[0004]

Furthermore, in some thin sewer pipelines, a direct visual check by an inspector and traveling of a mobile vehicle are difficult. Thus, in order to inspect such pipelines, unmanned machines suitably designed for miniaturization are needed.

Citation List

Patent Literature

[0005]

Patent Literature 1: Japanese Patent Laid-Open No. 2017-087917 (Japan)
Patent Literature 2: Japanese Patent Laid-Open No. 2017-226259 (Japan)
Patent Literature 3: Japanese Patent Laid-Open No. 2018-001967 (Japan)

Summary

[0006]

The disclosure provides a moving object suitably configured for miniaturization when viewed in at least one direction, and a method for using the same.

[0007]

In an aspect, the disclosure provides a moving object including at least two rotors arranged back and forth in a traveling direction, and a drive device for driving the at least two rotors and rotating at least two of the at least two rotors in different directions, wherein the moving object further comprises a cover member at least partially covering the at least two rotors with a side surface, with respect to the traveling direction, of the cover member, wherein the cover member has a hollow structure elongated along the traveling direction, the cover member is opened at the forward end and at the back end with respect to the traveling direction, and the cover member is provided with exhaust holes arranged along the traveling direction in the side surface at a lower side of the cover member, each of the exhaust holes diagonally extending through a side wall of the cover member from the inside to the outside of the cover member and diagonally backwardly with respect to the traveling direction.

[0008]

The drive device may include at least two motors for providing the respective rotors with powers, and at least two of the at least two motors may be configured to rotate the rotors powered by them in different

directions.

[0009]

In another aspect, the disclosure provides a moving object comprising at least two rotors arranged back and forth in a traveling direction; a drive device for driving the at least two rotors and rotating at least two of the at least two rotors in different directions; an attitude information sensor for measuring attitude information on the attitude of the moving object; and an attitude control unit for controlling the drive device such that the attitude of the moving object is controlled by controlling the rotation speed of at least one of the at least two rotors according to the attitude information measured by the attitude information sensor.

[0010]

The moving object may further include a traveling-direction shooting camera and a traveling-direction captured-image data transmitter. The moving object may be configured to capture an image in the traveling direction by means of the traveling-direction shooting camera and move while transmitting obtained traveling-direction captured-image data from the traveling-direction captured-image data transmitter to the outside.

[0011]

The moving object may further include a rear-direction shooting camera.

[0012]

The moving object may be configured such that the rear-direction shooting camera is positioned on the rear side of the at least two rotors in the traveling direction and at least a part of the rotors is not interrupted by the rear-direction shooting camera when viewed from the rear side.

[0012A] In another aspect, the disclosure provides a method comprising the steps of moving a moving object in a traveling direction in a closed-type space, the moving object including: at least two rotors arranged back and forth in the traveling direction;
a drive device for driving the at least two rotors and rotating at least two of the at least two rotors in different directions; and a rear-direction shooting camera, wherein the moving object is connected to a linear member; and capturing images inside the closed-type space by means of the rear-direction shooting camera while moving the moving object in a direction opposite to the traveling direction by using the linear member, wherein the moving object further comprises a cover member at least partially covering the at least two rotors with a side surface, with respect to the traveling direction, of the cover member, wherein the cover member has a hollow structure elongated along the traveling direction, the cover member is opened at the forward end and at the back end with respect to the traveling direction, and the cover member is provided with exhaust holes arranged along the traveling direction in the side surface at a lower side of the cover member, each of the exhaust holes diagonally extending through a side wall of the cover member from the inside to the outside of the cover member and diagonally backwardly with respect to the traveling direction.

[0013]

The moving object may be connected to a linear member.

[0014]

The linear member may include a power supply line, and the moving object may be configured to move while receiving power supply from an external power supply through the power supply line.

[0015]

Claims

[Claim 1]

A moving object comprising:

at least two rotors arranged back and forth in a traveling direction; and

a drive device for driving the at least two rotors and rotating at least two of the at least two rotors in different directions,

wherein the moving object further comprises a cover member at least partially covering the at least two rotors with a side surface, with respect to the traveling direction, of the cover member, wherein the cover member has a hollow structure elongated along the traveling direction, the cover member is opened at the forward end and at the back end with respect to the traveling direction, and the cover member is provided with exhaust holes arranged along the traveling direction in the side surface at a lower side of the cover member, each of the exhaust holes diagonally extending through a side wall of the cover member from the inside to the outside of the cover member and diagonally backwardly with respect to the traveling direction.

[Claim 2]

The moving object according to claim 1, wherein the drive device includes at least two motors for providing the respective rotors with powers, and

at least two of the at least two motors are configured to rotate the rotors powered by them in different directions.

[Claim 3]

A moving object comprising:

at least two rotors arranged back and forth in a traveling direction;

a drive device for driving the at least two rotors and rotating at least

two of the at least two rotors in different directions;

an attitude information sensor for measuring attitude information on an attitude of the moving object; and

an attitude control unit for controlling the drive device such that the attitude of the moving object is controlled by controlling a rotation speed of at least one of the at least two rotors according to the attitude information measured by the attitude information sensor.

[Claim 4]

The moving object according to any one of claims 1 to 3, further comprising a traveling-direction shooting camera and a traveling-direction captured-image data transmitter,

wherein the moving object is configured to capture an image in the traveling direction by means of the traveling-direction shooting camera and move while transmitting obtained traveling-direction captured-image data from the traveling-direction captured-image data transmitter to outside.

[Claim 5]

The moving object according to any one of claims 1 to 4, further comprising a rear-direction shooting camera.

[Claim 6]

The moving object according to claim 5, wherein the rear-direction shooting camera is positioned on a rear side of the at least two rotors in the traveling direction and at least a part of the rotors is not interrupted by the rear-direction shooting camera when viewed from the rear side.

[Claim 7]

The moving object according to any one of claims 1 to 6, wherein the moving object is connected to a linear member.

[Claim 8]

The moving object according to claim 7, wherein the linear member includes a power supply line, and

the moving object is configured to move while receiving power supply from an external power supply through the power supply line.

[Claim 9]

A method comprising the steps of:

moving a moving object in a traveling direction in a closed-type space, the moving object including:

at least two rotors arranged back and forth in the traveling direction;

a drive device for driving the at least two rotors and rotating at least two of the at least two rotors in different directions; and

a rear-direction shooting camera, wherein the moving object is connected to a linear member; and

capturing images inside the closed-type space by means of the rear-direction shooting camera while moving the moving object in a direction opposite to the traveling direction by using the linear member,

wherein the moving object further comprises a cover member at least partially covering the at least two rotors with a side surface, with respect to the traveling direction, of the cover member, wherein the cover member has a hollow structure elongated along the traveling direction, the cover member is opened at the forward end and at the back end with respect to the traveling direction, and the cover member is provided with exhaust holes arranged along the traveling direction in the side surface at a lower side of the cover member, each of the exhaust holes diagonally extending through a side wall of the cover member from the inside to the outside of the cover

member and diagonally backwardly with respect to the traveling direction.