, the use of these terms shall not be deemed as constituting any limitation on the present utility model. In addition, the terms “first” and “second” are only used for a distinguishing purpose in the description and have no special meaning.

As shown in Figs. 1 to 3, the present utility model discloses an automatic canopy tilting mechanism and an unmanned vehicle 900. The unmanned vehicle 900 comprises a vehicle head 910 and a load-bearing vehicle body 920, wherein the vehicle head 910 is connected with the load-bearing vehicle body 920, and one end of the load-bearing vehicle body 920 away from the vehicle head 910 is the tail of the vehicle; the unmanned vehicle further comprises an automatic canopy tilting mechanism. The automatic canopy tilting mechanism is designed to enable the unmanned vehicle 900 to accomplish express delivery normally even in rainy or snowy weather. In order to adapt to the characteristics of unmanned operation, a highly automated rain-proof device is added, and the rain-proof device is convenient to use and can save additional labor.

The automatic canopy tilting mechanism comprises a canopy module 100 and a tilting module 200. The canopy module 100 comprises a frame 110 and a canopy cloth 120 covering the frame 110, wherein the canopy cloth 120 is configured to cover the transport box cage on an unmanned vehicle 900 and the tilting module 200 configured to fix the transport box cage on the unmanned vehicle 900 during use to protect the cargo against rain and to provide a rainproof function to the unmanned vehicle 900, which can avoid the adverse effect of bad weather such as rain and snow during transportation; in addition, it can protect other mechanical modules and motor modules on the unmanned vehicle 900, protect the mechanism against damp and wet to prevent rusting and compromised movement of the structure, and prolong the service life of the automatic canopy tilting mechanism.

Specifically, one end of the frame 110 is rotatably connected with the top of a side of

the vehicle head 910 of the unmanned vehicle 900 close to the load-bearing vehicle body 920, and a rotational axis of the frame 110 is parallel to the body width direction of the unmanned vehicle 900. In this embodiment, a hinge 111 is arranged between the frame 110 and the vehicle head 910 for connection, so that the canopy module 100 can be fixed on the unmanned vehicle 900 via the hinge 111 and the hinge 111 can be used to control the tilting angle of the canopy module 100; the initial position of the canopy module 100 is set to be horizontal, and in a loading state, the canopy module 100 can keep covering the cargo.

In order to enable the canopy module 100 to be opened and closed automatically, a first roller 112 is provided on one end of the frame 110 close to the tail of the unmanned vehicle 900, a first slide rail 113 is provided on the bottom surface of the frame 110, and the first slide rail 113 extends along a length direction of the unmanned vehicle 900, i.e., the first roller 112 is arranged at the end of the first slide rail 113 close to the tail of the vehicle in the length direction of the vehicle; the tilting module 200 is movably placed on the load-bearing vehicle body 920; likewise, a second slide rail 201 is disposed on a side surface of the tilting module 200, and a second roller 202 is disposed at the top of the side surface of the tilting module 200, i.e., the second roller 202 is disposed at the top of extension of the second slide rail 201. When the automatic canopy tilting mechanism is in a loading state, the tilting module 200 is placed on the load-bearing vehicle body 920 in parallel. At this point, the tilting module 200 is driven by a motor to start tilting. When the tilting module 200 turns to a certain angle, the tilting module 200 can abut against the frame 110 and jack up the canopy module 100, while sliding on the first slide rail 113 by means of the second roller 202; when the

second roller 202 slides out of the first slide 113 toward a direction close to the tail of the unmanned vehicle 900, the first roller 112 can slidably engage with the second slide rail 201 accordingly and start to slide along the second slide rail 201 till the tilting module 200 is perpendicular to the load-bearing vehicle body 920; thus, the automatic canopy tilting mechanism is transited into an unloading state. In that way, the canopy module 100 can be opened and closed automatically by means of the movement and turnover of the tilting module 200 without any additional sensor or control. The mechanism has a simple structure and is convenient to operate, without affecting the loading and unloading of the transport box cage, and the mechanism has high reliability and high stability, and a relatively low manufacturing cost.

Furthermore, a collision prevention stop 210 is convexly arranged at the bottom of a side surface of the tilting module 200, and a third roller 211 is arranged on the collision prevention stop 210. When the first roller 112 slides along the second slide rail 201 toward the direction close to the third roller 211 till the third roller 211 on the collision prevention stop 210 abuts against the frame 110, the first roller 112 is disengaged from the second slide rail 201; at this point, the third roller 211 can slidably engage with the first slide rail 113 and continue to slide toward the tail of the vehicle, so that the tilting module 200 can become perpendicular to the load-bearing vehicle body 920 more smoothly, thereby the entire transition process of the automatic canopy tilting mechanism from the loading state to the unloading state can be completed, so as to avoid interference between the bottom side corners of the tilting module 200 and the frame 110 and avoid affecting the tilting of the tilting module 200 when the first roller 112 slides further. It can be understood that the process of transition of the automatic

canopy tilting mechanism from the unloading state to the loading state is reverse to the aforesaid process. Specifically, first, the third roller 211 slides along the first slide rail 113 toward the vehicle head 910 till the first roller 112 comes into contact with the second slide rail 201 and the first roller 112 slides toward the direction close to the second roller 202; at this point, the third roller 211 is disengaged from the first slide rail 113; when the first roller 112 slides out of the second slide rail 201, the second roller 202 abuts against the first slide rail 113 accordingly and slides toward the vehicle head 910, thereby the canopy module 100 gradually falls back to the horizontal state; at the same time, the tilting module 200 rotates back till it is placed on the load-bearing vehicle body 920 in parallel, thus, the automatic canopy tilting mechanism is transited to the loading state.

Exemplarily, the bottom surface of the tilting module 200 is provided with a rotating part, the tilting module 200 can be selectively and rotatably connected with the end of the load-bearing vehicle body 920 close to the tail of the vehicle by means of the rotating part, and the rotational axis of the tilting module 200 is parallel to the body width direction of the unmanned vehicle 900.

Specifically, the tilting module 200 is slidably arranged on the load-bearing vehicle body 920 along the length direction of the unmanned vehicle 900, a third slide rail is disposed on the load-bearing vehicle body 920, and a fourth roller 220 is disposed on the bottom surface of the tilting module 200, and the fourth roller 220 can slidably engage with the third slide rail; the end of the load-bearing vehicle body 920 close to the tail of the vehicle is provided with a stop; when the tilting module 200 slides till the rotating part abuts against the stop, the tilting module 200 reaches a tiltable position

and can turn with respect to the load-bearing vehicle body 920. When the automatic canopy tilting mechanism is transited from the loading state to the unloading state, the tilting module 200 moves toward the tail of the vehicle by a certain distance first till the rotating part abuts against the stop, and then the tilting module 200 starts to turn and abuts against the canopy module 100; in the process of transition of the automatic canopy tilting mechanism from the unloading state to the loading state, after the tilting module 200 rotates back to a position where it is placed on the load-bearing vehicle body 920 in parallel, the tilting module 200 moves further toward the vehicle head 910, so that the rotating part moves out of the tiltable position and stops stably.

Furthermore, the collision prevention stop 210 can stop the sliding of the tilting module 200, and the tilting module 200 can slide till the collision prevention stop 210 abuts against the side of the vehicle head 910 close to the load-bearing vehicle body 920; now, the automatic canopy tilting mechanism is in a stable loading state.

In this embodiment, the bottom surface of the frame 110 is also provided with a shock absorbing pad 114, which is generally made of rubber and can reduce noise and impact when the canopy module 100 falls back and is closed, thus achieving a cushioning effect to further increase the service life of the automatic canopy tilting mechanism.

Optionally, the frame 110 is further provided with a locking member. When the canopy module 100 covers the transport box cage on the unmanned vehicle 900 in parallel, the locking member can lock a relative position between the frame 110 and the tilting module 200 to prevent the frame 110 from rotating, so as to prevent the canopy module 100 on the unmanned vehicle 900 from tilting and overturning and affecting the covering effect during transportation under a bumpy road condition.

Apparently, the above-mentioned embodiments of the present utility model are only examples for clearly explaining the present utility model, and are not intended to limit the embodiments of the present utility model in any way. Various obvious modifications, readjustments and substitutions may be made by those having ordinary skills in the art without departing from the protection scope of the present utility model. It is unnecessary and impossible to enumerate all possible embodiments exhaustively herein. Any modification, equivalent substitution or improvement made to the embodiments without departing from the spirit and the principle of the present utility model shall be deemed as falling in the protection scope of the present utility model as defined by the claims.

Claims

1. An automatic canopy tilting mechanism, comprising:
 - a canopy module (100) comprising a frame (110) and a canopy cloth (120) covering the frame (110), wherein the canopy cloth (120) is configured to cover a transport box cage on an unmanned vehicle, one end of the frame (110) close to the head of the unmanned vehicle is configured to be rotatably connected with the unmanned vehicle, another end of the frame (110) close to the tail of the unmanned vehicle is provided with a first roller (112), and a bottom surface of the frame (110) is provided with a first slide rail (113) that extends along a length direction of the unmanned vehicle; and
 - a tilting module (200) configured to fix the transport box cage on the unmanned vehicle, wherein a second slide rail (201) is disposed on a side surface of the tilting module (200), a second roller (202) is disposed at the top of the side surface of the tilting module (200), the second roller (202) is configured to abut against the frame (110) and slide on the first slide rail (113), and the first roller (112) is configured to slidably engage with the second slide rail (201) when the second roller (202) slides out of the first slide rail (113) toward a direction close to the tail of the unmanned vehicle.
2. The automatic canopy tilting mechanism according to claim 1, wherein a collision prevention stop (210) is provided at the bottom of the side surface of tilting module (200), and
 - a third roller (211) is provided on the collision prevention stop (210), wherein the third roller (211) is configured to slidably engage with the first slide rail (113) when the first roller (112) slides toward a direction close to the third roller

(211) till the third roller (211) abuts against the frame (110) .

3. The automatic canopy tilting mechanism according to claim 1, wherein the bottom surface of the frame (110) is further provided with a shock absorbing pad (114).
4. The automatic canopy tilting mechanism according to claim 1, wherein the frame (110) is further provided with a locking member, which is configured to lock a relative position between the frame (110) and the tilting module (200) to prevent the frame (110) from rotating when the canopy module (100) covers the transport box cage on the unmanned vehicle in parallel.
5. An unmanned vehicle, comprising a vehicle head (910) and a load-bearing vehicle body (920), wherein the vehicle head (910) is connected with the load-bearing vehicle body (920), and one end of the load-bearing vehicle body (920) away from the vehicle head (910) is a tail, characterized in that the unmanned vehicle further comprises the automatic canopy tilting mechanism according to any one of claims 1 to 4, wherein the frame (110) is rotatably connected with the top of one side of the vehicle head (910) close to the load-bearing vehicle body (920), and a rotational axis of the frame (110) is parallel to a body width direction of the unmanned vehicle, and the tilting module (200) is movably arranged on the load-bearing vehicle body (920).
6. The unmanned vehicle according to claim 5, wherein the frame (110) is connected with the vehicle head (910) via a hinge (111).
7. The unmanned vehicle according to claim 5, wherein the bottom surface of the tilting module (200) is provided with a rotating part, the tilting module (200) is

configured to be selectively and rotatably connected with the end of the load-bearing vehicle body (920) close to the tail of the vehicle via the rotating part, and the rotational axis of the tilting module (200) is parallel to the body width direction of the unmanned vehicle.

8. The unmanned vehicle according to claim 7, wherein the tilting module (200) is slidably arranged on the load-bearing vehicle body (920) in the length direction of the unmanned vehicle, and the end of the load-bearing vehicle body (920) close to the tail of the vehicle is provided with a stop; and the tilting module (200) is configured to turn relative to the load-bearing vehicle body (920) when the tilting module (200) slides till the rotating part abuts against the stop .
9. The unmanned vehicle according to claim 8, wherein the load-bearing vehicle body (920) is provided with a third slide rail, and the bottom surface of the tilting module (200) is provided with a fourth roller (220), and the fourth roller (220) is configured to slidably engage with the third slide rail.
10. The unmanned vehicle according to claim 8, wherein a collision prevention stop (210) is provided at the bottom of the side surface of the tilting module (200), and the tilting module (200) can slide till the collision prevention stop (210) abuts against a side of the vehicle head (910) close to the load-bearing vehicle body (920).